

## **PhD-position/Postdoc – Biomedical Molecular Imaging**

### **Dynamic contrast-enhanced MRI for the quantification of neovascularisation in atherosclerotic plaque**

#### **Job description**

The project entitled: “Dynamic contrast-enhanced MRI for the visualization of neovascularisation in atherosclerotic plaque” aims to advance quantitative in vivo MRI from preclinical to clinical studies.

#### **Project aim**

Rupture of an atherosclerotic plaque is the main cause of the clinical symptoms of cardiovascular diseases such as acute myocardial infarction and ischemic stroke. For a ‘plaque at risk’, the risk of rupture is determined by morphological, molecular, biological and biomechanical parameters of the plaque. Neovascularisation is considered as an important feature of a plaque at risk. Focusing on the carotid artery, the ParisK consortium will construct technological and translational platforms in which several novel imaging modalities will be advanced, validated and added to existing non-invasive imaging modalities to measure one or more parameters of plaques at risk. The data will be integrated to develop a novel heuristic algorithm that gives the predicted risk of rupture of an individual plaque, which will be validated in subsequent clinical studies.

The objective of the present PhD project is to optimize and validate assessment of neovascularisation in plaque using dynamic contrast-enhanced MRI in experimental models of atherosclerosis and patients. The dynamic contrast-enhanced MRI protocol will be optimized considering contrast administration, sample frequency, and scan time to enhance the trade-off between SNR and/or spatial resolution. Fast computation, algorithm optimization with analytic expressions of pharmacokinetic models, and vascular input function modeling versus semiquantitative characterization (area-under-the-curve) will be performed, as well as spatial heterogeneity mapping and histogram analysis of pharmacokinetic parameters. We will compare the results for different pharmacokinetic models using parameters  $K_{trans}$ ,  $v_e$ , and  $v_p$  (possibly also PS and  $F_p$ ). The different models will be validated using microvessel density as determined by histology as reference standard. Finally, the method will be implemented in a large prospective multicentre clinical trial to study the predictive value of proliferated neovascularisation for the occurrence of stroke.

#### **Environment**

We offer a challenging research project within a large consortium with academic and industrial partners which will enable the candidate to perform state-of-the-art research on highly advanced imaging equipment in a national consortium of leading experts on imaging of atherosclerosis. You will be part of a multi-disciplinary team. Performing research within this consortium will provide you with an excellent network of contacts that can be of great value for your future career. Opportunities include development of novel image acquisition techniques as well as model optimization for image analysis, and pre- and clinical validation. You will be working in a stimulating interdisciplinary biomedical team including physicists, bio-chemists, biologists, and clinicians of the Cardiovascular Research Institute Maastricht (CARIM) in the Netherlands. CARIM is one of the internationally leading institutes on cardiovascular research and an international review committee recently judged the research on imaging as excellent.

#### **Requirements**

A Master Degree or PhD in Biomedical Engineering, Physics, Chemistry or a comparable degree. We are looking for a candidate with interest in image acquisition techniques as well as pharmacokinetic modelling. You are able to work in an inter-disciplinary environment.

#### **Conditions of employment**

PhD-student: You will have a full-time employment for 4 years at CARIM and will be working at the Radiology department to finish your PhD-thesis. Post-doc: you will have a full-time employment for 2 ½ years at CARIM.

#### **Application**

For more information, please contact:

ME (Eline) Kooi, PhD, [eline.kooi@mumc.nl](mailto:eline.kooi@mumc.nl); tel: +31 43-3874910