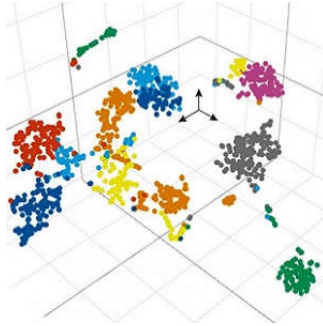


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## New actors identified in atherosclerosis



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Atherosclerosis is the most common cause of death and disease in the Western world. Still, there are a lot unresolved questions about how the disease develops. Using a new technique ("single-cell RNA sequencing"), German scientists have identified the immune cell populations in the affected vessels which play a significant role in the pathogenesis. Their findings are published in the journal *Circulation Research*.

"We used single-cell RNA sequencing to identify three different macrophage populations that can influence the development of atherosclerosis in different ways. This includes a macrophage population that has not been described previously," Clement Cochain sums up the central result of the recently published study. These populations were encountered in different disease stages as well as in different disease models.

The study was conducted by Professor Alma Zernecke-Madsen and her team at the Department of Experimental Biomedicine II at the Würzburg University Hospital, in collaboration with Dr Emmanuel Saliba and his team at the Helmholtz Institute for RNA-based Infection Research (HIRI) established at University of Würzburg in 2017, a branch of the Helmholtz Centre for Infection Research (HZI).

A high fat diet, lack of physical activity and smoking are among the key risk factors for atherosclerosis, which often begins with tiny damages of the interior vessel wall that lead to chronic inflammation.

"It has already been suspected that different macrophage subsets are at work in atherosclerotic vessels where they assume different tasks," Clement Cochain and Alma Zernecke-Madsen explain. In the past, however, scientists always failed to identify them because the suitable markers were not available. The use of single-cell RNA sequencing has now allowed the Würzburg team to be more successful.

This technique isolates the RNA molecules in single cells and analyses them using high-frequency sequencing. "The data delivered by this method provide information on the gene expression of each individual cell and give insight into their very special functions," Dr. Saliba explains.

The scientists took cell samples from a healthy aorta and an atherosclerotic aorta and sequenced them. They identified two types of macrophages only in the diseased vessels, namely monocytes and the so-called dendritic cells that derive from monocytes. In healthy vessels, they found local macrophages and several other immune cells.

As part of the immune system, monocytes circulate in the blood stream before migrating into the tissue to differentiate further to specific tissue macrophages. They are also part of the cell-mediated immune response and reside in the human body for several months.

The study provides a hitherto unknown picture of the immune cells in atherosclerotic plaques during atherosclerosis. "These findings open up new possibilities to study these cell populations and their respective functions during atherosclerosis in greater detail now," Alma Zernecke-Madsen says.

Source: [University of Würzburg](#)

Image Credit: Cochain/Vafadarnejad/Saliba/Zernecke

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