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ABSTRACT OF THE PhD THESIS

THE ROLE OF CARDIAC COMPUTED TOMOGRAPHY IN CORONARY ARTERY DISEASE

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Cardiovascular disease (CVD) represent the first cause of mortality worldwide, being responsible for approximately 17.9 million of deaths/year, accounting for approximately 31% of the total deaths, twice more than the number of deaths caused by oncological diseases. In Europe, approximately 85 million people are diagnosed with CVD and approximately 3.9 million people die annually because of this disease. Moreover, 20 million of people/year survive from a heart attack or from a stroke, causing an important long-term socio-economic burden.

Romania is one of the high cardiovascular risk European countries according to the data from the latest European Society of Cardiology guideline for prevention of CVD. There are only a limited number of national epidemiological studies which estimate the prevalence and future trends of cardiovascular risk factors in the Romanian population.

In Europe, Romania records one of the greatest incidences of cardiovascular diseases, according to the latest statistics offered by EuroStat in 2019. Our country occupies the second place in Europe regarding the per cent of total deaths caused by diseases of the circulatory system. Concerning the standardised death rates caused by ischaemic heart disease, Romania is also one of the leading countries, being on the sixth and fifth place in deaths of men and women, respectively. Therefore, an early diagnosis of coronary artery diseases (CAD) becomes mandatory, taking into consideration the high morbidity and mortality rates of CAD and its socio-economic impact on the individual quality of life.

Even if nowadays invasive coronary angiography (ICA) is still the "gold standard" test for the diagnosis of CAD, coronary CT angiography represents an alternative method more and more used for the evaluation of the coronary tree. Due to its non-invasive approach, it has become one of the investigations of choice used in contemporary cardiology. Compared with ICA, CCTA has fewer risks, being an efficient method for the assessment of coronary disease, with high accuracy and low costs.

The main recommendation for cardiac CT is the evaluation of coronary arteries in patients suspected with CAD, using a non-invasive method. The new guidelines recommend CCTA as the

preferred test in symptomatic patients with lower/intermediate pre-test probability of CAD. This includes patients with a normal/inconclusive EKG, normal/equivocal cardiac biomarkers, symptomatic patients with moderate risk of CAD and symptomatic patients with low-risk of CAD who have no history of cardiac disease and who are unable to perform an exercise EKG.

The main purpose of this PhD thesis represents the assessment of the cardiac CT contribution in the detection and evaluation of coronary diseases in patients suspected for CVD. Thereby, it is crucial to have a good knowledge of the indications, benefits, limitations and contraindications of this imaging method, CCTA being mainly recommended for the exclusion of atherosclerotic coronary disease in patients with intermediate pre-test likelihood of CAD. In addition to the information provided by ICA regarding the coronary lumen, CCTA offers a description of the coronary wall, bringing supplementary information about the atherosclerotic lesions and a 3D assessment of the whole heart.

This research is one of the fewest performed in Romania for the evaluation of the prevalence and characteristics of coronary artery disease assessed using CCTA. Our study proves that there is a “female advantage” in play, with males having a higher atherosclerotic burden and a higher frequency of obstructive coronary stenosis on all coronary arteries. Also, obstructive coronary stenosis was diagnosed in older patients, regardless the involved artery. Non-calcified/mixed plaques, which tend to be more vulnerable, were more likely to develop among younger subjects.

Moreover, this is the first study in Romania which offers an overall view of the prevalence of coronary artery anomalies (CAAs) diagnosed using CCTA. Since there are some coronary artery anomalies, considered “malignant” that can cause serious cardiovascular events like myocardial ischemia or even sudden death, we believe that it is important to study the prevalence of this pathology in Romanian population. On the basis of our results, we believe that identifying CAAs should be a healthcare priority, especially in symptomatic young patients without risk for atherosclerosis disease, CCTA proving to be an alternative diagnostic method with high sensitivity useful for the right management of the patients.

Last but not least, another aim of this research was to evaluate the association between traditional cardiovascular risk factors and coronary artery disease evaluated using the CAD-RADS score in the Romanian population. In 2016, the Society of Cardiovascular Computed Tomography published the Coronary Artery Disease—Reporting and Data System (CAD-RADS) grading system, which is a standardised reporting method of CCTA results. This is meant to facilitate communication of the results along with suggestions for consecutive management of the patients. The grading system ranges from 0 to 5, where CAD-RADS 0 score means a complete absence of stenosis and CAD-RADS 5 represents total occlusion of at least one coronary segment. This is the first study performed in Romania using the CAD-RADS classification and we recommend using this grading system for improving the communication between the radiologists and clinicians.