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Improved cardiovascular risk prediction using signs of atherosclerosis -Lessons from the Heinz Nixdorf Recall study and Multi-ethnic study of atherosclerosis

Despite the progress in the diagnosis and treatment of cardiovascular diseases the high frequency of sudden death is the biggest challenge today. Sudden and unexpected, acute myocardial infarctions occur even in “healthy” men due to plaque rupture or erosion based on subclinical coronary atherosclerosis. In relation to the total number of people, who die in the course of myocardial infarction, the number of out of hospital deaths reaches two thirds of all deaths. That means, only primary preventive strategies will be able to reduce this often tragic event, already known in the old Egypt documents. The best non-invasive method in order to detect signs of coronary atherosclerosis is computed tomography (CT), because this technique is able to visualize, localize and quantify coronary artery calcification (CAC). Calcium is, on the other hand, found intra- than extracellularly; an early sign of developing coronary atherosclerosis. In men at the age of 40 years, in women 10 years later, CAC appears and grows in the following years. CAC quantification is based on the Agatston algorithm. The detection and quantification of CAC helps to identify people at risk nowadays with low x-ray exposure of the patients’ chest. CAC increases during life on an exponential curvature, which allows the prediction of the progression. Due to the remodeling process—exhausted at a level of 40-50% of the vessel plaque area - , coronary atherosclerosis remains for decades subclinically until the plaque load exceeds a level which results in a significant luminal narrowing. In this stage the plaque load has usually reached 70–90 percent of the vessel cross-sectional area. However, not the luminal narrowing, but the plaque rupture or erosion is the main reason of the acute events leading to mural or occlusive thrombus formation and in many cases to formation of micro-embolization resulting in microinfarcts/infarctlets. Therefore, risk reduction based on known signs of coronary atherosclerosis already in the early phase, will help to start a new era of primary prevention.

Biography

Raimund Erbel studied medicine in Cologne and Düsseldorf. His internship led him to hospitals in Düsseldorf, Leverkusen, Koblenz, and Aachen. In Mainz he was signed consultant and received a Professorship in 1993, tenure-ship in 1998 and became a full professor and director of the department of cardiology in Essen 2003, where he worked until 2015. He was able to build up the 1st Heart Center located within a University Clinic in Germany providing an excellent partnership with the department of thoracic and cardiovascular surgery. The highlight was the opening of 1st hybrid room allowing heart catheterization and cardiovascular surgery without transportation of the patient in a specially designed room, so that cardiologists, anesthesiologists and cardiac surgeons found ideal working spaces. Early in 1993 he became aware of the new electron beam computed tomography which was installed in Bochum and Mülheim. The detection of coronary artery calcification as an early sign of atherosclerosis by this non-invasive method was fascinating. He started to evaluate the possibilities of primary prevention. In 2000 he started the Heinz Nixdorf Recall study funded by the Heinz Nixdorf Foundation. This study is now in its 16th year of follow up and has already started a multi-generation cohort. The study received national and international reputation and is currently involved in many multi-centre epidemiological projects looking not only at known cardiovascular risk factors but also at psychosocial factors as well as effects of pollution.

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