Immune system important in atherosclerosis

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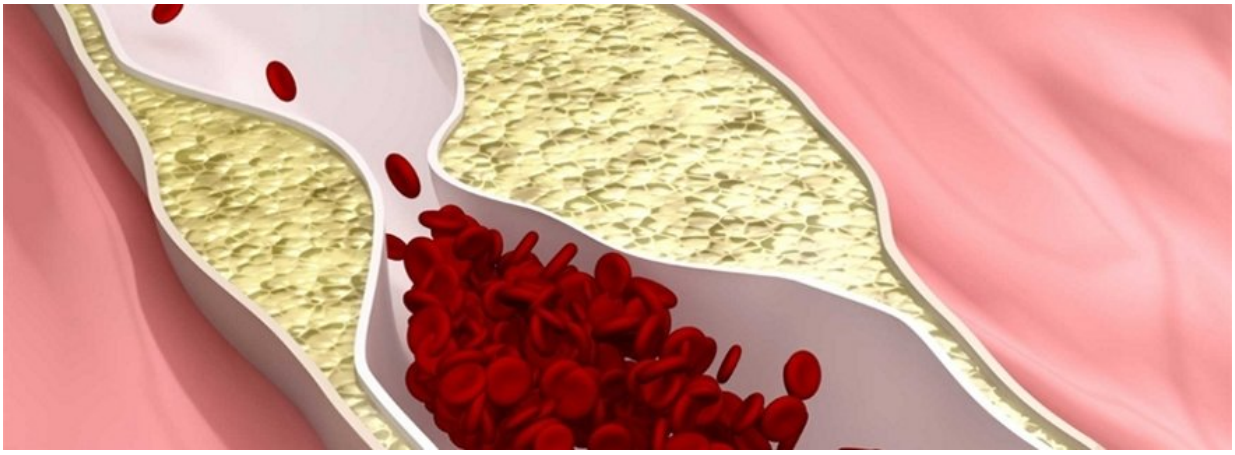

Credit: Leiden University

The immune system plays an important role in the development of atherosclerosis, the underlying cause of cardiovascular diseases. Thomas van der Heijden has discovered that immunosuppressants may play a preventative role. Ph.D. defence 19 December.

Atherosclerosis (the build up of fatty deposits in the arteries) is the underlying cause of many cardiovascular diseases. It is common for plaque to adhere to the walls of the blood vessels, particularly in the coronary arteries that transport oxygen to the heart. This plaque is made up of deposits of lipids or fat in immune cells, which narrow the blood vessels or even obstruct them altogether. Cholesterol is one particular fat that contributes to these kinds of deposits, which is how we know that a

diet low in cholesterol or saturated fats reduces the likelihood of cardiovascular disease.

"What's actually going on is that there is a process of inflammation within the plaque," Ph.D. candidate Thomas van der Heijden explains. This was the impetus for him to study the interaction between lipids and the immune system in the development of atherosclerosis. "We discovered that a high concentration of fatty deposits disrupts the immune system. An extreme level of cholesterol makes immune cells react differently, which makes it easier for atherosclerosis to occur." Previous research has shown that people whose immune system is compronised, for example as a result of an auto-immune disease, are at greater risk of atherosclerosis. "It's clear that the immune system plays an important role in atherosclerosis."

Van der Heijden broadened his studies to see whether the immune system could inhibit the inflammatory response in the plaque, using the anti-inflammatory protein IL-35. "This protein is made by specific immune cells in our body and it acts to reduce infections." Van der Heijden worked in the lab with a model for atherosclerosis that contained a lot of lipids. "Administering IL-35 to the model reduced the number of platelets that formed. This indicates that IL-35 could be a possible therapy to reduce atherosclerosis."

Van der Heijden also examined another aspect of the immune system: the NLPR3 inflammasome. "Normally, this protein complex is involved in fighting infections. When we inhibited the NLPR3 inflammasome in our model, we saw a lower incidence of atherosclerosis." This was mainly because fewer of a particular type of immune cell (macrophages) occurred in the platelets.

The Ph.D. research carried out by Van der Heijden confirms the importance of the role of the immune system in the development of

cardiovascular disease. It provided two new starting points for developing a therapy, using IL-35 and the NLRP3 inflammasome, although Van de Heijden believes it will take some time before this stage is reached. The next step is to find out what the exact mechanism is and explore its effect in the human body. "The immune system is extremely complex, so it is difficult to intervene by administering a substance without affecting other important processes. Having said that, an initial clinical study has been carried out recently using an immunosuppresant, and it has proved successful. I'm very hopeful."

Provided by Leiden University