

# Advanced imaging of the aortic valve and thoracic aorta

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# SCIENTIFIC AND SOCIETAL IMPACT

**‘Impact** [*noun*: im-pakt]: the change in the world which results from research’.

Diseases of the aorta, the largest artery of the human body, occur relatively infrequent as compared to other forms of heart and vessel disease. However, the aorta serves a vital function in the human body, rendering any aortic disease to be life-threatening. The death rate of aortic diseases in the Netherlands exceeds 150.000 annually. Two-thirds of all acute aortic syndromes (AAS) occur in patients that are less than 65 years old. Timely recognition of patients at risk is potentially life-saving and, thus, has great socio-economic impact. This thesis focuses on the role of imaging for prediction of AAS, ranging from timing of imaging follow-up to the application of novel anatomic and hemodynamic imaging markers. One of the most important conclusions from our work is that these novel markers can superiorly predict AAS as compared to simply measuring the maximal aortic diameter. Ever since publication, our findings have been validated by other research groups, raising hope that they can improve patient care in the near future. The Dutch Heart Foundation has acknowledged the high potential of advanced imaging by providing funds for the RADAR-study (‘earlier Recognition of Aortic Dissection and Aneurysm Rupture’). In this multi-institutional CVON (Cardiovasculair Onderzoek Nederland)-project, we combine forces with researchers from Leiden University Medical Center (LUMC) and Delft University of Technology (TU Delft) to develop an integrated magnetic resonance (MR) imaging platform that can further improve identification of patients at increased risk. Although the development and clinical evaluation of new imaging methods will take many years, the results from projects like the RADAR-study might revolutionize the future preventive management of aortic disease.

Although advanced imaging techniques enhance the ability to predict and monitor disease, they are a major contributor to health care expenditure. Therefore, they should be used in a cost-effective and expedient way. The results presented in this thesis reveal that a substantial part of currently performed annual routine imaging does not lead to changes in patient management, resulting in an important source of waste. The (cost-)efficacy of aortic imaging is one of the prioritized researched questions in the 2019 knowledge agenda of the Dutch Society of Cardiology (Nederlandse Vereniging voor Cardiologie, NVVC) and will receive further attention in coming years.

The results presented in this thesis are relevant to all patients with aortic disease. Aortic disease can be a worrisome diagnosis, and new follow-up strategies may impact quality of life, stress and anxiety levels. On the other hand, development of more sensitive imaging methods may also be reassuring. Obtaining information about these aspects is crucial for successful implementation of new surveillance approaches. For a better focus on patients’ view, research funders increasingly stimulate involvement of patients with experience of the condition in health care research. In our ongoing projects, we appreciate the valuable input from the ‘Contactgroep Marfan Nederland’, which is the national interest group of patients with Marfan syndrome. Their knowledge and experience has proven complementary to that of our research group and will enhance dissemination of research results in the future.