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## **Novel Rapid Molecular Theranostic Technologies for Nucleic Acid Detection**

<b>Status</b>	Current
<b>Competition</b>	Applied Genomics and Proteomics Research in Human Health
<b>Sector</b>	Health
<b>Genome Centre</b>	Genome Quebec
<b>Project Leader</b>	Michel Bergeron

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### **Project Description**

#### *Developing diagnostic tests to identify microbes causing infections in less than one hour*

The World Health Organization identifies infectious diseases as one of the world's most pressing health challenges. Fighting virulent diseases like SARS means working against time—a difficult challenge when most diagnostic technologies are slow, expensive, require highly skilled personnel, and are not practical for point-of-care or field applications. The absence of fast testing carries a heavy price: imprecise diagnosis, inappropriate therapy, over-use of antibiotics, development of drug resistance, high health-care costs, and difficulty in controlling epidemics.

For testing to be useful in preventing infection, Dr. Bergeron explains, physicians and their patients need results in less than one hour. Developing rapid, affordable molecular diagnostic tests is key to achieving this goal. Led by Dr. Bergeron, the Novel Rapid Molecular Theranostic Technologies for Nucleic Acid Detection project will bring diagnosis of infectious diseases into the twenty-first century. Combining the unique and complementary expertise of researchers from Université Laval, University of California at Irvine and three institutes of the National Research Council of Canada, Dr. Bergeron's team is developing new technologies for the rapid and affordable identification of infection-causing microbes.

In the Molecular Theranostic Technologies project, they will develop microscopic instruments that will be incorporated onto compact discs engraved with microchannels through which samples can be moved by centrifugal force. One CD will prepare clinical samples and extract their genetic material; one will rapidly identify nucleic acids on DNA chips; and one will amplify target gene sequences.

These instruments will enable diagnostic tests that detect respiratory viruses and microbes causing bloodstream infections on a single, easy-to-use micro total analysis system ( $\mu$ TAS) CD that will extract, amplify, and detect nucleic acids from any living organism in under an hour. Researchers will be able to detect many more microbes simultaneously, and low-cost manufacturing means that even developing countries could afford the CDs. IDI, the project's industrial partner, will bring the results to market, providing products for researchers, diagnostic laboratories, doctor's offices, clinics, dispensaries, and field operations.