Oxford goes big (data)

By C. Simone Fishburn, Senior Editor

The **University of Oxford** is bringing big data to translational research. The university, the U.K. government and a philanthropist are infusing up to £90 million ($138.3 million) to set up a new hub that will use large-scale data analysis to improve the odds of identifying clinically relevant molecular targets.

The center comprises a Big Data Institute (BDI) that will develop systems for gathering and analyzing large sets of data and a Target Discovery Institute (TDI) that will use genomic and chemical screens to identify new drug targets. In addition, the TDI will house some of the **SGC Oxford** branch of the **Structural Genomics Consortium** (SGC), a public-private partnership that performs large-scale 3D structural analysis of biomedically relevant proteins.[1]

The impetus for the new hub is the high failure rate of compounds that enter clinical trials. This led a group of Oxford professors to design an approach that would increase the probability of potential disease targets translating into strategies for efficacious therapeutics.

Peter Ratcliffe, a professor of clinical medicine at the University of Oxford who is leading the TDI branch of the center, said that the accurate selection of drug targets is the "most important missing link between academic research and drug development."

The new translational center is designed to work bi-directionally. In one direction, TDI and SGC will feed molecular target hypotheses to BDI. BDI will mine its banks of data from human genomic, imaging and population health studies to determine how strong the correlation is between a specific biological factor and a given disease.

In the other direction, BDI will search for associations based on epidemiological analyses and will provide the laboratory researchers at TDI with potential new targets and mechanisms to investigate. In the U.K., large cohorts of subjects have participated in Oxford-led initiatives such as The Million Women Study and the **UK Biobank**. Those studies have provided comprehensive source data from tens of thousands of individuals that will be available to BDI.

For example, "digital images and X-rays have been around for a long while, but we haven't maximized the information that we've gleaned from them," noted John Bell, Regius Professor of Medicine at the University of Oxford and a cofounder of the new BDI. Thus, he said, one function of BDI will be to find automated ways to extract measurements from images and then transform the data into information that can be analyzed.

"We need new approaches for turning data into information," added Rory Collins, a professor of medicine and epidemiology at the University of Oxford and CEO and principal investigator of UK Biobank. Collins, who will head the population health and epidemiology division of BDI, said developing tools to enable data analysis will be a principal function of BDI.

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> *—Rory Collins, University of Oxford*

BDI already has geneticists and epidemiologists to design the studies and analyze the data. Collins told *SciBX*, "The glue will be the bioinformatics and computer people" that BDI plans to recruit who can create algorithms for extracting usable information from the large banks of data rendered anonymous from clinical trials, imaging studies and routine medical health records.

The new systems developed by BDI will be publicly available, as will all new structures and reagents developed by SGC. In contrast, TDI will patent and publish its work. Licensing or partnering will be necessary to take its molecules forward as TDI is not set up to perform IND-enabling or clinical studies. Instead, its focus is generating preoptimized scaffolds or probe compounds suitable for early stage animal studies.

A new gift of £20 million ($30.7 million) from the philanthropic **Li Ka Shing Foundation** will help fund BDI research, adding to £20 million ($30.7 million) from the U.K. government and £50 million ($76.8 million) from the University of Oxford to construct new buildings and recruit staff for TDI and BDI.

Although the translational hub has backing from industry, there are no specific deliverables required of TDI or BDI by the corporate investors.

"This is not just about funds," said Chas Bountra, a professor of translational medicine at the University of Oxford and chief scientist at SGC Oxford. It is also about contributing expertise, medicinal chemistry and compound libraries and receiving access to the output.

Ultimately, the new big data approach being taken by the Oxford hub will be measured by an improved success rate in translating preclinical findings to clinical efficacy. "There are real signals to be found" in the databases, said Collins.

Bountra said the new center will be considered a success when its products get picked up by biotech or pharma companies and taken into clinical development.

REFERENCES
1. Cain, C. *SciBX* **4**(20); doi:10.1038/scibx.2011.562

COMPANIES AND INSTITUTIONS MENTIONED

Li Ka Shing Foundation, Hong Kong, China
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