Molecular signature of heart attack predicts longer-term outcomes

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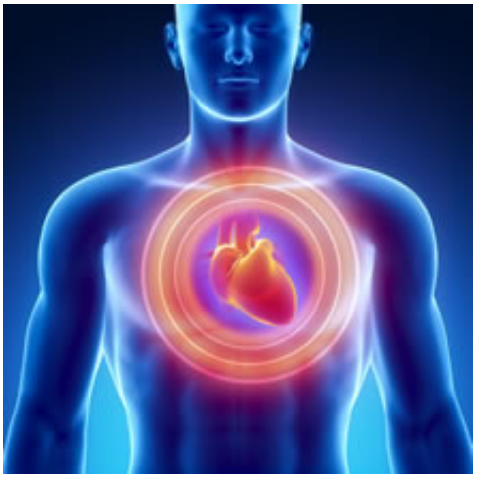

How do doctors know whether someone is really having a heart attack? At Emory, this is defined by the “Acute Coronary Syndrome Protocol”. Briefly, it’s a combination of information from the patient’s experience (chest pain), electrocardiography and levels of troponin, a blood marker of damage to the heart muscle.

(Medical Xpress)—A molecular signature seen in blood from patients who are experiencing an acute heart attack may also predict the risk of cardiovascular death over the next few years, Emory researchers have found.

The results were presented Monday at the American College of Cardiology meeting in Washington DC by cardiovascular research fellow

Nima Ghasemzadeh, MD. Ghasemzadeh is working with Arshed Quyyumi, MD, director of Emory's Clinical Cardiovascular Research Center, as well as Greg Gibson, PhD, director of the Integrative Genomics Center at Georgia Tech.

Ghasemzadeh and colleagues examined 337 patients undergoing cardiac catheterization at Emory. Just 18 percent of the patients in this group were having a heart attack. This research is a reminder that the majority of patients who undergo cardiac catheterization, and thus are suspected of experiencing a heart attack, are not actually having one at that moment.

Researchers took peripheral blood samples and analyzed them for patterns of gene expression, using microarrays to scan thousands of genes and measure which ones are turned on the blood cells and which are turned off. They used this information to generate a pattern to look for in the 31 patients in the group who would later die from cardiovascular causes.

They separated the genes into nine "axes", each representing a particular biological pathway. In patients that were experiencing a heart attack, an axis linked to the function of one type of white blood cell, lymphocytes, was down and another linked to another type of white blood cell, neutrophils, was up. The researchers interpret this as representing a pro-inflammatory response.

Seeing these patterns could help predict whether patients would then die from cardiovascular causes over the next few years (2.4 years average follow-up). This analysis was useful even on top of more mundane predictive information such as: age or whether someone had diabetes or impaired kidney function. Independently of other risk factors, patients who had a strong presence of the heart attack-linked pattern were more than 8 times more likely to die of cardiovascular causes.

Ghasemzadeh says his team's work is not aimed at replacing a doctor's judgment on whether someone is having a heart attack. Rather, it's a way of sifting through gene expression data, with an eye to crafting a test for longer-term outcomes that can be used to guide treatment. Doctors could choose to provide more intensive therapy to the patients who have higher risk, according to this test. This could be helpful in designing clinical trials, for example.

Although for statistical analysis the team separated the patients into discovery and validation groups, Ghasemzadeh adds that the results need to be further validated in larger studies. The patient group was almost all Caucasian, so additional confirmation in other populations will also be desirable.

Quyyumi notes that the molecular signature that predicts cardiovascular death is valid even for the larger group of patients who were not experiencing a heart attack when they were evaluated.

In addition, Ghasemzadeth presented data Sunday on the predictive capacity for two biomarkers related to progenitor stem cells, which are important for regenerating blood vessels.

In a similarly designed study of 479 patients undergoing cardiac catheterization, the Emory team divided patients into four groups based on two markers: the level of circulating hematopoetic progenitor cells, and the level of SDF-1, a "chemoattractant" responsible for the homing of progenitor cells to tissues that need repair after loss of blood supply.

Provided by Emory University