

House of Lords Science and Technology Committee
Setting science and technology research funding priorities

Evidence from the UK Government's Spongiform Encephalopathy Advisory Committees:

- 1. Advisory Committee on Dangerous Pathogens Transmissible Spongiform Encephalopathy Working Group (ACDP TSE WG),**
- 2. CJD Incidents Panel,**
- 3. Engineering and Science Advisory Committee into the decontamination of surgical instruments including Prion Removal (ESAC Pr)**
- 4. Spongiform Encephalopathy Advisory Committee (SEAC)**

1. The handling of transmissible spongiform encephalopathies (TSEs) has important lessons for the work that the House of Lords Science and Technology Committee intends to focus on, specifically:
 - How decisions are made to fund research to meet societal needs
 - The balance of funding for targeted versus unsolicited response-mode curiosity-driven research, and
 - How research is commissioned in Government departments and agencies
2. The transmissible spongiform encephalopathies (TSEs), also known as prion diseases, are a group of fatal transmissible neurodegenerative disorders of man and animals, characterized by the “spongy” microscopic appearance of the brain in affected animals and by a link with a ubiquitous protein, the prion protein (PrP), a misfolded form of which is widely believed (though never unequivocally proved) to be the infectious agent or prion. The most widely known examples of these diseases are bovine spongiform encephalopathy (BSE) in cattle, scrapie in sheep and goats and Creutzfeldt-Jakob disease (CJD) in humans. BSE emerged in the UK in the 1980s, has been reported in many other countries and is responsible for the human disease, variant CJD (vCJD).
3. TSEs are thus a group of diseases that, in a short space of time, gave rise to significant health effects in animals and humans and resulted in massive economic loss. In identifying the solutions that were required, science and scientific research, both basic and applied, were critical. The recent history of the diseases and the research into them therefore merits careful consideration by the House of Lords Science and Technology Committee, as many of the specific aspects of that history are relevant to the general principles that the Committee is looking into.
4. SEAC is the government's overarching committee for advising on the science of TSEs and thereby assessing risk to the public. ACDP TSE WG, CJDIP and ESAC Pr are in their different ways involved in developing practical advice to reduce the spread of TSEs (risk management), most notably spread of CJD/vCJD from person to person via contaminated surgical instruments or via blood transfusion.

What is the overall objective of publicly-funded science and technology research?

5. The overall objective of publicly-funded science and technology research, the public good, has to be considered in a broader and longer term context than that of policy, as the latter is often understood within government. This policy, in practice, is, inevitably, strongly influenced by electoral and media cycles whereas effective scientific policy has to be constructed around a much longer term administrative cycle. This is particularly aptly illustrated by TSEs, in which the slow progression of the diseases can make developing reliable answers to scientific questions, necessarily, a long term undertaking.
6. Publicly funded TSE research in the UK was stimulated by substantial public funding in the late 1980s/ early 1990s, initially in response to the threat that the emerging BSE epidemic in cattle posed to animal health and later following the recognition, in 1996, that BSE was linked to vCJD and posed a public health risk.. The need to limit the damage to health and wellbeing from BSE gave rise to a number of intensely practical questions such as the nature of the infection and the infectious agent, the distribution of the agent in different animal species and whether barriers to transmission existed between certain species. These questions could not be answered without an investment in basic science. Equally some of the key techniques for characterising the diseases, such as biological and molecular strain typing of the responsible agents had been developed in the 1970s and 1980s to distinguish different isolates of scrapie. This latter work had taken place at a time when the policy community put so little emphasis on TSEs that these developments were seen, at the time, as of little practical application.

**How are science and technology research priorities co-ordinated across government and between government and the relevant funding organizations?
Who is responsible for ensuring that research gaps are filled?**

7. Balancing curiosity driven research with research driven by departmental and policy needs requires that both research councils and the departments themselves are in a position to commission meaningful research and that this research can be effectively co-ordinated.
8. The model by which research funding priorities has been co-ordinated between government departments and the research councils has been the TSE Joint Funders Advisory Group which has been sufficiently successful to be emulated for novel H1N1 influenza A virus (“swine flu”) research. However, the decline of the BSE and vCJD epidemics has led to a recent disinvestment in the field. This is premature. Those of us who are members of the three risk-management committees, particularly, are aware of questions that, if answered, would facilitate disease control, by allowing potentially the relaxation of certain expensive contemporary control measures as well as those answers having implications for other more widespread diseases. There are equally other widespread TSEs such as Chronic Wasting Disease (CWD) of mule deer and elk in the United States and Canada that may yet show the potential to infect man, as well as newly identified TSEs such as bovine amyloid spongiform encephalopathy (BASE), and atypical scrapie, whose potential to be a human

health problem is not yet fully understood. In humans there is a recently discovered 'new' TSE called protease sensitive prionopathy (PSP), the significance of which is, as yet, unclear.

9. More specific examples of unanswered questions with health implications are:
- Will the eventual elimination of classical scrapie in the EU leave an ecological niche for other TSEs such as BSE or atypical scrapie?
 - Is CWD transmissible to humans?
 - Can a reliable *ante mortem* diagnostic blood test for vCJD be developed?
 - What is the true prevalence of v CJD infection (as opposed to overt disease) in the UK?
 - Are some commoner types of neurodegenerative disease (including Alzheimer's disease and Parkinson's disease) also transmissible? Some recent scientific research has suggested this possibility
 - Could cases of protease sensitive prionopathy (PSP) be missed by conventional tests which, in all other TSEs, rely on the resistance of the prion protein in the nervous system that accompanies disease to digestion by protease enzymes?
 - Can we develop reliable methods for removing and detecting protein on re-usable surgical instruments?
10. These are frequently highly practical questions impacting on very expensive policy options but needing to be informed by scientific work that may more appropriately be described as basic rather than applied. The cost of funding such work could well be trivial compared to the precautionary measures that are currently being put in place to mitigate such possible but unproven risks.

To what extent should publicly-funded science and technology research be focussed on areas of potential economic importance? How should these areas be identified?

11. We would argue that the evaluation of the economic importance of science and technology research needs to be based on a model that is sufficiently sophisticated to acknowledge adequately longer term economic benefit. For example, DEFRA have developed a prioritization tool which ranks animal diseases according to a number of variables – for example impact on public health, animal welfare, international trade and wider society.
12. Thus any method for evaluating the economic importance of research should be able to recognize that TSE research in the UK remains a vibrant field in which there are a number of young researchers making real progress with implications for a variety of diseases and disease processes. The TSEs themselves retain the capacity to surprise and although BSE and vCJD appear to be declining, other

health questions that give rise to circumstances that lead to human illness, economic loss and political embarrassment, seem likely. Further, we have now also arrived at the point where a research infrastructure (laboratories, animal facilities, cell lines, animal lines, reagents, trained personnel) with strong international links within the European Union and to Japan and North America, has been established in the UK that can allow complicated questions to be answered efficiently. There would be a considerable opportunity cost to losing this resource.

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The Secretariat on behalf of:

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