British Society for Immunology response to the Adrian Smith call for evidence on future frameworks for international collaboration on research and innovation

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Responding on behalf of the British Society for Immunology, a learned society representing scientists and clinicians working in academia, clinical medicine and industry who study the immune system. Our main objective is to promote and support excellence in research, scholarship and clinical practice in immunology for the benefit of human and animal health.

UK region: UK wide with our head office in London.

Confidential: No

Areas of interest:

1. **Methods by which new funding arrangements can:**

- ***support research discovery of outstanding quality in all disciplines through international partnerships***

There must be a programme or multiple programmes that fund the full range of research including basic research, the bedrock of innovation, which is so critical to the future of so many commercial ventures even when no immediate practical application is apparent when undertaking it. These efforts to better understand the fundamentals of sciences including, but certainly not limited to, immunology, are often the foundation of breakthrough commercial applications. For example, antibody technology has grown from initial blue skies research, much of which was undertaken at academic centres around the UK, to today's multi billion pound presence in the UK's life sciences sector.

Future international partnerships must be based on comprehensive support for all forms of research, from the abovementioned basic research to the translational research and applied research, which can have a more immediate impact. What would be disastrous for UK science and innovation in the long term is a piecemeal approach to international collaboration and funding that does not fully support all areas of research discovery; instead a holistic view must be taken when setting out future international partnerships. Continued access to the existing infrastructure of EU research networks must be a priority. Funding from these schemes not only attracts many talented researchers from around the world to work in Britain, but also provides crucial support to our 'home-grown' researchers to develop their own careers, participate in international consortia and develop their world-leading expertise of their own.

- ***attract to the UK researchers of outstanding capability from around the world***

Attracting and retaining researchers from around the world is important for the wider science sector and has been a success story in the immunology field; currently 42% of academic immunologists are from abroad, with 26% from the EU and 16% from countries outside the EU[i]. The reasons that they choose to live and work in the UK are wide-ranging and include the world class reputation of our research institutions, access to large scale research facilities, and the ability to participate in prestigious research projects. Much of this prestige however comes from EU funding including Horizon 2020, Marie Skłowdowska-Curie Actions (MSCAs), European Research Council (ERC) grants, and the SME instrument. As the Government has acknowledged, even if the UK is able to negotiate associate membership of the future Horizon Europe funding framework, we will lose access to the ERC grants and MSCAs, which account for 44% of the UK's current science funding derived from the EU[ii].

The Government has said that it will consider replacing ERC grants, and whilst we are clear that like for like replacement of funding that is lost after we leave the EU is absolutely necessary both to maintain the current status of UK science, funding is not the only aspect at risk. One of the most

challenging propositions facing the UK will be replicating the prestige that comes with these European funding streams. Opening up any future domestic funding scheme to researchers outside the UK, and hence increasing competition by expanding the pool of talent, may be one way through which the UK can both increase the prestige of its new domestic funding arrangements and continue to be a country that can attract researchers of outstanding capability from around the world.

For the UK to be seen as an attractive destination for researchers of outstanding capability, we must target effects at researchers from all career stages beginning at the undergraduate level and continuing right through to the most experienced and renowned scientific figures. Once recruited, the UK should continue to support the career development of these individuals to provide them with added incentive to stay. The British Society for Immunology's own review 'Careers in Immunology'[i] found that periods of international experience were key parts of careers in academic immunology, and that contacts made early on in a career are often important to networks that many use afterwards. It is no stretch to imagine that students who have had a positive experience of studying in the UK may be more inclined to return as researchers further on in their careers and, as the Migration Advisory Committee notes, a higher proportion of international students studying STEM subjects later move into post-study work in the UK[iii]. Remaining an appealing destination for international students must therefore be a priority.

More generally, the Government needs to consider carefully its proposed immigration arrangements. The removal of the cap on the number of tier 2 visas for those employed in scientific research occupations and the exemption of those same occupations from the £30,000 minimum salary threshold would both go a long way to making the UK more attractive to researchers of all levels.

- ***attract further R&D investment to the UK, thereby contributing to the Government's 2.4% agenda.***

The Government must undertake a joined up, holistic approach to investment in R&D. In order to benefit from private investment off the back of the Government's increased public investment, a climate must be created that is conducive to science and innovation across all Government departments – from the Department for Education doing more to encourage more students into STEM degrees, to the Home Office facilitating a welcoming immigration system, to HM Treasury ensuring that schemes such as R&D tax credits are globally competitive and investigating what it can do to encourage patient capital investment, e.g. by reassessing prudent investment rules for pension funds. To attract investment, the UK must ensure that it retains its world class status in research with access to a large and diverse pool of talent able to work here.

In terms of the regulatory environment, it's important for the UK to prioritise stability, and to allow a harmonious and collaborative approach to research. Shared standards facilitate collaborative science. The UK should aim to continue to collaborate and align with EU regulations where this is competitive. However, in new and emerging areas of science, the UK should maintain its global leadership position through developing regulation and setting the agenda for science policy to balance innovation with risk.

In order for public investment to be used effectively to stimulate and make the most of private sector investment, it should be targeted strategically towards sectors where capacity building is needed to keep up with growth. Immunology was one area, along with genomics, identified by the Association of the British Pharmaceutical Industry (ABPI) as having a widening skills gap[iv]. This coincides with a surge in demand for immunologists as the paradigm of drug development in several key areas shifts towards novel therapies founded in immunology, e.g. cancer immunotherapy.

2. **The optimum balance of emphasis for any new funding arrangements in each of the following dimensions:**

- ***European collaboration, Overseas Development Assistance and global collaboration***

We believe that the UK Government must see associating with Horizon Europe as its primary ambition in terms of international collaboration ahead of our departure from the European Union. As

mentioned previously an association would still preclude us from certain funding streams and these must be replaced through growth of other collaborations. There are many schemes currently in existence that could serve as models for development of our own collaborative partnerships. British Society for Immunology members have raised a number of examples, including the US–Ireland R&D Partnership Programme involving a tripartite arrangement across the USA, Irish Republic and Northern Ireland combining funding for larger budget projects with cross-disciplinary expertise. Individual partnerships between research institutions were also raised, such as one between the Systems Immunity Research Institute in Cardiff and the Biomedical Discovery Unit at Monash University in Melbourne; another possible collaborative model would be allowing research institutions to seek out individual partnerships but having these funded separately by the Government. When deciding on subject-specific schemes, it's important to take an evidence-based approach and include consultation with the relevant research community in advance of introducing new funding arrangements.

The ODA funded UK Vaccine Network is a programme that we are very keen to see continued beyond 2021 to ensure that the UK continues its leadership in vaccinology, through research into one of the most effective and best benefit to cost ratio public health interventions in history. This is an excellent example of problem driven research making a difference and Government should look to see if other areas would benefit from similar targeting. In a similar vein, the GCRF call for subject-specific vaccine networks to address R&D challenges, primarily relevant to the health or prosperity of low- and middle-income countries, has proved a useful tool in building global research networks in designated areas and may be a fruitful scheme to expand to other disciplines.

- ***support for: outstanding individuals; blue-skies research; business innovation and research impact; and research facilities and infrastructure.***

There must be proper balance between the funding of different forms of research. Quite often some of the breakthroughs that lend themselves best to commercial application arise from research where that application is not at all clear at the outset. Last year for example, Sir Greg Winter won a Nobel Prize for Chemistry for his immune research, which was curiosity driven and fundamental at the outset, but has now led to the development of monoclonal antibodies as therapeutics and myriad commercial opportunities[v]. Equally, years of UK investment in certain areas, for example immunology, has led to significant steps forward in our knowledge with new therapeutics now entering clinical trials. It is important that the UK continues to support research in these strategically important areas to see these initiatives through to completion and reap the rewards of our early investment.

- ***research and innovation domains (research disciplines, business sectors etc.)***

Any proposed funding model should target funding strategically towards disciplines and sectors in which the UK currently excels but where there is also an urgent need to build capacity in order to realise their potential. Immunology is one such discipline in which a widening skills gap threatens the many opportunities that are opening up to it. As demand for the development of immune-based therapies, and thus immunologists, surges, pharmaceutical companies are finding gaps throughout the career pipeline. The most effective way to ensure that we, as a research nation, are not stymied by limitations of our own making is to take a strategically targeted capacity building approach to investment, focusing on disciplines and sectors where opportunities are the greatest.

3. Methods and timescales for introducing any new funding arrangements for international collaboration, including those that:

- ***reflect the ambitions of small and large businesses***

We are pleased that the UK Government will be seeking to align our own regulatory environment with the EU's Clinical Trials Regulation post-departure – any arrangements must seek to minimise any barriers that could impact the UK's competitiveness in this area. In terms of any alignment of processes between our own Medicines and Healthcare products Regulatory Agency (MHRA) and the European Medicines Agency (EMA), we should seek to minimise and align these where practical.

This would ensure that the MHRA caseload is not overwhelmed after Brexit and that the UK is not seen as a 'secondary marketplace' for novel therapies.

- ***foster new systems of international peer review and funding.***

Due to the nature of the timescales in making applications for research funding which are written months in advance and often involve lengthy recruitment processes, new arrangements should be made clear as far in advance as possible with interim arrangements made in the meantime[vi]. Without this, there will not be a smooth transition between the funding structures that we enjoy now and any future regimen, which will be detrimental to UK science and innovation in the short term, but also in the longer term, as foreign partners and collaborators, who remain in funding structures that we have left, move on without British involvement.

As well as giving adequate warning of new funding streams, we would also encourage that there should not be a big gap between the end of any EU funding streams and the start of any new UK-administered schemes. If a significant proportion of the research community are left with a funding gap, even for a matter of months, they will look elsewhere for career opportunities, which could lead to many going to work overseas.

4. The roles of Government, UKRI, National Academies and other organisations in defining the agenda for European and international collaboration and administering any new funding arrangements for such activities

We are pleased that the UK Government is using the delay in the Brexit day date to continue to have an input into talks on the construction of the Horizon Europe framework. It is important, considering the Government's ambition to seek associate membership of the programme after we leave the EU, to ensure that we continue to have a say in how it is built right up until the departure date.

The creation of a new structure to deliver a framework of international collaboration is likely to fall within the capabilities of the Government, UKRI and Academies.

5. Existing evidence on the efficiency and effectiveness of funding for international collaborations.

International collaboration allows cost effective access to a much larger range of valuable resources and talent than otherwise would be able to be achieved. International collaboration is recognised today as integral to producing outstanding research with global impact[vii]. Bibliometric research has shown that research has progressed through three ages: the individual, the institutional and the national. We are now moving forward into a fourth age, one driven by international collaborations[viii]. Much private investment is internationally mobile, and public investment is key to attracting it to the UK. Based on figures reported by UKRI officials during a recent oral evidence session[ix] and applying a coefficient from a report commissioned by the former Department of Business, Innovation and Skills[x], we can extrapolate that for every £1 increase in public expenditure on R&D, this would lead to a £1.74 increase in private expenditure on R&D.

6. Any other issue relating to this work

N/A

[i] BSI, Careers Report, 2017

[ii] Science|Business, No deal would cut UK's Horizon 2020 funding by almost half, 2019

[iii] Migration Advisory Committee, Impact of international students in the UK, 2018

[iv] ABPI, Bridging the skills gap in the biopharmaceutical industry: Maintaining the UK's leading position in life sciences, 2019

[v] University of Cambridge, Sir Greg Winter wins the 2018 Nobel Prize in Chemistry, 2018

[vi] BSI, Written evidence to the HoC Science and Technology Committee, 2019

[vii] Universities UK, International Research Collaboration After The UK Leaves The European Union, 2017

[viii] Nature, Jonathan Adams, The fourth age of research, 2013

[ix] HoC Science and Technology Committee, Balance and effectiveness of research and innovation spending Oral evidence, 2019

[x] Economic Insight, What is the relationship between public and private investment in science, research and innovation?, 2015