

UA researchers first to complete the human metabolome

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Researchers at the University of Alberta, in Edmonton, Canada, have announced the completion of the first draft of the human metabolome, the chemical equivalent of the human genome.

The metabolome is the complete complement of all small molecule chemicals (metabolites) found in or produced by an organism. By analogy, if the genome represents the blueprint of life, the metabolome represents the ingredients of life.

The scientists have catalogued and characterized 2,500 metabolites, 1,200 drugs and 3,500 food components that can be found in the human body.

The research is published in the journal *Nucleic Acids Research*.

The researchers believe that the results of their work represent the starting point for a new era in diagnosing and detecting diseases.

They believe that the Human Metabolome Project (HMP), which began in Canada in 2004, will have a more immediate impact on medicine and medical practices than the Human Genome Project, because the metabolome is far more sensitive to the body's health and physiology.

"Metabolites are the canaries of the genome," says Project Leader Dr. Wishart, professor of computing science and biological sciences at the University of Alberta and Principal Investigator at NRC, National Institute for Nanotechnology. "A single base change in our DNA can lead to a 100,000X change in metabolite levels."

This \$7.5 Million project funded by Genome Canada through Genome Alberta, the Canada Foundation for Innovation (CFI), Alberta Ingenuity Centre for Machine Learning, and the University of Alberta will have far reaching benefits to patient care.

"The results of this research will have a significant impact on the diagnosis, prediction, prevention and monitoring of many genetic, infectious and environmental diseases," stated Dr. David Bailey, President and CEO of Genome Alberta.

The metabolome is exquisitely sensitive to what a person eats, where they live, the time of day, the time of year, their general health and even their mood. The HMP is aimed at allowing doctors to better diagnose and treat diseases.

"Most medical tests today are based on measuring metabolites in blood or urine," Wishart says. "Unfortunately, less than 1% of known metabolites are being used in routine clinical testing. If you can only see 1% of what's going on in the body, you're obviously going to miss a lot."

By measuring or acquiring chemical, biological and disease association data on all known human metabolites, the HMP Consortium, which consists of some 50 scientists based at the University of Alberta and the University of Calgary, has spent the past two and half years compiling the remaining 95% of all known metabolites in the human metabolome. Detailed information about each of the 2500 metabolites identified so far can be found on the Human Metabolome Database (HMDB) at www.hmdb.ca.

"With the data in the HMDB, anyone can find out what metabolites are associated with which diseases, what the normal and abnormal concentrations are, where the metabolites are found or what genes are associated with which metabolites," Wishart says.

"It's the first time that this sort of data has been compiled into one spot. By decoding the human metabolome, we can identify and diagnose hundreds of diseases in a matter of seconds at a cost of pennies," Wishart added.

Source: University of Alberta

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