28 July 2009

-HRH The Princess Royal officially opens UK Biobank storage facility -

- Further funding of £6 million announced -

UK Biobank's purpose built archive facility – a giant freezer for storing millions of samples of biological samples over many years – was opened by HRH Princess Anne, The Princess Royal, today.

The event coincided with further good news for the landmark project – the announcement of additional funding of £6 million, to allow scientists to find out more about people's current wellbeing and lifestyles, and to use that information to improve the health of future generations.

At the heart of the project is the £4.5 million high-tech blood and urine store, a runner-up in the prestigious Royal Academy of Engineering's 2008 MacRobert Award. It is the biggest resource of its kind anywhere in the world, and will keep 10 million samples at -80°C for the next 30 years and more.

Though big, size is not everything. The real tour de force is the way UK Biobank draws together specialist knowledge and systems from the UK and other parts of the world to ensure that blood and urine samples can be stored safely and efficiently over many years.

Dr Tim Peakman, UK Biobank Executive Director, explains: "To talk about its sheer size detracts from the other, very real, achievements that have allowed us to develop a state-of-the-art facility that means we can store large quantities of blood and urine samples in the best condition possible over decades, and retrieve them quickly and easily when the time comes."

Each sample of blood is stored in a number of small tubes, called aliquots, and identified by a unique bar code, so that the individual 'donor' remains anonymous. A frozen, frost-free storage environment is crucial if the bar codes are to be read and successfully retrieved in years to come.

"Frosting is one of our biggest concerns," said Dr Peakman. The solution is to ensure that the air circulating within the freezer is as dry as possible – as low as 2 parts per million of water vapour (compared with 10,000-12,000 outside on a relatively humid summers day) – so that frost cannot form and disable the robotics and make the bar codes on the tubes illegible. Water vapour is removed from compressed air by twin air dryers at the back of the store before feeding it into the system.

Samples are stacked in -80°C trays along a 27 metre central 'corridor' that is itself kept at an ambient temperature of -20C. A robotics system controls the archival and retrieval processes. It runs along a short track within this sub-zero environment. The system allows for precision storage that could not be achieved by hand; it can put away 8,500 samples in an hour – and doesn't need to stop for a warming cup of cocoa. The freezer is 7 metres wide and 6 metres high.

About 100,000 litres of dry air and 5,000 litres of liquid nitrogen are fed through the system each day, making UK Biobank one of the biggest consumers of liquid nitrogen in the country. The full weight of the store is 20 tonnes. The central robotic 'arm' travels at a maximum speed of 2 metres a second, and accelerates at 1.5m/per second/per second. The archive facility will eventually house about 9,500 litres of blood (about two lorry tankers) and 2,500 litres of urine.

The additional £6 million awarded by the Wellcome Trust, Medical Research Council and Department of Health, to the £60 million nationwide project will allow scientists to gather more important information about participants' diets, their fitness and physical activity levels, and to collect a sample of saliva. An additional blood sample will be collected to allow scientists to

explore how the various genes in an individual are being turned on and off. UK Biobank also plans to record information on participants' eyes. Eye health may be linked to a many other disorders.

Sir Alan Langlands, UK Biobank Chairman, said these enhancements to the project underlined the importance the scientific community gives to the building of the UK Biobank resource. "It has been satisfying to see the number of participants grow since the project launched in April 2007," said Sir Alan. More than 340,000 people are already taking part and the project expects to reach its 500,000 target in the middle of next year.

Sir Alan added: "The UK Biobank archive is a remarkable facility in many ways. Not only has it brought together the best from research, academia and industry, but it represents the desire of currently around 340,000 people, our participants, to do something positive to improve the health of future generations. I am grateful to everyone who has been involved, and look forward to those first important health findings coming out of the resource."

Sir Mark Walport, Director of the Wellcome Trust, said: "Many of the most important advances in health have come from the study of the health of populations. Conditions such as obesity, heart disease and diabetes are becoming more common in the UK and other developed and developing countries around the world. We need to understand better the underlying complex causes of these and many other conditions. UK Biobank will provide an invaluable resource linking health with social, environmental and genetic factors amongst 500,000 people from around the UK. The UK Biokank archive is a state-of-the-art facility that will store samples securely from the participants in Biobank for many years. It is an extraordinary facility that supports an extraordinary project."

Professor Dame Sally C Davies, Director General, Research and Development, Department of Health, said: "An important part of the Department of Health's work is to stand behind research aimed at tackling health problems and improving NHS care. Because of its potential for future generations, the government is glad to join with the Wellcome Trust, the Medical Research Council and others in supporting UK Biobank. UK Biobank will help us understand how our children and our children's children can live longer, healthier lives. Helping others is, I know, a powerful motivation for many people who have taken part."

UK Biobank is building a resource that will allow scientists to investigate the complex interaction of lifestyle and genes in the development of a large number of chronic diseases, from cancer and heart disease to dementia and depression. It is funded by the Medical Research Council, Wellcome Trust charity, Department of Health, Scottish Government, Welsh Assembly Government and the Northwest Regional Development Agency. The project is hosted by the University of Manchester and has the support of the NHS.

UK Biobank writes to people aged 40-69 years to see if they would like to take part in the project. With participants' approval, it will track their health over the next 30 years. Participants provide information on their current health and lifestyle and donate small samples of blood and urine for analysis long into the future.

The project is currently inviting people to join in Middlesbrough, Liverpool, Nottingham, central London, Hounslow and Bristol. It opens an assessment centre in Sheffield on 5 August 2009.

The archive facility has been designed and built with help from Royston-based company The Automation Partnership (TAP), a world-leader in the design and commercialisation of innovative automation for life science applications.

The UK Biobank archive facility is in Cheadle, near Stockport.

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