

Spectrum Health study first to identify heart attack-causing plaque in living patients (w/ Video)

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We may be closer to predicting who is at risk for a heart attack, according to a recently published Spectrum Health study.

Researchers with Spectrum Health's Frederik Meijer Heart & Vascular Institute used new imaging technology on patients being treated for heart attacks. The imaging technology allowed researchers to identify the characteristic makeup, or signature, of arterial plaque blocking an artery and causing a heart attack.

Knowing what type of plaque is present in narrowed arteries may help a physician determine a patient's risk for heart attacks and may lead to novel treatment options to avoid a serious cardiac event.

Previous research during autopsies has shown that most major heart attacks called ST-segment elevation myocardial infarctions (STEMIs) are caused by the rupture of lipid core plaque (LCP), a type of plaque rich in cholesterol. However, this is the first study to document the presence of LCP in living patients. The LCP was detected with the use of near-infrared spectroscopy (NIRS) performed with a special coronary catheter.

The study used this NIRS system to measure cholesterol in the plaques of 20 patients experiencing a STEMI. The measurements were made after blood flow was reestablished but before a stent was placed to keep

the artery open.

The findings were published online this week in the *Cardiovascular Interventions Journal* of the American College of Cardiology.

"We have discovered a NIRS signature of the plaques which caused myocardial infarction, a leading cause of death and injury worldwide," said Ryan Madder, MD, a Spectrum Health interventional cardiologist and principal investigator of the study. "This signature is detectable at the time of cardiac catheterization using a novel intracoronary imaging device. It is our hope that this signature may be capable of predicting a myocardial infarction before it happens."

Madder says that these findings provide support for further research of arteries narrowed with LCP. He's interested in conducting a prediction study to determine if patients with significant deposits of LCP do have a higher risk of heart attack. "If using NIRS technology is validated as a reliable predictor of cardiac events, then randomized studies of promising systemic and local therapies could be conducted."

"Dr. Madder and the entire team at Spectrum Health have made a significant step forward in the effort to identify the cause of heart attacks in living patients," said James Muller, MD. Muller is chief medical officer of Infraredx, the company that developed the combined NIRS and ultrasound catheter. "It is likely that the signature of a heart attack identified in the Spectrum Health study is present long before the event and could therefore be identified before a dangerous [heart attack](#) has occurred. The Spectrum Health study will lead to large prospective studies of this possibility."

Muller has been active in the pursuit of vulnerable plaques for over 20 years, first as a member of the faculty of Harvard Medical School, and more recently in his role as chief medical officer of Infraredx. Madder

used an imaging system developed by Infaredx, Inc., which uses advanced plaque characterization technology, NIRS, with intravascular ultrasound, for identification of plaque structure.

The system provides an image that displays key structural elements of a blockage. At the same time, the system performs spectroscopic analysis of optical data to produce a Chemogram map that indicates the location of LCP and quantifies the lipid core deposit in the artery.

Further research is needed, said Madder. "Through an international collaboration with several other centers, further studies are currently underway and others are being planned to validate this signature and to determine if near-infrared spectroscopy can accurately predict future [myocardial infarction](#)."

Provided by Spectrum Health

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