

Bench philosophy (10): UK Biobank

# Handling 15 Million Aliquots

UK Biobank processes thousands of blood and urine samples each day as part of a long-term initiative aimed at improving the prevention, diagnosis and treatment of a wide range of serious illnesses including cancer, heart disease, diabetes, arthritis and forms of dementia. Long term, this resource will provide scientists with the most detailed database ever collated to help determine why some people are susceptible to certain illnesses while others are not.

In recent years, there has been an explosion in our understanding of the way in which our bodies function at a cellular level, as well as the complex influence our genes and our environment have upon health and disease. A large-scale and long-term resource, comprising of, say, half a million people's lifestyle and medical records, together with a good set of baseline measurements and samples, would provide a deep vein of health-related information for scientists to mine for many years to come.

The idea of this type of epidemiological study is not new; in a seminal piece of research the late Sir Richard Doll followed the lives of 40,000 doctors, until their death, and was able to prove a link between smoking and lung cancer (Doll *et al.*, (2004) *British Medical Journal* 328(7455): 1519). This powerful study went on to underline the strength with which smoking is linked to a number of cancers and helped identify the pivotal role smoking plays in heart disease, stroke and many other life-threatening disorders. Many of these findings were unexpected at the time his study started.



Initiated the British doctors study in 1954:  
Sir Richard Doll

A new visionary project is now underway to build a major resource for scientists' future use. Launched in April 2007, UK Biobank is a major UK medical research initiative, set up to develop an extensive resource for long-term medical studies. The project is hosted by the University of Manchester and has funding from the Medical Research Council, the Department of Health, the Scottish Government, the Wellcome Trust and the Northwest Regional Development Agency. It is also supported by the NHS and involves a partnership of 22 UK universities.

Over five years, UK Biobank aims to recruit 500,000 Britons aged 40-69 (around one per cent of the adult British population) and follow their health for the next 30 years and more. Detailed information about lifestyle, work, health and medical history will be collected from each participant, along with consent for access to the participants' medical records throughout their life. Basic physical parameters like weight, height, blood pressure and lung function will also be recorded, which together with blood and urine samples taken from the participants, will establish a resource that is unprecedented in its abundance of baseline data that can be applied to a broad range of medical studies. The National Health Service (NHS) in the UK plays a crucial role within the overall scheme. By embedding UK Biobank within the NHS, which provides the overwhelming majority of health care in the UK, a very wide range of conditions could be identified and validated through routine medical records.

## Thinking big numbers

The key strengths of UK Biobank are the enormous sample volume and the extensive amount of health information, collected over a substantial period of time. Over the course of 10 to 20 years, subsets of the 500,000 people will suffer from different diseases and UK Biobank will have a package of information, together with blood and



Blood samples taken from participants.

urine samples, which can be made available to research groups in various disease areas. All information is made anonymous so that the participants cannot be identified, and the researchers are required to meet strict ethical and scientific criteria to access the resource.

UK Biobank predicts that, within ten years, it will have collected about 20,000 cases of diabetes mellitus, more than 10,000 cases of heart attack and coronary death, more than 5,000 cases of chronic obstructive pulmonary disease and 5,000 cases of breast cancer. By the fifteenth year of follow up there should be at least 5,000 cases of stroke, Alzheimer's disease, Parkinson's disease, and colorectal and prostate cancers. The resource will continue to mature with time, gathering more strength as people's health is followed for longer periods through their normal health records. The huge range of opportunities that UK Biobank will provide to creative-thinking scientists is potentially endless, particularly when considering the massive advances in research technologies that will occur over this period of time.

A prospective study, such as that being undertaken by UK Biobank, for the comprehensive and reliable qualification of the combined effects of lifestyle, environment, genotype and other exposures on a variety of outcomes, has a number of advantag-

