Impact of BREXIT on UK Gene and Cell Therapy: the need for Continued Pan-European Collaboration

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On June 23rd, 2016, the United Kingdom in a referendum voted to exit the European Union (EU). This is the so-called Brexit. The government is yet to activate Article 50,[1] after which there are 2 years to negotiate terms of engagement before the official exit, but the Brexit machinery is already picking up momentum. After the initial shockwaves that reverberated across the United Kingdom and beyond, many are now considering what the future holds for research based in the United Kingdom, for EU interactions, and for wider collaborations with the scientific community. Clearly much of this is generic to any type of scientific research, and has been articulated in a number of scientific journals. So what might Brexit mean for gene and cell therapy, given that the United Kingdom is a leading force in both basic science and clinical translation of these advanced therapeutics? This research is now gaining substantial support and investment from government, charitable and commercial sectors and is becoming a significant part of the UK national healthcare, innovation, and industrialization strategy. From the regulatory standpoint, the European Medicines Agency (currently headquartered in London) is now responsible for licensing new medicines across Europe and facilitates the implementation of multicenter trials. So there are a significant number of areas for which negotiated solutions need to be found if there is not to be a detrimental effect on the United Kingdom and indeed other EU member states. At present, of course, we are in a situation that is relatively unknown and difficult to predict.

The development and application of gene and cell therapy have been very high on the EU funding agenda for more than decade. The investment by the EU in consortia working on these approaches to human health has been well documented in the pages of specialist journals.[2–4] Many of these consortia involve UK-based research laboratories and these have provided substantial benefit to both the United Kingdom and to EU member states. The growth in the field can be credited, to some extent through such consortia that have provided the breadth of pre- clinical research required to prove safety, efficacy, and translatability of new approaches. Consortium approaches have been particularly important when there has been a need to maximize the recruitment of subjects for clinical trials involving rare and ultrarare genetic conditions. As these technologies enter and become established in clinical practice, patient access to trial sites and specialized interventions becomes even more important. To date, the EU has actively promoted healthcare mobility, enabling patients to receive treatment (and therefore access to clinical trials) in member states through reciprocal agreements.

There are various mechanisms through which UK scientists can apply for research funding. These include Horizon 2020 (H2020—the current framework program, previously these were Frameworks 7, 6, and so forth) that includes fellowships (inward and outward) as well as consortia to tackle specific pertinent scientific issues through a variety of funding tools. In addition, the much sought after European Research Agency (ERC) grants provide prestigious funding for individuals, based on either starter, consolidator, or advanced mechanisms, depending on the career status of the applicant. The United Kingdom has benefited substantially from ERC grants, evidenced by a high percentage being gained by UK-based scientists, including many in the gene and cell therapy space. Furthermore, consortia developed in Europe have significant reach globally. For example, the Transatlantic Gene Therapy Consortium has for nearly a decade brought together scientists in the United States and Europe working on hematopoietic stem cell gene therapies, facilitating both preclinical development and implementation of international multicenter trials.

Although the EU is currently an economic and political union of 28 countries, other countries such as Switzerland, Norway, Liechtenstein, and Iceland have access to the single market and receive some other benefits of EU membership. However, a recent vote on immigration in Switzerland in 2014 resulted in misalignment with EU regulations. This has caused uncertainty with respect to Swiss involvement in EU-funded science. An interim solution and long-term plan have been developed, although it remains unclear to what level of Swiss participation will be allowed from 2017 onward in H2020.[5] What is clear is that uncertainty is potentially harmful for both building and maintaining scientific interactions. For UK scientists, and for those in the EU, it is particularly important that existing scientific and clinical interactions are maintained, and that full participation can be negotiated for future funding mechanisms including H2020. Positivity in this regard needs to become evident quickly to avoid loss of momentum in a rapidly developing field.

Access to EU funding streams is only part of the discussion, as in theory the UK government could backfill any deficit. Perhaps even more important are the fundamental principles of scientific collaboration and mobility. Although this may have led to political anxieties in other sectors, for science it is widely regarded as a massive win. In recent years, UK-based laboratories have enjoyed the freedom of movement for scientists from other EU member states to work and live in the United Kingdom, and vice versa. This has created a rich backdrop and environment to foster excellence in training

and research. It would be a big step backwards and a tragedy for science in general to be affected by new constraints. This is likely to be a very difficult area to negotiate since reducing net immigration was a major reason for the Brexit vote.

It is interesting to note that the arrival of Theresa May as Prime Minister brought about some immediate changes that impact the life sciences sec- tor. Encouragingly, the government has expressed openly a very high priority to research. The Office for Life Sciences (OLS) will remain a joint unit across the Department of Health (DH) and the newly formed Department for Business, Energy, and Industrial Strategy.[6] The Chair of the newly created UK Research and Innovation body, Sir John Kingman, was recently quoted as saying: ''The critical point for me is that the new Prime Minister has quite rightly called for a new industrial strategy posing the question what is the best way to formulate a new economic future for an independent UK outside the European Union and I think that great science, great research universities have a huge amount to contribute to that.'' With that vision in mind, there is clearly a new opportunity to draw up a cohesive strategy for the field of cell and gene therapy that runs from discovery science through to commercialization. The United Kingdom has a highly skilled workforce in the life sciences sector. This is likely to keep the United Kingdom attractive for investment. A positive signal that the United Kingdom may remain strong was the announcement from Glaxo SmithKline that they will further enhance their investment in the UK advanced manufacturing, principally because of the United Kingdom's available highly skilled workforce.[7] Much of the dissemination of research and impact is through open scientific discourse. Now more than ever, the cell and gene therapy field should come together to ensure a bilaterally positive outcome of Brexit. The European Society of Gene and Cell Therapy together with the British Society of Gene and Cell Therapy and many other individual member state societies must play a proactive role to ensure that the pillars of scientific collaboration and mobility across geographical Europe are maintained, and even enhanced.

There is more to all of this than Brexit, which has focused minds on relationships and political ideals within Europe. As a scientific community, there are no geographical boundaries. Few would disagree with the notion that the best science is conducted collaboratively. Aside from monetary resource, mobility for research, training, and healthcare is par- amount. The forthcoming negotiations are of critical importance for the development of gene and cell therapy. Any reduction in funding, scientific and clinical interactions, and joined-up regulatory systems will have a detrimental impact on development of these innovative new medicines for both the United Kingdom and the EU. Scientists throughout Europe should therefore press the case for continued pan-European collaboration post-Brexit.

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1. References

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