HOUSE OF LORDS

Select Committee on Science and Technology

Corrected oral evidence: Ageing: science, technology and healthy living

Tuesday 10 March 2020

10.25 am

Watch the meeting

Members present: Lord Patel (The Chair); Lord Borwick; Lord Browne of Ladyton; Baroness Hilton of Eggardon; Lord Hollick; Lord Kakkar; Lord Mair; Baroness Penn; Viscount Ridley; Baroness Rock; Baroness Sheehan; Baroness Walmsley; Lord Winston; Baroness Young of Old Scone.

Evidence Session No. 19 Heard in Public Questions 170 - 180

Witnesses

Professor Fiona Watt, Executive Chair, Medical Research Council; Dr Alison Cave, Challenge Director, Data to Early Diagnosis and Precision Medicine Challenge, UKRI; Tamsin Berry, Director, Office for Life Sciences; Dr Louise Wood CBE, Director of Science, Research and Evidence, Department of Health and Social Care, and Co-lead of NIHR.

USE OF THE TRANSCRIPT

This is a corrected transcript of evidence taken in public and webcast on www.parliamentlive.tv.

Examination of witnesses

Professor Fiona Watt, Dr Alison Cave, Tamsin Berry and Dr Louise Wood.

Q170 **The Chair:** Good morning, and thank you for coming to help us with our inquiry today. Before we start, it would be very helpful if you could say who you are so that we get you on the record. If you want to make a few comments, feel free to do so, and then we will start the questions.

Dr Louise Wood: I am director of science, research and evidence at the Department of Health and Social Care. As part of that role I lead the National Institute for Health Research with Professor Chris Whitty. As you will hear later when we get to the questions, NIHR has a key role in supporting the translation of basic science, but we also help people to live well with ageing.

Tamsin Berry: I am the director at the Office for Life Sciences. The Office for Life Sciences is a joint unit between the Department of Health and the Department for Business, Energy and Industrial Strategy. We are responsible for implementing the life sciences industrial strategy, which as I am sure a lot of you know, we published in 2017. It was written by Sir John Bell on behalf of the life sciences sector. In it we articulated the need for more research into the underlying mechanisms of ageing. We recognise there is a huge need in this space and a lot of opportunity in a number of scientific areas of inquiry. We are working very closely with our colleagues in the SRE Directorate and the Department of Health and Social Care, and our colleagues in UKRI and the research councils, to look at what we can do in this space. Thank you for having me.

Professor Fiona Watt: I am executive chair of the Medical Research Council. I also run a research centre at King's College London which specialises in stem cells and regenerative medicine. The mission of the Medical Research Council is to improve human health through world-class research and we are now part of the umbrella organisation UK Research and Innovation, which, together with our partnerships with NIHR and the charitable sector, gives us a lot of opportunity to work in this space.

Dr Alison Cave: I am the Industrial Strategy Challenge Fund director for two challenges: data to early diagnosis and precision medicine, and accelerating detection of disease. These two challenges represent a significant government investment, and they coalesce under the vision of a digitally enabled learning healthcare system that can make best use of precision medicine approaches to detect disease earlier and more accurately, and to ensure that we treat it appropriately.

The two challenges take slightly different approaches to tackling the problem. The first, data to early diagnosis and precision medicine, is looking at how we can create a data ecosystem where we can take an integrated approach to combining multiple modalities to create new and improved ways of identifying disease and treatment pathways, and to understand how those treatments work in the real world in clinical practice.

The second challenge, accelerating the detection of disease, is creating a 5 million person cohort, which is unparalleled and world leading, to look at mechanisms for detecting, preventing or intervening earlier in a range of common diseases. The size and scale of that cohort will allow us to understand the factors that contribute to a range of late-onset conditions and evaluate at scale some of the interplay between genetic and environmental factors in our health and well-being.

Q171 **The Chair:** That is helpful, because that leads me to my first question to all of you on that subject.

How much are the Government investing in research into basic understanding of the biomedical processes of ageing? Secondly, are the Government investing in any research into the development of drugs to counter these biomedical processes, which end up causing diseases, particularly in older people?

Professor Fiona Watt: I am happy to kick off on that one. The issue, as I am sure you know, is that ageing is not a disease but a natural process.

The Chair: Tell me about it, yes.

Professor Fiona Watt: Ageing occurs, from a biological perspective, at many different levels. As you age, there could be changes in your DNA. Your cells may get old, senesce and die. Within the body, some of the cells, such as red blood cells, have a very short lifespan of a few weeks, whereas others, like the ones in the brain, are there for many, many years. When you ask how much, for example, the Medical Research Council spends on ageing, you would be asking me how much we spend on those different aspects as well as our core investments in ageing. Across UK Research and Innovation, other councils are very interested in funding ageing research, and I would highlight the BBSRC, which has had ageing as a priority theme for quite some time.

Dr Alison Cave: I would add a little on the two Industrial Strategy Challenge Fund challenges. Neither of them is focused specifically on ageing, but the data platforms they are creating will be a specific enabler, you could argue, for drug-repurposing approaches, because use of real-world data, as we call it, which is healthcare data generated through routine clinical encounters, has the potential to identify drugs that are indicated for other diseases but which may impact concomitant diseases.

Crucially, however, it is not necessarily about identifying new drugs but about enabling better, faster and more accurate diagnosis, combined with an understanding of how medicinal products work, to enable a better targeting of existing therapies, which is more the precision medicine approach.

Dr Louise Wood: NIHR invests a significant amount of funding in infrastructure to support translation of these basic science advances into new treatments, technologies and diagnostics. We are investing £816 million over five years in our biomedical research centres, which support translational research aimed at things that kill us, like cardiovascular disease, cancer, neurodegeneration; chronic illness like diabetes and

asthma, musculoskeletal conditions; as well as elements of the life course and nutrition and so on.

We also co-fund with the Medical Research Council the efficacy and mechanism evaluation programme, which provides responsive-mode funding to investigators, and includes the ability to apply for funding for the repurposing of medicines. We also provide infrastructure with full geographical coverage of England to support trials and other well-designed studies.

Last year, we had 162 studies, labelled as ageing per se, running through the Clinical Research Network. We fund a bespoke biomedical research centre in Newcastle that is focused on ageing. I know that Professor Avan Sayer talked to you here about the important work that it does translating basic science into understanding how we can better prevent and treat ageing syndromes like sarcopenia, frailty and multimorbidity. A lot of the focus of NIHR through the funders is on multimorbidities.

Tamsin Berry: Perhaps I could reiterate that it was a priority in the Government's life sciences industrial strategy, and it is great to see a lot of the infrastructure that we think we need being put into place, with the data, some of the early research, and more funding going into the translation of that research into new therapeutics.

We have done some research ourselves in OLS. We have also had a lot of stakeholders come to us to suggest other ways in which we could bring together research in this space to look at new therapies. In October 2019, we had a round table at No. 10, where experts from Dundee and Oxford came to talk about the innovative Therapeutics for Ageing consortium, which is a pre-competitive consortium looking at the new biomarkers and new possible targets for therapeutics. There is a lot going on and lots of potential in this space from our perspective.

Q172 **The Chair:** I have two brief questions to follow up and perhaps there could be brief answers. What is your reaction to the comment that as a country we do not invest enough in research into the processes of ageing, particularly healthy ageing, and, secondly, that we do not invest enough in research on developing drugs or technology that will prevent older people getting diseases, rather than investing in treating those diseases?

Professor Fiona Watt: The proportion of this country's GDP that is spent on research and development is low compared with other countries, so the short answer to your questions is that we should be investing more.

The Chair: You think the MRC should put more money, if it had it, into old-age research.

Professor Fiona Watt: Yes. There are a number of different initiatives that we have started and we would like to expand. Our partnership with NIHR on multimorbidity is just kicking off. We would like to expand that. We have a very exciting partnership with the charity Versus Arthritis looking at pain as a general issue, which is hugely problematical for older people. We are investing in some long-standing activities, such as our

Unit for Lifelong Health & Ageing at UCL, and are partners in the UK Prevention Research Partnership. All those things look like they are good investments, and we probably could do more.

The Chair: You commented that you are working with NIHR and others. Another comment we have heard in an earlier evidence session is that we need an institute, whether virtual or another, on ageing-related issues to co-ordinate activities that are piecemeal and unco-ordinated at the moment. Is that a good idea or a bad idea?

Professor Fiona Watt: I am looking at my notes, Chair, because we have a number of institutes with a focus on ageing. One that I particularly wanted to highlight is called the Centre for Integrated Research into Musculoskeletal Ageing (CIMA), which is a collaboration between the Universities of Liverpool, Sheffield and Manchester; another is the MRC Lifecourse Epidemiology Unit. I have already mentioned the health and ageing Unit at UCL.

Rather than creating another institute, we need to ensure that we are more joined up. The ways to do that are to encourage the end users to be involved in co-creation of schemes, and to ensure that we are moving expertise across sectors so that ageing is not just in individual buckets.

The Chair: What I gather from you is there is no need for a national institute.

Lord Winston: I have a quick question, if I may. Your point about the issue of wide areas of medical research is absolutely taken. I wonder whether you could expand a little. Often you will get a project grant application which has as part of its submission the possibility that it is relevant to the ageing process, although of course it is not the main thrust of that project grant. How much emphasis do you give for those sorts of aspects and how do you sift that out? Could you expand on that a little?

Professor Fiona Watt: This is what we call response-mode funding, when scientists apply to us directly and their applications are judged by a panel of experts. It is an extremely competitive process and the applications are judged on excellence, subject to peer review. Each of our funding panels has a number of highlighted areas that they want to emphasise, so that if two applications gain the same score and we only have enough money for one, the one that is in the strategically important area will be funded over the other one.

Lord Kakkar: On the point that has been made about data in some of the initiatives that you have discussed, are you content that you are able to capture longitudinal routine healthcare data in a meaningful way, both from hospitals and in particular from primary care, to inform the kinds of cohorts that you describe, and therefore exploit their true value?

Dr Alison Cave: It is a challenge. It is very hard to do it. We are working hard on it, particularly on the linkage between hospital data and primary care data which often contain with non-parsable PDFs and unstructured data. That is one of the challenges that Health Data Research UK is

looking hard at as part of a programme of work that is being funded under the data to early diagnosis challenge: thinking about what pillars we need to put in place to make the best use of our healthcare data.

There are three pillars there. One is the alliance, which is dealing with some of the things you are talking about, such as data governance and access to data, which is one of the challenges. Of course, absolutely key to these two challenges will be ensuring that we have really robust and secure data protection, so that volunteers and patients feel confident that their data is shared in a robust, secure and ethical manner. Through that alliance we are looking to build common purposes in relation to data linkage and common processes in relation to interoperability and ethical data sharing.

The second really important aspect is data discoverability. There are multiple datasets across the UK which people are not aware of and do not even know exist. It sounds an almost simple solution, but it is really important that we start to understand where the datasets are in order to link them better. It is definitely a challenge.

Lord Kakkar: On the point about it being a challenge, if, for instance, those charged with trying to bring this all together were unsuccessful, what ultimately would the impact of not being able to access longitudinal data be on healthcare, health outcomes and so on, and on the value of the initiatives that you have described?

Dr Alison Cave: Certainly for the accelerating detection of disease cohort, where we are looking to build this very large cohort of individuals, who will consent not only to sharing their data but to recontact of their data, if we were not able to link to those medical records it would undoubtedly have a huge impact on the success of that challenge. We would have to find other ways to link and store that data. That would be economically unfavourable and very expensive, and very challenging from a data security aspect. The full success of the challenge is dependent on that linkage of healthcare data.

Dr Louise Wood: This is a massive area of focus for us. There is huge potential in the use of these data for health outcomes as well as for improving the efficiency of research. We need to recognise that we have great examples of proof of concept in the UK. We have the UK Biobank. We have the Clinical Practice Research Datalink, which links data from primary care and Hospital Episode Statistics, and is used internationally for studies. One in 30 people in the UK is a member of a longitudinal cohort supported by the research councils. So we know that where there are proper ethical approval processes in place, members of the public are keen to contribute to research through these methods.

Tamsin Berry: OLS and colleagues at NHSX and NHSD have been looking specifically at this challenge of access to GP-coded data. Some of the cohorts that we already have which are going really well, such as UK Biobank, can access Hospital Episode Statistics data, and they have partial access to the GP-coded data, all on a consensual basis. They are working now to see if they can link to the rest of the GP-coded data for the other bit of the cohort that they cannot currently make that link for.

We are working with NHSX to see what processes need to be put in place to enable us to access GP-coded data, which, as you pointed out, will be fundamental and critical to the success of the accelerating detection of disease cohort. It is a big priority and an area of ongoing policy work.

The Chair: I was about to say that I think Lord Kakkar, as chair of Biobank, will take your comments on board.

Q173 **Viscount Ridley:** My question is about the Ageing Society Grand Challenge specifically and what biomedical research it is supporting. It would be wonderful to have an example of biomedical research that has started because of that challenge that would not have happened otherwise.

Professor Fiona Watt: I will start on this, but I will not give you the full answer.

Within UKRI, we have the Industrial Strategy Challenge Fund (ISCF), under which there are a number of challenges, one of which you heard about last week that is on healthy ageing and is looking specifically at innovation in social care. The ISCF is a distinct funding mechanism, and Alison's challenges come under it.

As for the Ageing Society Grand Challenge for the country as a whole, we would pick out the examples we have already given: funding for life course studies, and funding for the UK Biobank—it is extraordinary how information is coming out of Biobank about the genetic contribution to deafness, for example, or correlating use of hearing aids with delayed cognitive decline. In advance of the Government identifying ageing as a Grand Challenge, a lot of work was already being funded across the sector. Within UKRI, as we look at our collective priorities for the future, ageing is definitely one of the things that we consider very important.

Tamsin Berry: In that context, we have been working with the MRC and stakeholders in OLS and thinking about future priorities for how we deliver on the strategy. Expanding areas of inquiry in the existing ISCF, or whatever the new framework for Ministers will be in the future, would be one thing that we would want to explore.

Viscount Ridley: We have heard a lot about how this fund is supporting technology and how various morbidities and diseases are being looked at. We have also heard the view expressed in this inquiry that the biomedical process that lies behind ageing itself in a perfectly normal fashion is falling through the cracks here and is not getting support under these sorts of challenges.

Tamsin Berry: I certainly have stakeholders who would agree with that comment. It is great that we are putting investment into infrastructure that will support research, and other mechanisms and investments, and things like the accelerated access collaborative, the test beds, support for medtech to design and develop new technologies, but I think a number of our stakeholders would agree with your comment.

The Chair: Which of the research initiatives is likely to contribute towards or deliver the Government's Healthy Ageing Grand Challenge?

Professor Fiona Watt: As a basic scientist, I can answer first. I was truly surprised that the length of time people live in good health in this country is so low. It is below the age that most people would retire. Since many of us in the room have already exceeded the average healthy lifespan, we know that it is not impossible to increase it in the UK.

We have to take this really seriously. It has to be a matter that is widely disseminated and discussed with the public, and we have to recognise that the interventions that we need to make now in people who are in late middle age, for example, will be quite different from the interventions that we might be looking for in younger people. It is a wake-up call, and we really need to focus on it, because it is achievable.

The Chair: So the answer is not yet, but hopefully in future.

Professor Fiona Watt: I think that achieving this challenge is within our grasp.

Viscount Ridley: May I come back on that very last point? You said you think it is achievable, by which presumably you mean shrinking the gap between healthspan and lifespan. An awful lot of people we have seen have said they do not think it is achievable and that we are going in the wrong direction on that. It is quite interesting to hear your optimism. Would you like to expand on that briefly?

Professor Fiona Watt: I have to declare that I am a scientist. I love biomedical research and am always optimistic, but I know that for fundamental biomedical research you have to play a very long game. We know now that monoclonal antibodies are the bedrock of some of the most exciting new cancer treatments, but the fundamental discoveries were made in the late 1970s or the early 1980s. UK Biobank is another example where MRC and Wellcome invested many millions of pounds without any obvious return in the early days. Now, however, wherever we go in the world, people say, "We want to use UK Biobank data. How can we invest in it?"

We have to think about how we can intervene now, particularly in public health, to benefit our ageing population, but we also have to make investments that will pay off in the longer term.

Tamsin Berry: At our October round table, we heard from a number of experts who were optimistic. They shared your thoughts that we have some way to go before we see any progress, but they recognised opportunities such as changes in regulation for clinical trials. We have a very flexible regulator in the MHRA, we have a very strong public health agenda and we are collecting lots of data. There is no reason why we are not well positioned to do this research. We just need to go for it.

Q174 **Baroness Young of Old Scone:** Professor Watt said that part of the chain was to ensure there was plenty of investment in public health approaches, but that kind of confirms some of the things that other people have said to us, which is that there is a lot of investment and work going on into early detection of disease and dealing with the diseases of ageing rather than with the basic processes of ageing. Public

health approaches will be one part of the approach to the basic processes of ageing, but presumably there are also technological and pharmaceutical approaches, or am I mis-stating that?

Professor Fiona Watt: You are absolutely right.

Baroness Young of Old Scone: If you were asked for your views on the comparative balance of investment between all those, what would you say?

Professor Fiona Watt: I can tell you for a fact that the baseline budgets of the research councils have been pretty much flat for the last 10 years. The shoots of discovery that will pay off in 10 or 20 years have really not had the chance to flourish. As I said, we have to intervene at multiple points.

We also genuinely do not know what new discoveries will be most beneficial. Cancer, for example, is to some extent a disease of ageing, so it is important to understand how susceptibility to cancer changes, and how we can intervene better to make cancers that were previously fatal liveable with. There are also some very interesting situations in which infectious diseases that were fatal, such as HIV, are now chronic diseases, and we are now able to see in an ageing population the effects of long-term medication. We need to do the fundamental, underpinning mechanistic research, and we need to find markers and targets, but we definitely should not neglect the support that we can give through public health and social science now.

Dr Louise Wood: Part of the challenge the Committee has been grappling with is what we can really get our hands around to make an impact by 2035. We know, as Fiona has explained, that it takes time for basic science to pull through and make an impact. We need to focus on modifiable risk factors, which we know in England account for probably about 40% of ill-health across the population.

Public health research is an underfunded research area. A lot of the focus has been on trying to modify individual behaviours. There is a lot of recognition now that we need to focus on community-level interventions. That might be access to food outlets or to parks, et cetera, and population-level interventions such as fiscal and economic interventions that relate, for instance, to the pricing of alcohol and cigarettes, the impact of which we have evidence of.

The Chair: Is there a cross-government departmental strategy towards achieving the Grand Challenge or contributing to the Grand Challenge? Yes or no.

Dr Louise Wood: There is the prevention Green Paper, which provides a focus.

The Chair: That is one aspect, but you just mentioned several aspects, and others did too. Is there a co-ordinating cross-government strategy? No.

Q175 **Baroness Walmsley:** You are all very optimistic, but one of the most

trenchant pieces of evidence we have heard came from the head of a research group, who was not at all optimistic and who considered that one of the major barriers to the members of his group doing their research was the difficulty of access to this amazing amount of data that you have talked about. Indeed, he said that his researchers spent half their time identifying and gaining legal access to the data, and that they could do twice as much research if that was changed. What is your comment on that? I think members of the Committee will remember who I am referring to.

Dr Alison Cave: This goes back to what I was saying about facilitating access to these datasets, knowing where they exist, and understanding the characteristics of those datasets and whether they will answer the question at hand. It can take quite a long time to understand whether an available dataset can answer your question and whether it has the necessary characteristics. HDR UK is working hard through the alliance to get common mechanisms to understand how we might access the data, who one should contact about accessing the data, and whether we could have common governance of that data.

There is also the question of data discoverability. If I have a question about how many people are prescribed a certain drug in our population, which datasets do I need to go to address that problem? We very much hope that the gateway which HDR UK is establishing will facilitate access to those datasets. It is early days yet, but it is really growing. We currently have 414 datasets on the gateway and the number is growing daily.

Q176 **Lord Hollick:** May I come back to basic research? Which research projects in particular over the next 15 years will enable us to achieve the target that the Government have set?

Professor Fiona Watt: You are asking about basic research projects that will deliver the increase in healthspan in 15 years.

Lord Hollick: That is the challenge.

Professor Fiona Watt: One of the exciting things about research is that you can never predict what is going to pay off. The example I like to give is the strange bacterial immune defence system that was studied, and not very well funded, for many years, and turned out to be a mechanism for gene editing that could improve treatments in a number of age-associated diseases. If I were to give you one example now, it would be the reasonable possibility that macular degeneration—a disease that really decreases the quality of life of many old people—could be tractable in 15 years. That is just one example. I could go through my catalogue of projects that I am excited about.

Dr Alison Cave: It depends how you define healthy ageing. You could also define it as living with disease better or having better treatment of disease so that you can manage that disease and have a better quality of life. We are aware that elderly people are often prescribed multiple medications—polypharmacy. I have some figures from a study done by

Bruce Guthrie up in Scotland in 2015 that 24% of those aged 80 or over are receiving 10 or more medications.

The Chair: That is my hospital.

Dr Alison Cave: We know that that will increase the incidence of adverse drug reactions, from which there is still a high mortality rate, and a very high morbidity rate, and reduce the effectiveness of those medicines.

This goes back to how can we help people live better with disease and how can we target treatment better and understand disease processes better, so that the medications that people receive are effective. Some of the processes and access to hospital data, and primary healthcare data, will help us to understand better which treatments are effective across a lifespan.

Q177 **Lord Kakkar:** Some of this question has been covered, but I would like to bring some clarity to your views about the potential not only for fundamental research, which we have covered, but for research taking place in the biotech sector and the pharma sector, and how research initiatives there and research and development beyond that of the state are being brought to bear in a co-ordinated fashion to address, for instance, the five years of additional healthy life or the target of the Grand Challenge.

In particular, how much of what is going on at the moment that is now in the phase of clinical evaluation will be available and applicable in clinical practice to help us achieve that 2035 target? There has been a question already on what is happening in fundamental research, but what is happening in the translational and clinical research environment?

Is there proper co-ordination of the broad R&D effort that expands both what the state can do and what is happening beyond that in this country, to be brought to bear in some kind of action plan that will deliver this target?

Professor Fiona Watt: I can kick off on that one, and I am sure my colleagues will have a lot to add.

To give one very specific example, there is an MRC-industry asset-sharing initiative. We work with five different industrial partners, including AstraZeneca, GSK and Lilly. These companies provide researchers with access to their own deprioritised compounds. We see big enthusiasm among pharma companies for pre-competitive research—workers from companies working alongside our very best researchers, for example at the LMB in Cambridge and at the Francis Crick Institute.

At a number of different levels, there is a very good relationship with companies large and small. OLS has played a huge role in stimulating that, and the Industrial Strategy Challenge Fund has really facilitated that.

Tamsin Berry: Part of the life sciences industrial strategy has been to encourage more and more industry to come here and do research. We were really pleased that MSD announced a couple of years ago that a

discovery centre would be built up here. Amongst its focuses will be some of the ageing diseases and neurodegeneration, and it is collaborating with the Francis Crick Institute. Novo Nordisk is looking at type 2 diabetes and cardiometabolic diseases; it set up in Oxford in 2018.

I mentioned pre-competitive collaborations that are going on across the country with Oxford, Dundee and industry. Takeda, Shionogi and Bayer are joining in on that consortium to look at new biomarkers and new targets for the ageing process. There is activity that we are aware of and we want to do everything we can in OLS to support it.

Lord Kakkar: This activity is hugely important. Is there a view that you should have a co-ordinated role, bearing in mind that this is a Grand Challenge, and 2035 will soon be here, and it is vital for the health of our fellow citizens and for our economy to be able to address this particular question?

Is there a definite co-ordinating function that would allow you to go to these partners, state funded and beyond, and say, "This is an important issue for us. What are you doing? Are there other initiatives that we should be exploring? Could we continue to refresh our strategy on an annual basis, inform ourselves that we are achieving towards this target, and, if not, do other things potentially informed by a broader understanding of the development of science and R&D activity globally?"

Tamsin Berry: That is a really good question, and while we are very joined up and co-ordinated with colleagues and across areas of inquiry there is an opportunity for us to work more closely with the Grand Challenge structures and see how we can add some of this new potential into that.

Lord Kakkar: How is that going to be exploited? If one can see the opportunity, how might this Committee help in encouraging that process?

Professor Fiona Watt: We are sitting here essentially as funders, as administrators, and really what matters is the people who are doing the stuff on the ground. We can have committees and highlight problems, but the magic happens when you convene meetings of researchers who would not normally be in a room together. Certainly we can bring people across the sectors together and let them highlight what they see as the tractable areas where we could work.

Lord Kakkar: Is there an understanding across the science/biomedical research/R&D/industry sectors of everything you are doing across the various organisations and that even exposing that might stimulate a huge amount of interest and potential collaboration?

Professor Fiona Watt: The MRC has kicked off an external review of our core investments—we call them units and centres—with international and national assessors. We are essentially opening a chocolate box and asking what flavours are missing and what is out of date. I believe this review will be finished in the summer.

The review is also looking at opportunities to do meaningful collaborations, for example with the NIHR or the EPSRC. That is one way

we can do it. We can say, "This is what we have. What is core business and very important, and where are we missing things?" Of course, funding streams take on a life of their own, so taking a hard look at the portfolio is a good thing to do.

Dr Alison Cave: One thing that has really impressed me about the Industrial Strategy Challenge Fund—and I have been in post now six months—is how catalytic government funding can be at bringing a range of partners to the table. Take one example of the centres of excellence that we are funding in digital pathology and radiology. More than 100 partners are involved in that network, from small to medium-sized enterprises to big pharma and big diagnostic companies. They are bringing in kit and working with the academics to find new ways to digitise our slides and to utilise our radiological images. That sort of environment, where you can bring industry together with academia and SMEs, can be incredibly beneficial.

Lord Kakkar: Is that exposed to the broad base of NIHR-funded activities, programmes, individuals, et cetera?

Dr Louise Wood: I think it would be fair to say that if you were a novice coming to the UK asking, "Where do I go to see the totality of the activity in this space?", that does not exist. There are organisations that are aware of what we are all doing, and which can act as signposts, but there is no single visual entry point to that.

One of the really positive developments over recent time has been the way research funders have come together to think about how we can tackle multimorbidities. This has been put in the "too difficult" box for such a long time. We now have basic science funders, NIHR and medical research charities working together to look at how we can identify this. People have thought of this as a random collection of disorders rather than clusters that might be predicted on the basis of genetic or environmental factors. That goes back to the question of ageing processes. We are seeking as funders to understand how multimorbidities accrete over time and the common pathways that can be targeted for drug interventions.

Lord Kakkar: That is very reassuring on the funder side, but on the researcher side, as we have heard, that may be the other great opportunity to get researchers to come together and be stimulated by a comprehensive understanding of the totality of the national opportunity and research funding effort which each individual organisation has, and therefore stimulate what might be the next wave of innovative thinking and exciting new ideas and research questions. Who might take on that role to co-ordinate across all of you to expose that to the research community?

Dr Louise Wood: For multimorbidity, we have a single portal, which is available through the Academy of Medical Sciences' website. All funders are working together to provide details of their policies and funding opportunities through that site, but obviously that is not the full picture.

The Chair: That is not the same as co-ordinating activity, is it?

Dr Louise Wood: There is co-ordination of activity on multimorbidity, absolutely, but it is not the totality of the Ageing Society Grand Challenge.

Lord Hollick: Do any of you work closely with those who have overarching responsibility for achieving these challenges? Is there a forum where you can discuss progress and make suggestions about how co-ordination could be improved?

Dr Alison Cave: I work closely with George MacGinnis, the challenge director for the Industrial Strategy Challenge Fund. Obviously it is early days, but we are discussing how work that is funded through data to early diagnosis, and particularly accelerating disease, may impact on some of the things he is looking at through that challenge. That is one specific piece.

Professor Fiona Watt: For the Industrial Strategy Challenge Fund UKRI bucket, there is a steering committee, which the executive chairs of all the councils, and Innovate UK belong to. We are certainly monitoring the success of each of the challenges together. As you can imagine, there is a huge range of research and innovation. You can see interesting connections across the challenges. This bucket of money in ISCF is overseen by a steering group, so there is commonality across that.

Dr Louise Wood: Colleagues in the Department of Health and Social Care can commission evidence through the policy research units supported by NIHR. For instance, we have one on healthy ageing and frailty, which was developed specifically to support not the challenge per se but the agenda.

Q178 **Lord Borwick:** We have heard that it is difficult to conduct clinical trials on treatments for ageing, because multimorbid older people are often excluded from clinical trials. Is the regulatory environment supportive of biomedical research into ageing and translation of that research into clinical trials? Is the regulatory background helpful or obstructive to research?

Dr Louise Wood: I think it would be true to say that it is permissive. It is also true to say that multimorbid patients are often excluded from trials. We know that they are harder and more costly to recruit. They will drop out more or they may die throughout the process. There are no incentives in the system to recruit older people into commercial trials. There have been examples of regulatory interventions, for instance for studies in children, who historically have not had the opportunity to participate in research.

However, essentially, drug development is a global business, so unilateral action by the UK would not address this problem. It is not insuperable, though, and non-commercial funders, including NIHR, are absolutely supporting studies that involve older patients. We are, for instance, changing our application process to require investigators to justify more fully the populations that they are seeking to target in recruitment into trials.

Dr Alison Cave: I would add one further point. As Louise mentions, the lack of generalisability of a randomised control trial is well recognised. Having just come from the regulatory sector, I know that a regulator needs to be able to see that a medicine works. If you were to include a much broader population in that, it is likely that the trials would increase in size in order to be able to show a significant benefit across a range of different types of population.

There is a lot of thinking going on about how we could use real-world data, as it is called, real-world evidence, which, as I have touched on, is evidence from the electronic health record, to better understand how a drug or medicinal product works in the real world. One could envisage in the future that in a smaller-focused randomised control trial—a situation that is likely to get more common, as our treatments become more specialised and more specific and as we understand better sub-populations of a disease process. Following a medicine and understanding how it performs in the real world through observational studies is one route whereby we can understand better how those medicines performed in patients who were excluded from the clinical trial. That is hard, because we need clear evidence of effectiveness, which it is quite difficult to get from real-world data, but there is a lot of interest and a lot of work going on in that sector.

Dr Louise Wood: We are also looking at ways in which we can reach better into the environments in which elderly people are living and being treated: for example, infrastructure to support research in care homes. We need to bear in mind the demographics of the UK whereby elderly people retire to live in rural areas that are not near teaching hospitals and so on. We also need to think about our recruitment strategies for the elderly to ensure that people have the opportunity to participate in research.

Q179 **Baroness Young of Old Scone:** Focusing on pharmaceuticals that target the ageing process rather than any other area of research, there is a well-worn record in the UK of us being quite good at the basic research to establish an understanding of the potential of such pharmaceuticals, but then being pretty rubbish at taking these forward into innovation and development and bringing them to market. Most of that is now happening in the United States. Is there anything that we should be trying to do about that, or is that just axiomatic of pharmaceutical research these days?

Tamsin Berry: We struggle here in the UK with access to finance for growth capital. As you said, we are really good at doing some of the early-stage stuff. However, when we need more money to get that early-stage stuff to the point of commercialisation, a lot of the biotechs and pharmaceutical companies have to find capital elsewhere, quite often in the States, so they will move over to the States.

We in the OLS are looking at this. There was an announcement back in September about a £200 million scale-up fund through the British Business Bank, which is precisely to enable companies to stay here and continue to commercialise their products here in the UK.

Baroness Young of Old Scone: Do you think the charities could play a role, or are they too small-scale funders for those sorts of initiatives?

Tamsin Berry: They can definitely play a role. LifeArc is a charitable fund that invests in SMEs and biotechs and enables them to grow further. I am not so sure about research charities being able to give the quantum that is required, because, as you say, these late-stage growth rounds require quite a lot of money. It is a specific issue that we have in the UK that the US does not have. That confirms our hypothesis as to why they go over to the US.

Dr Louise Wood: There are a number of charities looking to make these sorts of investments. I think I am right in saying that cystic fibrosis and Parkinson's disease charities, for instance, have looked specifically at how they might invest in supporting these areas.

Baroness Young of Old Scone: These would be focused very much on disease rather than on senolytics, or whether metformin is the answer to a maiden's prayer. Is that a problem for us? Should we be in that field or should we just let the Yanks get on with it?

Tamsin Berry: It is part of the strategy. We have said that we do not want to lose companies. If we are developing the science here, we would very much like to keep them as part of our growth agenda. We are very keen to support any initiative that can increase access to finance here in the UK. The £200 million scale-up fund is the first step, but there are other initiatives that we are looking at, including how we can encourage more foreign direct investment by way of growth capital here in the UK, how we can support the development of talent here, better C-level executives to continue to grow the companies, and a range of other fiscal incentives with colleagues at the Treasury.

Baroness Sheehan: Growth capital is a challenge, is it not? We have in our notes that at the moment—and I wonder if any of you can comment on this—quite a lot of it comes from the European Investment Fund. That will no longer be the case. You mentioned the British Business Bank. To what extent is the British Business Bank equipped to step in to fill the gap in growth capital, because what a shame to lose the commercial benefit of the fantastic discoveries that our scientists here are capable of?

Tamsin Berry: It is a really good question and a real challenge. I am not sure I can answer the specifics of the question about the BBB, but we in the OLS are looking very keenly at this issue and how we ensure that there are growth funds for life sciences. I would say this, I suppose, being the director of the Office for Life Sciences, but life sciences is pretty unique in the scale and quantum and the stages that it needs financed.

Baroness Sheehan: It is that core funding that is so crucial for leveraging in other investors, is it not, and are we going to lost that?

Professor Fiona Watt: Anecdotally, at least in London, we are seeing more venture capitalists than we did five years ago, although definitely not on the same scale as in the US. I do not think I had met a venture capitalist five years ago, but they are here now and they are keen to

invest in life sciences. It would be great if we had a stronger investment community in Britain.

Viscount Ridley: Is cell senescence a very specific example of a strongly British discovery where most of the work is now being done in the United States? Cell senescence does seem to be a key element of understanding the ageing process. Professor Lynne Cox said to us, "Despite an early UK lead in cell senescence research, the bulk of exciting studies are now being carried out in the USA". Is this another example, like gene sequencing and other things, of the ones that got away?

Professor Fiona Watt: I think it is too early to say that it has got away. We do great fundamental ageing research. There are also other aspects of ageing, such as the way the chromatin gets changed in a cell which reflects ageing, so I would not be gloomy about that yet, but we should pay attention to it.

Lord Browne of Ladyton: In so far as you can answer this question, and you may already have answered it, the evidence we have heard is that there is no problem with us creating shiny objects. The magpies come and take them, but it tends to be US venture capitalist businesses that take them in their early years and buy them out. Venture capital operates in this country, and has done for decades, but it just has not operated in this sector in the way we would like.

As I understand the industrial challenge, it is designed to put us at the forefront of the industries of the 21st century, which clearly includes the life sciences. Is £200 million going to cut it? It does not seem to me that it will, compared to US venture capital businesses I know, where that figure is a rounding error in their annual accounts.

Tamsin Berry: This is a challenge that we have discussed at length. We are very grateful for the £200 million. We are going to work with colleagues at BBB to see how we can get the maximum leverage for that £200 million through British Patient Capital and its processes. Its normal process would be to put out a request for proposals, so we will ask the market to come to us with proposals to use some of our £200 million to leverage the maximum possible funds.

We would agree with you that £200 million is a modest figure for us to start with, but it is very much the start of our ambition. We will not stop work in this policy space. We are very keen to do everything we can with the life sciences industrial strategy to continue to make the UK as attractive a place as possible for life sciences so that we can attract the US-based fund managers over to the UK.

We are starting to see early signs, and inquiries are being made of us and, indeed, of the Department for International Trade, to set up growth funds, not at the venture stage but at the growth stage. Our hope is that our plan as we have laid it out in the strategy will continue to attract people here, but it is the beginning of our journey.

Dr Alison Cave: May I add one additional comment? It is about investment, but it is also about the ecosystem for a drug development process. As a regulator, and looking at what is changing in the regulatory

landscape, we are seeing many more innovative products coming through, and this will be the case with macular degeneration or other types of products for ageing. One of the things that is absolutely key to running a trial is to have that longitudinal follow-up of patients. If it is a gene therapy medicine, a patient will need to be followed up for 15 years after the initial treatment. Industry is having to set up multiple different product registries, as we call them, in which it can monitor a patient long term for 15 years. You can imagine that it is a real investment from a pharmaceutical company to have to do that, but it is required to do that in order to follow up on the safety and the benefit/risk of that medicine.

If we can develop an ecosystem in the UK which uses our electronic health records, and other types of longitudinal data sources, to enable companies to follow up patients for that length of time without additional investment, that will be a real lure into the UK, but we have to ensure those data sources ready and of sufficient quality and accessibility.

Q180 **Baroness Walmsley:** This morning we have focused on the first half of the Grand Challenge, which is the five extra years of healthy life. I would like to turn to the second half of the Grand Challenge, which is narrowing the gap between the health of the richest and the poorest in later years. Is biomedical research and development able to contribute to that part of the Grand Challenge, or could that biomedical research and development exacerbate those inequalities? Your comments please.

Professor Fiona Watt: As a firm believer in our National Health Service, I do not believe that it would exacerbate the inequalities. We have talked about investing in public health and social science. I heard something quite interesting when I was in Manchester recently about an investment through the UK Prevention Research Partnership. Researchers can take real data—coming from communities in Glasgow, Sheffield and Manchester—artificially squish it together, and run interventions through computer simulation to see how a common intervention would impact on these very different populations.

It may seem strange sitting at the computer and moving virtual people around, but it is really powerful, just as modelling is very important at the moment in trying to predict the spread of coronavirus. Modelling could benefit as many populations as you can bring in data from. It involves people on the front line of social care in the co-creation of a research project, which is very important.

Dr Louise Wood: If we take multimorbidity as an area of focus, we know there are socioeconomic gradients, in that people in the more deprived areas accrue multimorbidities much earlier in their lives, so by addressing those we ought to be able to reduce some of those inequalities.

With some of the public health interventions, it could go either way, depending on how they are implemented. We know that some people are better able to take on board the information and advice that is made available publicly. We know that we can target areas, particularly areas with large inequalities, with some of the fiscal and community interventions, which would help us to reduce some of those inequalities.

Baroness Walmsley: Is it not true that the rich know a good thing when they see it and the key is to ensure that whatever the benefit is gets to the people who really need it most?

Dr Louise Wood: Absolutely.

Professor Fiona Watt: We have not discussed the NHS Health Check. There you have the person where you want them, because they have had to go and see the GP. That is a very effective intervention, because it is personal, supportive. Those sorts of things are a really important part of the solution.

Dr Alison Cave: It is about having the evidence for those policy interventions to be confident that they are going to deliver the impact you need. Changing smoking habits is a particular example of where we have strong evidence. Certainly, the accelerating detection of disease cohort aims to be representative of the UK population. It is setting out numerous different recruitment routes. It will monitor the demographics of the population that it is recruiting, look over geographies, go across all devolved nations, and look at urban and rural, different socioeconomic classes and different ethnicities in order to try to capture some of that information better in a longitudinal cohort.

Baroness Walmsley: That sounds like a great objective. How long is it going to take?

Dr Alison Cave: The lifespan of that challenge is four years, but to recruit that large number of patients within that lifespan will be extremely challenging.

Tamsin Berry: We plan to start recruiting with quite a lot of vigour next January.

Dr Alison Cave: We are going to use a lot of innovative platforms and mechanisms to do that. We will use existing routes of recruitment such as the NHS Health Check, the blood donor routes, and other innovative processes. We are looking at whether we can link in with city deals to try to publicise the cohort and create almost a social media-type movement to motivate people to join the project.

The Chair: Thank you very much indeed to you all. It has been a most interesting session and we are grateful for your comments. Thank you very much indeed for coming today.