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Fiber Optic Nucleic Acid (FONA) Biosensor Based Gene Profiling

Status	Past
Competition	II
Sector	Development of New Technologies
Genome Centre	Ontario Genomics Institute
Project Leader	Alex MacKenzie, Paul Piunno and Ulrich Krull

Project Description

DNA and its close relative, RNA, (both are called nucleic acids) carry the code of life in all of Nature's creatures. By studying nucleic acids scientists can learn a great deal about human genetic diseases, and disease-causing viruses and micro-organisms. Nucleic acids are also important in environmental, defence, veterinary and agricultural applications. For all of these studies, scientists need to measure very accurately the amount of nucleic acids in a sample. Current methods have defects and we need new ones with fewer limitations.

The goal of this project was to develop a new kind of nucleic acid sensor (a "biosensor") that is reusable, sturdy, rapid, accurate, selective, sensitive and cheap. We approached this by putting together a team that included medical geneticists, chemists, molecular biologists, engineers and computer scientists to work together to develop a new instrument. It is based on the idea that certain chemical probes can detect specific stretches of DNA or RNA when attached to the surface of optical fibres. When the DNA or RNA to be detected is tagged with a light-emitting substance and binds to the optical fibre, it emits light that travels through the fibre and can be measured very accurately. Each measurement requires only a few minutes and the biosensor can be reused at least 100 times. We demonstrated the value of this new instrument by evaluating DNA that is associated with Spinal Muscular Atrophy, a very severe childhood genetic condition.

Fast Facts

Highlighted outcome: Development of a new method to measure the amount of DNA and RNA in human and other biological samples

Number of research personnel employed by the project: 9

Number of peer reviewed publications published: 8

Resources generated: Prototype instrument