Marker of oxidative stress predicts heart disease outcomes

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Judging from the number of juices and teas advertised as containing antioxidants, consumers are aware of the dangers of oxidative stress. But what is the best way to measure it - and fight it?

Doctors at Emory University School of Medicine have identified a substance in the blood that may be useful in predicting an individual's risk for heart disease.
The substance is cystine, an oxidized form of the amino acid cysteine and an indirect measure of oxidative stress.

In a study of more than 1,200 people undergoing cardiac imaging at Emory because of suspected heart disease, people with high levels of cystine in the blood were twice as likely to have a heart attack or die over the next few years.

Riyaz Patel, MD, a postdoctoral researcher at Emory's Cardiovascular Research Group, is presenting the results Monday at the American Heart Association Scientific Sessions meeting in Orlando.

Patel was part of a team led by Arshed Quyyumi, MD, professor of medicine (cardiology) at Emory University School of Medicine.

When considered independently of variables such as the presence of diabetes, high levels of cystine still predicted future trouble, Patel says. In the current research, high levels means the quarter of the group of patients with the highest levels.

"Cystine could be a valuable marker of cardiovascular risk, but it also has a direct harmful effect on cells, so reducing it may be a valuable treatment strategy," he says. "What's exciting is there are already known ways to intervene and drive down cystine levels in patients."

For example, a previous study has shown that supplementing the diet with zinc can lower cystine levels, he says.

Several studies have shown that levels of oxidized cysteine in the blood tend to rise as people age. Smoking and alcohol consumption are also linked with higher levels of oxidized cysteine.

Cysteine is itself a short-lived precursor to glutathione, one of the main antioxidants found inside cells, says Dean P. Jones, PhD, professor of medicine and director of the Clinical Biomarkers Laboratory at Emory University School of Medicine.

"We need to have a continuous supply of cysteine, but it is too reactive for us to have very much at any one time," he says. "We are not sure why the oxidized form of cysteine accumulates with aging and disease. But our studies show that when it accumulates, it activates inflammation in cells."

Jones and his colleagues have shown that when white blood cells are exposed to high levels of cystine, they display signs of inflammation and become stickier. That makes them more likely to adhere to blood vessels in the heart, an event that contributes to the development of heart disease.

The team has found that levels of cystine do not correlate with C-reactive protein, a blood marker of inflammation other scientists have studied for a possible relationship with heart disease. The team's future plans include comparing cystine to other markers of inflammation and

understanding the relationships between them.

More information: Effects of long-term zinc supplementation on plasma thiol metabolites and redox status in patients with age-related macular degeneration. SE Moriarty-Craige, KN Ha, P. Sternberg, M. Lynn, S. Bressler, G. Gensler, D.P. Jones. Am J Ophthalmol. 143(2):206-211 (2007)

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