Noninvasive magnetic resonance imaging may help predict who's at risk for a heart attack

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Mount Sinai researchers have discovered a new potential diagnostic tool that could provide clinicians with a much-needed window into the molecular activity of blood vessels. The findings, which could help identify patients at risk for heart attack and stroke, were published in the Jan. 16 issue of *Proceedings of the National Academy of Sciences*.

The study suggests that magnetic resonance imaging (MRI)—a highly sensitive technique that provides three-dimensional views of tissue at the molecular level—effectively measured macrophages or white blood cells, in the arterial walls of blood vessels. These detailed images allowed researchers not only to see macrophage activity, but also to determine whether the activity was unstable and likely to trigger a heart attack or stroke, explains senior study author Zahi A. Fayad, PhD, Director of the Eva and Morris Feld Cardiovascular Imaging Research Laboratory and a Professor of Radiology and Medicine (Cardiology) at The Mount Sinai Medical Center.

Dr. Fayad and his colleagues injected mice with a synthetic material that tracked down and attached itself to macrophages embedded in the arterial walls. Twenty-four hours after injection, MRI tests showed that measuring and assessing macrophages in the arterial walls yielded a 79 percent increase in detection compared with the initial baseline images taken the day before.

"Our study results clearly show that detecting and measuring macrophage levels using MRI could be an effective and non-invasive screening tool for what's becoming one of the leading public health threats worldwide," Dr. Fayad explains. "We have known that macrophages are red flags indicating inflammation in the blood vessels, and mounting evidence has cemented the causal relationship between inflammation and cardiovascular disease. Yet we lacked the technology to measure this inflammation at the molecular level and predict who was at risk. Now, the technology is here, and our findings demonstrate that this new approach in cardiovascular screening not only works, but works very well."

The next step is to test this new approach in larger animals before moving to human clinical trials. Dr. Fayad says it's possible this technique could become part of standard clinical practice in the next few years.

Atherosclerosis is the pathological cause behind cardiovascular, cerebrovascular, and peripheral arterial diseases. It is currently the leading cause of death in industrialized nations, and is estimated that in the next 15 years, cardiovascular diseases alone will be the leading cause of death worldwide.

Source: The Mount Sinai Hospital, Mount Sinai School of Medicine