

Ideas on the Edge



Injecting Hope

SOME PATIENTS WITH CARDIOVASCULAR DISEASE DON'T HAVE ANY TREATMENT OPTIONS. BUT GENE THERAPY PIONEERED BY DUNCAN STEWART AT ST. MICHAEL'S HOSPITAL MAY INJECT NEW HOPE.

"Some patients are just out of luck in terms of our standard toolbox."

Dr. Duncan Stewart is talking about the 15 percent of patients who aren't candidates for the most common treatments used in cardiovascular disease—the deadly narrowing of blood vessels inside the heart due to the build-up of plaque. The disease is usually treated by re-enlarging the affected vessels with a balloon catheter, or transplanting healthier vessels from elsewhere in the body. But the location of the narrowing, or the extent of the damage, can make both of these approaches unworkable.

Now, however, Dr. Stewart and a team of researchers at St. Michael's Hospital in Toronto are working on a promising alternative. Using facilities

Heart patient John Moore was unable to walk more than a few steps before undergoing an experimental procedure developed at St. Michael's Hospital. Now he works out daily on a treadmill.

funded in part by the Ontario Innovation Trust, they've developed a technique for injecting genetic material directly into heart tissue to stimulate the growth of new blood vessels.

The process begins with the use of a cutting edge navigational catheter that creates a three-dimensional map of electrical activity in the heart. "We're looking for regions that have activity but that don't contract," explains Dr. Stewart. "That's the hallmark of severe lack of blood flow."

Using the map, doctors guide a different catheter to the affected area and inject directly into the heart a solution containing millions of lab-grown copies of a gene that carries instructions for making the proteins used in blood vessel growth.

Some of the injected genes are absorbed into cells in the affected area of the heart, and turn those cells into factories for the release of the needed protein. New blood vessels grow as a result and the heart recovers some of its capacity.

At least, that's the theory.

A final assessment can't be made until

the study is complete and the records are "unblinded." To ensure an objective outcome, all treatments were arranged so that not even Dr. Stewart knows who among the 110 subjects received the actual gene therapy and who received a "placebo" injection.

RESEARCH THAT MATTERS
REAL-WORLD BENEFITS FOR ONTARIANS:

- treatment for previously fatal diseases of the circulatory system
- insights into other possible life-saving applications of gene therapy

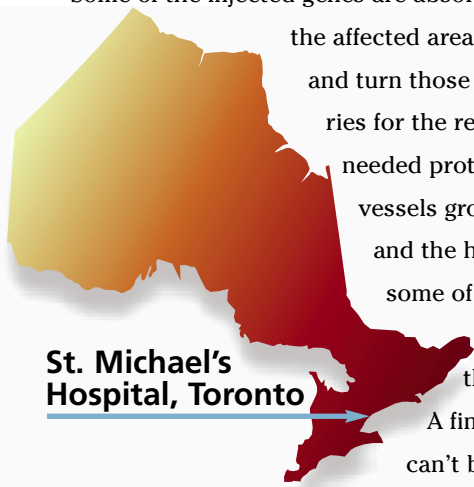
Early indications, however, are encouraging. "We've had a number of patients who have been significantly improved," Dr. Stewart reports. Windsor resident John Moore was unable to walk more than a few steps before the

procedure. Now he works out daily on a treadmill. "He prances into the office," says Dr. Stewart. "And that's not unusual. We have a number of patients like this." But while he admits to a growing sense of anticipation, he ultimately refuses to speculate on the outcome. "We'll have to be patient, and wait and see."

In the meantime, Dr. Stewart and his colleagues are building on what they've learned during the three-year study to develop a similar procedure for dealing with high blood pressure in the vessels that serve the lungs. It's another disease that, until now, has had a fatal prognosis. But with gene therapy, an injection of hope may be on the way.



Dr. Duncan Stewart (left), with one of the patients in the gene therapy study, Mr. Terence Deane.



St. Michael's Hospital, Toronto

Project: Cardiovascular Gene Therapy Initiative
Institution: St. Michael's Hospital
Research Sector: Health Sciences
Principal Investigator: Duncan Stewart
Trust Investment: \$1,685,107
CFI Investment: \$1,685,107
Total research investment from all sources: \$4,212,766



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Infrastructure for Innovation About the Ontario Innovation Trust

The Ontario Innovation Trust was created in 1999 by the Government of Ontario to invest in research equipment and facilities at Ontario's universities, colleges, hospitals and other non-profit research institutions. The Trust is governed by a volunteer Board of Directors, according to the terms of a Trust agreement established by the Ontario government. A small permanent staff looks after day-to-day operations.

Since its inception, the Trust has committed almost \$843 million to strengthen Ontario's position in the global marketplace of ideas. This represents more than a third of the \$2.44 billion in total funding that has been invested in Trust-supported projects.