

Bone Marrow Stem Cells Accelerate Atherosclerosis

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(PhysOrg.com) -- According to a new study at Columbia University Medical Center, excess numbers of stem cells in the bone marrow of mice accelerate the progression of atherosclerosis. Researchers found that large numbers of bone marrow stem cells create excessive numbers of white blood cells, which flock to cholesterol deposits on the artery wall (such as those shown here), enlarging and inflaming them.

Say the words “[stem cells](#)” and most people envision new therapies that replace [brain cells](#) lost to disease or worn-out hearts.

In [atherosclerosis](#), however, too many stem cells are a bad thing, according to a new study from researchers at Columbia University Medical Center and published online in *Science*.

In their study, excess numbers of stems cells in the [bone marrow](#) of mice accelerated the disease’s progression. The researchers found that large number of bone marrow stem cells create excessive numbers of [white blood cells](#), which flock to cholesterol deposits on the artery wall, enlarging and inflaming them.

“Unexpected finding”

The role of bone marrow stem cells was a surprise, says the study’s lead investigator, Alan Tall, MD, the Tilden-Weger-Bieler Professor of Medicine, professor of physiology and cellular biophysics, and director

of the Cardiovascular Research Initiative at Columbia University Medical Center.

“It’s been known for decades that a high white cell count is associated with atherosclerosis, but it’s been assumed that the white blood cells were simply a sign of inflammation,” Dr. Tall says. “No one had actually investigated the connection.”

With two researchers in his lab - Laurent Yvan-Charvet, PhD, and Tamara Pagler, PhD - Dr. Tall traced the increase in white blood cells back to a proliferation of blood cell-producing stem cells in the bone marrow. The rapid proliferation of bone marrow stem cells seems to be triggered by too much cholesterol in their cell membranes making them hyper-responsive to growth factors.

The finding changes the traditional view of atherosclerosis as a disease that happens only in the blood vessels. “Our study says atherosclerosis is more complex than that, and we need to look beyond the artery wall to understand the disease more fully,” Dr. Tall says.

HDL Keeps Stem Cell Proliferation in Check

Reducing the number of bone marrow stem cells could help prevent atherosclerosis and heart disease, so the researchers also looked for factors that control bone marrow stem cell proliferation.

In another surprise, they found that HDL (a.k.a. “good cholesterol”) - already well-known for its role in removing LDL (“bad” [cholesterol](#)) from arteries - also helps prevent atherosclerosis by suppressing bone marrow stem cell proliferation.

Though the treatment of atherosclerosis has been revolutionized by statins, which reduce LDL, large numbers of people are still at risk of

heart disease because of low HDL.

HDL can be raised through exercise, moderate alcohol consumption, and drugs such as niacin, but interventions specifically targeted at HDL have not yet been directly investigated for their ability to prevent heart disease.

New treatments may be on the horizon as HDL-raising therapies have moved again to the forefront of atherosclerosis clinical research. Several large clinical studies are ongoing, and results should be available in the next few years. And two other recent studies, also published online in Science in May, have discovered new molecules that regulate HDL, a finding that may lead to a new class of HDL-raising drugs.

Measuring the effectiveness of HDL stimulated by these new drugs remains a challenge in drug development, and the finding that HDL may suppress stem cell proliferation and decrease white cell counts gives researchers a new method for assessing the efficacy of new HDL-raising drugs.

Provided by Columbia University

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