BIG IDEAS FOR THE FUTURE

UK RESEARCH THAT WILL HAVE A PROFOUND EFFECT ON OUR FUTURE

ABOUT RCUK AND UUK

UNIVERSITIES WEEK is an annual event that demonstrates the benefits of universities within UK society. The campaign highlights the impact universities in the UK have on the individual, the local community, its businesses, and the future of the UK, just to name a few. The campaign is coordinated by Universities UK, working closely with a range of higher education institutions and organisations, including Research Councils UK, the University Marketing Forum, the National Union of Students, the Higher Education Funding Council for England, UCAS, the University Alliance and GuildHE.
www.universitiesweek.org.uk

UNIVERSITIES UK (UUK) is the representative body for the UK's universities. Founded in 1918, its mission is to be the definitive voice for all universities in the UK, providing high quality leadership and support to its members to promote a successful and diverse higher education sector. With 133 members and offices in London, Cardiff and Edinburgh, it promotes the strength and success of UK universities nationally and internationally.
www.universitiesuk.ac.uk

RESEARCH COUNCILS UK (RCUK) is the strategic partnership of the UK's seven Research Councils. We invest annually around £3 billion in research. Our focus is on excellence with impact. We nurture the highest quality research, as judged by international peer review providing the UK with a competitive advantage. Global research requires we sustain a diversity of funding approaches, fostering international collaborations, and providing access to the best facilities and infrastructure, and locating skilled researchers in stimulating environments. Our research achieves impact – the demonstrable contribution to society and the economy made by knowledge and skilled people. To deliver impact, researchers and businesses need to engage and collaborate with the public, business, government and charitable organisations.
www.rcuk.ac.uk

The seven UK Research Councils are:

- Arts & Humanities Research Council (AHRC)
- Biotechnology & Biological Sciences Research Council (BBSRC)
- Economic & Social Research Council (ESRC)
- Engineering & Physical Sciences Research Council (EPSRC)
- Medical Research Council (MRC)
- Natural Environment Research Council (NERC)
- Science & Technology Facilities Council (STFC)

For further information on the research featured in this report please contact communications@rcuk.ac.uk

FOREWORD

LORD BILIMORIA, CBE DL
FOUNDER AND CHAIRMAN, COBRA BEER
PRESIDENT, UK INDIA BUSINESS COUNCIL
INDEPENDENT CROSSBENCH PEER, HOUSE OF LORDS

I AM DELIGHTED to be introducing this publication brimming with examples of UK research that have the potential to have an impact on all of our lives. Despite the challenging economic times that we have all experienced over the last few years, UK research continues to be a great success story. The research being conducted in UK universities will contribute to the UK's climb out of recession and future economic growth.

What is so special about research that it can help us achieve economic growth and return to prosperity? We have seen during this recession that we can not rely on the old growth sectors, such as financial services, to give us the economic growth and stability that we experienced for over a decade before the 'credit crunch'. The UK needs to investigate, discover and successfully exploit new sectors for growth. In UK universities something very special is going on – people are having big ideas… Big ideas for the future. The sort of big ideas that will, if invested in, nurtured and exposed to the right opportunities and collaborations with business and international partners, provide the foundation for future UK economic growth and prosperity.

But these big ideas aren't just about economic growth and prosperity they are also about the health and wellbeing of the nation too. With challenges facing society such as an ageing population, increasing obesity levels, as well as the impact of climate change, we need to be investing in initiatives that will help tackle these issues. Research being carried out in UK universities, as the case studies within this publication demonstrate, are proactively working on innovative solutions to these issues and others that, we may not yet be facing, but will confront society in the future.

This publication is a true celebration of the research being conducted in UK universities. You will also find some other familiar voices, such as

Professor Lord Robert Winston, Dr Alice Roberts and Professor Iain Stewart, introducing the individual chapters of the publication and exploring what their area of research means to them and why it is so important to the UK. But, it focuses on no individual research discipline as, if we are to meet many of the challenges of the future, then we need a broad mix of the physical, natural, biological, medical and social sciences alongside contributions from engineering, arts and humanities.

It is easy to take these discoveries for granted, as we switch on our iPod or log on to the internet, especially as the UK has a track record of research excellence, but together, all of these big ideas have had a profound influence on our lives. When you next see a road sign directing you to a university building, think about the ground breaking work going on in that building. Or if you hear a Professor talking about their research on the news, think about what the impact of their work will be. The exciting big ideas currently being worked on in UK universities, as showcased by this publication, will continue to have a profound impact on our lives and the growth, prosperity and wellbeing of the UK. UK research is, truly, essential to the future as our ground breaking and life changing research has demonstrated for decades, having a lasting impact not just for our own country, but the benefit of people across the globe.

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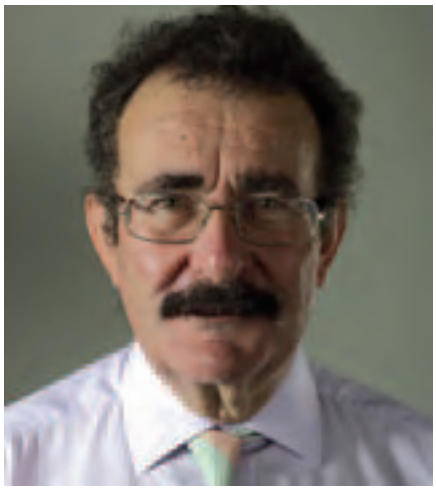

PROFESSOR LORD ROBERT WINSTON

WE ARE FORTUNATE TO LIVE at a time of dramatic progress in medicine. We now live longer, healthier lives than at any point in the past and this progress has mostly been possible because of the excellent research which makes a major impact in our understanding of health and disease. This is an area of human welfare for which this country is recognised internationally. And importantly, our excellence in biomedical research is based essentially in Britain's outstanding universities.

Universities are the seeding grounds for developing our talented young people and provide a world-class environment which nurtures young scientists and physicians. This wealth of original and high quality research is made possible by the support of the Research Councils, charitable foundations and industry which focus their funding at higher educational institutions across the UK. And we continue to punch above our weight as no country in the world, except the United States, can match this extraordinary excellence.

The pursuit of good health has been a key endeavour throughout history. Yet the human body is immensely complex and also very fragile. Moreover, we change throughout life – indeed, from the moment we are conceived, whilst still invisible to the naked eye, epigenetic research shows that each of us respond to our environment in different ways. And these changes may have a profound effect on our health as we grow and as adults. Each of us is unique; we vary in our anatomy and physiology, the make up of our DNA and the way it is programmed to respond to the environment. Only continued investment in our universities will ensure that we can use such knowledge to undertake research that promotes health and protects this fragile and complex body in which we live.

This chapter introduces just some of the thousands of projects that our dedicated university researchers have pursued to improve health. They have the potential to have an impact on the lives of millions. So, for example, medical researchers are looking at innovative ways to improve the outcome

after a stroke, a condition which maims or incapacitates some 150,000 sufferers annually in the UK. Others researchers attempt to find ways to prevent such age-associated diseases. As health improves people live longer, and research to maintain the health of older people becomes increasingly important. One reason why I am delighted to support this initiative is that it gives the opportunity to read and understand some of the latest ideas in all areas of health research. Studies using robots to help autistic children engage and communicate; the use of stem cells to grow new tissues, and the use of antibodies to treat cancer are not only interesting and exciting, but also have huge potential to improve lives.

If the UK is to remain at the forefront of international health research, support for our universities is vital. And the continued investment of bodies like the Research Councils is particularly critical. I am actively involved with a number of universities and higher educational institutions. Not all are directly connected to medical schools, but many – even the amazing Royal College of Music – conduct research which has an impact on health. And so many institutions all over the country collaborate to play an important role in developing ideas and bringing the benefits of medical research to patients. For example, studies such as the TOBY study in Oxford and London, have brought researchers and clinicians together to develop life-saving interventions for premature babies. Although friendly rivalry between organisations exists, this does not prevent excellent research, and frequently serves to produce invaluable knowledge. This publication is a showcase of what we expect we may achieve next.

Much of the research we do – particularly in biotechnology – will not lead to improved treatments quickly. But even those endeavours taking a long time to come to fruition are valuable learning experiences. And increasingly we gain knowledge from other research areas. These are not merely the medical, physical, mathematical or biological sciences, but the social sciences, engineering, research in the arts and humanities are increasingly important. Learning from all disciplines increases our understanding, encourages innovation and underpins the social and ethical value of what we do. And as this book illustrates, we are increasingly conscious of another important responsibility – to communicate and engage with the public and respond to public ambitions and anxieties.

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The importance of basic research cannot be overemphasised. Without the insights it provides, we would be unable to plan the work that will lead to the biggest advances. I feel privileged to be a member of the Engineering and Physical Sciences Research Council, one of the seven councils in the UK that invest around £3 billion each year in academic research. These bodies, particularly the Medical Research Council, are vital for setting this agenda and producing the basic knowledge that has such value.

The decision to invest public money in health and wellbeing should be easy to make, even in times when budgets are severely threatened. So many lives can be changed by university researchers; our bright young scientists must be supported if we are to see the different world which they hope to help shape. It is not merely a matter of empty pride that we should wish to be at the international forefront. This country has a critical role in ensuring the healthy future of our own children, as well as the health of many humans around the globe.

SEAWEED INSTEAD OF SALT

Salt may add flavour to our food, but excessive amounts of it are not good for our health with a high salt diet leading to raised blood pressure and heart problems. Researchers at the Centre for Food Innovation at Sheffield Hallam University are researching alternatives to salt that can be added to food to make it more healthy without ruining the taste.

There are salt substitutes available, many based on potassium chloride, but they are not suitable for use in all foods and can sometimes leave a bitter taste in the mouth. The research team at Sheffield Hallam has been exploring the potential of Seagreens®, a wild wrack seaweed that can be used in food. The great thing about this product is that it has a salty taste, but only 3.5 per cent sodium and a good balance of other minerals. It appears to be allergy free and is 100 per cent vegetable in origin so suitable for vegetarians and vegans.

TECHNOLOGY THAT MAKES US HEALTHY

More than ever we are relying on technology to help us in our day to day lives from shopping to socialising and entertaining. The rapid development of technology means that in the future it could help us lead healthier lifestyles too. Two universities are using mobile phone applications (apps) to help people stay healthy. One app is helping with mental health and the other with physical health.

Researchers at the University of the West of England (UWE) have designed a new app to support students with social anxiety. Social anxiety is a persistent fear of social or performance situations, estimated to affect 10 per cent of higher education students. It is personally distressing, has an adverse affect on engagement with learning and affects adult quality of life including career development. This new app will monitor anxiety levels and help users reduce their social anxiety, including anxiety about learning situations such as presentations, seminars and other group work.

Researchers at the University of Leeds have developed an app to support weight loss called 'My Meal Mate'. The app allows users to set a weight loss goal and monitor their daily calorie intake towards achieving a set goal. Users select the food and drink they have consumed from a comprehensive branded food database and log items in

The new app will monitor anxiety levels and help users reduce their social anxiety.

BIG IDEAS

FOR THE FUTURE

UNIVERSITIES WEEK

WHAT'S THE BIG IDEA?