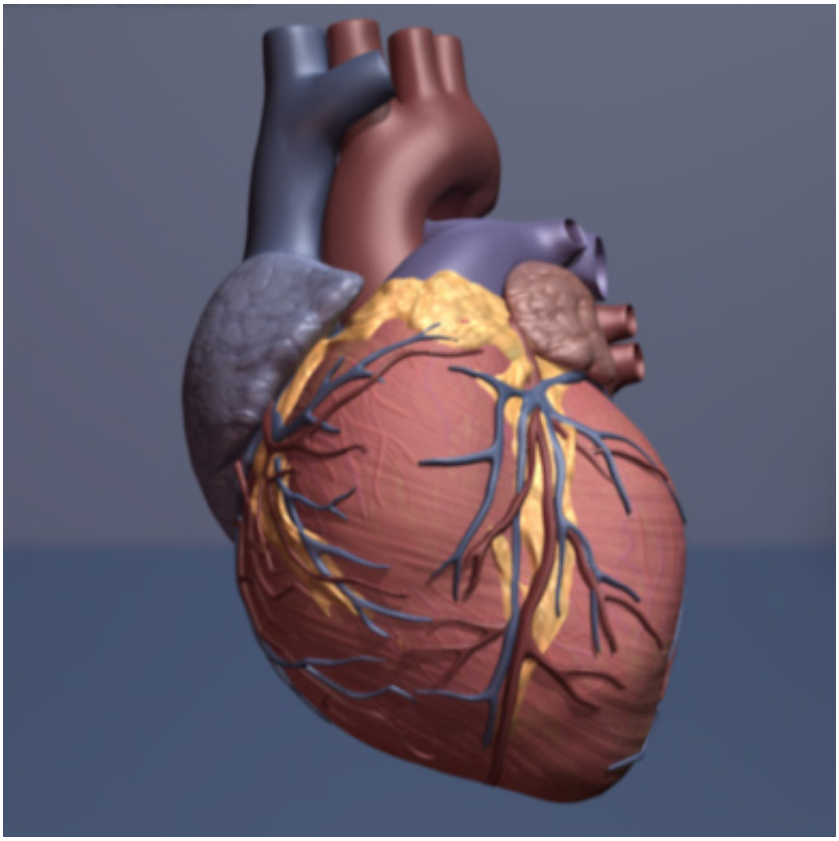
# Low levels of regenerative cells can lead to peripheral arterial disease

June 13 2016, by Jennifer Johnson Mcewen



Human heart. Credit: copyright American Heart Association

An Emory study published online this week in *Circulation Research* suggests that a disruption in the body's own regenerative capacity, measured by levels of circulating progenitor cells, may contribute to the development of peripheral arterial disease (PAD).

PAD is usually caused by plaque buildup, or atherosclerosis, in the peripheral arteries away from the heart. Despite sharing the same risk factors such as smoking, high blood pressure, high cholesterol and diabetes, only 20-30 percent of patients with coronary artery disease (CAD) develop PAD.

"Even though atherosclerosis is one of the most studied of all human diseases, the reason why some patients develop widespread atherosclerosis and PAD, while others develop only coronary disease - despite similar risk factors - is unknown," says Salim S. Hayek, MD, lead author of the study and Emory University cardiology research fellow at the Emory Clinical Cardiovascular Research Institute (ECCRI).

The Emory study investigated whether differences in progenitor cell counts could distinguish between patients with PAD and CAD and those with CAD alone.

Progenitor cells originate from bone marrow and circulate in peripheral blood. They are thought to be involved in vascular repair, promoting healing and recovery of blood flow.

Researchers looked at 1,497 patients participating in the Emory Cardiovascular Biobank, a prospective study enrolling patients undergoing left heart catheterization in the Emory system. The patients had a mean age of 65 and were 62 percent male.

They found patients with both PAD (in any of the carotid, abdominal, lower or upper extremity arteries) and CAD had significantly lower circulating progenitor cell counts, compared to those with only CAD. Researchers were specifically measuring CD34+ and CD34+/VEGFR2+, markers that are on the outside of the progenitor cells.

Most importantly, they found that having low numbers of these cells in the circulation was associated with worse cardiovascular outcomes – including death – and notably developing PAD in the future, which was measured as the occurrence of PAD-related events such as peripheral revascularizations or amputations.

"Our study not only provides information about the pathogenesis of PAD, it also suggests we may be able to use progenitor cell counts as a way to identify patients at risk of PAD. More investigation is needed in this area," says Hayek.

In the multivariable analysis, a 50 percent decrease in CD34+ or CD34+/VEGFR2+ counts were associated with a 31 percent (P=0.032) and 183 percent (P=0.002) increase in the odds of having PAD, respectively.

The CD34+ and CD34+/VEGFR2+ counts significantly improved risk prediction metrics for prevalent PAD. Low CD34+/VEGFR2+ counts were associated with a 1.40-fold (95 percent CI, 1.03, 1.91) and a 1.64-fold (95 percent CI 1.07, 2.50) increase in the risk of mortality and PAD-related events, respectively.

**More information:** Salim S Hayek et al. Circulating Progenitor Cells Identify Peripheral Arterial Disease in Patients With Coronary Artery Disease, *Circulation Research* (2016). DOI: 10.1161/CIRCRESAHA.116.308802

Provided by Emory University

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