



Technology Opportunity, Ref. No. UZ-19/020

## Ultrafast calculations for non-invasive hemodynamic functional assessment

*Functional hemodynamic assessment from patient-specific CT images can take several hours. An innovative numerical module allows much faster calculation times and offers a true alternative to invasive angiograms and other currently existing non-invasive technologies.*

- Keywords** Computed tomography (CT), blood flow metrics, non-invasive, diagnosis, coronary artery disease
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- Reference** in preparation
- Background** The quantification of the hemodynamic functionality of patients' blood vessels for the diagnosis and treatment of cardiovascular lesions requires a fast and reliable assessment of the blood flow features. Using hemodynamic calculations on anatomies obtained from CT images is intriguing because of their non-invasiveness and accuracy. However, current state-of-the-art methods can take several hours for each case. Furthermore, they rely on sending patient information to centres with the required computational resources, which raises concerns in terms of patient data privacy and security. Therefore, current computational methods do not integrate well into established clinical protocols, and invasive and less accurate assessment methods, such as echocardiography, still prevail.
- Invention** A numerical model that enables fast calculations of hemodynamic equations has been established. It is based on an efficient mapping of clinically relevant blood flow conditions and vessel anatomies into a low-dimensional manifold. The resulting description of the hemodynamic equations can be used for simulating real cases on anatomies obtained from patients' CT images with a computational time compatible with clinical requirements. The module may be implemented directly into a CT scanner, or used as standalone software on a common personal computer for the rapid and reliable quantification of important diagnostic parameters for the assessment of cardiovascular disease.
- Fields of Use** Calculation modules for CT scanners, image analysis software and services.
- Patent Status** Patent application filed EP 17/185034.0
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