

Researchers discover first-ever link between tiny genetic structures, imminent heart attack risk

March 25 2012

Researchers at the Intermountain Medical Center Heart Institute have, for the first time ever, made a connection between tiny genetic molecules called microRNAs and the imminent threat of a heart attack, according to a new study.

The findings are an important first step toward developing a method for predicting heart attacks in people who show no outward signs, but may be at great risk of having a [heart attack](#). The research group will present study results today (March 25) at the American College of Cardiology's 61st Annual Scientific Session in Chicago.

"About half of all heart attacks occur in patients with no previous signs of [heart disease](#). The heart attack is a surprise, and very often it's deadly," says Jeffrey L. Anderson, MD, chief of [cardiovascular research](#) at the Intermountain Medical Center Heart Institute and one of the study's authors. "This project has a lot of promise in helping us develop a way to identify these patients who don't show any obvious signs but are at imminent risk of suffering a heart attack."

The research group from Intermountain Medical Center, the flagship facility for the Intermountain [Healthcare system](#), examined [blood samples](#) for the presence of six microRNA molecules that had previously been identified in patients after a heart attack. These genetic structures serve as an "on-off switch" for regulating the expression of a host of

genes. When their levels drop, the genes they help to control are no longer regulated and can go "rogue."

The [blood](#) samples came from 85 patients who were sorted into four groups:

- Pre-heart attack patients, whose blood was drawn one to seven days before a heart attack
- Post-heart attack patients, whose blood was drawn within 36 hours after a heart attack
- Patients with [cardiac problems](#), but no heart attack within one year before or after blood sample collection
- Healthy patients with no cardiac problems

"We found that three of those six microRNA molecules were present in significantly lower levels in patients who had a heart attack within the next seven days compared to the two groups who didn't have a heart attack," says Oxana Galenko, who holds a doctorate in biomedical science and is lead author of the study.

The researchers believe the low levels of microRNA and the resulting genetic dysfunction may herald the heart attack. The three microRNAs are known as miR-122, miR-145, and miR-375.

"We don't know exactly which genes are controlled by these microRNAs, but this study gives us a good starting point for looking more deeply into the ways they influence the heart," says John Carlquist, PhD, director of Intermountain Healthcare's Cardiovascular Molecular and Genetic Laboratory at LDS Hospital and one of the study's authors.

The researchers envision a day in the not-too-distant future when a patient with cardiac risk factors does regular blood testing to watch for

signs of imminent heart attack. Developments in nanotechnology one day may make it possible to continuously monitor an individual's blood for changes in these markers and alert a physician at any sign of danger.

The group says this study was possible only at Intermountain Healthcare, which helped to pioneer computerized health data collection in the 1950s and continues today. Intermountain is home to the world's largest cardiovascular DNA and plasma bank repository, which includes samples from more than 20,000 consenting patients. Combining these resources allowed researchers to search medical records for patients who had a heart attack and also had a frozen blood sample in storage that was drawn in the days before the heart attack.

"Because of this trove of patient records and specimens, we're uniquely equipped to do a study like this," says Dr. Carlquist.

The group will continue their research into microRNAs and heart attack with another study looking at a larger sample of [patients](#), says Dr. Galenko.

Provided by Intermountain Medical Center

Citation: Researchers discover first-ever link between tiny genetic structures, imminent heart attack risk (2012, March 25) retrieved 12 May 2024 from <https://medicalxpress.com/news/2012-03-first-ever-link-tiny-genetic-imminent.html>

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