phgfoundation
making science work for health

2 Worts Causeway Cambridge CB1 8RN (UK)
Tel +44 (0)1223 740200 **Fax** +44 (0)1223 740892
www.phgfoundation.org

Strategy for UK Life Sciences update 2012: PHG Foundation comment

The PHG Foundation welcomes this announcement, which accords with much of the vision for using whole genome sequencing in clinical practice that we described in our document *Next Steps in the Sequence*. The strategy is a very positive development in support of the objectives of global leadership in healthcare genomics and improving health services for NHS patients. The extra resources committed to basic and translational research will act as powerful drivers. In addition, the commitment to build a sustainable multi-sector infrastructure including data linkage to support these activities is vital to future success.

The provision of 100,000 Whole Genome Sequences (WGS) for NHS patients is an important opportunity. These will be of diagnostic quality and will be provided in the next 3-5 years. The initial focus will be on cancer, rare diseases and infectious diseases. Service design for this provision will take place in 2013 and procurement in 2014. This is a very positive development in promoting additional NHS diagnostic capacity, but several questions remain.

The strategy acknowledges that there is much still to be done to make this operational. Sequencing the genome at a cost and speed that allows feasible introduction into routine healthcare is a technological triumph. But it is only part of the challenge.

Most importantly the PHG Foundation notes that NHS preventive and healthcare services must be made ready to receive and embed genomic science. Such readiness has both political and practical dimensions. It is, from a political perspective, unfortunate that, although there is a general commitment to support innovation and translation of scientific developments into benefits for patients there is no, or little, specific mention of genomics within documents published in recent months from the Department of Health, Public Health England or the NHS Commissioning Board. This provides a stark contrast with the high prominence given to genomics in the Life Sciences Strategy published in 2011, and the *Strategy for UK Life Sciences One Year On* published this Monday. In the current economic climate, where difficult prioritisation decisions have to be made, significant national leadership will be required to ensure that those with responsibilities for commissioning and providing disease prevention, diagnosis and

treatment services in the NHS do afford genomics the necessary priority. We believe that it is vital that Government strategy is 'joined up'; otherwise access to genomic medicine may remain limited to those within easy reach of teaching hospitals and centres of research excellence.

On the practical side we must also work out a number of implementation issues such as when to use genomic testing, how to interpret genomic data and how these data can be used to improve health outcomes or prevent disease in a systematic way across the NHS. This will require a commitment that parallels the scientific work in scale and timing. The continued involvement of regional genetics centres (whether or not they are providing sequencing tests), the UK Genetic Testing Network and clinicians from many other areas of medicine and primary care as important stakeholders, will be vital to implementation. The expertise of clinical geneticists should be embraced while, at the same time, promoting the use of genomics in mainstream medicine, through engagement with professional organisations such as the Royal College of Physicians, the NHS Commissioning Board and Public Health England and, through them to local commissioning organisations. The Academic Health Science Networks will also have an important role to play in coordinating the work of universities, healthcare services, the voluntary sector and industry at both local and national levels. These less glamorous, and more distributed aspects of scientific development and translation must also be recognised and appropriately funded if this initiative is to achieve its full potential.

The PHG Foundation identifies practical elements of implementation work and the wider policy implications, both of which which will be vital. We note the importance of using genomic data to improve patient outcomes. This should include prevention and enhanced treatment outcomes for diagnosed disease and requires assessment of clinical utility, effectiveness and cost effectiveness in clinical practice. The relative paucity of professionals, particularly health economists, able to undertake such assessments will be a barrier.

The commitment to improving bioinformatics infrastructure is very helpful. The strategy rightly acknowledges the importance of interpretation and the need to build large population datasets in which genotypic and detailed phenotypic elements are associated whilst maintaining appropriate safeguards for confidentiality and privacy. We believe that the Deciphering Developmental Disorders (DDD) project provides a prototype. To fully utilise the opportunity from the proposed sequencing of 100,000 genomes in a similar way for other rare disorders, it will be necessary to make significant investment in expert work to define agreed/standardised rare inherited phenotypes in clinical areas such as cardiovascular or renal medicine, neurology, ophthalmology

and endocrinology and to enable NHS clinicians and scientists to input accurate data and use testing accordingly. Interpretation of such information for clinical purposes will require the on-going development of bioinformatics systems with evidence-based algorithms to facilitate clinical decision-making. We believe that this is a major undertaking that will require significant investment on the NHS side as well as in research.

We must be sure that we use these whole genome tests wisely and with a focus on patient benefit. It is all very well to sequence genomes in research or clinical settings but we must know what will be done with the information so obtained. The PHG Foundation programme *Realising Genomics in Clinical Practice* will explore many of these issues. As such testing begins to be used in a clinical setting, this will require all stakeholders to agree the scope of whole genome sequencing and develop consensus on how and when it should be used. There will be requirement for guidelines on what genomic information will be deliberately sought and what other information may also inadvertently be revealed and how these will be managed. Finally, the opportunity to deliberately seek other genomic information, such as carrier status or susceptibility to an unrelated late onset disease, as the basis of individualised preventative health initiatives, should receive serious consideration. Most particularly, there will be requirement for multidisciplinary assessment of evidence of benefits against the obligation to protect patients from possible harm from such 'opportunistic' screening.

Finally, there are many detailed areas that will require clarification before work on the 100,000 genomes goes ahead. These include: the nature of 'full and explicit consent' that patients will need to give before their genetic data are analysed and stored. What happens if they change their minds and what information related to their clinical conditions or otherwise will be provided to them? How will the implications of findings for other family members be handled? What secondary use of data may be allowed and how will public concern related, for example, to insurance or forensic use, be managed? How will public trust in the NHS be maintained in the light of possible commercial gain from the use of valuable data obtained from public services?

The Government announcements in *Strategy for UK Life Sciences One Year On* are an expression of confidence that genomic science will deliver major boosts to health and to the UK economy. Over the forthcoming months and years the PHG Foundation aims, through its own work programme and in collaboration with key stakeholders, to help steer this investment in directions that will deliver benefits to UK patients and the wider health system.