Science and Technology Committee

Oral evidence: Impact of EU regulation on the UK life sciences, HC 904

Tuesday 22 March 2016

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Written evidence from witnesses:

- Shelford Group
- Wellcome Trust
- Brightwake Ltd
- Cell and Gene Therapy Catapult
- Bioindustry Association
- Academy of Medical Sciences
- The Royal Society

Watch the meeting

Members present: Nicola Blackwood (Chair); Victoria Borwick; Jim Dowd; Chris Green; Dr Tania Mathias; Carol Monaghan; Graham Stringer; Derek Thomas

Questions 1-94

Witnesses: **Stuart Pritchard**, EU Affairs Manager, Wellcome Trust, and **Dr Keith Ison** and **Professor Berne Ferry**, representing the Shelford Group, gave evidence.

Q1 Chair: I would like to open our first session on EU regulation on life sciences, with a particular focus on innovation. Before I start, I am sure the whole Committee will join me in saying how deeply shocked we are by today's atrocities in Brussels. All our thoughts and prayers will be with the victims and their families, and we would like to send strength and courage to the emergency responders at this time. All of us here would like to identify ourselves with the comments of the Prime Minister, the Chancellor and the shadow Chancellor in saying that today we stand with the people of Belgium.

I thank all of you who have come to give evidence in this session today. It is kind of you to take the time. Before we begin, Committee members have asked, as a point of clarification, if

the witnesses could tell the Committee to what extent their organisations are funded by the EU. Would you like to start, Mr Pritchard?

Stuart Pritchard: As you know, the Wellcome Trust is an independent charitable foundation and as such we do not receive EU funding.

Dr Ison: The Shelford group of trusts are NHS foundation trusts and so are funded through those routes. As far as I am aware, we would receive EU funding only for grant activities through our association with universities.

Q2 Chair: That is very helpful. We will be asking this of every witness to ensure that it is clear up front. First, I go to your written evidence, Mr Pritchard and Dr Ison. Both of you have given remarkably similar evidence, saying that the European Commission and the EU are very consultative, but their consultation and legislative processes are very lengthy and, as a result, can damp down competition. A particular example given by the Wellcome Trust showed that the European Commission responded to criticism of the clinical trials directive with a revised clinical trials regulation, making significant improvements, but that it took 20 years. Is this typical of the EU, and what do you think needs to be done to improve the situation?

Stuart Pritchard: Thank you for the invitation to attend today. It is less typical now than it has been in the past. There are indications that the institutions are improving the way they undertake the legislative process. The Commission has put in place a refit programme, which is intended to make sure that legislation is as fit for purpose as possible before it is published as a proposal, and it tries to make sure that its consultation is appropriate to do so. It also repeals legislation where it has proven to be ineffective.

The clinical trials directive is the stand-out example and has been referenced in a large number of the written evidence submissions to this inquiry. The Academy of Medical Sciences conducted a review in 2011, which was a pretty comprehensive exploration of some of the challenges posed by the directive itself. In terms of timing, the proposal was adopted in 2001 and there was a period of transposition into national law in about 2004. There followed an extended period when concerns were raised by many people, particularly across the UK, about the legislation. It took some time for that to be recognised, but eventually it led to changes. Part of the inherent challenge in correcting some of the problems is the sheer amount of time it takes for a multilateral organisation of 28 member states to co-ordinate itself into making change. When you add potential disagreements among each of the main legislative institutions, that puts additional time on to the process.

It is disappointing that it takes so long. In the case of the clinical trials directive, I think such a huge delay is unlikely to happen again. I believe the regulation has been adopted much more swiftly. Part of the challenge is that the date for member states to transpose it into their national legislation has been agreed to be in or around 2018, although as a regulation that transposition should be less than a directive. There are some concerns that perhaps it could be adopted a little sooner, but there may well be technical constraints on the European Medicines Agency to put some of the IT infrastructure in place to enable that to happen in the right way.

Dr Ison: The physical agents directive is an example of a directive that took a long time to get through with regard to electromagnetic fields. This was because an element was picked up in the legislation that had an implication for MR scanning in medical use. It took some time to work through and involved the collection of additional data to provide a substantial base of evidence to take forward the legislation. In the medical community there is now an exemption. That is an example of where something was introduced and then reviewed, an evidence base was formed and taken through to revision of the legislation. It took about 10 years to do it, but you can see why there was a need for time to collect the data.

Another directive is the medical devices directive, which has been in place for some years. In that case there has been a series of developments and amendments of the directive, and it is about to go through a major revision into a regulation. That is a good example of where a series of changes was necessitated by the speed of change of technology.

Q3 Chair: I am using the clinical trials directive as an example, but I know that there have been similar problems elsewhere. As I understand it, one of the problems with the clinical trials directive was inconsistent implementation across different states. This is the way EU legislation is supposed to work, with a margin of appreciation, but with clinical trials there is a need for harmonisation in order to have comparable data. How can problems specific to life sciences be overcome, or is there any way in which the current working is already addressing that?

Stuart Pritchard: In terms of the clinical trials directive, part of the challenge in inconsistent implementation was that Commission guidance was issued very late before the deadline for transposition, so many member states had already put in place the legislation necessary to fit national law, and that added complications to how it was implemented. There was believed to be lack of clarity in many of the definitions issued by the Commission, which led to further complications. Given that many clinical trials are multinational, multi-site trials, having that variation in member state legislation is very problematic. I think more could be done to ensure that guidance by the Commission is issued on a more timely basis to member states.

In terms of how the life sciences sector can contribute to legislation, it can get involved as early as possible in the development of the proposals and ensure that its voice is heard effectively and coherently. In the trust's experience, the UK is now very much better at that than it was at the time of the original directive, and it is seen to be far more effective. If you look at the data protection regulation that is due to be adopted by the Parliament in the next month or so, there was a much more effective pan-European coalition of science organisations who were able to provide evidence for the development of the legislation, which enabled potentially difficult amendments for medical research to be addressed early, before they became more problematic.

Q4 Dr Mathias: Are you aware of any forthcoming EU legislation that might give rise to concerns for life sciences in the UK and, if you are, how might they be allayed?

Professor Ferry: The forthcoming in vitro diagnostic medical devices regulation, if enacted as it currently stands, will have potentially a major impact on genetic testing services in Europe. I give you as an example two amendments—268 and 271. Amendment

268 effectively introduces a requirement that all genetic testing has to be supplied with a prescription. The second amendment is that, if you use genetic tests, they have to be conducted by medical personnel and have explicit consent. In addition, there must be counselling. An example of where that would be really difficult to do is new-born screening, which takes place in virtually all member states. It is time-dependent; you have to do it within 48 hours. Generally, it is done when babies are born. Their blood is taken quite quickly, and you do all sorts of different tests, for phenylketonuria and so on. There is no prescription or genetic counselling, and consent is not explicit. This would have a big impact on that kind of screening. That is one fairly major example. The European Genetic Alliance Network, the MRC and the Wellcome Trust are all concerned about that, and there are other examples.

Q5 Dr Mathias: Are you questioning whether genetic counselling is feasible or whether it can be avoided?

Professor Ferry: It just would not be workable in that particular respect.

Stuart Pritchard: One of the challenges is that the European Parliament is seeking to mandate genetic counselling, which ordinarily would be a member state competence, and it might not be appropriate to the different healthcare systems across the EU. It should be for the member state to decide how to direct its resourcing, and it is fair to say that genetic counselling is a resource that is already stretched to some extent in the UK, so having the European Union trying to mandate how the UK organises its healthcare system is going a little too far. Fortunately, member state Governments are fairly clear that they are not accepting that amendment.

Dr Ison: One thing to recognise in the medical field is that the pace of change is increasing so rapidly that any provision put too rigidly into regulation will be a bar in the future. To take the example of genetic testing for, say, HIV treatment, there is a proportion of the population who are more sensitive to a drug than others. If you begin to extend that way of thinking, genetic testing would become an automatic part of delivering a drug sequence to somebody, and you have to make sure the legislation will accommodate that. That is potentially difficult, because you cannot possibly provide counselling on the scale we are likely to see in the future.

Q6 Dr Mathias: You are advocating testing without counselling.

Dr Ison: It depends on the circumstances.

Q7 Dr Mathias: Is there any EU regulation that you think urgently needs amending at the moment?

Dr Ison: There is one going through at the moment—the medical device regulations—in which there is a provision for in-house manufacture of medical devices to be covered by CE marking, which is the recognition of achievement. At the moment the directive is silent on that. In the UK, the regulator, MHRA, interpreted it as allowing bodies to make adaptations and construct devices for use within their own organisations. As I understand

it, there is discussion with regard to development of the regulation to change the way it is worded so that it requires a quality system, or some other kind of structured approach, to create devices in-house, which is all to the good in terms of patient safety, but to go through the full CE marking process would be disproportionately expensive for a number of the devices we have.

Professor Ferry: Similarly, in pathology, particularly in the Shelford hospitals, because we work at the forefront of clinical innovation, quite a lot of tests done in laboratories are incredibly helpful to patients. They have been developed and worked up by scientists in the pathology lab or other labs there. Quite often, they are for rare diseases, and the tests they use will not be kitemarked. It is not worth our commercialising some of those tests, but they are incredibly useful.

Q8 Dr Mathias: Is the problem the time or the cost of getting the kitemark?

Professor Ferry: It is a number of things. One is the complexity of some of the tests that are done. They can be done quite easily in a biochemistry or immunology lab, but to try to commercialise some of them would be very expensive. Instead, what happens is that people around the country know that a particular lab does a test, so they send it to that lab. The commercial world knows that it does not have to spend a huge amount of money trying to develop the test. That is one reason.

Stuart Pritchard: I would like to add a couple of other examples of legislation that we anticipate coming through in the near future. One is a standard review activity. Many directives have an inbuilt review period. The use of animals in medical research directive has to be reviewed by November next year, so the Commission is undertaking ongoing review activity now. It is important for the UK life sciences sector to engage with that effectively to make sure that it is a comprehensive review and reflects the implementation that is taking place. Another piece of legislation we are anticipating later this year is an example of some of the indirect impacts of EU legislation on life sciences that we have to be careful to bear in mind. We anticipate that, as part of the EU's digital single market approach, there will be copyright legislation that could have an impact on text and data mining, which is an important part of health research in the UK. The UK Government have already allowed for that to continue in the UK, but we will be watching carefully to make sure that future EU legislation does not remove that ability.

Q9 Chair: To recap, in your answers to me, the main concern appeared to be about consistency of application of the different directives in member states, because of the need for comparable data. In your answers to Dr Mathias, the concern was not just about responsiveness but about the EU not spreading beyond its competency on issues like genetic testing, CE marking and so on. Those are two competing challenges. What would be your recommendations as to what the UK could do to try to address those problems?

Stuart Pritchard: The problem with the in vitro diagnostics directive very much lies with the position that the European Parliament has taken, which is very much at odds with the position taken by the national Governments and the European Commission. Part of the challenge there is to ensure that Members of the European Parliament have suitable scientific evidence on which to base their decisions. I do not think the current mechanisms

are sufficiently robust to do that. We would like to see greater activity being undertaken to strengthen it. There are very good offices there similar to the Parliamentary Office of Science and Technology and the House of Commons Library, but, recognising that this House also receives intense lobbying, they need support to cut through the extraordinary amount of lobbying in Brussels that MEPs have to deal with. Support to get independent evidence on scientific issues would be very important, and linking that to the European Commission's new science advice mechanism would be another important way of ensuring that the European Parliament has a sufficient evidence base on which to make careful judgments on legislation.

Dr Ison: The tension between providing a unified standardised system but also allowing flexibility is a real one, and the point about scientific advice is critical in getting that voice heard. Professional bodies work very well nationally but also internationally to provide the basis for that advice; it is about having a route to get that advice through and to be heard in Brussels.

Q10 Victoria Borwick: I want to take you back to the question put by Dr Mathias. You implied that the EU would require standardisation of things like prosthetics, and you would not have the opportunity of personalising them because of kitemarking. Did I understand that correctly?

Dr Ison: No. Prosthetics are sold with the intention of being customised for the individual, so that is fine. This is about generating things that are not readily available. For example, in my own trust, we make eye shields for radiotherapy treatment, but they are bespoke to the individual, so the number of eye shields one would need to create to make it a viable commercial operation is much greater than the demand. You end up with orphan products, and the question is how you deal with those within the regulatory structure.

Q11 Victoria Borwick: Would that also cover other personalisation of care? For example, medicines are often put together for a particular patient or disease. Would that requirement to regularise, for want of a better word, also be affected?

Dr Ison: A directive on advanced therapies is coming through, and it will make provision for things like gene therapy and somatic therapy. The regulation and control of that falls within a number of different regulatory areas, but that directive is an example of the EU responding to a particular need in terms of development of the science. There is a facility for recognition of the need for regulation and the provision of it; it is a question of having the scientific input to make sure the outcome does not lead to unintended consequences.

Q12 Victoria Borwick: Surely, that is the way we are going; it is now quite personalised. Now is a time of tremendous discovery.

Professor Ferry: A general point is that innovation in healthcare and life sciences is moving so fast that the legislation is finding it difficult to keep up. We talk about a lot of it being much more evidence-based, and that scientific input should be in the legislation much earlier than it currently is. One suggestion would be some kind of life science horizon-scanning group here in the UK. The Shelford Group would be happy to be

involved in that, as I am sure the trust would be, so we would hear much earlier about legislation about to be undertaken in Brussels, in order to have scientific input at that point from people on the ground.

Q13 Carol Monaghan: The Shelford Group spoke in its submission to the Committee about a more risk-proportionate approach to EU legislation. What is needed to secure that, and what would a better system look like?

Professor Ferry: In the past, the EU has tended to use the precautionary principle when looking at risk. That is very risk-averse. They believe you should probably not use anything that is not known about, or try to avoid it, but there are other ways of managing risk. Instead of simply avoiding risk altogether, which is very difficult unless you have concrete, hard evidence that it will not be harmful—mostly you cannot do that—another way to look at risk is to weigh up the hazards or potential risks against the benefits to society as a whole, or to a particular disease cohort as a whole. There are processes and mechanisms by which you can manage that risk. I think we would all suggest that the EU changes the way it approaches risk and moves from the precautionary principle to a much more risk-based and risk-managing principle.

Dr Ison: One example with regard to the way you assess risk is that, if you are an individual who has a terminal condition and there is a therapy that may help you, you are likely to accept a greater level of risk than the population as a whole, so it is a matter of trying to find the benefit. In the Shelford Group, we deal with a lot of patients who have very challenging conditions, so we are always trying to find the best appropriate treatment, but sometimes that means going beyond the boundaries of what is known. As Professor Ferry said, it is the idea of benefit and value as weighed against risk.

Q14 Carol Monaghan: Where are we currently in adopting a more risk-proportionate approach to clinical trials?

Stuart Pritchard: I have not been following the regulation closely, but the indications are that it is becoming more streamlined. Part of the challenge of risk in EU institutions is that each institution will have a different attitude to it. The Parliament will be perhaps slightly more risk-averse, or at least there will be divisions in the Parliament. One of the areas where there are challenges in life sciences is that there are different national attitudes, particularly to ethically difficult areas of health research. All those sorts of considerations come into play. With the establishment of the science advice mechanism by the European Commission, they are trying to provide a structure that gives that input to the Commission, and member states have their own science advice mechanisms, broadly speaking. There are various levels of risk tolerance in the different institutions, and trying to find consensus between them all is time-consuming, but it does happen. I think it is improving.

Q15 Carol Monaghan: Is there evidence that, where a level of risk has been taken in one EU state that has allowed it, as a result that technology has been used in other member states—following a successful trial, for example?

Stuart Pritchard: I cannot think of any, but I am happy to look into it. There are areas of ethics where the UK has a very different approach from other member states. It is fair to say that mitochondrial donation legislation was unlikely to happen elsewhere in the EU compared with the UK. We have quite a reasonable societal dialogue on some of these difficult areas and are more willing to have that consideration of what risk is acceptable than other parts of the EU. That is not to say that other parts of the EU are wrong on that; it is just that there are differences of opinion, often based on different national cultural attitudes to health research.

Q16 Jim Dowd: Could you give us any examples from your experience of unnecessary complexity in EU regulations? If the answer is no, the rest of my questions are redundant.

Professor Ferry: There is one, which again comes from genetics. It again pertains to the in vitro diagnostic medical devices regulation that is going to come out, and it is to do with genetic screening for HIV. For people who are positive for HIV, you can use an antiviral drug called Abacavir. That can be very helpful for people with HIV, but some of those with HIV will have a side-effect from it if they have a particular gene. Generally, before people with HIV are offered that drug at a clinic, a blood test will be taken and they will be tested for their HLA, which is a particular gene. Currently, you do not need to be counselled for that, because it is so important for you to have a prescription for the drug, and it can simply be done within the hospital. If the in vitro diagnostic medical devices regulation goes through, it would hold up the ability for people to have that drug in a much simpler way. It goes back to the question Dr Mathias asked.

Q17 Jim Dowd: In that particular case, is it because medical practice in this country already accommodates that activity, whereas elsewhere in the EU it may not?

Professor Ferry: I do not think so. One of the amendments to the in vitro diagnostic medical devices regulation is overly complex and does not appreciate how genetic testing is done. It goes back to what we were discussing; for some reason, whenever the amendment was made, there was perhaps insufficient scientific input to explain that it was not necessary to have an amendment at that level of detail.

Q18 Jim Dowd: Apart from a higher quality of scientific input prior to formulating the regulations, how do you balance the need for adequate legislation and local flexibility, given the differing activities across EU nations?

Professor Ferry: It comes down to assessing the risk, and understanding that you can manage risk in a different way rather than simply trying to avoid it completely. By and large, if you manage risk you can develop likelihood ratios of how dangerous it is going to be, and they generally work very well.

Dr Ison: It is to do with the proportionality of the risk you are dealing with and what the benefits can be.

Stuart Pritchard: In my experience, the EU is better now, and has more robust measures to try to address it before legislation gets too far through the process. The Commission has

done a lot of work to try to address it, with the support of member states and the other institutions. I can remember in the European Parliament a discussion about the level of vitamins and minerals that should be permitted in foodstuffs, which seemed to be a ludicrous level of detail for them to spend a lot of parliamentary time on. That has changed, and there is now a lot more consideration before one gets to that stage. It is improving, but there is always room for improvement. As colleagues have said, there are measures to try to address that which would be helpful: better horizon-scanning and better involvement earlier in the process by national organisations. The UK Government are good at trying to involve organisations in that discussion early, but part of the difficulty is that there will always be a certain level of ad hoc generation of different groupings to try to address legislation. To be able to identify the issues early enough and follow them through the legislative process depends on the resources of organisations, and that is not easy for everybody.

Jim Dowd: I have to say that the issue of vitamin supplements exercised a large number of my constituents and I am sure those of other colleagues as well, so it at least had some relevance to their lives or fears.

Q19 Chair: What about the impact on start-ups, SMEs and so on who are trying to engage with this process, when they see a new directive down the end of the telescope and wonder about the impact? What is the likelihood that they can in any way get their views across through the consultative process?

Professor Ferry: I understand that it is quite difficult for them. They find it quite difficult to know which group to go to, even in the United Kingdom. In Europe, it must be even more difficult for small start-up companies.

Dr Ison: There are large federations of manufacturers at European level that provide lobbying and input, but you are right: it is difficult for small individuals. We see spin-out companies coming from our own institutions that have to struggle with that.

Stuart Pritchard: There are a lot of organisations at both European and UK level, and organisations enable that conversation to take place. I was involved in a meeting in Brussels recently on antimicrobial resistance with an organisation called the BEAM Alliance, which is a network of pharmaceutical SMEs. It was clear from the conversation they were having with the Commission that they did not have the resource to engage in some of the protracted legislative discussion that larger organisations would have, and were looking for support to have their voice heard. There is much more that could be done to enable that to happen.

Q20 Chris Green: In 2001, the clinical trials directive was introduced and there were a number of concerns and criticisms. The clinical trials regulation is due to come in in 2018, as highlighted. How can we avoid a situation where it takes two decades to correct inappropriate regulation, such as in clinical trials?

Stuart Pritchard: We have pointed out that there are already measures in place to try to stop that happening again. The evidence from more recent pieces of legislation is that UK

organisations in the life sciences in particular are now more organised in ensuring that there is input to the discussion at the right time, but it is a bit of an ad hoc early warning system; it relies on organisations having the resource and capacity to identify those and follow them up.

Q21 Chris Green: It might be quite concerning to people if the expression "ad hoc" turned up in a conversation on clinical trials.

Stuart Pritchard: In terms of the organisation of the community, and thinking about the work colleagues have referred to on the in vitro diagnostics legislation, a number of organisations participated in drawing up positions to lead discussion with EU institutions on that. Some of them are very small charities that do not have the time or capacity to spend a lot of time on that and rely on other organisations, perhaps colleagues at the Association of Medical Research Charities, to do some of the heavy lifting. It relies to some extent on organisations being able and willing to get involved at the right time. That is not always possible given the pressures that the charity sector in particular might have. In the charity sector, sometimes it can rely on a few organisations coming together and trying to form a coalition to pull together a consensus position that can feed into discussion.

Q22 Chris Green: It is recognised across the European Union that there are variations in interpretation and perhaps in standards. Surely, we should have a mutual interest in common protocols, but it seems that the system is one that takes too long to reform, or there are too many problems in approaching the European Union at the right level. You highlighted difficulties for SMEs on microbial resistance. Smaller organisations, whether they are charities or SMEs, have difficulty working with an organisation such as the European Union. This inevitably will lead to inconsistencies across the EU, and large organisations will naturally think, "Where can we develop our drugs?" Do they develop them in the UK, which has one approach, or do they develop them in another part of the European Union where there is a significantly different approach? Is it acceptable to have that within the EU, where surely we should be meeting one high standard?

Stuart Pritchard: I do not think it is acceptable. It is not necessarily always the case. The pharmaceutical industry certainly benefits from simplified regulation that is applicable in all 28 member states, which is the case with a lot of the legislation. There has to be room for national considerations to come into play on a lot of the legislation relevant to the life sciences. The UK's health service is structured differently from that in other member states, so there has to be some flexibility to take that into account. The UK is very influential at EU level in driving up standards of legislation. The UK Government's permanent representation in Brussels is highly effective and active. If you look at some of the legislation we talked about in the written evidence, it is not always ideal when it starts out and can take a long time to reform, but there are indications that UK high standards lead to improvements elsewhere in Europe. In the protection of animals in medical experiments directive, UK standards have been translated into legislation at EU level, which hopefully should result in improvements. We are in a good position as the UK in influencing the standard of legislation at European level.

Q23 Chris Green: Given the nature of the organisation you are dealing with—it has 28 different countries—it is natural that taking information to the EU and for it to cascade down is a very slow process, and inevitably you have variations of interpretation. It is just part of the nature of it.

Stuart Pritchard: Unfortunately, I think so.

Dr Ison: One advantage we have in the EU is the strength of our regulators and the high opinion of them in Europe. We are also seeing the regulators develop networks of individuals to provide input to changes in legislation, which is helpful. The MHRA, the HSE and so on run a number of sector groups to provide that kind of input. That is about trying to ensure there is input to the way the UK influences standards, so that we always go in with high-quality evidence.

Q24 Chris Green: Is that influence at a significantly different level in comparison with, say, the influence you might have looking at the way clinical trials or other items are run around the world—for example, how the US, Canada or Switzerland approach things? By being part of the EU, does Britain have more influence, or do people just look at what is the most appropriate?

Dr Ison: If we were not in the EU, we would still need clinical trials regulations. One of the things we strongly support is collaboration. The Shelford trusts have a lot of collaborations with different European countries and run trials across a number of them at the same time. Reducing the burden of regulation is very helpful for that, but it does not mean that there is not a lot of work to do standardising trials and getting good quality of outcome. That is where working locally with local departments to make sure implementation works effectively is driven by the need to collect good evidence, not just by the regulatory words on the page.

Q25 Chair: That is interesting. Reducing the burden of regulation is very helpful. Would you say that at the moment the overall effect of the regulatory framework in the EU is enabling? Which way is it tipping? Is the emphasis at the moment on trying to reform to reduce the burden of regulation, or is the focus on trying to enable innovation? Where is the biggest problem?

Professor Ferry: It is enabling innovation. I think we would all agree that in the life sciences by and large, particularly in medicine, the regulation has been fine; it has not been overly burdensome, but innovation is moving very fast in the life sciences, particularly in medicine. We would prefer risk to be viewed in a more proportionate way and we would like scientists to be involved earlier in the legislative process. We want the legislation to be much more enabling for innovation.

Q26 Graham Stringer: You mentioned a number of times the Commission's improved science advisory mechanism. Is there any evidence in natural sciences that the mechanism is better than the individual science adviser? Professor Anne Glover used to give that advice, but she was sacked by Jean-Claude Juncker for giving advice on GM foods. Wasn't the

scientific advisory mechanism just because of the fact that the Commission had to have an answer as to why they sacked the previous adviser?

Stuart Pritchard: To be fair, it is early days for the new mechanism, because it was launched only in January this year. It is a question of waiting to see how effective it can be. The indications are that support for that mechanism has been improved by the Commission, so greater resource is going into it. Professor Glover gave evidence to the Lords Science and Technology Committee.

Graham Stringer: And this Committee.

Stuart Pritchard: Yes. She talked about her experience of her position. It is a question of waiting to see how much that additional resource will help improve the quality of science advice. There are moves to involve European academies more strongly in the provision of that evidence. It is very much a moveable feast at the moment. We are not quite sure how it is going to work out, and the Commission is still formulating the structures to do that. We work with the Federation of European Academies of Medicine, which is involved in some of the dialogue to provide structured input in what is referred to as the high-level group—of seven scientists—on which there is a UK representative. It very much feels like wait and see at the moment, but it appears that there is a little more resource and structure that might well see an improvement in the provision of advice.

Q27 Graham Stringer: But we do not know yet.

Stuart Pritchard: We do not know yet.

Q28 Graham Stringer: The Commission's response to scientific advice, particularly on GM foods, has not been particularly helpful in the past, has it? In answer to the Chair's first question, you talked about the physical agents directive and said it was a matter of balance. Tracey Brown, the director of Sense about Science, did not seem to think it was about balance. She said: "When scientists approached us"—Sense about Science—"with their frustrations at the lack of response to their concerns about the legislation, we were surprised that no-one involved in the policy had considered the public impact—not only the unnecessary threat to healthcare and research, but also the likely confusion about the relative risks of different types of scans." It was not a question about communication. When the Commission were told about it, they did nothing, and previously they had not even considered the impact. That is not balance; it is just gross incompetence, isn't it?

Stuart Pritchard: I was not involved in the physical agents directive legislation, but the understanding was that there was a huge gap, in that the medical community was not consulted. I believe that predominantly the power and telecommunications sectors were consulted. There was definitely a gap in not consulting early and effectively with the medical community, and it required quite a lot of persistence to get the Commission to change that position, but ultimately they did. The disappointment was that consultation was missed out in the first place and that it took time to address.

Dr Ison: Part of the driver for that was the interpretation of the scientific evidence, which is why more evidence was gathered to clarify the query.

Q29 Graham Stringer: A number of questions have been put to you about lobbying and how difficult it is to have an impact on the Commission when it is there. Is the implication that the Committee is to draw from that that both the Parliament and the Commission themselves are too influenced by the larger groups and not influenced enough by the smaller ones and the more detailed level of information that might be provided by those smaller groups?

Stuart Pritchard: Having worked in the European Parliament, it can be very difficult as regards the level of information received, as I am sure all of you are familiar with in your roles; there is intense interest in a lot of the legislation. When I was there, there was a huge amount of interest in a huge amount of legislation that was moving through the Parliament. You try to gather as many different perspectives as possible, so I suppose there is a responsibility on Members of the Parliament and the Commission to try to seek as broad a set of inputs as possible from different communities in the legislative process. That is difficult to achieve with perspectives from 28 different member states.

There are measures in place by the Commission to consult appropriately. Do they always get it right in terms of getting the smaller organisations' voice? I do not think they do, but from the UK perspective a lot of the smaller charities are very effective at grouping together their activity to have an impact in Brussels. It is a difficult question to answer. I do not think they automatically miss out on the smaller voices. There are indications that on some legislation there are very vocal minorities that are effective in getting their voices heard in EU institutions. There isn't an easy answer.

Q30 Chair: I want to pick up one point of your evidence, Dr Ison. We have been discussing a little bit the over-conservative, risk-averse approach of some of the regulators in the EU. You also highlighted that, "One current concern is that the Notified Bodies in some states have been making use of the existing Directive flexibility to interpret laxly in support of Regulation tourism; the numbers of Notified Bodies across the EU are being reduced for this reason." This is about the balance of getting the regulation or directive right in the first place and its being implemented consistently in all member states. Could you explain that point to the Committee and draw it out a little?

Dr Ison: This is about medical devices. Notified bodies in the member states go through the approval processes for medical devices, and it is about making sure they do it to the same standards. There are international standards for the construction, performance and so on of devices used in this process. Some have discretion over them, but generally it is about making sure that the right level of conformance to the standards is achieved, and that the notified bodies do that. The concern is whether the standards have been fully adhered to by all the organisations concerned.

Chair: Thank you very much for your evidence, which has been extremely helpful. We have to move on to the next panel now. We have rather packed today's session because there is so much to cover, as I am sure you can appreciate. We will probably have a few questions to follow up. If so, we would appreciate your coming back on those, but I thank you for the time you have given us today. I hope you will feel that our conclusions on this contribute to a more responsive European Union. We can only hope.

Witnesses*:* **Dr Jacqueline Barry,** Director of Regulatory Affairs, Cell and Gene Therapy Catapult, **Paul Browning,** Head of Regulatory Affairs, Brightwake Ltd, **Darren Budd,** Commercial Director UK and Ireland, BASF, and **Steve Bates,** Chief Executive Officer, BioIndustry Association, gave evidence.

Q31 Chair: I welcome all of you to this session. We are looking particularly at EU regulation of life sciences, focusing on innovation. I think most of you were in the room during the previous evidence session and heard some of the topics we covered, looking at the tensions between consistency of regulation and the need for flexibility and responsiveness at a time of accelerating innovation, and some of the challenges that presents, particularly for smaller charities and start-ups trying to understand exactly how to access a very protracted legislative process, and the scale of resources that requires. Perhaps I could start with you, Mr Browning. As a smaller company, how accessible do you feel this process is for a smaller life sciences company trying to understand EU legislation?

Victoria Borwick: Chair, I thought we were going to ask about EU funding before we start.

Chair: Yes. I will let you answer, Mr Browning, and then we will go through the panel.

Paul Browning: Changing and influencing the EU legislative process is somewhat difficult for SMEs. There is not a very clear mechanism with which to start engaging. A lot of SMEs rely on the much larger trade organisations to share that voice. There is some question about how effective they are and some are certainly more effective than others, but it is very difficult for an SME to engage with the European Parliament, and even with MEPs, to try to influence or at least provide more up-to-date and grassroots information.

Q32 Chair: Do you receive any EU funding?

Paul Browning: We receive de minimis funding for laboratory method development, which we share with UK universities.

Q33 Chair: Mr Bates, I imagine that one of the roles the BioIndustry Association would take on is to try to assist in communication between the industry and the EU. First, do you receive any EU funding?

Steve Bates: No.

Q34 Chair: How do you attempt to bridge the gap between various parts of the industry and the EU legislative process, recognising the problem raised today?

Steve Bates: I hope that what we can do is facilitate a way to provide information as to what is going on in Europe, focused on the 300 or so member companies in our association. We have had some success at tracking some of the key pieces of European legislation: clinical trials, which you have discussed, the advanced therapy medicinal products regulation and many of the medicines regulations. We engage through UK

organisations, whether that is UKREP, the Department here, or at technical level, in our space, the MHRA, the medicines regulator. Through Europabio, our association at European level, we engage with the Commission or the Parliament, as appropriate.

You have an understanding of where the systems are. You have talked about the systems being lengthy. Sometimes that gives you an advantage because it enables you to mobilise. The previous panel talked about working in coalition. On some of the bigger issues we have seen the UK work effectively as a coalition among charities, hospitals, industry and others on things in the life sciences sector. To give examples, we can look at UK influence in the development of PRIME—the priority review of innovative medicines—which is a new scheme launched by the EMA. That has been heavily influenced by and is linked to things that have been done in the UK under the early access to medicines scheme. We can look at the development of some of the schemes that have been beneficial to SMEs in terms of medicines development, where we have been quite successful in the development of an SME office at the European Medicines Agency, and SME engagement days. Because the European Medicines Agency is in London, there is a particular advantage for UK-based companies, which can access it and get to London more easily than other parts of the EU.

Q35 Chair: Dr Barry, do you receive EU funding?

Dr Barry: We do not, but we are in part set up by Innovate UK so we are UK-funded. However, we take part in Horizon 2020 grants, so we get a small amount of funding from that.

Q36 Chair: Is this a problem you recognise from industry partners you might have in the UK, and do you think more can be done to identify problems earlier and encourage access by smaller innovative start-ups and prevent any drag on their business plans?

Dr Barry: At the Cell and Gene Therapy Catapult, we are involved in advanced therapy medicinal products, which is a rapidly evolving field. As such, we may be quite privileged in that respect, because they acknowledge that it is evolving and the EMA is responsive to calls for meetings with SMEs, the BIA and other industry bodies. As Steve said, the EMA has an SME office, so that is a route. In addition, the MHRA has been very instrumental in making sure that innovation is considered as part of regulation. I think it was the first regulator to set up an innovation office for medicines. That is another route where SMEs, hospitals or academics can meet the regulator and have their voice heard in Europe. In that respect, it is perhaps easier in the advanced therapy field.

Q37 Chair: That is helpful. Mr Budd, you are obviously a larger organisation, with access routes. Do you think it is a lot easier for big business, or do you face some of the same challenges?

Darren Budd: We face some of the same challenges. We have to work with small SMEs. We have EU funding. As a private company, we use it as one of the routes for research. We are involved in EU funding. One of those, which is coming up, is Horizon 2020 where we have collaborations with universities as well. We have one coming up on renewable

biotechnology, biocatalysts and biorenewable materials, of which Imperial College is part. We hope that spin-out companies will come about. As a company, it is important for us to have those EU collaborations and the funding, so that we see technologies right across Europe and have access to the best technology. As a private company, we are looking all over the world. The EU is by far one of the most innovative regions in the world in this area. We look where we can for funding and for access to SMEs and universities and the technology they offer.

Q38 Derek Thomas: To what extent is the UK at fault for adding gold-plating to EU directives? Are you frustrated by it?

Steve Bates: Perhaps I can talk to the experience of the clinical trials directive. I think we would characterise that as a bad piece of legislation from Brussels made worse in the UK. The decision by the UK to be first adopter of the directive into national legislation, when perhaps things were not exactly clear, meant that some problems were baked in early and at a particular level in the UK that were not repeated in other parts of the EU. On that specific problem, gold-plating has been an issue.

Q39 Derek Thomas: Does anyone want to add to that? No? I might have to come back to you, Mr Bates. Is there any evidence or potential for regulation tourism, where businesses go to other European countries to avoid gold-plating?

Steve Bates: I think it is the other way round, with businesses endeavouring to develop medicines. The opportunity for a harmonised medicinal scheme across 28 countries is significantly attractive, and the fact that you have to go to the EMA for most of the things that are done in biotechnology is a net bonus. In a sense, the industry has grown up in a European environment. We are a relatively young sector and most of the legislation has been at European level since the science was developed, so we are at the benefit point of seeing ourselves within our European context. If we look at the UK's influence within that, the MHRA does a third of the files for the EMA in our space. The UK is also lucky to attract about a third of the innovation capital, and it is oversized and overweight compared with the rest of Europe in terms of the biotech sector. You can see the benefits from working in a harmonised scheme that gives you access to a very large market—27% of the global market—rather than 3% of the market if it was the UK alone, however the rules were set.

Q40 Derek Thomas: Other than the example you have already given regarding gold-plating, is there a message you would want the Government to get about what they could do to simplify things and remove some of the extra regulation that may not be necessary?

Steve Bates: Anybody who has a member of their family taking medicine would want to be sure that the medicine was regulated for safety and efficacy in an appropriate manner. I would not make the case for the deregulation of medicines. We want appropriate regulation of medicines. The flexibility and, in particular, the speed now being seen in EMA initiatives like the priority review of innovative medicines, influenced from the UK, is to be welcomed. We hope that enables the risk benefit, which your previous panel talked

about, to be successfully developed, particularly in the area of advanced therapies, and we hope that will be the way forward.

Q41 Victoria Borwick: What do you think are the main factors driving up the costs of complying with various EU regulations? Is it possible to avoid those? We heard from the first panel about innovation. If I have it right, innovation is moving so fast that it is difficult for legislation and, therefore, presumably regulation to keep up. How is that affecting you?

Paul Browning: For an SME, the impact is much larger than perhaps when it is absorbed in a much larger organisation. The new medical device regulation is, in effect, putting a lot of the previous guidance documents issued by the Commission into statute, so particularly for start-ups and new companies it provides a much easier recipe to follow to meet legislation. We have seen from Team NB—the Trade Association of Notified Bodies—in a knee-jerk response to some of the more public instances, like the PIP incident and so forth, an increased level of scrutiny at the manufacturers' expense. Within a year, we have seen an increase in the level of on-site review; scrutiny of technical documentation; a more thorough review of the quality management of regulatory systems in SMEs and all organisations; and spontaneous inspections. Each of those is at the company's own expense. For an SME to be able to swallow that additional expense has been quite difficult—obviously, for some more than others.

Steve Bates: The attraction for UK life sciences of operating in the EU is that you pay once for access across the EU, so that is a significant benefit. The reduced fee levels for scientific advice available for SMEs, which are part of the reforms that have happened at the European Medicines Agency, along with the other reduced fees that are particularly available for start-ups or spin-outs, are useful for the sector.

The question is: what is the alternative? If you are developing a medicine, you are thinking about a global market, not simply a medicine for use within the UK. The cost of patenting and regulation is what you invest in to have the opportunity to use that in a global market. You have to think about the cost across the EU, which is cost-effective, as well as the cost in the States and other markets.

Q42 Victoria Borwick: If you could change anything about the regulation, what would it be? Is there anything you would change? Are you saying there is no additional cost? That is not exactly what the first panel said.

Steve Bates: If I am correct, I think the first panel was made up of people who run hospitals rather than companies. From a company perspective, in the highly regulated environment where we would expect medicines to be, the cost of regulation would be a cost of doing business. The cost of medicines regulation falls on companies and has done for a long time. Businesses build that in as part of their expectation and look to recoup it, when they have a successful innovation, in their market price. If we can reduce the time it takes to get something through regulation, it obviously reduces cost and increases opportunity. We are very supportive of things that do that, but it is right that regulators put in place a proportionate amount of regulation for safety and efficacy for therapies in this area.

Paul Browning: I would absolutely agree with Mr Bates, but as a relatively innovative company that attracts a lot of university spin-outs and smaller organisations, when we have to explain that the costs to market, and now the ever-increasing delay to get to market, make a lot of innovation not possible, people literally walk away, which is unfortunate. I absolutely agree that there must be proportionality.

Q43 Victoria Borwick: That would be a risk. Are there any other comments?

Dr Barry: To pick up what Steve is talking about, in terms of advanced medical fields there are incentives. The EMA offers a 90% reduction in cost, or a 100% reduction if you are doing an orphan medicine, so there are incentives for small businesses to get into the medicinal product field. There are also schemes like PRIME and EAM where the regulators talk the developers through the requirements for registration. They meet them and help them meet the health technology assessment boards. All those schemes allow the developers to understand what they need to do and how they need to develop and test their product, and it will then help them to get through the licenser route in a quicker way. These things are actively being pursued now. As Steve says, the MHRA is instrumental in helping schemes like adaptive pathways and PRIME come to fruition. The schemes are there, and access to them is accelerating and being better publicised.

Q44 Victoria Borwick: Is there any particular legislation in the pipeline that you want to tell us about? Is there any legislation that gives you particular concern, and is there anything that you think may be a hindrance, or not?

Steve Bates: There is the opportunity to strengthen the regime and tell people more about the opportunities under PRIME and other things through the EMA. Perhaps I might flag up one concern about REACH, which is the EU regulation on registration, evaluation, authorisation and restriction of chemicals. It aims to protect from the risks posed by hazardous chemicals. While medicinal products and active pharmaceutical ingredients are exempt from REACH, other substrates—I am sorry to get technical—such as processing solvents used in the manufacture of API are not exempt, so there is chemical regulation in one part of the field and medical regulation in another part of the field. One of the solvents used for stopping viruses getting into product is being treated under the chemical rules rather than the medicine rules, and we think it would be sensible for them to be treated entirely under the medicine rules. We understand the objective of REACH, but if it can be sorted out so that the medicines path is clear, that would be very useful.

Q45 Victoria Borwick: We are keen to facilitate, and that is why we need you to advise us.

Paul Browning: In the new medical device regulation as now drafted, there is the formation of a centralised European medical device panel. As an SME, our concern is about what its role is, how it is managed, how it will be administered and who will be part of that panel.

Dr Barry: We have heard that the clinical trials directive was not particularly well implemented. There needs to be a move towards effective clinical trials regulation and its

introduction in an efficient and standard way across EU member states. That is a concern for the industry, but I believe that it is a positive regulation, rather than the directive.

Darren Budd: REACH is here now. It is about supporting it and reducing the complexity and cost of REACH, making sure that we have a harmonised approach to it. If we have it in Europe, how can we support it in terms of global reach, so that we have consistency and are competitive not just in Europe but globally? For a company like us, we estimate that up to 2018 the implementation of REACH will cost us about €50 million per year. That is expensive for a large company, but we can do it. For SMEs it is also a barrier to entry, so how do we support them? If we do not have SMEs, where will the next generation come from? As a large company it is a barrier, but we also have to support it to make sure we get reduction in the complexity in REACH—keeping it there as a regulation but also supporting it.

Q46 Chair: I was interested to hear about the programmes or schemes in place to help companies understand how to manage the regulations and how to access the different support that is available. How does the EU help companies to manage change? Mr Browning, you mentioned a knee-jerk response to various illegal activities around medical devices, and the change to those regulations and directives as a result. This obviously has a knock-on effect for business plans and the viability of businesses. What measures are in place to help different sectors manage that change?

Paul Browning: For us, the medical device regulation has yet to have an impact. On some initiatives from the European Commission, we see some impact analyses performed for SMEs up to large organisations. As yet, there has been nothing for the new regulation on medical devices, so at the moment it is being left to companies themselves to review. At Brightwake, we are literally taking the most current drafts and conducting our own gap analysis and impact assessments locally, but how that spreads to other organisations is not very well proposed.

Darren Budd: In BASF, we have a number of people internally who can work with the European Commission, but to give support in each country we work through trade associations. We understand the changes and work through those organisations to support small and medium-sized companies. We understand the change and we know what is going to happen from the trade association and how it is going to impact, so we can support that change through to the particular country.

Dr Barry: The EMA are quite active in going out to the industry—the academics, the SMEs and the larger industries—about potential changes. They notify you that guidance will be changed and give you some time to respond to that guidance. Then they review the guidance and implement it in a way that they think is harmonious. That option is there and it is used often.

Q47 Chris Green: For life science businesses, what are the most important commercial incentives available from being in the European Union?

Steve Bates: It is the point I mentioned earlier: a single harmonised approach to access through a single regulatory portal. It is the largest single market by volume in the world—27% of the global market.

Q48 Chris Green: The population of the EU is about 500 million and the population of the US is about 325 million. We heard earlier that the interpretation of EU rules varies quite significantly across the European Union.

Steve Bates: I am not sure that is the case with a centralised procedure of the European Medicines Agency for regulation of a drug. That is the responsibility of the company, so it is harmonised at a single point and the responsibility of the company is to get through to that place. That is harmonised.

Q49 Chris Green: When the drug is sold, it is standardised. What about development? What kind of environment is it?

Steve Bates: For the clinical trial standards, the evidence you need can be collected across the EU, or beyond it. It needs to meet the evidentiary requirements of the EMA. I think the previous session was about the market environment in the 27 or 28 different countries. The hospital and healthcare systems are very different and they are not harmonised. Companies, small and large, struggle with accessing that market, as they would any other market that is not harmonised.

Q50 Chris Green: You would accept that it is still a fair way off from the US.

Steve Bates: If you are trying to sell to the US healthcare market, the idea that you arrive and sell to one point—Obamacare—would perhaps not be the best way for successful companies like GW Pharma or Sirion Therapeutics to exploit the US market. There are complexities in all markets in terms of having a sales force and accessing them.

Q51 Chris Green: Would it be reasonable to say that being part of the EU is significantly better than the UK acting alone?

Steve Bates: On balance, we believe it is significantly better to be in the EU.

Q52 Chris Green: Could the EU provide more incentives, especially for life science SMEs?

Steve Bates: Yes, we believe it could. We look forward to the workings of PRIME. Some of the new incentives at the EMA—the administrative or procedural assistance in the SME office, the fee reductions on pre and post-marketing authorisation phases, fee exemptions, reductions in pharmacovigilance and fee exemptions on certain administrative services in the agency—need to be tested. We would love to come back to you and tell you how that is working in practice as we look at ATMP and some of the cell and gene therapies. We want those to work, but we think there is a raft of them we can engage with, and we are keen to keep them honest to their ambition.

Q53 Chris Green: That is quite a good list. Negotiations on the Transatlantic Trade Investment Partnership are ongoing between the EU and US. Is it likely to hinder the development and approval of new medicines and the research that underpins them, because you have the two regulatory systems of the EU and US?

Dr Barry: The EMA as the European medicines regulator is part of the tripartite International Conference on Harmonisation, which includes regulators from the US and Japan for medicinal products. It means that common standards are required if you want to develop medicinal products and supply them to all those territories. Those procedures are in place—standards for good manufacturing practice and clinical trials. As one of the major players, the EMA is very important and adds weight when taking part in TTIP and those types of thing.

Q54 Chris Green: It is a strong voice in the TTIP negotiations.

Dr Barry: Most definitely.

Steve Bates: There are a couple of other areas where it may be impactful, but I think it is too early at this stage to give a specific view until we see what proposals come out. One area, on which you have touched, is repeated re-examination, particularly of manufacturing plants, by different inspectors from different countries. If they were able to share some of the data rather than collecting their own all the time, it could lead to a reduction in the cost burden of oversight and regulation, particularly of manufacturing plants. The second one, which we have seen in other trade deals, is patents. The role of patenting has been on the table during deals between Asia and the US. That would be very sensitive for the biotech community in the UK. We have seen a significant departure in the US in recent judgments in regard to their interpretation of what is patentable. I would mark the Committee's card to think carefully about the interpretation of what is patentable and, therefore, able to be innovated and exploited in a commercial sense. If there was to be a deal between the EU and the US, we would want to watch that carefully.

Q55 Chris Green: One of the concerns people raise in the constituency about TTIP is that perhaps the slightly more aggressive corporations might use it as an opportunity to exploit what we currently do in the EU. If there is one set of rules in the EU, agreed perhaps through TTIP, but many different interpretations of those rules, could TTIP be a mechanism to argue from one country to the next that these are the same rules but they are applying them differently? Therefore, one particular nation's interpretation would be the one favoured by corporations, and pressure could be brought to standardise in the way that country interprets, as opposed to any other way. We have heard that differences in interpretation could perhaps lead to legal challenges when there is one set of rules governing a particular area.

Paul Browning: There is a collaborative effort called the International Medical Device Regulators Forum, which used to be the Global Harmonisation Task Force. They are looking to help with global harmonisation. One scheme that has just completed beta-testing this month is a single audit programme, which is being pushed by Brazil and Canada. They are looking to have a single audit that meets the requirements of all their member states. It helps to drive down costs but it also standardises the level of scrutiny

and review across all the members of the IMDRF. That will definitely go a long way to supporting organisations of all sizes.

Chris Green: We need quite reactive and responsive legislators and amendments to rules and interpretations, but, as we heard earlier, if you are trying to apply that throughout the EU's 28 nation states it can be quite a slow process. Perhaps work has to be done looking at the flexibility and responsiveness of the EU.

Q56 Graham Stringer: I do not know the answer to this question, which is always a dangerous thing. Does the EMA regulate medicines for more countries than just the European Union?

Chair: No one knows the answer to your question.

Graham Stringer: Do they authorise medicines for more than the 28 member countries of the EU?

Dr Barry: They authorise medicines for distribution in the 28 member states.

Q57 Graham Stringer: But not for countries outside.

Dr Barry: No.

Q58 Graham Stringer: That's a clear answer. Can you identify any examples where a common system of regulation across the EU adds to business costs?

Dr Barry: In the short term, it may be that a centralised marketing authorisation would add to cost. The cost of a centralised marketing authorisation would be, say, £200,000, whereas a national one would be about £70,000 or £80,000, but you could argue that that is more cost-effective because it will give you access to 28 member states, so perhaps in the short term yes, but in the longer term no.

Q59 Graham Stringer: Is there an opportunity lost because you do not have competing regulatory systems? We heard in the previous session about the inefficiencies of some of the current regulatory processes. If you had competing regulatory processes that did these things quicker and more effectively, is there a cost associated with that?

Steve Bates: I suppose it is the opportunity cost of the market that you would be able to access as a result, if you were able to have a single regulator, as perhaps we did many years ago, for some of the smaller markets. The question is whether it would be worth the cost of the regulation for access to the market. To put it in context, the UK is 3% of the global market for pharmaceuticals, and the EU, as at present constituted, is about 27%. If you can get access to 27% of the global market for £200,000, versus 3% for £70,000 to £80,000, which route would you take as a business decision?

Q60 Graham Stringer: One of the problems the Committee came across in a previous inquiry, on medical implants, was that where there was common European legislation that

was fine, but the authorisation of that regulation in 28 different countries led to very different products being authorised. Therefore, if you had a dodgy product and you wanted it authorised, you went to Bulgaria rather than Germany or the United Kingdom. Is that a problem? Is that the other side of having a common regulatory system?

Darren Budd: Yes. Take REACH as an example. First, it is very complex. The other side of REACH is chemicals regulation. The reason REACH was put in place was the growing need for chemicals regulation. If you did not have it, you would still need to have the same regulation, but in 28 different states, and maybe slight variances on it. An example is the nanomaterials directive. It should be covered under REACH, but in 2018 there is a 1-tonne threshold coming in under REACH. Typically, less than 1 tonne of nanomaterials is produced and, therefore, it is not considered to fall under the regulation. We are working through DEFRA and HSE to put pressure on the Commission to make sure they fit it into the annexes.

A restraint or fallback on that has happened subsequently. We currently have regulation in France, Belgium and Denmark, and some is coming in in Sweden, which introduces registration schemes for nanomaterial. All this is an additional cost to companies, and is particularly stifling for innovation for those companies, when it could be covered under the REACH annexes. This is an example where we need to work very closely together. All member states should put pressure on Brussels. We are working with ECHA and the Commission to make sure that nanomaterials are covered in the annexes and that, in terms of the innovation principle, we have a risk-based approach, but also better and sensible regulation, and that we do not increase costs for both large and small companies.

Q61 Jim Dowd: The previous panel, in particular Professor Ferry, covered this briefly. I want to look at the precautionary principle and your view of it. My interpretation of it is that you do not do anything until you know everything, so essentially it is a recipe for paralysis. Could I have your views on how it is misused and misinterpreted and on its effect?

Paul Browning: For medical devices, the precautionary approach, famously used by the US, was not developed for saleable products that already had to demonstrate a level of efficacy. It was originally an environmental measure to help deal with chemicals going into the environment. As you suggested, the endgame for that principle is a zero-risk approach. If we are dealing with medicines and medical devices that are being used with various people and different clinical conditions, you will never reach that zero-risk approach, so a huge burden is placed on manufacturers to try to reach a goal that statistically is not achievable.

Q62 Jim Dowd: Are there any other industries or activities comparable with medicine that would be under greater pressure from a very narrow interpretation of the principle, if indeed it is a principle?

Steve Bates: If I may talk wearing my Europabio hat slightly, most BIA member companies are involved in the development of medicines, but we have a few that are involved in agriculture. A good example of misuse of the principle is the field of genetically modified organisms. As you know well, the debate on that has not been rooted fully in scientific evidence, and member states' political views have unduly shaped policy

development over a number of years. The agreed regime should mean that GM crops are cleared for planting if they pass the required safety assessment. That has not happened in practice, even if the crop has received a favourable assessment from the European Food Safety Authority. A significant number of member states still object to the EU approvals due to their political views on GM. Having said that, it is not something seen only at European level. Within the UK, Scotland, Wales and Northern Ireland have signalled their wish to ban the growth of GM crops under the agreement reached in 2014. I think that is a good example of where the precautionary principle has had significant impact.

Q63 Jim Dowd: But in the end, even the Commission gave up trying to make it an EU-wide competency and handed it back as a delegated power, because of those complexities.

Steve Bates: And we have seen the impact that has had in the UK.

Q64 Carol Monaghan: This is probably directed to Mr Bates, but others should feel free to jump in. Are there opportunities for business associations, both UK and EU associations, constructively to influence EU life science policies?

Steve Bates: I hope so. That is what we have been deciding as an association to do. The fact that companies pay us fees to help them do that shows something about our success in this area. We have a track record. Some of the new things we have done with the European Medicines Agency have enabled us to do that. I do not think we do it perfectly; it is not a process where you ever get everything you want, but the UK has been a strong voice, and we are lucky to be able to partner with organisations like the catapult, Wellcome and the UK Government, who have been a strong voice, under all political colours, in the world of science at EU level through the scientific advisers, who have also played a significant role.

Q65 Carol Monaghan: In terms of European life science businesses, surely some of their concerns would be shared by UK life science businesses. Can they work together with a unified voice across Europe?

Steve Bates: We try to, certainly through EFPA—the European Federation of Pharmaceutical Associations—and Europabio. Interestingly, when I meet my colleagues in Switzerland or Norway, they are envious of our ability to have a responsive Government and a science-based community sitting at the table to make a real difference and set the agenda on some things we have talked about, such as antimicrobial resistance and the New Drugs for Bad Bugs initiative under Horizon 2020, which the UK has been able to influence. With UK businesses and other partners in Europe, we have been able to use that to tackle a global challenge. If we can do it for antimicrobial resistance, it would be good to be able to do it for other things like dementia that I know are a significant priority for the Government.

Dr Barry: The catapult is part of BIA, but it is also a member of the Alliance for Regenerative Medicine, which is an international body for advanced therapies or regenerative medicines. We have met with the EMA and the European Commission a number of times, and they have asked our opinion about developments and hold-ups. Trade associations and industry bodies have a voice, and, in my experience they are heard.

Darren Budd: I broadly reiterate that. I am on the board of two trade associations in the UK, and we are also part of a European trade association. We talk across countries with a European voice. It is very important that we have that European voice, so that we can put the UK perspective and have an understanding of what is happening in Europe. Having those trade associations and interaction in Europe, and keeping it going forward, is very important.

Q66 Carol Monaghan: Mr Budd, could I ask you a bit more about the UK's voice? To what extent does the UK Government represent industry perspectives at EU level?

Darren Budd: I chair the nanotechnology issue committee of the Chemical Industries Association. We have very strong discussions with the HSE, DEFRA and BIS to make sure as a UK body and UK manufacturers of nanomaterials that the Government represent the UK in Brussels. We have been very successful in lobbying to make sure we get the right regulation into the REACH annexes, and we are working our way through that. The UK Government have been very fundamental in pushing forward, and making sure the voice is heard on nanomaterials.

Q67 Carol Monaghan: Do you see the same happening with other EU member states?

Darren Budd: Yes. Through representation on the Chemical Industries Association and their representatives around Europe, and also through CEFIC, we try to come up with one voice in Europe. It is then much easier to have discussion and dialogue and make sure we have an understanding of where we want to position ourselves.

Q68 Chair: The previous panel responded to my question about the balance between the burden of regulation and enabling innovation with the comment that, by and large, they felt the EU had the balance of regulation more or less right and it was not too burdensome, but the challenge at the moment was making sure the regulation legislation was responsive enough to keep up with the accelerating pace of innovation. We have heard a couple of examples related to REACH about the cost for industry of the new medical devices regulation and the possible impact on the SME sector. What is your response? Do you think that regulation for the life sciences sector is too burdensome and there needs to be a renewed focus on reducing the burden, or, like the previous panel, do you think it is just about right and we need to focus on speeding up the process so that it is more responsive?

Darren Budd: From our perspective, it is about right. It is about the constant vision and making sure we do not go too far, and having the best regulation we can to allow innovation to be fostered. You have to have a balance between regulation and innovation; the two go hand in hand, so it is about keeping that balance right. The UK has a really strong voice in Europe; it is very well respected. Working through the trade associations, or the different entities here, as we heard from the previous panel, it is about having that voice and making sure that we keep the pressure on and keep the regulation at a level where we foster innovation.

Dr Barry: I would agree. The balance is more or less right. It is about making sure it is brought in effectively and efficiently. That is what we have to focus on. The field of

advanced therapies is developing so quickly that regulators have to work hard to keep up with scientific advances. They are working hard. The UK has a fairly strong voice. The MHRA is a well-respected regulator in advanced therapies; it is one of the key ones. I would say we are doing it. I believe it is there.

Paul Browning: There is a very difficult balance between innovation and regulation. I think that at the moment it is just about right. The proposed new regulation will certainly make it a lot easier for start-ups to enter the medical device sector. Where it falls down is when there are sudden changes and the bar is suddenly raised. That makes it very difficult for SMEs to manage and compete. We are seeing that most openly at the moment with the changes I mentioned earlier. They have increased the time to market from what was originally three months to over a year, and now a year and a half before a compliant product can reach the European market. It definitely has an impact, but when the new regulation is implemented and everyone is allowed to follow it, I believe it will be the right balance.

Steve Bates: The trade-off is between certainty of the current regulation, which may not be perfect, and the potential improvement, or disimprovement, as the result of a process that is likely to be long and may lead to an uncertain outcome. For me, there is a question mark about certainty versus potential. At the moment, on balance we think that EU regulation and membership brings net benefit to the life science sector. An area of regulation that could be considered is whether we can generate the finances needed to support innovation. Financial regulation is a different area and not really the focus of this Committee, but for us getting the money to support innovative businesses to get going is as important as the regulation itself. That is a very important area for the development of the UK economy in this space.

Chair: Thank you very much. I thank all of you for the time you have taken to give us evidence today. It has been very helpful to our inquiry. We may have a few questions that we want to follow up. I hope you will be kind to us and write back in time for us to include it in our report, and that we will be able to contribute to making all your lives easier in dealing with the legislative process.

Witnesses*:* **Professor Roger Lemon**, representing the Academy of Medical Sciences, and **Sir John Skehel,** Vice-President and Biological Secretary, the Royal Society, gave evidence.

Q69 Chair: I welcome both of you to the panel and thank you for coming to this session today. As I have mentioned, this is our first evidence session on EU regulation and UK life sciences, with the focus on innovation. It is very kind of you to take the time to give us evidence today. I saw both of you sitting in the audience, so you will have heard the answer from the BioIndustry Association to my final question; they believe that EU membership brings net benefit to the UK life sciences sector. Professor Lemon, do you agree, and, if so, why?

Professor Lemon: I should tell the Committee that my main expertise is in the use of animals in medicine and science, and the main impact on our work has been the directive on the protection of animals, which has been in place for three years. Overall, the benefit

of that is emerging, because three years is quite a short time for all the member states to come up to speed with the requirements of the directive in terms of their national legislation. I think most biomedical scientists in the UK welcome the directive because it allows them to collaborate more widely and evenly in a harmonised fashion with research groups around the European Union.

Q70 Chair: Does the Academy of Medical Sciences receive EU funding?

Professor Lemon: I would have to ask our policy officer about that. *[Interruption.]* We do not.

Q71 Chair: Sir John, would you answer my opening question? Do you believe, as the BioIndustry Association says, that EU membership brings net benefit to the UK life sciences sector and, if so, why?

Sir John Skehel: As Roger says, the standardisation in the animal sector has been pretty important. The idea that you can move things easily between countries is welcomed by most people. One of the things that happens in science is that international collaborations are welcomed; in that way you identify the best collaborator to work with. People will welcome anything you do to make that more efficient and facilitate it. That is the case with animal regulation.

Although I do not know about it personally, I agree that the people in charge of standardising and controlling medicines—for example, vaccines—welcome the involvement of other countries in Europe. Many times, for example, when you are changing a vaccine, like an influenza vaccine, you can do a limited number of safety tests on humans. If all countries in the organisation are doing the same, it adds value to the test that each is doing. I think that for them the idea of having a single boundary across 28 states is generally welcomed.

Q72 Chair: Does the Royal Society receive any EU funding?

Sir John Skehel: No.

Q73 Chair: Our first witnesses included the Shelford Group. In their written evidence they pointed out, rather obviously, that EU regulations are put in place with the intent to protect patients or workers from harm, but they also pointed out that there was a very conservative and risk-averse culture within that legislative process, which is inimical to innovation. Has this been the experience in the academic and research community, Professor Lemon?

Professor Lemon: The most obvious example is probably in the clinical trials directive. That is very important, because lots of the diseases and disorders you would want to tackle require large numbers of consenting patients to be included, and very often the patient base within the UK will not be large enough to allow you to do a big enough trial. Having a single overarching system that controls the selection and recruitment of patients to a multi-centre trial is much more helpful than having to negotiate that separately in each member state.

There was a great deal of concern about the first version of the European clinical trials directive when it first came out, but it is a good example of how scientists and scientific organisations can go into negotiations to improve things that clearly are not working. For example, the academy was very heavily involved in trying to remove from the existing directive some of the biggest, most time-costly obstacles to good trials. It is not so much that the system is always good or always bad, but that the opportunity for us to be involved in changing the existing rules from a perspective that benefits our science and medicine is not one we would want to lose. We have taken a leading role in seeing what was wrong, talking to people in the Commission and getting a better directive the second time around, if you like.

Q74 Chair: A particular point needing improvement that was identified in the first session was better science advice in the European Parliament, and observing how well the European Commission's scientific advice mechanism operates. It got going only in January. How do you observe that process, and what improvements do you think could be coming?

Sir John Skehel: They probably told you that the system for advice had changed recently. It remains to be seen to some extent, but it is not clear to me yet—it may be clear to other people—how the different parts of the European Union get their scientific advice. The set-up that has just been put in place is for the Commission. How much filters to the Parliament I do not know. I do not know how much filters to the Council. Presumably, the Council is advised by local experts in the individual countries. We certainly have contact with UK Members of the European Parliament, but as a body I do not quite know how that will work. Presumably it will, but I do not think it has been spelled out yet.

Professor Lemon: My experience with the animals directive was that the initial directive that came out in 2010 was overregulation. Some very restrictive practices would have been brought in, in particular blocking the basic, fundamental science that often leads to long-term clinical benefit. In that case, it was interesting that scientific organisations, individual scientists and individual MEPs engaged in the process of revision of the directive before it went to the EU Parliament. That was a very interesting process. As scientists, certainly from the point of view of the Academy of Medical Sciences, we now feel in a better position to know how to channel evidence and facts into that process than we did, say, four or five years ago. There are good instances when there are clearly collections of MEPs who want to have the evidence and the facts; they do not want just opinion the whole time.

Sir John Skehel: The whole business of scientific advice for policy makers is a very important thing for us. We are looking very closely at how this new system of advice will work. We certainly contribute to that, because the experts and the different academies in Europe who need to construct the advice will come from places like the UK and the other countries.

Q75 Chair: In essence, the scientific advice needs to be at the key decision-making points and as early as possible in the process to pre-empt the problems.

Sir John Skehel: Yes, and to be proactive as much as possible.

Q76 Jim Dowd: What, if any, are the key benefits of harmonised EU regulation? If there are some, have any of them come at too high a price?

Sir John Skehel: We have covered a bit of that already. I am most familiar with the animal regulations. The medicine regulations are welcomed currently by the UK people involved in these things. Roger is certainly correct that the initial directive needed modifying. They welcomed advice, so they got advice and fixed it. Generally, from all points of view in the use of animals in research, it has been welcomed by ethical committees and by users.

Professor Lemon: You can point to a couple of areas. One is research funding. Research funders are particularly concerned about the use of animals in biomedical research, and so they should be. It makes it much more transparent if all the countries in the EU are signed up to the same set of rules that protect the animals that are going to be used in those experiments. That is important, because organisations like the European Research Council are increasingly funding research that is carried on in more than one EU state. That would be virtually impossible if we did not have harmonised regulations for animal research.

Another important area that we will see develop is training. My concern is that ultimately what happens to an animal in a laboratory depends on the person looking after it. No matter how much legislation and how many rules you introduce, at the end of the day what really matters is the quality of the training of the person who has responsibility for looking after the animals. Training and making sure that people continue to be trained and compliant with the regulations is a key part of the European directive. That is going to be important because, with the free movement of scientists and scientific personnel around the EU, you want to know that people have been adequately trained and that they continue to be compliant with the regulations.

Q77 Jim Dowd: In the areas with which you are both particularly familiar do you think that, if it was not an EU-wide system, UK national regulations would be very much different?

Sir John Skehel: I do not think they would, at least for animals used for research. There are some differences. One of the things I have been involved with is the regulations already established by the UK. They were more or less carried through into European regulations. It is a very important function for all countries, especially the UK, to have the possibility of influencing how things are done in collaborating countries, eventually on a global basis, not just a European one, because other countries in the world look to the EU as well as to us as to how things are done.

Q78 Jim Dowd: We have already established the imperative to have the best possible scientific advice informing the legislative process, but is there any other way that you think it could be made more streamlined and responsive?

Sir John Skehel: The EU regulations? I understand that in the clinical trials regulation you heard about the portal is being streamlined at the moment—how you feed in applications and so on. That certainly has to be done. It was identified, and it is going on right now. In addition, as I understand it, to allow academic clinical research to go on more easily some

changes will be required for the standards upon which the regulations will be based. As I understand it—again, I am not involved in it—the basis for the regulations at the moment was drawn up by pharmaceutical companies, as we heard in previous questions, to facilitate multinational trials. The sort of monitoring, inspection and requirements laid down for those are quite different from those normally laid down for academic clinical research. To get that straight is one of the concerns at the moment of academic clinical researchers; otherwise, it will be extremely costly and time-consuming.

Professor Lemon: In these directives, a key part has always been the collection of data and the opportunity to be able to review data. Many of the rules were drawn up on the idea of what might happen rather than what really does happen. In terms of the animals directive, we have had one publication of stats across the whole of the EU. By the time we have three or four years of those collections we will have a much better picture of what is going on. That will paint a picture that will allow regulators to move much faster than they do at the moment. They tend to be very risk-averse, because they are always trying to make prospective guesses as to what may or may not happen. The same will be true of the clinical trials directive. The more experience you accumulate in terms of safety, ethics and so forth, the quicker you can move to testing.

Q79 Graham Stringer: You heard Jim's questions to the previous panel about the precautionary principle. Do you believe that approach is inhibiting good scientific research and technological development within the EU?

Sir John Skehel: I think you got a reply about the genetic manipulation of plants, and that is absolutely right. It seems to me that generally the precautionary principle looks at risk; it does not look at the risk of missing out on benefits. That would be an important thing. If you are to have a precautionary principle, look at both sides of the coin. The effect that the EU regulations, which I suppose come from individual countries, have had in blocking genetic manipulation is certain. You can see it from the amount of investment in that area of industry in Europe by comparison with the United States and Canada where it is booming currently. There are examples, and that is one of them.

Professor Lemon: I certainly echo that from the academy's point of view. The area with which I am most familiar is the animal protection directive. We were in the happy position that you can achieve the joint aims of good science and optimal welfare. There is nothing in the precautionary principle that prevents you from carrying on very good science with animals that are well looked after. Obviously, in the particular area of GM science, there is a much more complicated effect.

Q80 Graham Stringer: That was going to be my next question. We have generally, with some exceptions, had a positive view from the three panels about EU regulation and the impact on benefits to science. Is there something different about life science compared with, say, agro-industry, where most of the big agricultural companies have moved out of Europe because of the regulation, particularly on GM but also in other areas? Is there something particular about life sciences that has led to those more positive answers?

Sir John Skehel: GM is life sciences of course, in a broader sense.

Q81 Graham Stringer: Yes, but the agribusinesses have moved out because they cannot develop genetically modified crops very easily in Europe.

Sir John Skehel: It may well be that a political as well as perhaps a scientific consensus has been easier to obtain. The business of gene editing as a procedure for genetic manipulation has a lot of attention currently because of its speed and accuracy. The whole business of the use of that procedure has had international attention in summits in the United States between China and the UK and the US. There was consensus about the limit to which gene editing would be allowed in human cells. Maybe it would have been very good if the sort of consensus being established by those scientists could have been done for the genetic manipulation of plants. I suppose it got more involved in local politics than scientific considerations.

Professor Lemon: In this area, the academy took the lead. Sometimes a scientist can see the ethical problems coming. You see them in the distance, and as the science moves so fast you often have to accelerate your processes and think about what the consequences of the changes will be. For instance, in the area of humanisation of animal tissues, which is a key area of research, the academy published a report four years ago mapping out the scenarios of the ethics in this type of work. We want to see that work carried out in the UK and in Europe. To answer your question about the life sciences, the UK has always made a massive contribution in that area, and continues to do so. It is not a problem to attract world-leading scientists to do that sort of work in the UK. It is important for us that the regulation is proportionate and that techniques used in other countries can also be used here, with the appropriate ethical oversight. We are very anxious to maintain that area, and it is very important that the regulators understand that, for the future of the life sciences in the UK, they allow us at the very least to be competitive with scientific and commercial partners in other countries.

Q82 Graham Stringer: EU regulation has been based a lot on the precautionary principle. Do you think it is possible to influence it to move towards a more balanced risk-based assessment and, if so, how would one achieve that?

Sir John Skehel: We go back to genetic manipulation in plants. Different countries have taken a different approach from the EU. They look specifically at the procedure used to generate the new strain of plant. Instead of looking at the actual product itself, they look at the procedure used. Countries like Canada have adopted the opposite approach—looking at the specific products of the experiments rather than the procedure used to generate those products.

Q83 Graham Stringer: That was very much the view this Committee came to when we looked at it. What I am asking is how we influence the EU to come to a view that looks at that balance of evidence.

Sir John Skehel: There is a lot of debate about what sort of things could be done to change people's minds on this. As I understand the most recent considerations, the idea is to try to do both those things—look at both the product and the procedure—and avoid the

division that occurs when you look at one and not the other. How easy that is going to be I do not know, but it is certainly one of the things being suggested at the moment.

Professor Lemon: The question of how you collect the results of what is being done and what activity is ongoing also leads to that process. Even with our own national legislation, there is a system for collecting statistics. The opportunity will arise, as each year's statistics come in, to make an assessment of your prospective view of the risk and what actually happened. If the data show the number of times there are serious problems under the particular set of controls you are using, regulators have a duty to move to a less risk-averse approach to new licences and projects.

Sir John Skehel: That is absolutely right. You might say that initially when genetic manipulation was new it was reasonable to take a strict risk-averse attitude to it, but it has been used around the world for quite a few years, so surely that has to be reconsidered.

Q84 Dr Mathias: You talked about the need for good and early science advice. Can I ask both of you for your opinion on the internal sources of scientific advice in EU institutions such as the European Parliament? What is your judgment of their quality?

Sir John Skehel: It is early days in the new system, but there is some confidence. The organisations that unite the academies of Europe have been invited to be central in the new procedure. The Royal Society is a member of two of those: one is the European Academies Science Advisory Council and the other is called ALLEA—All European Academies. They are horrible acronyms. They will call upon their membership to give advice, so we are now more content that we will be asked to recommend experts who really know about these things. As to where that advice goes once it is given within the EU, I personally do not know. I do not know whether it is specifically for the Commission, as it is part of the Commission at the moment, or whether it will go to other elements of the European Union.

Q85 Dr Tania Mathias: Do you agree, Professor Lemon?

Professor Lemon: I do. There is no question but that the UK is at the forefront of providing that kind of evidence because of organisations like the Royal Society and the Academy of Medical Sciences. There is a huge amount of expertise there that is relatively freely available, and people want to come forward and tell the regulators what is happening and what their experience has been. If you look at the protection of animals directive, of the three or four major reports that came out in the few years before that directive was finally passed, three originated in the UK. There is a track record for people coming forward and providing an evidence-based approach to how these decisions should be made.

Sir John Skehel: I can give you an example of something I was involved in recently in an area called gain of function. Gain of function research became an issue of importance because some of the experiments were blocked in America, so internationally there was a lot of interest in it. EASAC, the European Academies Science Advisory Council, gathered together representatives from about eight countries in Europe over about four meetings in

Brussels, Hamburg and so on. We wrote a report that was accepted by DG SANTE in the Commission. It was a consensus report from scientists in a controversial area. It works. Scientists in the countries of Europe are quite prepared to get together and discuss thorny issues and then give advice to the Commission.

Q86 Dr Mathias: It is early days but very promising.

Sir John Skehel: Yes.

Q87 Dr Mathias: Is EASAC the same as the Commission's scientific advice mechanism?

Sir John Skehel: No, but EASAC is part of that. It is a separate organisation, but as part of the new scientific advice procedure, the joint academy organisations have been invited to take part in that, so that is the way it will go through.

Q88 Dr Mathias: Do you think that the scientific advice mechanism is working well?

Sir John Skehel: We do not know yet; it is too early. It has broadened the source of advice, and that can only be good.

Q89 Dr Mathias: Do you agree, Professor Lemon?

Professor Lemon: Yes. The animals directive came out in 2013. Like many of these directives, implementation across the whole of the EU has been at different rates. Some countries have not even implemented it and yet the review will begin next year, which is a slightly scary prospect. The evidence so far is that, because many of the articles in the directive were very carefully thought about before the final version went to the Parliament, there have not been any major reports that I have seen of important scientific developments being blocked. The only cases where that has happened are when countries have gone beyond their rights under the directive and tried to bring in rules to block particular types of research. That happened in Italy, for example, and they will, hopefully, be punished by the EU for trying to break the directive.

Q90 Dr Mathias: From what you have said, there are good UK advisers in these bodies, so we are well represented.

Professor Lemon: I think we are very well represented.

Q91 Chris Green: As we heard earlier, there are concerns about the creation of EU regulation and its being amended or changed substantially afterwards. In terms of the EU regulation we have now or that we develop in future, how can the EU be enabled to produce regulation flexible enough to accommodate emerging technologies?

Sir John Skehel: That was part of what we meant when we referred to proactive advice. Technology in these areas is moving extremely quickly.

Q92 Chris Green: One of the reasons behind the question is to see whether the EU policy-making infrastructure can be adapted from the current process-based approach to a more product-based approach—for example, in areas like GM.

Sir John Skehel: I think that has to be done. If it could be done through the scientific advice mechanisms that have now been put in place, it would be very useful. Somehow or other there has to be consensus about how it could be done on a scientific basis, and that might then be used, but it's a big might.

Q93 Chris Green: Is there greater scope for scientists to have more impact and more say in this?

Sir John Skehel: It probably needs an enormous amount of public education and communication. Certainly, a lot of people thought that was not done very well initially with genetically manipulated crops. Maybe it is still not so good, but people have certainly tried. Maybe they have to try a bit harder. If you could show that scientists in Europe could reach consensus on this issue, it would be pretty good publicity.

Professor Lemon: In both the clinical trials area and the animal research area, you have a very real risk that, unless you move with the times, a lot of this work will go to situations where patients are put at greater risk in countries that have less careful regulation, and animals will certainly be put at greater risk in those same countries. An important part of the message we are trying to put out is that, as long as we want to have responsible research with patients and animals, Europe is the best place to do it, and regulators should take that into account; otherwise, we will lose more of the research that is currently going on here. That is a very real risk: no question.

Q94 Chair: The tension between the need for certainty and stability and responsiveness is a theme that has run through today. One of the proposals that came up from one of the panels—I think it was the Shelford Group—was that there should be a life sciences horizon-scanning group that would propose areas where new regulation was needed, rather than just respond to requests for advice. Is that a sensible proposal? Is it needed, or is there something already providing that service within the system?

Sir John Skehel: I do not know whether there is, but, if so, certainly more is needed. One of the things that could bring it into focus currently is the whole business of gene editing. The reason for that is that, in the plant world, regulators at the moment cannot decide whether the use of gene editing is genetic manipulation or not. That being a very new technique—or a newly fashionable technique—may bring attention to the idea that you need to be ahead of the game with your regulations if you are to do it in a streamlined way. At the moment, people are still waiting for that deliberation.

Professor Lemon: There is definitely scope for that. One of the problems at the moment is that the received model for doing this sort of work is that you get a collection of very clever people together to write a report with recommendations, but much can then not happen between publication of the report and the appropriate authorities taking action. To give an example, there was a period of four years between the academy's report on the

humanisation of animal tissues and the publication by the Home Office in this country of the system of regulation they want to see used to control experiments in that area. Four years is a huge delay in an area of science that is moving very fast, and it is moving faster elsewhere in the world than in the UK. The development of those reports and ideas and trying to scope what is coming would be better done in collaboration with the people who finally have to take responsibility for rolling out the changes to regulations and legislation that are needed; otherwise, they are two isolated processes that are not terribly well linked.

Chair: Thank you very much for your time. It has been a very helpful opening session to our inquiry. I suspect that in what is quite a complex area we will have a few more questions for you. We may well write to you for clarification of different points. I hope you will be kind to us and respond in time for our report so that we can contribute to trying to make the legislative process a little more encouraging for innovation and life sciences in the UK and the EU. Thank you for your time.