Antibiotic could be the key to treating heart ailments

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Dr. Rick Schulz and researcher Mohammad Ali have discovered that the MMD2 molecule is responsible for cutting an essential protein in heart tissue.

A researcher at the University of Alberta has discovered that treating basic heart ailments could be as simple as using a well-known antibiotic.

Richard Schulz, a professor of pediatrics and pharmacology in the Faculty of Medicine & Dentistry, and his team were looking at a specific type of cardiac injury called ischemia and reperfusion injury. This happens when a patient suffers a heart attack caused by a blockage in a coronary artery. The sooner the blockage is relieved by reperfusion, which is the resuming of the blood flow, the less overall damage the

heart muscle receives and the better the recovery for the patient.

But in many types of heart disease the body's largest protein, titin, is cut into pieces inside the heart. This is dangerous because titin is a major contributor in the heart's filling and pumping action. What Schulz and his team discovered is that it's a molecule found in the heart muscle—Matrix Metalloproteinase-2, or MMP2—that is cutting titin.

By targeting MMP2, Schulz says the occurrence of titin being cut will be significantly lessened. That targeting, or inhibiting of MMP2, can be done by using the tetracycline family of drugs, known for their effectiveness as antibiotics and also used for acne sufferers,

"The exciting thing about this is that people have not considered using MMP inhibitors to treat very basic heart diseases," said Schulz, who added it is an inexpensive drug that should be tested as a treatment for one of Canada's top killers, cardiovascular disease.

Schulz is also thinking more broadly than just ischemia reperfusion, because ischemia reperfusion is a type of oxidative-stress injury to the heart, whereby the body produces too many chemically reactive molecules containing oxygen and this overwhelms the body's anti-oxidant protective systems. Excess oxidative stress is thought to be the cause of a number of heart problems. Antioxidants might reduce the risk of this dangerous process, says Schulz, but as MMP2 is activated by oxidative stress, its inhibitors could be much more specific and effective drugs to use to treat patients with heart diseases.

"You find a kernel of where things could affect a lot of pathways to heart disease, whether it's ischemia reperfusion or heart failure or transplant rejection," said Schulz, whose work is funded by the Canadian Institutes of Health Research. "We have a feeling that this is something that could be used for a wide variety of heart diseases."

More information: Schulz's team will now test MMP2 inhibitors in a number of heart disease models. The results of this study were published in the Nov. 1 edition of *Circulation*.

Provided by University of Alberta