Academy of Medical Sciences response to R&D Roadmap consultation

August 2020

The Academy of Medical Sciences is the independent body in the UK representing the diversity of medical science. Our mission is to promote medical science and its translation into benefits for society. The Academy's elected Fellows are the UK's leading medical scientists from hospitals, academia, industry and the public service. We work with them to promote excellence, influence policy to improve health and wealth, nurture the next generation of medical researchers, link academia, industry and the NHS, seize international opportunities and encourage dialogue about the medical sciences.

- ***How can we best increase knowledge and understanding through research, including by achieving bigger breakthroughs?***

Increasing knowledge and understanding through research requires a careful balance of support for a broad range of research and innovation activities, from fundamental, discovery research, to applied translational research. The Roadmap acknowledges the need for this balance and makes a welcome commitment to increase investment in discovery research, whilst also committing to diversify the range of funding approaches, including through challenge-led initiatives.

The increased investment detailed in this roadmap presents enormous opportunities to transform research and innovation in the UK. New and diverse funding models such as moonshots, with built in risk-appetite, present attractive possibilities to conduct high-risk, high-reward research. Proposals to develop an ARPA-like funding body must draw on learnings from the health research response to COVID-19, which rapidly rose to the challenge of the pandemic through development of vaccine candidates and the RECOVERY trial which identified dexamethasone as the first effective treatment for patients suffering severe COVID-19.

However, it is critical that the establishment of these exciting opportunities is in complement to increased support for the UK's outstanding existing research base. The dual support model for research in Higher Education Institutions (HEIs) is the bedrock on which this strength is built and the ongoing sustainability of this model must be ensured. The UK's HEI sector is truly world-leading and yet COVID-19 has posed enormous challenges to the financial stability of research in these institutions, with major implications for the research workforce. Sustaining and supporting HEIs to act as partners and drivers for the vision laid out in this roadmap, through investing in talent and infrastructure will be critical to its overall success. This must receive adequate attention and funding alongside new and exciting opportunities presented in the roadmap.

Cross Government approach

In medical research, investment already comes from a range of sources across Government, as coordinated by the Office for Strategic Coordination of Health Research. Achieving the ambition set out in the roadmap must build on this existing diversity and should ensure that public investment in research is considered broadly, including both UKRI and departmental investment, such as through the National Institute of Health Research (NIHR) in England. The UK Government must also work with devolved administrations to ensure that a truly cross Government and four nations approach is taken in the comprehensive R&D plan.

Interdisciplinary approaches

Meanwhile, much ground-breaking research takes place at the interface between traditional disciplines, involving collaborative and multidisciplinary teams. Funding must be flexible enough to enable bottom-up assembly of interdisciplinary projects alongside large strategic initiatives. Working at the intersection of different disciplines requires specific skills sets and further efforts are required to incentivise and reward this "team science" approach. This will require a balance between the personal awards identified in the roadmap and the funding for teams and consortia. Facilitating this kind of approach will also require significant efforts to create careers structures and incentives for technical specialists as explored in the Academy of Medical Sciences "Team Science" report.[1]

How can we maximise the economic, environmental and societal impact of research through effective application of new knowledge?

The economic benefits of investing in medical research are well documented: every £1 invested in medical research delivers a return equivalent to around 25p every year, forever.[2] This figure is comprised of direct and indirect health and economic impacts. The increased investment outlined in the Roadmap offers opportunity to enhance these benefits and will depend on several factors (in addition to those outlined above):

Enhancing the interface between academia and the NHS

The RECOVERY trial has shown the enormous power of the NHS as an engine for research yet this potential is not fully realised. Investing in and valuing research in the NHS and wider healthcare system could improve patient outcomes; enable the UK to remain globally competitive in the life sciences; and increase job-satisfaction, thereby improving recruitment and retention, and decreasing locum bills.

These benefits will be facilitated by a close interface between academia and the NHS. However, the Academy is concerned that the gap between these institutions is widening.

[1] https://acmedsci.ac.uk/policy/policy-projects/team-science
[2] https://acmedsci.ac.uk/file-download/54792223

Consequently, we recently published a series of recommendations to achieve six key outcomes that will be essential to enhance this interface:[3]

1. Creating a healthcare system that truly values research.
2. Fully integrating research teams across academia and the NHS.
3. Providing dedicated research time for research-active NHS staff.
4. Ensuring undergraduate curricula equip healthcare staff with the skills to engage with research.
5. Incorporating flexibility into postgraduate training pathways.
6. Streamlining research through joint R&D offices.

In particular, we recommend that a pilot is established in several hospitals where a proportion of consultants is offered a contract that includes dedicated time for research. We estimate that the costs of conducting such a pilot (where 20% of consultants have 20% of their time protected for research in ten hospitals across the UK) would be around £25 million per year.

We recognise that the demands imposed on the NHS by COVID-19 are substantial and long-term, however we believe this crisis has demonstrated the value of research involvement by clinical staff and the need to protect their time to participate. We will continue to work with the Government and the NHS to establish this pilot.

Public health

Public health research has an important role to play in both delivering societal benefits and the Government's wider levelling-up agenda. As highlighted during the COVID pandemic and the Academy's Health of the Public 2040 report, these disciplines are critical to preserving health and can help to understand and address the links between socio-economic and healthcare inequalities.[4]

As a result, the Academy is developing a new transdisciplinary Health of the Public Fellowship to bring fresh approaches to public health challenges and improve connections between academia, local authorities and public health practice.

The comprehensive R&D plan must ensure that there is increased support for public health research.

Patient and Public Involvement

A critical element to delivering the full benefits of medical research is the engagement and empowerment of patients to participate in and shape research. This should include equitable access to research at point of care; patient and public involvement (PPI) in

[3] https://acmedsci.ac.uk/policy/policy-projects/nhs-academia-interface
[4] https://acmedsci.ac.uk/policy/policy-projects/health-of-the-public-in-2040

research throughout the R&D pipeline; providing medical researchers with skills to conduct effective PPI; and accessible research outputs.

How can we encourage innovation and ensure it is used to greatest effect, not just in our cutting-edge industries, but right across the economy and throughout our public services?

Life Sciences Industry

Achieving the 2.4% target will require a substantial increase in private sector investment in R&D. The life sciences industry is already one of the UK's most productive and highest investors in R&D, employing almost 250,000 people and delivering enormous economic benefits to the UK. The comprehensive plan must ensure that the UK can enhance its attractiveness to life sciences investment.

The UK's R&D skills base is a major incentive to industry investment. Public investment in R&D must therefore continue to deliver the highly-skilled workforce required by the sector. Skills gaps in clinical pharmacology, bioinformatics and data science are well documented and must be addressed.[5]

Access to capital continues to be an issue at some stages of private sector growth. The UK's venture capital market has made exceptional progress in recent years, however access to capital remains a challenge in some areas of the country. In addition, many medium-sized innovative firms struggle to access capital that will allow them to scale-up. Investment in the British Business Bank is welcome, however in isolation is unlikely to provide the scale of funding required address this issue.

Finally, a robust and efficient regulatory landscape which facilitates research will be vital to the ongoing attractiveness of the UK as a destination for commercial clinical research. This is particularly important in the context of EU exit and the role of the MHRA.

Research in the NHS

As outlined above, driving innovation in the NHS is critical to delivering improved patient care, maximising the health benefits of increased investment in R&D and driving private sector investment. This requires a close interface between NHS and academia, but also the ability for the NHS to act as a customer of research.

This must be achieved through increasing the ability of the NHS to adopt innovation early, facilitating patient access. The Roadmap describes using the Innovative Medicines Fund (IMF) to turn NHS England into a major procurer of technology and health innovation. This is a welcome approach, however limited detail is available on how the IMF will work and how innovative procurement will be driven in devolved nations.

[5] https://acmedsci.ac.uk/file-download/36971834

In designing the IMF, a broad definition of "value" is required to reflect the true impact of new technologies and interventions. This may include avoiding disruption caused by switching between treatments and enhancing the ability of patients to return to work. Decisions should reflect this and align price with value and thereby driving uptake in the NHS.

Patient data

Health data generated in the NHS is a huge national asset that if used effectively could provide health benefits for patients and enhance R&D. Data linkage to create research-ready sets which are accessible by researchers must be a priority. Easy access to these rich data sets would allow the life sciences community to create innovations which may not be foreseen and would likely return significant economic and health benefits. Linking systems and data sets will also benefit patients and the NHS by allowing the system to be more efficient and clinicians to make more informed decisions.

The accessibility of these datasets is critical to their utility, however access must be in accordance with the principles lined out in the AMS report on "Our data driven future in healthcare".[6] It is the responsibility of the NHS, who act as stewards of the data on behalf of patients to act responsibly, respect patient wishes and carry out due diligence on the reasons for accessing and using data.

Next generation leaders

Finally, to drive innovation across public and private sectors we will need exceptional leaders in biomedical and health research. These leaders must be able to work across traditional academic disciplines; feel at home in multidisciplinary teams; and create collaborations across academia, industry, the NHS and Government. As a result the Academy has developed an innovative leadership programme for Future Leaders in Innovation, Enterprise and Research (FLIER) with funding support from BEIS. This scheme equips these emerging leaders with skills to lead multidisciplinary approaches across the life sciences sector and embed innovation across public and private sectors.[7]

How can we attract, retain and develop talented and diverse people to R&D roles? How can we make R&D for everyone?

The R&D Roadmap places welcome emphasis on supporting the people behind the science, including through developing an R&D People and Culture Strategy. Research cannot take place without people and we look forward to engaging with the development of this strategy.

Research Workforce and Research Culture

[6] https://acmedsci.ac.uk/file-download/74634438
[7] https://acmedsci.ac.uk/grants-and-schemes/mentoring-and-other-schemes/FLIER

Research must be an accessible and attractive career option. This begins with embedding research skills into undergraduate and early medical training. Then, for clinician researchers, there must be flexibility to engage in research throughout their training. Across all disciplines there is a need to provide appealing and flexible career structures for the full range of skills required to conduct health research. This includes "Team Science" approaches which can enhance careers structures for individuals with specialist skills.

Meanwhile, the Wellcome Trust's work on "Reimaging Research Culture" has explored elements of the current system which dissuade many from pursuing careers in research. The People and Culture Strategy must learn from this work and stem the loss of talent through poor research culture.

The diversity of the research workforce remains a significant issue and the strategy must adopt new approaches to maximise the potential of untapped talent. The Academy is already working to increase our own efforts to improve diversity in our disciplines and we look forward to working with Government through the strategy to enhance this work.[8]

Research Careers and COVID-19

Many, if not all, of these issues and inequalities risk being exacerbated by COVID-19, particularly for those at early stages or transition points in their careers. Decreased charitable funding; disrupted research; reduced preliminary data and delayed application rounds may all lead to increased competition and pose risks to the stability and accessibility of research careers in the short and medium term.

Concerted action must be taken by funders, employers and in the People and Culture Strategy to ensure that this does not result in a "lost generation" of medical researchers at precisely the wrong time.

Permeability

Achieving the 2.4% target will require improved permeability between academia, NHS and industry. As highlighted elsewhere in this response, the Academy has developed FLIER, an innovative leadership scheme to build up a cadre of leaders with this breadth of experience. In addition, we are developing a mobility scheme to establish regional hubs to drive permeability across sectors.

Global Talent

Finally, research is a truly international endeavour, almost one in three members of the UK's academic workforce in HEIs are non-UK nationals. As freedom of movement ends, the UK must ensure that our immigration system is attractive to international talent.

[8] https://acmedsci.ac.uk/more/news/race-and-the-academy-the-president-reflects

The development of the Global Talent Visa (GTV) is an extremely welcome first step. The Academy looks forward to working with the Government to ensure that the GTV offer continues to improve, including to cover researchers who work in industry, and as the Office for Talent is established.

As a next step, the Government should consider the overall cost of the visa system, which is significantly more expensive than other leading research nations.

How should we ensure that R&D plays its fullest role in levelling up all over the UK?

The UK has enormous strength in research across the country. The ambition and spending commitments laid out in the R&D Roadmap provide the opportunity to build on this excellence to drive up the R&D intensity; create highly skilled jobs; and spread the benefits of R&D investment more equitably across the country.

In doing so, the focus must remain on supporting existing and emerging excellence. This means working with local, regional and national partners to identify these strengths. Critically, levelling-up must not be at the expense of regions with existing globally important research institutions.

UK Life Sciences Clusters

In the medical sciences, the UK Life science Clusters can play an important role in bringing together regional HEIs, the NHS and industry to support this existing and emerging excellence; drive regional economic growth and create highly-skilled jobs. The UK Life Sciences Clusters can support the delivery of the Roadmap and the Place-based R&D Strategy by:

- Providing insight into existing and emerging strengths
- Identifying UK regions where there is high potential for future growth
- Ensuring that support for less R&D intensive regions is appropriate for and meaningful within regional economies
- Driving collaboration between local, regional and devolved institutions.

Linking regional institutions by promoting mobility across sectors

At present a lack of connectivity and movement of researchers working across academia, NHS and industry, can hinder innovation. The Academy has undertaken extensive scoping work to develop proposals for a new programme to drive collaboration and innovation across the UK by promoting mobility between these sectors. These proposals are based on the development of regional hubs drawing together existing infrastructure to connect people from academia, industry and the NHS. We believe that these regional consortia will lead to the regional and cross-sector collaborations and enhance engagement with hard to reach groups locally such as clinical academics and SMEs.

Place-based funding

Enhancing and increasing the offer of place-based funding including through the Strength in Places Fund and the UK Shared Prosperity Fund would be a welcome step.

The first two waves of the Strength in Places Fund have shown great promise and the engagement of local businesses and local leadership have been central to its success to-date. This should be maintained if the scheme is to be expanded.

Progress towards the development of a UK Shared Prosperity Fund (UKSPF) to replace EU structural funds has been slower. EU structural funds, such as the European Regional Development Fund (ERDF) provided support for research and innovation, however details of how the UKSPF will fill this gap are scant. Further clarity is required to ensure that this fund is designed to support research and innovation.

However, place-based funding should not drive unnecessary competition between regions. Mechanisms must be in place to support partnership and collaborations between regions. This is particularly important in the context of the UKSPF which should not replicate features of EU structural funds which can disincentivise this kind of collaboration between Local Enterprise Partnerships.

How should we strengthen our research infrastructure and institutions in support of our vision?

Sustainability of research institutions – COVID 19

The UK is fortunate to host outstanding research institutions and organisations. However the economic viability of many of these institutions has faced unprecedented challenge in recent months.

Medical research charities, which play an enormously important role in supporting health research, anticipate a decline in their funding of up to 40% next year. On average, charities predict that it will take 4.5 years for their research spend to return to pre-COVID levels.

Charities fill a unique niche, funding research into specific, sometimes rare conditions; setting strategic priorities in health research; and playing an essential role in the training of the next generation of medical researchers (in 2019, charities provided support for the salaries of over 17,000 researchers). As such, charities are critical to preserving the pipeline of talent that will be required to achieve the ambitions set out in the Roadmap.

The University Support Package is welcome and highlights the importance of charities in the HEI funding landscape, however it does not address the impact of the pandemic on the charities themselves. We urge the Government to work in partnership with the charities to find a solution which protects research charities.

Meanwhile, in the university sector issues of cross subsidy and reliance on income from international students to support research activities have been brought to the fore by the

pandemic. The comprehensive R&D plan must ensure the financial stability of the sector. For example, the roadmap proposes considering the appropriate proportion of the full economic cost of research projects that the Government should fund. The Academy looks forward to engaging further on this topic to ensure the long-term sustainability of research in universities.

Research infrastructure

UKRI's R&D Infrastructure Roadmap demonstrated a welcome long-term strategic view on the need to invest in research infrastructure. Using this as a template should guide the Government's ambition to develop a long-term investment plan for new and existing infrastructure.

International Infrastructure

As highlighted in the Smith-Reid Review and the Infrastructure Roadmap, international collaboration is facilitated by shared access to infrastructure. The UK must continue to invest in opportunities to host internationally important infrastructure (both existing and emerging). Meanwhile, the UK should seek continued membership of major EU science infrastructure rather than trying to replicate everything in the UK.

Clinical Research Infrastructure

The comprehensive R&D plan must also recognise the importance of clinical research infrastructure in healthcare settings. In England, NIHR plays a pivotal role in supporting infrastructure for research in healthcare settings through the Clinical Research Facilities, Biomedical Research Centres and Applied Research Centres. The comprehensive R&D plan must take account of the need for cross-Government and four-nation support for clinical research infrastructure. This may also play into the Government's levelling-up ambition through driving collaboration and integrative, networks between the NHS, industry and the universities in regions and devolved nations.

- ***How should we most effectively and safely collaborate with partners and networks around the globe?***

International collaboration with partners has been, and will continue to be, central to the UK's position as a global leader in research and innovation. The importance of international collaboration and shared learning has never been more evident than during the COVID-19 pandemic. During the current pandemic, we have relied upon existing international structures and collaborations to identify research priorities and to share protocols and information rapidly. Maintaining and enhancing these structures will be essential to our ability to respond quickly in future. However, international collaboration is not just important during rapid responses to global emergencies; it is also about sharing knowledge, expertise and experience; and tackling shared challenges from AMR to the health impacts of climate change.

Therefore, our approach to international research must strengthen our collaborative partnerships with both established and emerging research nations from across the globe. This should include creating mechanisms to co-fund large-scale research programmes at a bilateral and multilateral level to tackle major health and research challenges. Adopting this approach would enable the UK to maximise our existing strengths and act as a global leader in responding to the future's greatest challenges.

We must ensure that efforts to boost collaborations with global partners are in addition to maintaining our productive relationships with European partners and not at their expense. We believe that the EU will continue to represent a key partner for UK research and therefore we continue to believe that the UK should seek the closest possible association to Horizon Europe.

The R&D Roadmap commits that if the UK does not associate to Horizon Europe, funding will be made available to allow UK partners to participate in European schemes open to third countries. This is a welcome commitment and the Academy looks forward to further detail on how this will be administered. Confidence in this mechanism will be paramount to its success, this will require clarity at the earliest possibility as consortia are already being built and UK participation will be negatively impacted by ongoing uncertainty. In addition, an arbitrary cap on participation would be a significant disincentive to this kind of collaboration and should be avoided.

We must renew funding commitments to existing schemes where the UK shows international leadership in driving partnership and collaboration, such as the Global Challenges Research Fund.

In the short-term we must adapt to the reality that international travel may be more challenging and find new ways to engage internationally. Government initiatives to support these kind of activities must be flexible to new approaches in a changed context.

- ***How can we harness excitement about this vision, listen to a wider range of voices to ensure R&D is delivering for society, and inspire a whole new generation of scientists, researchers, technicians, engineers, and innovators?***

COVID-19 has posed a huge challenge to the nation and to the research and innovation community. However, research and innovation has contributed enormously to the national response and as a result has risen the nation's collective consciousness. Polling figures indicate high levels of public support for research and trust in researchers prior to the pandemic and suggest that this has been at least sustained in recent months.

Harnessing the raised profile of "science" and research in supporting the UK's response to, and recovery from, COVID-19 presents enormous opportunities. However, with increased investment, particularly in straitened economic times, there will be increasing scrutiny applied to these investments. It will be vital to demonstrate that investing in R&D delivers benefits widely and across the country.

Medical research and the delivery of health improvements present one clear route to demonstrate this. However, it will also be important to ensure that medical research

continues to address patient need. As outlined above, ensuring continued Patient and Public Involvement in research will be key to the conduct of research that inspires public trust and delivers outputs of value to society.

At present, medical research charities play an important role in linking the public to research through their relationship with patient communities and donors. There is much that can be learnt from charities in this. As outlined above, ensuring the ongoing sustainability of the medical research charities is critical to both the health of the eco-system and to maintaining the link between research and the general public.

Finally, to inspire the next generation of researchers, we must build on the current profile of research and present a compelling and attractive vision of what careers in medical research can look like through a modern and person-focused R&D People and Culture Strategy.