



**House of Lords Nanotechnology and Food Inquiry
Medical Research Council Follow-Up**

17th July 2009

Thank you for the opportunity to present the MRC's work relevant to nanotechnology and food to the Select Committee. This response addresses issues raised during the evidence session and provides an update on several matters.

Transfer of nanoparticles across the placenta

This question was raised during the evidence session, and has been addressed in a separate response from BBSRC, to which the MRC contributed. To summarise, cross-placental transfer of nanoparticles is the subject of debate in the research community. There is limited data on this matter, but an unpublished (and therefore not peer-reviewed) study showing that transfer may occur in rats. There are probably a variety of routes of access, as with gut absorption, and different particles may behave in different ways. On balance, it is possible that some nanoparticles can cross from mother to foetus, but this has yet to be formally shown.

Activity in the UK: worldwide comparisons

The select committee asked how the UK's research effort rated compared to other countries, and at the time we could not give an assessment. The EMERGNANO report which we referred to in the evidence session, has now been released at http://randd.defra.gov.uk/Document.aspx?Document=CB0409_7911_FRP.pdf provides information on the relative activity in environment, health and safety research on nanomaterials and nanotechnology in countries worldwide. The UK was found to conduct 15% of studies, placing it second behind the USA. Additionally, a high number of studies had been completed (third, behind the USA and Canada), suggesting a leading position in the field.

While these findings are encouraging for UK nanotechnology/nanotoxicology research, there is no doubt that there remain significant gaps in our knowledge, and the report highlights these well. The report covers all research funded by Research Councils (or their equivalents) and by agencies closer to policy making needs and regulation. We expect that combined efforts of several funders will continue to be needed, to cover the gaps across basic and applied, ideas-led and needs-led. The MRC, in combination with the other Research Councils, will play an important role in generating the scientific knowledge required to fill these gaps. Regulators, particularly the Food Standards Agency, DEFRA and the MHRA, will have an equally important function, using basic research findings to create an appropriate and balanced legislative environment for nanotechnology and food.

MRC Highlight Notice: Nanotoxicology

The highlight notice in nanotoxicology, which was first released in March 2007, is at **Annex 1**, and on the MRC website at <http://www.mrc.ac.uk/Fundingopportunities/Highlightnotices/Nanotoxicology>. This is currently the second version of the notice, with further revisions currently

under consideration. Revisions will include a focus on “oral route” nanotoxicology, as discussed in the evidence session.

Highlight notices are one of several mechanisms available to the MRC to increase funding in a particular scientific area. Although there is no specific funding associated exclusively with an area, highlight notices should not be considered inferior to other mechanisms; since they are not time-limited, it is often possible to do more through a highlight notice than other options. They also offer the potential for gradual revision as the scientific landscape changes, and as such offer an adaptable long-term commitment to an area. Our past experience has shown them to be highly effective in increasing the funding associated with the area in question.

Nanotoxicology at the MRC Collaborative Centre for Human Nutrition Research

Since the evidence session, this programme of research (led by Dr Jonathan Powell) has been scientifically reviewed by the MRC. It was found to be of high quality, and the reporting subcommittee recommended its continued support.

Annexes

Annex 1 – MRC Highlight Notice in Nanotoxicology

MRC Highlight Notice in Nanotoxicology

Nanotoxicology highlight notice

The 2004 the Royal Society and Royal Academy of Engineering report on nanotechnologies and subsequent UK Government reports raised concerns that the investment in research to develop new nanotechnologies is not accompanied by research addressing the health impact of these new materials in order to underpin their safe use. In the light of the recommendations in these reports the Molecular and Cellular Medicine Board wishes to encourage innovative, high quality research applications in nanotoxicology relevant to human health with the aim to help inform policy development in this important area.

Background

Nanotechnology involves the production and application of substances and structures at the nanoscale; within this size range substances can have very different properties when compared to material in bulk form, reflecting surface area, surface properties and quantum effects.

While engineered nanoparticles offer significant potential benefits, there are also uncertainties with regards to potential risks to human health. This was a key finding of the Royal Society and Royal Academy of Engineering report *[Nanoscience and Nanotechnologies: opportunities and uncertainties](#)*, commissioned by the UK Government and published in July 2004. The report concluded that many nanotechnologies pose no new health and safety risks. However, there were concerns over the potential impacts of engineered nanoparticles and nanotubes (in a free rather than embedded form) and these materials were identified as a priority area for research.

Highlight notice

In accordance with the [Government response](#) to the report, a cross-Government Nanotechnology Research Co-ordination Group (NRCG) has been set up to coordinate research efforts relating to the potential human health and environmental exposure, hazards and risks posed by the products of nanotechnologies. This work is aimed at leading to the development of an appropriate framework and measures for controlling any unacceptable risks. The [NRCG's first report](#), published in November 2005 sets out a programme of 19 research objectives to characterise the potential risks posed by engineered nanoscale materials; Objectives 11-16 are relevant to the remit of MCMB and include research to establish: a clear understanding of the absorption of nanoparticles via

lung, skin and gut, their distribution in the body and potential target tissues; inter and intracellular transport and localisation of nanoparticles and their cellular toxicity; whether oxidative stress, inflammatory effects and genotoxicity apply to nanoparticles; and the deposition, distribution, toxicity, pathogenicity and translocation potential and pathways for nanoparticles in the airways and lung and their potential impacts on the cardiovascular system and brain; A subsequent [progress report](#) was published in October 2006.

In the light of working in partnership with the Department of Health and other stakeholders MCMB encourages innovative, high quality applications relating to the potential human health hazard of nanoparticles, focussing on areas highlighted in the above Government reports. Since launch of the nanotoxicology highlight notice four awards were made ([Nanotoxicology Awards](#)). In the light of these recent awards, **MCMB now wishes to encourage in particular proposals which investigate the health impact of nanoparticles *in vivo* or aim to validate *in vitro* tests against *in vivo* models with a particular emphasis on studies addressing the mechanisms of toxicity.** This is in accordance with the recommendations of the recent Royal Commission on Environmental Pollution report (2008) on Novel Materials in the Environment: The case of Nanotechnology.

Application process and schedule

Applications are invited through the normal MRC funding schemes and will be considered at the regular MCMB Board meetings. These will be in competition with other applications received, but the Board will be mindful of the policy importance of this area to Government. [Click here for details on available grants.](#)

Contact and guidance

If you wish to discuss your proposals informally please contact

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