Researchers can predict heart transplant patient's health earlier

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Michael Mengel, a pathology researcher with the Faculty of Medicine & Dentistry, has found a new way to analyze biopsies from heart transplant patients by looking at their genes. This allows him to make an early prediction whether the transplant is working.

This is extremely important in heart transplant patients because a successful outcome depends completely on doing a biopsy of the heart tissue and prescribing treatments if necessary. In other organs transplants, doctors can use other measurements.

It's hoped the new technology and process developed in the Faculty of Medicine & Dentistry will become a standard of care worldwide, and improve patient care within the next three to five years, says Mengel.

Using what is called gene chip technology, Mengel can look at all 54,000 human genes of a heart transplant biopsy. Then, by using software algorithms developed by the team at the faculty's Alberta Transplant Applied Genomics Centre, he can reduce them to a dozen single numbers, all of which are necessary to interpret what is happening and make a diagnosis.

"This system of molecular annotation to predict prognosis is better than anything else available currently," said Mengel. "We get more information out of the tissue than we were able to before we could read all the genes."

The current standard of care is for pathologists to use a microscope and assess single cells in the diseased tissue. The problem is, pathologists can see tissue lesions but can't see finer details like the difference between tissue injury and rejection.

With Mengel's new approach they can go beyond the microscope and assess changes in the molecules in a tissue. This helps pathologists tell the difference between certain disease processes. Based on such improved diagnosis, physicians can start appropriate treatment earlier, further improving the patient's long-term outcome after getting a heart transplant.

"Molecules also give mechanistic insight and can help to discover new drug targets," adds Mengel.

The group is getting close to having this used worldwide in clinics. The next trial, which will begin in 2011, will be an international multi-centre

validation trial. They'll send the new type of biopsy results to transplant physicians across the United States, Germany, Spain and the United Kingdom and get feedback on the process and how efficient and useful the data is in a clinical setting.

He's optimistic that in a few years, pathologists and transplant doctors elsewhere will start using the process he and his team have developed. "That (time frame) sounds long for individual patients, but in terms of device development, in the time frames the health-care industry usually calculates things, it is a very short period because they usually think in terms of 10 or 15 years," notes Mengel. "It's not more research; it's already application in real patients."

The Alberta Transplant Applied Genomics Centre in the Faculty of Medicine & Dentistry is leading the world in this field. The centre's director, Phil Halloran, has worked in transplant immunology for more than 30 years. Recently this renowned group published work with gene chips and kidney transplants, showing the molecules could better predict outcome than any other clinical or pathological parameter.

The group's recent work in cardiac transplant patients is published in *American Journal of Transplantation*.

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