Science and Technology Committee Inquiry into Bioengineering

EVIDENCE SUBMITTED BY THE SOCIETY FOR GENERAL MICROBIOLOGY

Introduction

The Society for General Microbiology (SGM), founded in 1945, is an independent learned and professional scientific body dedicated to promoting modern microbial science. It has established itself as one of the two major societies in its field globally, with some 5,000 members in the UK and abroad. Further information about SGM is provided in Appendix 1.

General comments

The next healthcare revolution will apply regenerative medicines developed through stem cell technologies and could be worth £250 billion globally. Scientific understanding and techniques embedded in the physical sciences and engineering fields will be increasingly important in this industry. The UK must invest in the training of highly skilled individuals to maintain its leading position in this field and to fulfill its potential.

A positive government attitude towards stem cell research has helped the UK to achieve its leading status in research. More positive government attitudes towards genetic engineering technologies will improve the UK's research capacity in this field also. Increased public engagement initiatives are needed to achieve this.

Translational research in both the stem cell and genetic engineering fields must be invested in to translate research into economic processes. This will be helped by development of initiatives from the research councils such the BBSRC Bioprocessing Research Industry Club (BRIC) initiative.

Specific comments

What is the UK's research capacity?

1. Regenerative medicine research will lead to biological therapies or substitutes for the replacement or restoration of lost tissue function. The impact of this will be substantial, taking into consideration the global aging population.

2. The UK currently has a leading edge in developing regenerative medicine technologies at the lab bench, which is helped by a positive government

attitude. The science and development of early products has revealed the huge potential of the industry.

3. In the genetic engineering field, the UK excels in bacteriology but remains weak in the vital areas of plant molecular genetics. One of the reasons for this is the unfavourable political environment. This has been created partly by a lack of public engagement combined with public misinformation. The consequences of this are evident and have seen the UK take a backseat in European genetic research following its dominating position ten years ago.

How easy is it to translate and commercialise research?

4. For the UK to excel in healthcare innovation it must improve the translation of basic clinical research into development of new products and treatment approaches. It must also focus on implementing these into clinical practice. Both of these gaps have been identified in a government review of UK health research funding (Cooksey, 2006).

5. Translation and commercialisation of research is essential to realize its economic potential and for it to have impact on the cost of healthcare.

6. It is still very difficult to get ideas funded, despite encouragement from research councils. The BBSRC has an excellent scheme for short term development work, but its follow-on fund scheme is confused and requires rethinking.

How do UK and international regulations affect research and translation?

7. Permissive legislation in the UK regarding stem cell research and restrictive legislation in other countries (e.g. US) have given the UK has a leading edge in this field.

8. Public resistance to genetic engineering means that the UK research agenda in this field is not driven by scientists. Increased public engagement initiatives would no doubt improve public attitudes, which would in turn promote research and translation in this field. This is evidenced in countries such as South America, China and Korea, where a public acceptance of plant genetic engineering has helped them become leaders in this field.

How can the UK maintain and grow its internationally competitive position?

9. With regards to stem cell technology, current training programmes are not well equipped to meet the demand for highly skilled scientists and engineers. This is largely because the technologies differ from those needed by mainstream pharmaceutical companies. In addition to clinical and biological disciplines, the new technologies require special expertise in engineering and the physical sciences. Engineering skills are also essential in translating research and development of new technologies into economic processes – increasingly referred to as 'bioprocessing'.

10. Specialized training programmes must be developed to meet the demand for highly skilled personnel to overcome the challenges at all levels of bioprocessing, including isolation, culture, delivery, packaging and evaluation. Although difficult to predict the employment needs of the sector, the number of highly skilled engineers able to work on the same level as cutting edge bioscientists and clinicians is small. 20-50 newly trained MScs or PhDs would have a very large impact.

11. In the field of genetic engineering, national investment and commitment are required to reinvigorate 21st century biotechnology industries. The research agenda must be driven by a knowledge-based bioeconomy, which can only be established by strong government backing. Public engagement initiatives will facilitate this. Heavy investment is needed in translational research and research council initiatives such as the highly effective BBSRC Bioprocessing Research Industry Club (BRIC) initiative should be developed.

References

Cooksey, D., (2006) *A review of health research funding*. HMSO. Available online at http://www.hm-treasury.gov.uk/independent_reviews/cooksey_review/cookseyreview_index.cfm

Sources

This response has been prepared from written evidence provided by Professor Jeff Cole, University of Birmingham and Professor Chris Hewitt, University of Loughborough.

Appendix 1

The Society for General Microbiology (SGM) was founded in 1944/1945 and is now the largest microbiological society in Europe. It has over 4500 individual members of whom 75% are resident in the UK. The remainder are located in more than 60 countries throughout the world. Almost all full members are qualified to doctoral or higher level; there are 1000 postgraduate student members. More than 700 schools and a number of companies are corporate members.

The Society provides a common meeting ground for scientists working in academic centres and in a number of fields with applications in microbiology (medicine, dentistry, veterinary medicine, pharmaceuticals, numerous industries, agriculture, food and beverages, the environment and education). The majority of Society members are employees of universities, research institutes, health services, government agencies and small to multinational companies.

The science of microbiology covers a great diversity of life forms: disease-related molecular structures such as prions and viruses, archaea, bacteria, fungi, protozoa and algae. Microbes are of crucial importance in a number of processes affecting all life on Earth: the cause and control of disease, fertility of soils and aquatic environments, fermentation, biodegradation of waste materials and dead biomass, bioprocessing steps in drug and antibiotic production, and molecular biotechnology.

The Society's objective is to advance the art and science of microbiology. It does this by:

- Organizing regular scientific meetings at centres throughout the UK and abroad, where microbiologists meet to hear and discuss the latest research findings. The largest meetings last 4 days and involve up to 1400 participants.

- Publishing four major international learned journals: *Microbiology, Journal of General Virology, Journal of Medical Microbiology* and *International Journal of Systematic and Evolutionary Microbiology*. The journals are available on-line through HighWire Press (http://www.sgmjournals.org).

- Representing the science and profession of microbiology to government and the media. The Society is represented on a number of biological and biomedical committees and organizations, in the UK and internationally, thereby exerting influence on science policy and education, regulatory affairs and international collaboration.

- Promoting microbiology as a career for young people, by increasing awareness of microbiology in schools and aiding the development of teaching

resources. The Society also provides grants for young scientists to attend scientific meetings and training courses.

- Keeping members informed of current developments in professional and scientific matters in microbiology, through publication of the magazine *Microbiology Today* and other means.

The Society is a Charity registered in England and Wales (No. 264017) and in Scotland (No. SC039250) and a Company Limited by Guarantee, registered in England and Wales (No. 1039582). It is governed by a Council drawn and elected from the membership. The Society employs a staff of over 30 at its headquarters.

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