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## Development and Applications of Functional Genomics Technologies

<b>Status</b>	Past
<b>Competition</b>	II
<b>Sector</b>	Development of New Technology
<b>Genome Centre</b>	Ontario Genomics Institute
<b>Project Leader</b>	Jim Woodgett

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### Project Description

The Human Genome Project documents the complete DNA sequence, not only of humans, but of over 300 other organisms, with more to come. The next step is to turn this wealth of information into useful knowledge so that it can be applied to medical and biological advances. This kind of research is called "functional genomics" and it seeks to learn how genetic information coded in DNA directs all the workings of a living organism.

It is well known that advancements in new fields of science—such as functional genomics—depend on new technology. The goal of our research was to develop new techniques and measuring instruments for functional genomics, and to apply them to basic research and clinical studies. Our focus was on a new technology called DNA micro-arrays. This is a method of measuring with great accuracy and acute sensitivity the read-out from each individual gene in any organism. In order to improve this technology, we brought together a team of experts in biology, computer science, informatics and engineering to work in one of the World's largest micro-array production and analysis programs at the University Health Network.

Our technical developments in DNA micro-arrays include the following: miniaturization to reduce the cost and complexity of experiments; automation of micro-array fabrication; new robots; increased rapidity of data collection; and better reliability of results. One of our robot designs is now sold commercially. We have developed better array design through the use of computational algorithms, more efficient storage and recovery of data from DNA micro-array experiments, and better ways to compare our data with other researchers in the world. We have begun to use micro-arrays to study the expression of genes in children's leukemia, ovarian and prostate cancer, cancer of the kidney, and heart disease. We provide DNA micro-arrays, training and support to over 300 research laboratories in 27 countries.

## **Fast Facts**

***Highlighted outcome:*** A robot design that is now sold commercially

***Number of research personnel employed by the project:*** 40

***Number of peer reviewed publications published:*** 44 plus 1 book, 3 book chapters and 87 invited presentations

***Resources generated:*** 5 new devices, 1 reagent and 1 diagnostic marker; tens of thousands of DNA micro-arrays for researchers in Canada and abroad

***Number of public outreach events held:*** 22, including lectures, newspaper, magazine and TV articles, and public lectures