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Building the Metabolomics Toolbox: Enabling Rapid Disease Diagnosis through Metabolic Profiling

Status	Current
Competition	Applied Genomics and Proteomics Research in Human Health
Sector	Health
Genome Centre	Genome Alberta
Project Leader	David Wishart

Project Description

Metabolomics, or metabolic profiling, is an emerging branch of genetic research. It uses small molecules called metabolites to detect changes in cell behavior and organ function. It also uses these chemicals to monitor and measure the larger-scale physiological changes that occur in response to subtle changes in the environment, thus helping to improve our monitoring of adverse drug reactions and better understand individual sensitivities to prescription drugs. Physicians and scientists around the world are now beginning to realize that metabolic profiling will have a significant impact on the diagnosis, prediction, prevention and monitoring of many genetic, infectious and environmental diseases.

The Building The Metabolic Toolbox: Enabling Rapid Disease Diagnosis Through Metabolic Profiling project will use mass spectrometry, chromatography, and Nuclear Magnetic Resonance (NMR) spectroscopy to achieve its goal of becoming the first group in the world to "complete" the human metabolome. "The term metabolome, like genome or proteome, refers to the complete complement of metabolites found in or produced by an organism," explains Dr. Wishart. "Through our work on this project, we will make an important contribution to establishing revolutionary advances in medical diagnostic testing. These tools will allow literally hundreds of normally expensive and time-consuming medical tests to be performed in just a few minutes. We expect these new tools to shorten diagnosis time by a factor of 100, and reduce testing costs by a factor of 1000 or more."

This large-scale and integrated effort will involve the identification and quantification of known and unknown metabolites in human tissues and fluids. Building on this effort, and the very valuable data it will provide, the research team will partner with Chenomx Inc. to design, prototype and produce a refrigerator-sized clinical NMR system, expected to be commercializable within three years. These tools will perform rapid, inexpensive, and comprehensive metabolic profiling in support of disease diagnosis or prediction, toxicological testing and personalized healthcare.

This project brings together researchers from several Canadian universities, hospitals, research institutes and industry to assist in the development of instruments, technologies and methodologies that will have a significant, positive impact on Canadian health care and health management within the next five years. Through their partnership with Chenomx Inc., the project team intends to make Canada an international leader in the development and deployment of databases, metabolic profiling instruments, and software.