World’s largest genetics project to tackle deadly diseases launches

The £200 million whole genome sequencing project is being created, forming a partnership of pharmaceutical firms and health experts which will examine and sequence the genetic code of 500,000 volunteers at the UK Biobank, based in Stockport.

Prime Minister Boris Johnson said:

> Britain has a proud history of putting itself at the heart of international collaboration and discovery. Over 60 years ago, we saw the discovery of DNA in Cambridge by a team of international researchers and today we are going even further. Now we are bringing together experts from around the globe to work in the UK on the world’s largest genetics research project, set to help us better treat life-threatening illnesses and ultimately save lives.
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> Breakthroughs of this kind wouldn’t be possible without being open to the brightest and the best from across the globe to study and work in the UK. That’s why we’re unveiling a new route for international students to unlock their potential and start their careers in the UK.

Genomics research has the potential to create a genuinely predictive, more personalised healthcare system and the UK has a clear desire to seize the opportunities that research in this area offers, which is why the government has committed to carrying out five million analyses of DNA by 2024.

The new project aims to improve health through genetic research, improve the prevention, diagnosis and treatment of a wide range of serious and life-threatening illnesses including cancer, heart diseases, diabetes, arthritis and dementia.

Business Secretary Andrea Leadsom said:

> Today’s funding will support one of the world’s most ambitious gene sequencing programmes ever undertaken, reflecting the UK’s determination to remain at the forefront of scientific endeavour and progress.
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> Its results could transform the field of genetic repeated research – unlocking the causes of some of the most terrible diseases and how we can best tackle them. It will be a major step forward for individually tailored treatment plans, and will help us better understand why some people get certain diseases while others don’t.

Health and Social Care Secretary Matt Hancock said:

> I am incredibly excited by the potential of genomics to change the way we think about disease and healthcare. In an ageing society with an increasing burden of chronic diseases, it is vital that we diagnose earlier, personalise treatment and where possible prevent diseases from occurring altogether.
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> This project will help unlock new treatments and grow our understanding of how genetics effects our risk of disease. It is one part of our world leading set of genomics programmes, including the NHS' Genomics Medicine Service and the Accelerated Detection of Disease challenge, and shows that the UK is the go-to destination for genomics research and development.

The UK Biobank recruited 500,000 people aged between 40 and 69 years between 2006 and 2010 from across the country. They have provided blood, urine and saliva samples for future analysis, detailed information about themselves and agreed to have their health followed on an anonymous basis.

Much of the sequencing will be by experts at the Wellcome Sanger Institute, based in Cambridge, and the results will help the NHS treat patients better.

Through the Biobank research, industry can work with experts to create new treatments and preventative measures which will help those suffering from illnesses and may eventually reveal why some people develop diseases and others do not.

Funding for the genome project comes from a consortium formed by the government's research and innovation agency, UK Research and Innovation (UKRI) with £50 million through the Industrial Strategy Challenge Fund, £50 million from the research organisation, Wellcome.

A further £100 million has come from four of the world's leading biopharmaceutical and healthcare companies Amgen, AstraZeneca, GlaxoSmithKline (GSK) and Johnson & Johnson.

The samples will be sequenced in equal numbers at the Wellcome Sanger Institute in Cambridge and the deCOde site in Iceland, from the genome sequencing company, Illumina.

Notes to editors

This follows a shake-up of immigration rules announced by the Prime Minister in August to encourage the world's top scientists to move to the UK. The government will set out plans in the autumn to significantly boost public R&D funding, provide greater long-term certainty to the scientific community, and accelerate our ambition to reach 2.4% of GDP.

The new immigration route enables international students who have successfully completed a course in any subject at undergraduate level or

higher to work, or look for work, at any skill level, giving them valuable work experience at the start of their careers. There will be no cap on the number of students who can apply for the new graduate route.

Students who start courses in 2020/21 at undergraduate level or above will be able to benefit from the new route. Those on the route will be able to switch onto the skilled work route if they find a job which meets the skill requirement of the route.

The new route for international students builds on the already strong offer available, which is why university-sponsored visa applications are at record levels and over 450,000 international students are currently studying in the UK per year. This will boost the government's plans to increase the number international students by 30% to 600,000 by 2030, as set out in its International Education Strategy.

The genome project builds on a £34 million pilot programme funded by the Medical Research Council (MRC) that saw the first 50,000 UK Biobank participants analysed. This pilot or Vanguard project refined the approach needed to complete this globally unique project. All data held by UK Biobank is anonymised and protected.

The addition of complete genetic information to the information held by UK Biobank is expected to reveal why some people develop particular diseases and others do not. It may also hold the key to more precise treatments for a range of conditions tailored to the genetic makeup of an individual and help predict and prevent life-changing diseases.

Through this research, industry will be able to work with experts to create new products and services which will help those suffering from illnesses.

The government funding forms part of the delivery of the Life Sciences Sector deals and the modern Industrial strategy and is funded through the wider £210 million Industrial Strategy Challenge Fund: Data to early diagnosis and precision medicine, administered by UKRI.

Sir Mark Walport, Chief Executive of UK Research and Innovation said

> As one of the half million participants in UK BioBank, I'm very excited by the potential of the Whole Genome Sequencing Project, which will sequence the genetic code of everyone in UK BioBank to help develop novel and personalised forms of healthcare.
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> UK BioBank is globally unique in the depth and quality of the information that it contains about so many people in health and disease. Adding whole genome sequencing data to this will provide major opportunities to improve how we prevent, diagnose and treat the chronic conditions that afflict so many of us as we live longer lives.

Prof Sir John Bell, HMG's Life Sciences Champion, said:

> This genome sequencing project will provide exciting new insights into the causes of many major diseases.
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> It builds on 70 years of pioneering work in genetics research and exemplifies the creation of a whole new sector in Life Sciences that the UK Life Sciences Industrial Strategy has been developing. We do not know what the project will uncover but it is certain to be both novel and informative.

John Lepore, Senior Vice President, Research at GlaxoSmithKline (GSK) said:

> This historic whole genome sequencing effort is a welcome asset for researchers and testament to the volunteers who believe in the power of data to advance science.
>
> Genetically validated drug candidates are twice as likely to become registered novel medicines, and efforts like this bring us closer to developing transformational medicines that can significantly improve patient health and change lives.

AstraZeneca quote: Mene Pangalos, Executive Vice President, BioPharmaceuticals R&D, AstraZeneca, commented:

> Whole genome sequencing on this scale is unprecedented, and through this collaboration we hope to unlock the potential of genomics to evolve our understanding of complex diseases such as cancer, heart disease and chronic kidney disease.
>
> These new insights will guide our drug discovery programme and will help us bring innovative new precision medicines to patients who need them most urgently.

Richard Tillyer, PhD, Global Head, Discovery, Product Development & Supply, Janssen Research & Development, LLC, one of the Janssen Pharmaceutical Companies of Johnson & Johnson, commented:

> We are proud to participate in this ground-breaking initiative to generate genomics data from samples obtained through the generosity of citizens/people in the United Kingdom.
>
> The insights gained from the analysis of this rich data set will guide our efforts to develop safe and effective therapies so that diseases aren’t just being treated, they are predicted, pre-empted and stopped in their tracks to help generations of people live their healthiest lives.

NB: Contract entered by Janssen Biotech, Inc., one of the Janssen

Pharmaceutical Companies of Johnson & Johnson

David M. Reese, M.D., Executive Vice-President of Research and Development at Amgen said:

> We are pleased to partner on a project with immense potential to advance public health.
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> This collaboration reflects our belief in the power of human genetics to transform medicine and the need for continued growth in the size and diversity of the data that can be mined for new discoveries for patients with serious life-threatening diseases.

Kari Stefansson, CEO of deCODE Genetics, a subsidiary of Amgen, said:

> deCODE is taking human genetic research to a new level, applying the methods we pioneered in Iceland to lead a worldwide search for disease genes.
>
> As drug development programs backed by genetics are twice as likely to succeed, the data sequenced and analyzed through this collaboration will be essential to help the broader scientific community identify and validate promising drug targets for some of the most challenging diseases patients face.

Sara Marshall, Head of Clinical Research and Physiological Sciences at Wellcome, said:

> This exciting new project will help scientists and doctors develop new ways of preventing, diagnosing and treating a range of life changing diseases such as cancer and dementia.
>
> By sequencing the genomes of the UK Biobank participants, the research community will have an unprecedented resource to gain new insights into human disease.
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> This work would not be possible without the generous support of the 500,000 participants of the UK Biobank who, without any direct benefit to themselves, have allowed their lives to be studied through blood tests, body scans and information from their medical records all in the hope that it will benefit others.

Sir Michael Rawlins, Chair of UK Biobank’s Board said:

> We are delighted that government, charity and industry have come together to unleash the full potential of UK Biobank by supporting the sequencing of all the participants.

> It is a tribute to the altruism of the half million people who agreed to be part of UK Biobank, and it recognises the valuable findings that have already emerged from the project. Scientists around the world will be eager to use these genetic data in imaginative ways to further improve the health of the public.

Paula Dowdy, Illumina's Senior Vice President and General Manager, EMEA, said:

> Illumina would like to thank the Biobank volunteers who have generated this invaluable resource over more than a decade.
>
> We are proud to support the project through the use of whole genome sequencing technology and unlock the power of 450,000 genomes to deliver world-leading genetic data that could transform the lives of so many.

About UK BioBank

UK Biobank was established by the Wellcome Trust medical charity, Medical Research Council, Department of Health, Scottish Government and the Northwest Regional Development Agency. It has also had funding from the Welsh Government, British Heart Foundation, Cancer Research UK and Diabetes UK. UK Biobank is supported by the National Health Service (NHS). UK Biobank is open to bona fide researchers anywhere in the world, including those funded by academia and industry. The medical research project is a non-profit charity which had initial funding of about £62 million and a subsequent investment over the past 10 years of around £180 million.

About the Wellcome Sanger Institute

The Wellcome Sanger Institute is one of the premier centres of genomic discovery and understanding in the world. It leads ambitious collaborations across the globe to provide the foundations for further research and transformative healthcare innovations. Its success is founded on the expertise and knowledge of its people and the Institute seeks to share its discoveries and techniques with the next generation of genomics scientists and researchers worldwide.

About UK Research and Innovation

UKRI works in partnership with universities, research organisations, businesses, charities, and government to create the best possible environment for research and innovation to flourish. We aim to maximise the contribution of each of our component parts, working individually and collectively. We work with our many partners to benefit everyone through knowledge, talent and ideas.

Operating across the whole of the UK with a combined budget of more than £7

billion, UKRI brings together the seven Research Councils, Innovate UK and Research England.