ProCan®

Transforming cancer diagnosis and personalised treatment decision making.

ProCan is a global first cancer research program and facility focused on high-throughput, cancer proteomics across all types of human cancer.

The Problem

Cancers are typically characterised by alteration and aberration in gene products, especially proteins. Proteins play key roles in cellular processes and most effective cancer treatments act against proteins rather than genes.

Cancers continue to mutate randomly after they form and those which look similar by microscopic examination may differ markedly in their molecular composition.

This in turn, accounts for differences in their response to treatment. Every person's cancer is unique and treatment needs to be personalised. Doing this in a clinically relevant time frame and cost-effective manner is a major challenge.

Today, measurement of a very limited set of proteins is part of the standard cancer diagnostic process, and is used to inform treatment decisions.

Current protein detection methods are time consuming, imprecise and examine one protein at a time. This is a major impediment to determining optimal personalised treatment regimes.

The Solution

Until recently, methods for reliably analysing all proteins in a tissue (the proteome) simultaneously in a clinically-relevant manner have not been available. This changed with the advent of the technology combination PCT-SWATH MS in mass spectrometers. The technology combination, which was developed in 2015, generates high-quality, reproducible proteomic data rapidly (within 24-36 hours), from small cancer samples.

The novel combination includes Pressure Cycling Technology (PCT) for thorough tissue liquefaction and protein digestion with SWATH – MS, a specialised mass spectrometry method, in order to comprehensively map protein fragments (peptides) within each sample (SWATH = Sequential Window Acquisition of All Theoretical Mass Spectra).

Installation of six high-end mass spectrometers for SWATH-MS alongside multiple PCT machines in the purpose-built *ProCan* facility, that can be operated 24-hours per day, seven days per week has, for the first time, created the potential for large-scale, high-throughput mapping of the human cancer proteome.

In the *ProCan* research program, proteomes will be generated for tens of thousands of cancers, for which the outcome of treatment is known. Machine learning will then be used to detect protein signatures that predict response to specific treatments. For this study, cancer samples for which genomic or other 'omic data are already available will be prioritized so that the optimal combination of proteogenomic data for predicting treatment response can be found for individual cancer patients.

Worldwide, ProCan is one of only two such facilities and the only one focused exclusively on cancer.

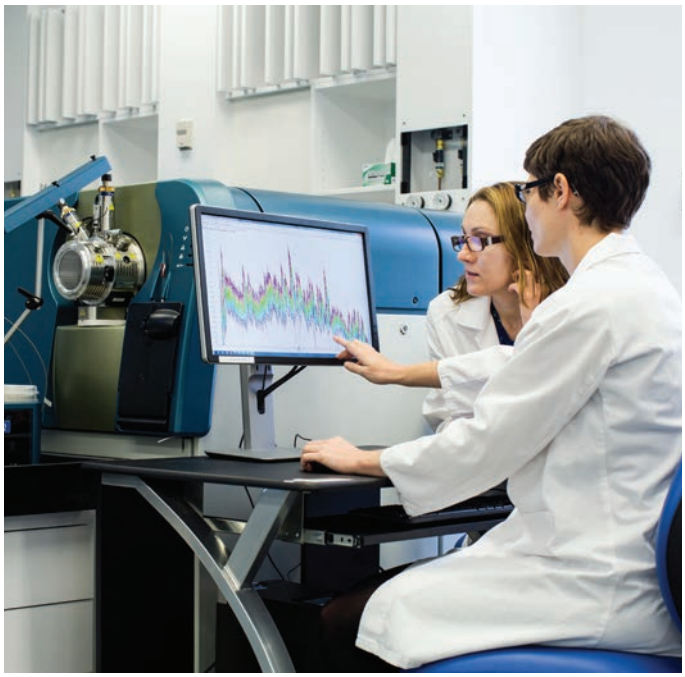
The Vision

1) Personalised Treatment

Our vision is that this technology will enable oncologists to identify the most suitable cancer treatments for each patient, thereby improving treatment outcomes; reducing direct and indirect costs of testing and care; and avoiding the side effects of ineffective therapies.

The technology is clinically relevant, and can be applied readily to existing diagnostic workflows. We expect to be able to replace most or all the protein-based cancer pathology tests currently in use for cancer diagnosis. Analysis of cancer samples will occur in a clinically-relevant time frame, typically 24-36 hours within receipt of sample.

Seeking Industry Partners



2) Improved Clinical Trials and Drug Development

ProCan can potentially identify biomarker signatures for response to drugs (new or abandoned) thereby assisting with clinical trial design and cohort selection.

By analysing proteomic signatures during early stage clinical trials, investigators will be able to select patients for later-phase clinical trials whose cancers exhibit the previously identified signatures. This will reduce costs and time involved in conducting clinical trials as well as increasing the probability of success of the trials.

It is fully expected that the vast analytical capabilities of *ProCan* will lead to the identification of new treatment targets.

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