

COVID-19: THE ROLE OF RESEARCH AND INNOVATION IN TACKLING THE PANDEMIC



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The UK's response to the COVID-19 pandemic has demonstrated the importance of research and innovation in navigating the crisis and it will be central in how we manage to build back better. UKRI has a clear role to play in our continued fight against the pandemic and in our recovery from it.

These uncertain and challenging times bring into sharp focus the central importance of research and innovation in the future of the UK and beyond. As the new CEO of UK Research and Innovation (UKRI), the largest UK public funder of research and innovation, I am determined that we meet our responsibility to ensure we are investing every penny of taxpayer money entrusted to us wisely.

UKRI brings together seven research councils spanning the full range of disciplines from engineering to history, and medicine to geoscience; with Innovate UK focused on the research and innovation needs of the business community; and Research England which works in close collaboration with the higher education funding bodies of the devolved administrations to support universities. Bringing these organisations together allows us to connect research and innovation communities, institutions, businesses and wider society, in the UK and around the world. Informed by our networks and expertise we are working across the whole research and innovation system.

Our vision is for an outstanding research and innovation system in the UK that gives everyone the opportunity to contribute and to benefit; enriching lives

locally, nationally and internationally.

With a budget of over £8 billion, it is our responsibility to ensure the health of the whole system, now and in the future.

As a steward of this system, we will work with many other actors, including our close partners such as Higher Education Institutions, innovative businesses, investors, not-for-profit organisations and policy makers, and a wider set of partners such as those in the education system and civil society.

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The UK has an excellent research base. These strong foundations have allowed us to act quickly to mobilise the research community to rise to this new challenge. Our councils have a rich understanding of their domains and deep relationships with universities, institutes and businesses across the UK. It is this strong research base, connected under the UKRI umbrella, that has allowed us to

respond so rapidly and effectively to the pandemic.

Working closely with partners across the wider research community, such as the National Institute for Health Research and the Office for National Statistics, UKRI-funded research has made major contributions to progressing the UK's understanding of the spread of COVID-19, its impact on society, and to efforts to develop new diagnostics, therapeutic medicines and vaccines.

Research is addressing the many impacts of COVID-19, which are diverse, complex and evolving; not just improving our understanding of the virus itself so we can develop treatments and vaccines but also the economic, social, psychological, and environmental impacts of the pandemic on society. UKRI's response to the pandemic has touched on all research disciplines across all areas of our remit.

UKRI is also investing heavily to help innovative businesses survive the economic impacts of the pandemic and build for the future. Businesses have been able to apply for new funding to support the development of technologies to help tackle both the health and economic impacts of the pandemic. We have also been able to provide



further investment for hundreds of businesses already receiving UKRI support to ensure they stay afloat during troubled times and are able to continue developing their innovations and bring them to market.

Whilst we continue to work hard to address the issues we

are facing now, it is critical that we also learn from experience to ensure that the UK has a coherent framework for future responses based on preparedness and resilience. This is essential both to address the evolving R&D needs in the current pandemic and for preparedness for any future

infectious diseases with pandemic potential.

Beyond this, as we look to the future, UKRI is working hard to provide the country with the infrastructure, environment and research and innovation culture required to thrive and build a greener, healthier and more resilient UK.

Since the start of the pandemic, UKRI has invested more than £400 million into some 250 COVID-19 related research projects and more than 1,500 of the most R&D intensive small and medium size firms. Here are just a few examples of UKRI-funded work.

CASE STUDY: CREATING NEW VACCINES

Even before the new coronavirus emerged, UKRI had strategically invested millions in vaccine development and manufacturing research, for example through the Medical Research Council and the Cell and Gene Therapy Catapult. Now, UKRI is funding two vaccines that are in human trials. Professor Sarah Gilbert and Professor Robin Shattock are leading two teams based at the University of Oxford and Imperial College London respectively.

The technology used to develop the Oxford COVID-19 vaccine has been named ChAdOx1. It is based on a harmless, weakened adenovirus that usually causes the common cold in chimpanzees. Chimpanzee adenoviral vectors are a very well-studied vaccine type, having been used safely in thousands of subjects. It has been genetically changed so that it is impossible for the adenovirus to grow in humans. This also makes it safer to give to children, the elderly and anyone with a pre-existing condition such as diabetes. ChAdOx1 was chosen as the most suitable vaccine technology as it has been shown to generate a strong immune response from one dose in other vaccines.

Imperial's vaccine uses a different approach. Unlike traditional vaccines that are typically based on a weakened form of a virus or particular proteins made by the virus, the Imperial vaccine instead uses bits of genetic code, called self-amplifying RNA.

Once injected into muscle, the RNA allows cells to produce copies of a protein found on the outside of the virus. This trains the immune system to respond to the coronavirus, so the body can easily recognise it as a threat in future. The current trials will show what dose is needed to produce an immune response safely.

CASE STUDY: IMPACT ON THE ENVIRONMENT

UKRI funded research is looking at how the pandemic has affected our environment. Projects include looking at the effect on air quality whilst much of the world was in lockdown, studying emissions data to understand the potential impact on respiratory illnesses and thinking about how we can build back in a more sustainable, greener way, for our economy and society.

The UK Centre for Ecology & Hydrology (UKCEH) has provided emissions data and analysis as part of its National Capability programmes. Air pollution levels during the lockdown period provide valuable evidence on how air quality might change as sources are reduced, for example during the UK's transition to net zero greenhouse gas emissions.

CASE STUDY: SUPPORTING INNOVATIVE BUSINESSES

In April, the government charged Innovate UK with delivering £750m of investment and support for UK businesses driving innovation and development during the COVID-19 pandemic. Alongside grants and loans for existing Innovate UK customers, an early package of funding saw £42m made available to 'fast track' over 900 new products and services specifically designed to boost economic recovery from the impact of COVID-19.

We have funded a huge variety of projects across a range of sectors. Just some examples:

- **Radical Fibres Ltd** will create the next generation of personal protective equipment using materials that capture viruses.
- **The National Theatre** is developing a cutting-edge entertainment platform, giving performers a digital stage for global audiences.
- **Volunteero Ltd** has developed a social media app to connect local communities and allow volunteers to target support to their most vulnerable neighbours.
- **i3d Robotics** is building a virtual-reality training/teaching platform that will enable medical students to upskill remotely and perform simulation surgeries.
- **Elchies Estates Limited** is setting up virtual farmers' markets to replace traditional markets that closed down as a result of the COVID-19 outbreak, providing a platform for local businesses and farmers to sell produce. □