Cancer Research UK response to the Science and Technology Committee (Commons) inquiry:
'Leaving the EU: implications and opportunities for science and research'
August 2016

Government must ensure that in negotiating a new relationship with the EU it protects the strength of the UK's science base. We welcome the committee's focus on this issue and the opportunity to submit evidence to its inquiry.

Last year Cancer Research UK spent £432 million on research across the UK, including our £28 million contribution to the Francis Crick Institute. Our ambition is to accelerate progress and see three in four cancer patients survive their disease by 2034. Research is at the heart of our plan to reach this ambition and see cancers diagnosed early and treated well. This is why it is so crucial that the UK maintains its excellent science base and that cancer researchers across Europe and around the world, can continue to work together to make the best use of our pooled talent and resources.

Medical research in the UK benefits patients here, as well as patients across Europe and worldwide. It's in the best interests of all patients that UK science remains strong and competitive.

Our response builds on evidence we've previously supplied to the committee[1,2]. In outlining the risks and opportunities for UK science following an exit from the EU, we will focus on four principal areas:

- Attracting and retaining talent
- Protecting investment in UK science
- Supporting collaboration through compatible regulation
- Building NHS research capability

Attracting and retaining talent

***The UK's ability to attract, efficiently recruit and retain scientific talent from the EU must be protected to maintain the excellence of our science.***

Cancer Research UK recruits post-graduate students and researchers from an international pool to ensure that we are working with the very best minds to conduct the highest quality research. The mix of UK, European and international researchers within our research community is vital for the sharing of best practice, expertise and skills.

The UK plays a key role in training young researchers; many of whom go on to set up labs elsewhere, but maintain important collaborative relationships with research groups in the UK (see case study 1). The UK also benefits from recruiting talented researchers who have received specialist training from centres outside of the UK. Such recruitment is particularly important and sometimes necessary in areas of science where we have a national skills shortage such as researchers working in computational biology and big data[3,4].

In addition to the valuable contribution that international scientists make to our workforce, the movement of researchers between countries develops valuable networks. Networks are crucial for the building of collaborative partnerships which are common place and often necessary in many fields of science including cancer, where nearly 50% all UK research involves international

[1] Association of Medical Research Charities submission to the EU regulation of the life sciences inquiry
[2] Cancer Research UK oral evidence given by Emma Greenwood, head of policy development at Cancer Research UK, to the committee on Tuesday 19th April
3 'Bio-informatician' and 'informatician' are included on the Shortage Occupation List, valid from 6th April 2015
4 Medical Research Council and Biotechnology and Biological Sciences Research Council (2014) Vulnerable Skills Survey 2014

collaboration[5]. In Feb 2016, CRUK researchers were partnering with over 400 different organisations based in EU countries [6].

These collaborations enable sharing of knowledge and expertise, as well as research materials, equipment and data. They also support training, the running of pan-EU clinical trials and establishment of consortia set up to inform policy. The importance of such collaboration is shown by its impact on the UK's research outputs: nearly 50% of the UK's scientific publications have non-UK authors and the impact of these papers is significantly higher than the average impact of UK papers[7].

EU nationals are a significant and valuable part of our workforce dedicated to beating cancer sooner: 33% of our PhD students and 39% of our research fellows are non-UK EU nationals[8]. Importantly, existing free movement rules, including the right to bring partners and dependents, enable us to recruit these talented researchers easily and cost-effectively. **Government must consider mechanisms that allow UK research organisations to recruit the best talent – protecting the ease with which we can do so for EU nationals and developing policies that allow for more efficient recruitment of international talent. Scientists should remain a priority group in the UK's points-based system.**

Many EU nationals in the UK are concerned about their ability to continuing working here, and the UK's vote to leave the EU has also made some feel unwelcome. Such concerns have been raised directly with us by researchers that we fund. We are also concerned that this message is being heard by the international research community and is affecting the attractiveness of the UK as a place to come and work. **In addition to tangible policies that enable us to recruit talent, the Prime Minister and key ministers in the Department of Business, Energy and Industrial Strategy and the Department of Health, need to ensure that a positive message is sent to the international research community, including those already based in the UK, to reassure that their contribution to UK science is valued and encouraged. Government should also consider additional incentives that could be applied in the medium term so that the UK remains an attractive place for the best researchers to come and work. Such incentives would serve to counter the uncertainty and disruption that these researchers may experience over the coming years.**

Protecting investment in UK science

***Overall levels of investment in UK science must be protected and grown in the longer term to ensure the UK remains globally competitive.***

The UK received significant funding for cancer research from the EU: In 2015, this investment totalled £40 million[9]. Although Cancer Research UK does not receive any direct funding for research, in 2015/16, Cancer Research UK's institutes across the UK received £7.5 million income from EU grants; this was more than 4% of their total research funding[10]. Furthermore, universities at Cancer Research UK centres are currently supported by EU grants totalling more than £110 million[11]. This funding provides crucial support for individual labs and promotes research collaborations with other EU countries (case study 1).

[5] https://www.ohe.org/publications/exploring-interdependencies-research-funders-uk
[6] Based on data from Researchfish, a self-reporting tool for researchers, including those receiving funding from CRUK
[7] Elsevier, International comparative performance of the UK Research Base, 2013
[8] The PhD student figure is based on data from Researchfish, a self-reporting tool for researchers, including those receiving CRUK funding
[9] This includes all grants given to cancer-specific and cancer-related research. NCRI analysis using data derived from the Global Grants Award Database and corresponding Dimensions Software platform, provided by UberResearch.
[10] Funding data reported directly to us from CR-UK institutes, including the Francis Crick Institute
[11] Self-reported data from universities at current CR-UK centre locations. Includes total award of active grants in August 2016

Cancer research is one of many fields of UK research that benefit from the financial support provided by the EU. Overall investment by the EU in UK science is significant: in 2014/15, UK universities attracted more than £836 million in research grants and contracts from EU sources. This represents 14.2% of all UK income from research grants and contracts in that year. The UK does disproportionately well in securing EU research funding, and successfully secured 15.5% of the funding allocated under the previous EU research and innovation programme (FP7).[12]

Beyond their financial benefit to UK researchers, EU grants offer prestige and promote global recognition owing to their competitiveness and broad pool of peer reviewers. Winning these grants therefore gives visibility to the UK's first-in-class science and research offer and promotes multi-national research collaborations.

Importantly, EU investment in UK research leverages further private investment: €4.4 billion invested in the UK through FP7 from 2007 to 2012, secured an additional €1.1 billion from other sources to meet total project costs of €5.5 billion[13]. This builds on evidence showing that UK public funding leverages significant investment from industry and charities[14].

Every pound invested in cancer-related research by the taxpayer and charities returns around 27p to the UK economy each year[15,16]. Government's investment in research supports the UK economy in a number of ways. It attracts private investment from overseas, builds a skilled workforce and contributes towards the generation of income from commercialised products. Research fundamentally improves the nation's health and, as such, delivers savings to Government by reducing the incidence of disease or limiting its impact.

Government's new industrial strategy is an opportunity for the UK to put science at the heart of its plan for growth. UK Government has previously acknowledged the key role of science and innovation to drive growth and productivity in the UK[17] and made the important commitment to protect the budget for science in real terms at the last spending review. Recently, we were pleased to see the new Prime Minister give an early indication of her strong support for science in a letter to Sir Paul Nurse. **Government should now ensure that with a UK exit from the EU, overall levels of investment in UK science and the diversity of funding are protected and grown in the longer term. In developing the new cross-departmental industrial strategy, the Department of Business, Energy and Industrial Strategy and the Department of Health should set out plans that will enable the UK to grow its investment in science to strengthen the global standing of our research base. These departments should work with HMT to consider a range of measures to grow investment including tax-breaks and public-private incentives.**

Exiting the EU provides the UK with an opportunity to promote research collaborations between academia and industry and further attract inward investment. The extent to which charities and universities can currently partner with industry is limited by VAT rules on sharing of facilities, equipment and buildings. Although calls have been made for Government to address this issue[18] we understand that reform has not been possible because of EU membership. **In exiting the EU, Government should review current rules on VAT exemption on sharing of buildings, equipment**

[12] http://www.universitiesuk.ac.uk/policy-and-analysis/reports/Pages/economic-impact-on-the-uk-of-eu-research-funding-to-uk-universities.aspx
[13] Department for Business, Innovation and Skills, 2013, Leverage from public funding of science and research
[14] Economic Insight, What is the relationship between public and private investment in R&D?, 2015
[15] Health Economics Research Group (Brunel University), RAND Europe, and King's Policy Institute, medical Research: What's it Worth? Estimating the economic benefits of cancer-related research in the UK, 2014
[16] http://www.kcl.ac.uk/sspp/policy-institute/publications/SpilloversFINAL.pdf
[17] HM Treasury, Fixing the Foundations: Creating a more prosperous nation, 2015
[18] http://www.raeng.org.uk/policy/dowling-review/the-dowling-review-of-business-university-research

**and facilities for the purposes of R&D, to support industry, academia and charity collaborations and attract further inward investment.**

**The Department for International Trade should also work to grow science funding in the UK by ensuring that it provides strong representation internationally to effectively communicate the value and opportunity of investing in UK science.**

It is becoming increasingly important to draw together scientists from different countries and disciplines to solve today's biggest health challenges. That's why, in October 2015 Cancer Research UK launched our Grand Challenge, which will see international, multi-disciplinary teams collaborating to tackle some of the biggest problems in cancer research. The award is open to researchers across the globe, who will work in collaboration with UK-based scientists. We have had 56 applications from 409 investigators, spanning 224 institutes and 25 countries, and have shortlisted nine applications for further development. We anticipate awarding the first grant in late 2016.

Charity, industry and government funders of research need to work together to support multidisciplinary and international scientific collaborations. Such partnerships provide funders with the opportunity to leverage additional support and enhance progress through shared knowledge, resources and capabilities. **UK Government should develop the prestige and global recognition of its research grants and consider how these may facilitate and promote international collaboration and drive international research consortia. There is an opportunity for UK Research and Innovation to play a lead role in developing such grants.**

**Case study 1 - Dr John Diffley, Francis Crick Institute**

John Diffley is one of the world's leading experts in studying how cells grow and make copies of themselves - a process that goes wrong in cancer. Dr Diffley's discoveries will form the foundations for new ways to diagnose and treat cancer in the future.

John's world leading research has benefitted hugely from the European Research Grant (ERC) funding he was awarded in 2009. To date, this funding has supported 11 of his peer-reviewed research publications. Last year he was awarded another prestigious ERC Advanced Grant providing him with £1,455,294 for further research.

*'The ERC is a fantastic scheme and has transformed my lab. The research I was able to carry out with the ERC grant enabled my lab to enter a new area of science, which would otherwise have been closed to us. It has had an enormously positive impact on our science.'*
Dr John Diffley

Around 50% of the scientists in John's lab are from non-UK EU countries. Two of the current 15 are funded through the Marie Skłodowska-Curie actions - Research Fellowship Programme. This fellowship, which is part of Horizon 2020, encourages researchers to move between EU countries to conduct their research, sharing their knowledge and skills as they go.

Over the years, John has established strong collaborations with labs across Europe. Some of these have been the direct result of EU funding. Dr Monica Segurado was able to come and work in John's lab thanks to an EU Network Grant, awarded in 2002. Since establishing her own lab in Spain, Monica and John have continued to collaborate and have jointly published research.

<u>Supporting collaboration through compatible regulation</u>

***UK standards and legislation governing the approval and conduct of research must be compatible with the EU to enable our continued participation in pan-EU research projects.***

The compatibility of regulation and standards across member states brings benefits to UK medical research. In areas such as clinical trials, the use of personal data in research and medicines approval, it supports scientific collaboration across EU member states and can streamline approval for large studies.

Cancer Research UK supports over 250 clinical trials by providing funding, expertise and facilitating partnerships. These trials recruit more than 25,000 patients each year. Of the trials that we directly fund – currently over 200 - more than a quarter involve at least one other EU country[19]. To set up and run pan-EU trials efficiently and effectively, it is important that the legislation, guidance and standards governing their approval and conduct is aligned across member states. Such trials are especially important for rarer cancers and childhood cancers, where trials are often only feasible because they are able to recruit from a large pool of patients across the EU (case study 2).

**Case study 2 – Pan-EU pancreatic cancer trial**

Pancreatic cancer is one of the hardest cancers to treat, and has one of the lowest survival rates[20]. The European Study Group for Pancreatic Cancer (ESPAC) wants to change this. ESPAC formed in 1989, and their research has contributed to accelerated improvements in survival and quality of life for patients. Since the 1980s, short term survival has increased by around 60%.

But ESPAC know there is more to do. Just 1% of people diagnosed with pancreatic cancer in England and Wales survive for ten years or more. In the UK in 2014 alone, there were around 9,400 new cases of pancreatic cancer, and 8,800 deaths.

In 2008, they set up the ESPAC-4 clinical trial. By 2014, it had recruited 732 patients from the UK, Germany, Sweden, and France[21]. Around half of trial participants received an innovative combination of chemotherapy drugs. The other half received the standard chemotherapy treatment.

An extra 13% of patients on the trial lived for five years when given the combination of chemotherapy drugs. This brings five year survival to almost a third, a huge result for patients.

The ESPAC is spearheaded by Professor John Neoptolemos from Liverpool University and the team includes experts from all over Europe [22].

Running trials for rarer cancers across the EU means we can develop new treatments that benefit patients in UK and across the continent. Groups like ESPAC need to be able to continue their life-saving work, in the immediate and longer term post-Brexit environment.

The new Clinical Trials Regulation, due to come into force at the end of 2018, represents a significant improvement on the current Directive. Importantly it provides for a new streamlined and coordinated system for approving trials that take place across different member states. The UK has played a key role in shaping this new legislation so that it works for research in the UK and enables us to effectively collaborate across the EU. **Government should ensure that the UK aligns with the new Clinical Trials Regulation and can take part in the coordinated, EU-wide system of trial approval. This will be necessary for the UK to easily set up, and take part in, pan-European trials; attracting industry investment and bringing benefits to patients in the UK and the rest of the Europe. If the UK does not align with this regulation, it may find itself closed to such trials, which would be bad for patients and for inward investment in UK science.**

[19] Statistics from CRUK's internal databases and include clinical trials from our Clinical Research Committee, New Agents Committee and Centre for Drug Development.
[20] Pancreatic Cancer Statistics – CRUK Website
[21] CRUK trial shows improved 5 year survival for pancreatic cancer patients – CRUK Press Release (2016)
[22] Changing the future of pancreatic cancer: The ESPAC trials – CRUK 'Milestones', Science Blog (2014)

Building NHS research capability

***Government should build the NHS' research capability to benefit patients and to effectively market the UK internationally as a single research hub; thereby attracting inward investment.***

The existence of historic, universal healthcare puts the UK in a strong position to conduct clinical trials, promote the uptake of innovation and fully realise the value of our wide ranging and comprehensive data sets, for example the cancer registries. By optimising research in the NHS and marketing the UK as a single research hub, we will be in a strong position to attract industry investment and world-leading researchers, and can provide innovative treatments to patients faster. The UK should take the opportunity to build and capitalise on this national asset when exiting the EU.

Cancer Research UK partners with the NHS in order to bring treatments to patients. Our Centres drive local partnerships and high-calibre collaborations between universities, NHS Trusts and other cancer charities. We also fund the Experimental Cancer Medicine Centre (ECMC) network in partnership with National Institute of Health Research (NIHR) and the Departments of Health in Scotland, Northern Ireland and Wales. The ECMC network provides the infrastructure for early phase clinical trials that often receives support from pharmaceutical partners. In 2014/15, ECMCs in England alone leveraged over £72 million through partnering with industry.

Researchers' access to patient data is crucial to improving our understanding of disease and treatments at a population level. To ensure such access, effective data capture systems are needed and the UK's major data-holding bodies need appropriate analytical capacity.

In its Five Year Forward View, the NHS stated an intention to improve its ability to undertake research and apply innovation. **In order to achieve this, Government must continue to invest in clinical research infrastructure through the NIHR and ensure that NHS Digital is appropriately resourced to achieve its ambition of realising a truly digital NHS.**

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