



InSilicoCARDIO

Aorta Fluid dynamics tool

Aortic aneurysm refers to pathologic dilatation of aortic segment that has the tendency to expand and rupture. The extent of dilatation is debatable, but one criterion is an increase in the diameter of at least 50% greater than that expected for the same aortic segment in unaffected individuals of same age and sex. Aortic aneurysms are described in terms of their size, location, morphology, and cause (1). Thoracic aortic aneurysms (TAAs) have an estimated incidence of at least 5-10 per 100,000 person-years (2).

Aortic aneurysms can be managed with aggressive blood pressure control and lifestyle interventions, monitored with serial imaging, and electively replaced with low surgical morbidity and mortality when the risk of dissection rises. Thus, timely detection and constant monitoring of aortic aneurysms is paramount in reducing dissection risk (3).

Quantification of the blood flow and associated bio-markers such as wall shear stress (WSS) and pressure gradients or specific hemodynamic indices can provide useful information in diagnosis and treatment of several cardiovascular pathologies such aortic aneurysms. In-silico modeling and simulation can help to quantify these hemodynamic parameters (4).

What is Aorta fluid dynamics tool?

Aorta fluid dynamics tool is based on a deep learning framework and computational fluid dynamic model which evaluate the flow dynamics in a patient-specific model of the thoracic aorta. The tool aims to support clinicians in the decision-making process and in the monitoring of disease progression.

The innovation of this tool resides in the deep learning framework able to automatically segment the aorta from patient's CT images. The tool is powered by ANSYS® Fluent® and estimates hemodynamic predictors of potential pathological state, such as the wall shear stress (WSS), Time-Averaged Wall Shear Stress (TAWSS) and Oscillatory Shear Index (OSI).

Aorta fluid dynamics tool enables simulations of fluid dynamics in patients with many different characteristics and conditions: from coarctations to aneurysms, as well as to monitor the onset of aortic-located comorbidities in all subjects.

Advantages

Securely create a patient-specific model

Create a 3D anatomy segmentation leveraging AI technologies

Simulate patient's flows and pressure to obtain flow patterns and indices

Inspect hemodynamic values within the aorta

Generate a report in pdf format

How it works

Aorta fluid dynamics tool enables to setup and run computational simulations in a user-friendly way by using a step-by-step integrated workflow that can be applied to any adult patient CT images:

- Set the simulation name
- Upload the patient DICOM images
- Inspect the automatically created 3D model of the aorta
- Insert patient additional information on pressures and flows

After running the simulation, results will be displayed as:

- Flow streamlines in the aorta
- Color maps of the WSS values on the aortic wall
- OSI and other hemodynamic indexes

Results can be downloaded in pdf format.



In silico methods can innovate medical device research and development

Today, the costs and duration of the development and regulatory assessment of new medicines and medical devices are becoming a burden to innovation in healthcare.

Regulatory agencies have been encouraging the use of in silico methods in research and development for years (9), since the use of these methods can significantly reduce costs and greatly accelerate the go-to-market of new products while maintaining or improving the level of safety.

However, specialize expertise and dedicated computing infrastructures require a continuous investment from companies, hence representing a barrier to a rapid uptake of computational solutions.

To help solve these challenges, InSilicoTrials Technologies has developed a game-changing-solution. Our experts:

*Select computational models from research centers of excellence around the world
Integrate them in our cloud-based platform
Make them available through user-friendly online products*

This solution enables companies to leverage cutting-edge in silico methods at low costs without specific computational expertise, IT infrastructure and solvers investments requirements. On our cloud-based platform, users can select the online computational product of their choice in pay-per-use, or ask us to build the digital product they need.

Why working with InSilicoTrials

SaaS

Buy tokens and use the online products of your choice among those available on the platform

ON DEMAND & CUSTOM

Ask us for the models and simulations you need, or ask us to evaluate where modeling and simulation can support you

VIRTUAL PATIENTS

Design and accelerate your clinical trials with the virtual patient populations you need

TECHNOLOGY-ENABLED SERVICES

Ask us for support on technology integration, in silico trials planning, execution and reporting, in line with regulatory requirements

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