A quantitative model of thrombosis in intracranial aneurysms (Thrombus)

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Research Areas

Tool Development
Prediction

At a Glance

- Status: Completed Consortium
- Year Launched: 2011
- Initiating Organization: European Comission Seventh Framework Programme (FP7)
- Initiator Type: Government
- Location: Australia

Abstract

The Thrombus consortium consists of allied partners willing to cooperate and share a diverse set of complementary technical skills and scientific expertise required for the development of the Thrombus project. The consortium is formed with a strong commitment to maintain and develop innovative, patient-specific, computational modeling and simulation of the thrombosis to assist the radiologist and the surgeon in defining the severity and extent of aneurysm in patients. Specific computational methods will allow clinical decision-making and planning of the optimal treatment. The consortium has seen a constituency process aimed at realizing an optimum example of complementarities, gathering together all the fundamental actors needed to develop such a solution.

Mission

Rupture risk of intracranial aneurysms (IA) has been studied at length. However, very little is known about the healing mechanism, namely the formation of a clot inside the cavity after insertion of a stent. The multiscale interaction between biological and hemodynamic processes is the central ingredient of
The core of the project is to develop and validate a biological model of spontaneous or stent-induced thrombosis in IA. From this model, Thrombus will compute quantitative stent efficiency score by its capability to induce clotting in aneurysms.

In medical practice the choice of which stent to deploy is left to the medical doctor and remains intuitive to date. It is common to use one or several full-course stents, in order to induce thrombosis formation. Recent pipeline stents allowing simple or multiple devices constructs with variable flow disruption will be investigated. The project will study through numerical simulation the effect of stent configurations in patient-specific geometry and will help to explain why some stents produce good thrombus while others do not.

The project will develop a multiscale computational modeling and simulation framework based on the triptych In Vitro – In Vivo – In Silico rule of three for the thrombosis.

The associated technological aim of the project is to deliver software with an interactive end-user interface, providing a virtual simulation of the thrombosis leading to the optimal stent for a specific patient’s aneurysm.

This goal will be achieved by integrating some of the leading open-source software and VPH toolkit software in the area of computational bioengineering. In addition, a collaborative online system will be adapted allowing Thrombus partners to correlate any type of data in case simultaneous multidisciplinary analysis by distant partners is required. This platform will remain operational after the end of the project.

Expected results at the end of the project are as follows:

**Consortium History**

The project is funded for three years, from Feb. 1, 2011 to Jan. 31, 2014.

**Structure & Governance**
The Thrombus project about intracranial aneurysms has been divided into five Work Packages (WPs):

WP1 focuses on project management. The objectives of the management team are as follows:

**Financing**

The Thrombus project has received funding from the European Union’s Seventh Framework Programme for research, technological development, and demonstration under grant agreement no. 269966. The total cost is €3.7 million, of which the European Union contribution is €2.8 million.

**Links/Social Media Feed**

Homepage http://www.thrombus-vph.eu/

**Points of Contact**

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**Sponsors & Partners**

CNRS-INSA Lyon-Creatis – Medical Imaging Research Center  
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