Translational Systems Biology and Bioinformatics in the European Union

Co-chairs: Dr Nuria Lopez Bigas¹, Dr Nour Shublaq²

A Think Tank was held in Barcelona (October 2011) to assess the challenges and opportunities that are key to facilitating a translational role for bioinformatics and systems biology in drug discovery and clinical medicine. 23 invited experts took part in this 2.5 hour session, including clinicians, researchers, and industrialists.

The Think Tank saw potential in sub-cellular and molecular systems biology approaches to biomedicine, as compared to conventional methods of drug design. Despite these approaches being at an infant state, and a vast amount of research remaining to be done, these methods should be able to assist in more personalised approaches to drug treatment, e.g. in the use of multi-target therapy for finding genotype association to risk of disease and drug response. For translational systems biology to make a major impact, the whole system of data access, including access to medical records, needs to be transformed into one based on more openness and sharing of information between hospitals, academia and industry. Various societal structures currently impede this development. Regulatory and funding agencies must be involved to overcome these obstacles.

Genotype-Phenotype Resources in the European Union

Co-chairs: Dr Scott Boyer¹, Prof Alfonso Valencia², Dr Nour Shublaq³

A Think Tank was held in Brussels (October 2011) to discuss the opportunities and obstacles that confront us as Europe plans to make full use of the integration of genome-based data resources with resources detailing disease-based and other human phenotypes. 17 invited experts, drawn from various backgrounds (including researchers, clinicians, and industrialists), took part in this 5 hour session.

We addressed prospects for the development and application of genotype-phenotype resources, considering these to be very promising. Establishing clear correlations between increasing amounts of genotypic information available from clinical studies, and similarly of phenotype information at the population level, is still largely impossible today. Indeed, assuming that genotype controls phenotype in all situations is very unlikely to be correct. There are rather general grounds for thinking that establishing such correlations will always be fraught with difficulty. This approach assists in “stratification” – instead of rejecting so many drugs during clinical trials, it could be that many which are deemed to be failures today will work well for sets of patients on genotypic-phenotypic grounds.

Re-use of Clinical Information for Research in the European Union

Co-chairs: Prof Peter Coveney¹, Prof Norbert Graf², Dr Nour Shublaq¹

A Think Tank was held in London (June 2011) to contribute to the current debate at the European level, tackling the re-use of clinical data for biomedical research. 27 invited experts (including clinicians, physicians, hospital IT directors, engineers, and industry representatives) participated in this 5 hour session.

The Think Tank asserted that a “digital vision” and agenda are needed within Europe, to cover the next five years and beyond. EU member states are urged to commit significant resources to this effort, and to adopt clear and fully aligned legal positions to allow the optimum re-use of data in research and to support clinical decision-making. This would substantially facilitate the digital revolution in healthcare provision that is urgently required. It is important to involve Internet-savvy “expert patients” and their families not only in their own treatment, but to actively contribute to basic biomedical research into their conditions. Issues discussed were wide-ranging and covered data, IT security, information governance, and legal issues with regard to clinical data.

The strategy report is available at:


1 AstraZeneca R&D
2 Spanish National Cancer Research Center
3 University College London

The strategy report is available at:


1 University College London
2 University of Saarland

1 University of Pompeu Fabra
2 University College London
Key Recommendations & The Big Picture

The three Think Tanks settled on numerous recommendations, as detailed in the aforementioned strategy reports. Key to all three are:

- Patients, and their carers, should be at the forefront of biomedical research and proposed healthcare solutions; their views in relation to their own treatment should always be accounted for. Personal ownership of healthcare data is paramount.

- Training for clinicians in statistics, probability and data evaluation should be encouraged and made more widespread.

- The EU should invest significant time and resources in establishing a clear, Europe-wide vision for the digitisation and standardisation of clinical data and integration of medical records over the next five to ten years.

- The EU should provide more infrastructure support, which is sustainable, for establishing and developing ontologies and text mining tools for biomedical and clinical support.

- Sensitive and personal healthcare data will no doubt raise issues of security, privacy and ethics. These should be an indispensable part in the design of any IT system handling such data.

We are moving towards an unprecedented age of personalised medicine that, in order to bring to fruition, will require international co-ordination on a vast scale. Major steps are already taking place along this path to the future. Some key examples are listed below:

In November 2011, at the request of the NIH, the U.S. National Research Council panel called for "Google maps of human disease", i.e. the creation of a data network that would combine genomic and molecular data on human diseases with patients’ routine medical records.

In January 2012, the UK government’s Human Genomics Strategy Group produced a report that laid out recommendations for patients to be able to benefit from genomic technology in the National Health Service.

Relevant Projects

CRESTA cresta-project.eu
Digital Patient www.digital-patient.net
EATRIS www.eatris.eu
ELIXIR www.elixir-europe.org
eTOX www.etoxproject.eu
EU-ADR www.euadr-project.org
EUDAT www.eudat.eu
Innovative Medicine Initiative
ITFoM www.imi.europa.eu/content/ongoing-projects
p-medicine www.p-medicine.eu
VPH www.vph-noe.eu

Such initiatives and projects will help bring biomedical informatics into the clinic as we move towards a future of truly personalised medicine.