Cardiovascular disease *(CVD)* is a multifactorial disorder and, according to World Health Organization *(WHO)* the number one killer worldwide. It appears that oxidative stress may play a key role in initiation and progression of atherosclerosis in coronary arteries, which is a sign of coronary artery disease *(CAD).* Measuring free radicals in blood is very difficult because of their instability, however, there are some indirect ways to measure oxidative stress within the blood, which are planned to be applied in this project.

Therefore, we chose a population of individuals who underwent low dose computed tomography (*LDCT*) screening in order to seek for a lung cancer (years 2016-2017). We enrolled into the study those who did not have cancer but by incidence were diagnosed with coronary atherosclerosis determined as *CAC score* as an additional parameter. As a control group for comparison we chose those with healthy coronary arteries. The biological material necessary to perform molecular analyses has already been collected. In this study, we plan to perform extensive molecular analyses connected to oxidative stress, like biochemical parameters, untargeted metabolomics, microRNAs levels determination and genetic polymorphisms (*SNVs*) analyses. We will combine such a vast majority of molecular data with clinical profile of the patients and with follow-up data giving us information about major adverse cardiovascular events (*MACE).*

Therefore we want to answer some questions: Are oxidative stress parameters independently linked to presence of atherosclerosis determined by *CAC score*? Are extended lipid profile parameters, containing oxidized forms of lipoproteins directly associated with the oxidative stress level within the vasculature? Are there any mRNA which can be useful in early diagnosis of symptomless patients with high risk of development of atherosclerosis? Can genetics risk score *(GRS)* of oxidative stress-related genes be a determinant of different biochemical parameters level, which in turn combine with the lipid profile parameters? Can untargeted metabolomics be useful in assessment risk factors differentiating free-atherosclerosis individuals and those prone to atherosclerosis formation?

This kind of study, which will be conducted on already recruited population patients has some advantages - we can determine molecular status of an individual in order to correlate it with prospective data (5-year follow-up is already accessible). That kind of study is particularly valuable as it can help to designate factors which have a predictive value in cardiovascular risk assessment. Therefore, we propose a series of innovative research to expand knowledge related to atherosclerosis and cardiovascular morbidity by an interdisciplinary approach combining the latest state-of-the-art non-invasive imaging techniques and reliable prospective data with a wide range of oxidative-stress molecular determinants. Seeing cardiovascular disease still as the number one killer and the key role of the oxidative stress in its onset and development, we consider our research project as the topic of first importance.