Science and Technology Committee
Sports and exercise science and medicine: building on the Olympic legacy to improve the nation’s health
Oral and written evidence

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Arthritis Research UK welcomes the opportunity to respond to The House of Lords Science and Technology Committee inquiry: ‘Sports and exercise science and medicine: building on the Olympic legacy to improve the nation’s health’. Through the examples in this submission we provide a brief overview of our charity’s involvement in this area. We would be pleased to expand on the points below, and to provide further information to the Committee as oral evidence.

Arthritis Research UK is the UK’s fourth largest medical research charity. Our vision is ‘a future free from arthritis’. Our remit includes arthritis and musculoskeletal conditions, which are disorders of the joints, bones and muscles – including back pain – along with rarer systemic autoimmune diseases such as lupus. Together, these conditions affect around ten million people across the UK and account for the fourth largest NHS programme budget spend of £5 billion in England. Arthritis is the biggest cause of pain and disability in the UK and with other musculoskeletal conditions accounts for one in five General Practice consultations. As a charity we fund research, provide information to patients and educational resources for healthcare professionals.

Whilst acknowledging the health and well-being benefits of exercise, we are concerned that questions about the long term effects of sport and exercise on musculoskeletal health should be addressed. There is a need for consideration of areas including:

- The effect of individual episodes of injury as well as the cumulative effect of sports activity on the body;
- Impact on elite as well as casual participants;
- Particular concerns about the long term consequences of injuries in children, and the need to ensure these are considered in relation to training regimes.

How is sports and exercise science research co-ordinated? Who sets the research agenda?

In July 2011, Arthritis Research UK launched ‘The Arthritis Research UK Centre for Sport and Exercise’. This pioneering national research centre will lead in investigating how to prevent the development of arthritis from sports and exercise injuries. It will be the first major research initiative dedicated to understanding, and reducing the risk of, long term injury and damage (especially osteoarthritis) from sport. It will also consider injury management, and review recovery techniques, surgical and pharmacological interventions. In establishing the centre, which has the support of the International Olympic Committee (IOC) and the London 2012 Olympic Organising Committee (LOCOG), Arthritis Research UK is providing the leadership and coordination needed to bring together researchers across a range of disciplines (including expertise in sports medicine, rehabilitation, osteoarthritis, basic science and biomedical imaging). The

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1 Sports and exercise science and medicine: building on the Olympic legacy to improve the nation’s health, House of Lords Science and Technology Committee, May 2012.
3 The NHS Atlas of Variation in Healthcare, Right Care, November 2011.
4 NHS programme budget spend for 2010/11.
5 Musculoskeletal Matters, Arthritis Research UK National Primary Care Centre, Keele University, October 2009.
charity aims to make £3 million available to support research work through the centre over a 5 year period.

5. Arthritis Research UK hosted an international conference ‘Tackling osteoarthritis in sport’ in association with The Institute of Sports and Exercise Medicine in October 2010. The conference highlighted the lack of research into the prevention and management of osteoarthritis as a result of a sports injury, and called for research to increase our understanding about the long-term risks of such injuries. The conference report indicated gaps in the knowledge base, and illustrated a range of questions which need to be addressed within both scientific and clinical settings.

How are advances in basic understanding of physiology, biomechanics, genetics, nutrition and other disciplines applied to improving the performance of athletes (both elite and non-elite)? How robust is the application of science in this area? For example, is it possible to conduct research within a training environment?

6. There are gaps in the current evidence base which should be addressed. A multidisciplinary approach will be important for research in relation to the long term effects of sports and exercise injury, to consider questions such as:
   - Are there specific personal (constitutional) factors including genetic background and the shape of the skeleton that predispose some individuals to risk?
   - Are there early measurable indicators (blood tests, imaging) of the potential for long term damage of exercise?
   - When is it safe to return to sport following injury?
   - What may be inferred from one sport to another?
   - What are the consequences of chronic use of pharmacological interventions (steroids/pain killers)?
   - What are the long term implications of surgical procedures designed to provide immediate recovery?

7. Arthritis Research UK funds work from investigational research to clinical studies to increase understanding of arthritis and sports injury. Our portfolio includes research involving athletes in training settings. For example, we recently supported a longitudinal study to investigate the epidemiology of injury amongst elite soccer players.

8. We emphasise the important contribution made by allied health professionals in delivering musculoskeletal health services. Consideration should be given to the need to further develop the evidence base in this area. For example, we are currently supporting a clinical study to address the advice provided by physiotherapists on arm pain.

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6 Information on the Institute of Sports and Exercise Medicine is available at [http://www.fssem.co.uk/site/2409/default.aspx](http://www.fssem.co.uk/site/2409/default.aspx). The Institute became the Research Arm of the Faculty of Sport and Exercise Medicine (UK) in July 2007.


8 Information on Arthritis Research UK’s current research portfolio, and the grants we fund is available at [http://www.arthritisresearchuk.org/research/what-we-are-funding.aspx](http://www.arthritisresearchuk.org/research/what-we-are-funding.aspx)

9 Epidemiology of Sporting Injuries among elite soccer players; a longitudinal study, Cooper P et al., ABSR and BHPR Plenary Abstracts, PAI iii25, Rheumatology Volume 51 Supplement 3, May 2012.

9. Further consideration should be given to developing UK expertise in sports and exercise science and medicine. There is a need for centres, adequate training, and the establishment of research positions to grow national capacity in the field.

Public engagement

10. Active engagement with the public is essential to effective communication about both the benefits of sport and exercise participation, and risks of sports injury. Arthritis Research UK’s ‘Taking the pain out of sport’ website was established in October 2010 and had received over 3,000 visits by July 2011. An ongoing short survey on the website enables public feedback to be used to help inform the charity’s considerations around future research needs for the management of sports-related osteoarthritis in the UK.\(^{11}\)

6 June 2012

\(^{11}\) Arthritis Research UK’s ‘Taking the pain out of sport’ website is available at www.painoutofsport.org
Evidence is submitted for the following question in the “Sports and exercise science research” topic:
“How are advances in basic understanding of physiology, biomechanics, genetics, nutrition and other disciplines applied to improving the performance of athletes (both elite and non-elite)? How robust is the application of science in this area? For example, is it possible to conduct research within a training environment? Crossover between sports performance and health-related research”

Evidence Statement

1. In keeping with the multi-disciplinary nature of the sport and exercise sciences, there is a broad range of strategies and designs in performance enhancement research for athletes. There are published guidelines for sports performance researchers in terms of appropriate research methods and statistical approaches (Atkinson and Nevill, 1996; Atkinson and Nevill, 2001; Hopkins et al., 2009), which have been elaborated upon in later published editorials (Atkinson, 2002; 2003).

2. In the review by Atkinson and Nevill (2001), there was a section entitled “Can we experiment on athletes in real competition?”, in which the value of quasi-experimental designs was emphasised for gaining knowledge about performance enhancement in sport. Associated issues such as the decision of the minimal worthwhile effect size for sports performance, and how a sports performance researcher can optimise components of statistical power within a training environment were also covered. The minimal worthwhile effect size is relatively straightforward to quantify in individual athlete timed sports but is more difficult to identify when the sports performance outcome is essentially a construct of individual performance components, as is the case in sports like football and rugby (Atkinson, 2002).

3. While sample size is generally low in sports performance research, there is a trade-off in terms of the generally low test-retest variability (or ‘noise’) associated with sports-specific performance outcomes such as time trials. These types of tests tend to have coefficients of variation (CV) less than 2%. Therefore, it is possible to detect practically worthwhile changes in these types of tests with a relatively small sample size of athletes. A different picture is emerging for field-invasive team sports such as football in which the CV for match-to-match variability in performance outcomes (e.g. amount of high intensity running) can be above 80% (Gregson et al., 2010). Again, there might be a trade-off in light of the fact that match analysis systems such as Prozone can collect huge amounts of data on all players on the pitch so that sample size will be increased using these types of data collection tools. Nevertheless, it is perceived that the impact of performance-enhancement interventions in these types of team sports is difficult to quantify, and that many repeated match-related observations would be needed to quantify any intervention effects with adequate precision.

4. Atkinson et al. (2008) proposed a framework for sports performance research which was adapted from the phased clinical trials framework familiar to medical researchers. ‘Field-based’ studies of efficacy of a performance-enhancement
intervention (either on individual or samples of athletes) in the training and competition environment were perceived to be of great value in this framework. Randomised controlled trials are obviously difficult to undertake in an applied sports performance setting. There are issues of lack of blinding, contamination between intervention and control groups, small sample sizes and the ethical problem of withholding a possibly effective intervention from some of the athletes (Harriss and Atkinson, 2009). Therefore, single-sample pre/post designs may well be the most feasible design in sports performance research. These can provide valuable information as long as possible biases such as regression-to-the-mean are accounted for (Atkinson and Taylor, 2011).

5. One important topic when conducting research within a training environment is how to arrive at decisions regarding performance enhancement on individual elite athletes. Atkinson and Nevill (2001) maintained that single-case designs and analyses could be useful to researchers offering sport science support to athletes. Some sports performance researchers have followed single-case methodology derived from an education context (Aeschleman, 1991; Barlow and Hersen, 1984). There are also dedicated statistical guidelines for arriving at probabilistic decisions regarding the value of interventions on individual athletes (Atkinson and Nevill, 1996; Hopkins, 2000).

6. Complicated statistical modelling approaches are starting to be applied to longitudinal data collected during training and competition. Cycling is a good example in terms of how power output data during elite competitions can be obtained (via strain gauges in the bicycle cranks) and analysed (Jobson et al., 2009). There are now companies who purport to be able to apply statistical approaches like neural network analysis to data collected (using match analysis systems like Prozone and/or GPS technology) on football and rugby players (Gabbett, 2010) during training and competition in order to arrive at decisions regarding player recruitment and selection. However, these approaches have not been validated properly to date.

31 May 2012

References


Q1 The Chairman: I would like to welcome our first witness panel this morning in the opening session of this short inquiry we are holding into sport and exercise science and medicine in relation to the legacy from the Olympic Games. This is the first oral evidence session and therefore I would request that Members of the Select Committee declare any relevant interest before they speak today. Those interests have to be declared only once during the inquiry. I should also mention that the proceedings are being webcast—you can see the sign saying “broadcasting”—so sotto voce comments and asides will be picked up
Professor Sir Steve Bloom, Imperial College London, Professor Tim Cable, Liverpool John Moores University, Colonel John Etherington, Faculty of Sport and Exercise Medicine and Professor Hugh Montgomery, University College London – Oral evidence (QQ 1-25) and broadcast to the nation in all their glory. That machine is also not necessarily switched off the moment the session ends, so be on your guard for a few minutes after the session.

I am going to invite you to briefly introduce yourselves, starting with Sir Steve Bloom. If you wish to make any opening statement, please feel free to do so, but I would urge you to keep any comments brief as we only have about an hour in this session and we have quite a bit of work to get through. Steve, would you like to kick off?

Professor Bloom: I work at Imperial College London, and I am an obesity researcher who is also a clinical endocrinologist.

Professor Cable: I am Professor Tim Cable and I am Director of the School of Sport and Exercise Sciences at Liverpool John Moores University. I manage the educational unit. It is a strong research unit. My own personal research area is vascular physiology.

Colonel Etherington: I am John Etherington. I am a consultant physician in rheumatology and rehabilitation medicine. I am the Director of Defence Rehabilitation based at Headley Court, although I am speaking here today representing the Faculty of Sport and Exercise Medicine and the Royal College of Physicians of London.

Professor Montgomery: I am Hugh Montgomery. I am a Professor of Intensive Care Medicine but for half of my paid work I direct the Institute for Human Health and Performance at UCL and I research the translation of exercise science. I do not think it is a relevant interest, but I should declare that I have a consultancy with a company that spun out some of the intellectual property related to exercise and the genetic finding we made.

Q2 The Chairman: Thank you very much. One of the foci of our inquiry is to try to get an understanding of how strong the scientific evidence is that underpins the methods to improve the performance of elite and near-elite athletes. We are keen to hear from you what your assessment is of the strength of the science that underpins the improvement in athletic performance through training and other forms of advice, including, for example, nutrition. We are also particularly interested in whether you are able to give us examples of how recent developments in cognate disciplines like physiology, human nutrition, biomechanics, genetics and so on are being brought into play in this branch of the application of knowledge about the human body in relation to improving the performance of elite athletes. Perhaps Professor Bloom would like to start off with a few comments.

Professor Bloom: Thank you. The evidence that exercise prolongs life and improves functioning in older age is very strong indeed: it is epidemiological and widely accepted. It has an independent effect from that of obesity; if you are both thin and take a lot of exercise, this is definitely going to prolong your life by a decade or more.

The type of exercise that is involved, however, is not competitive. It is important that it be easy to take, and most of the population does not have access to any methods of easy exercise. This undoubtedly is bad for the health of the nation. The publicity surrounding the Games does encourage people to take exercise, but it is a psychological effect and does not have very much practical impact. In fact the only practical impact is that they remain sitting in front of a flat screen for many weeks, which probably shortens the nation’s life by a measure of minutes or seconds. The connection between the two is very difficult to establish in my opinion.
Professor Sir Steve Bloom, Imperial College London, Professor Tim Cable, Liverpool John Moores University, Colonel John Etherington, Faculty of Sport and Exercise Medicine and Professor Hugh Montgomery, University College London – Oral evidence (QQ 1-25)

Q3 The Chairman: Could I just press you a little bit further? You talked about the fact that exercise is beneficial for health. I wanted to focus on the question of when trainers and those involved in improving the performance of elite athletes are applying scientific advice, whether it is how to improve your speed of running, if you are a runner, or whether you should adopt a particular pattern of nutrition to be an elite sportsman. How strong is the science that leads to that advice? Is there really robust scientific evidence?

Professor Bloom: It is not my area of expertise. I think there is reasonable science behind it but not very strong, and I do not think it applies directly to the sort of exercise that we in this room ought to be taking to improve our health. I think they are different things.

Q4 The Chairman: Could I move along to Professor Cable?

Professor Cable: Sport and exercise science is a very young discipline, but it is based upon observations of the elite athlete over many centuries. Some of the information in the past has been anecdotal but the evidence base now, for the physiological adaptations that can be provoked by certain training regimens, the brain behaviour adaptations that can be seen in learning skills and the biomechanical adaptations that can accrue, are all based on sound scientific evidence.

The principles of exercise prescription for athletic training are very specific and very focused. It is a science rather than an art in provoking adaptations to enhance human performance. It is all based upon sound laboratory investigation. For example, you can now train an athlete in what we would call a macrocycle, and that macrocycle might be three years long and would be precisely engineered to provoke peak performance at a given date. That can be engineered scientifically and can produce physiological adaptation and, if we bring the correct nutritional strategies into play, we can enhance athletic performance.

Q5 The Chairman: One comment made to us is that, because you are dealing with small sample sizes of elite athletes and there are limits to the degree to which you can set up proper controls, the science is not actually that strong. That is because you would not want to take an elite athlete and put them in a non-effective training programme as opposed to someone else in an effective training programme. Would you refute that?

Professor Cable: I would refute that, because the adaptations that you see in different physiological systems, for example, have been widely investigated with good power in the scientific literature. Then you can apply those to the individual athlete and monitor that individual athlete over time. For example, in the scientific literature you can find precise data on Paula Radcliffe that explains why she broke the marathon record in London when she did, by virtue of the training process that she has been through. That training process is underpinned by the empirical science that is based upon a large N.

Q6 Lord Winston: Given that adaptation, and in view of Professor Steve Bloom’s comments, is there any evidence that athletes live longer than the rest of the population?

Professor Cable: There is evidence in the literature that athletes live longer than the general population, particularly those athletes that have been engaged in endurance aerobic type sports, relative to strength and conditioning type sports. By and large you will find in the literature that athletes, particularly Olympic athletes, will live two years longer than the average age of the population.

Q7 The Chairman: Can I ask the same question of Colonel Etherington?
Professor Sir Steve Bloom, Imperial College London, Professor Tim Cable, Liverpool John Moores University, Colonel John Etherington, Faculty of Sport and Exercise Medicine and Professor Hugh Montgomery, University College London – Oral evidence (QQ 1-25)

**Colonel Etherington:** I would agree with Professor Cable’s assertion. The model of the science is very good. There is always a difficulty in applying knowledge from an elite training programme to the general population. However, the principles of exercise to produce a physiological adaptation are very applicable to the general population. In my daily work we use it every day, in terms of strength, conditioning and improving aerobic fitness, with a view to enhancing physical performance to alleviate pain and suffering. So, whereas the minutiae of the physiological enhancement to get that last 2% to win a gold medal may not be so relevant to the elderly patient with osteoarthritis of the knee, the principles of strength training and general conditioning are. You can clearly demonstrate that strengthening the quadriceps improves knee pain and general function. So the fine detail may not be taken away, but there are definitely lessons to learn for both the prevention of illness and my particular interest, which is the treatment of illness by exercise.

**Q8 The Chairman:** One thing you say in your written submission is that the quality of research in sport and exercise medicine is less strong; there is a tendency to focus on more esoteric areas and the methodology is weaker. That seems slightly at odds with what you have just told us.

**Colonel Etherington:** I think there is a difference between sport and exercise science, as practised by Professor Cable, and some of the clinical approaches in sport and exercise medicine, which is an even newer specialty than sport and exercise science. I might be considered to be talking out of turn, but I do not think that there is that same rigour in approach to clinical trials in sport and exercise medicine.

**Q9 The Chairman:** So your focus, where you think there is a weakness, is in the clinical trials rather than the basic science?

**Colonel Etherington:** Yes, I think with sport and exercise medicine there is a focus on sport medicine. My interest is particularly in exercise medicine. With sports medicine there is a problem where you have small numbers and the imperative is to get someone back on the pitch—which sometimes will mean a loss of quality in research—rather than general improvement in function.

**Q10 The Chairman:** I asked for specific examples; you have given the concrete example of there being strong evidence that improving muscle strength helps to alleviate osteoarthritic pains. Would you take that as a very good example of the evidence base?

**Colonel Etherington:** Yes, it is fair to say that is a very simple but very directly applicable example: if you give people a programme of exercises to strengthen the muscles around the knee, not just function and strength improve but the pain improves.

**Q11 The Chairman:** I would ask Professor Montgomery to answer.

**Professor Montgomery:** I would echo much of what I have heard, and I think Tim Cable makes a good point, but, equally, the weaknesses have also been pointed out. I agree; there is some very strong science related to physiology that is being performed in large N numbers, working its way from cells and rodents through to human beings and then on to the elite. But it is also fair to say that it is difficult to do interventional physiological studies on the elite, for the reasons you pointed out earlier on. The numbers are small. There is an issue of competitive advantage in releasing information as national teams, international teams and elite clubs will not want people to know if they find something that they think works. Training is very highly individualised and that is what elite sport is about: tailoring
Professor Sir Steve Bloom, Imperial College London, Professor Tim Cable, Liverpool John Moores University, Colonel John Etherington, Faculty of Sport and Exercise Medicine and Professor Hugh Montgomery, University College London – Oral evidence (QQ 1-25) something very precisely for one person. That gives you an N of one as your experiment and it makes it very much observational in tailoring. There are also difficulties in interrupting training. If someone said, “We would really like to do this study between you two people and we are going to do, say, serial muscle biopsies or change things,” no elite athlete at a high level is really going to be interested in that, and I would not be. Those are the difficulties.

That has led to some evolutionary progression of the science in a way that Lord Winston would be less happy with and it is something that I am less used to. That is where people find something they think seems to work and then it is an intuitive process. The only area where I have some expertise in that field would be in hypoxic training—altitude-related training—where people seem to notice that those who are training higher seem to perform better. We are still in that iterative process now of trying to ask, “How high, and how high for how long?” Moving on from that we see that it is not just that the blood gets richer and delivers more oxygen but there seems to be some other metabolic component to that. It may be that you need a bit of time down to pick up again. This is an iterative process, so the science underpinning the fact it works is not there. We know that it does work, but the reasons why and how to manipulate it are not well understood.

Q12 The Chairman: Professor Cable, did you wish to come back in?

Professor Cable: I was just going to give you another example of the translation from exercise science at the elite end to the population end, which would again be around muscle strength, for example. Given that the demographic of our society is moving beyond 50 years of age, so 51% of us are older than 50 years of age, perhaps we can think of the older individual very much like the Olympic athlete because, in order to perform everyday tasks the older individual may be operating at 100% of their capacity, much like an Olympic athlete. So, if we can strength train that individual, there will be less of a cost of the daily activities as a percentage of that individual’s maximum. So we should be looking to encourage our older individuals to be physically active and muscually conditioned so that they can have a better quality of life. Those training methods can transfer from the evidence base that we have around the elite and be applied to the general population.

Q13 Earl of Selborne: It is evident from what you have told us that research on elite athletes has been of specific benefit to elite athletes themselves. You mentioned Paula Radcliffe, and Sir Steve said that some of the exercises might not be appropriate for people in this room. Could you tell us what the relevance of this research on elite athletes is to the general public?

Professor Cable: It is an understanding of the beneficial adaptations that occur from a physiological perspective. So what are the adaptations that occur in the cardiac tissue, and, importantly, in the muscle tissue? When people exercise they become far less insulin resistant. That means the chances of developing type 2 diabetes, which is becoming epidemic in our population, are dramatically reduced. So we now know that a single bout of exercise can enhance your ability to take up glucose into the tissue, and if that is done sequentially, that will put less stress on the pancreas and therefore decrease the risk of type 2 diabetes. That is just one example. We know how much exercise, from an aerobic or resistance training exercise perspective, is required for those adaptations to occur in humans.

Professor Bloom: In one study, every half hour extra per day of vigorous exercise increased life expectation by about two years, but there was a maximum and after that it started to go down again. Unfortunately most of our elite athletes are over the maximum and it is
Professor Sir Steve Bloom, Imperial College London, Professor Tim Cable, Liverpool John Moores University, Colonel John Etherington, Faculty of Sport and Exercise Medicine and Professor Hugh Montgomery, University College London – Oral evidence (QQ 1-25)

doubtful that, if, for example, you get a high haemoglobin, this is actually good for you. We know that when you treat with erythropoietin, it increases heart disease.

So it is not clear to me that the specialist training for elite athletes is actually health beneficial. It may be, and certainly the research that Professor Cable has mentioned is very important for the improvement of insulin sensitivity. The area where we are a little defective is involutional sarcopenia; in other words, why we get weaker when we get older. That is really important and we do not have much of a handle on it. It should be amenable to ordinary research. That would enable older people to take exercise more readily and that could make a big difference to our expectation of life and enjoyment of it.

Q14 Earl of Selborne: Could I just follow up and ask how you would set about that? Would you think elite athletes would have any role in that or would you take general members of the public?

Professor Bloom: I regret that I cannot see any area of research that has come out of competitive training that is actually helpful to the general population. This is a slightly off-centre view but it is one I hold.

Q15 The Chairman: I think Professor Montgomery and Colonel Etherington would like to come in on this.

Professor Montgomery: I share Professor Bloom’s view on some elements of this but not others. I think there are substantial advantages in studying elite athletes and there are things one can learn that are very directly applicable to the general public.

Firstly, I would extend the idea of elite athletes. We tend to think of Olympic gold medal winners, but there is value in looking at the top-end performers who are sub-elite, club athletes. We have done a lot of work with elite mountaineers and, indeed, the British military. Colonel Etherington and I have done some research over the years. Soldiers are, in many ways, elite athletes. They might be young, fit and generally men, but they train very vigorously and those that come out the other end of it are often very fit indeed. I would group those together as people worthy of study.

The areas in which one can make learnings are in the diseases that are common to both groups but are more common amongst the athletes. If we think about a recreational weekend football player, they are prone to cruciate ligament injuries, stress fractures and Achilles tendinopathy. The elite athletes are very much more prone to those. By doing genomic studies, as we are embarking on at the moment, in those high-risk groups with very clearly defined training and where the environmental signatures are quantified, we can be optimistic that we can identify mechanisms of disease that are directly translational to people undertaking more recreational sport.

The second thing is that there are some common physiological mechanisms that are much more readily explored. Colonel Etherington, many years ago, was very helpful to us in performing some work in cardiac growth. Bigger hearts are generally rather bad news for pretty much every condition, whether it be tight valves that exit them, particular heart muscle disorders or heart muscle that grows thicker in response to high blood pressure. It is very hard to work out those mechanisms in humans because you cannot get at the tissue and so forth, whereas, if you look at heart growth in athletes, it is very easy to crack the genetic influences. We have been able to show those are directly applicable; the same mechanisms that cause the heart to grow in athletic performance cause the heart to grow in high blood pressure, for instance. The same would apply for bone remodelling.
Finally, there are some bits that are more directly translational from experience. Both Colonel Etherington and I were at a meeting at the Royal Society of Medicine recently where we listened to Steve Redgrave talking, with his physician, about the management of his diabetes and how they really had to start completely from scratch. No one had ever managed an elite athlete with type 1 diabetes before. What they have shown, as Steve pointed out, was that, as a diabetic, if you are exercising, you can have superb insulin control and eat jam doughnuts at eight in the morning. His physician was explaining that this was helping them understand how to manage diabetes better; but also how to translate that to populational health. Particularly as a young male, once you reach 17 and your life has been very restricted by diabetes, there is a common problem that young males tend to rebel against it and diabetic control becomes difficult. Actually, if you can offer them a way through that, with sport, they feel that they can get better clinical care.

So in all those three areas there are elements of study of elite athletes that are very directly applicable.

**Colonel Etherington**: The benefits of exercise are not just about extending the length of your life; it is about quality of life as well. We know that the fitter you are the more functional you are generally. I was involved in some work at St Thomas’s a few years ago, looking at ex-elite athletes and comparing them with the sedentary population. They did better for bone health but, interestingly, they had slightly higher rates of osteoarthritis of the knee radiographically, but lower rates of symptoms. So although they had X-ray changes of osteoarthritis, they had fewer symptoms than the people that were sedentary. That is an example of how the quality of life may improve as a result of exercise.

In terms of the issues of basic sarcopenia, we know that if you exercise people in their 90s you can at least partially reverse that sarcopenia, although obviously not completely. I do not think we exploit specialist training techniques enough, which we could take from the elite environment and apply to the elderly. As Professor Cable says, the elderly are working at a higher proportion of their maximum capacity, and perhaps they will not sustain the 150 minutes of exercise that we are advocating. Perhaps they could sustain 20 minutes but in a more specified and intense way, which could have the same effect. We do not know, but there are lessons that can be learnt from the elite side.

**Professor Bloom**: It is a question of what we mean by elite. I fully agree with Professor Montgomery and Colonel Etherington that plenty of exercise is good for you. Playing football or joining the Army and becoming very fit is excellent; there is no problem with that. It is the Olympic gold medal type person, who sacrifices everything in life to win, who is not necessarily good. In the more frequent but easier-to-study heavily exercising local footballer, you can certainly get very interesting data, and that is extremely good. That is the athlete as an experimental model, and it does tell us things we could not otherwise find out—for example, why the heart gets thick, which is definitely likely to be a bad thing for people. Hypertrophy of the heart can be studied in an extreme situation, and that is certainly useful, but it does not extend to those competing in the Olympics.

**Q16  Lord O'Neill of Clackmannan**: Could I ask a simple question? I can understand that Colonel Etherington’s numbers are, sadly, in part determined by conflict and the injuries that come out of that. How many elite athletes, who are the subject of your research, are we talking about? We have not had any information as to the scale of the research and how many people are actively being considered. Is it just potential Olympic gold, silver and bronze medallists, or are we talking about the 300 people in the Premier League, who have to be regarded—in some people’s eyes—as elite athletes? They have
Professor Sir Steve Bloom, Imperial College London, Professor Tim Cable, Liverpool John Moores University, Colonel John Etherington, Faculty of Sport and Exercise Medicine and Professor Hugh Montgomery, University College London – Oral evidence (QQ 1-25) many of the problems and have to do it every week, not just once every three or four years.

**Professor Cable**: There are many screening programmes that operate across elite sport. So in the Premier League football that you refer to, the elite athletes and all the age group athletes that represent the teams in the academies are screened, for example, for cardiac defects. That is one example. In the UK the English Institute of Sport and the Scottish Institute of Sport work routinely with elite athletes in different subgroups of the sports to collect data. That data may be qualitative in nature, in the sense that they are following the progression of individual athletes, but taken collectively in their sport a lot of that information can end up in the scientific literature. So if you look at the birth, for example, of the Australian Institute of Sport, back in the early 1980s, there is much detail in the scientific literature that has come out of data collection on those populations, and that is the same for the American institutes as well. So there is a wealth of data in the scientific literature on the elite and the elite are monitored sequentially in this country.

**Q17 Lord Wade of Chorlton**: An elite athlete, above all, has the mental attitude that means he will put all the effort into concentrating; he wants to win. Now, that does not apply to the vast majority of the population, not when it comes to athletics. I am very unhappy about this concept that we can use athletes as an example of how we can get everybody else to operate. What I would like to see come out of our report is how we can persuade the vast majority of people who are not athletes to actually do the correct amount of exercise that is going to improve their health. Certainly I think the most important message that we have come across is the role they can play for older people. I am in that category. I am also diabetic and, in fact, listening to you guys I am surprised I am going at all, but I am.

The other point I would like to make is that Professor Cable said there is a two years’ improvement in the longevity of athletes compared with those of the general population, but in the general population there are a lot of others that live a long time as well. For example, what are the genetic benefits? Most of my life I have been in the animal business. With families of animals, some live a lot longer and have much less disease than others, but they all live exactly the same lives. So there are other issues here that we have not touched on.

**The Chairman**: Are there any brief comments on that?

**Professor Bloom**: I would just say that it is awfully difficult to know who you compare with. Going back to Lord Winston’s question, if you compare elite athletes with ordinary members of the population who take a reasonable amount of exercise—who go jogging several times a week—then probably the ordinary members of society who do that would live longer.

**Professor Cable**: Lord Wade, I think you make an excellent point. The epidemiological data that Professor Bloom referred to earlier suggests that the population benefit accrues at lower exercise intensities than those required by elite athletes. So it is very important to get those individuals with low levels of fitness doing something. When you do that, the evidence would suggest you reduce their risk of all-cause mortality by about a half. So if you move someone from a poor level of fitness to even a below average level of fitness, you will reduce their risk of dying from anything by a half.
Professor Sir Steve Bloom, Imperial College London, Professor Tim Cable, Liverpool John Moores University, Colonel John Etherington, Faculty of Sport and Exercise Medicine and Professor Hugh Montgomery, University College London – Oral evidence (QQ 1-25)

Professor Montgomery: I would just like briefly to pick up on Lord O’Neill’s and Lord Wade’s points. On the numbers game, we have already touched on the fact that the numbers can be quite restricted. Increasingly, groups are working together internationally to amplify those numbers. So, specifically, the work we do is genetic. The point you make is very well made. We are all the product of our genes and our environment. The two are important and dissecting the two tells you a great deal. I suppose if one was looking at studies we have done with the British Olympic Medical Institute and others to elite, gold passport level—Olympic standard runners—that studies have been between 100 and 150 genetically. That sounds like a small number, but if one is asking the right question in the right way it can be adequate. Working with other groups you can amplify those up; for instance, with UK swimmers plus those of the Commonwealth and then the USA, you can get up to 700 or 800. We will be getting a paper back shortly that will be somewhere between 500 and 1,000. If you then start working with ex-Soviet groups, the numbers can amplify. So collaboration in those studies will be the name of the game and will increase the numbers.

We will probably come back to the issue of how to persuade members of the general public to exercise. I touched on this briefly previously, and I have a strong view that it is an institutional issue of the way society is structured to allow people to exercise. Do we know how to encourage the general public to exercise? No we do not. The recent publicity surrounding the TREAD trial was not a trial, in my view, that demonstrated—

The Chairman: I should just interrupt because this is not the focus of our inquiry; we are not looking at behaviour change in this particular inquiry. I would like to turn now to Lord Patel.

Q18 Lord Patel: My question relates to translation of research findings into health improvement in individuals who might suffer from diseases, and Professor Cable earlier mentioned the example of type 2 diabetes. I would like to hear if there are any other examples. Also, how would you translate it more widely to public health issues, what are the barriers to translation, if there are any, and how would you address them?

Colonel Etherington: For my particular area of rehabilitation there is very good evidence of exercise benefiting cardiac rehabilitation, so people suffering myocardial infarcts or who have mild to moderate levels of heart failure will benefit from exercise. With respiratory rehabilitation, people with chronic obstructive pulmonary disease, there are improvements in quality of life, function and longevity. From a musculoskeletal perspective—back pain—providing it is provided at the right intensity and in the right multi-disciplinary way, again it is very effective and is more effective than most other treatments that are available.

My frustration is that I can provide that in my environment, in the military, but I cannot provide that in the National Health Service. We have considerable evidence of the benefits of exercise in a controlled and well-delivered manner, from an elite and sub-elite perspective, from training at all levels, from an epidemiological point of view and in specific cases of rehabilitation, but we do not apply those principles. This is drifting into the public health issue, but I think sometimes we just assume the public do not want to exercise and do not want to do anything, and that leads us down a bit of a blind alley with rehabilitation. We say that we can deliver high intensity, exercise-based rehabilitation to the military because they are compliant, will do what they are told and are enthusiastic, but we will not do that to civilian populations because they are not. I have not seen the evidence for that because we have never tried it. Most of the studies of exercise delivery, and exercise
reform schemes such as the TREAD study that was done recently, were looking at trying to encourage people to exercise. I am sorry but that does not work. Trying to encourage people to exercise is not a treatment. It is a bit like trying to encourage people to lower their blood pressure. We give them the tablets and we are very happy to do that, but we are not very happy to treat them with exercise.

Q19 The Chairman: Are there any other responses to Lord Patel’s question about the barriers to translation from research to treatment through the NHS?

Professor Cable: Some treatments are actually enhanced by performing exercise alongside them. Specific cancer therapies can improve recovery times if carried out during an exercise programme. One of the main barriers to the adoption of using rehab procedures in the NHS is perhaps the lack of a career routeway for exercise physiology. If there were a prescribed career routeway through the NHS for clinical exercise physiologists—because as I said earlier, exercise prescription is a science that is evidence based—that would help the adoption of exercise in the treatment of disease. We also should not forget that we should be using exercise for prehab. So we should be exercising people before surgical procedures to improve the outcomes after surgical procedures, specifically around some of the orthopaedic operations.

Q20 Lord Patel: If we believe the science is now strong enough to demonstrate that it is beneficial for people with certain conditions to do regular exercises and, as a preventative measure, it is better for people to exercise—you are all four clinicians and there are two around the table here—why is this not prescribed more widely, whatever the barriers to implementing it and training?

Professor Bloom: It is prescribed. “Eat less food and take more exercise” is what one says when the patient comes into the consulting room, and they do do it for a few weeks and then they forget. To go back to an earlier question about the concrete advantages that can be demonstrated: there is also the advantage on blood pressure, which is lower when you exercise. Quality of life is the most important factor. In Finland, when they had a major epidemic of ischaemic heart disease in Karelia, they did actually roll out a population-wide enhanced exercise programme, along with dietary advice. It did produce a considerable reduction in mortality and, one understands, the quality of life improved. That was an experiment but it was motivated by fear of early death because the Finns did have a very high rate of ischaemic heart disease, which has since fallen. How one does this in practice goes back to a behavioural thing; should there be tax relief for everyone that jogs for more than an hour a week?

The Chairman: Would anybody else like to respond to Lord Patel’s question?

Colonel Etherington: The only thing I would slightly disagree with, Professor, is that we do not prescribe it. We do not prescribe it in the way we prescribe an ACE inhibitor, where we have a regulated system, we know the dose, we apply the dose and we hope the patient takes the tablet. We say, “Stop smoking and take more exercise.” I know that does not work. We do not deliver the treatment, we do not supervise the exercise programme, we do not tell them how to train and we do not measure their outcomes. We could do, because I do on a daily basis; for my military patients, I do that all the time. But we do not have that framework. One of the barriers is the lack of translatable sport and exercise science expertise into the NHS. Also, one of the barriers is that we have created this specialty of sport and exercise medicine and we are training a number of specialists in that
Professor Sir Steve Bloom, Imperial College London, Professor Tim Cable, Liverpool John Moores University, Colonel John Etherington, Faculty of Sport and Exercise Medicine and Professor Hugh Montgomery, University College London – Oral evidence (QQ 1-25)

area, but we have very few NHS jobs for them. So they are being trained by the NHS and a large proportion of them are going into professional sport or private sector activity and not the National Health Service, where they could be supporting not just sport medicine but exercise medicine services.

Professor Montgomery: I concur with everything that has just been said. The first issue is that this is not taught at medical school; it still is not. So the benefits of exercise, let alone how one would prescribe it, are not taught. When people come through foundation training it is not taught there either. In fact, it is not embedded in any of the other specialties at all. Secondly, until only a couple of years ago, one could not even train in sport and exercise medicine. It still has to be done, essentially, as a parallel track. So someone can be training in something else and can add on sport and exercise medicine; many are doing that. Their career path is difficult, as John said. People are doubtful there will be a job to go to, certainly a job that would involve prescribing exercise to the general population. Those posts are very rare; in fact, I am not sure I even know of any. John may know of some but they are very few indeed.

To do an academic route in that, to be a clinical academic, at the moment I think would be virtually impossible. Those people who do dual accreditation in two subjects and try to add academia to that are told they are not allowed to do that; essentially, there are barriers to doing it. Finally, it is very hard to get the money. It has not been very clear where to go to. There is a British Heart Foundation and a British Lung Foundation, there are cancer charities and there are arthritis charities, but the place that one would go to for money related to sport and exercise research is not there. As a net result of all that, the general medical profession do not know how to prescribe the exercise and there is not the money in the system to do it. There are people who know how to do it, but those are the barriers, as I see it, to getting it embedded.

Q21 Lord Rees of Ludlow: I just wanted some information about the nature of the health benefits of exercise. Some are obvious but I wanted to ask about any effect on the immune system and vulnerability to diseases. I ask this because I read somewhere that for the extreme elite athletes there was an adverse effect.

Professor Bloom: That is correct. I do not know that there is any evidence for moderate exercise improving the immune system.

Professor Cable: There is with moderate exercise. There is an inverted U relationship between exercise intensity and susceptibility to infection. So up to moderate intensities you tend to see an improvement in immune function and then it goes over the top.

Lord Rees of Ludlow: We did learn a bit about this at the seminar.

Q22 Lord O'Neill of Clackmannan: Professor Montgomery and Colonel Etherington were talking about the lack of status for sport and exercise medicine, the confusion over funding and the difficulty of getting people into employment. It begs the question: why do we have a National Centre for Sport and Exercise Medicine? Is this not the kind of thing it should be doing: promoting it, co-ordinating it and providing the focus? What is wrong with it? My understanding is that something in the order of £30 million has been spent in establishing this, or is in the process of being spent, yet, from what you are saying, despite all your efforts nothing much is really coming out of it.

Professor Montgomery: I would like to pick up on that briefly, given that we are part of it. UCLH has £10 million of that £30 million. Firstly, the centre does not exist yet; the money
Professor Sir Steve Bloom, Imperial College London, Professor Tim Cable, Liverpool John Moores University, Colonel John Etherington, Faculty of Sport and Exercise Medicine and Professor Hugh Montgomery, University College London – Oral evidence (QQ 1-25)

was only awarded, as it were, months ago. The building work for us is still going on, so we do not even have an office let alone a centre yet, but there will be one. You are absolutely right; there is not yet a strategy that I am aware of to link the three centres to do that. I know Sheffield had a very clear focus on engaging people in exercise and how they deliver exercise prescription. It is fair to say that there is really genuine ambition among all the partners in this to work together. This should not be a parochial, elitist, single-centre-based group of three people just focusing back on what they have always done before. There is a genuine ambition, I feel, to work together to try to address exactly these sorts of issues. You are absolutely right that the challenge will be the same barriers we have had before: where is the money to run it? The money has been put in for infrastructure, but that is not posts or research grants; it is floor space. So we will have a place in which we can aggregate people, but the challenge will be the same one we have faced before: raising the money to allow us to work together to do it. There absolutely is the ambition.

Professor Bloom: It is worth comparing and contrasting our advice on diet. Every hospital has a dietetics department but people do not follow the advice on diet any more than they do on exercise. That is also fairly vague, but at least we have pictures showing people what to eat. I agree; I think if we were more prescriptive about the way exercise should be undertaken, people would be more likely to follow the advice. That is a concrete piece of advice this Committee might give.

Q23 Lord O'Neill of Clackmannan: Can I just get it clear: we are in the process of constructing buildings but we do not have any funding for running costs? You have capital but nothing else.

Professor Montgomery: As I understand it, yes. Our model to try to make it sustainable is to build in some functions to provide revenue streams. So we are running an education programme, an MSc programme, which will bring monies in. That is partly because what we should be doing anyway is educating people, so we are fulfilling one of those goals. That will help provide revenue to keep that supported. The rest of it will, I am sure, come down to the same process as before of bidding for grants and so forth. One might hope that we would be a bit more successful, given that broad infrastructure now exists; at least we will now have the facility.

Q24 Lord O'Neill of Clackmannan: A number of Government sponsored or encouraged projects would perhaps get initial funding for three years and, in that period, you have to prove your worth and get your money. What you are saying is that you are not even getting that.

Professor Montgomery: Oddly enough, I wrote down exactly that. One of the questions we have been asked to address is how long we have done it. That is exactly the way I see those things working. If one puts trust in the right institutions and individuals, I do not think that should be a limitless piece of rope; it should be a short section to say, “Here is the money, make good with it and go from there. If you do not make good of it, the money stops.” But to start from ground zero recompeting for part of it is very difficult.

Q25 The Chairman: Professor Cable and Colonel Etherington, could you come in with some final comments? I will be drawing the session to a close after that.

Professor Cable: From an education perspective we produce around 10,000 sport and exercise science graduates a year. They are coming out highly trained, with lots of information on the health benefits of exercise. We should be able to tailor specific career
Professor Sir Steve Bloom, Imperial College London, Professor Tim Cable, Liverpool John Moores University, Colonel John Etherington, Faculty of Sport and Exercise Medicine and Professor Hugh Montgomery, University College London – Oral evidence (QQ 1-25) paths for those individuals around clinical exercise physiology within the NHS, within the old PCTs and whatever is going to replace those, to really allow us to permeate society with education for the population about how to exercise: what to do, how much, what type and what benefit it might have. In my mind, that is the career pathway we need to create. In terms of the National Centre for Sport and Exercise Medicine, whilst I welcome that initiative, it is perhaps worth pointing out that it was not a competitive bidding process for those centres. Perhaps if there were more competitive bidding for those centres of excellence, it would truly be a more national organisation.

Colonel Etherington: Again, I welcome these centres but this is a National Health Service issue. They may well be driving education and academic research developments, but this is a health issue and the NHS does not address this, to my mind, as effectively and efficiently as possible. If 80% of the population are seeing their GP each year, that seems to be an excellent way of marketing this particular approach. GPs need to have the information, the information technology tools available to them, and they need to have a referral pathway that they can be confident in. I would propose that involves sport and exercise medicine consultants and sport and exercise scientists but also exercise deliverers who are properly registered and have a properly standardised level of training.

The Chairman: Thank you very much. I am afraid I will have to draw this evidence session to a close as we have run out of time. I would like to thank our witness panel very much indeed. If there are any points that you wish you had a chance to make and you did not have an opportunity to because of the time constraint, please do write in to the Clerk, Chris Atkinson, with any other further comments you would like to make. That will become part of the record of the inquiry. You will shortly receive a transcript of this session, for you to make any editorial corrections, and in due course you will see the publication of our report. Thank you for your contribution to it.
1. The British Association for Applied Nutrition and Nutritional Therapy (BANT) is the professional association for nutritional therapy (NT) practitioners. NT comprises individualised dietary, nutraceutical and lifestyle advice to promote optimal physical and mental well-being. NT practice stands apart from current NHS dietetic and public health nutrition practice in that it recognises variation in metabolic function deriving from genetic, epigenetic and environmental differences among individuals. National Occupational Standards for nutritional therapy have been set by Skills for Health and the Complementary and Natural Healthcare Council holds the national register of practitioners.

Elite Performance

2. For athletes, diet and nutrition are critically important but nonetheless speed/power and endurance appear to be driven by genetic inheritance.\(^\text{12,13}\) It is in the military arena where elite performance and nutrition, including use of supplements, may confer new benefits and contribute to the Total Force Fitness paradigm.\(^\text{14}\) In 2008 the US Department of Defense hosted a workshop on ‘Warfighter Nutrition: Advanced Technologies and Opportunities’. Research with a military cohort offers controlled environment and mandatory enrolment/compliance. Points emerging from the conference include:

- Nutritional optimization represents an integral and proactive approach to prevent illness, injury, and performance degradation throughout all phases of military service.
- Best practice consistent with state-of-the-art nutritional science would require much greater access to highly trained dietitians whose numbers should be increased in each of the services and assigned outside of the hospital and treatment facilities.
- Research was needed on probiotics/prebiotics, bioactive food components, functional foods and nutrigenomics/nutrigenetics with applications to human performance enhancement: plant chemicals as free radical scavengers, gene switching mediators, anti-inflammatory agents, neuroprotectants and membrane stabilizers which may mediate metabolic processes. Bioactive food substances may counter the debilitating effects of heat illness, high-altitude mountain sickness, and other environmental threats.
- Advanced nutrition research needed to understand the application of metabolomics, nutrigenomics and nutrigenetics, and/or epinutrigenetics to human health and performance, ie nutritional modulation of phenotype characteristics of a warfighter.
- Exploiting nutrigenomics for ‘pre-emptive nutrition’ to optimise health through nutrient-gene interactions.
- Traumatic injury, brain or spinal, may be minimised by immediate administration of nutrients or bioactive compounds (omega-3 fatty acids, quercetin). Research

\(^\text{12}\) http://omim.org/entry/102574
\(^\text{13}\) http://omim.org/entry/106180?search=ACE&highlight=ace
needed for optimal nutritional strategies for advanced prosthesis rehabilitation and neuroregeneration.

- Nutrition should be considered a key component of any human weapon platform - the warfighter should be prepared and ready to meet any expected threat with easily transportable nutritional countermeasures beyond the baseline of good nutrition. Nutritional strategies may be critical for survival.

The conclusions of the workshop were that a robust nutritional program will (1) enhance the mental and physical performance of the warfighter, (2) result in few injuries and illnesses, (3) result in more rapid recoveries from injuries, and (4) provide start-of-the-art knowledge on nutrition to the warfighter.15


Exercise and health

3. Increasing the physical activity of a sedentary public leads to individual health benefits and overall care cost savings where it helps prevent weight gain and reduce the risk of low-grade inflammation associated with circulating adipokines. Aside from short-term recovery, including drinking water to reduce the risk of dehydration, general levels of exercise compensate for the increasingly sedentary work patterns of the last 50 years and recommendations for calorie requirements have assumed physical activity levels which would now include regular exercise.

4. The one-size-fits-all public health nutrition approach is at odds with the reality of post-genome nutrigenetic science which has been evident for a decade. It was at the 2004 Nutrition Society Summer Meeting that the stark admission was made that “...There is not even the information needed for setting dietary recommendations with confidence now at the group level.”16 It is therefore surprising that in 2009 the Department of Health should have awarded grants totalling £662,660 (£582,660 over 3 years, plus an additional ‘core grant’ of £80,000) to the Association for Nutrition so that it could develop a capacity framework to determine who is qualified and competent to promote the Eatwell Plate and 5-a-day, both of which are based on 20-year old science. The one-size-fits-all public health

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16 Arab L. Individualized nutritional recommendations: do we have the measurements needed to assess risk and make dietary recommendations? Proc Nutr Soc. 2004 Feb;63:167-72
nutrition agenda can no longer serve individual or population health but only try to underpin the developing pan-EU register of unqualified health claims.

6 June 2012
The statement is organised in response to the questions asked – shown in the boxes

- how advances in basic understanding about physiology, genetics, nutrition, etc are applied to enhance the performance of elite athletes; and how this research may be of relevance to the public’s health;
- how findings from research on physical performance are translated into treatments and preventative interventions to improve the nation’s health within the NHS and through public health interventions;
- exploration of the definition of sport and exercise science and medicine

Sport and exercise science is the study of human responses to physical movement. It formed in the early part of the 20th century as a specialist research interest in medical and biological faculties. By the 1970s, the evidence-base for the impact of optimal physical activity on health and elite sports performance gathered momentum. Specialist research journals (appendix A), professional bodies (appendix B) and university degrees steadily developed and the volume of academic work multiplied. External groups in politics, health, sports and business recognized the significance of the new knowledge generated and consequently sport and exercise science has become a driving force for change. In the U.K., sport and exercise scientists have informed government policies on exercise in the treatment and prevention of chronic disease, weight management and obesity; they have helped develop the national institutes of sports science (England, Northern Ireland, Scotland, Wales) to provide evidence-based support for national sports teams; they contribute to private business ventures which derive from original scientific knowledge (these include companies producing exercise equipment, sport drinks or personalized fitness regimes).

Public recognition of the value of sport and exercise science is extremely strong, as evidenced by the almost universal acceptance of exercise as a promoter of good health, and the value of science in supporting medal-winning sports. The future of sport science is one of continued growth and the acknowledgement of the discipline can be seen in the work sport and exercise scientists deliver in team preparations for high profile events such as the 2012 Olympic and Paralympic Games, 2014 Commonwealth Games and continuing initiatives to increase exercise participation and improve the health of the nation. There is a strong emphasis on the applied and inter-disciplinary contexts of both sport and exercise with new knowledge being readily translated into practice. A recent example is the universities UK report on how universities are supporting the 2012 Games http://blog.universitiesuk.ac.uk/2012/05/04/universitiesweek2012/

Sport and exercise science is now recognized as an academic as well as an applied discipline in its own right. It has intellectual coherence, a substantial and sophisticated knowledge set, standards of practice and ethics, professional bodies and recognition by others as demonstrated by, for example a discrete unit within the 2014 Research Excellence Framework (REF).
Sport and exercise science is differentiated from other sport-related subjects such as management, coaching and sports studies and is characterized by a significant proportion of laboratory and experimental work. It draws upon natural-scientific, quantitative and evidence-based approach to knowledge.

Sport and exercise science uses scientific methods including those of natural, social and inter-disciplinary science e.g. systematic reviews, randomized controlled trials, experimental investigations, pragmatic trials. These methods are used to understand research and enhance human physical performance in health and disease. There is a substantial laboratory component, utilizing physiological, biomechanical, biochemical, biomolecular and psychological techniques and specialist equipment to measure, analyse and evaluate. Research extends into local and national communities using both field and ethnographic methods of information collection. In many universities cross-department sharing of knowledge and specialist equipment has been particularly fruitful (e.g. Sports science with the Schools of Medicine, Pharmacy, Engineering or Psychology). Research has been funded by the NHS, the research councils, businesses and national initiatives such as the NPRI.

RAE and REF

RAE 2008 reports a continued growth in the volume of research activity with 39 submissions (18 in 1992) and 500 (137 in 1992) category A full-time staff. New departments, early-career researchers and PGR students all rose in number. Total research income was £31.2 million.

“...The top departments in the UK are judged as being amongst the best departments in the world.” RAE sports-related subject panel overview report.

REF (2014) includes a sports-specific unit of assessment (panel C26) Sport and Exercise Science, Leisure and Tourism.

Outputs and impact

72 sports-related journals are indexed by Thomson Reuters, reflecting the extent of worldwide activity. Appendix A lists the major journals and their impact factors. Exercise science research has been a major contributor to the universal acceptance that regular physical activity has numerous positive outcomes to health, particularly to cardiovascular, diabetes, weight management, depression and anxiety. Resulting UK government policies (e.g. At least five a week; Legacy action plan 2012 2 million target; Let’s get moving – physical activity care pathway. DoH, 2010) demonstrate the significance of this.

For sport, world-leading sports science research and support has played a critical part in the success of our sportsmen and women on the international stage. For example, the English Institute of Sport (EIS) has a network of 15 high performance centre’s with 250 sports
science and medicine staff delivering 4,000 hours of direct athlete support each week in the run-up to the 2012 Games.

- Career paths for sports and exercise scientists

From the first single honours undergraduate degree in the early 1980s, sport and exercise science has shown a sustained growth in popularity. Furthermore, around 60 universities offer taught masters and research degrees. Many universities offer aspects of sports science as part of combined honours degrees, or within associated science degrees such as Sports Product Design, Sport Engineering, and Equine Sports Science. An intercalated year for medical students is popular, as are individual sport and exercise science modules for students taking other degrees. In the Complete University Guide Sports Science Table there were 76 HEI listed with an average tariff of 278 points. The leading Universities typically require A-level entry grades of AAA or AAB.

HESA student numbers show a 37.2% increase from 2004/05 to 2009/10 with approximately 550 overseas students. Between 2002 and 2010 there was a 63% rise in the number of applicants for sport and exercise science. Sport Science is the tenth most popular course in the UK.

Table 2. HESA returns

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<th>Year</th>
<th>FT HE Study</th>
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<tr>
<td>2004/05</td>
<td>25,505</td>
<td>22,135</td>
<td>370</td>
</tr>
<tr>
<td>2005/06</td>
<td>29,050</td>
<td>25,175</td>
<td>485</td>
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<tr>
<td>2006/07</td>
<td>30,835</td>
<td>26,915</td>
<td>485</td>
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<tr>
<td>2007/08</td>
<td>32,870</td>
<td>29,365</td>
<td>490</td>
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<tr>
<td>2009/10</td>
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<td>33,665</td>
<td>NA</td>
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<tr>
<td>2010/11</td>
<td>37,315</td>
<td>35,775</td>
<td>585</td>
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Table 3 Subject popularity rankings for 2011

<table>
<thead>
<tr>
<th>Subject line (JACS2)</th>
<th>Acceptances</th>
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<tbody>
<tr>
<td>- Nursing (B7)</td>
<td>24,587</td>
</tr>
<tr>
<td>- Design studies (W2)</td>
<td>19,701</td>
</tr>
<tr>
<td>- Law by Area (M1)</td>
<td>17,953</td>
</tr>
<tr>
<td>- Psychology (C8)</td>
<td>16,709</td>
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<tr>
<td>- Computer Science (G4)</td>
<td>13,299</td>
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<tr>
<td>- Business studies (N1)</td>
<td>13,232</td>
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<tr>
<td>- Management studies (N2)</td>
<td>13,076</td>
</tr>
<tr>
<td>- Combinations within Business &amp; Admin Studies (NN)</td>
<td>11,377</td>
</tr>
<tr>
<td>- Social Work (L5)</td>
<td>11,334</td>
</tr>
<tr>
<td>- Sports Science (C6)</td>
<td>11,097</td>
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</tbody>
</table>
Employment

In the UK the sports sector is worth an estimated £16.7bn and employs 441,000 people, 76% in the commercial sector, 11% voluntary and 13% the public sector (Sport England 2010). No data are available to determine the proportion that is related to sport and exercise science. However several soft indicators suggest a positive outlook including the rate of graduate employment, job adverts requiring certain knowledge and skills for employment in businesses (e.g. Nuffield Health Clubs, Gatorade), public sector exercise and health initiatives and in support of elite sport (e.g. professional sports clubs with a backroom staff of physiologists, psychologists and performance analysts.

First destination statistics from universities commonly report around 35% of sport and exercise science graduates go straight into sport related employment, with the majority working in health and fitness, as sports coaches, or as sports scientists (the “new” and “niche” graduate occupations). Around 35% gain employment in general graduate occupations. Around 15% progress to further study typically a master’s degree, PhD or a PGCE and gain subsequent employment in physical education. Universities UK (2010) report the employability of sport and exercise science students as slightly better than that of students in other, traditional, biological science subjects.

Post graduate qualifications frameworks

There are around 200 MSc courses available in the UK and an estimated 500 students studying for a PhD.

There are three applied professional frameworks.

I. SkillsActive, the sector skills council provides national occupational standards for graduate sport and exercise science.

II. The Register of Exercise Professionals offers a registration scheme which is widely accepted by the fitness industry but is limited to sub-degree levels 3 and 4 and is more designed for non-graduate fitness instructors.

III. BASES offers a well-established (c15 years) accreditation scheme which requires an undergraduate degree, a postgraduate degree and practical experience to evidence competency. Around 700 individuals are accredited. In May 2012 BASES application was accepted by the Board of the Science Council for recognition of its members as Chartered Scientists.

There is no scheme which is recognised formally by the NHS or fits its employment structure. The BASES scheme fulfills all the requirements for Health Professions Council registration and the Association was in the final stages of submission when the new coalition government stopped any further professions joining the HPC in 2010.

It is the view of BASES that it is critical that formal recognition of sports and exercise science is developed for the NHS to ensure the provision of appropriately skilled, qualified and regulated staff to undertake work with patients and individuals referred by GPs.

- the barriers to translation of such applications within the NHS and through public health interventions;
- funding arrangements for sports and exercise science and medicine.
British Association of Sport and Exercise Science (BASES) – Written evidence

1) The qualifications framework referred to above
2) The limited research funding available to conduct sufficient full randomized controlled trials of exercise interventions
3) University degrees are categorized as band C by HEFCE (mixed laboratory and classroom) limited the opportunity of university departments to fund courses adequately

10 June 2012

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### Appendix A

**Major specialist peer-reviewed journals in the sport and exercise sciences.**

Impact factors are taken from the Thomson Reuters data reported by Professor Hopkins of sportssci.org (2010)

<table>
<thead>
<tr>
<th>Impact Factor</th>
<th>Journal Title</th>
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<tbody>
<tr>
<td>2.8</td>
<td>Acta Physiologica (Scandinavica)</td>
</tr>
<tr>
<td>0.9</td>
<td>Adapted Physical Activity Quarterly</td>
</tr>
<tr>
<td>1.6</td>
<td>American Journal of Physical Medicine &amp; Rehabilitation</td>
</tr>
<tr>
<td>4.4</td>
<td>American Journal of Physiology - Endo &amp; Metab</td>
</tr>
<tr>
<td>3.7</td>
<td>American Journal of Physiology - Heart &amp; Circ</td>
</tr>
<tr>
<td>3.6</td>
<td>American Journal of Sports Medicine</td>
</tr>
<tr>
<td>1.1</td>
<td>Applied Ergonomics</td>
</tr>
<tr>
<td>2.2</td>
<td>Archives of Physical Medicine and Rehabilitation</td>
</tr>
<tr>
<td>2.5</td>
<td>British Journal of Sports Medicine</td>
</tr>
<tr>
<td>1.8</td>
<td>Clinical Biomechanics</td>
</tr>
<tr>
<td>1.5</td>
<td>Clinical Journal of Sport Medicine</td>
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<tr>
<td>1.3</td>
<td>Clinics in Sports Medicine</td>
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<tr>
<td>1.4</td>
<td>Ergonomics</td>
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<tr>
<td>2.0</td>
<td>European Journal of Applied Physiology</td>
</tr>
<tr>
<td>0.7</td>
<td>European Journal of Sport Science</td>
</tr>
<tr>
<td>0.6</td>
<td>European Review of Aging and Physical Activity</td>
</tr>
<tr>
<td>2.4</td>
<td>Exercise Immunology Review</td>
</tr>
<tr>
<td>3.2</td>
<td>Exercise and Sport Sciences Reviews</td>
</tr>
<tr>
<td>2.6</td>
<td>Gait and Posture</td>
</tr>
<tr>
<td>1.6</td>
<td>High Altitude Medicine and Biology</td>
</tr>
<tr>
<td>2.1</td>
<td>Human Movement Science</td>
</tr>
<tr>
<td>1.2</td>
<td>International J of Sport Nutrition &amp; Exercise Metabolism</td>
</tr>
<tr>
<td>1.0</td>
<td>International Journal of Sport Psychology</td>
</tr>
<tr>
<td>1.6</td>
<td>International Journal of Sports Medicine</td>
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<tr>
<td>&lt;1.0</td>
<td>Isokinetics and Exercise Science</td>
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<tr>
<td>1.5</td>
<td>Journal of Aging and Physical Activity</td>
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<tr>
<td>3.7</td>
<td>Journal of Applied Physiology</td>
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<tr>
<td>3.8</td>
<td>Journal of Applied Psychology</td>
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<tr>
<td>1.3</td>
<td>Journal of Applied Sport Psychology</td>
</tr>
<tr>
<td>2.5</td>
<td>Journal of Athletic Training</td>
</tr>
<tr>
<td>2.7</td>
<td>Journal of Biomechanics</td>
</tr>
<tr>
<td>2.0</td>
<td>Journal of Electromyography and Kinesiology</td>
</tr>
<tr>
<td>3.0</td>
<td>Journal of Epidemiology and Community Health</td>
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<tr>
<td>1.6</td>
<td>Journal of Motor Behavior</td>
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<tr>
<td>1.9</td>
<td>Journal of Occupational &amp; Environmental Medicine</td>
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<tr>
<td>2.5</td>
<td>Journal of Orthopaedic &amp; Sports Physical Therapy</td>
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<tr>
<td>3.0</td>
<td>Journal of Sport and Exercise Psychology</td>
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<tr>
<td>1.6</td>
<td>Journal of Sports Sciences</td>
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<tr>
<td>1.5</td>
<td>Journal of Strength and Conditioning Research</td>
</tr>
<tr>
<td>3.7</td>
<td>Medicine and Science in Sports and Exercise</td>
</tr>
<tr>
<td>1.6</td>
<td>Pediatric Exercise Science</td>
</tr>
</tbody>
</table>
In an analysis of impact factors Tsigilis et al. (2010) report: “Scientific journals' impact factors classified under the “Sport Sciences” subject category of the Journal Citation Reports (JCR) database from 2000 to 2006 were included in the present study. Results showed that during that period of time, 78 journals appeared in the “Sport Sciences” subject category. The mean impact factor rose from 0.851 (median=0.747) in 2000 to 1.178 (median=1.155) in 2006, following a linear trend or even a quadratic trend. The overall mean impact factor of the “Sport Sciences” category was 0.954 (median=0.876). In relation to the other 172 subject categories of the Science Edition of the JCR, “Sport Sciences” was placed slightly below the middle for the year 2006. Finally, intra-class correlation coefficients (0.850) suggested that “Sport Sciences” journals' impact factors remained relatively stable during the seven years examined.”

Appendix B: Major UK, European and World-wide sport and exercise science professional associations:
(deliberately NOT included mainstream bodies like Phys Soc, BPS etc. since this list is about demonstrating the weight and international reach of sport and exercise science

United Kingdom
The British Association of Sport and Exercise Sciences (BASES)
http://www.bases.org.uk/Home

The British Association of Sport and Exercise medicine (BASEM)
http://www.basem.co.uk/

British Association of Cardiac Prevention and Rehabilitation

Europe
European College of Sports Science
http://www.ecss.mobi/

European Federation of Sport Psychology (FEPSAC)
http://www.fepsac.com/

European Network of Sports Science, education and employment (ENSSEE)
http://www.enssee.eu/ENSSEE/

World Wide
American College of Sports medicine (ACSM)
http://www.acsm.org/

Asian Council of Exercise and Sports Science
Appendix C

The nature of university sports degrees
(From QAA benchmark document: QAA, 2008)

1. “Sport” is defined by the Council of Europe to embrace all forms of physical activity which, through casual or organised participation, aim at expressing or improving physical fitness and mental well-being, forming social relationships, or obtaining results in competition at all levels. Since sport is such a wide church, a considerable variety of university degrees have evolved, ranging from science-based to management-based programmes.

2. Sport-related award titles:
   - Coaching studies; community sport; exercise physiology; exercise science; exercise studies; exercise therapy; fitness science; fitness studies; health and fitness management; movement science; movement studies; outdoor studies; physical education (non-qualified teacher status); recreation management; sport and exercise sciences; sport and the media; sport education; sports coaching; sports development; sports economics; sports injury/therapy; sports management; sports performance analysis; sports psychology; sports science, including the science of specific sports, for example, football science; sports studies; sports technology; and sports tourism management.

3. Award titles often contain the words management, studies or science. The QAA benchmark statements distinguish the characteristics of the outcomes of these three types of programmes.

4. Science-based programmes will embrace the following learning outcomes, with relevant subject related content:

   The study of human responses to sport and exercise, including:
   - making effective use of knowledge and understanding of the disciplines underpinning human structure and function
   - appraising and evaluating the effects of sport and exercise intervention on the participant
• showing evidence of the skills required to monitor and evaluate human responses to sport and/or exercise
• providing a critical appreciation of the relationship between sport and exercise activity and intervention in a variety of participant groups; this could include special populations such as senior citizens, disabled people and children.

The study of the performance of sport and its enhancement, monitoring and analysis, including:
• monitoring, analysing, diagnosing and prescribing action to enhance the learning and performance of the component elements of sport
• showing evidence of the skills required to monitor and evaluate sports performance in laboratories and/or field settings
• displaying a critical appreciation of the integration of the variables involved in the delivery (teaching, instructing and coaching) of enhanced sport performance.

The study of health-related and disease management aspects of exercise and physical activity, including:
• displaying an awareness of current government policy on disease prevention and the relevance of exercise
• showing evidence of an ability to monitor health through exercise and prescribe appropriate interventions
• displaying a broad range of skills, including awareness of health and safety, ethical considerations, exercise prescription, population differences and the role of education, health and sports bodies in improving the health of the nation.

Where a programme title contains the word 'science' then it should, among other things, enable students to:
• demonstrate an understanding of the philosophical basis of scientific paradigms
• demonstrate evidence of competence in the scientific methods of enquiry, interpretation and analysis of relevant data and appropriate technologies
Professor Tim Cable, Liverpool John Moores University, Colonel John Etherington, Faculty of Sport and Exercise Medicine, Professor Hugh Montgomery, University College London and Professor Sir Steve Bloom, Imperial College London – Oral evidence (QQ 1-25)

Transcript to be found under Professor Sir Steve Bloom
Department of Culture, Media and Sport (DCMS), NHS Confederation, National Institute for Health and Clinical Excellence (NICE) and Department of Health (DH) – Oral evidence (QQ 26-68)

Transcript to be found under Department of Health
1. **Department for Culture, Media and Sport (DCMS)**

1.1 The Department is responsible for Government policy on a number of areas, including sport and our strategic aims and objectives are delivered by working with 50 public bodies.

1.2 The delivery of the Government’s key sporting priorities is achieved in partnership with Sport England, UK Sport, UK Anti-Doping and the wider sporting sector. The current priorities are focused around creating a sporting legacy from the Olympic and Paralympic Games, including:

- encouraging competitive sport in schools through the School Games;
- delivering the mass participation Places, People Play strategy; and
- reforming arm’s length bodies in the sport sector and improving governance arrangements within sporting bodies.

1.3 Delivery of these priorities is primarily undertaken by two of our public bodies – UK Sport and Sport England.

2. **UK Sport**

2.1 UK Sport is the Department’s strategic lead body for performance sport in the UK. Its mission is to work in partnership to lead sport in the UK to world class success. It invests Exchequer and National Lottery funds in UK’s Olympic and Paralympic sports and athletes to maximise their chances of success on the world stage.

2.2 For the period 2009 - 13 over £300 million of public funds is being invested through UK Sport’s World Class Performance (WCPP) to support the UKs very best Olympic and Paralympic athletes to train and compete in London. The investment by UK Sport in specific Research & Innovation projects represents 2% of the total public investment in high performance sport.

2.3 UK Sport works with each sport to provide the best possible support for athletes, providing everything they need from world-class coaches to cutting edge research and innovation, talent identification and Performance Lifestyle support.

2.4 Research and Innovation is an important but small aspect of the WCPP. UK Sport are the facilitators between sport and experts; working in partnership with both to create a system that allows UK athletes to be the most prepared and best equipped of all on the world stage. The innovation delivered has been across a range of areas including training science, performance medicine, equipment and coaching technologies.

2.5 UK Sport’s success is measured primarily by the performance of sports and athletes at the Olympics and Paralympics and the investment for the London Games is being
Department for Culture, Media and Sport (DCMS) – Written evidence

provided to help deliver the Government’s ambitious medal table targets for the Games of Top 4 and 2nd in the Olympics and Paralympics medal table respectively.

3. **English Institute of Sport (EIS)**

3.1 The EIS is a wholly owned subsidiary of UK Sport and works in partnership with sports to improve performances through the delivery of high quality sport science and medical support to elite athletes, through its nationwide network of expertise and facilities. Their vision is to be the world’s leading provider of performance-impacting sport science and sport medicine in elite sport. The EIS, as provider of choice for sport science and medical services in England, works across Olympic and Paralympic summer and winter sports as well as English sports.

3.2 For the 4 year funding cycle 2009 – 13, UK Sport invested £39.8 million in the EIS. This funding enables the EIS practitioners to work daily with coaches and athletes as part of their elite performance programmes. They work in multi-disciplinary teams to provide a holistic service that supports coaches and Performance Directors in helping to improve and optimise the training, preparation and performance of their athletes. In addition, their service provision assists athletes to achieve peak performance at major tournaments, enables athletes and coaches to prevent, reduce and manage injuries; helps athletes and coaches to manage pressure and stress; and deploys performance enhancing technology, insight and analysis to enable athletes to develop strategies and tactics for competition.

3.3 The services provided by the EIS are guided by the technical programme needs of the sports’ Performance Directors, coaches and athletes. The mix of practitioners is based on delivering the precise blend of skills and expertise to meet these requirements and contribute to performance improvements.

4. **Sport England**

4.1 Sport England is focused on helping people and communities across the country create a sporting habit for life. They will invest over £1 billion of National Lottery and Exchequer funding between 2012 and 2017 in organisations and projects that will:

- Help more people have a sporting habit for life
- Create more opportunities for young people to play sport
- Nurture and develop talent
- Provide the right facilities in the right places
- Support local authorities and unlock local funding
- Ensure real opportunities for communities

4.2 The key sporting priorities for Sport England are therefore:

- through their new youth sport strategy and Whole Sport Plans (WSP) to hold bodies to account, based on the principle of payment-by-results, for the delivery
of agreed outcomes and so that we see consistent year on year increases in the proportion of adults, and in particular young people, regularly playing sport;

• where young people are the main participants, to work with NGBs to focus new WSP funding on activities that promote sport as a habit for life amongst young people so they continue their interest in sport into their adult life; and

• to work with DCMS to deliver the School Games and work to ensure there is appropriate structural provision within the system to deliver the School Games.

4.3 Measurement of the levels of participation is undertaken by the Active People survey. The Active People Survey is a sample-based survey conducted every 6 months. It is a telephone market research survey interviewing a random sample of the English adult population (16 plus). The survey provides by far the largest sample size ever established for a sport and recreation survey and allows levels of detailed analysis previously unavailable. It identifies how participation varies from place to place and between different groups in the population.

4.4 The survey also measures the proportion of the adult population that volunteer in sport on a weekly basis, club membership, involvement in organised sport/competition, receipt of tuition or coaching, and overall satisfaction with levels of sporting provision in the local community.

4.5 The survey is also used by the Department of Health to provide data on physical activity levels.

5. Performance Management of our Public Bodies

5.1 UK Sport, Sport England and the EIS all have independent Boards who are entrusted to oversee the organisation to ensure that it fulfils its aims and objectives. In addition, the Department has in place a Management Agreement with both UK Sport and Sport England which sets out the broad framework within which the public body will operate. The Agreements also include the key performance indicators against which the Department will monitor the performance of the public body. These performance indicators are limited in number and focus upon the key priorities of the organisation.

5.2 UK Sport and EIS have a Funding Agreement in place that sets out how it will deliver against its strategic objectives in exchange for grant funding and which also details the performance indicators for the period of the agreement.

6. Sport and Exercise Medicine (SEM) Specialty

6.1 DCMS supports the need for research in and practical application of sports science and sports medicine and was actively involved in the process of enabling SEM to be recognised as a discrete speciality.

6.2 This support goes as far back as 2003 when Rt Hon Richard Caborn MP, Minister for Sport, co-chaired a Sport and Exercise Medicine Forum to consider the post-graduate education required for Sport and Exercise Medicine in the UK. This was in response to the Commons Health Select Committee report in March 2001 that
concluded that the health benefits of sport were not being sufficiently promoted by the Government. In addition, it stated that the Department for Culture, Media and Sport (DCMS) should develop closer links with the Department of Health (DH).

6.3 The forum agreed that there were significant and measurable national benefits to be gained if Sport and Exercise Medicine could achieve full recognition as an independent medical discipline.

6.4 Following the forum, the Rt Hon Richard Caborn MP, Minister for Sport, asked DCMS officials in conjunction with UK Sport to establish a working group to develop a strategy based on the proposals developed. In June 2003 UK Sport, DCMS and DH set up a Sport and Exercise Medicine Workgroup. The terms of reference for the Sport and Exercise Medicine workgroup were as follows:

- To produce a proposal for presentation to the government for a formal training programme which would lead to the recognition of Sport and Exercise Medicine as a medical speciality.
- To work with a consultation group consisting of the Intercollegiate Academic Board of Sport and Exercise Medicine (IABSEM), Universities, Primary Care Trusts, DCMS and DH and all other relevant bodies as identified by the workgroup to build the case.
- To present a clear educational and training framework that all key stakeholders have formally committed to, including identification of centres that will be involved in the initial phase of the fellowship training programme.
- To present a strong financial case that takes into account all necessary parties and demonstrates their support in principle to the recognition of Sport and Exercise Medicine as a medical speciality.
- To obtain and present evidence demonstrating a service need and measurable benefit to sport, health, waiting lists and occupational health.
- To identify issues or constraining factors that could influence implementation e.g. professional indemnity insurance.
- To produce a formal report that incorporates all of the above.
- To present a case that will enable the Minister for Sport and the Secretary of State for Health to help drive this forward within Government.

6.5 The SEM workgroup proposed in January 2004 that Sport and Exercise Medicine be recognised as a new Certificate of Completion of Training. In August 2004, the Department of Heath consulted on this proposal and in February 2005 the Chief Medical Officer announced that SEM was accredited as a discrete specialty of medicine.

14 June 2012
Q129  The Chairman: Thank you very much, Minister, for making time in your busy diary in the run-up to the Olympics to come and give oral evidence to us. You will appreciate that we spoke to one of your officials in an earlier session, but there are some questions that we would very much like to put to you and we appreciate this opportunity to do so. Just so that everybody in the room is aware, the session is being webcast live, so sotto voce comments will be picked up by the microphones and broadcast to the world outside. To recap on the purpose of this inquiry for the Minister, it is looking both at the science underpinning the improvement in sporting performance—how scientific are the methods that are used by UK Sport and other bodies to improve athletic performance?—and at, importantly, how the knowledge gained in improving sporting performance of elite athletes can be cascaded down to create a healthier nation as part of the Olympic legacy, and what the link between the two is. Clearly a substantial part of this falls to your department, but also reads across to many other departments. I would like to invite you, if you wish to, to make any opening statement, but then I will move straight into the questions.

Hugh Robertson: No, use the time available for any questions you have.

Q130  The Chairman: Okay. Following on from that brief preamble that I gave, I wonder if you could give us some examples of the work that your department undertakes jointly with others to promote the sport and health agendas.
Hugh Robertson: Yes. The start point in all this should be that there was a fairly major change of policy undertaken by the last Government, when James Purnell was the Secretary of State, to move away from using Sport England—one of the four bodies that the sport side of my department funds—to promote health and exercise, and use it instead to drive up participation in sport. There was a clear policy shift from what quite a lot of sports rather contemptuously called “walking in the woods” to trying to get more young people in particular playing football, cricket, rugby, athletics and all the other things that are part of the sports mix. As a result of that, a new process was born called the whole sport plans, under which half of Sport England’s money goes to support governing bodies specifically to drive up participation in sports. Therefore, in a sense, the key policy objective is not to make the whole nation healthier but to get more people playing sport, which is a rather different thing.

That said, clearly the benefits of getting more people playing sport are pretty well established. I think most people now accept that people who play sport tend to stay fitter and healthier longer and they tend to be happier. There is some evidence that I have seen that they perform better at work or academically and that, through the release of endorphins or whatever, it contributes to a happier nation. If you want me to go beyond that and give you examples of where the department works with the Department of Health, I can of course do that, but it is important to understand that the baseline for all of this, under the whole sport plans, is driving up participation in sport; it is not a bigger drive on the nation’s health.

Q131 The Chairman: Thank you very much for that clarification. These may be early days, but I would like to ask whether you have outcome measures of whether participation rates are going up and what the scale of the increases are.

Hugh Robertson: Yes, there is a survey conducted on behalf of Government called Active People. The most recent results were released last week. If I give you the best outcome figures from this, they show that, since 2005-2006, there are an extra 1.3 million adults who are taking part in sport at least once a week. Therefore, since the bid was won, there has been a noticeable increase in sports participation.

I should put a heavy health warning on that: successive Governments have found this a particularly difficult nut to crack. A good start point was the introduction of lottery funding, which pretty much transformed this whole area. If you look at the period since the National Lottery funding appeared, for a long time the dial did not move at all. There were various approaches—“We’ll try to do the nation’s health and get them all walking, running and cycling”. There was initially an attempt to do it through local authorities by providing more sports facilities. That did not really shift the dial. Then we moved on to this greater health agenda to get people walking, swimming, cycling and running. That did not really shift the dial very much either. That was the point at which James Purnell switched to the new whole sport plan policy, a policy switch that, in opposition, we absolutely supported and have continued in government.

If I am honest, the first four-year cycle of that has demonstrated once again just how difficult this is to do. A lot of sports thought you could crack this by simply laying on extra coaching sessions. That has not proved the case. That very often drives revenue through the turnstiles. If you are Rugby League, for example, and you lay on a series of Rugby League taster sessions, that very often encourages more people to go and watch Rugby League; it does not necessarily encourage them to play it, Saturday in, Saturday out, at a club administered by the RFL. The Chief Executive of British Swimming, David Sparkes, said to
me that there is a whole consumer influencing piece here about how you get families or individuals to go into a swimming pool that is not simply about laying on a breaststroke-coaching session in the local pool. That is part of it.

We also set the bar too high initially by trying to measure this against three separate incidents of exercise a week. When I was playing hockey at any reasonable level in my 20s, we used to train on Tuesday night and play on a Saturday, so I would have failed that measure, even though I was playing in a top hockey league. Then we picked, straight after the Olympics was awarded, this rather arbitrary figure of 1 million, which was never scientifically based at all. Finally, we measured it solely through using fixed-line telephone surveys, in an era when hardly anybody under the age of 30 seems to have a fixed-line telephone any more. We have really made this very difficult for ourselves and, as a result, the figures have taken some time to shift.

Q132 The Chairman: Could I, before moving on to other items, just ask one follow-up question? You offered to give us some specific examples of working with other departments. I wondered, particularly in relation to children, about your work with the Department for Education, and how that is encouraging the uptake of sport in schools. I also wonder whether you have any links across to BIS and the research councils, or to the MoD—there are important issues about fitness in the armed services. Are those linkages at all relevant?

Hugh Robertson: The first thing I should probably say to you, Lord Chairman, is that—this is going to sound an awful thing to say and I am just turning over in my mind how to put it. Please understand that, for the last six months, almost every minute of every single day of every single week of every single month has been spent trying to organise the world’s biggest sporting event. We are involved in the biggest construction project anywhere in Europe, the largest logistical exercise a country undertakes outside a major world war. This is taking a huge amount of ministerial and departmental time, so we are in a slightly unusual period at the moment. You would understand why for this country it is incredibly important we get this right. To give you an example, we have had to cancel four meetings this morning to find time to do this and take civil servants off the organisation of the London Olympics to prepare for this Committee. I do not say that in any unpleasant or awkward way, but it is just that the department is entirely centred on delivering this massive national event, so many of these things are at the moment possibly not getting the attention they might get if normal traffic were there.

I will give you some examples of things that we do with other departments. The Department of Health is very closely involved with funding many of the school games coordinators at the moment. The new youth sport strategy, which will pick up the next round of the whole sport plans, was devised in very close consultation with the Department of Health. They fund the Change4Life clubs, which are specifically targeted at primary schools, where we feel at the moment that there is a particular need to take further action. The Department for Education has, for the very first time, made PE a compulsory curriculum subject, one of four in the curriculum review.

I spent 10 years of my working life in the Ministry of Defence and quite a lot of that, when we were not soldiering, playing sport. There is no particular tie-up between us and the military. From my own experience, the military keeps people fit quite efficiently on its own. In the regiment I was in, every single morning we used to start with some form of physical exercise for about an hour, so they are probably quite good at doing it without any intervention from us.
Q133  The Chairman: I wondered whether the flow might be the other way—whether there are lessons from the MoD.

Hugh Robertson: It would be lovely to get the entire population out for an hour’s physical education first thing in the morning. You can, in a sense, see some of the connections with the number of military training companies. You can now see people who have that sort of background operating in the parks and open spaces of London of a morning. Actually, there is quite a lot of interchange between the military and elite sport; many of the disciplines that you learn in military life are very easily transferable to elite sport. There are of course an increasing number of injured servicemen coming back from Afghanistan who are finding a way forward through Paralympic sport. Probably for the first time since we started the Paralympics in 1948, we will in 2012 see a significant number of injured servicemen taking part in the Paralympics. Those sorts of connections are there. However, do we formally meet once a quarter with our colleagues in the Ministry of Defence to discuss this? No, we do not.

Q134  Lord Cunningham of Felling: Minister, when James Purnell made this qualitative and quantitative policy shift, which you supported, did it affect the science budget of the department in any way adversely?

Hugh Robertson: Of course I was not in the department at the time, so I do not directly know the answer to that, but I would doubt it very much. As a Minister, I fund four bodies: UK Sport, which does the elite high-performance stuff; Sport England, which does the community stuff; and then a relatively small amount goes to UK Anti-Doping and to the Sports Grounds Safety Authority, but the majority of funding goes to UK Sport and Sport England. The majority of scientific research lies inside the UK Sport budget, where it is done not quite in a cloak-and-dagger way, but there are commercial linkages with Formula 1 teams and all the rest of it. We can look at the technology that is used in Formula 1 cars and use it for cycles and all the rest of it. We do not advertise it heavily, for obvious reasons, because this is a very competitive area and we would not want our international competitors to know exactly what we are doing.

Q135  Lord Cunningham of Felling: I understand that point, but how do you then ensure, in so far as it is possible to ensure, that the funding of the science commissioned results in the highest possible quality of research being done?

Hugh Robertson: That is really a question you would need to address to the Chief Executive of UK Sport over her particular science budget. It is a live debate at the moment about how we assess the contribution that UK Sport has made. They would argue pretty strongly that they have just about the toughest assessment of any department in government, because everybody looks at the medal table at the end of the Games and they are the agency that funds that. If we are up or down from 47, which was our total in Beijing, people will arrive at their conclusions accordingly. It is a very, very tough figure. The figure you need to remember to understand this is 0.87 of a second, which is the time difference that separated our last four gold medals from their silver counterparts in Beijing. I have not picked four; that was the last four. It is a game that comes down those fractions of a second. So, do we as a department formally assess the quality of the scientific research undertaken by Formula 1 companies that, for example, transfers to British Cycling? No, we do not; that is done by UK Sport and we do not personally assess that in the department.

Q136  Lord Cunningham of Felling: Are you content that UK Sport has the competence to be left with making that judgment?
Hugh Robertson: Yes, I am. Indeed, you might say the success of the British cycling team in recent years would give you enormous confidence that that is the case.

Q137 Lord Winston: You have made, as everybody does, the assertion that sport is good for health and that is where we start, of course, but we are quite interested in the metrics. We have to look fairly carefully at just how valuable it is. I wonder if you could help us; who advises you on the science?

Hugh Robertson: The metrics of the impact of exercise on public health are entirely the province of the Department of Health.

Q138 Lord Winston: Why have increasing participation in sport? How valuable is that if you do not know whether the metrics are working and it is not ongoing?

Hugh Robertson: Because we believe, as previous Governments have done, that to get more people playing sport is, in itself, a worthwhile objective. I think you are trying to tie me into an academic discussion. The question of whether keeping fitter longer will prolong somebody's life and mean that they are less of a drain on the National Health Service, which I think is where you are heading, is not an exercise that is undertaken by my department, but it is one that is undertaken by the Department of Health.

Lord Winston: I do not think fitness has anything to do with the health service actually. What the health service does is treat ill people, which is rather different.

Hugh Robertson: As I say, you are having this discussion with the wrong man, because I am not the Public Health Minister, but—this is not something that politicians ever like to get caught saying publicly—I have heard it said that people who are fit stay healthier longer and die quicker.

Q139 Lord Winston: If I may just ask one other question, you mentioned the 1.3 million now actively involved in sport. How do you define “sport” in that context?

Hugh Robertson: One 30-minute incident of sport a week.

Q140 Lord Winston: What would that include? Is chess a sport?

Hugh Robertson: No, chess would not be a sport, neither would walking. There are running, cycling and swimming. Indeed, one of the interesting things about the statistic is that there are an increasing number of people in particular undertaking four activities—running, swimming, cycling and small-sided football—and the participation figures for the big team sports have remained pretty fixed.

Q141 Lord Winston: If there were to be an assessment of primary school children, for example, who do you think should do that?

Hugh Robertson: The Department for Education. In my department, we have no remit whatsoever. We have crossed this with both the new youth sport strategy and indeed school games, where we have used our position leading on the Olympic legacy to decide that one of the key features of an Olympic legacy should be a—you cannot call it “Schools Olympics” because of the branding and IP rules—UK school games that gets as many children as possible in the school system involved in competitive sport. That is as much about driving a legacy from the Olympics as it is about the wider public health agenda. However, there is this assumption underneath it that, if you can get more people playing sport, that leads to a fitter, healthier and happier nation.
Q142 The Chairman: Earlier on you said “we believe” that is the case. I hope it is more the belief that there is some evidence that it is the case. I just wanted to go back to the question that Lord Cunningham asked about UK Sport. You said, as indeed the Chief Executive of UK Sport told us, that their focus is on the outcome of medals, but to me that slightly begs a question. If a scientific approach can help to increase the medal performance at the Olympics, surely science has an important role to play. I just slightly think that going to the medals as the outcome and saying science does not matter or we are not focused on the quality of the science misses a key link in the chain. One ought to ask the question: do the countries that do very well in the medals table have a better scientific basis for improving athletic performance? Is that not a concern to you, as the Minister for Sport, that there should be a sound evidence base to understand how UK Sport is going to achieve its objective?

Hugh Robertson: I think you may have extrapolated more from my answer than I intended. If I have misled you or given you the wrong impression, I apologise. There are a number of things in an elite athlete’s make-up that give him or her the very best chance of winning a gold medal. If you were to ask this question of Lord Coe, who has of course won two of them, he would say that there are four vital components: structure, money, coaching and mental toughness. The question of science is one of the factors that influences structure—the way that that science is used in the way that the sport is set up—and clearly has arguably a bigger impact on coaching, because a really good coach, among the range of things in his or her armoury, will want the greatest scientific expertise at his or her disposal. He will also want nutritional advice; the very best medical care; mental conditioning to get an athlete’s brain right; the right sorts of support mechanisms to look after that athlete’s family and those around him; the right conditions; the right post-athletic recovery; and so on and so forth. Science clearly impacts on all of those, and there is an extremely good body that does this for us, called the English Institute of Sport, which brings together the sport and exercise science disciplines.

However, out on the end—which I thought was the question I was asking—there is also this research arm that UK Sport has, which works with others in the commercial world to try to redesign and redefine some of the tools that our athletes use. There is work that is done with the rowing crews; there is work that is done with the cycling squads. When you are dealing with 0.87 seconds over four medals, if you can shave a minute bit off the weight of a cycle by using a less heavy paint, for example, that makes a difference. Without going into it in too much detail—I am not holding out on you, but the Australians would be very interested to have this information—there is a small box of tricks designed by one of the Formula 1 teams that you clip down the back of a saddle, which gives you information that previously could only be collected by two panniers’ worth of kit that used to sit over the back wheel. That allows you to measure very exactly the amount of power that a cyclist generates over the crucial first 10 or 15 yards of a race, which very often determines the end result of it. That sort of very detailed work is done by a lot of our firms. BAE Systems and the Formula 1 teams are very closely involved in this. However, I would be nervous about going into that in too much detail, for reasons I hope you would all understand.

Q143 Lord Wade of Chorlton: You have given a very detailed explanation of all the input that needs to go into producing an elite sportsman, so that somebody, as a result of all that attention, becomes a gold medallist, but how does that help the rest of us keep fit? It is not going to do that for me.
Hugh Robertson: It may not but, if I might be cheeky, if you were 15 it might. That is a cheeky answer and I apologise.

Q144 Lord Wade of Chorlton: Does it make a 15-year-old fit?

Hugh Robertson: Again, it is quite difficult to say that the appearance of X or Y athlete in X or Y school ensures that all those 15-year-olds then play baseball once a week. That is quite a big leap, but there is no doubt whatsoever that, if you want to publicise a sports participation scheme, by far the best way to do it is to get some young role model to whom children relate to do it. One of the interesting things is, actually, that that does not always have to be a sports star. Given the nature of society these days, if you get a children’s television presenter or a pop star, it can have a not dissimilar effect.

I will give you an example of where this has worked. The Hampshire Cricket Board, when I was in opposition—so this would be two or three years ago—told me they had really struggled to reach out to the ethnic populations in and around places like Portsmouth. They had tried every manner of outreach programme you could possibly devise. The moment they put Wasim Akram, the Pakistan test cricketer, in a park on a Saturday, the thing filled up. That is simply because young children relate to major sports stars.

Lord Wade of Chorlton: Great heroes that other people follow—that is what you believe.

Hugh Robertson: Correct, I absolutely do believe that. I have seen it time and time again. I took part in a coaching session undertaken by Frank Lampard on a housing estate. There were youth workers standing around saying, “We have never seen this level of interest,” because you get a hero, somebody to whom they relate, and they will turn out to see them. It is part of celebrity culture and all sorts of other complicated things like that, but it does work.

Q145 Baroness Sharp of Guildford: You have talked quite a lot about the impact of the Sport England strategy, but their youth and community strategy actually stretches through to 2017, with the aim that “sport becomes a habit for life for more people and a regular choice for the majority”. You have talked a little bit about that already. I wonder whether you could tell us what DCMS is thinking about in terms of taking this work forward. In particular, given that it does stretch through to 2017, how will you use the legacy of the Olympics to make sure that the strategy does not get lost?

Hugh Robertson: First of all, the strategy has not yet started. It is out for consultation at the moment. Indeed, the new measurement strategy of concentrating on one week is out for consultation at the moment. It stops in August. We are also under a series of contractual obligations with the sport governing body under the first round of whole sport plans, and that does not work its way out until the beginning of next year. This is a 2013-2017 strategy that we hope builds on the lessons we have learnt in this strategy. Crucially, it includes a much greater element of payment by results. We have started for the first time to take money away from sports that have underperformed, and indeed have done that. I have seen a series of chief executives whose sports have underperformed and then we have taken money off them and reset their targets as a result of that underperformance, so there will be a much greater element of that. There will be much greater attention on trying to get people out of school and into community sports.
Department for Culture, Media and Sport (DCMS), Hugh Robertson MP, Minister for Sport and the Olympics – Oral evidence (QQ 129-160)

Q146 Baroness Sharp of Guildford: So the targets here are set in terms of participation.

Hugh Robertson: They are indeed, yes. The targets will be set in terms of absolute numbers of people that those sports have to agree on. The process involves us going out to them and them coming back with what they can achieve. I do not know if you have picked up this debate about the 1 million target, but it is popularly held out there that the 1 million target has been abolished. Actually, that is not quite true. Instead of Government setting a target and then telling sport to meet it, we are trying this time to do it the other way round: to go out to sports and say, “Here is a pot of money. What can you achieve with this?” It may be that the aggregate total of that is somewhere near 1 million, but we will not know that until we have been through the process.

Q147 Baroness Sharp of Guildford: Are you working here with the Department of Health and DfE?

Hugh Robertson: Yes, we are. Clearly we are going to need a lot of buy-in from DfE to get people out of school. There are two great challenges that British sport has failed in the last 25 years: increasing participation steadily, year on year; and getting people out of school and into sport. People have been talking about the post-school drop-out for all the time I was shadowing this in opposition and all the time I have been a Minister, and it is particularly severe among women, if I am brutally honest. Tackling that is absolutely at the core of what we are trying to do here. People go through a series of cycles of sport in their life—they probably play a lot of it in their 20s, then they get married and have young children and it drops off a bit, then they pick it up when their children start playing sport and so on and so forth. All that happens, but the hope is that, if we can capture people a bit younger than we have tried in the past, that is going to help.

Q148 The Chairman: Can I just pick up on this? As you said earlier, the emphasis is on participation in sport, and sport does not, for example, include walking. If you are looking for health benefits to the nation and to individuals, then the crucial thing may be exercise, as opposed to sport. Walking could yield the benefits you referred to—happier, healthier, longer-living and more gracefully-dying individuals. It does not mean to say they have to play rugby or cricket; they might do it all by walking. Why this focus just on sport rather than on exercise?

Hugh Robertson: That would probably be a question you might need to address to James Purnell, but we supported it in opposition and I drove that process, because it did not seem as if this greater policy of trying to get everybody to do three half-hours of exercise a week was shifting the dial in any way whatsoever. The sports were saying to the then Government, in no uncertain terms, “We cannot get our hands on this money. We cannot run schemes that we think will increase participation in sport. This is all too vague and too waffly, and it is not getting us anywhere.” The Department for Culture, Media and Sport is a very small department in spending terms, up against the mighty Department of Health. We were actually spending a tiny sum of money, strewing it all around the place on these various increasing exercise schemes, and it was not really having any impact. To be fair, if you look back, if not at this Committee then at a number of other Committees such as the Public Accounts Committee, in the last Parliament the department was very heavily criticised for this rather untargeted and unfocused approach.

Q149 The Chairman: This is slightly odd to me, because we heard from Dame Sally Davies, the CMO, all about the Department of Health guidelines, which are to do 150
minutes of moderate exercise—not sport, but exercise, and that includes walking—or to do 75 minutes of more intense exercise, which might be running. It seems to me that the DH guidelines are not in line with the notion of wanting to make people do more sport; they are in line with wanting people to do more exercise. Does that not slightly jar with your policy objective?

**Hugh Robertson**: Without sitting on your Committee, Lord Chairman, may I ask whether you asked her what policy initiatives she had taken at that point to bring that about?

**The Chairman**: Well, she described a whole lot of things. Yes, she did.

**Hugh Robertson**: In as much as there is a departmental division, it is that I am responsible for getting more people playing sport and the Department of Health is responsible for getting more people active.

**The Chairman**: Okay, but it is about what the objective of that is in the longer run.

**Hugh Robertson**: This comes to the heart of Lord Winston’s question: I think they are slightly different things. As a department, we have this objective of getting more people playing sport, which we think is good for a whole number of reasons. There are others that we have not touched on today. The more people you put into the gene pool, the greater your chance of producing elite athletes later, and so on and so forth. That is a subtly—or not-very-subtly—different thing from keeping the nation active for public health reasons, which, up until now, has been the responsibility of the Department of Health.

**Q150 Lord Cunningham of Felling**: Do you have an assessment of the impact of this policy change on individual sports? Which have produced more participation, which have remained the same, and which have reduced?

**Hugh Robertson**: Good question. There are some sports that have done well and some surprising ones, actually. A team sport that has done unusually well is netball, funnily enough, because they have gone about what they are trying to do in a very different way. The four big winners have been swimming, cycling, running and small-sided football, and the interesting thing is increasingly people are undertaking those activities outside the formal governing body structure. There has not been a giant rise in membership of athletics clubs; it is that more people are taking part in fun runs and community activities of that sort. In my part of Kent, you can see the difference. If I go down to the next-door village to buy the Sunday paper, you get mown down by groups of middle-aged men and women in Lycra, piling around the Weald on their bicycles on a Sunday morning. I have no scientific measure; I have not stood outside the Sainsbury’s—

**Lord Cunningham of Felling**: You get mown down every day outside this Palace, Minister.

**Hugh Robertson**: British Cycling will tell you that there are an extra half a million people cycling since Beijing.

**Q151 Lord Cunningham of Felling**: Can I add a brief supplementary to that? Do you take a close interest in the competence of the governing bodies of sports?

**Hugh Robertson**: I say this gently to you of all people: I think I have probably taken a closer interest in that than any of my predecessors. Indeed, the way we have particularly knocked football around in order to get a better governance structure has achieved a level of results that had not been achieved until now. We are also making modern and transparent
governance structures a key trigger for funding for both the whole sport plans and the elite athlete funding for the next cycle. There is now a very clear set of guidelines to which sports will adhere. If they have not met those, we will take the funding away.

**Q152 Lord Cunningham of Felling:** What do you think of the governance of tennis?

**Hugh Robertson:** Wimbledon week, isn’t it? I was on record some while ago as describing football as “the worst governed sport in this country”. To be fair to them, they have taken very considerable steps to address that issue, and now have a much better focused board with more independence. It is the first time we have had a woman on the FA board and it is the first time we have had somebody from the black and minority ethnic community on the FA board. The FA board will be much the better for it. There is a much better balance between independence and what one could term “vested interests”. Tennis is a sport in transition in terms of that. They have two independents on the board; they are now looking for an independent chairman for the first time. I think the moves they have taken are much to be welcomed and the move they are making about the chairman is a good step forward. If I am honest, I think they also have some way to go.

**Q153 Lord Broers:** Could we change our attention to the Paralympics? What legacy will the Paralympic Games leave? For example, will advances in development of prostheses for Paralympic athletes help members of the public with a physical impairment? It occurs to me that the prime examples are those injured military personnel.

**Hugh Robertson:** In a sense, they are two slightly different questions, if I might be so bold. My sense of this is that there is a read-across between the types of limbs developed for elite athletes but, because of the level of performance that many of these remarkable men and women are trying to achieve, they tend to be extremely expensive to produce and quite specialised. I was involved some years ago in an effort to raise some money for WheelPower, which is the charity based at Stoke Mandeville that seeks to provide sport-specific wheelchairs for wheelchair basketball players, wheelchair rugby players and the like. It is very specialised, top-end equipment. There is a pretty clear read-across between the sorts of limbs devised for injured servicemen. It is not an area in which I am a great expert, but I can tell you that I went with Lord Coe down to Headley Court two summers ago and there followed a fascinating discussion with a young Gurkha, who had had both his legs blown off in an explosion in Afghanistan, about the shape of the shoe and the way the heel was put in. Seb knew quite a lot about it, having been involved in the design of running shoes. There is clearly a knowledge transfer there, but I am not sure I am the greatest ministerial expert on that.

**Q154 The Chairman:** Can I come back to some earlier comments you made in response to Lord Cunningham about the benefits of increasing participation? We drew a distinction between participation in sport, which is your objective, and exercise more generally, which is DH’s objective. You said one of the benefits of increasing participation was not just to get more people out there playing but also to provide, I think your phrase was, a bigger gene pool for the national competition, so we end up with more players getting beyond the first round at Wimbledon and more football teams getting beyond the penalty shoot-out in the quarter-finals. In pursuing that objective, do you learn lessons from countries that clearly seek to do this much better than we do, where they have high participation rates and better outcomes in terms of the top teams?

**Hugh Robertson:** The first point should be that there are a relatively small number of teams that perform better than us at Olympic level. We did come fourth in the medal table.
The Chairman: You have to normalise that by population size, don’t you?

Hugh Robertson: Yes, but if you look at the countries that do better than us, America and China have vastly bigger population bases. It will be quite a challenge to overtake either of those.

The Chairman: That is why I say you have to normalise it by population size, so you divide the number of medals by the number of people in the country.

Hugh Robertson: Yes, but there are plenty of countries that have not dissimilar population sizes to us and we perform rather better. Quite a lot of people, interestingly enough, are looking at us and how we run sport at the moment, and trying to learn lessons for their own countries. We clearly have things to learn and one of my challenges is to keep pushing sport forward. Actually, one of the things that worries me is that we might be getting a little bit complacent about how we do this, on the back of Beijing and other things. However, I do not think you should start from the basis that things are not working here.

Clearly if you get more people participating, then you have a better chance of finding elite athletes. There is a very interesting case study at the moment of a young rower who was picked up under a scheme run by Steve Redgrave. They basically measured people. They sort of have a dynamic for what your perfect rower should look like, so went around measuring people or invited anybody between—I do not know what the exact requirements are—6’0” and 6’4” with thighs over such a size, shoulders thus large and all the rest of it. Surprisingly, they had a huge take-up and then they put them into training and worked this down. One of the young women who came through that programme is part of a pair that has just won a world championship for the first time and stands a very good chance of winning a gold medal in a couple of weeks’ time. There is a perfect example of how you might increase the gene pool to give yourself greater success.

All of that said, there is quite a lot of targeting in this game. One of the reasons why some of the eastern bloc countries were very successful—there are a number of reasons why eastern bloc countries were very good at this before the fall of the Wall—is that they tended to concentrate on certain sports and then push people towards this. People were assessed at a fairly young age for their athletic ability. Sergey Bubka, the Ukrainian former pole-vaulting champion, was spotted as an athlete and was then channelled in a rather eastern bloc type of way towards pole-vaulting and became arguably the world’s greatest pole-vaulter. There are quite a lot of examples of where this has worked in the past.

Q155 Lord Willis of Knaresborough: First of all, can I offer you, both personally and I hope on behalf of the Committee, best wishes for the Olympics? Indeed, it is a pleasure to hear a Minister who is so enthusiastic about the brief—it has been a pleasure listening to you this morning—and who does not rubbish what the previous Government did. I think James Purnell was a good Minister who did, in fact, set really interesting targets.

My interest here, though, is in terms of your department and indeed science. It is fair to say that we are a little concerned as a Committee about how little what I would call basic science goes on in terms of underpinning, particularly, the elite programmes. In terms of the technology, quite clearly you are right: BAE Systems and others—you have mentioned Formula 1 in particular—are ahead of the world in terms of the way they are developing technologies, carbon fibres and all the rest of it. However, when the Australians had the

17 Note from witness: DCMs clarified after the session that the scheme was run by UK Sport and the English Institute of Sport, and Steve Redgrave helped to launch it.
Olympics, one of the ideas they had—as you have just alluded to—was to have individual athletes' passports, where, at an early stage when they were breaking into junior ranks, you looked at the make-up of an athlete and followed them through, on a longitudinal study, to be able to see what the effect of nutritional programmes and the rest of it was. I just wonder whether in fact that sort of scientific approach to elite athletes, which could then move on into the public arena, is going on. We heard nothing from the Chief Executive of UK Sport. She seemed to be totally oblivious to any science that was going on.

**Hugh Robertson**: It is a very good question and thank you for it. Thank you also for your remarks about the Olympics, and indeed I absolutely share your assessment of James Purnell's move. It was a move I supported in opposition and I have defended it in government, even when the figures have not moved, because I believe that it was the right step to take.

I am surprised that UK Sport did not make more of this, because I would say it is one of the things that has, without doubt, contributed to the rise in our Olympic performance. The body that does this is called the English Institute of Sport. It is based at a number of locations around the United Kingdom, the seven or eight major sports centres. I was with them myself last Tuesday at Bisham Abbey, where they do a lot of the rehabilitation and exercise science. They have a fantastic group of medical-based expertise, which helps our athletes get on to the start line in the very best possible state. That goes right the way across the full range of core medical skills—doctors and surgeons, the Olympic Medical Institute, physiotherapists who are attached to and remain with the teams, nutritionists and psychologists. There is a huge scientific back-up that goes behind all of this. If you examine that particular area in greater detail, it is impressive.

Indeed, people like the Australians, who set up the Australian Institute of Sport back in the mid-1970s, which I went to visit when I was in opposition, have realised that their systems have got a bit behind the curve now. Bizarrely, we used an Australian to set our system up—Wilma Shakespear. She has gone back. The sense is that our system has now moved ahead of that in Australia, principally because it is lottery-funded and is therefore not dependent on a negotiation with the Government at each and every Olympic cycle. There is a security of funding, and quite a lot of people are now looking at our system.

You would be very well advised, if I might say so, to get the English Institute of Sport in and talk to them about all of this. Talk to their top doctors. There is a fantastic man called Richard Budgett, who provides all the medical advice. He used to work for BOA; he now works for the Organising Committee. There are people like that who are real experts who could give you absolute examples of medical advances that they have used to bring athletes back into training or to help them. When I was down at the EIS at Bisham last Tuesday, they had—it is probably a bit unfair to name them, because they are undergoing treatment—a young sprinter in there. Basically, because he is quite young, his back had stretched and they were helping him back to fitness. They also had a couple of female rowers who likewise had lower-back injuries—a very common injury with rowers—and were helping them back to fitness. They have been doing that work day in, day out for ages.

**Q156 Lord Winston**: How much are they publishing in the peer-reviewed medical literature?

**Hugh Robertson**: I do not know.

**Lord Winston**: Is that not the point of Lord Willis's question?
Hugh Robertson: I do not read the peer-reviewed—I have a very full in-tray. I do not spend my time idling around, but I promise you——

Q157 Lord Winston: Your record in sport is fantastic. I do not think anybody around this table would question that. However, we are trying to separate sport and exercise. They are different. For example, participation in sport is actually participation in exercise. It is rather different.

Hugh Robertson: Sport is participation in exercise; exercise is not always participation in sport.

Lord Winston: The people whom you meet cycling around your village are not participating in a sport.

Hugh Robertson: Yes, they are.

Lord Winston: Are they competing?

Hugh Robertson: You can either take a race or you can participate.

Lord Winston: I would argue that they are not.

Hugh Robertson: If you went out there and, if you spotted somebody on a bike, asked them whether they were taking part in sport, most people would say yes.

Lord Winston: When I cycle, the only sport is dodging the buses actually. The exercise is much more important.

Hugh Robertson: I am sorry; I have a fundamental disagreement. I think if a young man or woman, or in fact a middle-aged one in Lycra, gets on their bicycle at the weekend and, as part of an organised ride, goes bombing around the Kent Weald, they are absolutely taking part in sport.

Q158 Lord Winston: But in general, it is the component of sport that is exercise that is intriguing with regard to health and the benefits. I agree there are specific advantages in sport as well—for example, the psychology that you mentioned. That is absolutely right; I am quite convinced that the psychology of performance is quite translatable to all sorts of areas of human life. However, the key question we still have is how valuable exercise really is, and I am not entirely sure it is clear. I am also not quite clear how the research that is going on in sport translates into this area. We are not trying to be antagonistic; we are trying to tease this out.

Hugh Robertson: You wanted me to appear in front of you today. My responsibility is for participation in sport and for elite and high-performance sport in this country. My responsibility is not for keeping the nation fit and active. That is a responsibility of the Public Health Minister and the Department of Health. I think you are trying to get me to steer into areas that are not my responsibility.

The Chairman: I think we will just leave this one for a moment. Lord Willis, do you want to ask a very brief question?

Q159 Lord Willis of Knaresborough: I just wanted to finish off my line of questioning. First of all, thank you for that reply, because I do not think we have had that real link between the research going on and what actually happens to it. It would be useful, perhaps
Department for Culture, Media and Sport (DCMS), Hugh Robertson MP, Minister for Sport and the Olympics – Oral evidence (QQ 129-160)

after the Olympics, if you would let us know what actually happens to that research, how it gets out elsewhere and, in fact, if any of it is peer-reviewed.

I wanted to ask you another question. Our elite athletes, in all sports, are being tested both in competition and out of competition, and randomly, in terms of taking blood and urine for simple drug-testing. I just wondered whether, at any time, that huge database that appears is in fact used by any scientific group in order to conduct the sorts of research you can do in terms of following the progress of elite athletes.

*Hugh Robertson*: That is a good question.

*Lord Willis of Knaresborough*: It is a waste if it just simply poured down—

*Hugh Robertson*: If I have understood your question absolutely right, I am not aware that the data collected around the various doping regimes that we have in this country are used and transferred for other means. I am not sure what the legalities of doing that would be. If I could turn the question inside out, there is, however, huge scientific input into the methods by which we test for all these agents. The very best facility of its sort anywhere in the world to do this resides in this country, at the GSK lab, which is going to do all the testing for the London 2012 Olympics. That is a partnership between GSK, our own anti-dopers and academics from King’s College London. We opened it six months ago. It is an extraordinarily impressive scientific facility. GSK has put some of their very best research scientists on to that to give us the very best possible chance of detecting anybody who has transgressed in this way. There will naturally, I would have thought, through that process be a read-across from what they learn into what GSK does and, indeed, into what King’s College London does. But is there formal transfer? I am not aware of it and I suspect there would be very real data protection issues.

*Lord Willis of Knaresborough*: I accept the point that Lord Winston is making that you have to deal with the Data Protection Act.

*Lord Winston*: You would have to get informed consent.

*Hugh Robertson*: I have never heard of this happening.

*Q160 Lord Winston*: If you wanted to say whether a raised cortisone level is related to the performance of an athlete running, let us say, then presumably, if you were drug-testing them, you would still have to get their informed consent for that to happen.

*Hugh Robertson*: I am sure that is right, yes. We have agreed on something at last.

*The Chairman*: On that happy note, I will draw this session to a close. I would like to thank the Minister very much indeed. You have emphasised to us how busy your schedule is and we all echo Lord Willis’s wishes for the Olympics: we hope it all goes very well and is a great success. You will no doubt take the credit for its success, as I am sure it will be a success, as is due. We thank you very much. In due course, you will receive a draft of the transcript and you are obviously free to make editorial comments. Thank you very much for giving us your time. We appreciate it.

*Hugh Robertson*: I would simply urge you to use my remark about the benefit of exercise allowing people to live healthier and longer and to die quicker with some care.
Department of Health (DH) – Written evidence

1. The Department welcomes the Select Committee’s interest in sport and exercise science and medicine. This note represents the Department’s written evidence to the Committee. It sets out the importance of promoting exercise to prevent illness, the prescription of illness to facilitate faster recovery and the translation into treatment to improve the nation’s health. It also provides the Committee with key documents they may wish to read.

Importance of promoting exercise to prevent illness

2. The benefits of physical activity for general health and to address the symptoms of a range of long-term conditions are well known. This has been well documented in successive reports by Chief Medical Officers including At Least Five a Week and Start Active, Stay Active.

3. Start Active, Stay Active was the result of a process led by Professor Fiona Bull, Co-Director of the British Heart Foundation National Centre for Physical Activity and Health and DH officials to produce new guidelines on physical activity. The process for reviewing the international evidence, agreeing new guidelines and preparing a joint UK CMO report was supported by working groups of UK and international experts brought together for this purpose. The report included reviews of the risks associated with sedentary behaviour and took a life course approach looking at the benefits of physical activity in early years and older age groups.

4. Physical activity can be effective in the prevention and management of over 20 chronic conditions including coronary heart disease, stroke, type 2 diabetes, cancer, obesity, mental health problems and musculoskeletal conditions. Health professionals are well placed to inform their patients about the benefits of physical activity, but Change4Life and NHS Choices are important channels used by the Department to communicate this advice direct to the public.

5. Most recently the Government has developed initiatives to harness the inspiration provided by the London 2012 Olympic and Paralympic Games. The School Games involves half the schools in England, Change4Life Clubs have been established in every secondary school and are now being rolled out to 4,500 primary schools with the aim of reaching the least active children. In addition the Government is working to increase adult participation through workforce challenges: the NHS Challenge aims to get NHS staff in every NHS organisation more physically active and the Civil Service Physical Activity Challenge is directed at all civil servants. The Public Health Responsibility Deal Physical Activity Network is also working across the private and voluntary sectors to increase participation in physical activity. The forthcoming Games4Life campaign is a major social marketing campaign, being run under the Change4Life umbrella, which will be launched in June and build momentum in the run up to the London Games.

The prescription of illness to facilitate faster recovery
6. Exercise referral (sometimes called exercise on prescription) is becoming more widespread across the NHS. This involves the referral of patients by their GP to community-based exercise professionals for a period of 12 weeks or more to promote physical activity or address long-term conditions. Phase IV Cardiac Rehabilitation is an example of the latter. The Department of Health published a National Quality Assurance Framework\textsuperscript{18} for exercise referral schemes in 2001 and supported the creation of the Register of Exercise Professionals (REPS) to underpin the safe and appropriate delivery of exercise referral. Subsequent work by the British Heart Foundation National Centre for Physical Activity (BHFNC) to create an exercise referral toolkit built upon this.

7. NICE Public Health Guidance published in 2006 recommended that brief interventions in primary care should be provided as a cost effective way to promote physical activity. In order to support its implementation, the Department of Health developed Let’s Get Moving\textsuperscript{19} - a physical activity care pathway for the NHS. This is aimed at patients who would benefit from increased levels of physical activity. The pathway provides screening for activity levels, brief advice (based upon a motivational interview model) signposting to community-based physical activity and follow up.

8. There is growing interest in general practitioners ‘prescribing’ physical activity to patients tailored to their health status and need. NHS London has worked with partners to develop schemes providing advice on physical activity for patients with long-term conditions. One of these, ‘My Best Move’ includes a reference guide for GPs currently in draft, upon which they might base their physical activity recommendations.

**Development of Sport and Exercise Services in the NHS**

9. Sport and Exercise Medicine (SEM) was established as a new medical specialty in 2005 to treat and prevent sports injuries. As a new specialty, the provision of specialist SEM services across the wider NHS remains relatively limited.

10. Most NHS services are commissioned by Primary Care Trusts. From April 2013, Clinical Commissioning Groups will take on this responsibility. This will give GPs and other clinicians responsibility for using resources to secure high quality services. CCGs will have the freedom to pursue innovative approaches to delivering care that will deliver improved outcomes for patients. It is therefore important that there is a strong evidence base that could demonstrate improved outcomes and productivity for, and awareness of, the benefits of Sport and Exercise medicine to inform commissioners’ decisions. Where a good evidence base exists, the NHS Commissioning Board could decide, as part of its role in creating the environment in which CCGs can flourish, to provide CCGs with advice on those strategic service improvements that will have greatest impact in improving outcomes and any practical resources that might support them in commissioning for those services.


11. As part of London’s bid to host the 2012 Olympic and Paralympic Games, two bid commitments were made by Government to the International Olympic Committee (IOC) on Sport and Exercise Medicine. The first was to expand recruitment, training and services in sport medicine and the second that a National Centre for Sport and Exercise Medicine (NCSEM) would be established. The aim of the bid commitments was to lay the foundations for the expansion of SEM in England both for elite sport and more widely.

12. As a first step, the Department of Health actively supported the development of the specialty and the development of SEM specialty training programmes across the country. Funding has been provided to support the training of 50 SEM consultants. This will be completed by the end of 2012.

13. In addition, in January 2012, the Department committed £30 million to support the establishment of a National Centre for Sport and Exercise Medicine (NCSEM). One of the aims of the centre is to support the wider take up of SEM services across the NHS by gathering data from research and patient outcomes to inform and strengthen the case for SEM services and to raise awareness of the health benefits and potential cost savings to the NHS.

14. The model for the Centre was developed jointly with a range of organisations that are key to sport medicine. It was agreed that a networked facility would be most beneficial and consortia based in the East Midlands, Sheffield and London were able to meet the required standards. The three network partners will jointly share the £30 million funding.

15. The Centre will have a strong research base and will use this to help promote and develop SEM services to enable more people to be active, help prevent injuries caused by exercise and treat conditions associated with lack of exercise. Its influence and resources will extend to local NHS hospitals and primary care services.

16. The Department of Health has supported the development of a document setting out the contribution that sport and exercise medicine can make, particularly in primary care (Sport and Exercise Medicine – A Fresh Approach - Annex B). Work is now underway to establish ‘beacon’ SEM services across four pathfinder clinical commissioning groups (CCGs), based in Sheffield. These are intended to gain more experience and evidence of the potential benefits of the introduction of SEM services into primary care. They will enable relevant primary care clinics, for example Musculo-skeletal, Sport and Exercise medicine, physiotherapy and orthopaedics to be co-located around diagnostic services in primary care. The aim is to demonstrate the benefits of NHS SEM services on patient outcomes and cost effectiveness to the NHS.

17. The focus over the next three years will be to use data and evidence from these services and those provided by the National Centre to develop the evidence base for clinical best practice, facilitate the translation of research into services and to support the business case for the expansion of commissioning of SEM services more broadly across the NHS.

7 June 2012
TUESDAY 12 JUNE 2012

Members present

Lord Krebs (Chairman)
Lord Broers
Baroness Hilton of Eggardon
Lord O’Neill of Clackmannan
Lord Patel
Baroness Perry of Southwark
Lord Rees of Ludlow
Earl of Selborne
Lord Wade of Chorlton
Lord Winston

Examination of Witnesses

Professor Dame Sally Davies, Chief Medical Officer (England) and Chief Scientific Adviser, Department of Health; Mr David Brooker, Director, Legacy, Department of Culture, Media and Sport; Mr Mike Farrar, Government physical activity champion and Chief Executive of the NHS Confederation; and Professor Mike Kelly, Director, Public Health Excellence Centre, National Institute for Health and Clinical Excellence.

Q161 The Chairman: I would like to welcome our second witness panel this morning in this short inquiry we are conducting into sport and exercise medicine and its link to the Olympic legacy to improve the nation’s health. Just to remind you: we are interested in two questions. One is: how good is the quality of science that underpins the improvement of performance of elite athletes and the study of elite athletes? Also, how is the knowledge acquired from that kind of scientific research and medical research rolled out to the population at large and how can the population at large improve their health through the knowledge gained in research on athletic performance? Those are the foci of the inquiry and, before we come to the questions, I would like to invite each of our panel members to introduce themselves briefly. If you wish to say anything by way of an opening comment please feel free to do so, but you are not obliged to do anything more than introduce yourselves.
I should also remind Members of the Committee and members of the panel that we are being broadcast on the web, so any asides will be picked up by the microphones and heard by the millions of listeners out there who are tuned in, anxiously waiting to hear what you say. For the members of the audience, the Members of the Select Committee have been invited to declare any relevant interest before they speak for the first time in the inquiry. As this is the first day of the inquiry, those with relevant interests will declare them as they speak. May I now invite you to kick off?

Professor Kelly: Good morning, my name is Professor Mike Kelly. I am the Director of the Centre for Public Health Excellence at NICE. Over the last six or seven years we have had a programme of work on the relationship between physical activity, disease prevention and health promotion.

Professor Dame Sally Davies: Good morning, I am Dame Sally Davies. I have a number of roles in the Department of Health. First, as Chief Medical Officer I am the independent adviser to the UK Government on matters clinical and medical. As well as being CMO for England I continue as Chief Scientific Adviser to the Department of Health and I maintain the leadership role in dealing with the R and D budget. As the senior person here I would like to say, on behalf of those of us here, that we welcome this opportunity. This is a timely inquiry, with the Games fast approaching. Having the public health fraternity, as well as the Government, recognise the opportunity to use the Games, including the Paralympics, to inspire people in sports and physical exercise means that we are the first country ever to make a commitment to develop sport and exercise medicine as a legacy from hosting the Games. We will come back to the physical activity guidelines that I, supported by the other three CMOs, published last year. I would like to say that I think the Government has delivered and is delivering on its commitment to develop sport and exercise medicine and developing the evidence base, and I am happy to discuss that with you.

Q162 The Chairman: Thank you. We will unpick that as we go through the session.

David Brooker: Good morning, I am David Brooker, the Director for Legacy in the Government Olympic Executive in the Department of Culture, Media and Sport. My role, as part of the Olympic team in DCMS, is to try to secure the widest possible benefits for the United Kingdom from the Games, in terms of sport, the economy and the social legacy, such as volunteering, the regeneration of East London and so on.

Mike Farrar: Hello, my name is Mike Farrar. I am the Chief Executive of the NHS Confederation. I am here in my responsibility as the National Champion for Sport and Physical Activity, having been appointed some three years ago. It is an odd role; it is a role that is trying to effectively connect the NHS into the fields of sport and physical exercise, and it is largely a championing role to try to make sure the NHS is using the evidence available to develop services. I have had particular objectives around setting up a workforce challenge to help improve the health of the NHS workforce using the Olympics as a catalyst. I have been involved in establishing the National Centre for Sport and Exercise Medicine and have been doing a lot of work with professional clubs around connecting them to local commissioners and local government in terms of the role that they can play.

Q163 The Chairman: Thank you very much. Perhaps I could kick off with a general question to start. We, along with many other people, have heard that physical exercise is good for your health. We are interested in hearing your assessment of how robust the evidence base is to support both the treatment and the prevention of specific chronic diseases through physical activity, and how promoting physical activity among the general
Department of Health (DH), Department of Culture, Media and Sport (DCMS), NHS Confederation and National Institute for Health and Clinical Excellence (NICE) – Oral evidence (QQ 26-68)

Public achieves those aims. This relates to the physical activity guidelines, but we are interested in not just the generality but the specifics of how good the evidence is in relation to particular diseases.

**Professor Dame Sally Davies:** Let me start and then I will pass over to Mike Kelly. If I sit as a researcher, the evidence is never good enough. I always want to do more research. If I sit here as a doctor, I ask whether the evidence is good enough to take action on and a pragmatic reality. When Professor Fiona Bull chaired the expert scientific committee to develop the CMO physical activity guidelines, they looked first at the US Department of Health and Human Services publication *Physical Activity Guidelines Advisory Committee Report, 2008*. They found that they had done the job well, that there were a large number of studies where they agreed with each other sufficiently that you could draw conclusions, and they were therefore able, with some updating of that, to advise us on what was an appropriate level of physical activity. So there is a sound evidence base for the good that physical activity can do. I was interested, as you must have been, at your science symposium a couple of weeks ago to hear how, for elite athletes, the immune system begins to become a bit more fragile if they are very taxed and super-fit.

From epidemiology we have evidence that the worst things for human health are, in order, smoking, high blood pressure, high blood sugar, and sedentary behaviour or lack of physical activity. So we know, from the epidemiology, that physical activity plays an important role in the maintenance of health and in handling chronic disease—trying to minimise the symptoms of chronic disease and delay its advancement. So while there will be people who think we should do more, I believe there is quite a good evidence base there for the professions to use.

Mike will pick up on some of this, but I also want to tell you that I had a horizon-scanning workshop about a month ago, not knowing you were going to have a science seminar, bringing in about 25 physical activity specialists. What we discovered was that there was a lot of congruence and appreciation of the evidence base, but where we did not have enough work, and will need to move forward, is on the economic analyses of this. There is more work that we can and will be picking up there.

We have, and I am sure you will come back to this, set up the specialty of sport and exercise medicine and this national centre, and we see the national centre as playing a key role in helping to develop the evidence base and as a transmission agent to getting the evidence into practice. I am sure you will want to come back to getting evidence into practice, but let me pass over to Mike now.

**Q164 The Chairman:** Perhaps as you answer, Mike, you could focus on moving from the general point Dame Sally has made to specific links between treatment and prevention of conditions, such as osteoarthritis or heart disease, and specific exercise advice. Does NICE address those issues at that level of particular syndromes?

**Professor Kelly:** Sometimes. I concur absolutely with what Dame Sally has said. The evidence base is certainly strong enough and robust enough for us to be able to develop, over the last six or seven years, a whole series of sets of guidance relating to the promotion of physical activity. Underlying that are the findings that have emerged in epidemiology about the preventive effects Dame Sally referred to across a range of conditions. Consequently our guidance relating to the prevention of diabetes, cardiovascular disease and certain osteoporotic problems all make reference to physical activity as part of the plan.
The evidence is good at population level. The evidence is also good enough at individual level for us to be confident that increasing the overall level of activity in the population will produce beneficial outcomes. It is also worth saying, while we concentrate on the robustness of the evidence, that we are actually rather fortunate in the United Kingdom that there is a significant body of scholars and researchers, both at the physiological end of things as well as the more public health end of things, who by and large work together. The outputs of those researchers have been used extensively as we put together guidance at NICE. Considering the degree to which we have this strength, I think we have done quite a good job at trying to get the message across to practitioners, the National Health Service and to local government.

Q165 The Chairman: So if I looked at your guidelines and I wanted to treat diabetes, would the exercise regime advice be different from the guidelines for heart disease?
Professor Kelly: No, not necessarily. It is a rather more rounded picture than that.

Q166 The Chairman: When you say rounded do you mean non-specific?
Professor Kelly: I do indeed. We do not say, “You need to do this particular type of exercise for diabetes and this particular type of exercise for heart disease.”

Q167 The Chairman: Is that because there is not the science to enable you to provide those guidelines or that there is the science and the science says, “It does not matter whether someone has diabetes, osteoarthritis or heart disease; they should just do more exercise of a generic sense, such as walking or climbing stairs.”
Professor Kelly: I would distinguish between where the disease is already established, because in certain circumstances there may be functional limitations, which the recommendations to medical practitioners would need to take account of. More broadly, in terms of general prevention, being active, getting the heart moving, keeping muscle mass in place, flexibility and strength are basically the same in preventing cardiovascular disease or diabetes, or building up these kinds of things preventively for children too.

Q168 Baroness Perry of Southwark: Pursuing the general point you made, is the evidence robust enough to fine-tune things? If you say to someone who is a bit overweight and has not done any exercise for 20 years that they need to take more exercise, do they suddenly go out and start running up and down a field? Are they not likely to drop dead of a heart attack if they do? I am talking about the level of exercise and the build up of exercise; is there sufficient evidence about that? We know that it can be quite dangerous for people who only play football once a week and do no exercise for the rest of the week. There is some fine-tuning needed, rather than just saying, “Take more exercise.”
Professor Kelly: Yes. The guidance does not just say, “Take more exercise.” The guidance acknowledges that individuals within a population will be at different stages in terms of their exercising and capacity. If somebody is completely sedentary, the most sensible advice you can give, other things being equal, is that they should start walking. Walking, although it is often not seen as exercise, is one of nature’s best ways of giving us a boost.

Q169 Baroness Perry of Southwark: Is there scientific evidence and empirical evidence to show that these things start to work?
Professor Kelly: Absolutely, and you would start with that sort of gentle exercise. You certainly would not say, “Go off and run a 100 metre dash,” or something of that sort. The
Department of Health (DH), Department of Culture, Media and Sport (DCMS), NHS Confederation and National Institute for Health and Clinical Excellence (NICE) – Oral evidence (QQ 26-68)

body responds to exercise by building up a type of resistance, and the more the resistance builds up, the greater the training effects and the greater the training the body can take. There is a dose-response relationship until you reach that very elite when the immune system changes marginally. As you are building up the training benefits that accrue start fairly early and can be built up to a median level, which would be appropriate for most people who are not intending to compete at elite levels. The important thing is that the heart rate goes up, that the various parts of the body are exercised and different muscles are exercised. There are other bits of advice you would give, like it being a good idea to stretch before you begin and all that sort of thing. The other bit of advice you would always give to somebody who had never done anything before and had been sedentary for many years is that they should consult with their doctor first, just to make sure there is not some underlying problem they are not aware of. Those things aside, the sort of advice we are talking about can be given with confidence and will have those beneficial effects. Walking will not make you lose weight and walking will not prepare you for running marathons, but it is a good place to begin.

Q170 Lord Winston: I will conflate two questions if I may.

The Chairman: Please conflate away.

Lord Winston: There is a Cochrane review that is not long published. Our witnesses have ignored cognitive changes so far. I wonder if, in addressing this, you could tell us whether or not cognitive ability is changed. This Cochrane review that I have read tends to suggest that there is not much change in older people, which is clearly an increasingly important health problem. The main question I want to ask you is: what are the gaps in our knowledge that we need to do more research on with regard to physical activity and exercise as preventive measures, and to promote better treatments?

Professor Kelly: The principal gaps that NICE has identified relate to our knowledge of particular population groups. We are aware that the patterning of population-level exercise varies. It varies socio-economically, according to ethnicity and, very importantly, according to gender. Young girls are tailing off their exercise much sooner than young men do. I refer to that as a gap. We have an understanding of these patterns but what we need more information on is not the patterns themselves but what we can do to change them. So how you encourage young women to stay active in their early teens and how you encourage all adults to remain more active in their middle years are the points where our behavioural understanding, rather than our physiological understanding, is not as strong as we would like it to be.

Q171 Lord Winston: One of the issues the Chairman has already highlighted is that we are not dealing with behaviour change in this inquiry; that was a previous inquiry. I would rather focus on the gaps we have in our knowledge that you think should be more researched.

Professor Kelly: It is difficult to draw the line. I gave evidence to your behaviour change inquiry as well, and it is difficult to draw the line too sharply, partly because exercise is a behaviour, and we do need to understand that process. Perhaps the biggest gap of all is a fully integrated understanding of how behaviour is part of the etiological pathway to the development of the kinds of chronic diseases that Lord Krebs was referring to initially. That is an area where there is a need for more sustained research over time.
Regarding the gaps that you are referring to, Lord Winston, the studies of particular impacts within different population groups would be important. For example, in diabetes the elevated risk in South Asian populations is higher than in the white population in this country. Not only are rates of exercise relatively lower but whether you could have the kinds of impacts that we know happen at population level on the metabolic syndrome with that population would be an interesting area to follow.

Mike Farrar: I just wanted to add a rider. Obviously, my interest is in translating the information and making sure we get it into practice, but I do think the whole area of exercise and its impact on cognitive function is something that we could and should do more about. I suspect that there is a lot more to understand about the benefits of exercise in that context, particularly when we look at the increasing incidence of dementia in later years. When I asked the Clinical College to present evidence back to me about where we were on real solid ground, we had a lot of strength in the evidence on the benefits on physical things, like cardiovascular disease, diabetes and hypertension, but the amount of evidence around depression and dementia is much smaller. That is a really powerful place to be.

Professor Dame Sally Davies: You will notice that last week the ESRC announced a call for public health interventions to prevent the onset of dementia or delay its progression. That includes exercise medicine and it was at my request, using money that we have asked them to spend.

Q172 Lord Winston: That leads me beautifully to a supplementary question I intended to ask. Our previous witnesses seemed to give the impression that there was not enough research being done. Sometimes those pleas mean that the research applications are not of very good quality; that is generally how that is regarded. I wondered whether you, Dame Sally, might want to answer the question of how you assure the quality of research that you and your sponsored bodies commission in these fields.

Professor Dame Sally Davies: I agree with you that researchers always want more money. Clearly we monitor the quality through peer review. We have funded a couple of biomedical research units with particular interest in exercise: University Hospitals of Leicester with Loughborough University, and University College. They passed an international panel of peer reviewers. Their individual pieces of work will be peer reviewed at the start and for publication. We fund, with a number of other funders, the UKCRC public health research centre of excellence CEDAR, which is in Cambridge. Again that has had an international peer review. We have set up the NIHR School for Public Health Research to look at interventions to improve health and the membership was agreed based on the RAE and excellence. I think it would be wrong for us to use public money without making sure the research is of the highest quality.

Q173 Lord Winston: Are you getting enough applications?

Professor Dame Sally Davies: Yes. It is a developing field. What I was pleased about with the biomedical research unit application was that it brought Loughborough, which does have physiology and basic science, together with University Hospitals of Leicester so that we could get the translation, which was the object of that. Clearly, we are not funding the basic science. That comes from the MRC and BBSRC. I think that translational stuff will develop and, as we develop more SEM specialists, we will have more people and will develop the whole field. But these things take time to develop excellence as well as quantity.
Q174 The Chairman: David, would you like to say anything about DCMS commissioning research on sport and exercise science?

David Brooker: I can give you a relatively brief answer on that because, as a department, our role is more on the strategic level of the direction of sport strategy and sport policy. The sharp end of this would be experienced through UK Sport, which is the body that deals with high performance sport, and the English Institute of Sport, which works with high performance athletes on medical support. That I think is the area where they would commission.

Q175 The Chairman: Are those two bodies sponsored by DCMS?

David Brooker: They are part funded by us.

Q176 The Chairman: How do you quality assure the research that they are carrying out or commissioning?

David Brooker: We do it through setting the objectives for the performance we want them to reach in terms of medals tables and performance at major events. Of course, the supporting science to that and the benefit that brings to the athletes impacts on the overall performance of the organisation and the targets they set. So we do it as part of that objective-setting process for the performance of UK sport as a whole.

Q177 The Chairman: Do you have an analogous peer review process to the one Dame Sally described for the Department of Health?

David Brooker: I am not aware of that.

Q178 The Chairman: Perhaps you could let us know in writing.

David Brooker: I certainly will.

Q179 Lord Rees of Ludlow: We heard a lot about the detailed scrutiny that elite athletes are getting in the lead-up to the Olympics. Could you comment on the lessons learnt from that and the transferability and relevance of what we have learnt from the really elite Olympic athletes to the broader health situation of the average person?

Professor Dame Sally Davies: I confess that I am not convinced there is vast transferability. Clearly there is, but what you are talking about with elite athletes is fit, young people who train to the extremes of their capability. We do learn physiology and nutritional lessons from them that we can take back to everyday life, but my interest as Chief Medical Officer is how we prevent disease, and that starts in trying to prevent sedentary behaviour and obesity, and how we handle disease. That is right at the other end of the spectrum. Clearly we fund quite a lot of research and work around that. It has other ramifications of course. How do we get a more active population walking or active transport by biking, not just for the health benefits—although those are the ones I am most after—but for the sustainability and community cohesion benefits? For instance, we have contributed £400,000 to a Department for Transport active cycling evaluation. We work cross-Government.

Mike Farrar: One of the opportunities and objectives of developing a National Centre for Sport and Exercise Medicine is to bring different parties together, including the elite end of sport. We are talking to the national governing bodies. The hub around the East Midlands is now linked in to St George’s Park at Burton upon Trent and the development the FA has there. There is a hypothesis to be tested about the extent to which you can look at the
high-tech treatment for sporting injuries for elite athletes. We need to understand how we work right from the Ferrari down to the—well, I will not mention a brand at the other end, as I might get sued, but it is that notion of potential understanding and transferability. We are hopeful that, in creating the centre with the ability to have elite athletes alongside ordinary members of the public, the ability to understand where that investment is going in sport science in keeping athletes on the field will move more swiftly into something where we have evidence it works for ordinary people. The only place where I am not sure that works so easily, coming back to the point I made to Lord Rees, is around mental health. Almost by definition elite athletes have a particular mindset, which actually is not quite that of the ordinary person.

Professor Kelly: One very important point to note in the assessment of elite sport is that there are a number of issues relating to measurement, the understanding of the quantification and of how best to understand the volume of exercise. That is the same whether you are measuring someone who is going to run in the 400 metres in the Olympic Games or someone who is just walking. The techniques of understanding the response to physical activity arise in that way. The original technical attempt to understand those things was done with elite athletes and has passed down into the broader spectrum of people trying to understand effects more generally.

Q180 Lord Rees of Ludlow: Could I ask you about the national centre? We have heard that it involved quite a big investment and I wonder if you could explain how it is going to work and whether you are confident about its sustainability.

Mike Farrar: Initially there was an opportunity for us to look at where we had existing centres of excellence, but in individual locations. There are lots of pockets of different activity relevant to sport and exercise medicine across the country, but there were three centres at the leading edge of that: UCH in London; the Loughborough group, which includes Nottingham; and Sheffield, with the English Institute of Sport. We have been fairly pragmatic and said that we will build on the work of those three centres to create a collaborating entity. We have in mind that it will expand further, so we have already had expressions of interest from the south-west to expand that, and I have also been talking to colleagues in Northern Ireland about some opportunities there. I think we will also see a north-west grouping come forward as well. This is very much the start of the organisation.

We have set three areas where we expect them to be active. One is research, the second is teaching and the third is service provision. We have also carried out an inventory of where those three initial centres stand against that. Some are stronger in research; some—for example Sheffield—are very strong at working with primary care. The idea is that we would establish the centres as hubs and they will spread into their hinterland the expertise of sport and exercise medicine in general practice and other routine services.

So we are just starting here. We have a capital grant for the three sites of £30 million; we are grateful for that. Effectively we are now trying to work the service model whereby, through getting research in the areas Dame Sally talked about, they would obviously be clear candidates to win some of that resource. In developing a funding stream, we are talking to Health Education England about how we sustain the balance we have had with creating the Faculty of Sport and Exercise Medicine.

The tricky one is service provision. That is because, effectively, for some specialist centres we have had the ability to have specialised commissioning money. At one level, we are now dealing with sports and exercise injuries in our mainstream services, but we are not dealing
with them as well as we might. One of the things we are working on is a commissioning strategy to get a revenue stream into those centres to support their service provision. That involves a variety of things. We are talking to the national governing bodies about whether they could redirect the work they currently pay for, sometimes privately, into these centres. Secondly, is there an opportunity for commercial sponsorship? There are lots of big organisations that are very interested in developing the science with us around this, and it may well be that we can bring in a public-private partnership around that. The third issue is where the ongoing revenue comes from when effectively those centres are dealing with caseloads sufficient to give them a revenue stream and a margin as well. We are working through that. In the evidence session before there was a question about whether it needs a bit of a boost and a pump prime to get it sorted out. We are looking at the potential case for that, but at the moment we are looking at whether we can source revenue from our routine sources first.

Q181 Lord Rees of Ludlow: Is it a top-down initiative in the first place?

Mike Farrar: Because it was part of our Olympic legacy commitment, we absolutely wanted to get this established. To the extent it is top down, it exists at the moment because we have three centres that were effectively doing things in isolation, and what the collaboration has done is pulled them together to get synergy and, hopefully, spread across the country. So I think it is a good start, but we know we have a lot more to do.

Q182 The Chairman: We have been told there is no model for sustainable funding. So you have three buildings—palaces—but nothing to fund the activity in those palaces. Is that a fair comment or have I misunderstood?

Mike Farrar: Is there a central grant to run this service as a separate centre and separate to all other revenue streams for research, education and service provision? No, there is not a separate grant.

Q183 The Chairman: So the comment is justified.

Mike Farrar: It is only justified to the extent to which it has not been given a single block of start-up funding. Like any other bit of the NHS, it has to justify itself in terms of the resource it gets for its research, training and service provision. Its sustainability will lie in those routes, rather than being separated from the way in which the rest of the NHS works. That is entirely defensible in the long run. The key thing is getting it started. That is perhaps the issue.

Q184 Lord Broers: I apologise, Chairman, that I was only able to join the second half of this session. My question relates to this translation to the treatment of the public. Specifically, how has sport medicine helped in treating people with disabilities and people with paralysis? Perhaps this relates to the Paralympics more than the Olympics, but it strikes me as a great area of potential for this sort of study.

Mike Farrar: I could not be absolutely specific about the detail but I am aware that sport and exercise medicine has been helping in the field of rehabilitation. I have just been working in the north-west, and we had some excellent rehab links to our cancer centres, so for people who had problems following amputations or disability following cancer. The links to sport and exercise medicine are adding great strength to those rehab services. It is early days for sport and exercise medicine. We have a number of posts that have been trained and we are looking to try to get them into the NHS and NHS organisations. The national
centre is a way of helping to focus the specialty and help the NHS understand the benefits. Although we have been doing a lot of training, I do not think we are fully exploiting the opportunity of having a specialty in sport and exercise medicine yet because we do not have enough funded posts and enough focal points in the service to really benefit from it. It is there but only in pockets.

Q185 Baroness Hilton of Eggardon: I am inclined to go back to the national centre. I do not really understand what the £30 million is being spent on. Is it being spent on three buildings, one in each location?

Mike Farrar: It has been spent on developing facilities. It is a capital grant so it can be spent on equipment, project management and physical capability, but it is a capital grant rather than ongoing revenue. The question about financial stability relates not to the physical facility announcements but largely the revenue streams.

Q186 Baroness Hilton of Eggardon: It seems that it is being set up without any clear idea of what it is going to do.

Mike Farrar: That would be unfair. There is a vision the three centres have had separately that they are now putting together into a single vision for a national collaborating centre. Its vision is very clear: it will be at the leading edge of research in this field, and many of the questions you have been asking have been about whether we need to do more; I think the national centre will have a big impact on the amount of research done in this area.

Q187 The Chairman: Who is going to fund the research?

Mike Farrar: The research comes out of the national streams we have in the programme anyway.

Professor Dame Sally Davies: They would have to compete, and rightly so.

Q188 The Chairman: Suppose they compete and do not get the funding, is there more money going in?

Professor Dame Sally Davies: There is no extra money.

Q189 The Chairman: So why should they suddenly get more money to support the work of a £10 million building?

Professor Dame Sally Davies: I do not think the money was actually put into new buildings; it was more refurbishment and equipment so that they actually had a place, but we can check up and give you more details on how it was spent. For research, they can compete with the research councils with us, with the Wellcome and, if they are good enough, they will get the grants. Loughborough is off to a good start because we have given them a biomedical research unit. The biomedical research centre at University College also spends some of its money, as agreed with the international panel, on this area of work. So they have already acquired funding streams for the next five years on which to build. Sheffield is, as Mike said, looking much more at the primary care end so will probably do less research. They have set up four beacon pathfinders with clinical commissioning routes, and they are looking at how to take musculoskeletal care services into the community to improve lives and save money. That is a different health services sort of research and ScHARR—the School of Health and Related Research in Sheffield—is adept at getting money from us. It is a very good competitor.
Q190 Lord O'Neill of Clackmannan: How were the three centres chosen? Were they the subject of a competitive process between other centres of excellence across the UK? In the last session the impression I got from Professor Cable was that they were plucked out of the air and there was none of the competition you are now suggesting will be the hallmark of the allocation of funds.

Professor Dame Sally Davies: No, I am telling you about research, which I manage.

Mike Farrar: The three centres were identified about three years ago when we were trying to get the legacy commitment into play. They were largely done using our knowledge of the NHS and where there were sufficiently developed centres.

Q191 Lord O'Neill of Clackmannan: So the process of identification was not competitive.

Mike Farrar: It was not at all competitive. We looked where we had initial strengths sufficiently congregated in individual centres. I know, for example, that the University of Central Lancashire has some really interesting work going on around physiotherapy but it was in isolation. The three centres were chosen to start. This is really important; it is not a club that stays as three. The vision is very clear that this will expand, pull in and disseminate its ideas to develop across the country. It started with three to get us into a position where we had an opportunity to create a collaborating centre, but it was very clearly built in that it will expand further. In fact, we have already had a bid from the South West, which will be the next element to build in.

Q192 Lord Wade of Chorlton: Could you explain to us how these benefits of physical activity and the curative benefits are disseminated to healthcare professionals? Is the NHS capable of using this question of physical activity as a treatment?

Professor Kelly: First of all, the guidance produced by my organisation, NICE, is aimed specifically at NHS professionals. One of the reasons a tranche of work was done relating to physical activity was precisely to get the information that we know about effectiveness to those audiences. We have had a consistent effort to do that and to pull together the sorts of disparate pieces of primary research and review research, as well as practical applications of that research, in the guidance. There is a pretty consistent platform of stuff that comes across in relation to both prevention and treatment that is specifically geared, for example, to primary care and, in certain circumstances, to secondary care types of services. So we have a mechanism in place to do that.

The other important element is one we have not yet mentioned this morning. The university curricula in sport science has been a big growth area over the last 10 to 20 years. There are many people coming out of universities with degrees wholly or in part containing some of this information. We are in a very different place in relation to physical activity than we were when my career began in the mid 1970s, although there was Jerry Morris’s work on bus conductors and bus drivers, which is the same sort of vintage as the early work on smoking. What you have to imagine is that the work on smoking, contemporaneous with Morris’s work on physical activity, led to an absolute take-off in work on smoking prevention from the early 1950s through to the Royal College of Physicians report in 1962. We saw a huge public health effort—and an entirely appropriate public health effort—on that subject and dealing with cardiovascular disease since then.

Work on physical activity was much slower to take off. When I started working in public health in the late 1970s, I remember going to see my head of department and making the
suggestion that I should link up with the Department of Physical Education at the University of Glasgow, where I was working. It was regarded as a somewhat eccentric suggestion. We are certainly not in that place now. We are in a place where physical activity is seen as part of both the public health and clinical armoury, and has been developed accordingly.

Q193 The Chairman: Do we know, with this plethora of sport science graduates and all the work you have described, that the population is becoming more active? Is it having an effect? You describe a very positive picture of medical practice. Is it working?

Professor Kelly: Well, it works in those who undertake it.

Q194 The Chairman: But is it working at the population level? Are we actually seeing more people taking up exercise, following the NICE guidelines and being helped by their GP to become more active? Is that happening?

Professor Kelly: In epidemiological terms, I am not certain.

Professor Dame Sally Davies: We will be able to report back to you because, in the public health outcomes framework, we do have two exercise metrics, so we are going to monitor that.

Q195 The Chairman: So it will be reported but is not known yet?

Professor Dame Sally Davies: We have some survey evidence but I am not sure of the trend. We can let you know the trend.

Q196 Lord Wade of Chorlton: I can understand that you have given the right advice, but do you know that doctors are saying, “Instead of giving you this packet of pills, this is what I want you to do: I want you to go out and walk”? How do you actually have a physical exercise treatment that you know the patient is going to carry out? Is that feasible? Should we try to do that?

Professor Dame Sally Davies: Yes. So it starts with a continuum of research evidence on NICE guidelines, UK CMO guidelines, about what should be done and then how you persuade GPs to take it up. If I pick London, because I know most about it from living here, they have done a variety of things to get GPs up. One of them is a programme called “My Best Move”, which is working to get 50% of our GPs in London discussing physical activity during the consultation with patients in order to handle their long-term conditions better. They have a booklet this fat that they have been using to work with GPs to take them on a journey of why and how. There is another campaign in NHS London with GSK, who are sponsors of the Olympics, called “Your Personal Best”. They have Arlene Phillips, who even I know dances on TV, doing some work with the Royal College of General Practitioners and the Royal College of Nursing about using dance for exercise, which I think is something very important. Indeed, we had the “Big Dance”, with every borough engaged in GLA-led programmes to get people dancing. So every local authority is doing something in London to try to promote physical activity, and we are working with GPs so they understand what NICE is advising them to do and they try different ways of doing it. It is not easy. I would love to wave a magic wand and say, “The evidence is there; now, GPs or other doctors, do it.” It takes time to make that transition.

Q197 Lord Wade of Chorlton: What evidence do you have of how many doctors now have this on their list of things they tell patients?
Professor Dame Sally Davies: We do not collect that evidence but, in discussion, I think I can echo both Mikes in saying that it is coming up the agenda. People talk about it much more than they did in medical circles as being good for your health and part of your health management. So it is going up but we do not survey people to get the evidence, and would they give us the right answers anyway, when they know we want them to do it?

Lord O'Neill of Clackmannan: With respect, I think it would be rather depressing if the medical profession was not aware of the relationship between exercise and health. What some of us would be concerned about would be that, if we go to our doctor and they tell us we should do X, Y or Z, they probably will say to go to a gym. I raised this question at the briefing session we had and I did not get a satisfactory answer. You have the trickle down effect to the medical profession and that is fine. What happens when you leave the surgery and you go to a gym? Who is giving you advice? We have 10,500 sport science graduates per annum but we do not really have any proper system of regulation of the people who take you through the paces of getting fit and actually going through this. It seems there are certain gyms or certain health or sports centres where people can give advice and are qualified. Dame Sally, are you satisfied that, even if the message got to the GPs, it will get down to the people who give the general public advice on how to get fit?

Professor Dame Sally Davies: I know that when my GP discussed it with me, not knowing my role, the suggestion was—absolutely as I would wish—it started with asking me with whether I walked, and it did not start with, “You had better go to the gym.” I do believe that GPs think about the patient in front of them and give advice appropriate for that patient, which has to be graduated, and build up. Of course GPs now generally work in practices with nurses. We have the NHS health check, where the nurses are talking to us elders about our physical activity. The nurses are picking up on this, and I think there is much more spread of sensible advice than you allow.

The Chairman: Could I just pick up on that, Dame Sally? The British Association of Sport and Exercise Sciences comments that there is no scheme recognised formally by the NHS or a fitted deployment structure. This is a scheme for appropriately skilled or qualified, regulated staff to undertake work with patients and individuals referred by GPs. The evidence says that the association was in the final stages of submission when the new coalition Government stopped any further professions joining the HPC in 2010. Is this something that you envisage trying to change in light of the comments of Lord O’Neill and also witnesses within the NHS—to have more qualified people for implementation?

Professor Dame Sally Davies: It depends what the need is. Cardiac rehabilitation and exercise is done by properly trained people. Often it is nurses and sometimes people come in from sports medicine. There you have to have properly trained people because there is a risk to patients if they get it wrong. What we are asking people to do is to start to take exercise and be a responsible public. I do not believe in mollycoddling the public.

Mike Farrar: I think there is a degree of complexity. Clearly, if you have a recognisable problem and you are being referred by a GP, I would expect the GP, through either a practice nurse or your ongoing care management, to be very clear in supporting you throughout your increasing exercise. That is a responsibility for primary care. If you are going to recommend people go to particular gyms, you would want to try to make sure there is a degree of communication for somebody who is coming in with a high degree of risk. The truth is that we have made quite a lot of progress in recent years around using community-based health trainers. These are not regulated in the sense of being a
The extent to which we are medicalising the whole spectrum of people we want to be more active has to be thought through carefully, without sending the wrong signals to people about the benefits of exercise from a position where you are effectively deciding to do more exercise because you think it might help you with a condition that you have not presented to a primary carer. I just think we have to be careful about getting that balance right and not sending out inappropriate signals.

The Chairman: I see that Dame Sally now has a briefing note.

Professor Dame Sally Davies: That I do.

Mike Farrar: It is her own briefing note.

Professor Dame Sally Davies: As you are aware I am not an expert at this, and I have to say that, as I was jogging this morning at 6 o’clock in the drizzle, I was not in the gym so I did not know that gyms have exercise professionals registered on REPs—the register of exercise professionals—which requires a high level of training. So there is some form of registration. Can I give you some other briefing that I was not aware of?

The Chairman: Please do, and then I will turn to Baroness Hilton for the last point.

Professor Dame Sally Davies: The self-reported physical activity through Health Survey for England over the last 10 years has shown a slight upward trend in adults of self-reported physical activity, while the active people survey has flatlined. We all know that people are apt to over-report as compared with accelerometer data.

The Chairman: Thank you very much. That is helpful.

Baroness Hilton of Eggardon: In 2005 there was a physical activity action plan that recommended a cross-Government approach to promoting physical activity. It stressed the importance of departments working together and also local authorities. I thought that might be one of the avenues where we might be increasing provision of physical activity involvement as well as integration between departments. The question really is: are we satisfied that there is sufficient co-operation between the departments and that lessons from the Olympic Games are being fed into the Department of Health sufficiently and that DCMS is providing you with the scientific back-up we have been hearing about from some of the sports scientists themselves? How integrated is the Government in its approach?

Professor Dame Sally Davies: Let me start and then I will hand over to my colleagues. This coalition Government is pretty well integrated. They have a Cabinet sub-committee on public health—I am the only official who attends. They do actually discuss issues. At the Cabinet level they discuss public health across it. We have senior official level meetings across the different ministries, and I am sure that will be picked up for you by David.

We have a new opportunity, which I am actually quite excited about, with the health reforms of putting public health into local authorities with a ring-fenced budget. I think a lot of the health improvement activities, including physical activity, will join up and be able to be taken forward there very effectively.

Mike Farrar: I think it has improved and I say that because, as I should have said at the outset, I am the current vice chair of Sport England and was its interim chair for 14 months between the last two substantive chairs. I think DCMS and DH have worked well together to try to create a cross-Government thing. It gets harder when we get into the NHS and local government. I guess, at one level, that is what my appointment was trying to do: to
Department of Health (DH), Department of Culture, Media and Sport (DCMS), NHS Confederation and National Institute for Health and Clinical Excellence (NICE) – Oral evidence (QQ 26-68)

bring those closer. I would make the point that Dame Sally has made: that health and wellbeing boards have a really good opportunity now to help us. We are very conscious that, post-Olympic Games, the amount of money that local government is devoting to opportunities for physical exercise may well come under greater scrutiny. Some of the money that has come into our systems through the collaboration with Olympic sponsors will disappear. So we are at a vulnerable time in terms of local authorities, and the only way I can see that we can manage in the financial situation we are in is by pulling together the resources that we spend in health and in local government. So I very much welcome the health and wellbeing boards.

Q202 The Chairman: We are running out of time, but could I just ask David Brooker for a concrete example of how DCMS and DH are working together in the area of exercise and public health?

David Brooker: From my perspective we do work hand in glove with the Department of Health, the Department for Education and other departments. That is a necessity because we have a commonality of interest in this area. To take one example, my Secretary of State announced a new youth sports strategy earlier this year to try to get young people between the ages of 14 and 25 to create a sporting habit for life, with funding focused towards that age group. That policy is entirely complemented by the Department of Health’s programme of Change4Life, out-of-hours sports clubs, which are there to help non-sporty children begin to get an experience of sport in a non-threatening environment. That is one example, and the Department of Health fund that to the tune of £8 million and expect to have 7,500 clubs in place by the end of this year.

Q203 The Chairman: Has the Department for Education come in on that? Without being aware of the details, I know a lot of schools lost their sports facilities and playing fields, and I imagine it is quite a challenge to encourage schoolchildren to take up sport if there are no facilities for them to do it in. Have you brought in the Department for Education to ask them how they are going to generate the infrastructure for children to take up sport and sustain it?

David Brooker: Yes, we worked very closely with the Department for Education on another strategy we introduced a couple of years ago to create a new “Schools Olympics”, as one might dub it informally. It is a national school games programme, which is intended to create competition between and within primary and secondary schools up to national and county level. The Department for Education helped to fund that programme with us.

The Chairman: We have run out of time but I would like to thank our witnesses very much indeed for a very helpful session. I am sure there may be things you would like to have said to us but have not had time to comment on. If there are such things, please do write in to us as we would very much welcome further comment. It will all be part of the published evidence we will put together for this report. Also I should say, as those of you have previously appeared before Select Committees know, you will receive a draft of the transcript within the next week or two for you to comment on. Thank you very much indeed and in the end no doubt you will read the results of our inquiry.
Response provided by the Department of Health to a request for supplementary evidence following the oral evidence given by Professor Dame Sally Davies, Chief Medical Officer, on 12 June 2012.

Thank you for inviting me to give evidence in front of the House of Lords Science and Technology Committee on the 12 June 2012.

As discussed in the session, I agreed to send through information relating to how the £30m Capital Grant towards the National Centre for Sport and Exercise Medicine (NCSEM) will be spent by the three network partners.

I thought it would be helpful to explain some of the background to you. On the 9 January 2012, Secretary of State for Health announced that £30m capital funding would be made available as a contribution towards the establishment of the first ever NCSEM. The establishment of the Centre fulfils one of the commitments made by the Government in its bid to host the 2012 Olympic and Paralympic Games and will form part of the legacy. The funding is to be divided equally between the three “network partners” developing the Centre to be spent over the next three years.

Business cases were submitted to the Department by each of the network partners, setting out what their share of funding would be used for. The Department is now working on the detail of the terms and conditions before the funding is awarded, and we expect these to be finalised shortly.

Each partner intends to spend their £10 million grant to meet the wider objectives of the National Centre in the following way:

- **University College London** will use the funding to co-locate clinicians with researchers to enable fast translation of research into clinical practice. This will enable new services to be designed for patients across London.

- **Loughborough** University (East Midlands) will extend an existing laboratory to translate research rapidly into clinical practice. This will help to ensure the effective prescription of exercise to improve the treatment of long-term conditions.

- **Sheffield** is using the funding to co-locate primary care services with specialist SEM services by refurbishing an existing site within Sheffield International Venues that will be used as the Sheffield base for the National Centre. They are also developing a beacon service to develop a model for improving quality of SEM care across the country.

I hope this helps to clarify how the £30m capital funding will be spent.

25 June 2012
Evidence Session No. 4.  
Heard in Public.  
Questions 104 - 128

TUESDAY 19 JUNE 2012

Members present

Lord Krebs (The Chairman)
Lord Broers
Lord Cunningham of Felling
Lord Dixon-Smith
Baroness Hilton of Eggardon
Lord O’Neill of Clackmannan
Baroness Perry of Southwark
Lord Rees of Ludlow
Earl of Selborne
Baroness Sharp of Guildford
Lord Willis of Knaresborough
Lord Winston

Examination of Witness

Anne Milton MP, Parliamentary Under-Secretary of State, Department of Health.

Q104 The Chairman: Thank you very much indeed for joining us this morning, Minister. This is the fourth evidence session in our short inquiry into sport and exercise science and medicine and the Olympic legacy. The session is, as usual, being broadcast on the internet, so sotto voce asides will be picked up.

As you know, originally we had hoped this session would involve yourself and the Minister for Sport from DCMS. However, for various reasons, that has not come to pass, so you are here representing DH but we will ask questions about what is going on across the Government. As I am sure you are aware, there are two thrusts to our short inquiry. One is to try and understand how developments in science and medicine are feeding in to the improvement in performance of elite athletes. Importantly, and perhaps more relevant to your remit, is the question of how the knowledge acquired in the arena of performance athletes has translated, or is being translated, into the Olympic legacy of improving the health of the nation at large, by engagement in physical activity, including sport and other kinds of exercise.
I would like to kick off by asking whether you could give us some examples of the kind of work that the DH and other departments are undertaking to promote the sport and health agendas, and how sport and exercise are being promoted for their health benefits.

Anne Milton MP: Thank you, Chairman. I have nobody to make an aside to. It is a pleasure to be here, and I would just like to welcome the Committee’s interest in this. Select Committees are always an opportunity to increase our understanding and evidence base for what we are doing. I have to just say—as I know you are all aware—that inactivity probably counts for 6% of deaths globally. There is a human cost represented in those figures but also there is a financial cost of £5.5 billion in sickness absence.

You specifically asked about examples. School Games is the first example that comes to mind, which has been taken forward by the Department of Health, DCMS and the Department for Education. Those reached their climax on 9 May. Important to that is the 30,000 young people and their families that watched over 1,500 athletes compete in this once-in-a-lifetime opportunity. One can sometimes underestimate the ripples that an event like that has, and the impact. The Department of Health is funding £7 million per year in School Games and the funding is for 450 School Games organisers.

This is a crucial area for me, as Minister for Public Health, because the role of those organisers is at the opposite end from the elite athletes. It is about getting people who are the least active more involved in sport. My officials attend regular ministerial and project board meetings to help ensure that those 450 organisers do what they are intended to do and that this does do what it says on the tin, and to make sure we do reach out and get hold of people who would otherwise not participate. It is quite easy to get somebody who is already a convert to the importance to themselves of physical exercise to do more; what is quite difficult is to get people who have not undergone that conversion to do more.

The Department of Health is also funding the Change4Life school sports clubs. We are working closely with DCMS and the Department for Education to make sure the School Games use Change4Life clubs as a lever for getting the least active into competitive sport. I do not know whether you have been sent anything about Change4Life.

The Chairman: We do have some information, thank you very much.

Anne Milton MP: Marvellous. Obviously an initiative like that includes quite a lot of cross-working with DCLG but also organisations outside of the Government, such as the Local Government Association and local councillors.

I should mention that, across the civil service, Una O’Brien, who is the Permanent Secretary in the department, and Jonathan Stephens are leading a civil service physical activity challenge across Whitehall to help ensure that those 450 organisers do what they are intended to do and that this does do what it says on the tin, and to make sure we do reach out and get hold of people who would otherwise not participate. It is quite easy to get somebody who is already a convert to the importance to themselves of physical exercise to do more; what is quite difficult is to get people who have not undergone that conversion to do more.

On active travel, we are working very closely with the Department for Transport on cycling. There is a £560 million Local Sustainable Transport fund. So we are very involved in making sure that ticks the boxes on physical activity. I recently launched an initiative on walking for health with the Minister from Defra. The Ramblers Association and Macmillan are taking that forward. That is very important when you consider older people, as walking for health can have a significant impact.

Dame Carol Black, who heads up our network on the Responsibility Deal, is working across Government but particularly with small business—specifically with DWP—and that is about
working with employers, getting people back to work and getting people who are working to stay well and stay active.

I could go on. We just put £400,000 in to help evaluate the 12 healthy cycling towns and cities as well. Of course I have to mention the Cabinet Sub-Committee on Public Health, which is remarkable really. To get that many Ministers around a table is always quite a feat. That is, if you like, the womb in which cross-Government working on improving the public’s health is grown. That gives us an opportunity to say what we are doing in the Department of Health and also to say that the two of us, for example with Defra or the Department for Education, need to get together and take that forward.

**Q105 The Chairman:** You mentioned a very impressive list of cross-departmental efforts. Could I just pick up on a couple of other departments that you have not referred to and ask whether there is work going on there? One is links across to MoD, where for the armed forces there is a great deal of emphasis on physical fitness and exercise; the question is whether there are lessons from the programmes run for the armed forces that are applicable to the population at large. The second department is BIS and the question is whether the research councils under BIS come into the picture in terms of commissioning and funding research that would help to carry forward the exercise, sport and health agenda.

**Anne Milton MP:** I will deal with BIS first. Obviously there is an issue there, and I did allude to it in the work that Carol Black is doing. One of the things on physical activity and one of the challenges for the Government is that it is very easy to get a big organisation like Unilever, or some of the big organisations in my constituency, to put in place opportunities for their staff to undertake physical activity. Actually what is quite difficult is for small businesses to realise how they can do it. So we are doing quite a lot of work from that point of view.

You mentioned research opportunities. The Secretary of State and BIS launched a document about opening doors and saying that this is an opportunity and we are open for business in the UK. You can never really have enough research to convince the yet to be converted about the opportunities and to increase our knowledge. You are never at the end of the road and you never know enough.

As far as working with the MoD is concerned, I think that is very interesting and we are on a bit of a learning curve with that, particularly for people who have suffered permanent injury. There is a bit of a learning curve and I think there will be a lot of important lessons for us on physical activity. So there is quite a lot of work. I know that one of my colleagues who is working with the department is specifically involved in that.

**Q106 The Chairman:** You talked a lot about School Games and the involvement of children. One of the big stories of the last few decades has been the selling off of school playing fields. I just wondered what the Government is doing to either reverse that or enable children at school who do not have the facilities around them to engage in sport and exercise to do so. How is this actually going to spread out from these small initiatives, which are very worthy and very good as leadership, to the population at large if the facilities simply are not there?

**Anne Milton MP:** School playing fields are out of my brief. I am very happy to get you a note on that, because I think there has been an announcement recently about that.

**The Chairman:** It would be very helpful if you could.
Anne Milton MP: I am very happy to do that; I know I did spot something. I have a particular personal issue on this. When we think of sport in school we think of football, rugby or cricket, and playing sport on a big playing field. In fact sports like basketball and fives, which have been taken up by a lot of London schools where space is particularly limited, are also opportunities. So playing fields are not necessarily essential. The other thing is that we are not very good at sharing, so sharing sports facilities in a local area, moving from public health to local authorities, will enable a great deal more of that. There is ground and space in all sorts of areas in a local community that we have not used as well as we should. I speak personally to some extent: if you are the kid who does not have binocular vision and cannot see a ball, then football, cricket and rugby are not terribly great for you, but we have not always offered children other opportunities to be physically active. You heard from somebody earlier about dance. With girls there is a drop-off in teenage years but they will go and dance. I should talk about zumba for anybody who has not tried it. Maybe the Committee should go and do a class; I have not yet.

Q107 Baroness Perry of Southwark: Some of the evidence we have had suggests that the quality of research in the field of sport and exercise science is variable. We wondered whether the department, when it allows its arm’s-length bodies like the research of the NHS or the work that NICE does in advising the medical profession, has any system of quality control over the commissioning of research that they do?

Anne Milton MP: Yes. I have to say, because it comes up so often in the work I am doing in public health, research is always a mixed bag; there is some good stuff and some not very good stuff. I always get slightly anxious when people quote a research paper when in fact there are probably a couple of thousand. To some extent the quality of research is going to be led by the National Institute for Health Research who will obviously need to demand the highest possible standards. With peer review, if something is not good enough it will not get published. There is quite a good system in research generally in terms of peer review. The CMOs’ role is not to be underestimated in this, in raising the bar and ensuring quality research. Fundamentally the proof of the pudding will be in the eating; if it is not good quality research it will not get taken up. So all the incentives are there to make it the best quality. There are limited resources around these days; people do not want to go spending money on research projects that are not good enough.

Q108 Baroness Perry of Southwark: Some of the research on which the training of elite athletes rests is not necessarily published research. The criticism was much more that there is an emphasis on the method rather than the outcome; does it really make a difference to performance? So is it really something the general public can use?

Anne Milton MP: Correct me if I am getting your meaning wrong. What you are saying is: is the research done on elite athletes of any use to us as a general population? There are always some by-products but to some extent that is what we have said we will do. There is always a trickle, and it is like with any elite area. Sending men to the moon actually produced offshoots that were useful to us in our everyday life. It will be the same here but what we do need is continuing research evidence to come forward on what it means to the man in the street. There are two aspects: how we prevent poor health and what we do to maintain health as we get older. Both of those are equally as important. The new centre will play a role in driving that.

I know the Committee do not want to deal with behaviour change. Research is the hard evidence on what physical activity does, and that is not to underestimate what is going on around the world all the time, but there is also an issue of how we change people’s
behaviours. Although you do not want to look at it, we cannot forget that. Physical activity is a behaviour.

Q109 Baroness Perry of Southwark: Can I just be clear that what you said earlier is that, in looking at what your arm’s length bodies do—whether it is the NHS research or the NICE work—you rely on their own quality control, on peer review and so on, rather than having any mechanisms within DH itself to check on the quality?

Anne Milton MP: Research commissioned through the National Institute for Health Research and our policy programme are one check on that. I understand results from the National Institute for Health Research and the Health Technology Assessment programme are highly regarded internationally and ranked in the top 10% of medical and health-related journals in 2010. That is a position we do not want to see drop. I am reasonably confident. It is an area where I do not think we will see any drop. Other research is done in other countries and, although I am not a scientist, I am always anxious to know who paid for the research and where the vested interest lies. That is important and is as important as the quality of the research itself.

Baroness Perry of Southwark: Indeed.

Q110 Lord Willis of Knaresborough: There is now an army of students studying sports science in UK universities. You rightly alluded to the fact that there is both good and bad research, which clearly should be underpinning their work in the universities as undergraduates and postgraduates. I wonder now, in your role as Public Health Minister, whether you can point to just one single piece of research that has come out of the sports science field, which actually informs and improves public health?

Anne Milton MP: No, I cannot, because I am not a research scientist and I could not point you to one off the top of my head.

Q111 Lord Willis of Knaresborough: So you are not aware of anything coming out that is actually improving the health of the nation?

Anne Milton MP: A research paper will not improve the health of the nation. Forgive me but I need to understand the question. A research paper will inform practice that then, hopefully, improves the health of the nation.

Lord Willis of Knaresborough: It is not a trick question.

Anne Milton MP: No, I do not think it is; I am probably being a bit dim.

Q112 Lord Willis of Knaresborough: No, you are certainly not that; that is my province. If you went to NIHR and asked Dame Sally Davies where world-leading research was coming out of our universities that informs medical health and improves the health of the nation, she would be able to give you a long list. You are quite right that it is internationally renowned. What I am trying to get at is: in this new science of sports science, is there anything at all coming out that is improving the health of the nation? You, as a Minister, cannot tell me anything.

Anne Milton MP: I can tell you lots of things but I cannot quote one single paper because I rely on the CMO for that information. I can tell you about the outcomes. I started by saying that physical inactivity probably accounts for 6% of deaths. There is broad support. Actually, it is not really my job to be able to quote one single paper; that is the point I was making.
earlier. If you are going to adopt practice and promote certain things on the basis of evidence, you would never base it on the evidence from one single paper.

**Lord Willis of Knaresborough:** I did not mention one paper.

**The Chairman:** I wonder whether you would be able to get your officials to write in to respond to Lord Willis’s question; that might be the best way forward.

**Anne Milton MP:** I will, yes.

**Q113 Lord Winston:** Minister, as we understand, the research councils are not your department, but nonetheless they are intimately connected with what you do. I am a bit puzzled because the Physiological Society has said there is a concern about lack of support from research councils for research in this area. I wonder whether you could tell me: if I as a researcher wanted to research into sports science, would I apply to the Medical Research Council or the BBSRC?

**Anne Milton MP:** If you came to see me and asked who you should apply to I would say to apply to every body that you can. I do not know the criteria on which they award money.

**Lord Winston:** That is not quite the answer I was hoping for.

**Anne Milton MP:** It is not my job to decide who would get the money.

**Q114 Lord Winston:** It seems to me that the BBSRC is the only research council that is really making any offers of grants in that area. Yet the BBSRC, if I apply for most of the research I do, I am told it is not human and therefore I cannot apply for it.

**Anne Milton MP:** It is not my field; I am stepping out of my role a bit, I am afraid. It is always the case, but more so than ever before, that there are a lot of people beating down my door saying they want money for research. That is an important role that the national centre, which I am sure we will get on to, is going to play.

**Q115 The Chairman:** I would just like to follow up on the question Lord Willis asked about concrete examples. Might you, at the same time, send us one or more examples of how this trickle down from research that has improved performance of elite athletes has fed into the Olympic legacy of improving the health of the nation as a whole? You do not necessarily need to answer that now, although if you can that would be great. Otherwise, if you could write in with an example or two that would be very helpful to us.

**Anne Milton MP:** If I may say, Chairman, I think it is quite important to say that of course there is a trickle-down effect, but what you need is hard evidence. I am hugely mindful of that. Again, my door is beaten down by people saying, “If we do A, B will follow”. Well, you need to demonstrate that that is the case. It is important, as you say. I will make sure that something is sent to you.

**Q116 Earl of Selborne:** I wanted to ask about National Centre for Sport and Exercise Medicine. As we understand it, this is a virtual centre of participating partners, which are geographically spread, and has a capital grant of £30 million. Could you give us some idea as to what role is envisaged for this centre? Is it to produce a national strategy? What do you feel it can fulfil?

**Anne Milton MP:** I am very happy to talk about this. Maybe it is because I am getting older but I sometimes struggle with things like this: when something is called a centre I expect to see a building. So the idea of a virtual centre is a concept that I needed to get my head
Department of Health (DH), Anne Milton MP, Parliamentary Under-Secretary of State – Oral evidence (QQ 104-128)

around. £30 million has gone in; that is capital funding, and maybe I should say what that has been spent on. I do not know whether you have been told that already.

**The Chairman**: No, please do.

**Anne Milton MP**: At UCL it has been spent to co-locate clinicians with researchers. Translational research is so important, and actually we do not always do that. This goes back to the point about research of elite athletes. We keep research in a cupboard over here and clinicians in a cupboard over there. Actually the co-location of two different disciplines is going to be very important. That money is actually on some building changes as well.

Loughborough is extending a laboratory to translate this research into medical practice. That, again, is building. Sheffield, for me, is a really critical end of this. There it is about co-locating primary care services with specialist sport and exercise medicine services by refurbishing an existing site. That is what is developing: a beacon service to develop a model.

What is quite difficult is to work out how that will make a difference across the country, how that will make a difference to how people promote public health, and how we use sport and exercise medicine as treatment. I did check with my office whether this was a coincidence, and it was, but I actually met with three people from these centres yesterday with the Sports Minister. It is quite interesting watching people from these three centres get together. It was quite apparent to me that they are greater than the sum total of their individual parts. This is not fixed on three places; it will extend. There are other places also doing good work. The idea is that you create a network about research, behaviour change, translational work and persuading clinicians that this is an effective form of treatment, always backed up by evidence. This will spread out and really have an impact on how we view exercise. At the moment that is still a little bit in a cupboard. It is something that we do; it is not part of our daily life.

Q117 **Earl of Selborne**: I am very familiar with the concept of geographically dispersed networks; indeed I chair one myself. Nonetheless, what clearly is needed is some sort of overall vision of what can be achieved nationally that would not be achieved by the sum of the parts without such a formal network. Is somebody writing a plan for the centre that will have a national relevance? You say it is going to be extended; who will determine how it is to be extended? Is there a vision as to what this should achieve?

**Anne Milton MP**: There is a vision; it is about increasing the research body of evidence, education, and increasing service delivery. For me, on a very practical side, I will judge its effectiveness by the service delivery and improving outcomes for people.

Q118 **The Chairman**: What about the continuity of funding for the national centre? We understand that the £30 million as you have described is to set up these three entities, but how are they going to be funded in the next five to 10 years to keep the momentum going?

**Anne Milton MP**: The secret to their continuity is in their success. They will have several opportunities. There will be opportunities to continue to attract the research funding that Lord Winston alluded to. The second thing is about service delivery. I can see that there will be opportunities for them to be paid for their services. The other issue, and this is a field that we do not know how it will develop, is increased opportunities for sponsorship, being mindful of the vested interests I alluded to earlier. There will be opportunities for that as well. We do not have any money, really; this is seed funding. This is about launching something that then, by its own success, will continue to attract funding in.
Q119 The Chairman: So if one or more of them does not succeed then would you just let that wither on the vine and say that it was an idea that did not work out?

Anne Milton MP: I would never say what I would do that far ahead. I would be enormously disappointed and we will be watching carefully to see. There are opportunities for saving money for the NHS at both ends: preventatively—although it is always quite difficult to realise savings by preventing illness—and for treatment, where the savings are substantial. Exercise as a treatment is somewhere you can make substantial savings. One of the problems with it is that there is not a lot of money in it for anybody.

Q120 Baroness Sharp of Guildford: We have been provided with a number of documents from your department: Be Active, Be Healthy and, more recently, Sport and Exercise Medicine as well as the NICE guidelines that have been produced. There are two questions that emerge out of that. One is that you have set up a number of pilots, including one in Sheffield for sports and exercise medicine, and the NHS London scheme, “My Best Move”, which aims to resource GPs to prescribe physical activity to patients, tailored to their health and research needs. How far do you feel you are getting the results of some of this money that is being ploughed into the elite athletes at the moment in terms of the research going on compared to the performance coming out? This picks up the point you were making earlier about the trickle down and how far this has really been fed into the public health service.

Secondly, it was suggested by one of the people who have given evidence to us that a good way of putting this into practice would be to get the GP quality and outcomes framework to incorporate something about the value of exercise as treatment. I wondered whether you had any thoughts about that.

Anne Milton MP: Yes, absolutely. Going back to your point about elite athletes, I may have displayed some slight cynicism about trickle down. We do have to be able to demonstrate that it did trickle down. Things do not trickle down unless you give them a channel to run down, which is partly the point of the national centre. At the moment we are just starting to see it. It would be very hard to produce any good evidence of the impact of the Games, not least because there are so many confounding factors. However, everybody is aware that people are playing sport this summer. That is probably clear; we are all aware of it. We have people running around the country with a torch to remind us of that fact. What impact that has at the front line is what “My Best Move” is all about. We will try to see what evidence we can find to suggest that it has an impact. What matters is that we do use it to its absolute limits. Even if what goes on with elite athletes is difficult to get a trickle down from, we have to make sure we get 100% out of it. That is what the centres are doing, to some extent. That is why working across Government, with all the different Government departments, is really important. If you had the Minister for Transport here, he would talk about how important it is to cut down the traffic on our roads. It would not have struck him a couple of years ago that there is an enormous health benefit. He now does know that there is an enormous health benefit. It is about using every possible tool in the box to extract every possible benefit from elite athletes that we are going to be seeing, into our daily lives.

Q121 The Chairman: Could I just pick up on this question of translation through the NHS? The evidence we have had from the Royal College of Physicians referred to a lack of proper resource and consistent focus in the Department of Health; and the Physiological Society said that health practitioners typically lack understanding of the benefits of exercise.
Department of Health (DH), Anne Milton MP, Parliamentary Under-Secretary of State – Oral evidence (QQ 104-128)

We have heard other evidence that suggests that the medical profession and allied healthcare professions are not sufficiently up to speed on advising and encouraging people about how they can both prevent and treat illness through exercise. I just wondered what your plans are to up the game here. In relation to that, in the new organisation of the healthcare system, who is in the lead? Is it clinical commissioning groups, Public Health England, health and wellbeing boards or somebody else? Perhaps you could just unpack that for us.

**Anne Milton MP:** It is not invalid. I did start by saying that there is not a huge amount to be made out of exercise. Getting somebody who is 70 to walk four miles a day benefits the local community and that individual but there is nobody making any money out of it. One needs to be mindful of that. We have massive changes, which will finally produce the levers that we want. We have the public health outcomes framework, which sits in local authorities and is driven forward by the directors of public health, joint strategic needs assessments and joint health and wellbeing strategies. I do not know whether you have had a list of the public health outcomes framework indicators.

**Q122 The Chairman:** We have it but it would be helpful if you could go through some of it.

**Anne Milton MP:** What is quite interesting, when you drill down into that, is how many involve physical activity. There are two obvious ones: the proportion of people who are active for 150 minutes a week, and the proportion who do less than 30 minutes a week. That covers both ends of the scale. There are also things like use of green spaces and falls prevention, all of which are dependent on physical activity. It would be interesting to look at those and tick off how many apply to physical activity or where there is a benefit for people being physically active.

Then we have the health and wellbeing boards that will sit in local authorities and which I think will be quite an important driver. In a similar way to what we are doing across Government, we are bringing all the departments together because this is a children’s issue, an older persons issue, a social care issue—because physical exercise can keep people out of needing social care—and it is without a doubt a planning issue. It cuts across so many different areas. The health and wellbeing board will be where that is played out. Then you have the clinical commissioning groups. The feed between the two is very close. You have groups of people deciding how they will commission services and treatment.

I am an eternal optimist and I do not apologise for that. I think that people are going to be more mindful, possibly given the economic climate, about what works. It is interesting to hear the royal colleges say this as well: we are not always very good at doing what we know works and not doing what we know does not work. There are some good things that affect us as individuals and people who are professionals. If we know that taking 30 minutes of exercise five times a week will reduce our risk of stroke, heart disease and probably some cancers by a significant proportion, why do we not do it? I had a conversation with the Director-General of the WHO about this. As she and I said, this is the cost of a pair of trainers, or maybe not even that, but we do not do it. Why do we not do it?

I will stop there because I will get into behaviour change. Some of it is about professionals understanding and accepting, which involves education and training, and that is something the national centre will drive. It will help raise awareness that this is cheap, easy and has massive benefits. Cardiac rehab is the obvious benefit; there is a poor uptake. Surgeons love operating though, don’t they?
Q123 **The Chairman:** Coming back to my question: who is in the lead for commissioning such services in the NHS? Did I understand you to say that it would be a mixture of the commissioning boards and the health and wellbeing boards?

**Anne Milton MP:** Sorry, I did not quite answer your question. The NHS Commissioning Board is where it sits finally.

Q124 **Lord O'Neill of Clackmannan:** I am concerned about the fact that a number of people seeking to get fit are not being properly advised by professionally competent people. You are the Minister for professional regulation, as I understand it. We have a plethora of health clubs and facilities, some of which, in the local authority sector, have people with recognised, accountable qualifications. A lot of other people are making money out of it—to use your expression—by running private health clubs where the advice that is given is of a variable quality and where a number of people are not properly qualified to give that advice. Are you aware of the scale of this and are you doing anything about it, given your responsibility for professional regulation? I know this Government does not like regulation but if we are going to play ducks and drakes with people's health using inadequately or not clearly qualified individuals to give advice then I would have thought it was something that perhaps deserves some of your attention.

**Anne Milton MP:** It does deserve some of my attention, and it has some of my attention. We are not very fond of statutory regulation. A lot of the problems we have had in the NHS, and where there have been big scandals—for want of a better word—often involve statutorily regulated professionals. The trouble is that it does not stop bad stuff happening today. However, you are right. If exercise is used as prescription it is important that, if we are spending public money, we are assured that it is well spent and spent by people who have reached an appropriate standard and are achieving a certain quality of service. If we are spending public money on buying something we have to be sure that we are buying well. This is something I am looking at. I have never been lobbied by anybody about poor advice. I think I possibly occasionally have seen an article in the paper. That is partly because a lot of it is in the private market, although provision of leisure services is an area local authorities are working on.

Q125 **Lord O'Neill of Clackmannan:** Sorry, I think you are missing the point. The public sector seems to have standards that are applied. What I am concerned with is the private health club sector. Although we have something in the order of 10,000 sports science students and a number of them will end up these places, it is one thing having a degree and having one or two modules within it, but it is another thing people having the professional qualification that we as members of the public can then have confidence in. This is a point where we put an undue amount of trust on people who are not properly recognised and qualified to do the work.

**Anne Milton MP:** I cannot comment on that. If you went to the private health clubs, such as David Lloyd and LA fitness, they will talk about the professional qualifications of the staff that work there and the staff that are allowed to do training there. To some extent they rise and fall on their professionalism. It is quite a competitive market out there these days. Your point is valid not just in privately run clubs; it is going to be worthy of investigation in local authority-run clubs. I do not know that much about what is necessary to assure the public that somebody has appropriate professional qualifications, but of course that is only the start. You then need continuing professional development and you need to be sure that people's quality is kept up and they are working to a standard that we would expect. That is
something I will certainly look at. It might help me if you have personal examples, because I have not heard any examples of poor practice from the private clubs.

The Chairman: It would be useful for us to hear if you have any further thoughts.

Anne Milton MP: It is something I have already considered, because if you are going to prescribe something you have to be assured of the quality of what it is you are commissioning.

Q126 Lord Dixon-Smith: Is there a recognised qualification or group of qualifications that are relevant?

Anne Milton MP: There are some and I am happy to send you some of those if you would like.

Q127 The Chairman: In this agenda that we have been talking about, are there other countries that you look to that have done better than us? You mentioned there are certain challenges in this country. Where do you look to for good examples of methods of improving people’s health through exercise and sport that we might learn from?

Anne Milton MP: I have responsibility for European and world health matters and whenever I go to Health Council we all sit, put our head in our hands and say the same, which is slightly depressing. Scandinavia and that side of the world is where we always tend to look. What we can do is a pick-and-mix approach. Some people have cracked cycling as a means of travel. Some people are very good at using open spaces. I do not think there is any one country that is really striding ahead. The impact on non-communicable diseases is significant.

Q128 The Chairman: Thank you very much. I would like to draw this session to a close. Thank you very much for answering our questions with patience. There are a few things you have kindly agreed to follow up on and we very much look forward to that.

Anne Milton MP: Yes, I will make sure you receive those.

The Chairman: As you will know, in due course you will receive a transcript, which you are free to edit and make amendments to. Before the Olympics we hope to launch our report; we hope it will be of interest to you and the other departments. Thank you very much.

Anne Milton MP: Thank you very much.
1. What the Government is doing to reverse the sale of school playing fields and ensure there are places for all children and young people to play sport.

In November 2010, Sport England launched the London 2012 sports participation Olympic legacy – Places People Play – a £135 million National Lottery funded grassroots sports participation programme that they have developed in partnership with the London Organising Committee of the Olympic and Paralympic Games (LOCOG), the British Olympic Association (BOA) and the British Paralympic Association (BPA).

Distinct strands of Places People Play (PPP) set out to create an effective and enduring post-Games legacy for grassroots sport. Playing fields are vital to a vibrant grassroots sports environment, and the Protecting Playing Fields fund element of Places People Play enhances Sport England’s role as a statutory consultee on planning applications affecting playing fields by securing the future of many sites for a minimum of 25 years. This £10m fund is investing in improving pitches and bringing disused playing fields back into use, creating a legacy of high quality pitches where people can play competitive sport. Clubs, community and voluntary sector groups, local authorities, town and parish councils and schools will be eligible to apply for the fund. Through this initiative Sport England are working in partnership with Fields in Trust in support of the Queen Elizabeth II Fields Challenge.

The statutory requirement to consult Sport England includes applications affecting any land that has been used as a playing field in the last five years and any replacement of a grass pitch with a synthetic surface. Whilst this does not mean that playing fields cannot be sold, there is an expectation that none will be disposed of if a needs assessment demonstrates a continuing community demand. Schools in England need permission from the Secretary of State for Education before they can sell any school playing fields or any part of a school playing field and the Secretary of State has a general presumption against the need to change the current pattern of school playing-field provision by disposal or change of use. The Secretary of State for Education expects applicants to have first investigated and exhausted all other possible sources of funding before considering the sale of school playing fields.

2. Examples of research in the sports science field, including research in elite athletes, that has improved public health or fed into Olympic legacy.

There is a significant body of worldwide evidence on the health benefits of participation in sport and physical activity for the general population. Development of the UK CMOs Physical Activity Guidelines ‘Start Active, Stay Active’ was based upon a review of existing and emerging evidence, much of which derives from sports science. The development of the UK guidelines was also underpinned by a comprehensive scientific review of the evidence base conducted in the United States and Canada.
The primary sources of evidence used to underpin the UK guidelines were:


In terms of elite athletics and delivering an Olympic legacy, in 2008 the Department of Health commissioned Canterbury Christ Church University to conduct a review of the evidence base for developing a health legacy from the London 2012 Olympic and Paralympic Games. The review concluded that the evidence base to show that the Olympic Games, sports events and sports franchises can impact upon physical activity and sport participation, and upon health related behaviours, was generally poor.


3. Public Health Outcomes Framework

The new public health outcomes framework was published on 23rd January 2012. This sets out two high level outcomes for public health and how these will be measured.

A set of supporting public health indicators will help focus understanding of progress year by year nationally and locally on those things that matter most to public health.

A full list of Public Health Outcomes Framework indicators *Improving outcomes and supporting transparency Part 2: Summary technical specifications of public health indicators, January 2012*, is attached at Annex A.

4. What is being done to ensure the quality of advice being provided by health club trainers?

The Department of Health published a National Quality Assurance Framework\(^\text{20}\) for exercise referral schemes in 2001, which recommends that participating exercise professionals hold appropriate qualifications as demonstrated by their inclusion in the Register of Exercise Professionals (REPs) at an appropriate level. REPs membership signifies that a fitness professional meets minimum National Occupational Standards (NOS) for the knowledge, competencies and skills needed to perform a specific job role, for example exercise referral to benefit specific medical conditions.

SkillsActive is the Sector Skills Council for the sport and fitness industries and is responsible for the standards and qualifications of fitness instructors who provide exercise to patients with a range of medical conditions, usually as part of an exercise referral scheme.

SkillsActive oversees the National Occupational Standards that inform all qualifications and practice in this area. There are standards for providing exercise to patients with a range of conditions including cardiac disease, mental health, stroke, back pain, cancer, obesity, chronic respiratory disease and long term neurological conditions. SkillsActive has an exercise referral and exercise for medical conditions (level 4) panel who oversee the whole process of standards and qualifications. This is chaired by a representative from British Association of Sport and Exercise Sciences (BASES) and has several academics and representatives of relevant associations on the group, as well as practitioners who work in the field.

(This information has been provided by Skills Active)

5 July 2012
Colonel John Etherington, Faculty of Sport and Exercise Medicine, Professor Hugh Montgomery, University College London, Professor Sir Steve Bloom, Imperial College London and Professor Tim Cable, Liverpool John Moores University – Oral evidence (QQ 1-25)

Colonel John Etherington, Faculty of Sport and Exercise Medicine, Professor Hugh Montgomery, University College London, Professor Sir Steve Bloom, Imperial College London and Professor Tim Cable, Liverpool John Moores University – Oral evidence (QQ 1-25)

Transcript to be found under Professor Sir Steve Bloom
What is known about the fundamental underlying mechanisms that result in some many and diverse [sic] health benefits of exercise? Can this knowledge be used to tune the advice to the general public about the kinds of exercise they should undertake to treat or prevent different conditions?

The adaptations that occur in response to training can and are frequently applied to the practice of rehabilitation. Guidelines for exercise, which benefit the health of the general population, are based on these principles.

Much of the physical benefits of rehabilitation appear to relate to muscular and cardiovascular conditioning. The interesting finding appears to be that muscular training also benefits those with the most severe disease, such as those with heart failure or respiratory disease. Much of this benefit appears to arise from improved muscular strength and energy efficiency and adheres to the principles of training seen in elite athletes, but working at the lower end of the performance spectrum.

25 June 2012
Evidence Session No. 3

TUESDAY 19 JUNE 2012

Members present:
Lord Krebs (Chairman)
Lord Broers
Lord Cunningham of Felling
Lord Dixon-Smith
Baroness Hilton of Eggardon
Lord O’Neill of Clackmannan
Baroness Perry of Southwark
Lord Rees of Ludlow
Earl of Selborne
Baroness Sharp of Guildford
Lord Willis of Knaresborough
Lord Winston

Examination of Witnesses

Professor David Patterson, Chairman, Institute of Sports and Exercise Medicine; Liz Nicholl, Chief Executive, UK Sport; Professor Nick Wareham, Director of the MRC Epidemiology Unit; and Professor Alan Silman, Medical Director, Arthritis Research UK.

Q69 The Chairman: I would like to welcome our witness panel for this evidence session. Thank you very much for coming. I would just like to remind you that, as you can see from the sign up above the door there, we are being broadcast on the web so any sotto voce comments will be spread, through the microphones, to the public at large. The other point I must remind members of the Committee of is that, if they have not spoken in this inquiry before, they should declare any relevant interests before they first speak.

We have about 45 to 50 minutes for this session and I would like to invite the members of the panel to introduce themselves very briefly. If you wish to make any opening statements feel free to do so and then we will move into the questioning.

Professor Patterson: I am David Patterson. I am a cardiologist and professor of cardiovascular medicine at UCL. I am also the Chairman of the Institute of Sports and Exercise Medicine. I should declare a potential interest: I have just set up a spin-out
company from UCL, which is involved in health informatics and the electronic health record. I will probably mention that during the course of the discussion.

**Liz Nicholl:** I am Liz Nicholl, Chief Executive of UK Sport. I have been Chief Executive for the last two years; I was previously Director of Elite Sport for UK Sport so I have been with the organisation since 1999 and have seen it through a very interesting journey, as we head through London and onwards. I have no interest to declare, except for an interest in the debate that will be happening today.

**Professor Wareham:** Good morning, I am Nick Wareham. I am the Co-Director of the Institute of Metabolic Science at the University of Cambridge, where I direct the Medical Research Council Epidemiology Unit and the UKCRC Public Health Research Centre of Excellence for Diet and Activity, which is a long title; the short title is CEDAR. I am here representing the Medical Research Council this morning.

**Professor Silman:** I am Alan Silman, I am currently the Medical Director of Arthritis Research UK. By background, I am a rheumatologist and epidemiologist, and for 20 years I was Director of the Arthritis Research UK Epidemiology Unit at the University of Manchester. I am here this morning partly because of Arthritis Research UK's interest in sports injuries and the long-term musculoskeletal consequences of those. We are on the cusp of awarding a National Centre, with support of £3 million, to a consortium of universities, to undertake research into this area.

**Q70 The Chairman:** Thank you very much. We are interested in two themes in this inquiry. One is the quality of research that is there to underpin the improvement or performance of elite athletes; so we are interested in how good is the science and whether there are good examples of that science. We are also interested in how the findings in that scientific arena and the practical implication of them are translated into benefits for the wider public, which is seen as part of the legacy of the London Olympics.

I would like to kick off by focusing on the first part, which is the quality of scientific evidence that underpins methods to improve elite athletes' performance and whether you could give us your views on the quality of that evidence. It would be particularly useful if you could give us examples of how cutting-edge science has been used to improve the performance of elite athletes.

**Liz Nicholl:** I should explain that UK Sport's role is predominantly as the UK's high performance agency for sport. Our role is primarily to support Olympic and Paralympic success, as the UK's high performance agency for sport. We invest in about 55 sports and 1,400 athletes, as I am sure you know. We focus on those athletes with the best prospects of medal potential in London and in 2016. By investing in those athletes we invest in the system of support. The system of support of interest to this Committee is twofold. One is that we invest in the UK Sports Institute network, predominantly the English Institute of Sport, which is a wholly owned subsidiary of UK Sport. The English Institute of Sport is positioned as the provider of choice for the sports, for their science and medicine service provision in areas of physiology, strength and conditioning, psychology, performance nutrition and performance analysis. So that is the day job of the network.

In addition to that UK Sport has invested about £7.5 million over the last four years in research and innovation. That is very focused on where it can make a performance difference. We do not conduct that research; we work in partnership with other agencies that can provide the expertise. Those agencies, in their own way, will have their own quality assurance mechanisms within their own systems. We work with about 25 different academic
groups and probably about 50 different groups in industry, ranging from the bigger ones, such as BAE Systems and McLaren, down to some small and medium-sized enterprises or even garage innovators, who are looking for where we can find a performance solution to an issue that has been identified by a sport.

Everything that we do is focused on what the performance challenge is for the athletes in the sports we fund. We look at the potential performance solution, the information out there—because our research team scans the environment to say what information is out there in formal institutions with research responsibilities—and how we can work in partnership with them to bring our resource to the table, to take that research one step further for a real performance gain. That is our approach. We hugely depend on the expertise that rests in other agencies, in academia and industry, and we work very well and co-operatively with the research councils involved in science and exercise medicine, so that we can access resources, expertise and funding. So that is our approach to work.

The examples would all be about where it can make a performance difference. Our work is in equipment designs, through making boats go faster and athletes run faster; coaching tools, which would be about field-based measurements that can inform performance coaching; training signs, such as information available to athletes and coaches about best practice in warm-up, recovery and managing physical stress; and performance medicine. Performance medicine has been a big one for us, but it is a relatively new one, looking at better ways of managing injury surveillance and the risk. We can invest a significant amount of public funding in athletes but the most important thing is that they get to the start line fit, well and able to compete. So it is about keeping them fit and healthy, particularly in these last few months as we lead up to the Games. So illness management is an important one as well. Those are the areas of work that we have an interest in but we are relying on the expertise that sits in other organisations.

Q71 The Chairman: You referred to your research budget. How much was it?

Liz Nicholl: £7.5 million over four years.

Q72 The Chairman: Some of that is directed towards kit and some towards physiology, so the human being and how that is related to performance. Do you have any figures on how that divides up?

Liz Nicholl: I certainly can provide that to the Committee. The focus of our decision-making in how we prioritise the use of that spend is all about where the best medal prospects are. So we will always prioritise the performance solution to support our very best medal prospects. So sports and athletes the furthest away from the podium are least likely to benefit from the research and innovation work that we do.

Q73 The Chairman: You said—and I paraphrase; I hope I have not misrepresented this—that you rely on others to assure you of the quality of the science that is being fed in to elite athletes.

Liz Nicholl: We do but, in addition to that, we have experts that we employ ourselves. You have met Dr Scott Drawer, who has already given evidence to this Committee, and he leads on this work. To support Scott and his responsibilities, we have established a research advisory group of experts so that they can, as a group, advise on the research processes that we will be investing in and any ethical issues that would need to be considered, over and above what might be considered by a third party that we would work with.
Q74 The Chairman: Some of the written and oral evidence we have received has suggested that there is, on the one hand, a gap between cutting edge science and its application in sports—that is what the Physiological Society told us—and on the other hand the fact that the quality of research in sport and exercise medicine is not always very strong. How do you, as the body responsible for improving elite athlete performance, deal with those issues? Are you aware of them, and what is your response?

Liz Nicholl: I would probably have to refer to my team to see whether they are aware of them. As a Chief Executive, I am aware that there are challenges in the way we work with partners. I would say that this is about applied research; it is not research for research’s sake. We only invest in research with an outcome that is going to make a performance difference. We are confident that in fact the projects that we invest in do make a difference at the front line, because we can see that in the way the athletes are performing. I do not know whether that answers your question.

Q75 The Chairman: Maybe I had better give the others a chance to come in on the core question of the scientific evidence underpinning the methods used to improve elite athlete performance. Professor Patterson, would you like to come in on this?

Professor Patterson: It is not really my expertise, as such; I am more interested in how that research spins down to the lesser elite athletes.

Q76 The Chairman: Let me ask whether either of the other members of the panel have any views on this issue.

Professor Silman: One fact of interest to us is the avoidance of injuries in elite athletes. There are particular challenges there, and there are areas of research that are important and ripe for exploitation. One of the messages coming through to us is that there is a need for integration of different components, for example, identifying predisposition in relation to genetics or other traits that we have, plus training regimes. Although this is important for the weekend athlete, one of the messages coming through to us increasingly is that there is a large amount of activity for elite sportspeople. For example, we heard some examples last week of Premier League football teams, cricket clubs and so on, undertaking some quite intensive screening activity, such as looking at the ultrastructure of the skeleton, which might identify people who might be at risk of injury. On the one hand that might suggest that people have to avoid or change what they do, but my understanding is that people are getting really quite smart and developing personalised training regimes for our elite sportsmen to help them avoid injury.

Q77 The Chairman: Is that something that you recognise, Liz?

Liz Nicholl: That medical screening does take place within the Institute network to support the elite athletes that are funded. We focus the support services of that quality around a relatively small cohort of 1,400 athletes. I am confident that they get access to that and I am confident that the system is learning. So there are advances on an ongoing basis.

Q78 The Chairman: Before I turn to Lord Rees, I wonder whether Professor Wareham would like to make any comments on this question of the quality of scientific evidence underpinning athlete performance?

Professor Wareham: I would only say that it is rather outside of MRC’s remit. MRC’s remit is focused on discovery science as it relates to physical activity, health and the underlining
physiological mechanisms. We regard science where the end point was performance as being within the remit of BBSRC. You have had full input from them already.

Q79  The Chairman: Do you do anything jointly with BBSRC? Surely there is a continuum between underpinning physiology, genetics, molecular biology and its application and this is an area that falls between stools.

Professor Wareham: One of the new initiatives that MRC is pushing currently is the experimental medicine grand challenge, which is the study of disease mechanisms in humans. That is a scheme that will cross that divide between normal physiology and pathophysiology, as you suggest.

Professor Silman: One point worth making is that, when one talks about elite sportspeople, perhaps one should consider some of the performing arts as well, particularly dance. They are elite sportspeople with a rate of injuries, and there is a body of research emerging in regards to those people.

Q80  The Chairman: Before I move to Lord Rees, I just want to check something. I have heard so far one concrete example of how developments in science have translated into improvements in the treatment or prevention of injury in elite athletes, which was the comment from Professor Silman. I just want to check whether there are any other examples that you can think of at this point?

Liz Nicholl: None that I would want to draw attention to over and above the evidence provided by my team. That is probably the better-quality information.

The Chairman: That is fine; that is all I needed to know.

Q81  Lord Rees of Ludlow: I want to turn to the second strand of the inquiry, as indicated by the Chairman: whether the results of research on elite athletes are relevant to the general public. In particular I would like to know what funding is available to researchers exploring the translation of sport and exercise research into health interventions, treatments and benefits to the wider public.

Professor Patterson: That is a very good question. One of the sadnesses is that a lot of the research for the elites only comes down to a relatively high level, and most of the weekend warriors do not benefit from it yet. However, I think it is part of a drip-down, and in many other walks of life sciences where the elite related research does come down—for example in the motor industry and space—so it does eventually get there.

The problem, if I can work from the bottom up, is this: we have a major problem in this country, as in many other countries, where sport and exercise medicine—and there is a distinction there between medicine and science—is a relatively new discipline. It is only five years old, and the research within that discipline is not great. There is a disconnect. The problem is that, with a new discipline, there is not a cadre of research-active people in sport and exercise medicine. One of our roles in the Institute of Sports and Exercise Medicine is to try and put that right. It is not easy because without research-active clinicians and without research funding going in—it is going in to science but not medicine—and without the infrastructure, it is quite a task.

At your last meeting, you were talking about the three new centres of excellence in the country, which are connected but they are all about money for buildings.\(^\text{21}\) There is quite a

\(^{21}\) Note by witness: buildings and equipment.
lot of work still to be done to make the connection between buildings and research-active people linking with others—research scientists, anthropologists and a whole range of others. Those links have yet to be made and translated to the benefit of sport and exercise medicine. Within sport and exercise medicine, there is the beginning of that cadre of people, but it is very early. Does that answer your question? It is a very negative view.

**Lord Rees of Ludlow:** We will come on to the centre of excellence later I think.

**The Chairman:** Would any of the others like to come in on this question?

**Liz Nicholl:** I would like to answer the first part of the question, about the application of research for high performance and how that drips down. I think it is a matter of time. The examples are with Formula 1 and space; we are in world-level competition here so there is an element of confidentiality around some of the work and the outputs from the work. When we are on to the second version, the first version will be available. That is the approach that we apply in making information more widely available for others to access.

**Q82 Lord Rees of Ludlow:** Is there anything special to be learnt from Paralympic competition that might be relevant to people with particular handicaps?

**Liz Nicholl:** We work with Paralympic athletes in much the same way as we do with Olympic athletes. All the same principles apply, so we would still work on kit and equipment, but this would include prosthetics as well. We work on performance medicine and injury surveillance, but of course it is more complicated so there is a lot more detailed work to be done and a lot of care has to be taken with the athletes.

The practitioners that are working with the elite athletes now are learning by the day. As the system develops, they are developing in parallel to it. There will be a wealth of information and knowledge created by this work and the investment in elite athletes that would not have been there had the public investment not been available. I support the comment that was made earlier about the fact that it is early days in the professionalisation of sports medicine practitioners. I remember being involved in discussions at the very start when consultancy status was given. I think we will get there but it is a matter of time.

**Q83 Lord Willis of Knaresborough:** I am particularly interested in the connection between elite sports and the general public. Ms Nicholl, you mentioned in your earlier comments that one of the areas that was very important was injury. Clearly for elite athletes of whatever sort, the recovery time from injury will make the difference between them competing in the first place and certainly competing well. Exactly the same applies to somebody working in a factory, or a nurse who injures a leg by falling on the steps. There is a crossover there. I just wonder whether you could comment on the way in which genetics and the new developments in muscle and tissue repair using gene therapies are actually being taken forward by elite athletes and how that is spreading forward into ordinary medicine and care.

**Liz Nicholl:** I wish I could answer your question, but I have to be honest and say that that would be a matter of detail that I would have to ask my team to respond to. I am very happy to take that question away and provide the answer. I completely understand what you are saying. I cannot answer about gene therapy and the extent to which that is being applied for muscle repair. With a lot of the lessons being learnt from the work being undertaken with elite athletes, particularly where there is research behind that, that research is generally published. We learn from published material, and research that we invest in is, the
majority of the time, published and available for others that have responsibilities for taking forward that information.

The Chairman: If you could write in and give us a response, that would be helpful.

Q84 Lord Willis of Knaresborough: Could Professor Wareham respond? I would have thought this would come forward from you.

Professor Wareham: Actually it is not a topic that has really surfaced within the Medical Research Council. Your point about whether we can understand about rehabilitation from elite athletes and translate that to the general public is a good one. Since those interventions would principally be delivered by the NHS or occupational medicine, that is an interface between sports science and NIHR on behalf of the NHS. It is less something that comes to MRC. It would be considered if it did, but it just has not.

Q85 The Chairman: Professor Silman, would you like to add to that?

Professor Silman: Based on extrapolation from other areas, the likelihood that gene therapy would be of value for muscle repair in the near future is slight. There is an issue about other areas of regenerative medicine and cell-based therapies, which are being used—for example using stem cells to repair cartilage or ligaments. Jointly the Institute of Sports and Exercise Medicine and Arthritis Research UK had an international workshop a year or so ago, and these technologies are being used for elite sport people. I do not know whether Professor Patterson would agree, but our sense was that it is quite early days to know whether they are beneficial in the short-term and, perhaps more importantly, whether they may have long-term health benefits.

Q86 Lord Winston: Lord Willis leads me very neatly into my question. Let us take a step back. What notice is taken of animal research? For example, the most elite athlete is the racehorse. There is the PEPCK mouse, which can run 20 times further than a normal mouse, uses oxygen in a different way and has extraordinary mitochondria. What kind of work is going in to see whether or not that can be translated into human physiology and, therefore, into all aspects of healing as well as improved performance?

Professor Wareham: I am familiar with the PEPCK knockout mouse and the very illustrative videos you can see of the extent to which it can keep running and running. People have tried to look for variations of the same gene in humans to see whether it is associated with performance. We have done that ourselves and it has been negative; we have not found the same phenomenon in humans. MRC has a whole investment in mouse models of human disease and pathophysiological situations. I see no reason why that research, in some instances, could not result in better understanding about performance and its relationship to health.

Q87 Lord Winston: It is a mouse that has 30% longer longevity than a normal mouse.

Professor Wareham: Indeed, it is very impressive.

Q88 Lord Winston: What about racehorses? There is a massive amount of physiology there, as well as metabolic chemistry.

Professor Wareham: I do not know anything about the interface between equine physiology and humans; I am sorry.
Professor Patterson: There are some associations, although not many formal ones, between veterinary science and medical science. UCL certainly has associations. I am not aware of anything that has come out of that research yet that is of benefit to humans. It is very fascinating, though, and I am sure that in time it will. The downside of horses is that they are so refined that the gene pool is not as variable as ours. That is a downside.

Q89 Lord Dixon-Smith: I just wanted to pick up on the last point Lord Winston was asking about. Racehorses have been selectively bred for two, pushing on for three, centuries. So, as Professor Patterson just said, the gene pool is very highly and specifically selected. There is a commonality there. When you are dealing with elite athletes you are dealing very much with individuals. Whilst I understand that there might be a large pool of scientific evidence underlying everything that is done with them, in the end is there not a great deal of ad hocery? What works with one person may well not work with another. When you are dealing with the elite and you are seeking to maximise the performance absolutely, whilst a lot of information is useful, what actually works for one individual may well not work for another one. It is about finding the right balance for each particular one. I do wonder how scientific that is; it seems to me that it is frightfully ad hoc.

Liz Nicholl: I agree. All our interventions are, as I said earlier, focused on achieving a performance outcome. We prioritise our work in support of athletes with the very best medal prospects. So some of the work that we do is very individualised and therefore there are limited lessons that can be learned and shared from that very individualised piece of work to support an individual athlete.

In terms of it being ad hoc, this is something we have debated. We have debated the way in which research protocols exist in other industries and the issue of the cohort size being so small in the areas of work that we have to focus on. Our approach is always to use as many of the same principles as we possibly can. So we are dealing with observation, measurement, correlation, looking at cause and effect and translating it into impact. However, we have to really rely on the outcome and whether the outcome has achieved the impact that we wanted. It is very hard to then separate out the cause and effect when you are looking at individual athletes. So yes, it is an issue. We just have to focus on the task in hand, which is supporting the elite athletes the best way we can. Not everything is transferable.

Q90 Lord Rees of Ludlow: Clearly, to be convinced, you need to have a fairly large sample with randomised trials and all of that. As you said, you cannot have that for the super-elite athletes because there are too few of them. What are the prospects of doing randomised trials to see what lessons can be learnt and make that convincing for the wider population? Have any studies of that kind been done already?

Liz Nicholl: I am not aware of any studies but I am sure that is possible. The challenge when working with elite athletes is that they are not often in a laboratory setting; they are actually out there in the training environment.

Lord Rees of Ludlow: There are too few of them as well.

Liz Nicholl: Yes, there are too few of them and, given the environment they are in, the focus to their activity has to be on what makes a difference to them rather than research for research’s sake. So there is a balance here. We find that the best approach is not to use the very elite athletes who are really focused on their next competition—whether it be world, European or Olympic—but to use athletes competing at a national level and at
university level. There are very competent students that are then also available for research support.

**Professor Patterson:** I would just add that there is the cohort of the military, who I think you have discussed already. They have become pretty competent and pretty fit; they may not be elite, although some of them are. There are cohorts around where the numbers can rise and the research can be richer and more definite. I would just add that randomised trials are only one scientific way of making progress; you can make it in many other ways. You do not have to have randomised trials.

**Q91 The Chairman:** Are there any examples of using randomised control trials, not necessarily with elite athletes, but in relation to the wider population and with sub-elite athletes?

**Professor Patterson:** Professor Montgomery discussed using the military with you last time. The numbers there could rise.

**The Chairman:** I was thinking of particular examples, rather than what might happen.

**Professor Patterson:** No, it is more about what might happen.

**Q92 Lord Broers:** I have a question perhaps for all of you. I wonder whether longitudinal studies are going on, which study these elite athletes when they cease to be elite athletes and continue in life. I noticed that Professor Silman is an expert in the musculoskeletal field and arthritis. Do athletes wear out their joints or do they make their joints last longer? Are boxers damaged in the long run by their activities? Do you follow those things and go on long after their lives to try and learn from that?

**Professor Silman:** Arthritis Research UK is making a substantial investment to address these questions. I will try to be brief as there are a number of issues here. Firstly, longitudinal studies are being undertaken. There are two ways of doing it. Firstly, you can identify those individuals at some stage later on in life based on previous records, and you can screen them currently to look at their level of injury, osteoarthritis and so on. In those studies you can get an answer relatively quickly. That relies on having fairly solid data about their exposures 10, 20 or 30 years ago. The challenge is that, if you want to do longitudinal studies on athletes today and measure some of their detailed characteristics at baseline that might predict their outcome, there is an anxiety that it may be 10, 20 or 30 years before we have the answers.

There are some tricks that we can think about applying. One is what might be called intermediate outcomes, or intermediate phenotypes. Rather than waiting until an athlete develops arthritis that becomes significantly apparent, we can ask whether there are biomarkers—for example, whether there are things you can measure in the blood or things that may be relevant on an MR scan that are seen quite quickly, which might predict the development of disease in the future. These studies are starting to be done, and it is very much the kind of work we want to foster within the charity.

The other thing I would say is that there is a very mixed picture here, which is confusing for athletes and for the wider public. On the one hand there are some studies suggesting that with significant injury—for example, if you damage your cruciate ligament—you have a substantial risk of developing arthritis. What about the kind of injury from overuse and excessive use? We know that the use of musculoskeletal system appropriately is beneficial to musculoskeletal health and the body responds by developing and nurturing cartilage and bone. Most runners, appropriately training and using appropriate footwear, will not have
problems. However, there are groups that do. The challenge is, rather than saying “running is bad” or “running is not bad”, to try and identify the key research questions of what the factors are associated with that risk. This is a research agenda we will need to follow.

Q93 Lord Cunningham of Felling: Given that there are a plethora of bodies and institutions involved in this, is there any attempt by anyone, or does anyone have the responsibility, to create a co-ordination or overarching strategy of this work? There are sport and exercise scientists, medical researchers, health care professionals and sport and exercise researchers; does anyone try to bring all this work together, not just because that in itself would be worthwhile but because it would also, one assumes, expose those areas that are not being properly addressed?

Professor Patterson: That is a fascinating question and you are absolutely right. The history we have to put right is that researchers, just like many people, tend to work in silos, relating to a small group of people. We have opportunities now, with information technology and with other means, of developing much more connectivity, so people are beginning to work more together. Within the university framework, some of the grand visions that many of the universities are developing is of that nature: to bring disciplines together that hitherto have not worked together. We in the Institute have been trying. We are an unusual body; I have been told that we, the Institute of Sports and Exercise Medicine, are the only institute that has representatives of sports science, sports medicine, elite athletes and the lay public. We would like to become an organisation that plays a part in a facilitating role. We have done it in the past with the development of the discipline of sport and exercise medicine, and we would quite like to do it in the future. There are not many bodies of that nature around. I know that the intent for the three institutes being developed in the UK, with the £30 million, is for them to do a similar sort of thing.

Q94 Lord Cunningham of Felling: You said earlier that they were spending their money on buildings.

Professor Patterson: That was what the money has been defined for. I am sure that, if the universities and others are wise, they will populate that with research activity and research monies. There is also an issue with connectivity. It is very easy to be in an ivory tower, and it does not then get spread out to the public. That is another connectivity that we have to work on very hard. So I think your question is absolutely right and we should keep it high on our agenda.

Q95 Lord Cunningham of Felling: I do not want to put words into your mouth, but does your answer imply that at present no one has this responsibility?

Professor Patterson: I would say not, but I would look to my learned colleagues.

Professor Wareham: It is a very large and diverse field with different interfaces between organisations. In our case, there is excellent strategic co-ordination of issues related to prevention, physical activity as it relates to public health research, and ageing. There are issues like the National Prevention Research Initiative, which brings together 16 different funders and has funded 22 different projects related to physical activity and health, to the tune of £8 million. So there is very close, careful, strategic co-ordination of specific areas but I would agree with David that there is no one organisation that has an overview of the totality.

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22 Note from witness: sports medicine, public health medicine, elite athletes.
23 Note from witness: research active people and raise research monies.
Professor Silman: David would probably be better qualified than me to talk about the role of the Faculty of Sport and Exercise Medicine. Do you feel that is relevant?

Professor Patterson: No, because that is purely medical. There is an issue there in terms of medicine and its connectivity. Yes, medicine has to be part of the equation, and the faculty is part of the equation, but the connectivity in one body does not yet exist.

Q96 The Chairman: Ms Nicholl, if you, as UK Sport, want to interface with the scientific and medical community and ask where the key advances that could lead to enhancement of our elite athletes performance are going on, is there a single contact point? How do you make that entry into the scientific and medical community?

Liz Nicholl: There is not a single contact point from our perspective.

Q97 The Chairman: Does it look co-ordinated from your perspective?

Liz Nicholl: Individuals, from experience, know their way around, and there is greater co-ordination than there previously has been. We certainly play our part in trying to help facilitate that co-ordination for the performance outcomes that we are seeking. There has been a lot of co-operation but there is no one point of co-ordination. That would really add value to the whole system

Q98 Lord Cunningham of Felling: Is this lack of overarching co-ordination a lack of resources or just a lack of will?

Professor Patterson: It is both. It is culture, but resources play a large part.

Professor Silman: As far as Arthritis Research UK’s investment in this field is concerned, £500,000 of it has been set aside for what we refer to as national networking activities. The idea is that, although there would be a centre comprising a consortium of universities, the charity’s aim is that, where appropriate, these activities are networked, identifying where their strengths are elsewhere, encouraging training, exchange of knowledge et cetera. So there is some resource going in from the charity sector.

Q99 Baroness Sharp of Guildford: The BBSRC have funded two collaborative programmes with UK Sport. One of them was on high performance sport as a model for acquisition, retention and retraining of the individual skill base, and the other one was a model for biological research. Have you had responses to this call for research proposals and is there any proposal to co-ordinate the work going on within these collaborative projects?

Liz Nicholl: I am afraid that I do not know the detail. There is evidence from BBSRC, which has been collaborated on by my team, but I do not know the detail about where this now is. I do think this is an example of where we work in partnership to identify something really beneficial to the elite community. Actually we know that there is expertise and resource out there and the work we do with the research councils generally is to do exactly this: to identify where we can get the best research and the best financial support to address this solution.

Q100 Baroness Sharp of Guildford: I take it part of your £7.5 million has been devoted to this, has it?

Liz Nicholl: We would probably be putting some partnership funding into this. I do not know the detail of it. Part of our aim is to influence the research councils’ agenda for the
Institute of Sports and Exercise Medicine, UK Sport, Medical Research Council Epidemiology Unit and Arthritis Research UK – Oral evidence (QQ 69-103)

investments that they make. In some instances we do not have to put any resource into it but we bring together the opportunity for the subject matter to be relevant and something that is going to actually translate into something that will make a difference. That is a huge inspiration to those who do research.

Q101 Baroness Sharp of Guildford: Most such projects would have some form of dissemination required of them.

Liz Nicholl: We bring the environment together to allow that to happen.

Q102 Lord O'Neill of Clackmannan: A lot of attention has been given to the £30 million in buildings. It was suggested to us that some of it is actually refurbishment; it is not quite new buildings. The point is that, already, within this national centre there are three elements. We were told that, if people were good, we might get another two, but it was not very clear how that process was going to be achieved. Thereafter it appears that everybody is in it for themselves, trying to compete for research resources. Do you think this is the most appropriate way of conducting this, with a federation and this divided approach? Is it really about people playing to their strengths and each one will contribute something different, or will we have a degree of overlap? Professor Patterson, you raised the question of the buildings and there being no money in the future. My concern is that we have the buildings, but are we going to see a scramble for resource in which the devil will take the hindmost?

Professor Patterson: That is a complicated question to answer. In a way it is a piece of a jigsaw. The expertise, by definition, will be located in different parts geographically. That is not just the case in the UK; we are concentrating here on the UK but this is an international activity, so there may be, for example, somebody in America doing a particular piece of work that is highly relevant. So there is a communication issue about who is doing what and where, which we need to address. I mentioned at the beginning that technology can help us in at least identifying who is doing what and where. I think you are making a slightly critical point about competition. I think that competition in research is very healthy; there should be good, healthy competition of people wanting to be the best. So one does not want to gainsay that in any way, but one wants to know what is going on, who is producing what, and the links. The research funding bodies are also encouraging that process because they want research submissions from a number of different sites—different universities, different players. So they are also giving that message out, as are universities. So it is a jigsaw puzzle and it is a mixture of good competition and high quality research but with much more connectivity and knowledge about who is doing what and where.

Q103 Lord O'Neill of Clackmannan: At the end of the day, this is a centre for sport and exercise medicine. Which of the two do you think will emerge? Do you think there are tensions between sport and exercise science and medicine? At the moment, one gets the impression that the medical establishment, even though it is in its infancy, is better placed to take advantage of it than sport. One would therefore say that the medical research may be going on in one shape or another, but how is sport going to get its share of the outcomes?

Professor Patterson: You missed out the magic word, “health”. Most of them also have health within their title as well. Certainly, the one in Sheffield is very much oriented towards primary care, secondary care and health, with the university. They are interconnected. What goes on in the sporting field enables activity. I have to make the statement that a lot of people are actually put off by sport, so one has to use words very carefully. Dance is a very valuable activity, but it is not a sport. Again, there is a bit of a jigsaw puzzle. The intent
of these centres is to link in with primary care. We have not talked at all about that area and the commissioning and the integrated care organisations that are emerging. There are some opportunities to move some of that research activity into that arena and the public will benefit from that. That is a huge area that we have not really addressed today.

The Chairman: We are running out of time, so I will have to draw this session to a close. I would like to thank the four witnesses very much for your contributions. There are a few points, particularly from Liz Nicholl, where we would like some follow-up in writing, if you would not mind. In due course, you will receive a draft of the transcript of this meeting and you will have an opportunity to make any editorial corrections that you wish to make. In the mean time, thank you very much indeed for your attendance today.
Intelligent Health – Written evidence

My Best Move for NHS London

Introduction

My Best Move is a project initiated and sponsored by NHS London to increase physical activity in patients with long term conditions. It is one of the main legacies of NHS London for the 2012 Games. This has been delivered by Intelligent Health, a company founded by Dr William Bird MBE who is a GP with 20 years’ experience of physical activity promotion in primary care.

Dr Bird has delivered training to 48 GP practices in 28 London Boroughs. The practices have varied from single-handed practices to polyclinics.

The format of the training was a 1.5 hour session, usually at lunchtime with GPs, nurses and in most cases administration staff at their own surgery premises or sometimes jointly with a neighbouring practice. The scheme aimed to have the physical activity lead for the local borough in attendance – a person who is employed by either the NHS or Local Authority.

The aim of My Best Move

• To educate GPs and staff about the benefits of physical activity so that they can improve their confidence and skill in advising patients to become more active.

• To create consistency about how to diagnose physical inactivity using GPPAQ. (General Practice Physical Activity Questionnaire).

• To provide GPs with the skills on how to deliver a brief intervention to encourage the patient to change their behaviour.

• To help GPs understand what activities are available locally and how to signpost the patient to suitable activities.

Key problems identified

Not a single GP or nurse knew the current DH physical activity guidelines. Only 10% of GPs knew the previous guidelines of 30 minutes of moderate activity five times a week. Nurses were more informed.

Despite evidence to the contrary many GPs still identified gyms and sport as the answer to physical activity promotion. “If we could make it free for my patients many more would take part in gyms and become more active”. Evidence tells us that informal and unstructured activities are more likely to be sustained.

There was a significant problem of communication between the physical activity leads and GPs. The council-employed staff complained that they were unable to get an appointment with the GPs directly to explain what is on offer. The GPs said that the offer of activities was too confusing with lots of leaflets which often changed. They also did not see this
Intelligent Health – Written evidence

information as important. Every borough had well organised Health Walks yet GPs did not know of their existence even when sometimes they started the walks from the surgery.

Exercise referral provision was very patchy with most GPs disappointed that there was often a long wait for the patient to start and they received no feedback so unable to judge whether it had been a success. Some areas were more organised but all GPs complained that the referral forms were too complicated.

GPs’ knowledge of physical activity was very low. This was the first training that most had ever had. Initially they were sceptical about the training but every practice we visited offered more time than had originally been allocated once they realised that physical activity was a key factor in clinical care.

GPPAQ is the official Department of Health measure of physical activity widely used for Health Checks and provides READ codes that are directly fed into patients’ records. However GPs were not happy that everyday activities such as walking and gardening were excluded from the algorithm as a patient who is genuinely walking 5 hours a week would be classed as inactive.

What content had the most impact with GPs

1) Low fitness was the single biggest single cause of mortality. Obesity in contrast made very little contribution to all-cause mortality.

2) Getting people who do less than 30 minutes a week to do more than 30 minutes a week is the priority.

3) Increasing physical activity in the elderly is a priority and, for commissioners, has a rapid return on investment.

4) Walking should be the first line treatment for every condition and this may be all that is required. Walking has very few contraindications. Gyms, sport and exercise classes offer very little additional benefit and are generally unsustainable.

5) There is inconclusive evidence to recommend Exercise Referral schemes.

6) Physical activity is both a potent anti-inflammatory and anti-ageing agent. This information transformed the way GPs viewed physical activity.

7) GPs and nurses were very interested in the evidence that suggested that obesity was less important than inactivity. Patients only see physical activity as a way to lose weight and yet those who are ‘fit and fat’ will live longer than those who have a normal weight and are unfit.

8) Only half of all GPs knew that physical activity prevented cancer and less than 10% knew it prevented dementia.

9) Very few GPs understood physical activity as a treatment. All were surprised by how effective it is in treating cancer, hypertension, diabetes, depression, osteoarthritis and COPD.

Recommendations

1) Physical activity and obesity must be separated in policies and guidelines and dealt with separately.
The public and health professionals see physical activity mainly as a way of using up calories and losing weight.

Yet only 10% of the health benefits (for the prevention of cardiovascular disease) of physical activity are related to weight loss.

Patients often stop exercising if they don’t lose weight and then lose the remaining 90% of the benefits of being physically active.

2) The Department of Health and NICE need to set a 5 year plan to get physical activity QOF points into 2-3 long term conditions starting with Hypertension

- This requires an agreed measure of activity that can record change. (The current official measure of GPPAQ is unlikely to remain fit for purpose)
- An agreed brief intervention in primary care.
- To work with the BMA, RCGP and Faculty of Sports and Exercise Medicine to ensure full buy-in from the professions and commissioners.

3) GP education about the science and promotion of physical activity

- Start in medical schools
- Continue in postgraduate training.
- Best delivered in the existing GP practices with all staff present.

4) Develop and deliver a marketing strategy to increase awareness of the Government’s physical activity guidelines to both professionals and public.

- There is no awareness of these guidelines in primary care

5) Government to help create a cost benefit analytic tool for promoting physical activity to help commissioners calculate the ROI.

- This could be based on the WHO HEAT Tools.

6) All Government departments to co-ordinate their approach to walking. Increasing walking would be the single most important and achievable intervention for health and the greatest legacy of the 2012 Games.

- Benefits include reducing carbon and congestion, reducing crime, increasing independence in the elderly and life expectancy, strengthening community and increasing productivity.
- Increasing walking from an average of 0.25 to 1.5 miles a day doubles the chances of survival in men.

Plans for My Best Move

1) NHS London has supported the production of a book designed to help GPs become more confident in delivering physical activity interventions. Written by Intelligent Health and reviewed by London health professionals, the book will be sent to all GPs who have received the training by mid-July. This book has been designed for the
Intelligent Health – Written evidence

GPs to use in the consultation similar in principle to the BNF when trying to choose the correct medication.

2) GPs will be trained up to deliver training to their colleagues and if replicated in every borough will allow every GP in London to have been trained within 2 years.

Figure 1

This shows that increasing Cardiorespiratory Fitness (CRF) is the single most important intervention to reduce death rate. Note the difference between CRF and obesity.
These are my private views.

**Sports and exercise science research**

1. *How are advances in basic understanding of physiology, biomechanics, genetics, nutrition and other disciplines applied to improving the performance of athletes (both elite and non-elite)? How robust is the application of science in this area? For example, is it possible to conduct research within a training environment?*

It is difficult to think of examples where research in these areas has actually improved performance. Most of the physiological interventions that would significantly improve performance (i.e. the use of steroids, amphetamines, EPO, growth hormone etc) are illegal or banned by the governing bodies. It could be argued that physiological research has resulted in improved methods for rehydration and restocking of muscle glycogen and in understanding the importance of protein and carbohydrate intake immediately after exercise to stimulate protein synthesis. Most sports science research has been devoted to explaining how and why certain training techniques work, rather than introducing new methods. One exception might be the realisation that one of the limiting factors in the marathon is heat and that runners need to cool down before a race rather than warm up. Much is made of potential for talent spotting or genetic modification but performance is such a complex business that I doubt that there will be much progress in this area. Many years ago when I was thinking of using sophisticated physiological testing to identify talent in children, an experienced coach said to me that best way to spot talent was to get the kids to run round the track and see who was fastest. I think this will remain true for a long time to come.

It is exceptionally difficult to carry out more than observational studies in a training environment. Most worthwhile studies require some type of intervention with a control group and elite athletes cannot afford to take the risk of being in the control group or of the intervention not working. Most athletes also have a very close relationship with their coach and coaches are very reluctant to have their methods questioned.

2. *How is this research relevant to improving the health of the wider public?*

Most of the good research going on in sports science departments is actually directed at the health of the general population. The interest generated by trying to understand (rather than improve) athletic performance has had considerable spin-offs. These would include the importance of exercise in combating obesity and type 2 diabetes with all the attendant cardiovascular complications; understanding the role of protein and carbohydrate intake in maintaining muscle; studies of motor control, especially of balance. Many of these studies are particularly relevant to maintaining mobility and quality of life in an elderly population.

3. *What is the role of exercise in improving health, as a preventative measure, and as a treatment provided or commissioned by the NHS for illnesses and chronic conditions?*
Exercise has an absolutely key role to play. Probably the most important role that exercise can play is in preventing the development of obesity, diabetes and cardiovascular disease. It also (probably) has a valuable role in chronic conditions, not only in delaying or preventing cardiovascular complications but also in improving cognitive function and psychological well being. Fatigue and depression are very common complaints in patients with chronic conditions (rheumatoid arthritis, vasculitis, during and following radio- and chemotherapy, as well as the ill defined condition of Chronic Fatigue Syndrome) and there is good evidence that exercise can help in many cases.

There is an urgent need to determine what type of exercise is appropriate for various conditions. In order to achieve the metabolic benefits it is probably sufficient to do a relatively few short bouts of very high intensity exercise every week. However to get rid of excess calories and fat it is prolonged exercise at moderate intensities, together with a sensible diet that is required. For the psychological benefits.. nobody really knows whether it is the metabolic/hormonal consequences of exercise that do the trick or being part of a group activity, or just the sense of achievement.

4. How is sports and exercise science research co-ordinated? Who sets the research agenda? Are health professionals involved in setting the research agenda for sport science and vice versa?

I am not aware that there is any coordination and there is certainly no national agenda for research in sports science. There are many examples of collaborations between sports scientists and clinicians but these come about as the result of initiatives of individuals rather than being part of a grand strategy. The one thing that does drive this type of collaboration is the fact that there is virtually no funding for sports science research per se so that researchers have to rely on medical charities and, and to a lesser extent, research councils, for any research funding. So we might say there is a strategy.. but a strategy by default.

5. How are findings from sports science research, and sports and exercise medicine, used to develop medical treatments and public health interventions? Is this done effectively?

Most of the relevant research is done in collaboration with clinical colleagues and will be put into practice by those clinicians and spread by the “usual channels”, publications etc. In an ideal world it could probably be done more effectively but the big problem with exercise is that participation is very low and unless people have been regular exercisers in their youth they are very unlikely to take up exercise and persist with it into middle and older age when it is particularly important. The only real solution is a change in social attitudes to exercise and probably some form of social engineering that encouraged (forced) people to walk to work, carry shopping etc. But this raises huge issues of personal liberty and choice.

6. What medical treatments and public health interventions involving sport or exercise currently exist?

The major one is obviously exercise interventions and there are examples where such interventions are being either used or trialled.

7. Are the findings from sports and exercise science research, and sports and exercise medicine, translated effectively by the NHS and Department of Health? If not, what are the barriers to translation and how could these be addressed?
8. Are policies on sport, physical activity and health adequately integrated? What, if any, are the barriers to integration? How can the sport and health agendas in Government be better linked to leave an Olympic legacy to improve the nation’s health?

I am sure they could be better integrated. However it is a mistake to think that sport is the answer to our health problems. The rise in obesity and cardiovascular disease in recent decades has not been as a result of people playing less sport but is primarily due to a reduction in general physical activity and manual labour, both in the work place and home, together with an increase in calorie intake. I hope that the Olympic legacy will result in more people playing sport since this is good for social interaction and makes people happy. However sport will only ever be a minority activity and to make the general population healthier we have to find ways of making them more active in their daily lives and, probably, eating less.

1 June 2012
Professor Alison McConnell, Brunel University – Written evidence

This is a personal submission.

About me

I am Professor of Applied Physiology at Brunel University, London, UK. I graduated from the University of Birmingham with a B.Sc. in Biological Sciences (Physiology). My transition into exercise physiology came after completing a M.Sc. in Human and Applied Physiology (1984), and a Ph.D. (1989) at Kings College London. I joined Brunel University in 2000 where I have pursued my interest in respiratory limitations to exercise. In particular, I have pioneered research on the ergogenic influence of inspiratory muscle training. My research and publications encompass both athletes and patients with chronic disease. I invented the POWERbreathe® mechanical inspiratory muscle trainer in 1992 (www.powerbreathe.com), and I am a co-inventor of an electronic POWERbreathe® product (K Series) that was launched in 2011. I am a leading international expert on inspiratory muscle training; my guide to breathing training for sport, “Breathe Strong, Perform Better”, was published by Human Kinetics Inc. in 2011, and my guide for clinicians will be published by Reed Elsevier in Spring 2013.

Conflict of interest

I declare a beneficial interest in the POWERbreathe® inspiratory muscle trainer in the form of a share of royalty income to the University of Birmingham and Brunel University. I also provide consultancy services to the HaB International Ltd, which owns the POWERbreathe® brand. However, I would like to stress that I am making this submission on behalf of myself and not at the behest of HaB International Ltd.

Summary responses to specific questions raised by the Committee

This section contains brief responses to the specific questions raised by the Committee in its targeted call for evidence. In addition, the questions relating to translation are “fleshed out” using a specific case study example of the POWERbreathe® inspiratory muscle trainer.

1. Sport and exercise science research

How are advances in basic understanding of physiology, biomechanics, genetics, nutrition and other disciplines applied to improving the performance of athletes (both elite and non-elite)? How robust is the application of science in this area? For example, is it possible to conduct research within a training environment?

The most meaningful advances in science arise at a mechanistic level, not a descriptive one. In exercise science, the studies that provide mechanistic insights are undertaken in laboratories on sub-elite and well-trained people. I understand that UK Sport has a system that monitors emerging advances at an international level, and facilitates the translation of these to improve the performance of elite athletes. However, there is no formal mechanism for bringing these advances to the attention of the general population, let alone any quality control system for the information the public is exposed to. If the advances
in knowledge don’t involve a product, it’s unlikely that they will be promoted and taken up widely, since there is no incentive or means to do so. Notwithstanding this, some researchers are extremely proactive and disseminate their research via coaching and lay publications; myself included. Furthermore, some coaches with sport science backgrounds monitor the literature and facilitate the uptake of new ideas by the wider sporting community through their practice.

In my experience, it is not possible to conduct high quality research in an elite training environment, but it is not necessary to do so. Sub-elite and well-trained individuals make excellent and willing participants in laboratory research, and they have provided the mainstay of advances in our understanding of the limits of human performance.

How is this research relevant to improving the health of the wider public?

By understanding the limits of human performance (e.g., cardiac output, muscle blood flow) and by gaining an understanding of how to optimise interventions to achieve specific goals, exercise science can contribute to the development of exercise-related interventions for patients. However, translating these insights is extremely challenging, specifically in relation to funding. For example, Brunel University’s Centre for Sports Medicine & Human Performance (CSMHP) is one of the world leaders in research on the control of human limb blood flow. Using insights gained from high-quality research in athletes, we believe it is possible to develop a method of stimulating cardiovascular adoptions that are similar to those of exercise, but without the need for muscle contractions. The method has the potential to deliver wide-ranging benefits that could be applicable to a many different patients. The head of the CSMHP, Professor Jose Gonzalez-Alonso, and I recently applied to NIHR to undertake feasibility research, and to develop a device to make the method applicable in a clinical context. Unfortunately, because of its speculative nature, the project wasn’t funded. However, the point I wish to make here is that by understanding the mechanisms that underlie the beneficial effects of exercise, it may be possible to deliver these stimuli in another way. This research is by definition speculative, but is nonetheless worthy of support. Currently, exercise science “falls between the cracks” – too medical for some funders, and not medical enough for others. In the case of the latter, there appears to be a bias towards research on patients, that can influence practice in the short term. This discriminates against research on underlying mechanisms that can, in time, be applied to patients.

What is the role of exercise in improving health, as a preventative measure, and as a treatment provided or commissioned by the NHS for illnesses and chronic conditions?

Overwhelming evidence suggests that exercise is essential for good health, and that most people in the UK do not undertake sufficient exercise to maintain good health - QED. So far as chronic conditions are concerned, pharmacological interventions make only a modest impact on disability in conditions such as chronic obstructive pulmonary disease (COPD) and heart failure, exercise is therefore the ONLY effective treatment for these patients. Exercise also improves a wide range of other clinically meaningful outcomes such as quality of life. However, the challenge for both health maintenance and treatment of chronic illness is how to deliver the benefits of exercise in a palatable format. This is why we need to understand what it is about exercise that stimulates adaptations that are beneficial.

How is sports and exercise science research coordinated? Who sets the research agenda? Are health professionals involved in setting the research agenda for sport science and vice versa?
Typically, the research agenda is set by the Research Councils. There is no coordination in exercise science, because there is no research council that funds research in exercise science. There is a misconception that UK Sport does/should coordinate exercise science research. However, UK Sport is tasked with delivering championship success, not high quality basic research, so its goals are short term and highly applied. Accordingly, it is not UK Sport’s responsibility to set the exercise science research agenda, which remains rudderless.

Currently, healthcare professionals lack the expertise to set the research agenda for exercise, because the exercise knowledgebase within the NHS remains rudimentary. Using an *ad hoc* approach, sport scientists have to some extent provided direction by just “getting on with it”. It is also fair to say that the scarcity of funding for research into sport and exercise has led academics in this field to adapt their research to make it amenable to health-related funding. This “opportunism” has also influenced the exercise science research agenda.

2. Translation of research

*How are findings from sports science research, and sports and exercise medicine, used to develop medical treatments and public health interventions? Is this done effectively?*

This is definitely not done effectively, especially if the intervention like exercise, which is essentially “free”; if no one makes money from “exercise”, no one promotes it, and no one hears about it. On the other hand, if a drug company develops “exercise in a pill”, they are able to pay for randomised multi-centre trials, as well as lavishing huge sums on marketing and promoting it. In contrast, if I develop a way to get the benefits of exercise by engaging in an activity for 5 minutes a day at home, who pays for the randomised multi-centre trials, and the marketing and promotion? Not me, or the NIHR, or the MRC - so who? Even recreational exercise products such as Zumba® (www.zumba.com) rely upon a business model in which someone makes some money.

Even if a new exercise intervention involves a device (e.g., POWERbreathe®), the NHS is not set-up to facilitate the uptake of this as a treatment. This is expanded below in the POWERbreathe® case study.

*What medical treatments and public health interventions involving sport or exercise currently exist?*

The POWERbreathe® inspiratory muscle trainer - please see the case study below.

*Are the findings from sports and exercise science research, and sports and exercise medicine, translated effectively by the NHS and Department of Health? If not, what are the barriers to translation and how could these be addressed?*

The route for new treatments is a tortuous one that appears to have evolved to meet the requirements of pharmacological treatments that are backed by huge resources. As was mentioned in a previous point, no one has a vested interest in promoting exercise, because it does not profit any specific commercial entity. Even if an exercise-related intervention involves a device that is owned by a commercial company, the resources that are required for this to be taken up widely within the NHS are prohibitive, for everyone but a multi-national corporation. This is expanded below in the POWERbreathe® case study.
Are policies on sport, physical activity and health adequately integrated? What, if any, are the barriers to integration? How can the sport and health agendas in Government be better linked to leave an Olympic legacy to improve the nation’s health?

The NHS is pharmaco-centric, and true integration can only take place if exercise is embraced and understood by the NHS; the NHS must also involve exercise professionals in the implementation of exercise as a treatment. Other countries (e.g., Australia) have a career structure for exercise scientists within their healthcare systems; the NHS does not. A fitting Olympic legacy would be for exercise to be given the same status within the NHS as pharmacotherapy. After all, if a pharmacological agent were able to replicate the wide-ranging benefits of exercise, it would be hailed as a “wonder drug”.

1 June 2012

Case study - Translating exercise science research into treatments within the NHS (or not)

The POWERbretahe® inspiratory muscle trainer provides a tangible example of an effective exercise intervention that originated in an exercise physiology laboratory, but has struggled to gain traction within the NHS. The story is a long one, beginning in 1992, so I will focus upon the highlights that illustrate the major points I wish to make about barriers to translation.

These points are –

1. Evidence-based medicine means that an intervention must be backed by a huge amount of clinical data to even be considered as a credible treatment. Production of these data requires multi-million pound clinical trials that are beyond the means of all but “Big Pharma”.
2. The vested interests of clinical opinion formers can destroy the credibility of an intervention by promoting skepticism. This influence is so strong that it can even override the clinical evidence of positive meta-analyses and systematic reviews. The result is that the recommendations and guidelines that influence prescribing don’t include the new intervention(s) because their authors are reluctant to go up against those who have asserted their position as opinion formers. This makes a mockery of “evidence based” medicine.
3. Once a medical device achieves the required standards for inclusion in the drug tariff, its owners are confronted with a “money pit” of demands in order for it to be stocked within pharmacies. Furthermore, there appears to be no simple mechanism by which prescribers can learn about non-pharmacological treatments.
4. Lack of training and expertise within the NHS necessitates up-skilling of staff to implement non-pharmacological interventions such as exercise.

What is POWERbretahe®?

POWERbretahe® is a simple, handheld device that permits the tried and trusted principles of weight training to be applied to the muscles used to inhale (see figures below and www.breathestrong.com/about). These muscles are weak and/or overloaded in a wide range
of conditions, including those that place a major burden on the NHS, such as chronic obstructive pulmonary disease, chronic heart failure and obesity (Ottenheijm et al., 2005; Ribeiro et al., 2009; Salome et al., 2010). Inspiratory muscle training (IMT) requires around five minutes per day, and can be undertaken at home. Improvements in clinical outcomes are measurable within 12 weeks in patients (Beckerman et al., 2005; Gosselink et al., 2011), and six weeks in athletes (Romer et al., 2002; Illi et al., 2012).

Figure 1. The POWERbreathe® inspiratory muscle trainer – the “dumbbell for the diaphragm”.

How POWERbreathe® helps patients

Improving the function of the inspiratory muscles reduces breathlessness, improves exercise tolerance and enhances quality of life (Gosselink et al., 2011). There is also emerging evidence that it reduces the use of medications and healthcare resources (Weiner et al., 1992; Beckerman et al., 2005). The underlying mechanisms are complex, but are underpinned by established physiological principles (McConnell & Lomax, 2006; McConnell, 2007; McConnell, 2009).

Some of the barriers faced by POWERbreathe®

Since 2000, the POWERbreathe® brand has been owned by a British SME (HaB International Ltd.), which purchased the assets of the spin-out company that originally launched the POWERbreathe®. I founded the spin-out in 1996, with the support of a DTI SMART award and business angel investment; unfortunately, it was forced to cease trading for financial reasons in 2000. In 2000, HaB International was a sales and marketing company serving the fitness market; it had no expertise in medical products, but its owners had the vision to see the potential of the POWERbreathe® in both the sporting and medical markets. HaB did not have the resources to commission clinical trials, and was forced to rely upon those that emerged organically from research undertaken independently using the POWERbreathe® and similar products.

In 2002, the credibility of IMT was boosted by a meta-analysis showing that, in patients with COPD, IMT was beneficial for breathlessness and quality of life (and almost significantly for exercise tolerance) (Lotters et al., 2002). Despite this objective evidence, skepticism about
IMT persisted, thanks to the continued opposition of a group of opinion formers led by respiratory consultants Profs John Moxham and Michael Polkey (Polkey & Moxham, 2004). Their opposition to IMT has been vociferous and unrelenting; even in the face of the latest robust scientific evidence (Geddes et al., 2008; O’Brien et al., 2008; Shoemaker et al., 2009; Gosselink et al., 2011; Illi et al., 2012), they continue to voice concerns and to call for yet more research (Polkey et al., 2011). The group has even attempted to damage the reputation of the product, and those associated with it, by publishing flawed research (Hart et al., 2001). The polarity of their position is made all the more surprising by the fact that they acknowledge that the inspiratory muscles are overloaded in patients with chronic lung disease, and are a source of breathlessness (Moxham & Jolley, 2009). The effect of their negativity has been remarkably damaging, because it has deterred people from “coming out” as IMT “enthusiasts” (as they like to call us); even very senior figures involved in the development of key guidelines, e.g., COPD strategy, express only qualified support for IMT. POWERbreathe® is therefore an example of how the vested interests of influential, individual physicians can shape the fate of a treatment within the NHS, and beyond. It cannot be right that the personal opinions of one or two clinicians can outweigh a substantial body of scientific research.

In spite the opposition of Profs Moxham and Polkey, in 2006, POWERbreathe was finally approved for prescription. However, this was not without considerable effort, and the presentation of an overwhelming body of evidence to the Prescriptions Pricing Authority. However, HaB International’s relief was short-lived, as they could not have anticipated the time and money that they would still need to invest to simply get pharmacies to stock POWERbreathe®, let alone, bring it to the attention of prescribers. Unfortunately, some six years later, most GPs have never heard of IMT, or POWERbreathe®, and rehabilitation specialists dismiss it as a gimmick (thanks to Profs Moxham and Polkey). Nothing about providing a medical device via the NHS seems to be straightforward, or without considerable direct cost.

The future of IMT within the NHS

Advances in our understanding of the role of breathing muscles in exercise limitation have identified this muscle group as a primary source of exercise intolerance in health and disease (Dempsey et al., 2006). However, there remain two main impediments to the uptake of the only evidence-based treatment for breathing-related exercise limitation, i.e., IMT. Firstly, for the reasons articulated above, IMT remains a Cinderella treatment that is insufficiently known or understood. To facilitate the implementation of IMT in a clinical environment, I am currently writing a book on IMT that will be published in 2013 (McConnell, 2013). However, without the inclusion of IMT within key NHS guidelines, interest in IMT will remain the preserve of those bold, independent-minded individuals who follow the original research. Secondly, we currently lack a method to identify the patients whose exercise tolerance is limited primarily by their breathing muscles. The development of techniques to address this problem requires further research. However, when I applied to NIHR “Ideas for Innovation” scheme to use an existing technology to develop prognostic and diagnostic methods for application within the NHS, I was turned down because my ideas didn’t involve the development of a new technology.

References


Ministry of Defence – Written evidence

Introduction

The Committee's questions have been addressed by the Director of Defence Rehabilitation and Defence Consultant Advisor in Rheumatology, Rehabilitation and Sport and Exercise Medicine, Colonel John Etherington. His responses are based on his experience in the Ministry of Defence (MOD) and informed by national experience in the area of Sport and Exercise Medicine (SEM), his appointment as Vice President of the UK Faculty of Sport and Exercise Medicine (FSEM) and Chair of the Royal College of Physicians of London committee on Sport and Exercise Medicine.

There is strong emphasis on sport and physical training in the Armed Forces in order to maximise fitness for operations. This inevitably leads to musculo-skeletal injury, which is managed by elements of the Defence Medical Services, including the specialty of orthopedics and trauma. The Defence Medical Rehabilitation Programme is a tiered system of rehabilitation facilities which manages the rehabilitation of all forms, and severity, of injury and illness ranging from sprained ankles to traumatic brain injury and multiple limb loss. The system involves the Defence Medical Rehabilitation Centre at Headley Court, Regional Rehabilitation Units, Primary Care Rehabilitation Facilities, and operationally Deployed Medical Rehabilitation Teams. Fundamental to the MOD’s principles of management is exercise-based rehabilitation. In addition to standard therapeutic rehabilitation approaches, MOD is unique in having the Exercise Rehabilitation Instructor (ERI: a physical training instructor with enhanced training in the management of the injured and ill) who delivers this component of the process: please see paragraph 12(e) below.

MOD is therefore uniquely placed in its use of the principles of sports performance, training and rehabilitation in the management of a large, but otherwise healthy and fit, population with illness and injury.

Sports and Exercise Science and Research

How are advances in basic understanding of physiology, biomechanics, genetics, nutrition and other disciplines applied to improving the performance of athletes (both elite and non-elite)? How robust is the application of science in this area? For example, is it possible to conduct research within a training environment?

1. It is reasonable to say that the conduct of research in this environment is difficult. By definition, the number of elite subjects is small and there is a strong imperative not to interfere with their sporting preparation. Therefore the results of studies tend to be conducted on the ‘sub-elite’ athlete and consequently the generalisability of results can be limited. The level of sports science expertise in the UK is high and scientific methodology is usually robust. There is potential for lessons to be identified and applied to the general healthy, or ill, population – but this cross-over into mainstream science and medicine is not always effective.
2. The quality of research in SEM, however, is less strong. There is a tendency to focus on more esoteric areas and the methodology is weaker. There is a poorer exchange of ideas with mainstream medicine and there persists a view amongst some that clinical practice in elite athletes is ‘different’, that is this group is not suitable for the application of the normal principles of the clinical trial because of different physiological responses and the need to expedite the return to play at all costs.

**How is this research relevant to improving the health of the wider public?**

3. There have been benefits ‘pulled-through’ to the general population in both training techniques and medical treatments, for example, the management of elite sportsmen has informed the principles of diabetic care in the exercising population. There have also been lessons applied in the use of exercise and muscle conditioning in the improvement of back pain or knee pain in osteoarthritis.

**What is the role of exercise in improving health, as a preventative measure, and as a treatment provided or commissioned by the NHS for illness and chronic conditions?**

4. There are considerable benefits for the health of the population from regular exercise: it is as effective in reducing coronary artery disease as stopping smoking.

5. With regards to treatment, there is good evidence that appropriate levels of exercise are effective in the management of many conditions including musculo-skeletal injury; coronary artery disease; hypertension; heart failure and depression.

6. What is less clear is how best to deliver it. Exercise referral schemes have been studied at length however, NICE guidance is not supportive of their use. Col Etherington believes this reflects the paucity of good quality, large scale trials with appropriate outcome measures producing an absence of evidence, rather than evidence of the absence of effect. There is a potential for exercise to provide significant health benefits as a treatment but there is lack of clinical trials to support this.

**How is sports and exercise science research co-ordinated? Who sets the research agenda? Are health professionals involved in setting the agenda for sport science and vice versa?**

7. Col Etherington’s view is that there is little or no coordination of sports and exercise science research: there is no national research council and therefore no national research agenda. Except in a few cases, there is very little cross-pollination, and no strategic coordination, between sports scientists and clinicians. In addition, there has tended to be a focus on sports medicine rather than on the exercise medicine elements which could benefit the population suffering from ill-health.

**Translation of Research**

How are findings from sports and science research, and sports and exercise medicine, used to develop medical treatments and public health interventions? Is this done effectively?
8. There has been research into the effectiveness of exercise referral schemes and there is basic science research into the metabolic effects of exercise.

9. Very little funding goes into trials of treatment: most of the best controlled large scale trials of medical treatment are directed at pharmacological interventions and are funded by pharmaceutical companies. There are no such commercial benefits available for proving the effect of medically-supervised exercise, therefore funding to provide studies of sufficient size and quality is not available. This invariably means that studies of exercise interventions are small, often under-powered and short term. In addition, outcome measures are often ill-selected, measuring long term compliance rather than the metabolic or health effect. The risk of small, incompletely powered studies is that they fail to demonstrate benefit, which is then interpreted as demonstrating that exercise has no effect.

**What medical treatments and public health interventions involving sport or exercise currently exist?**

10. Defence uses a network of exercise-based services to deliver rehabilitation, with benefits to operational effectiveness, including on operations in Afghanistan.

11. There are many exercise referral schemes across the UK and exercise is used in a structured way in the context of cardiac and respiratory rehabilitation services.

**Are the findings from sports and exercise medicine translated effectively by the NHS and Department of Health? If not, what are the barriers to translation and how could these be addressed?**

12. The barriers to translation reported by Col Etherington are:

   (a) There exists no properly resourced, consistent focus/point of contact in the Departments of Health to address exercise and the treatment of disease;

   (b) There is no recognition of the benefits of exercise, including cost benefits and ‘Green’ credentials;

   (c) Doctors are poor advocates for exercise as they are not usually trained in exercise medicine, and some feel it is not part of the doctor’s role: doctors should be trained to deliver advice and offer a key opportunity to inform and persuade those who are ill of the benefits of exercise;

   (d) There is a lack of facilities and expertise to refer into. In particular, despite the training a cohort of SEM consultants, there are very few posts for them in the NHS. This means that many are working for professional sport or taking up part-time work supporting musculo-skeletal services. The NHS investment in their training is not being recouped, and the lack of strategic guidance on this issue means reliance on Care Commissioning Groups to decide on the local relevance of SEM; and

   (e) There is no assurance of exercise professionals’ management of patients. ERIs in the military go through extensive training and strict assurance processes but
they are not on the HPC register as no new professions are being included. Civilian exercise therapists do not have such a high standard of training to achieve and there is no assurance system once qualified. This leaves doubt amongst GPs about the safety of referral into systems which aim to deliver exercise-based treatment.

**Are policies on sport, physical activity and health adequately integrated? What, if any, are the barriers to integration? How can the sport and health agendas in Government be better linked to leave an Olympic legacy to improve the Nation’s health?**

13. Col Etherington’s view is that there is inadequate integration of these issues. Sport, health and exercise medicine are interlinked and a positive message of their benefit should be given. There is too much focus on negative behaviours and not enough on the huge UK population that does participate in sport and exercise. Medical professionals should be more involved as advocates for exercise both at a strategic and patient level.

14. A trial of an integrated primary and secondary care exercise medicine scheme should be undertaken.

**Additional Information**

15. Battle Back is the term used to describe an adaptive sport and adventurous training programme for wounded, injured and sick personnel from across the Armed Forces. Its programmes and activities are designed to promote confidence and independence in direct support of an individual’s recovery plan. Regular participation in inclusive sport, outdoor and other activities can help the individual to focus on those things they are able to achieve rather than what they cannot in order to improve resilience, develop confidence, improve motivation and develop positive relationships that will enhance recovery.

16. The Battle Back Centre has been established by The Royal British Legion at the National Sports Centre, Lilleshall: programmes and activities can be delivered from Lilleshall, Personnel Recovery Centres in Edinburgh, Germany, Tidworth, Catterick and Colchester as well as at specialist centres both in the UK and abroad. Battle Back facilities are also available at the Defence Medical Rehabilitation Centre at Headley Court.

17. Battle Back is a MOD led programme which is delivered, funded and organised in partnership with The Royal British Legion, Help for Heroes and other Service charities. It is also available for former Service personnel funded separately by Help for Heroes.

*6 June 2012*
Professor Hugh Montgomery, University College London, Professor Sir Steve Bloom, Imperial College London, Professor Tim Cable, Liverpool John Moores University and Colonel John Etherington, Faculty of Sport and Exercise Medicine – Oral evidence (QQ 1-25)

Transcript to be found under Professor Sir Steve Bloom
Can you give specific examples of how recent developments in understanding in the basic biomedical sciences have been used in SEM research to enhance the performance of athletes?

What is the scientific evidence underpinning nutrition advice for elite athletes? Is this advice relevant to the wider population?

To what extent are training techniques for athletes based on scientific evidence, and how relevant are these to the wider public. For example what is the quality of evidence (eg are there randomised control trials) to support many commonly held views amongst the public, such as: carbohydrate loading before intensive exercise, protein loading after exercise, interval training for increasing speed, taking sports supplements to improve performance, stretching before or after exercise to prevent injury.

These questions fall outside my remit of specialist expertise. However, I have sought opinion from Dr Ken VanSomeren, director of Sport’s Science at the English Institute of Sport, who I hope may offer appropriate data under separate cover, should the committee find this helpful.

What is known about the fundamental underlying mechanisms that result in some many and diverse [sic] health benefits of exercise? Can this knowledge be used to tune the advice to the general public about the kinds of exercise they should undertake to treat or prevent different conditions?

It is known that regular exercise improves a number of phenotypes associated with cardiovascular risk. A detailed literature review is not possible here, but a 2007 meta-analysis of data relating to 75 trials and 105 study groups (Eu J Cardiovasc Prev Rehabil 2007 Feb;14(1):12-7) offers some insight, as does a more recent detailed review (Circulation, 2010 Oct 19;122(16):1637-48): waist circumference, weight and percentage body fat all fall; insulin resistance improves; blood pressurefalls (perhaps moreso in the those with hypertension), in association with a reduction in systemic vascular resistance, and circulating catecholamine and renin activity; markers of systemic inflammation fall; lipid profile improves; and thrombotic profile improves; These effects seem consistent for endurance training. Although less well studied, resistance training may have similar effects. Other unknown factors (or an unrecognised synergy of changes in those known) may underpin the fact that physical fitness may be ‘a more powerful predictor of survival than traditional risk factors’ (to quote the latter review). Increasing aerobic activity is thus associated with gains. However, strength/ resistance training also preserves muscle bulk, which may have its own advantages. Increasing research suggest benefits for shorter-duration high-intensity training. I understand that further work may be required to delineate the relative benefits of these different programmes to those of different age and disease status.
Meanwhile, bone is far from biologically inert: constant deposition and removal of bone occur throughout life, the rates of which respond to the biological stimulus of exercise, such that bone can remodel in response. In the acute phases of exercise, bone resorption may in fact exceed deposition, although the latter appears true with sustained exercise loading. The means by which such mechanotransduction occurs are well (albeit not completely) described. Increased longer-term physical activity thus ‘builds stronger bones’, increasing peak bone mass, and slowing declines in bone mass with age. Exercise also appears to have benefits in those with established osteoporosis, as evidenced by a Cochrane Review in 2011 (Cochrane Database Syst Rev, 2011 Jul 6;(7):CD000333) of 43 randomised trials (with 4320 subjects). Femoral neck bone mineral density (BMD) seems best aided by progressive lower limb resistance strength training, and for the spine by combination exercise programmes pared with control groups. The authors report ‘a relatively small statistically significant, but possibly important, effect of exercise on bone density compared with control groups. Exercise has the potential to be a safe and effective way to avert bone loss in postmenopausal women.’

Such data are offered by way of exemplar, the key message being that physical activity (and associated fitness) is associated with health benefits. A lifestyle exposed to mixed aerobic/endurance exercise, strength/resistance training and flexibility training thus appears to offer benefits to two aspects of health, with the ‘type’ of exercise benefitting specific aspects. This, I suspect, is the best ‘advice to the general public.’ Whilst much is known as to the tailoring of exercise therapy to specific patient groups, there is yet more to learn. In addition, how to encourage uptake and embedded change in behaviour in these disease states (as in the sedentary) is far less well characterised in my view.

**Does regular exercise burn off calories beyond the time period during which an individual is exercising? How robust is the evidence?**

Studies in animals do suggest that both longer-term physical training and single-bout exercise are associated with resting metabolism (s-called post-exercise oxygen consumption- EPOC). In humans, this may have two phases- the first lasting 1-2 hours after exercise, and second tailing off nearer 48 hours later. Some conflicting data exist, but it is suggested that these may in part derive from insufficient time-windows between exercise bouts. Some reference review data include Sports Med 2003;33(14):1037-60. Professor Bloom may be better placed to comment on the relevance of such responses to weight loss in the general public, rather than in elite athletes.

21 June 2012
Sports and exercise science research

How are advances in basic understanding of physiology, biomechanics, genetics, nutrition and other disciplines applied to improving the performance of athletes (both elite and non-elite)? How robust is the application of science in this area? For example, is it possible to conduct research within a training environment?

1. There are applications of concepts to improving performance of athletes. With elite athletes the robustness of the research is generally low, primarily owing to the difficulty of experimental control interfering with training and because of limited research council and other funding sources for such research. One of the few more robust studies was a randomised control trial of top-level rifle shooters [Mullineaux]. Still, such research would typically not appeal to funding bodies owing both to the necessary small sample used and because of the small population to which such a study relates.


How is this research relevant to improving the health of the wider public?

2. Research on athletes is typically not transferred to improving the health of the wider public. Largely this is due to research questions on public health being addressed directly with the population of interest. Recently in 2011 there has been a rare research council funding announcement to address the transfer of knowledge of elite athletes to the wider population [BBSRC]. There is great potential to transfer understanding of elite athletes to improve the health of the wider public, although this avenue of research has not been largely explored.

- BBSRC ‘High performance sport as a model for the acquisition, retention and retraining of an individual’s skill base’ http://www.bbsrc.ac.uk/funding/opportunities/2011/high-performance-sport.aspx [not yet awarded as of 1 June 2012]

What is the role of exercise in improving health, as a preventative measure, and as a treatment provided or commissioned by the NHS for illnesses and chronic conditions?

3. It is well established that exercise improves health, which is evidenced by a wealth of research in both patient [e.g. Klonizakis] and healthy populations [e.g. Klonizakis, Winter]. Across the country the NHS uses exercise therapeutically through the long running Exercise Referral scheme [NHS]. In the scheme General Practitioner’s refer patients to exercise specialists who devise and deliver a tailor-made exercise regime lasting a few months. These schemes are typically managed by the local Primary Care Trust (PCT), so every scheme in the country is run differently. Within each PCT exercise may also be used therapeutically in different ways. Typically this would involve short-term interventions targeting specific populations [e.g. Middleton].

How is sports and exercise science research co-ordinated? Who sets the research agenda? Are health professionals involved in setting the research agenda for sport science and vice versa?

4. Sport and exercise science research is represented by the professional body of the British Association of Sport and Exercise Science [BASES]. BASES liaise with local authorities, government departments and other bodies to promote sport and exercise. The research is not co-ordinated or guided by a research agenda. Setting an agenda would be difficult owing to the breadth of the sport and exercise science area, lack of a clear national or government agenda, and absence of clear funding streams for research. The lack of funding, for example, is evident through the UK government’s assessment of Higher Education Institutes’ research quality in the 2008 Research Assessment Exercise [RAE]. In the RAE the total external income over 2001 to 2007 for the sports-related studies unit of assessment was low at £31 million, of which only £1.6 million was made up of research council funds.

• BASES: www.bases.org.uk
• RAE: www.rae.ac.uk

5. The breadth of disciplines is typically combined including that ‘sport science’ and ‘exercise science’ are considered together through the professional body of the British Association of Sport and Exercise Science [BASES]. This breadth is further expanded through the UK government’s assessment of Higher Education Institutes’ research quality in the 2014 Research Excellence Framework [REF] whereby the unit of assessment number 26 is titled ‘Sport and Exercise Sciences, Leisure and Tourism’. The nuances of the varying types of research are often not appreciated by the different disciplines, which can hinder the development of a national research strategy. A sport science agenda will be very different to an exercise science agenda.

• BASES: www.bases.org.uk
• REF: www.ref.ac.uk

6. The UK government’s assessment of Higher Education Institutes’ (HEI) research quality in the 2014 Research Excellence Framework [REF] has a number of changes to its predecessor the Research Assessment Framework [RAE] that may lead to a reduction in sport and exercise science research. These are that the proportion of staff is no longer a metric, hence there is less incentive for all staff to be encouraged to be ‘research active’ in a department. In addition, the financial benefit is even more
heavily weighted towards higher quality research. It was recognised from the 2001 RAE that the sports-related unit was one of seven of the forty-six units as containing research with a greater proportion of lower quality scoring research, and instigated the capability funding that ran from about 2003-2009 [HEFCE]. HEI are likely to omit departments with low quality rankings from the REF, which will lead to both less research and less recognised research in the sport and exercise sciences.

- REF: www.ref.ac.uk
- RAE: www.rae.ac.uk
- HEFCE: ‘Funding Higher Education in England’

**Translation of research**

How are findings from sports science research, and sports and exercise medicine, used to develop medical treatments and public health interventions? Is this done effectively?

What medical treatments and public health interventions involving sport or exercise currently exist?

7. A variety of public interventions involving sport and physical exercise exist. These often target patients, special populations and specific conditions (e.g. obesity [Middleton]). In addition, targeting healthy populations (e.g. middle-aged [Klonizakis]) have been shown to be implementable and effective as preventative health interventions.


Are the findings from sports and exercise science research, and sports and exercise medicine, translated effectively by the NHS and Department of Health? If not, what are the barriers to translation and how could these be addressed?

Are policies on sport, physical activity and health adequately integrated? What, if any, are the barriers to integration? How can the sport and health agendas in Government be better linked to leave an Olympic legacy to improve the nation's health?

1 June 2012
NHS Confederation, National Institute for Health and Clinical Excellence (NICE), Department of Health (DH) and Department of Culture, Media and Sport (DCMS) – Oral evidence (QQ 26-68)

**NHS Confederation, National Institute for Health and Clinical Excellence (NICE), Department of Health (DH) and Department of Culture, Media and Sport (DCMS) – Oral evidence (QQ 26-68)**

*Transcript to be found under Department of Health*
National Institute for Health and Clinical Excellence (NICE), Department of Health (DH), Department of Culture, Media and Sport (DCMS) and NHS Confederation – Oral evidence (QQ 26-68)

Transcript to be found under Department of Health
The Physiological Society – Written evidence

A response from The Physiological Society to the House of Lords Science and Technology Committee

The Physiological Society is a learned society which brings together over 3000 scientists from over 60 countries. Physiology is the study of the normal functioning of genes, cells, tissues and organs and how these in turn influence the whole animal or person. Consequently some physiological research needs to be undertaken on living animals or people so as to integrate the insights that come from studying isolated cells and tissues. Working with living animals or people requires additional skills in the care and welfare of the experimental subjects, on top of the underlying investigative skills needed by all researchers. For animals that combination is generally referred to as 'in vivo skills'.

Since its foundation in 1876, the Members of The Physiological Society have made significant contributions to the knowledge of biological systems and the treatment of disease. Our aims are to support physiologists - from researchers starting out in the field to those that are more established in their career, promote the discipline to ensure it remains at the forefront of biological and medical research, and to raise awareness of physiology among non-specialists. A key focus of our work is to ensure physiology remains an attractive career option and we work with teachers, lecturers and researchers from both academia and industry to achieve this.

Q1. How are advances in basic understanding of physiology, biomechanics, genetics, nutrition and other disciplines applied to improving the performance of athletes (both elite and non-elite)?

1. Fundamental scientific research underpins our current knowledge of the mechanisms of the body, e.g. understanding of how muscle functions has been advanced by studies in physiology, biochemistry and nutrition. Moreover, performance of athletes can gradually be improved by advances in knowledge - for example, understanding how the human body responds to different exercise stimuli, and the time-course of these responses, may act to guide training programmes.

2. Whilst there is significant potential for fundamental scientific research to feed into performance enhancement of both elite and non-elite athletes, this potential is often not fulfilled. Instead, as with the translation of many academic fields, a gap exists between the cutting edge of fundamental research and the application of knowledge acquired. In order for more effective translation, better incentives need to be created for scientists engaging in fundamental research (including integrative human and exercise physiology), applied sports scientists, and both coaches and athletes to work more closely together. Increased incentive for academics may be provided by creation of a funding stream to be utilised to investigate the methods and mechanisms to use basic science to improve athletic performance. Other incentives may be provided by more obvious inclusion of performance enhancement in the impact criteria of the Research Councils and the Research Excellence Framework (REF). Whilst we can’t speculate what may act as incentive for coaches and athletes, it seems likely they would be deterred by a lack of obvious direct benefits from participating in blue-skies research.
3. More obvious inclusion of sports enhancement when judging research impact may help mitigate problems surrounding the clustering of research conducted with elite athletes. This research takes place in only a few centres across the UK. Whilst this may be preferable to athletes, there is no guarantee that centres focusing upon research with elite athletes are also at the cutting edge of basic science, nor that the sports science taking place within these centres are applying advances in fundamental science.

4. There are some questions as to the applicability of fundamental research with respect to performance enhancement. For reasons explained below, much of the fundamental research pertinent to athletic performance is conducted with active but non-elite subject groups. The applicability of research to elite (Olympic medal) performers is questioned, and it is impossible to prove this either way without active and extended cooperation with elite athletes.

Q2. How robust is the application of science in this area? For example, is it possible to conduct research within a training environment?

5. As with any area of research, the quality of science conducted within the fields of exercise physiology, sports science and sports medicine is variable. Additionally, the research covered by these broad fields is wide-ranging, making it hard challenging to define how robust the application of science may be.

6. Conducting robust and high quality research with elite athletes and elite athletic populations during training can be difficult; the coach and athlete have the primary focus of fulfilling athletic potential, rather than conducting blue skies research. The risk of accidentally reducing performance is often felt to be a risk not worth taking, and as such, work with elite athletes is typically observational in nature. Additionally, concessions can often be made to athletes which decreases the reliability and robustness of the trials conducted.

7. Much of the research taking place in these fields is conducted upon either sub-elite athletes, within the laboratory environment upon healthy active volunteers, or utilising clinical populations. These research findings can subsequently be applied to before to elite athletes. However, translation of research from sub-elite to elite athletes can be complex; enhancing the performance of the former is typically easier than the latter, as the latter are usually operating near their maximum capacity.

8. It can be tricky to ensure scientific control of extraneous variables in a training environment than it can be within the laboratory. Whilst it is possible to utilise training environment related data, this must be conducted utilising projects larger in scale than the current small case-study type analyses currently funded. This will help ensure that increased rigor permeates the field.

Q3. How is this research relevant to improving the health of the wider public?

9. The study of exercise and its application to disease prevention and rehabilitation has significant benefits to the health of the wider public. Any research that increases the understanding of human physiology is beneficial; improved understanding of elite performance physiology, being located on one extreme of a continuum of human states
(from elite, through the normal range to various disease states) can provide unique insight into physiological mechanisms of relevance to heart disease, respiratory disease, ageing, muscle wasting, obesity, diabetes. This enables a trickledown effect which modifies exercise knowledge in non-elite populations.

10. Whilst there is a wealth of epidemiological research linking health and physical activity, there are far fewer intervention studies actually proving the benefits of exercise to clinical populations. Such studies are now being funded and it is critical that investment continues to be focused in this area of exercise science. This will enable generation of data that may guide personalized prescription of exercise.

11. There are problems relating to access to funding to enable high quality research in sports science and performance enhancement), and it is felt the focus of exercise physiology and sports science is often upon health rather than sports science. This means translation more typically travels from fundamental research on clinical to application upon athlete populations.

12. However, it is felt that the research findings from this work are not always translated to their full potential, for a number of reasons discussed in the answers to question 7 and 9 below, including but not limited to a lack of incentive for clinicians and researchers to work together, and a lack of appreciation of exercise physiology within mainstream medicine.

13. In addition, study of elite athletes may have limited direct applicability to the health of non-sporting populations. Whilst such research may provide major indicators for health-directed exercise, these indications should always be confirmed with appropriate populations; confirming applicability of age, gender and pre-existing health conditions.

Q4. What is the role of exercise in improving health, as a preventative measure, and as a treatment provided or commissioned by the NHS for illnesses and chronic conditions?

14. Exercise is not utilised to its full potential by the NHS. This is despite fairly conclusive evidence that insufficient physical activity is highly detrimental to long term individual and public health. In addition, exercise can prevent or delay the onset of many chronic disorders, including cardiovascular conditions, and this is far less costly than subsequent treatment with pharmacological agents or surgical intervention.

15. It is felt that GPs and other health practitioners under-prescribe exercise as an intervention. One reason for this is that health practitioners typically lack understanding of the benefits that may be provided by exercise. This is partially due to exercise physiology and sports science often not featuring on the undergraduate medical curriculum.

16. There are concerns that funding for clinical trials investigating the use of exercise is sparse, and this is felt to be partly due to the fact that use of exercise as a therapy may come into conflict with pharmacological options funded by industry, and that there is no specific funding. This is in spite of the fact that many exercise studies will in fact help identify potential therapeutic targets through highlighting the physiological pathways that are involved in response to sedentary behaviour/environmental challenges.
17. It is also important to ensure that there is an increased amount of robust research carried out. As mentioned in response to Q3 (above), whilst there is a wealth of epidemiological research linking health and physical activity, there are fewer intervention studies. Generation of data from large-scale and long term projects is important to show cause and effect, and to help identify specific populations for whom certain exercise based interventions are beneficial.

Q5. How is sports and exercise science research co-ordinated? Who sets the research agenda?

18. There is no national research agenda in terms of sports science and exercise. However there are a number of organisations including industry, with directed agenda. Research into specific aspects of sports performance is occasionally instigated by several National-level organisations, including Sport England and the English Institute of Sport (and the devolved counterparts), as well as the governing bodies of individual sports occasionally instigates research into specific aspects of sports performance.

19. Research conducted is largely determined by funding bodies; be this Government Departments, Research Councils, medical charities or industry. In addition, individual academics may have access to monies from the QR funding stream.

20. There are concerns about a lack of support provided by the Research Councils for these fields of research. There is a perception that there are insufficient integrative human physiologists on the funding boards. This impedes the financing of high quality research into human physiology, upon which much of the more applied sports science is based.

21. The Research Councils have also historically been less than supportive in the applied sports science end of the spectrum. There is no specific research council home for sports enhancement or sports science, and as such, performance focussed work is largely driven by individual interests or potential commercial interests. Whilst this lack of funding can encourage collaboration between sports scientists and clinicians, with the former having to rely upon medical charities and to a lesser extent, research councils, for funding. However, these collaborations are the result of individual initiatives, rather than being part of a grand strategy.

22. There is a strong sense that far more organisation and co-ordination across sport-sciences centres is required, in order to deliver high quality data (large sample sizes), rather than competing with each other.

Q6. Are health professionals involved in setting the research agenda for sport science and vice versa?

23. There is no specific, national research agenda for sports science, and as such there health professionals are not involved this. In addition, there is a lack of communication between health professionals and sports scientists, and a lack of knowledge and understanding of exercise science within the mainstream medical community. This leads to many health care professionals underestimating the possible benefits of exercise in the prevention of chronic disease and as a possible therapy. Without suitable knowledge
to prescribe such, it seems unlikely that health care professionals should have much of a role in guiding the agenda of future research.

24. This, however, is not to say that if barriers between the two communities could be broken down effectively, that there shouldn’t be greater integration in terms of development of a research agenda designed to increase the knowledge and understanding of the human body. In addition, we should ensure that the international leaders we have in sports and exercise science in the UK ought to have a greater role in setting the medical education agenda.

Q7. How are findings from sports science research, and sports and exercise medicine, used to develop medical treatments and public health interventions? Is this done effectively?

25. There is no national strategy or structure for the translation of these research findings into medical treatments and public health interventions. As such, development doesn’t take place frequently and is neither as effective as it could nor ought to be. With no funding structure for this translational work, success depends upon the funding of individual grants, or work with obvious commercial potential, which can gain industrial support.

26. Effective development of medical treatments occurs through follow on studies, for example in university departments with infrastructure for translation. This may include the presence of a suitable breadth of academics, or where there are established collaborative links with clinicians. Alternatively the development of medical treatments and public health interventions may be led by clinicians sufficiently engaged with the literature so as to pick up upon advances in sports and exercise science.

27. This development process could be co-ordinated much more effectively. It is felt that whilst the NIHR does a good job, it does not fully integrate sports science approaches, and their potential application to health, in calls.

28. In addition, the same issues are faced as with the translation of any fundamental sciences into medical treatments. There are insufficient formal links between the NHS, the Department of Health and academic researchers. Additionally, there is a lack of career paths for research scientists within the NHS, including those with interest in sports science, as well as excessive bureaucracy within the NHS.

29. However, it must be noted that there are some successes in the translation of sports and exercise medicine into medical treatments and public health interventions. An example of translation is the €6M EU investment in Metapredict.eu, which partly stems from the exercise sciences studies of Gibala and Professor Jamie. Following from studies indicating that short/sharp bursts of exercise could effectively control diabetes and cardiovascular disease risk factors, Professor Timmons lab now has large intervention studies funded looking at-risk populations (obese) and integrating ‘OMIC’ screening to also yield personalized diagnostics. This relies heavily upon the early exercise science studies and additionally highlights the importance of well-funded human physiology laboratories in the UK.
Q9. Are the findings from sports and exercise science research, and sports and exercise medicine, translated effectively by the NHS and Department of Health? If not, what are the barriers to translation and how could these be addressed?

30. Whilst there is world-class research into sports/exercise science and medicine taking place within the UK, there is no existing national co-ordinating structure to translate findings, nor is there any research funding readily available for this. These barriers need to be addressed to fulfil the potential for development of innovative and low cost approaches to maintaining and improving health.

31. Moreover, there needs to be increased communication between health practitioners and scientists working on fundamental research as well as applied sports science.

32. As with many fields of research, there is a significant problem relating to a lack of recognition and career pathways for research scientists in the NHS. Whilst with respect to this inquiry, ensuring improved careers for research scientists and clinicians with an interest in exercise science would help, the same requirement holds true for other biomedical related disciplines.

33. It is felt health professionals in general underappreciate the health benefits of regular exercise, with practitioners being more concerned with treating existing disease rather than preventative medicine. It is felt that focussed training of medical and health professionals (including short courses providing updates to those qualified), as well as ensuring the integration of more exercise science into the medical programme, would equip these practitioners with the correct knowledge to prescribe exercise correctly.

8 June 2012
The Register of Exercise Professionals (REPs) was created in 2002 to protect the public and professionalise the industry by ensuring that personal trainers and fitness instructors have the relevant knowledge, competence and skills based on standards agreed by the industry. Supported by government with grant aid funding from the Department of Health, it established itself as a voluntary Register and now has over 29,000 Registrants who each pay £29 per year to remain registered as well as completing adequate Continual Professional Development (CPD). This is essentially our main source of funding.

We believe this represents around 65% of the current industry workforce and REPs has recently launched a growth plan which aims at increasing membership to more than 40,000 by 2015. To achieve this will require increased support from Government and a greater public awareness of the role of REPs and registration. REPs is a publically available Register which anyone can access to check the qualifications of their fitness instructor or personal trainer.

REPs registrants must:

- Meet agreed National Occupational Standards which describe the knowledge, competence and skills to perform each role
- Hold recognised and approved qualifications
- Be committed to their ongoing professional development
- Be legally covered by appropriate insurance
- Abide by a Code of Ethical Conduct

Entry to the Register is evidence based and in order to be admitted, applicants must demonstrate they have the relevant qualifications. Over the past 10 years, working with SkillsActive and the fitness industry, REPs has developed the National Occupational Standards defining the knowledge, competence and skills which underpin the REPs entry categories and which meet both the needs of industry and the national Qualification and Credit Framework. The most basic entry to REPs is at level 2 which includes Gym Instructors, Group Exercise, and Aqua Instructors. All personal trainers, Pilates and Yoga instructors must acquire a level 3 competence.

Over the past five years REPs has worked with the medical profession to develop specific competences with the express intention of facilitating exercise in the management and prevention of disease. Those working in this field must gain the Level 3 Exercise Referral category and are able to progress to specialist instructors at level 4 to deal with specific diseases.

**Level 3 Exercise Referral Instructor:**

Exercise Referral Instructors are aware of their professional role boundaries and are able to support clients with the following medical conditions:

- **Respiratory Conditions** – Asthma; Chronic obstructive pulmonary disease (COPD)
Register of Exercise Professionals (REPs) – Written evidence

- **Musculoskeletal Conditions** - Osteoarthritis; Rheumatoid arthritis; Joint replacement; Simple mechanical back pain; Osteoporosis
- **Cardiovascular Conditions** – Hypertension; Hypercholesterolaemia
- **Psychological/Mental Health Conditions** – Depression; Stress; Anxiety
- **Metabolic/Immunological Conditions** - Diabetes Type I and Type 2; Obesity

**Level 4 Specialist Exercise Instructor:**

The specialist exercise instructor is able to demonstrate that they have met the Level 4 National Occupational Standards in one or more medical areas. Specialist exercise professionals are working within the healthcare sector and are also providing an interface between clinically-led exercise and community-based exercise programmes by designing, delivering, monitoring and evaluating structured, individualised physical activity programmes for clients. Additionally, they have a range of appropriate knowledge and skills that are aligned with current evidence-based, best practice guidelines regarding the affects of exercise on the specific condition/s for which they are qualified to work.

Specific medical areas covered by the Level 4 specialist exercise instructors:

- Cardiac Rehabilitation
- Falls Prevention
- Low Back Pain
- Stroke
- Cancer
- Accelerated Rehabilitation Exercise (military only)
- Obesity and/or Diabetes
- Mental Health
- Chronic Respiratory Disease

There are now around 2500 Level 3 Exercise Referral instructors and 1500 REPs members with a level 4 qualification. However in order to encourage more of our members to gain these skills and competences, we want to see a greater uptake of these higher level qualifications which will require renewed encouragement and support from Government. I am in no doubt that the importance attached by Government to the Olympic legacy so far as it relates to the general population engaging in greater physical activity provides an ideal platform for greater recognition to be given to the value of Registration and increased acceptance by the medical profession of exercise referral as a more effective means of improving health outcomes.

Our vision- ‘more people, more active, more often, more healthy’ – which is shared throughout the fitness industry, reflects the generally accepted belief that physical activity is beneficial to health, both preventative and curative. There is much anecdotal evidence to support this view and, worldwide, a number of research projects have been undertaken in this field. However here in the UK we would welcome research into the health outcomes which result from structured physical activity associated with health referrals.
Register of Exercise Professionals (REPs) – Written evidence

We would be happy to help facilitate research in this field and provide access to the 29,000 members.

26 June 2012
Research Councils UK (RCUK) – Written evidence

Introduction

1. Research Councils UK (RCUK) is a strategic partnership set up to champion the research supported by the seven UK Research Councils. RCUK was established in 2002 to enable the Councils to work together more effectively to enhance the overall impact and effectiveness of their research, training and innovation activities, contributing to the delivery of the Government’s objectives for science and innovation. Further details are available at www.rcuk.ac.uk.

2. This evidence is submitted by RCUK on behalf of the Research Councils listed below and represents their independent views. It does not include or necessarily reflect the views of the Science and Research Group in the Department for Business, Innovation and Skills (BIS). The submission is made on behalf of the following Councils:

- Biotechnology and Biological Sciences Research Council (BBSRC)
- Economic and Social Sciences Research Council (ESRC)
- Engineering and Physical Sciences Research Council (EPSRC)
- Medical Research Council (MRC)

3. This response focuses only on those questions or parts of questions relevant to RCUK or the individual Councils who have contributed to the response.

Q1 bullet 1. How are advances in basic understanding of physiology, biomechanics, genetics, nutrition and other disciplines applied to improving the performance of athletes (both elite and non-elite)? How robust is the application of science in this area? For example, is it possible to conduct research within a training environment?

BBSRC:

4. BBSRC supports research to further understand normal, healthy human biology. This remit includes understanding the physiology, biomechanics, genetics, nutrition and other disciplines (e.g. immunology, neuroscience and psychology) of the healthy human. Understanding this basic biology will lead to improvements in the understanding of the training and performance of all UK athletes.

5. Examples of research projects submitted to BBSRC that directly underpin athletic performance include:

- ‘Cardiovascular and intramuscular interactions in the control of skeletal muscle oxygen consumption kinetics’
- ‘Integrating perception and action: the multi-channel model of visuo-motor control’
6. BBSRC has also collaborated with UK Sport\textsuperscript{24} to develop two calls for research proposals targeted specifically at understanding and improving elite athlete performance. The collaboration with UK Sport has helped to promote interaction between researchers in basic biology with those in more applied sport-related disciplines. To date this collaboration has supported 5 full projects (£1.9M), across two calls:

- **Call 1: ‘High Performance Sport as a Model for Biological Research’**
  
  The first call was designed to stimulate proposals to understand several key challenges of skill acquisition, muscle performance and stress resilience. To promote the interaction between basic research scientists and sports scientists for the first call, a two day workshop involving fundamental biologists in physiology, neuroscience and systems biology and sports-related scientists was held before the call was announced. The workshop had series of presentations from academics and UK Sport, to define the key challenges for Olympic athletes. A round table session was designed to initiate discussion and develop potential research synergies on each challenge between the basic and sports science communities. (further details of the call and workshop are at \textit{Annex 1}).

  Two projects were supported:

  - Physiological systems integration in the optimisation of exercise tolerance
  - Mechanism of eccentric training augmentation of muscle adaptation in humans and the potential negative impact of non-steroidal anti-inflammatory drugs

- **Call 2: ‘High Performance Sport as a model for the acquisition, retention and retraining of an individual’s skill base’**

  The second call was designed to encourage basic research on understanding the biological and psychological basis of skill learning and retention. This will address issues of common interest such as the improved maintenance of an individual’s skill base and lead to improved training methodologies for elite athletes. This call was preceded by a one-day workshop to explain the call to the neuroscience, psychology and sports science communities. The full text from the call for research proposals is at \textit{Annex 2}.

  Three projects have been supported to date (further applications remain in peer review at this time):

  - Cognitive and Motor Skills: Adaptation over the Lifespan, Neural Signatures, and Transfer from Lab to Field
  - Identifying the behavioural and biological mechanisms underpinning elite performance in aiming tasks
  - Linking Perception to Action in Sport: Does superior visual perception explain why good players make it look easy?

  Details of the awards supported through both calls are at \textit{Annex 3}.

7. Whilst the research projects described above are funded by BBSRC (with ESRC co-funding on two awards), the collaboration with UK Sport has been key to the success of

\textsuperscript{24} \url{www.uksport.gov.uk}
these calls, as this has provided the researchers with previously unavailable access to
cohorts of high performing athletes. This allied with the application of new, non- or
minimally-invasive techniques has allowed far greater analysis of these athletes than
previously possible. UK Sport will also have a significant role in the translation of the
research outputs of these awards to improving athlete performance; without such
collaboration, this translation would likely take significantly longer.

EPSRC:

8. As part of its mission EPSRC invests in basic, strategic and applied research and training
in sports and healthcare technologies which underpin future economic competitiveness
and improve the quality of life in the UK. The majority of EPSRC investment in this field
is focused on sports technology and engineering (thus outside the scope of the Inquiry)
however research in this field also includes advanced monitoring technologies that track
physical and physiological performance, and the development of biomechanical models
to enhance performance.

9. In the last 15 years EPSRC has invested in circa 30 projects with a direct sports domain
focus and relevant to both elite and non-elite sports performance, this has included
research into:
   - Development of sensors and data distribution systems
   - Biomechanical modelling and development of new computational models
   - Materials and product development for impact attenuation

10. Specific examples of (current and recently completed) research projects supported by
EPSRC that directly underpin athletic performance through monitoring technologies
include:
   - **The ESPRIT (Elite Sport Performance Research in Training) Programme grant**: this £8.1M (£2M UK Sport and £6.1M EPSRC) programme is
     a large multi institution (Imperial College London, Queen Mary (University of
     London) and Loughborough University) collaborative research effort supported by
     the EPSRC over five years. It seeks to bring together researchers from diverse
     backgrounds to work directly with and maximise the potential of UK athletes. The
     project, lead by Professor Guang-Zhong Yang (Imperial), not only aims to benefit
     the athletes and sports councils but also hopes to transform the technologies
     pioneered here into healthcare technology.

     The research focuses on tackling the problem of monitoring of elite athletes in
     their training environment, as opposed to a laboratory and includes the
development of miniature subcutaneous biosensors, body motion measurement
and movement tracking in the field. It builds on earlier work which resulted in a
spin out company Sensixa pioneering an accelerometer based sensor that is worn
on the ear (e-AR). This device measures the movement of an individual but can
also detect the shock transmitted through the skeleton as a result of footfall.

     The sensor, further developed in the ESPRIT programme as a training aid for
athletes is now being adapted and transformed to the healthcare sector where it
has implications for the remote patient monitoring. In conjunction with other new
sensor network technologies developed by the research team these sensors could tell if a patient was at rest, had fallen or was walking with a stager.

- **SESAME (Sensing for Sport And Managed Exercise) consortium**: this was an EPSRC supported collaboration between University College London, University of Cambridge, Royal Veterinary College, Cardiff Metropolitan University, £2.9M, which finished in 2010 and was aimed at developing sensing technologies for athlete training.

  The research resulted in a spin out company, sensAthlete, which manufacture and sell automatic track-and-field athlete performance monitoring systems to elite sport stadiums in the UK and across the world. The innovative, award-winning product is the first and only system in the world that can capture fine-grain, multiple competing athletes’ performances over long distances. Performance data of athletes is delivered in real-time to support coaching.

- **New computer software aimed at Improving Swim Performance by Optimising Glide Efficiency and Time of Initiating Post-Glide Actions** has resulted from EPSRC supported research undertaken by the University and Sheffield Hallam University in collaboration with UK Sport. The software provides instant, in-depth feedback on a swimmer’s glide technique. Swimmers glide following starts and turns, when a swimmer is not moving their arms or legs but is just using their momentum to travel through the water. As well as supplying data on head position, body posture/alignment etc, the software actively suggests ways a swimmer can improve their posture to minimise resistance and pinpoints the optimum moment to begin kicking.

11. Research in the domain is typically multi-disciplinary in nature, aided by a flexible support environment provided by EPSRC drawing together strong relationships with industrial partners (e.g. Slazenger, Speedo and Umbro), Government (e.g. UK Sport, Sport England and British Olympic Association) and wider research disciplines including the medical and life sciences.

12. Sport science often sits alongside centres of activity in Sports Technology and Engineering and one such example is the EPSRC Innovative Manufacturing and Construction Research Centre (IMCRC) at Loughborough University. EPSRC has awarded the group over £33M since 2001 to help further its international reputation for world leading teaching and research in sports science, technology and engineering. An illustration of one of the many examples of the successful outputs of this group includes A Unique Human Grip Simulator for Robotic Testing of Sports Equipment, is developing a robot golfer that can copy the nuances of an elite player’s technique, opening up exciting new possibilities. It could lead to a new generation of sports robotics and enable manufacturers to develop high-tech sports equipment, support elite sports men and women in their pursuit of perfection, and help amateur sports enthusiasts to maximise their potential. It could have wider applications in industry in terms of manipulating, grasping and moving flexible beams. And in prosthetics, it could have implications for how objects can be grasped in a more realistic manner.

Q1 bullet 2. How is this research relevant to improving the health of the wider public?
13. An improved understanding of the fundamental physiology, neuroscience, biomechanics (etc) of healthy fit individuals will be relevant to maintaining the health of the wider public across the lifecourse. The research described in paragraphs 4-7 above is aligned to BBSRC’s strategic research priority in ‘Basic Bioscience Underpinning Health’\(^{25}\). This priority seeks to drive advances in fundamental bioscience for better and improved quality of life across the lifecourse, reducing the need for medical and social intervention.

14. The development of new technologies to monitor the performance or elite athletes in their training environment also has wider applicability in the healthcare sector, as described in paragraph 10 above.

15. Furthermore, the cross-Research Council programme in ‘lifelong health and wellbeing’ (see below) supports research into factors throughout life, including those such as nutrition and physical activity, that influence health and wellbeing in older age.

**Q1 Bullet 3 What is the role of exercise in improving health, as a preventative measure, and as a treatment provided or commissioned by the NHS for illnesses and chronic conditions?**

16. It is known that physical activity confers widespread health benefits including enhanced cardiovascular, metabolic, musculoskeletal and respiratory function and improved mental health and wellbeing across all stages of the life course. Health gains from physical activity can be achieved at any age and there is evidence that that exercising in childhood or throughout adulthood can confer primary and secondary preventative effects against chronic conditions. Levels of physical activity decrease at older age, with older age groups often being very inactive. Research suggests that sedentary behaviour, such as long periods sitting or lying is an independent risk factor for ill health. The area of the health benefits of physical activity has been comprehensively reviewed in the 2011 report from the four UK Chief Medical Officers *Start Active Stay Active*\(^{26}\).

17. The National Institute for Health and Clinical Excellence (NICE) has published a number of guidelines\(^{27}\) that relate to physical activity and health, including physical activity interventions to promoting mental wellbeing, promoting physical activity in the workplace and guidance on walking and cycling.

18. The MRC’s research priorities include understanding the roles of physical activity and sedentary behaviour in the maintenance of health and also the prevention/development of disease. Research in this area will help to underpin the development of policy and preventative health measures, as will much of the fundamental bioscience research funded by BBSRC, which focuses on generating an improved understanding of the normal healthy human state.

19. The vast majority of research on physical activity and health has been conducted on athletes, children and adults under 60 years of age, and it is not clear that the findings

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\(^{25}\) As described in BBSRC’s Strategic Plan 2010-2015, [www.bbsrc.ac.uk/strategy](http://www.bbsrc.ac.uk/strategy)


\(^{27}\) [www.nice.org.uk/guidance](http://www.nice.org.uk/guidance)
from this research can be accurately extrapolated to older people. Older adults face physical and mental decline, increased risk of fractures and falls and have more sedentary lifestyles yet there is a paucity of research on the effects of activity and inactivity on health and wellbeing in this age group. The Research Councils, through the Lifelong Health and Wellbeing programme28 led by the MRC, have identified an opportunity to increase the evidence of the effects of activity and sedentary behaviour on health of older people and will work with UK health department partners to provide funding for a future call for research in this priority area. Developing a greater understanding of the impacts of active and inactive behaviours in older populations, and the determinants that influence an individual’s likelihood of being physically active, will inform the development of more effective interventions to motivate and sustain activity in this target population.

20. An example of a research challenge in this area is the need to increase our understanding of the biological mechanisms of age-related loss of skeletal muscle mass and function which is a major cause of loss of mobility and of increased sedentary behaviour, frailty and falls in the elderly. An international workshop, supported by BBSRC and AgeUK and hosted by the University of Liverpool, was held in July 2011 to address at a basic level what is known about the fundamental mechanisms by which skeletal muscle mass and function are lost during ageing and to examine the nature of interventions that might prevent these mechanistic changes. Of particular importance was to attempt to evaluate how different forms of exercise (or muscle contractile activity) influence these processes and how these effects can be best optimised to prevent or delay age-related loss of muscle function.

21. Also relevant to this area of research, the MRC and Arthritis Research UK have jointly created two new Musculoskeletal Ageing Centres with a total investment of £5m (£3.75m MRC, £1.25m ARUK), bringing together researchers from the Universities of Birmingham, Nottingham, Liverpool, Newcastle and Sheffield. The research at these Centres will investigate risk factors and biological processes for how musculoskeletal tissue function and structure declines with age, and will aim to pioneer new interventions to improve musculoskeletal health in old age.

Q1, Bullet 4: How is sports and exercise science research co-ordinated? Who sets the research agenda? Are health professionals involved in setting the research agenda for sport science and vice versa?

22. EPSRC works closely with a range of stakeholders and the research base in developing the research agenda in sports technology and engineering and its related interfaces to sport and exercise sciences. As an example, in 2006 a series of researcher workshops were held jointly with EPSRC and UK Sport and themed around grand challenges which included:

• How to provide real-time feedback of athlete performance to coaches?
• How to optimise new performance equipment?

28 Lifelong Health and Wellbeing (www.mrc.ac.uk/LLHW) is a cross-Council initiative led by MRC, and funded by AHRC, BBSRC, EPSRC, ESRC and MRC in partnership with the UK health departments. It supports research into factors throughout life that influence health and wellbeing in older age. Since, 2008, LLHW has invested £30M in multidisciplinary ageing research.
• How to improve our understanding of sails?

The workshops were exploratory in nature and focused on identifying research opportunities that could provide a competitive edge. Through the resulting new collaborations between researchers and stakeholders, twelve feasibility projects were subsequently supported by EPSRC and initiated in 2007, a number of which have developed into more substantive programmes of research.

23. Similarly, the collaboration between BBSRC and UK Sport, described in paragraphs 6-7 above, included two joint workshops which were used to identify key challenges through which the research community could contribute to sporting development through the application of basic science, and by using sport as a model system. Some of the research challenges identified were:

• Understanding the neurological changes associated with the acquisition of skills
• Understanding how elite athletes cope with such stress and whether resilience to stress is a factor in training
• Understanding the factors affecting the efficiency of muscle performance
• Understanding the cognitive and psychological factors that facilitate an individual's ability to maintain a high level of performance

The collaboration with UK Sport has been has provided researchers with previously unavailable access to cohorts of high performing athletes, thus opening up new research opportunities. UK Sport will also have a significant role in the translation of the research outputs of these awards to improving athlete performance.

24. EPSRC is working with the Royal Academy of Engineering, HealthTech and Medicines KTN and the Science and Innovation Network (Paris) to develop a workshop to be held on 04 September 2012, during the Paralympics. The workshop will bring together researchers in rehabilitation science and engineering and sports scientists. It also takes place alongside UKTI’s Life Sciences summit on 03 September, which will be looking at 'how can sport drive engineering innovation?', focussing on the linkage between Life Sciences and the Paralympics, and featuring ways in which people with disabilities are enabled to live a full and active life as a result of innovation by UK companies.

6 June 2012
HIGH PERFORMANCE SPORT AS A MODEL FOR BIOLOGICAL RESEARCH.

A one day workshop organised by BBSRC and UK Sport was held in September 2009 to promote interaction between researchers in basic biology with those in more applied sport-related disciplines. Four Challenges were identified during the meeting as areas where the research community could contribute to sporting development through the application of basic science and using sport as a model system.

Background

The UK bioscience community has the knowledge and skills base to address many major challenges facing high performance sport in the UK through athletic training and performance. Fundamental bioscience, including the physiology of the nerve to muscle to tendon system, can provide new insights into the stress and adaptation required to maximise physical potential. In addition, the functioning and understanding of the neurobiological system can provide crucial insights into the development of expert learning through talent development.

High performance sport provides a novel and unique model with which to investigate key underpinning scientific challenges related to increasing the healthy lifespan. Elite athletes seek to maintain a high level of performance over a long time scale, resulting in a physiology that is both healthier than that of the average population, but also exposed to significantly more physical stresses that can compromise performance or eventually lead to pathological conditions. The physiological parameters of elite athletes challenge our notions of what we consider ‘healthy’, and represent a unique model of human neuro to musculoskeletal performance and stress adaptation. This cohort will provide new insights into the fundamental physiology and neurobiology of the healthy ageing process across the lifespan.

The aim of the workshop was to stimulate participants with some of the practical challenges faced in supporting and developing leading British athletes, and to encourage research collaborations to help address some of these issues.

Key Challenges for the workshop and call for research proposals

Neurological changes in the acquisition of skill

The acquisition of skill and its maintenance is an important process in the training of elite athletes, and is a process relevant to all members of society throughout the life course. The key questions for this challenge are:

1. Are there measurable neurological changes with sporting skill acquisition, and can these be identified in athletes undergoing a high level of training, and skill maintenance?
2. If such changes can be identified, are they markers of current skill acquisition and can they be used as biomarkers to predict future skill acquisition ability and progress?
3. Can we model the skill learning process and so predict sport and wider skill acquisition?
4. Is there a genetic basis to expert skill development?

**Stress Resilience**

Elite athletes are required to cope with and maintain a level of physical stress in excess of the rest of the population. It is unclear how these elite athletes cope with such stress and whether resilience to stress is a factor in training. The key questions for this challenge are:

1. Can we identify and accurately quantify stress (neural, muscle, tendon) in the body?
2. Can stress resilience (neural, muscle, tendon) act as a marker for ability to train at an elite level?
3. Can stress resilience predict the ability of an athlete to perform?

**Efficiency of muscle performance**

Strength training is a central activity for athletes to maintain performance and for the wider population to maintain health at all ages. However it is not clear what makes for the optimal performance of a muscle. The key questions for this challenge are:

1. Does strength training really make the muscle slow down?
2. Can we identify the trade off between muscle size and speed of relaxation and contractions - is there a threshold beyond which we should be making muscles bigger or just faster relaxers and contractors?

**Optimising training portfolios**

Training regimes are specific to the sport and the individual. Mixing strength and endurance training effectively to maintain muscle mass and function is clearly vital to an elite athlete, but has important implications for the general population over the lifecourse. The key question for this challenge is:

1. How can you mix strength and endurance training effectively and maintain muscle mass and function?

**Awards**


‘Mechanism of eccentric training augmentation of muscle adaptation in humans and the potential negative impact of non-steroidal anti-inflammatory drugs’ Greenhaff, Nottingham, £376,728.
Annex 2

Call text for: High Performance Sport as a model for the acquisition, retention and retraining of an individual’s skill base

BBSRC and UK Sport wish to encourage basic research on understanding the biological and psychological basis of skill learning and retention. This will address issues of common interest such as the improved maintenance of an individual’s skill base and lead to improved training methodologies for elite athletes.

Background

The Biotechnology and Biological Sciences Research Council (BBSRC) is the country’s leading agency for funding research and training in the biological sciences. BBSRC recognises we are in a period of unprecedented demographic change; with increasing lifespan there is the need to increase healthspan. Through its Delivery Plan BBSRC has recognised the need to maintain wellbeing over the lifecourse and particularly into longer periods of old age. An aspect of this maintenance is the capacity to align an individual’s skill base over the lifecourse to promote physical health into old age and extend the working life of the individual. This issue is identified within the research challenges in the Strategy for Collaborative Ageing Research in the UK developed under the auspices of the Lifelong Health and Wellbeing Programme, and will require an understanding of the cognitive and linked physical processes leading to the learning and retention of skills, as well as the acquisition of new skills.

UK Sport is the lead Government organisation responsible for the strategic support and development of World, Olympic and Paralympic performance sport in the UK. As part of its current remit, it also provides the lead on research and innovation programmes run alongside the UK’s leading sports coaches and athletes. These programmes are targeted in a number of key areas – one of which is related directly to human science and performance. UK Sport runs numerous talent identification campaigns and talent transfer initiatives to facilitate athletes in switching their specific skills into new sports.

Both organisations are keen to stimulate research in this area to the benefit of elite athletes as part of the legacy of the Olympic Games in 2012.

Key issue

Understanding how skills are learnt, developed, applied, maintained and changed over time is important both to top athletes and the wider population more generally. Elite athletes need to both maintain a wide range of skills, and have the ability to acquire new ones during the course of their athletic careers. Understanding how elite athletes are able acquire and retain their skills will inform on the broader population as it faces the prospect of longer working lives and the continued introduction of new technologies within the home, work, and wider environments.

The acquisition and application of skills by elite athletes

29 www.mrc.ac.uk/LLHW/ageingstrategy
Although innate ability is important for athletic development, top athletes also need the ability to acquire and apply high level cognitive, perceptual and motor skills. These skills need to be acquired through physically and mentally intense learning processes. It may take 10,000 hours of practice to develop winning expertise; how that practice is structured, delivered and supported is critical to the outcome. A previous funding highlight between BBSRC and UK Sport explored the physiological basis of athletic performance. However, many successful athletes are notable for their ability to either develop additional skills, or acquire a new skill set replacing the original, and subsequently apply them at the top level of performance. This has become apparent with examples of talent transfer where athletes have been able to cross from one sport into another with equal levels of success at the very top, or the rapid ability to change technique due to injury.

The acquisition of a skill and its application requires an individual to have the correct cognitive capabilities; understanding how these attributes interact is key to understanding how we develop a new skill. Whilst the characteristics required for learning a new skill are obviously not unique to high performance athletes, their focus on a very precise skill set and a high level of physiological capability, coupled with the opportunity to quantify athletic outputs, makes athletes potentially useful models for the study of skill acquisition. The ability of athletes to maintain their health at such an optimal level, and over a significant timespan, alongside an ability learn new skills at the same time, makes them potentially interesting models for the wider population.

**Challenges**

To study the acquisition, retention and retraining of an individual’s skill base, BBSRC and UK Sport have identified three challenges that should be addressed to further understand skill acquisition in both high performing athletes and the wider population throughout the lifecourse. The purpose of the highlight is to encourage a multidisciplinary approach including the fields of neuroscience, biomechanics, motor behaviour, cognition, psychology, modelling, education, gerontology and management and business studies. To promote a multidisciplinary approach, the Economic and Social Research Council (ESRC) has agreed to provide co-funding for suitable applications which fall partially within its remit.

The following challenges have been identified:

- How does cognitive capability interact with the social and physical environment to influence the development of skill and expertise, and are there markers for skill acquisition?

Issues of relevance to the athletic community and wider society include an understanding of the biological processes that underlie the ability to acquire and execute new motor and other skills, and using these as a marker to both optimise learning environments and understand how this changes over time. Issues to address could include:

- Can we model these processes to predict and optimise performance outcomes, and expand the outcomes to the wider population?
- What is the cognitive basis for the retention of skills across the lifecourse?
- Is there a set or sets of markers that biologically indicate functional skill acquisition, and do these change over time and under different learning environments?
• What cognitive and psychological factors facilitate an individual’s ability to maintain a high level of performance, and what affects an individual’s resilience?

Issues that could be addressed under this challenge may include:
• Can we identify a cognitive basis for mental toughness and resilience – are there key psychological traits for repeat high performance and resilience in challenging environments?
• Which factors contribute to an athlete’s ability to manage psychological stress, willingness to pass through the pain barrier, and mental stamina for intensive training to increase performance? Such factors could relate to an athlete’s ability to cope with the stress of training, competing and ultimately using both failure and success constructively.
• Can we identify and validate methods to integrate neural, physiological, genetic or behavioural biomarkers to better understand or predict resilience for athletic performance and throughout the lifecourse?
• Can we use this knowledge to model options for training programmes - both physical and learning and over a lifespan?

• How do we optimise the retention, as well as the learning and retraining of skills by an individual to maximise the performance and flexibility of their skill base?

In high performance sport, it has been shown that talented individuals from one domain can acquire the ability to perform at a high standard in a new activity. Refining a previous skill, or learning a new skill may be required to be effective in a new sport or wider activity.

Issues that can be addressed under this challenge include:
• Does athlete’s previous skill acquisition help or hinder the process?
• Is refining a previous skill a key component in transfer success or does it require a new learning pattern?
• How does history and environment interact to influence skill acquisition? Are there key steps that are mandatory in the process?

Understanding the processes involved could lead to a better understanding of the factors, both innate and acquired, that identify potential capacity to retrain, be it for sport or within a wider societal context. This could increase the effectiveness for example of talent transfer initiatives or re-skilling for a new work environment, and could accelerate skill-based learning through the development of training programmes. In a wider context, greater understanding could establish the relationship between such markers and the learning styles derived from established theories of learning in education and psychology.

BBSRC and UK Sport are keen to explore the above challenges as applied to athletes involved in high performance sport. This includes consideration of the full range of Olympic sports and involves athletes of all ages and backgrounds. It is anticipated that the study of athletes as a model system would lead to understanding skill acquisition at a broader level, and we are particularly keen to identify ways in which the resulting knowledge might be more widely applicable to other aspects of human activities throughout the lifecourse including, but not limited to, learning, teaching and training.
Applicants who seek to address the challenges above in athletes, and inform on improving an individual’s skill base and healthspan within the broader society, are invited to submit to the 19 October Responsive Mode closing date. All proposals will need to address one or more of the above challenges; however it is not a requirement to incorporate cohort studies into applications.

**ESRC context**

BBSRC and ESRC recognise the importance of social context to the maintenance of an individual’s skill base, the challenges presented in this context for an ageing population and the social nature of teaching, learning and training activities. Since individuals must learn and maintain a broad range of diverse skills, and also have the ability to acquire new skills throughout their lifecourse in order to function successfully in a changing society, this topic is of particular interest to ESRC, and would contribute directly to its key priority area of Influencing Behaviour and Informing Interventions. Understanding the biological, psychological and social processes involved in human skill acquisition will also underpin the promotion of physical and mental wellbeing throughout the lifecourse, which is of interest to both councils.

This is a BBSRC highlight, however both councils are keen to engage the social science community within this call, and applications are expected to be primarily within BBSRC remit with contribution from the social sciences. Applicants proposing to include a social science component within the project should contact BBSRC in the first instance to discuss the proposed project, and advice should be sought from ESRC.
Grants Awarded* through the two Sports Highlights in collaboration with UK Sport.

<table>
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<tr>
<th>Grant Reference</th>
<th>PI</th>
<th>Institution</th>
<th>Title</th>
<th>Total Value (£)</th>
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<td>BB/I020713/1</td>
<td>Prof. P. Greenhaff</td>
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Grants shown in italics indicate joint research projects involving more than one research organisation.
*to date; further awards remain in peer review at this time.
The Royal College of Physicians (RCP) – Written evidence

The Royal College of Physicians (RCP) plays a leading role in the delivery of high quality patient care by setting standards of medical practice and promoting clinical excellence. We provide physicians in the United Kingdom and overseas with education, training and support throughout their careers. As an independent body representing over 27,000 fellows and members worldwide, we advise and work with government, the public, patients and other professions to improve health and healthcare.

Introduction

The Royal College of Physicians (RCP) welcomes the invitation to submit evidence to the House of Lords Science and Technology Select Committee inquiry on Sports and exercise science and medicine: building on the Olympic legacy to improve the nation’s health.

Sport and Exercise Medicine (SEM) is a relatively new medical specialty which embraces the management of the medical consequences of exercise as well as using exercise to manage injury and illness in the general, recreationally active and elite athletic population. It has an important role in advocating exercise to maximize health throughout the population.

The RCP will shortly publish a document entitled ‘Exercise for Life’. This reviews the evidence for the role of exercise in the maintenance health and particularly focuses on the use of exercise in the management of disease.

Comments

Sports and exercise science research

Q. How are advances in basic understanding of physiology, biomechanics, genetics, nutrition and other disciplines applied to improving the performance of athletes (both elite and non-elite)? How robust is the application of science in this area? For example, is it possible to conduct research within a training environment?

The conduct of research in this environment is difficult. By definition, the number of elite subjects is small and there is a strong imperative not to interfere with their sporting preparation. Therefore the results of studies tend to be conducted on the ‘sub-elite’ athlete and consequently the generalisability of results can be limited. The level of sports science expertise of the UK is high and it is our experience the scientific methodology is usually robust. There are potential for lessons to be learnt to apply to the general healthy, or ill, population – but this cross-over into mainstream science and medicine is not always effective.

The quality of research in SEM, however is less strong. There is a tendency to focus on more esoteric areas and the methodology is weaker. There is a poorer exchange of ideas with mainstream medicine and there persists a view amongst, some that...
clinical practice in elite athletes is 'different'. That this group is not suitable for the application of the normal principles of the clinical trial because of different physiological responses and the need to expedite the return to play at all costs.

**Q. How is this research relevant to improving the health of the wider public?**

There have been benefits 'pulled-through' to the general population of both training techniques and medical treatments eg the management of elite sportsmen has informed the principles of diabetic care in the exercising population. There have also been lessons learnt in the use of exercise and muscle conditioning in the improvement of back pain or knee pain in osteo-arthritis.

There is, however, a potential for closer integration between the science of elite sports performance and the exercise medicine as applied to the general population. Likewise, there are clinical processes, including governance structures, learnt in general clinical practice which could be applied to the elite sport setting.

**Q. What is the role of exercise in improving health, as a preventative measure, and as a treatment provided or commissioned by the NHS for illnesses and chronic conditions?**

There are considerable benefits for the health of the population from regular exercise. Regular exercise is as effective in reducing coronary artery disease as stopping smoking. About two thirds are insufficiently active to benefit their health. The introduction of regular, moderate activity could deliver significant benefits to the population in the prevention of conditions such as cardiovascular disease, cancer and stroke.

Inactive and overweight children are at higher risk of becoming obese adults and physical inactivity is associated with hypertension, metabolic risk, mental health risk and reduced bone density in children and young adults.

With regards to treatment - there is good evidence that the appropriate levels of exercise are effective in the management of many conditions including; musculo-skeletal injury, low back pain, COPD, coronary artery disease, hypertension, heart failure and depression. The risks of developing Diabetes appear to be modified and exercise improves Diabetic control. A summary of these findings can be found in Exercise for Life and My Best Move.30

What is less clear is how best to deliver it. Exercise referral schemes have been studied at length - with NICE producing guidance which are not supportive of their use. However, this reflects the paucity of good quality, large scale trials, with appropriate outcome measures – producing an absence of evidence, rather than evidence of the absence of effect. There is a potential for exercise to provide significant health benefits as a treatment but there is lack of clinical trials to support it.

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Q. How is sports and exercise science research co-ordinated? Who sets the research agenda? Are health professionals involved in setting the research agenda for sport science and vice versa?

There is little or no coordination of sports and exercise science research. There is no national research council so there is no national research agenda. It is the view of our experts that, except in a few cases, there is very little cross-pollination between sports scientists and clinicians. There is certainly no strategic coordination between these two groups. In addition, there has tended to be a focus on sports medicine rather than on the exercise medicine elements which could benefit the population suffering from ill-health.

The DH England funded National Sports and Exercise Medicine Centres of Excellence reflect this lack of national strategy. Despite £30m investment the Faculty of Sport and Exercise Medicine (FSEM) is unsure as to the strategic intent of the programme. There is a risk of disconnect between the sports medicine and sports science communities, as well as the money serving only to support existing local research needs rather than a national strategy.

Translation of research

Q. How are findings from sports science research, and sports and exercise medicine, used to develop medical treatments and public health interventions? Is this done effectively?

There has been research into the effectiveness of exercise referral schemes. There is also basic science research into the metabolic effects of exercise.

Very little funding goes into trials of treatment. Most of the best controlled large scale trials of medical treatment are directed at pharmacological interventions and are funded by pharmaceutical companies. There are no such commercial benefits available for proving the effect of medically-supervised exercise, therefore funding to provide studies of sufficient size and quality is not available. This invariably means that studies of exercise interventions are small, often under-powered and short term. In addition, outcome measures are often ill-selected, measuring long term compliance rather than the metabolic or health effect. The risk of small, incompletely powered studies is that they fail to demonstrate benefit – which is then interpreted as demonstrating that exercise has no effect.

Q. What medical treatments and public health interventions involving sport or exercise currently exist?

Defence uses a network of exercise-based services to deliver rehabilitation, with benefits to operational effectiveness – including on operations in Afghanistan.

There are many exercise-referral schemes across the UK and exercise is used in a structured way in the context of cardiac and respiratory rehabilitation services.
Q. Are the findings from sports and exercise science research, and sports and exercise medicine, translated effectively by the NHS and Department of Health? If not, what are the barriers to translation and how could these be addressed?

No. Our experts consider the barriers to be:

- Lack of a properly resourced consistent focus/point of contact in the Departments of Health to address exercise and the treatment of disease.
- Lack of recognition of the benefits of exercise, including cost benefits and ‘Green’ credentials.
- Doctors are poor advocates for exercise as they are not usually trained in exercise medicine and some feel it is not the doctor’s role. Our experts believe that doctors should be trained to deliver advice and offer a key opportunity to inform and persuade those who are ill of the benefits of exercise.
- A lack of facilities and expertise to refer into. In particular, despite the NHS training a cohort of SEM consultants there are very few posts for them to fill in the NHS. This means that many are working for professional sport or taking up part-time work supporting musculo-skeletal services. The NHS investment in their training is not being recouped. The lack of strategic guidance on this issue means that it will rely on Clinical Commissioning Groups (CCGs) to decide on the local relevance of SEM.
- There is a lack of assurance of the exercise professional managing patients. Remedial instructors (ERIs) in the military go through extensive training and strict assurance processes but they are not on the Health Professions Council (HPC) register – as no new professions are being taken on. Civilian exercise therapists do not have such a high standard of training to achieve and there is no assurance system once qualified. This leaves doubt amongst GPs as to the safety of referral into systems which aim to deliver exercise-based treatment.

Q. Are policies on sport, physical activity and health adequately integrated? What, if any, are the barriers to integration? How can the sport and health agendas in Government be better linked to leave an Olympic legacy to improve the nation’s health?

Our experts do not feel there is adequate integration of these issues. Sport, health and exercise medicine are interlinked and a positive message of their benefit should be given. There is too much focus on the negative behaviours and not on the huge elements of the UK that participate in sport and exercise. The medical profession should be more involved as advocates for exercise both at a strategic and patient level.

We would propose a trial of an integrated primary and secondary care exercise medicine scheme such as that currently being proposed in London.


7 June 2012
The Sport and Exercise Nutrition Register (SENr) – Written evidence

I am writing to you on behalf of the Sport and Exercise Nutrition Register (SENr) in relation to the Committee’s enquiry into Sports and exercise science and medicine: building on the Olympic legacy to improve the nation’s health

On behalf of the Register I would like to respond to the questions:

How is this (sport and exercise science) research relevant to improving the health of the wider public?

What is the role of exercise in improving health, as a preventative measure, and as a treatment provided or commissioned by the NHS for illnesses and chronic conditions?

How are findings from sports science research, and sports and exercise medicine, used to develop medical treatments and public health interventions? Is this done effectively?

What medical treatments and public health interventions involving sport or exercise currently exist?

Are the findings from sports and exercise science research, and sports and exercise medicine, translated effectively by the NHS and Department of Health? If not, what are the barriers to translation and how could these be addressed?

Are policies on sport, physical activity and health adequately integrated? What, if any, are the barriers to integration? How can the sport and health agendas in Government be better linked to leave an Olympic legacy to improve the nation’s health?

The SENr was established some time ago with support from UK Sport as a joint initiative between dietitians, nutritionists and sport and exercise scientists. It is currently administered by The British Dietetic Association on behalf of the SENr Board. The Register is the only voluntary register with clear standards and competencies designed to protect the public (and especially those involved with sport) from poor nutrition advice. More details about the Register can be found on our website www.senr.org.uk

There is clear evidence about the benefits of sound nutrition advice on the outcomes of professional sports people and elite athletes. This includes the avoidance of banned substances which can be detected by drug testing, even when substances are taken in good faith. Sports nutritionists, dietitians and sports scientists with appropriate training and knowledge contribute greatly to the body of knowledge that impacts on outcomes and performance.

However, there is also clear evidence about the benefit of exercise and sound nutrition advice on the health of the public. The translation of sound nutrition advice which could
have a wider beneficial impact and a legacy from the Olympics is not dissimilar from the principles of the advice given to professional or elite squads/individuals.

The benefit of such a legacy could be hugely significant with a growing concern about obesity and long term conditions. Providing both exercise and nutrition advice together could present a huge public health benefits by having a significant impact on obesity, long term medical conditions and as such will also help reduce costs and other burdens on the National Health Service and Social Care resources.

What presents a barrier to such strategies is the fact that the sources of nutrition advice is hugely varied, ranging from those individuals registered with the SENr to those with only a cursory training in sport and exercise nutrition. The advice from the latter group places great reliance on supplements as opposed to a healthier or balanced diet. For those individuals requiring specialist nutrition advice (e.g. competitors with diabetes, etc.) then it is essential, rather than desirable, that it is provided by a registered sport and exercise nutrition registered professional. Sadly this is not a requirement nor is it embedded within national guidance.

We continue to try to engage with all professional and national sports associations in order to encourage them to recognise SEN Registration as the ‘industry standard’ of professional competence. We have established a good working relationship with the English Institute of Sport who has adopted SENr for their teams that provide nutritional advice and support for the athletes in their care.

These are some small examples of why progress will be limited within professional and elite sport: there is no clear mandate for voluntary regulation or clear standards for sports nutrition advice. Similarly, from a legacy point of view, progress on the nation’s health will only be made if there is a clear mandate from Government that best practice must be followed and standards of nutrition advice should follow at least basic sound principles (including voluntary regulation) to ensure public health receives positive benefits. The reliance on supplements to try to achieve improved performance results is one that appears to cross both professional and amateur sport as well as those in the wider public who want to lose weight or improving fitness. It is clear that prescribing nutritional supplements as an approach to improving public health is no substitute sound nutrition advice.

SENr provides a clear and sound basis for voluntary regulation and the opportunity to improve the health of the nation as well as the opportunity for an Olympic Legacy that will help protect the health of all those participating in sport both at the recreational and the professional levels of activity. We would welcome stronger Government support in delivering what was envisaged by UK Sport and the three professions involved in setting up the Register. We would welcome any opportunity to work more closely with sports associations, the NHS, social care organisations and local authorities, but the landscape is unregulated and lacking in direction from a national perspective. We would welcome any outcomes from the Select Committee to help galvanise policy in this area.

6 June 2012
Sport and Recreation Alliance – Written evidence

The Sport and Recreation Alliance is the national independent voice for sport and recreation, representing over 300 member organisations including the national governing bodies of sport and county sport partnerships. Our members account for 151,000 sports clubs catering for some 13 million participants, and the Alliance works to protect and promote the role of sport and recreation in healthy and active lifestyles.

Summary

1. There is well-established evidence that exercise can improve physical health and so reduce the risk of obesity, heart disease, certain types of cancer, osteoporosis and many other illnesses, as well as treating depression, stress and anxiety and helping to prevent dementia.

2. The sport and recreation sector is equipped to build and deliver positive public health outcomes; within the sector there is a broad range of organisations with the knowledge and expertise to deliver an even wider range of physical activities to suit individuals of all backgrounds, interests and abilities. There are a range of examples of positive public health interventions delivered by organisations within the sport and recreation sector:

   - The Changing the Physical Activity Landscape programme in County Durham draws on the collective capacity of the sport and recreation sector and supports community organisations to deliver sustainable opportunities for physical activity.
   - The Get Walking Keep Walking project uses a structured 12-week programme to encourage inactive people to walk regularly, and has successfully engaged nearly 90,000 people across the UK.
   - The ‘Swim4Life’ referring programme is a practical and potentially effective way to link health advice given by GPs to services provided at local leisure facilities.
   - Many County Sport and Physical Activity Partnerships offer inter-workplace competition programmes; these are linked with either a local sports club or a "Back2" sports programme, giving participants the option to continue with the activity after the competition.

3. Policies on sport, physical activity and health are not adequately integrated. A greater level of coordination first requires full recognition of the value of physical activity and the merits of prevention over cure. This requires action not just by the Department for Culture, Media and Sport and the Department of Health, but also the full range of departments across government.

4. The language barrier that can exist between healthcare professionals and individuals in the sport and recreation sector can be bridged by County Sports and Physical Activity Partnerships (CSPAPs), which are able to facilitate partnership working and dialogue between the commissioners of healthcare and providers of sport and recreation.

Sports and exercise science research
What is the role of exercise in improving health, as a preventative measure, and as a treatment provided or commissioned by the NHS for illnesses and chronic conditions?

5. There is well-established evidence that exercise can improve physical health and so reduce the risk of obesity, heart disease, certain types of cancer, osteoporosis and many other illnesses, as well as treating depression, stress and anxiety and helping to prevent dementia. It is thought that physically inactive individuals spend an average of 38% more days in hospital, make 5.5% more GP visits, 13% more specialist services and 12% more nurse visits than an active individual (Jones et al., 2012). Evidence suggests that even small improvements in physical fitness reduce the risk of premature death, with previously sedentary people who make modest improvements to their physical fitness seeing large improvements to their health. Sport England have used existing research to estimate that if the UK had an additional one million people participating in sport once a week it would save £22.5 billion in health and associated costs31.

6. From reviewing existing cross sectional studies32, experimental studies33 and cohort studies34, O’Donovan et al. (2010) found that inactivity results in a two-fold increase in the risk of cardiovascular disease, type 2 diabetes and overweight and obesity. The cohort studies also showed strong evidence that physical activity has a causal relationship with reducing the risk of post-menopausal breast cancer and depression, and moderate evidence that this is the case for colon cancer, psychological well-being, cognitive impairment and prostate cancer. This supports earlier findings from Warburton, Nicol and Bredin (2006a) who explored the evidence from over 150 pieces of observational35 and randomised36 research on the health benefits of physical activity. They found that existing research showed irrefutable evidence that regular physical activity is effective in the primary and secondary prevention of premature death and the prevention of chronic diseases including cardiovascular disease, diabetes, cancer, hypertension, obesity, depression and osteoporosis.

7. Based on their review of the evidence, O’Donovan et al. (2010) propose that healthy adults (18-65 years) should participate in 150 minutes of moderate intensity aerobic exercise a week, or 75 minutes if it is of a vigorous intensity, with minimum bouts of 10 minutes. For children (5-18 years), O’Donovan et al. recommend accumulating at least 60 minutes of moderate to vigorous intensity activity a day which should include vigorous-intensity aerobic activities aimed at improving bone density and muscle strength. This is echoed in the Government’s current adult guidelines for physical

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31 Sport England Website: http://www.sportengland.org/about_us/our_news/sport_and_health/sport_and_health_statement.aspx

32 In this context, cross sectional studies compare risk factors for disease in those who exercise regularly as part of their lifestyle against sedentary counterparts at a given point in time.

33 Experimental studies assess risk factors for disease before and after a specific physical activity intervention whilst controlling for other influencing factors such as a change in diet.

34 Cohort studies are conducted over a long period of time and involve studying a large group of healthy people to observe the incidence of disease and death, this can then be compared by physical activity levels of individuals and groups.

35 Observational research is not a scientific experiment with controlled parameters. It involves direct observation of participants in their natural environments, for example, observation of the physical activities undertaken by a sample of participants.

36 Randomised research is a scientific experiment. It takes the total number of eligible participants recruited and randomly assigns them to different intervention groups, such as running for 30 minutes a day or running for 60 minutes a day. A randomised trial assigns participants to different intervention groups only. A randomised controlled trial assigns some of the participants to a placebo group to increase the validity of a study.
activity. Wen et al. (2011) concluded that 15 minutes of moderate intensity physical activity a day or 90 minutes over a week may be enough to bring about health benefits even in those who are at risk of cardiovascular disease. The research suggests that some exercise is better for our health than none, but going beyond the current recommended daily guidelines can have further health benefits. Warburton, Nicol and Bredin (2006b) concluded that there is no one solution for how much a given activity should be done at a set intensity and frequency; effective physical activity for physical health is dependent on the existing health of an individual and their health goals.

**Weight Maintenance**

8. In 2011, the direct costs associated with obesity were estimated to be £5.1 billion per year in the UK; it is thought that this will reach £6.4 billion by 2015. The indirect costs of obesity are also significant, excluding further disease or illness brought about by obesity, it is thought that between £2.35 and £2.6 billion a year in lost earnings can be attributed to obesity through either obesity related premature mortality or obesity related sick days – estimated at around 16 million sick days. Overall, in 2007 the total cost of overweight and obesity to society and the economy was thought to be around £16 billion (Department of Health, 2011a).

9. From a review of existing research the Department of Health (2011b) believe there to be strong evidence that aerobic physical activity at the recommended level (30 minutes moderate intensity activity five times a week) consistently has an effect on maintaining weight. Research by Goodpaster et al. (2010) shows that if combined with a moderate restriction in diet, between 150 minutes and 250 minutes could be effective as a means of weight loss for those who are overweight or obese. Without a dietary change, research emphasises the need to go beyond the recommended guidelines for general health benefits to 250 minutes or more of moderate intensity activity a week. There is also solid evidence that regular physical activity can go as far as to offset genetic susceptibility to obesity (Kilpeläinen et al. 2011). This has led the Medical Research Council (2011) to confirm that physical activity can be beneficial even if there is a genetic predisposition to obesity.

**Cardiovascular Diseases**

10. Almost half (46%) of the 180,000 deaths from cardiovascular diseases in the UK in 2009 were as a result of coronary heart disease. It is estimated that overall cardiovascular diseases cost the UK economy £30.7 billion a year (British Heart Foundation, 2011). It is thought that reducing cardiovascular disease in 1% of the population of England and Wales would save the National Health Service at least £30 million a year (Barton et al., 2011). In the 1950's it was discovered that bus drivers in London were twice as likely to experience mortality from coronary heart disease as their counterpart bus conductors. This led to the hypothesis that the activity involved in the work of bus conductors protected bus conductors from coronary heart disease (Morris et al. 1953). Paffenbarger et al. (1986) assessed 16,936 male Harvard alumni between the ages of 35-74 to establish influences on rates of mortality from all causes and length of life. It was observed that burning 2000 kcal or more a week reduced all-cause mortality by between 22% and 27%, and coronary mortality by 25%-33%. In addition physical activity was seen to increase life expectancy by an average of 1-2 years at the age of 80. Later analysis by Warburton, Nicol and Bredin (2006a) of several studies found that mortality from a cardiovascular
disease was 20% less likely following an increase in physical fitness of one metabolic equivalent (MET)\textsuperscript{37}. Large scale analyses on men and women echo these findings.

**Diabetes**

11. One risk factor for cardiovascular disease is diabetes. According to Diabetes UK (2011), ‘Type 2 diabetes develops when the body can still make some insulin, but not enough, or when the insulin that is produced does not work properly (known as insulin resistance). In most cases this is linked with being overweight.’ It would therefore be logical that physical activity could have an impact on reducing prevalence of type 2 diabetes. A study by Helmrich et al. (1991, cited in Warbuton et al., 2006a) found that for every increase of 500kcal of energy expenditure per week there was a 6% decrease in the incidence of type 2 diabetes. Knowler et al. (2002) demonstrated that physical activity as part of a healthy lifestyle is twice as effective as drugs in preventing type 2 diabetes. It is also a fraction of the cost. Using the UK Diabetes data above, reducing type 2 diabetes in the UK by 6% through physical activity would not only enrich the lives of over 150,000 individuals but could save the NHS an estimated £4.9 billion a year\textsuperscript{38}.

**Musculoskeletal Health**

12. Evidence shows that low intensity exercise and exercise that focuses on muscular strength and endurance can benefit health in people of all ages by helping in the treatment and maintenance of musculoskeletal conditions including osteoporosis, which causes 1 in 3 women and 1 in 12 men to develop broken bones during their lifetime (National Osteoporosis Society, 2004). Physical activity can lower the risk of falls and fractures, reduce pain, improve muscle strength and stamina, and improve balance, posture and morale. This is however also particularly relevant for the ageing population in the UK, as greater musculoskeletal health in old age facilitates independence amongst elderly people, and furthermore, in the first year after a hip fracture the mortality rate for elderly individuals is 15-20% (Schurch et al., 1996, cited in Kohrt et al., 2004).

13. Michaëlsson et al. (2007) explored the relationship between leisure time physical activity and an osteoporotic fracture over a 35 year period, finding that 20.5% of the men with low physical activity levels suffered a hip fracture in comparison to 8.4% of those with high physical activity levels. The researchers conclude that, ‘according to the estimation of population-attributable risk, one third of all hip fractures could be prevented by participation in regular sports activities’ (Michaëlsson et al., 2007, n.p.). Currently it is thought that there are 70,000 instances of hip fractures in the UK each year and that the overall associated costs are almost £2 billion a year (National Hip Fracture Database, 2011). By Michaëlsson et al.’s estimations over 23,000 of these could be prevented through sport, which could potentially equate to a saving of over £600 million.

**Cancer**

14. The relationship between cancer and physical activity has been much examined, with the overall conclusion that routine physical activity can reduce the incidence of breast and colon cancer in particular. Evidence shows that regular exercise can reduce the incidence of breast and colon cancer and may reduce the risk of prostate, endometrial and lung cancers.

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\textsuperscript{37} MET is the estimate of a person’s resting metabolic rate, it is how much energy they expend when sitting quietly. 1 MET can be defined as 1kcal per kilogram per hour, or 3.5ml of oxygen per kilogram per minute.

\textsuperscript{38} 90% of 2.9 million people diagnosed with diabetes have type 2 diabetes, this is 2.61 million people. 2.9 million diabetics cost the NHS £9 billion a year, this amounts to an average cost per person of approximately £3,100. 6% of 2.1 million people with type 2 diabetes is 156,600 people. 156,600 x £3,103.45 = £486,000,270
cancer (Rajarajeswaran and Vishnupriya, 2009) reduce overweight and obesity – estimated to contribute to between 14 and 20% of all cancer-related mortality in the United States (Calle et al., 2003, cited in Kushi et al., 2012), enhance survival rates amongst breast, colorectal and pancreatic cancer patients and increase quality of life in all cancer patients.

15. Physical activity is also held to be beneficial for improving the health and quality of life for people diagnosed with cancer. Traditionally rest was thought to be beneficial for patients recovering from cancer. However research shows that physical activity is important for treating symptoms such as anxiety, fatigue and impaired mobility, improving quality of life in cancer patients and increased chances of survival. As a result, Macmillan Cancer Support (2011) has calculated that of the 2 million cancer survivors in the UK, 1.6 million are not currently physically active to recommended levels. From a range of evidence Macmillan concluded that, ‘physical exercise for people with a cancer diagnosis is vital’ (2011, pg.4). Research carried out at the University of Hong Kong supports the Macmillan findings. Fong et al. (2012) concluded that patients who had received cancer treatment and then taken part in physical activity programmes had improved health with regards to their BMI, body weight, physical functions (such as oxygen consumption), depression and quality of life.

Mental health

16. There is a strong relationship between mental ill health and physical ill health. People with long term illnesses such as diabetes or hypertension have double the rate of depression in comparison to the general population, and mental ill health increases the risk of physical ill health. A review of several hundred studies on the influence of physical activity on mental wellbeing by Fox (1999) concluded that moderate, regular exercise is a viable way to treat depression and anxiety, and to improve mental wellbeing generally via improved mood and enhanced self-perception. The total cost of mental health problems in England in 2009/2010 was calculated to be £105.2 billion. This represents a 36% increase since 2002/03 despite the prevalence of mental health problems remaining unchanged at 23% of the adult population (Centre for Mental Health, 2010). This includes NHS and social care costs of over £21 billion a year and sick leave absence and unemployment costs as high as £30 billion a year. Yet despite the evidence from research on the role of physical activity in both the treatment and prevention of mental illnesses there is currently little precedent amongst GP’s and healthcare professionals to prescribe this form of treatment.

17. Blumenthal et al. (2007) found that physical activity is as effective as medication in treating depression. A 16 week study of 202 men and women found that 45% of patients diagnosed with major depression no longer met the criteria for depression after exercising three times a week in a supervised group setting. This is on a par with the 47% of patients who no longer met the criteria after taking anti-depressants. This echoes a study by Craft and Perna (2004), who found physical activity to be beneficial for sufferers of depression, concluding that ‘many studies have examined the efficacy of exercise to reduce symptoms of depression, and the overwhelming majority of these studies have described a positive benefit associated with exercise involvement’ (Craft and Perna, 2004, p.105).

Dementia
18. Physical inactivity has been identified as a risk factor for dementia, and the World Health Organisation (2012) concludes that evidence for the protective role of physical activity against dementia is inconclusive but positive, with aerobic exercise being seen to bring about cognitive benefits. The most recent research on physical activity and Alzheimer’s disease found that elderly people with low levels of physical activity had more than twice the risk of the disease when compared to their physically active counterparts. Buchman et al. (2012) showed that physical activity at any age can help to stave off Alzheimer’s disease and that the benefits of a more active lifestyle can be seen even if formal exercise programmes are not in place.

**Translation of research**

**What medical treatments and public health interventions involving sport or exercise currently exist?**

19. The examples given below highlight the range of initiatives being delivered by organisations within the sport and recreation sector. These demonstrate that, collectively, sport and recreation organisations are equipped to build and deliver positive public health outcomes; within the sector there is a broad range of organisations with the knowledge and expertise to deliver an even wider range of physical activities to suit individuals of all backgrounds, interests and abilities.

**Changing the Physical Activity Landscape, County Durham**

20. The Changing the Physical Activity Landscape programme is designed to encourage people aged between 40 and 74 with an estimated or actual risk of Cardiovascular Disease (CVD) greater than 20% to participate in a menu of structured activities. The primary aim is to bring about a measured increase in the level of both structured and unstructured physical activity after six months. Participants enter the CPAL programme via a number of routes:

- Formal health checks undertaken by GP practices or Pharmacists where an actual risk of CVD has been calculated
- Signposting from health trainers or stop smoking teams
- Self-referral (subject to assessment)
- The programme is also open to families of the individuals in the CVD risk group in order to provide an effective peer support mechanism.

21. Once they are registered within the programme, participants are offered a range of activities which are delivered by 23 different organisations from the public, private, voluntary and community sectors. The projects cover more than 100 of the top 30% most deprived wards across County Durham, and include schemes run by the Rugby Football Union, Amateur Swimming Association, the Ramblers and England Athletics. The CSPAP in County Durham played a critical co-ordinating role in the delivery of the programme, which was funded by a £4.5 million investment over three years by the NHS. County Durham Sport (CDS) led a project group which developed a series of commissioning principles and a range of guidance documents to support the extensive network of potential delivery agencies. As part of the commissioning process CDS selected 28 projects from a portfolio of 97 based on a number of criteria, including best-fit for their target location and audience. Applicants were expected to provide significant evidence of community need through public engagement before being allowed to progress.
22. The strength of the CPAL programme is the way in which it draws on the collective capacity of the sport and recreation sector and supports community organisations to deliver sustainable opportunities for physical activity. At the end of December 2011, 8,409 people had benefitted from CPAL, putting the project on course to meet the targets set by the NHS. To evaluate the wider impact of CPAL a model was developed by an independent consultancy, which allows a financial return on investment to be derived. The most recent evaluation suggests that, at the half way point in the programme, CPAL is already achieving a return on the investment to date of at least £1.26 of benefits for every £1 invested. The evaluation also concluded that the programme has the potential to deliver up to £2.63 for every £1 invested by the end of March 2013, and a far greater return (£3.62 for every £1 invested) in the CVD risk target group.39

Get Walking Keep Walking
23. The Get Walking Keep Walking (GWKW) scheme was developed by the Ramblers with the aim of increasing regular independent walking amongst previously inactive and insufficiently active people. The basic principle of GWKW is for people to gradually increase their level of walking using structured plans, and there are a number of ways in which participants can engage with the programme. Local GWKW staff work with local community services, health providers and the public (amongst others) to develop walking programmes of up to twelve weeks for adults alongside one-off taster events and school programmes (lasting up to six weeks). A ‘Get Walking Pack’ is also distributed widely, providing a log book, a pedometer and a 12-week plan to develop regular independent walking as well as information about the benefits of walking. The GWKW website provides further information and guidance, including downloadable maps of local walking routes. A key strength of the programme is therefore the ease with which individuals can engage with walking; by September 2011, GWKW had engaged 87,587 people from across the UK.

24. An independent evaluation of GKWK by the Centre for Local Economic Strategies (2011) calculated that every £1 invested in the project has returned £3.61 of social, economic and environmental benefits. CLES found that 12 weeks after participants’ last contact with the project, 75% reported an increase in their daily overall physical activity. On average, participants walked on one day a week or more after taking part. CLES also found evidence of a sustained impact: Twelve months after participating in the scheme, 57% of people who were previously described as inactive had increased their levels of activity.

Swim4Life GP Recommending Programme
25. The ‘Swim4Life’ GP Recommending programme is an initiative by the Amateur Swimming Association (ASA) to establish swimming as a tool for GPs across the UK, seeking to transform the way swimming is delivered to individuals. The programme establishes working relationships between ASA regional teams, pool operators and GP practices, thereby providing an effective and workable outline for boosting physical activity through the development of local partnerships. ‘Swim4Life’ ensures that GP practices receive locally relevant information and helpful literature as well as template correspondence, enabling GPs to easily send a personalised letter to patients recommending a visit to their local pool. Leaflets are also provided for display in GP surgeries to highlight the

benefits of swimming. Individuals who decide to act on the advice are greeted by a friendly face at the leisure facility and given the support they need from the car park to the poolside, helping them to overcome any hesitation and get into the habit of swimming regularly.

26. The ‘Swim4Life’ referring programme is a practical and potentially effective way to ensure that GPs continue to play a key role in public health. By linking the advice individuals receive in the doctor’s surgery with the service provided at local facilities, swimming is more accessible and more attractive to those who would otherwise remain insufficiently active. By providing a comprehensive referring system from medic to pool, the ASA’s example demonstrates the potential benefits of closer engagement between GP practices, local facilities and sport and recreation bodies, and shows that sport can play a key role in the delivery of key public health objectives.

Active workplace schemes

27. Active workplace schemes provide a compelling model for the promotion of physical activity, and they are at their most effective when they utilise the local sport and recreation network. Many County Sport and Physical Activity Partnerships offer inter-workplace competition programmes; these are linked with either a local sports club or "Back2" sports programme, giving participants the option to continue with the activity after the competition. Common elements of events offered by the programme are low cost, an emphasis on fun and socialising, beginner-friendly sessions open to participants of all abilities, and coaching. Competitions are delivered in partnership with governing bodies of sport, allowing information about local clubs and playing opportunities to be distributed to participants.

28. One example of an active workplace scheme is the Active Together Workplace Challenge, delivered by Leicestershire and Rutland Sport (LRS) as part of the Active Together programme. It is designed to encourage and support workplaces of all sizes to promote increased participation in physical activity and sport amongst all their staff, especially those who did little or no activity. The project is focused around a web based tool40 which allows individuals and organisations to log participation in sport, physical activity and active travel; view leader boards/live statistics; register for inter workplace competitions and find out more about workplace health. In addition to the tool, a programme of nine inter-workplace competitions were organised in 2011 in partnership with the governing bodies for the following sports: badminton, basketball, football, netball, rugby touch, running, tennis and volleyball.

29. Participants completed an initial registration questionnaire, logged their activity over the course of the challenge and completed an evaluation questionnaire. In total, from January to July 2011 827 people from 67 workplaces took part in the Challenge. There was a significant decrease in the percentage of participants who were inactive, from 11% at registration to 3.2% of those who completed the post survey evaluation. There was also a significant increase in the percentage of participants achieving the recommended amount of participation in sport and physical activity from 34% to 47%. Participants stated they enjoyed taking part in the Challenge and would like to see similar challenges in the future.

40 www.workplacechallenge.org.uk
30. The Amateur Swimming Association's 'Swim 4 Work' scheme is a further example of a governing body of sport working with employers to deliver physical activity opportunities in the work environment. Under the scheme, each participating employee is presented with a pack explaining the benefits of regular swimming and outlining tips for getting started. Participants are directed to a local pool and are able to take advantage of discounted rates. Within the workplace a 'Swim Champion' is appointed to provide guidance and promote the scheme to colleagues. To ensure support for the initiative, the ASA engages with employers to communicate the benefits of swimming in terms of reduced absenteeism through sickness and increased productivity.

31. Cornish food company Ginsters also initiated a successful active workplace scheme. The programme, operated in partnership with Caradon District Council, was funded by a £160,000 grant from Sport England and aimed to promote physical activity and positive health choices among employees and their families. To deliver these outcomes, a free fitness suite was installed on site, and a full-time Active Workplace Coordinator recruited to manage the project and organise weekly activity sessions including badminton, football, cycle-spinning and running. Local sports clubs agreed to provide discounted sessions in more than eighty activities ranging from snowboarding to martial arts. The company also adopted healthy eating menus and have offered employees access to continuing health checks as well as a range of treatments including sports massage and physiotherapy. The company also worked with the local authority to deliver much needed improvements to local cycle paths and footpaths to encourage staff to leave their cars at home. The benefits to individual staff members have been complemented by the commercial impact. Over the three-year trial period, sickness, stress-related illness and accidents at work have all declined, and staff turnover has reduced by 9%, saving the company over £32,000 in job advertising costs and agency fees.\footnote{http://www.dotcornwall.com/design-matters/case-studies/ginsters-the-active-workplace}

Are policies on sport, physical activity and health adequately integrated? What, if any, are the barriers to integration? How can the sport and health agendas in Government be better linked to leave an Olympic legacy to improve the nation’s health?

32. Policies on sport, physical activity and health are not adequately integrated. A greater level of coordination first requires full recognition of the value of physical activity and the merits of prevention over cure. Fostering a physically active nation can be achieved only with full support for the organisations delivering sport and other forms of physical activity. This requires action not just by the Department for Culture, Media and Sport and the Department of Health, but also the full range of departments across government.

33. For example, the Department for Communities and Local Government has the power to make provision of physical activity opportunities a statutory requirement, and can encourage local authorities to prioritise access to sport and recreation facilities in planning decisions. The Department of Education can ensure that the National Curriculum provision for physical education and sport is in line with the Chief Medical Officer’s recommendations of at least sixty minutes moderate to vigorous physical activity a day for children, and recognise the associated benefits for educational attainment and behaviour. Similarly, the Department for Business, Innovation and Skills can take action to facilitate workplace activity and promote the benefits in terms of increased productivity and reduced absenteeism. The Department for Environment,
Food and Rural Affairs can play a huge role in encouraging physical activity by maximising recreational access to green space, including forests, waterways and England’s coastline. The Department for Transport can support active travel and work with organisations like Cycle Touring Club, British Cycling and the Ramblers to deliver an extensive network of cycle lanes and walking paths. Given the wide range of economic and social benefits that will result from increasing the nation’s physical activity levels, it is in the interests of these departments to pull together in the same direction. Ultimately, however, it is the Treasury which must recognise the significant return on investment which can be derived by encouraging more people to become more active.

34. Another factor which limits the integration of sport and health is the language barrier that can exist between healthcare professionals and individuals in the sport and recreation sector. At a local level, this gap in understanding can be bridged by County Sports and Physical Activity Partnerships (CSPAPs), which are able to facilitate partnership working and dialogue between the commissioners of healthcare and providers of sport and recreation. CSPAPs are uniquely placed to identify local physical activity needs and then develop and deliver solutions in collaboration with a wide range of providers including local authorities, clubs and national governing bodies. The prime example is the County Durham project detailed above, which shows what can be achieved by local sport and recreation networks when they have the investment and backing of the health service.

6 June 2012

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Sport England – Written evidence

We have been asked to submit evidence on our roles and responsibilities, the scope of our work and the relationship between sport and public health at a grassroots level.

About us

Sport England is focused on helping people and communities across the country create a sporting habit for life. We will invest over £1 billion of National Lottery and Exchequer funding between 2012 and 2017 in organisations and projects that will:

• Help more people have a sporting habit for life
• Create more opportunities for young people to play sport
• Nurture and develop talent
• Provide the right facilities in the right places
• Support local authorities and unlock local funding
• Ensure real opportunities for communities

We invest in sport for the social benefits it provides - bringing communities together, building individuals’ confidence and helping to develop people’s life skills - as well as the benefits to public health.

In January 2012 we launched the 2012-17 Youth and Community Strategy, describing how we will invest in sport to increase participation across the country over the next five years. Please see appendix one for more details.

We are working closely with various expert bodies to deliver our strategy. As the stewards of their sport national governing bodies of sport (NGBs) play a pivotal role, county sport partnerships and local authorities support our work at a local level and other partners such as StreetGames and the Youth Sport Trust help us tackle specific barriers to participation for certain underrepresented groups.

The key to achieving success and creating a lasting legacy post Olympics and Paralympics is understanding what factors determine whether sport becomes an established habit, what keeps people playing and why people drop out of sport. This intelligence helps us and our partners invest into projects and organisations that genuinely address the barriers to participation and encourages more people to adopt and maintain a sporting habit.

Integration of sport with public health policy

Sport makes up a large proportion of all physical activity and as such has a positive and valued impact on health across the life-course. It has a significant role to play in helping to improve public health and realise the NHS’s ambition to increase the number of people taking part in sustained and regular physical activity.

This is recognised by public policy makers in sport and in the health sector. Sport England and the NHS’s indicators are in closer alignment than they have ever been before. The Department of Health National Ambition for Physical Activity focuses on a 150 minute a
week aspiration as well as moving people from doing nothing to doing something. Our ambition to get more people playing sport 1 x 30min per week reflects how people play sport and fits well with both the National Ambition and the Physical Activity indicator within the Public Health Outcomes Framework for local authorities.

Our Active People Survey (the largest annual participation survey in England) counts the number of people taking part in physical activities (as well as sporting activities) at a local, county and national level to help local authorities and health providers understand the levels and types of activity people are doing.

Yet on the ground, health decision-makers frequently overlook sports impact, focussing predominately on walking as the major driver to increasing physical activity. This is often because sport is just seen as traditional team games – football or netball – or about competition. We support and fund a very wide range of activities including for example fitness training, jogging, going the gym, dance and informal running and cycling groups.

Our challenge is ensuring the appropriate health professionals understand the role sport can play in preventing poor public health and that the right infrastructure is in place and available to signpost more individuals to appropriate sporting opportunities.

**Relationship between sport and physical activity**

Physical activity includes all forms of activity, such as ‘everyday’ walking or cycling to get from A to B, active recreation not undertaken competitively, such as working out in the gym, dancing, gardening or families playing together, as well as organised and competitive sport.  

What unites all physical activity is its effect upon our bodies, raising our heart rate, bringing about an immediate and often beneficial physiological response and improving our overall well-being.
As the diagram highlights sport is an integral sub-set of wider physical activity.

**Sports role in improving public health**

Sport has an offer for everyone. As well as formalised, competitive sports where we hope our athletes will succeed with medals later this year, the wide variety of clubs and community opportunities – there are also adapted versions of traditional sports which reach out and draw in inactive or reluctant participants. Programmes such as Get back into Netball are showing how we can improve participation for lapsed participants and the locally led sky rides are having great success in attracting new or lapsed cyclists.

Importantly it is never too late to adopt and benefit from playing more sport since there is good evidence that the health benefits apply across the age range even in adults who are inactive.

People who play sport and meet the Chief Medical Officer guidelines have a 20-30% reduced risk of premature death, and up to 50% reduced risk of developing major chronic disease such as coronary heart disease, stroke, diabetes and cancers.44

Sport can play a positive role in helping individuals to meet the CMO guidelines for physical activity and general health benefits. Within Start Active, Stay Active45 the Chief Medical Officer highlighted the important role of vigorous intensity activity, particularly the role it can play in achieving health benefits over and above that of moderate intensity activity. As many sports combine periods of moderate and vigorous intensity activity and other sports are purely vigorous the new guidelines open up exciting new opportunities for partnerships between sport and health.

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44 Department of Health (2004). *At least five a week: Evidence on the impact of physical activity and its relationship to health*. A report from the Chief Medical Officer.

45 Department of Health (2011) *Start Active, Stay Active*. A report on physical activity for health from the four home countries’ Chief Medical Officers.
Sport is already working with health partners on shared activity and health outcomes. For example Active women in Hull is one of 20 projects backed as part of Sport England’s £10 million Active Women campaign. Delivered in some of Hull’s most disadvantaged areas, the project is being delivered in partnership with local children’s centres and health services such as Hull’s Active Lifestyle Health Trainers.

In Blackburn and Darwen the Local Authority partnered with the Primary Care Trust and local leisure centres to run a marketing campaign ‘re-fresh’ highlighting for residents the dangers of inactivity to health while simultaneously providing free, social sessions of sport and physical activity of their choice.

National governing bodies of sport are also playing their part, developing sporting offers to attract sedentary people and those taking part in lower intensity activity. Last summer, British Cycling’s Sky ride attracted more than 210,000 sedentary people or occasional cyclists from Southampton, Bradford and London into the sport.

**Making further progress**

There is much more we can do to develop the role of sport and wider physical activity and the contribution we can make to the wider health agenda.

We want England to be a nation where sport becomes a regular habit for many more people, for the health and wider benefits it can bring but also for sports own sake.

Within our new Youth and Community strategy 2012-17 we have identified our intention to review the evidence of what works and look at how sport can best make a contribution to improving health and growing participation. We have set aside some funding to pilot this approach. If successful we intend to do more between 2013-17.

As an integral part of wider physical activity we know that sport is good for health, however, we wanted to confirm that sport could engage those who are least active and will gain the greatest health benefit.

To support this we commissioned the British Heart Foundation Health Promotion Group at Oxford University to review the published evidence looking at whether sport can engage the least active. The final conclusions of this report (soon to be published) conclude that there is evidence (although there is a need for better quality reporting and evaluation) from the published literature that sport can engage inactive people at an individual or group level with increased success when targeting those willing and ready to change their behaviour. There was also evidence from current practice in the UK that sport can reach inactive people especially if the programmes include the targeting of inactive people and are properly marketed, planned and delivered appropriate to the needs of the target groups.

We intend to use this research to help us develop health pilots beginning with a stakeholder meeting across the sport and health sectors to determine the approach we might take. We are keen to develop these programmes quickly in partnership with the Department of Health and to work alongside other organisations to up-skill both the sport and health sectors.
With responsibility for public health moving to local authorities now is the time to embed the relationship between sport, health and wider physical activity fully. For example there is more to be done to ensure that health professionals fully understand the benefits of activity for health.

We have a growing evidence base for the impact of public health professionals encouraging physical activity (including sport) and NICE has advised Primary Care practitioners\(^\text{46}\) to take the opportunity, whenever possible, to identify inactive adults and advise them to aim for 30 minutes of moderate activity on five days a week or more. However promoting physical activity to patients is not seen as an option for many health care professionals.

Although some realise the benefits, the lack of a physical activity indicator in the Quality Outcomes Framework means that other public health issues are often at the forefront of a physician’s mind before physical activity. It would be a lot easier to facilitate the identification of inactive individuals if there was a physical activity indicator in the Quality Outcomes Framework.

The ideal situation would be for Clinical Commissioning groups and Health and Wellbeing boards to see sport and wider physical activity as a cost-effective means of improving health. For example, physical activity as a primary prevention strategy for sedentary adults compares very favourably with the use of statins (blood pressure medication).

NICE established that brief interventions for physical activity cost between £20 and £440 per QALY (when compared with no intervention), which is significantly below the £30,000 threshold and represents exceptional value for money. In comparison the costs of statins is between £10,000 and £17,000 per QALY while the costs of smoking cessation is between £221 and £9,515 per QALY.\(^\text{47}\)

We cannot make this case without better evaluation and support from wider public health bodies. This was summed up by the Faculty of Sport & Exercise Medicine in the recent publication ‘A Fresh Approach’ when it argued that Exercise Prescription should sit alongside pharmaceutical and surgical interventions. The cultural change required to improve national physical activity levels can be and should be led by the NHS.\(^\text{48}\)

This is endorsed by local healthcare professionals

“As a GP and commissioner of local health services I am charged with reducing morbidity and mortality, reducing health inequalities, promoting behavioural change, and using available resources to gain the best health outcomes. Much has been done to reduce the prevalence of smoking and alcohol use, to combat obesity and to educate patients with chronic diseases, such as type 2 diabetes in self-care. However, little emphasis has been placed on the value of exercise to promote and maintain both physical and mental health. As healthcare professionals we should take every available opportunity to promote this undervalued means of maintaining and improving health and social outcomes”


\(^{48}\) NHS NorthWest. Natasha SC Jones & Richard Weiler. Sport & Exercise Medicine – A fresh approach
Conclusion

We want England to be a nation where sport becomes a regular habit for many more people, for the health and wider benefits it can bring as well as for sports own sake.

There is much more we can do and we need partnership opportunities with health to make fundamental cultural shifts with health professionals so that they see sport and wider physical activity as the first and most cost-effective option in improving and protecting health.

We will also continue to work with our partners and others to ensure that sport is locally available and appropriate for those least active.

11 June 2012

Appendix One: The scope of our work

2012-17 Youth and Community Strategy

In January 2012 we launched the 2012-17 Youth and Community Strategy, describing how we will invest in sport over the next five years to increase participation across the country.

The majority of our investment - £450 million over four years - is made in national governing bodies of sport (NGBs). NGBs have responsibility for growing participation in their sport and they receive investment in return for an increase in numbers of participants.

To grow participation in their sport NGBs use market intelligence to understand the types of people that would be interested in playing their sport. Their challenge is to target those people in the right way, developing programmes and interventions to best suit the market need. Those NGBs that have use market intelligence and tailor their sport accordingly have seen success in increasing participation. For example, table tennis developed an informal social element of the sport. It put table tennis tables in communal spaces like stations, parks and cafes to encourage people to play socially. The programme was so successful when launched in London that it has recently expanded to Birmingham and Hull.

Future programmes will include helping young people move from school sport into club sport and working with universities and colleges to create more sporting opportunities for students.

Local investment is vital to making sure our work reaches into the heart of our communities and links with NGB activity. Over £250 million investment will be made in this area including a new community sport activation fund, and 1000 Door Step Clubs to create sustainable clubs for young people in the most deprived areas. 2000 young people on the margins of society will also be encouraged by the Dame Kelly Holmes Legacy Trust into sport. New

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resources will be available to deliver sport in further education colleges, as well as funding for coaching, volunteering and disability sport.

Sporting facilities underpin our work and £100 million will be available for mid-range facilities, facility improvements and new facilities.

Sport England is responsible for the School Games – motivating and inspiring millions of young people to take part in competitive school sport.

We are also working with the education sector to:

- Improve community access to schools, colleges and academy sports facilities
- Create at least 150 full-time sports professionals in further education colleges to encourage FE students into sport
- Ensure three quarters of university students aged 18-24 get the chance to take up a new sport or continue playing a sport they played at school or college
- Offer every one of the 4,000 secondary schools in England a community sport club on its site with a direct link to one or more NGBs, depending on the local clubs in its area.

Places People Play – Olympic and Paralympic legacy programme

In addition to our Youth and Community Strategy, in 2010 we launched Places People Play, a £135 million programme delivered in partnership with the British Olympic Association and the British Paralympic Association with the backing of The London Organising Committee of the Olympic Games and Paralympic Games to create a grassroots sport legacy beyond the London 2012 Games. It has three themes:

- Transforming the places – facilities and playing fields - where people play sport
- Inspiring thousands of people – volunteers and club leaders - to make sport happen in their local area
- Giving people in every community more varied opportunities to play sport, through specific programmes Sportivate (aimed at young people) and Gold Challenge.

In terms of places, we are investing £50m in modernising and extending clubs and other local facilities through our Inspired Facilities fund, providing to up to 1,000 grants of around £50,000. The facilities will carry the Inspire mark. 356 projects have benefited from £17.7m of investment in Round 1. Round 2 closed on 2 April and applications are currently being assessed.

We are also investing in Iconic Facilities large-scale, regionally-significant state of the art facilities, catering for several sports. Six excellent projects have been supported in Round 1 with a total project value of £145m and potential investment of £10m from Sport England. In round two a further 6 applications have been supported through to stage two. Round 3 will open for applications in October 2012.

Finally we are investing protecting and improving hundreds of playing fields across the country, making grants of £20,000 to £50,000 available for between 300 and 450 projects through our Protecting Playing Fields fund. Working in tandem with and supporting Fields in Trust on their Queen Elizabeth II Playing Fields Challenge. 109 conditional grant
awards have been made to date. **Round 3 is currently open for applications and closes on 9th July.**

In terms of *people*, we are recruiting, training and deploying 40,000 **Sport Makers** as the next generation of sports volunteers to organise and lead grassroots sporting activities. Results so far show **over 16,000 Sport Makers have already been inspired through a local event and are actively undertaking 10 hours of sport making with a further 5,965 booked to attend an event.**

**Club Leaders** is also part of the people strand of our strategy. It is designed to equip sports clubs and volunteers with the administration and business-oriented skills needed to overcome the multiple challenges they face, including asset transfer, balancing the books, and reliance on a volunteer workforce. Club Leaders aims to reach 10,000 clubs. It involves a learning bus to market the project and host training sessions across the country.

The *play* strand of our legacy plan includes **Gold Challenge** and **Sportivate**. Gold Challenge is an independent initiative that is motivating over 100,000 adults to test themselves in multiple Olympic and Paralympic sports, and in doing so raising millions of pounds for charity. **Over 92,000** adults and young people have registered for the challenge, with increasing corporate workforce engagement. Sportivate is providing opportunities for up to 300,000 participants aged 14-25 to receive six weeks of coaching in the sport of their choice and then guiding them into regular participation within their community. **The first years annual results showed 80,870 participants completed their Sportivate coaching sessions and a total of 98,978 young people have been engaged across 6,428 Sportivate projects.**

In terms of the *inclusive opportunities* included in **Places People Play** we aim to increase participation by inspiring people with a disability to take part in sport. **£8m of investment opened for applications on 21 May - 100 days to go to the Paralympic Games.**
1. This evidence is submitted from a broad perspective. As a performance scientist, I have worked with over 60 world and/or Olympic medallists, together with a number of elite athletes from professional sports. I have taught PE in Public, State and special schools, and have worked in teacher education. As Performance Director of Athletics (2005-2008) I was responsible for the system which took the UK from 23rd to 5th in the world. As an academic, my research has been predominantly in the area of performance, although much of this work has also focussed on the development of talent and expertise in a broad range of domains. Finally, I have acted as a consultant to Government and Trust Committees in the areas of exercise and health.

2. I note that the scope of the research deliberately states that it “will not cover psychology or behaviour change where it relates to the uptake of sport itself”. Whilst respecting this statement, I would submit that this evidence relates to a broad spectrum of behaviour change related to the pursuit of excellence at a personal level pertinent to both sport and a variety of other performance domains. I am happy to provide references and copies of published research underpinning my evidence at your request.

3. First of all, I would challenge the inference made in the ‘background and scope’ document that ‘the UK invests significantly in sports science research’. The government investment through UK sport is almost entirely focussed on support provision. Indeed, the area of sport performance research could be said to be a ‘dying art’, in the face of university pressures to pursue the larger funds available around exercise and health. I know of several high level academics who are actively dissuaded from a sport science focus, whilst even the highest status university sport and exercise science programmes in the UK reflect an increasing predominance of exercise related investigation.

4. That said, there are several advances driven by, or initiated through, work with performance athletes which have cascaded downwards to lower level populations. In the elite arena, the application of science is robust although, due in no small part to the need for cutting edge advantage at world level, it often comes from soundly grounded but as yet empirically unjustified ideas. From a wider public health perspective, psychological components of this research apply in two ways. Firstly, through the identification and systematic development of Psychological Characteristics of Developing Excellence (PCDE’s) which not only apply to the pursuit of excellence in almost any domain but also act to empower people in pursuit of their own personally set agendas through an increased sense of self-determination. The applied interaction of these factors has been shown to be successful in the promotion of broad ranging achievement AND physical activity participation.

5. I feel there is a general lack of focus and effective direction to sport and exercise science research. The agenda is often publication or funding driven but those funds which are available are often committed to very limited ‘personal interests’. This stands in contrast to practice in the 80s, when agendas were often driven, or at least informed, by committees of experts.

6. Of note to the health agenda is the current focus on sport versus physical activity as the primary outcome deliverable of Physical Education. In the same way as literacy is
a crucial precursor for a broad range of academic development so physical literacy is
the essential underpinning to a lifetime of choice behaviours leading to elite
performance, personal participation or a fun focussed physically active lifestyle. Or,
preferably all three as a developmental process across the lifespan. Unfortunately,
these aspects of Physical Education, movement literacy (education of the physical)
and what could be broadly termed character development (education through the
physical), seem to have been lost in an intervention focussed, initiative-laden 'lets get
kids active' agenda. The paucity of rationale and underpinnings in these initiatives
stands in stark contrast to the requirement for 'evidence-based practice' which is
apparent elsewhere.

7. Reflecting these concerns, it is my informed perception that policies on sport,
physical activity and health are largely un-integrated. This occurs for a number of
reasons, but not least because the governance and pursuit of the different areas lies
with different government departments, funding streams, etc. Notably, many of the
most effective council programmes I have seen have been based around a
reintegration of funding streams from completely different pots to provide a
realistically sized resource for a theoretically driven and well integrated holistic
programme.

8. As a psychologist and former teacher I would suggest that a focus on the
development of personal characteristics, skills and attributes, supported by a similar
increased skill focus for coaches and teachers, offers THE best way to get Britain
active, winning and achieving in the broader sense.

20 June 2012
UK Sport – Written evidence

Background and Context
1. This document has been produced in response to the House of Lords Science and Technology Select Committee relating to their inquiry “Sports and exercise science and medicine: building on the Olympic legacy to improve the nation’s health.”

UK Sport
2. UK Sport is the strategic lead body for high performance sport in the UK. It invests Exchequer and National Lottery funds in Britain’s best Olympic and Paralympic sports and athletes to maximize their chances of success on the world stage. For London and beyond, a third stream of private sector funding – Team 2012 – complements this public investment.

The English Institute of Sport (EIS)
3. The EIS is grant funded through and a wholly owned subsidiary of UK Sport, incorporated in 2002. The EIS works with the National Governing Bodies of Sports to provide elite athletes with access to sport science and sport medical support services. The expert support services available to athletes include sports medicine, physiotherapy, soft tissue therapy, performance nutrition, performance psychology, physiology, biomechanics, performance analysis, talent identification, strength & conditioning and performance lifestyle.

Science, medicine, technology & engineering in high performance sport
4. The delivery of science, medicine and engineering support to high performance sports comes through four different Home Country Institute (HCSI) networks (Scotland, Wales, Northern Ireland and England). The most significant of these networks, the English Institute of Sport receives the greatest proportion of core funding (£10M per annum) from UK Sport to enable a training and support network of facilities, services and support to sports to be available on a local basis. As well as service delivery, the institute network has responsibility for the development of science and medicine practitioners.

Research & Innovation
5. UK Sport’s investment in specific Research & Innovation (R&I) projects represents 2% of the total Government investment in high performance sport (around £7.5M over 4 years). This specific programme has existed since 2003 with a clear remit to exploit current knowledge from the industrial and academic sectors to support performance opportunities direct with sports. For more detailed information please see Appendix One.

Targeted Call for Evidence (Specific reference from High Performance Sport)

How are advances in basic understanding of physiology, biomechanics, genetics, nutrition and other disciplines applied to improving the performance of athletes (both elite and non-elite)? How robust is the application of science in this area? For example, is it possible to conduct research within a training environment?

6. Basic understanding of key applied disciplines in high performance sport is well established in the UK high performance system as well as our international competitors, e.g. Australia, Germany, US, France. Disciplines such as physiology, biomechanics, psychology and nutrition have established methods, practices and protocols in the delivery of sports specific
services. There are numerous organisations which provide guidelines on robust applied practice in high performance sport, e.g. ACSM, UKSCA, BASES, FSEM BASEM. These guidelines form the minimum requirements to pursue a career in this field.

7. Other emerging disciplines such as that of functional genomics and neuroscience are still limited in terms of their application in high performance sport. However, they do provide huge future potential once the fundamental knowledge is established and understood but also appropriate to answer the meaningful questions and challenges posed in high performance sport. Early work in this area, e.g. Yarrow et al (2009), Timmons (2011), Bouchard (2012) has highlighted the potential of application of such disciplines but the basic research and associated tools require more fundamental development to impact on applied practice in performance sport.

8. Most of the applied science in this area is peer reviewed and published in very specific journals to this field, e.g. Journal of Sports Sciences, Medicine and Science in Sports and Exercise, International Journal of Sports Physiology and Performance, Journal of Strength & Conditioning Research. Indeed there has been significant growth in this field in the past decade. Nichols (2008) has described this increase in publications in the field of sports medicine clinical trials between 1996 and 2005; and, Cardinale (2012) in a recent blog (http://www.teamgb.com/blogs/dr-marco-cardinale/science-sport-and-business-marginal-gains) illustrated the increase in publications through PubMed when using the term ‘strength training’. He expected to see more than 1800 articles related to strength training in the scientific press in 2012.

9. It is possible to conduct research in a training environment but this does place constraints on the type of research exercises that are possible. In most cases, some of this works tends to be more descriptive in nature, e.g. Yu et al (2012), Ingham et al (2012), Leeder et al (2012) as opposed to interventional models because of the degree of control required to test relevant hypotheses. Interventional and mechanistic work in the sports science domain tends to be with University standard trained individuals or at best National level athletes at best e.g. Lansley et al (2011) where controlled conditions are essential to test hypotheses. Consequently, such work is reviewed and published in higher impact sport and exercise specific journals, e.g. Journal of Applied Physiology, British Journal of Sports Medicine.

10. However, the functional capabilities between normal healthy cohorts and that of elite performers (top 8 in the world) are vastly different. Immediate transfer of knowledge from one standard of cohort to another needs consideration as some of the underlying norms and physiological responses in elite athletes are different to normal healthy cohorts e.g. Crewther et al, 2011.

11. With regards to the health of elite athletes, UK Sport R&I and the EIS have pioneered a unique, bespoke and economically and clinically effective approach to monitoring and the illness and injury risks of elite athletes. This approach, developed with Queens Medical Centre at Nottingham University, provides critical intelligence for sports on their athlete risk profiles. The information is used by support staff to reduce the risk and then assess the impact of any intervention. Whilst the current focus is elite sport, the concept and methodology is transferable to all aspects of healthcare.

How is this research relevant to improving the health of the wider public?
There are numerous examples of current work in high performance with direct application to health and vice versa. Below are some examples where the work of UK Sport R&I and EIS has directly linked back to other cohorts in the health and wellness domains. Other examples are provided below to show how some fundamental science driven by the academic sector is benefiting both high performance and the health sectors. These examples are not exhaustive but highlight and demonstrate the potential crossover between high performance and public health.

UK Sport and Institute projects with application and potential to the health sector – examples
- ESPRIT – an EPSRC programme targeted at the development of technologies for elite sport and health – partnership with Imperial College, Queen Mary’s University and Loughborough University (www.esprit-sport.org).
- Development of sensor technologies for wheelchairs in partnership with Frazer Nash Consultancy and are now being used in military rehab centres and NHS clinics for spinal injuries.
- Development and assessment of novel muscle training devices through eccentric cycling and the use of occlusion for rehabilitation. The eccentric training model is also used by some BBSRC funded work which arose from a UK Sport engagement with Nottingham University (Prof Paul Greenhaff) investigating the role of inflammation in muscular adaptation.
- Collaboration between the EIS and UCL has the potential to provide genomic insight into stress fracture and tendinopathy injuries.
- Evaluation of the impact of ‘recovery strategies’ on performance, inflammation and adaptation whereby inflammation is common to both athletic training and chronic disease models in partnership with Liverpool John Moores (UKS) and Northumbria University (EIS).
- Development of methods to more accurately measure training load, through which the relationship between physical activity and physiological adaptation may be better understood.
- EIS Vitamin D medical supplement policy for bone injury and soft tissue injury recovery (Oxford Julia Newton)
- EIS medical survey on bone stress symptoms as early markers of injury (Bath – Dr Paul Jackson).
- EIS medical hamstring injury rehab protocol – used widely throughout the EIS.
- EIS MRI scan effectiveness in clinical decision making – 2010-11 survey (Sheffield and Manchester).
- EIS medical assessment of bone stimulator effectiveness in stress injuries (EIS 2010).
- EIS medical markers for monitoring UUPS (underperformance) recovery (EIS policy 2009).
- EIS governance on clinical use and CPD of medical diagnostic Ultrasound (adopted by FSEM 2012).
- EIS – UK Sport policy on infection control pre-Olympic games to National Governing Bodies (Dr Roger Palfreeman).
- EIS – UK Sport Injury Illness Performance Project (IIPP) – the first to measure exposure vs. illness and injury across multiple Olympic sports – now recognised by IOC as the gold standard internationally.
14. Academic research that benefits both health and high performance – examples

- Nitrates and physiological efficiency across the lifespan (Prof Andy Jones, Exeter University).
- Respiratory training in COPD patients and for physiological efficiency in athletes (Prof Alison McConnell, Brunel).
- Inflammatory signals for adaptation – understanding mechanistic responses (Prof Paul Greenhaff, Nottingham University).
- Metabolic limitations in exercise and health (Prof Asker Jeukendrup, Birmingham / Loughborough; Prof Kieran Clarke, Oxford University; Dr James Betts, Bath University).
- Genomic predictors for exercise and health (Prof Jamie Timmons, Loughborough University).
- Exercise in extreme environments (altitude, heat, cold) (Prof Michael Tipton, Portsmouth University).
- Recovery strategies for exercise-induced injury and fatigue (Dr Glyn Howatson, Northumbria University, Dr Warren Gregson, LJM).

15. It is important to stress that whilst the generation of scientific evidence which could transfer to the general health of the nation is important, the science without application serves only an academic purpose. The approach used and lessons learnt as to how to translate the evidence into ‘reality’ to make a performance difference in elite sport is equally important. Application of this model and ways of working could help deliver more potential health gains to the nation by facilitating the application of current science to the population.

What is the role of exercise in improving health, as a preventative measure, and as a treatment provided or commissioned by the NHS for illnesses and chronic conditions?

16. Evidence for this question is best supported by the UK Research Councils, NHS and the other organisations with direct responsibility for research and evidence based practice in this domain. Please refer to ‘Sport and Exercise Medicine - A Fresh Approach’ by Jones et al (2011). Significant contributions from EIS medical practitioners were sought in production of this document.

How is sports and exercise science research co-ordinated? Who sets the research agenda? Are health professionals involved in setting the research agenda for sport science and vice versa?

17. Research with direct relevance to lottery funded high performance athletes is co-ordinated by UK Sport in partnership with HCSIs and National Governing Bodies (NGBs). The ‘short-term’ research agenda is set in partnership with all of these organisations based on agreed technical strategies; the needs of individual athletes within each programme; and an understanding of where new applied evidence is likely to have greatest impact on each athlete’s medal plan in that time period. In addition, research project work is also determined by the high performance investment strategy which is targeted at delivering maximum medal impact with the available lottery and exchequer investment.

18. Longer term research initiatives which could impact on high performance athletes are determined by the National research strategies set by the UK’s Research Councils. UK Sport and the HCSIs seeks to partner with some targeted academic groups which receive
such funding from Research Councils as a mechanism to further fundamental knowledge development relevant to the key priorities in which it currently operates. These high performance sport priorities include:

- **Equipment development** – materials engineering, computational fluid dynamics, experimental fluid dynamics, rapid prototyping for bespoke manufacture, man machine ergonomics.
- **Coaching tools** – sensor development, rapid biochemical diagnostics and biomedical engineering, wireless telemetry, precision tracking, mechanical engineering, data modelling and predictive analytics, learning and skill acquisition (neuroscience), virtual reality and immersive environments.
- **Training science** – tissue stress and adaptation (muscle, brain, heart, and connective tissue), functional genomics and predictors of responsiveness, psycho-neurobiological relationships in skill development and learning.
- **Medicine** - injury and illness risk and surveillance; functional genomics related to predisposition to injury; respiratory illness and infection.
- **Expertise** – psycho, social, environmental, training, genetic factors that contribute to the development of expertise in athletes and coaches; resilience in high performance.

**How are findings from sports science research, and sports and exercise medicine, used to develop medical treatments and public health interventions? Is this done effectively?**

19. Evidence for this question is best supported by the UK Research Councils, NHS and the other organisations with direct responsibility for research and evidence based practice in public health. Please refer to ‘Sport and Exercise Medicine - A Fresh Approach’ by Jones et al (2011). Significant contributions from EIS medical practitioners were sought in production of this document.

20. Furthermore, as part of the duty of care for the allocation of a portion of Exchequer and National Lottery funds to science, medicine research and development, UK Sport and the institute system are required to provide evidence of the quality and performance impact of this investment (quality control). In a ‘pure’ academic context, evidence of impact is typically provided by the research assessment exercise (on behalf of higher education funding councils), where publications, translation and hierarchical levels of evidence (Atkins et al 2004) are used to provide a university rating. In elite sport, the culture, environment and competitive performance nature of the work provides unique methodological challenges over the assessment of scientific quality, for example, in the academic sector dissemination of information is rated highly and yet dissemination in elite sport work negate any competitive performance advantage.

21. To address the unique methodological challenges in elite sport, a continually evolving system of quality control is in place. This approach has the core principles of established bodies such as the National Institute for Health and Clinical Excellence (Effectiveness, safety and Patient experience) and research translation (awareness, acceptance and adoption) (Green et al, 2005) at its centre. The approach can be evidenced as follows:

22. **Intelligence and insight of the research or performance question (Awareness).**
- **UK Sport** has had a process in place since 2008 referred to as ‘Mission 2012’ (see [www.uksport.gov.uk](http://www.uksport.gov.uk)). This process audits the current performance status of sports
and helps to identify research opportunities but in the wider context of the issues the sport is managing at that time.

- UK Sport developed an issue management tool where sports can ‘call for help’ in specific areas of performance (for example, in addressing an increase in illness or injury, or a need for engineering or design input for a piece of equipment).
- UK Sport R&I team has a technical model which it uses in consultation with sports to understand the performance needs and then works with sports to turn these performance needs into research questions that are framed and structured in a way that maximises the likelihood of performance impact in the desired timeframe.
- UK Sport’s R&I team and Institute staff continually horizon scan for scientific evidence that may have performance value. There are immense challenges in human factors of the translation of evidence from non-elite populations to elite, however in other areas such as engineering and technology the opportunities for transfer may be more easily evident.
- The UK Sport R&I/EIS injury and illness research program provide guidance on medical research issues.

23. Effectiveness

- In terms of clinical/performance effectiveness, the institute system regularly conducts an audit of practice and feeds this into its CPD program to help maximize practitioner performance.
- UK Sport’s R&I team has an independent research advisory group in place. This group provides advice on research and development projects and also evaluates the effectiveness of projects annually.

24. Acceptance and adoption and athlete experience

- In terms of the translation of science into impact, a major focus of UK Sport and institute work is working with practitioners, coaches and athletes to increase awareness and update of best practice for performance gains. This dimension of evidence is harder to measure is traditional rigorous terms as it encompasses more consumerism based approaches. In this Olympic summer cycle, UK Sport has led the delivery of > 140 projects across 25 summer Olympic and Paralympic sports. Currently, there are a number of other targeted projects with the winter sports heading into Sochi 2014. There have been > 25 different academic groups involved in these projects - the most significant being Loughborough, Oxford, Southampton, Imperial, Queen Mary’s, Bath University. In addition, numerous partners (> 50) from British industry covering large enterprise, e.g. BAE Systems to SMEs and garage innovators, e.g. Draft Wheelchairs, Crux Design, TotalSim, Metron Engineering.
- UK Sport conducts an annual athlete survey where the ‘user’ evaluates their experience of their needs being met.

25. In summary, in terms of quality control and understanding the elite sport research process:

- Major emphasis is placed on establishing an appropriate research/performance question which is practical within agreed time frames.
- Methodological challenges exist in terms of evaluating work against more traditional levels of evidence, but these challenges come from the uniqueness of the population environment rather than the ability of the scientists to conduct studies which would receive a higher evidential rating.
In contrast to the major challenges in translating science into practice in the general population, the approach taken by the UK Sport’s R&I team (which places emphasis on acceptance and adoption science for legitimate performance gain), maximises the impact of science at the adoption level.

What medical treatments and public health interventions involving sport or exercise currently exist?

26. Evidence for this question is best supported by the UK Research Councils, NHS and the other organisations with direct responsibility for research and evidence based practice in public health. Please refer to ‘Sport and Exercise Medicine - A Fresh Approach’ by Jones et al (2011). Significant contributions from EIS medical practitioners were sought in production of this document.

Are the findings from sports and exercise science research, and sports and exercise medicine, translated effectively by the NHS and Department of Health? If not, what are the barriers to translation and how could these be addressed?

27. Evidence for this question is best supported by the UK Research Councils, NHS and the other organisations with direct responsibility for research and evidence based practice in public health. Please refer to ‘Sport and Exercise Medicine - A Fresh Approach’ by Jones et al (2011). Significant contributions from EIS medical practitioners were sought in production of this document.

28. Translation is impeded by a number of factors relating to the elite sport environment, not least small cohorts, a lack of ‘laboratory control’, the relative standards of meaningful effects/difference, although there are some notable examples of good practice, e.g. the annual International Sport Science and Medicine Conference, which bring science, medicine, elite sport and health together in one forum.

29. Whilst pathways exist for the generation and transfer of knowledge around the system, the mechanism by which this knowledge is appropriately applied to make a positive difference is less clear. The fusion of scientific evidence, knowledge transfer, application and evaluation is evident at an elite level but to truly transfer relevant outcomes to the general population requires a combination scientific and consumer based approaches.

Conclusion, challenges and future recommendations

30. This document provides a response to the House of Lords Science and Technology Select Committee relating to their inquiry “Sports and exercise science and medicine: building on the Olympic legacy to improve the nation’s health.”

31. It has provided an insight into the elite sport environment, its uniqueness in terms of culture, population and research/performance focussed questions and has also provided an insight as to how methodological challenges in terms of research and development and quality control are addressed.

32. There are significant challenges in providing evidence to this inquiry:

• The broad nature of the question.
UK Sport – Written evidence

- The potential vulnerability of words such as ‘Nation’s health’ – defining key terms such as this will be critical to maximising the possible impact of this work.
- The limitations of ‘transferring science’ and its impact between populations and cultures; elite to non-elite populations.
- The emphasis in the questions, based on a traditional approach to science, that focuses on the quality of the scientific evidence in terms of the method rather than the ‘end user’ – who adopted the recommendations, what difference did it make and, equally importantly, did it change behaviour and provide the right experience?

Future recommendations

33. Whilst it is important to evaluate science using hierarchical models accepted by the scientific community, the limitation of these models when applied in specific populations and the danger in transferring outcomes inappropriately must be acknowledged. Whilst there are many examples of scientific work in elite sport, cited above, that may transfer to various dimensions of the ‘health of the nation’ (however this is defined), the issue of whether this work produces a ‘responder or non-responder’ outcome requires much further work.

34. One recommendation for a future area of study involving the impact of science in elite sport on the ‘Nation’s health’ comes from a major distinguishing feature of the work of UK Sport’s R&I team, and that is the area of transferring scientific outcomes into reality and application. An evaluation into the practices and process of translation (awareness, acceptance, and adoption) in elite sport may yield many useful lessons that could be applied to influencing behavioural changes and make positive difference to the ‘health of the nation’.

35. Above all, it is important that all stakeholders work together to achieve this aim and that, where possible, knowledge is shared between the relevant bodies so that we can better understand how elite sport programmes might be used to affect the ‘health of the nation’ through science and medicine.

6 June 2012

References
Green LA, Seifert CM 2005, Translation of Research Into practice: why can’t we just do it? J of the American Board of Family Medicine, 18, 6, 541 - 545


### Appendix One: Detailed background and context

**UK Sport**

UK Sport is the strategic lead body for high performance sport in the UK. It invests Exchequer and National Lottery funds in Britain’s best Olympic and Paralympic sports and athletes to maximize their chances of success on the world stage. For London and beyond, a third stream of private sector funding - Team 2012 - complements this public investment.

Using a ‘No Compromise’ philosophy which targets investment at those most likely to deliver medals at Olympic and Paralympic level (see [www.uksport.gov.uk](http://www.uksport.gov.uk) for individual funding awards in sport), UK Sport also works with each sport to provide the best possible support for athletes through a national institute of science and medicine services, world-class coach development, targeted and focused research and innovation, and strategic athlete / talent development projects and programmes.

As of May 2012, the current annual investment in high performance sport covers:

- 29 Olympic summer sports and 1049 athletes
- 19 Paralympic summer sports and 323 athletes
- 6 Olympic winter sports and 56 athletes
- 2 Paralympic winter sports and 9 athletes
- Approximately 360 coaches
- Approximately 250 applied science and medicine practitioners (as part of English Institute for Sport) covering multiple disciplines including physiology, strength and conditioning, nutrition, biomechanics, physiotherapy, psychology, performance lifestyle and management.

**The English Institute of Sport (EIS)**

The EIS is grant funded through and a wholly owned subsidiary of UK Sport, incorporated in 2002. The EIS works with the National Governing Bodies of Sports to provide elite athletes
with access to sport science and sport medical support services. The expert support services available to athletes include sports medicine, physiotherapy, soft tissue therapy, performance nutrition, performance psychology, physiology, biomechanics, performance analysis, talent identification, strength & conditioning and performance lifestyle. Within the EIS there are approximately 250 staff working with approximately 1700 athletes (Olympic, Paralympic, English and professional sports) delivering on average 4,000 hours of sport science and medicine every week, out of sites across the country. Of the 70 medal winning athletes at the Beijing Olympics, 65 (93%) were supported by the EIS, including all of those who won gold and silver. Of the 17 Paralympic sports competing in Beijing, the EIS supported 16. Key to delivering high quality science and medicine support services to sports NGBs is the acquisition and development of cutting edge knowledge and practice. The EIS works proactively with partners, including UK Sport and the academic sector, to address identified performance questions and to translate advances in basic sciences where appropriate. Collaboration enables knowledge transfer and dissemination, influencing of the academic research agenda, and the development of novel knowledge and practice. For more information visit [www.eis2win.co.uk](http://www.eis2win.co.uk)

**Science, medicine & engineering in high performance sport**

The delivery of science, medicine and engineering support to high performance sports comes through four (4) different Home Country Institute (HCSI) networks (Scotland, Wales, Northern Ireland and England). The most significant of these networks, the English Institute of Sport ([www.eis2win.co.uk](http://www.eis2win.co.uk)) receives the greatest proportion of core funding (£10M per annum) from UK Sport to enable a training and support network of facilities, services and support to sports to be available on a local basis. There are major training and support sites in Bath, Bisham Abbey (Marlow), Loughborough, Sheffield, Manchester and multiple sports specific satellite training sites in Weymouth, Lilleshall, Birmingham, Eton Dorney, Nottingham, Swansea, Stirling, Lea Valley among many others. As well as service delivery, the institute network has responsibility for the development of science and medicine practitioners.

In addition, some sports invest further in additional sports specific science and medicine practitioners to support their coaches and athletes. This is either through the EIS, direct employment, or through engagement with academia and industry depending on the specific needs and requirements.

**Research & Innovation**

UK Sport’s investment in specific Research & Innovation (R&I) projects represents 2% of the total Government investment in high performance sport (around £7.5M over 4 years). This specific programme has existed since 2003 with a clear remit to exploit current knowledge from the industrial and academic sectors to support performance opportunities direct with sports. Projects are supported in a targeted way with a focus on performance and medals in the short term, i.e. < 3 years delivery from hypothesis to impact and application. This is managed and delivered above and beyond core investments in science and medicine in the HCSIs with a clear focus on external academia and industry capabilities to compliment current practice.

UK Sport’s investment in R&I projects are characterized by the following:

- They are only of value and impact when basic support and services in coaching, medicine and fundamental scientific support is established and in place.
They are only of value where there is a clear technical plan based on the needs of the athletes and the sport in performance development. New knowledge developed in the research sector is only applicable and only delivers impact when relevant to the individual and sports specific technical plan.

They require active engagement by the athletes, coaches and sports specific support staff. Final decisions on engagement lie with the sport and its ability to engage in project work above and beyond their day to day job; and the ability to implement the project within such requirements without impacting on the fundamentals of training and competition demands.

Timing is the most crucial factor for impact – in a four year Olympic cycle, the window for exploration to deliver impact through a research process is typically in years one to three. In each of those years, half of the year is taken up through competition; hence, the opportunity to systematically explore questions within their training environment is 12-18 months at best.

All R&I projects are typically ‘development’ and ‘applied’ in nature - exploiting fundamental knowledge and ideas developed in the academic and industrial sectors with a direct impact on function within a 4 year period maximum.

They are not focused on mechanistic and fundamental understanding (although this knowledge is crucial to aid applied project design). Fundamental research work is already funded through numerous other bodies with this role and remit, e.g. Research Councils UK, Welcome Trust, University research funds etc. UK Sport has engaged with these bodies to share observations to stimulate fundamental applications for funding (see Appendix Two).

Due to the competitive nature of high performance support, outcomes from the work remain highly confidential for fixed periods.

The projects delivered within the UK Sport R&I programme cover 5 main work streams identified below:

**Athlete equipment and accessories** – design, development and testing of athletic equipment to improve the man-machine interface for increased performance efficiencies, e.g. aerodynamic cycling helmets, stiffer / lighter canoe paddles, ergonomic seating for wheelchair basketball athletes.

**Coaching tools and technologies** – development of field based measurement systems to increase the quality of objective data that can be used to inform athletic training and development, e.g. real time force diagnostics from a rowing oar, indoor tracking to assess time motion characteristics in wheelchair rugby. This includes all aspects of the signal measurement, collection, storage and feedback loops within sport between coach and athlete. This includes research expertise in electronics, data logging, telemetry, software development, data mining and analysis, training ergometer development, immersive learning environments.

**Training science** – investigations into acute interventions that can maximise the ability of an athlete to express their performance during competitions, e.g. warm ups, recovery, resilience under pressure. In addition, systematic investigations into understanding the effective management of physical stress to maximise the rate of adaptation in athletes through training, e.g. assessing various training models, conjugative versus block periodisation, use of novel training methods for strength development, e.g. eccentric exercise.

**Performance Medicine** – investigations into understanding the major performance risks within the high performance system and in specific sports through injury
surveillance; and the implementation of effective strategies to combat these major risks, e.g. illness management through infection, ergonomic based approaches to the athlete equipment interface.

- **Expertise** – investigations into understanding the critical factors that explain the development pathway of a performance athlete including environmental, social, physical, psychological and psychological factors.

In this Olympic summer cycle, UK Sport has led the delivery of > 140 projects across 25 summer Olympic and Paralympic sports. Currently, there are a number of other targeted projects with the winter sports heading into Sochi 2014. There have been > 25 different academic groups involved in these projects – the most significant being Loughborough, Oxford, Southampton, Imperial, Queen Mary’s, Bath University. In addition, numerous partners (> 50) from British industry covering large enterprise, e.g. BAE Systems to SMEs and garage innovators, e.g. Draft Wheelchairs, Crux Design, TotalSim, Metron Engineering.

**Impact on research in general**

As part of its growing knowledge in the development and performance of high performance, UK Sport has engaged with the Research Council network to use sport as a model for the development and alignment of knowledge development to UK specific research strategies. The main aim of these partnerships has been to better understand the scope of other current funded research work in the UK academic sectors; to source new and relevant expertise where fundamental science could be applied to high performance sport; and, to use high performance sport as model for developing and supporting these central UK strategies for science and research. The main partnerships have been with EPSRC ([www.epsrc.ac.uk](http://www.epsrc.ac.uk)) and BBSRC ([www.bbsrc.ac.uk](http://www.bbsrc.ac.uk)). A summary of grants and programme funded by EPSRC and BBSRC where UK Sport and other partners in the UK high performance landscape have partnered are listed in Appendix Two.
Appendix Two: High performance sport partnerships with Research Council funded grants linked directly to high performance sport

<table>
<thead>
<tr>
<th>Grant awarding body</th>
<th>Academic Institution/s</th>
<th>Project description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>EPSRC</td>
<td>Imperial College; Queen Mary’s University, London; Loughborough University</td>
<td>2009 - ESPRIT – development of pervasive sensing techniques and associated modelling techniques to investigate human performance</td>
<td>£6.0m</td>
</tr>
<tr>
<td>EPSRC</td>
<td>Nottingham University Southampton University</td>
<td>2009 - Computational modelling and experimental testing of super hydrophobic surfaces</td>
<td>£1.1M</td>
</tr>
<tr>
<td>EPSRC</td>
<td>STFC Strathclyde University Warwick University</td>
<td>2010 - Multistage modelling of nonequilibrium fluid dynamics</td>
<td>£2.4M</td>
</tr>
<tr>
<td>EPSRC</td>
<td>Southampton, Strathclyde, Nottingham, UWE, Imperial,</td>
<td>2006 - Number of small funded projects to initiate greater links between academia and sport including sail shapes, experimental models for boat testing, data analytics</td>
<td>£1.5M for all pilot projects</td>
</tr>
<tr>
<td>IMCRC (EPSRC)</td>
<td>Loughborough University</td>
<td>2008 – Rapid laser sintering and prototyping techniques for bespoke running shoe development – bespoke shoe development</td>
<td>£1M</td>
</tr>
<tr>
<td>LGC</td>
<td>None</td>
<td>2011 – Ultra trace detection of biochemical markers and the development of a real time diagnostic platforms</td>
<td>£0.3M</td>
</tr>
<tr>
<td>BBSRC</td>
<td>Royal Holloway, University of London</td>
<td>2012 - Cognitive and Motor Skills: Adaptation over the Lifespan, Neural Signatures, and Transfer from Lab to Field</td>
<td>£0.35M</td>
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<tr>
<td>BBSRC</td>
<td>Liverpool John Moores, Birmingham University</td>
<td>2012- Identifying the behavioural and biological mechanisms underpinning elite performance in aiming tasks</td>
<td>£0.55M</td>
</tr>
<tr>
<td>BBSRC</td>
<td>Bradford University, University of St Andrews,</td>
<td>2012 - Linking Perception to Action in Sport: Does superior visual perception explain why good players make it look easy?</td>
<td>£0.49M</td>
</tr>
<tr>
<td>Organisation</td>
<td>University</td>
<td>Project Description</td>
<td>Funding (£)</td>
</tr>
<tr>
<td>--------------------</td>
<td>---------------------------</td>
<td>--------------------------------------------------------------------------------------</td>
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</tr>
<tr>
<td>Liverpool John Moores</td>
<td>Nottingham University</td>
<td>Mechanism of eccentric training augmentation of muscle adaptation in humans and the potential negative impact of non-steroidal anti-inflammatory drugs</td>
<td>£0.38M</td>
</tr>
<tr>
<td>BBSRC</td>
<td>Leeds University</td>
<td>Physiological systems integration in the optimisation of exercise tolerance</td>
<td>£0.2M</td>
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<tr>
<td>TOTAL GRANT AWARDS</td>
<td></td>
<td></td>
<td>£14.27M</td>
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UK Sport, Medical Research Council Epidemiology Unit, Arthritis Research UK and Institute of Sports and Exercise Medicine – Oral evidence (QQ 69-103)

Transcript to be found under Institute of Sports and Exercise Medicine
UK Sport – Supplementary written evidence

Response provided by UK Sport to a request for supplementary evidence following the oral evidence given by Liz Nicholl, Chief Executive, on 19 June 2012.

Thank you for the opportunity last week to give evidence to the House of Lords Science and Technology Select Committee’s inquiry into how sports and exercise science can improve the nation’s health. I am writing with regard to two issues which were raised at the Committee, about which I promised to provide additional written evidence.

Firstly, the Committee requested more detail about UK Sport’s Research and Innovation budget, which I outlined as a total spend of approximately £7.5 million over the four year London Olympic cycle from 2009 to 2013. The table below provides more detail into which areas of Research and Innovation the money has been invested.

<table>
<thead>
<tr>
<th></th>
<th>Total 4 year spend (£)</th>
<th>Total 4 year spend (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Equipment</strong></td>
<td>3,691,413</td>
<td>50.3</td>
</tr>
<tr>
<td><strong>Coaching Tools</strong></td>
<td>991,370</td>
<td>13.5</td>
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<tr>
<td><strong>Training Science</strong></td>
<td>1,630,931</td>
<td>22.2</td>
</tr>
<tr>
<td><strong>Medicine</strong></td>
<td>776,904</td>
<td>10.6</td>
</tr>
<tr>
<td><strong>Expertise</strong></td>
<td>250,000</td>
<td>3.4</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>7,340,618</td>
<td>100</td>
</tr>
</tbody>
</table>

Secondly, the Committee asked to what extent has UK Sport invested in work around gene therapy. I can confirm that UK Sport has not invested any money into this specific area of work.

25 June 2012

50 UK Sport defines Equipment as “design and development of athlete equipment used in competition to improve movement efficiency and man-machine interface, e.g. bikes, boats, paddles, oars, helmets, wheelchairs, rowing components”.

51 UK Sport defines Coaching Tools as “design and development of field based diagnostics devices (covers sensors, telemetry, data logging, software visualisation, databases, analytics) and specialist training ergometers, e.g. dry land training gate for snowboard cross”.

52 UK Sport defines Training Science as “human science investigations into the acute and chronic understanding of stress and adaptation for functional gain”.

53 UK Sport defines Performance Medicine as “covers the development of injury and illness surveillance systems to understand performance risks and the implementation of targeted interventions to reduce these risks”.

54 UK Sport defines Expertise as “psycho-social understanding of those factors which are critical for development of medal winning athletes to influence future policy on athlete development strategies in the UK”.

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My aim is to provide ideas and insights into the question “How are advances in basic understanding of physiology applied to improving the performance of athletes?” I will also mention how advances in physiology are applied to the beneficial effects of exercise. There is a notorious lack of communication between the science produced in the UK and elsewhere and the general population including professional athletes and their trainers.

The UK enjoys a leadership in metabolic research, especially as applied to physiology of muscle. Much of this is due to the pioneer work of Sir Frederick Cole and Hopkins in terms of micronutrients and of Sir Hans Krebs in terms of metabolism. Sir Hans Krebs, who was my mentor, also frequently mentioned that basic science was of the utmost importance because its advances would eventually be translated into public awareness of basic phenomena and finally, into the health of the population. This is not happening in terms of physical exercise and I would set two examples.

In terms of micronutrients, approximately 40% of the population who practise sport take antioxidant vitamins in relatively large doses. This has been recently proved to be wrong by our own group and by other groups in Germany, Australia, and the United States. Where and when should one take antioxidant vitamins, in particular in relation to the practice of sport, in terms of both amateurs and professionals, should be clearly explained to the population. These new advances have recently become the target of heated debate in the scientific communities, especially in that of nutrition, but really, they have not permeated even the professionals who are taking antioxidants when they are “worse than useless”.

The second aspect I would like to point out (also from my own particular field of competence) is to what extent free radicals, which are produced during exhaustive exercise, are bad for one’s health. These radicals activate a number of defence mechanisms and should not be systematically quenched. Training protocols should include periods in which, by non-exhaustive training, one increases the activity of these radicals so that performance and health is promoted. These two cases are one example of the lack of communication between the general population (including sports professionals) and scientists without producing new facts regarding the metabolism of muscle that may, not only increase the performance of athletes, but also increase the beneficial effects of exercise for the general population.

1 June 2012


Sports and exercise science res.

1/ Application of advances in basic understanding of physiology, biomechanics and other disciplines to improve performance of athletes.

Departments of sports medicine should act as mediators between basic and applied science, but are often poorly equipped with evaluating basic scientific information for particular problems of adaptation to exercise.

2/ Relevance to improve health of the public.

Exploration of the mechanisms that the body uses to respond and adapt to different types and levels of activity throughout life is very important for helping to design a lifestyle that will ensure a better quality of life, and reduce the effects of changes with ageing.

3/ Role of exercise in improving health, and prevent consequence of injury and disease. Very important, but not taken advantage of in this country. This is probably due to lack of understanding of basic scientific knowledge how neuromuscular activity affects the body, and how motor control is exerted. Activity induced by exercise depends on voluntary movement which may be sometime limited due to constrains imposed by the central nervous system. Often these constrains can be bypassed by inducing activity by externally driven stimulation. Health professionals are poorly trained to assess when and how to use these approaches.

Translation of Research.

1/ How are findings from sport science research and sports and exercise medicine used to develop treatment and public health interventions? Is this done effectively?

The knowledge of the effect of activity on muscle that has been well researched since the 1960 is not being applied to situations where it would considerably reduce the recovery period after surgical interventions such as hip of knee replacement. Activity induced by externally driving the muscles involved can easily be applied before and after surgery. The damaging effects of prolonged bed rest can also be reduced by externally driven activity. Disabilities caused by various nerve injuries including spinal cord injury and stroke could be reduced by more effective use of activity driven by externally applied stimulation. The progress of neuromuscular diseases could be slowed by effective use of activity. Growth of blood vessels to muscles and heart can be improved by activity.

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2/ What medical treatment and public health interventions involving sport or exercise currently exist?
Regular exercise to prevent cardiac malfunction. Improving cardiac function after coronary bypass or stents by regular walking. Physiotherapy after various operations, and bed rest. Improving pelvic floor function to ameliorate or prevent uterine prolapse in older women.

3/ Are findings from sports and exercise science research and exercise medicine translated effectively by the NHS and Department of Health? If not what are the barriers to translation and how could these be addressed?
Regular courses to health practitioners informing them of recent advances in the field, and helping them to understand existing knowledge would help.

4/ Are policies on sport, physical activity and health adequately integrated? What if any are the barriers of integration? How can the sport and health agendas in Government be better linked to leave an Olympic legacy to improve the nation’s health?
Better and more relevant training to health practitioners in the ability of the body to adapt to different levels of voluntary or externally induced activity, and relevant changes that can be induced in the neuromuscular cardiovascular and other systems by specific patterns of activity.

30 May 2012
Wellcome Trust – Written evidence

We would like to make you aware of our recently launched initiative to engage the public with the science of how the body works during sport, activity, movement and rest: *In the Zone*, linked to the London 2012 Olympic and Paralympic Games. The initiative has been awarded the ‘Inspire Mark’ from the London Organising Committee of the Olympic Games (LOCOG).

*In the Zone* is a £6 million UK-wide initiative that consists of:

- 31,000 kits for schools – a physiology-related experiment for every UK child, supported by scientific equipment and teaching resources;
- touring exhibition – a high-quality, interactive and fun science engagement experience;
- a smaller-scale touring interactive experience linked to 2012 local events; and
- training for scientists and communicators.

Further information is available at [http://www.getinthezone.org.uk/](http://www.getinthezone.org.uk/)

The exhibition will reach close to 200,000 people by the end of the summer and we hope the kits will be used by around 60 per cent of all schools. The school kits and exhibition have not been designed as health interventions although they involve people being active, for example counting their steps using a pedometer or sprinting down a running track. The real legacy of the initiative will be in engaging the public in the human biology of sport and exercise.

The school kits provide resources for teachers to improve the quality of their teaching and to encourage them to increase the amount of practical, investigative work they do with their pupils. Pupils should experience more engaging science lessons, and learn how to ask scientific questions and carry out practical investigations, as well as improving their knowledge of how their bodies work. The exhibition is aimed at a family audience and seeks to improve understanding of the body in an entertaining and practical hands-on way.

7 June 2012