Low levels of lipid antibodies increase complications following heart attack

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Coronary patients with low levels of an immune system antibody called anti-PC, which neutralises parts of the "bad" cholesterol, run a greater risk of suffering complications following an acute cardiac episode and thus of premature death. This according to new research from the Swedish medical university Karolinska Institutet in Sweden published in the scientific periodical The *International Journal of Cardiology*.

"We're hoping that injections of anti-PC can form part of the treatment received by coronary patients," says principal investigator Professor Johan Frostegård from the Institute of Environmental Medicine at Karolinska Institutet.

The main cause of myocardial infarction is atherosclerosis, in which plaque forms along the vascular walls and that has proved to be an inflammatory disease. The plaque contains large amounts of modified and oxidised "bad" cholesterol (low-density lipoprotein, or LDL), which could also be described as a kind of rancid fat. There are also a great many dead cells. Problems arise when the body is unable to cleanse away these harmful plaque substances, and if the plaque then ruptures it can cause a stroke or heart attack.

Antibodies are formed to defend the body from what it treats as dangerous substances and foreign bodies. Apart from germs, this also includes dead cells. The team behind the present study have previously shown that there are natural antibodies (anti-PC) to the lipid phosphorylcholine (PC), which is found in, amongst other substances,

LDL cholesterol and dead cells. Their hypothesis is that excessively low levels of anti-PC can be a contributor to atherosclerosis and other inflammatory diseases.

The present study in The *International Journal of Cardiology* shows that patients with low levels of anti-PC in connection with acute coronary syndromes and refractory, unstable angina run a greater risk of complications and premature death. The risk of death was more than double in coronary patients with low levels of anti-PC, who also had a significantly higher risk of additional heart attacks or other complications.

The study included 1,185 patients who had been admitted to Sahlgrenska University Hospital in Gothenburg for acute coronary disease between September 1995 and March 2001. The blood samples on which the analyses were based were taken within 24 hours of their arrival.

According to Professor Frostegård, the results suggest that anti-PC can have a protective effect on cardiovascular disease by inhibiting inflammation and cell death. His team has spent many years developing immunological treatments for atherosclerotic plaque based on exploiting anti-PC to target phosphorylcholine. The work is done in part through a company set up within Karolinska Institutet's innovation system, and the model they have developed has been patented.

"The immunological treatment of cardiovascular diseases is clearly a Swedish speciality," says Professor Frostegård. "Other Swedish researchers maintain that it's apolipoprotein B, an important constituent of LDL, that we should be vaccinating against, but the two aren't mutually exclusive and a combination is conceivable and something that we're now also testing."

Professors Kenneth Caidahl and Ulf de Faire at Karolinska Institutet

have also been involved in the study, along with researchers from the Sahlgren Academy. The project is part of the EU consortium CVDIMMUNE, which is being led by Professor Frostegård.

More information: "IgM-phosphorylcholine autoantibodies and outcome in acute coronary syndromes", Kenneth Caidahl, Marianne Hartford, Thomas Karlsson, Johan Herlitz, Knut Petersson, Ulf de Faire & Johan Frostegård, *International Journal of Cardiology*, online 3 February 2012, doi:10.1016/j.ijcard.2012.01.018

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