Gut microbiota and coronary artery disease

Coronary artery disease (CAD) is one of the most common causes of hospitalization, death and disability in Poland and Europe. Its unfavorable consequences affect both the condition of individuals and the whole society. It is well known that the most common cause of CAD is atherosclerosis, that is tightly associated with a wide number of factors both non-modifiable for instance: age, male gender, genetic factors as well as those that could be influenced on such as: lack of physical activity, improper diet, smoking and other indicators of unhealthy lifestyle, high blood pressure, abnormal glucose and lipids profile. Despite the knowledge of classical CAD risk factors, the morbidity and mortality associated with this disease remains high. As a consequence, new factors that may play a role in the development of atherosclerosis and thus lead to CAD and influence the prognosis in this group of patients are constantly required.

Recently, particular attention has been paid to the endogenous microflora of human digestive system, that could influence both the metabolic and immune processes of the host, becoming therefore an important part pathogenetic process.

Interested in this subject, we decided to investigate the role of gut microbiota in CAD. We focused on the role of intestinal microbiome on risk factors, disease progression, the incidence of recurrent cardiovascular events (cardiovascular death, myocardial infarction, stroke, a need for revascularization that was not planned before the initial visit) and prognosis in 24-month follow-up in CAD patients.

The proposed project is a follow-up of the performed study, in which all study participants underwent detailed and comprehensive assessment of health status (with a particular attention to the cardiovascular system), including biochemical and imaging tests. A stool samples were also collected from the participants.

As the next step, an intestinal microbiome analysis from the stool sample is planned. Due to the fact that most bacterial species are not cultured in vitro, the bacterial 16S rRNA gene analysis and bioinformatic analysis will be used in this project.

Demonstration in the study the differences in composition of intestinal microbiome of patients with CAD and control group will allow identification of a potentially modifiable risk factor. The qualitative and quantitative change of which, in the long term period may help reduce the CAD morbidity and mortality.

Moreover, the project is aimed to investigate the relationship between particular elements of lifestyle, that lead to CAD with the microbiome composition. The use of probiotics, prebiotics and modification of diet as factors that potentially modify the intestinal bacteria profile, may help to develop an easy and acceptable method of therapy.

After 2 years, patients will be re-evaluated for the occurrence of cardiovascular events and progression of atherosclerosis. This will allow for the assessment of relationship between microbiome composition and cardiovascular events and mortality in 24-month follow-up. The comparison of CAD patients with recurrent cardiovascular events with those without them will bring us closer to identifying a microbiome profile that is associated with higher cardiovascular risk. It will allow more specific diagnostic and therapeutic actions.

It should be underlined, that even a slight decrease in the relative risk of complications, in such common disease as CAD, is reflected by considerable profits in the context of the functioning of society as a whole.