

Discovery may lead to targeted heart disease treatments

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University of Guelph researchers have found the location and effect of abnormal heart proteins that can cause cardiac failure, a discovery that points to potential new ways to treat the most costly health problem in the world.

The study appears today in [PLoS ONE](#), a peer-reviewed international journal published by the Public Library of Science.

"In order to cure heart disease, you have to understand its fundamental properties," said study author John Dawson, a [molecular and cellular biology](#) professor.

"So we looked at variants of naturally occurring proteins that are found in people with heart disease."

The research team included graduate students Maureen Mundia, Ryan Demers, Melissa Chow and Alexandru Perieteanu.

Heart disease and stroke is the leading cause of death in Canada, killing tens of thousands each year. Treating cardiovascular disease costs more than \$20 billion a year in physician and hospital costs, lost wages and reduced productivity.

The study examined gene abnormalities for the actin protein and its role in [heart failure](#).

As the most abundant protein in the body, actin helps in vital processes including muscle movement.

Abnormal actin genes are linked to heart diseases such as hypertrophic cardiomyopathy (HCM) and dilated cardiomyopathy (DCM). HCM causes excessive thickening of the heart muscle and can lead to [sudden cardiac death](#). Under DCM, the heart weakens and enlarges, and cannot pump blood efficiently.

Scientists had already linked HCM and DCM to 14 actin gene abnormalities. "But this is the first time that many of these variants have been studied at the molecular level," Dawson said.

Understanding the molecular deficiencies of actin variants is a starting point for figuring out the underlying mechanisms of heart diseases, he said.

The researchers inserted [human genes](#) into [insect cells](#) to make heart muscle proteins for study. Dawson's lab is one of the few in the world able to do this work.

They then mapped where on the abnormalities occurred and their effects. Three were in spots that resulted in problems with heart contractions; three others were in locations that affected stability and efficiency.

Dawson hopes their work will help in developing more targeted treatments.

"[Heart disease](#) has many different forms and variants. If we can design specific therapies that address the precise mechanisms of the things going on — treat the root cause rather than the whole system — then we can improve the quality of life for people."

Dawson belongs to a growing cardiovascular research group at the University of Guelph, one of few such groups worldwide studying cardiovascular disease from single molecules to animal models.

"It makes Guelph a unique place to do this research," he said.

More information: The study is available online:
<http://dx.plos.org/10.1371/journal.pone.0036821>

Provided by University of Guelph

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