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Functional Genomics of Type 1 Diabetes

Status	Past
Competition	Competition II
Sector	Health
Genome Centre	Ontario Genomics Institute
Project Leaders	Jayne Danska

Project Description

There is unanimous agreement that Type 1 Diabetes (T1D) is a complex, autoimmune-mediated disease caused by multiple genetic risk factors and currently unknown environmental factors. The incidence of T1D varies widely between populations. Canada has the third highest rate in the world, and approximately \$13 billion is spent annually in T1D-related health care, disability, lost work, and premature deaths.

While childhood T1D was uncommon in the first half of the 20th century, its incidence has risen rapidly over the past 50 years in Finland, England, Norway, Israel, Austria and several other countries. The reasons for the increasing incidence of T1D are not known, largely because the etiology of the disease is still poorly understood.

Our aim was to identify key genes conferring T1D risk to humans, and gain insight into the biological pathways that confer early stages in disease progression. Results from our analyses of rat and mouse rodent models were used to compile a list of potential T1D related genes for family-based association studies. Leveraging the recent progress in high-throughput genotyping platforms and human HapMap data, we designed a genotyping analysis to examine 176 genes from our list.

Findings generated through our program will significantly impact our understanding of T1D. Markers to identify at-risk individuals prior to overt disease promise great opportunity for use of tailored therapeutics.

Importantly, the progress made under this project was essential to formation of an expanded \$15M, 4 year T1D research effort that recently began funding with support from Genome Canada/Ontario Genomics Institute, the National Institutes of Health, Celera Diagnostics, Inc., several European funding agencies, and support from our research institutions.

Fast Facts

Highlighted outcome: identification of key genes conferring Type 1 Diabetes (T1D) risk to humans and insight into the biological pathways that confer early stages in disease progression

Number of research personnel employed by the project: 45

Number of peer reviewed publications published: 13 journal articles, 1 book, and 35 invited presentations

Number of patents in process or obtained: 1 invention disclosure for the identification of a gene potentially controlling T1D and Human Hematopoiesis, and 1 provisional patent for three novel loci for T1D susceptibility