MedicalXpress

Researchers reveal the nature of atherosclerosis from plaque initiation to thrombosis

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For the first time, researchers can provide early detection of plaques that have a high likelihood of clotting and/or rupture. Boston University School of Medicine (BUSM) scientists have observed the development and evolution of atherosclerotic plaques at the highest risk for thrombosis (clotting) by using non-invasive Magnetic Resonance Imaging (MRI).

The results were reported in the journal *Atherosclerosis*.

Atherosclerosis is an important contributor to heart attacks and strokes, the leading causes of death in developed nations despite progress in their prevention. Atherosclerosis is a complex disease with many stages, ranging from plaques that can remain clinically silent for decades ("stable") to dangerous ("vulnerable") plaques that in their most highly advanced stage ("highest risk") can suddenly form a blood clot (thrombus) in the vessel, leading to myocardial infarction or stroke.

Researchers at BUSM, under the direction of James A. Hamilton, PhD, Professor of Physiology and Biophysics and Research Professor of medicine at BUSM, pioneered the use of MRI to identify high-risk plaques in a unique experimental model encompassing both atherosclerosis and thrombosis (atherothrombosis). The group established criteria for distinguishing vulnerable and stable plaques from analysis of in vivo (from a living organism) images of mature plaques.

The plaques were then tested to determine their stability.

In the new study, images were obtained at monthly intervals to provide information about the pathways of progression (plaque history) of individual plaques in the vessel and to determine whether MRI can discriminate vulnerable and stable plaques at early times.

"Vulnerable plaques and stable plaques showed different physiological progression patterns beginning after one month. Stable plaques exhibited no features of vulnerability at any time, whereas vulnerable plaques showed a progression of vulnerable features, especially in the last month," explained Hamilton, who is the corresponding author.

According to Hamilton, successive MRIs could provide a non-invasive means of identifying plaques that are evolving to become a high risk for rupture. "This work provides us a unique model for evaluating potential therapies after vulnerable plaques are clearly established."

Provided by Boston University Medical Center