HORIZON 2020

Multi-scale computational hemodynamics in obese children and adolescents: enabling personalised prediction of cardiovascular disease

Sprawozdania

Informacje na temat projektu

CALLIRHEO

Identyfikator umowy o grant: 749185

Strona internetowa projektu

DOI
10.3030/749185

Projekt został zamknięty

Data podpisania przez KE
24 Marca 2017

Data rozpoczęcia	**Data zakończenia**
1 Marca 2018	29 Lutego 2020

Finansowanie w ramach
EXCELLENT SCIENCE - Marie Skłodowska-Curie Actions

Koszt całkowity
€ 183 454,80

Wkład UE
€ 183 454,80

Koordynowany przez
UNIVERSITY OF STRATHCLYDE
United Kingdom

Periodic Reporting for period 1 - CALLIRHEO (Multi-scale computational hemodynamics in obese children and adolescents: enabling personalised prediction of cardiovascular disease)

Okres sprawozdawczy: 2018-03-01 do 2020-02-29

Podsumowanie kontekstu i ogólnych celów projektu

Childhood and adolescent obesity, primarily a dietary disease, has become a major challenge in recent decades. Obesity is known to accelerate the initiation of endothelial dysfunction, one of the key biological indicators of lesions of atherosclerosis that underlie most cardiovascular diseases.

In line with recent European and worldwide policies on understanding childhood adiposity, the CALLIRHEO project aimed to develop an efficient multi-scale computational framework that would allow for the 3D blood flow analysis of young arteries. The project also aimed to perform patient-specific numerical simulations, correlated with medical data, for the investigation and assessment of flow-related disease markers. This research could have a significant impact for the society, in understanding obesity-induced vascular changes in children, and for the healthcare industry and medical science, in advancing novel methodologies.

The scope and scientific objectives of the CALLIRHEO project were achieved within the timeframe of the project resulting in a considerable number of publications, public engagement activities, and application of a patent.

Prace wykonane od początku projektu do końca okresu sprawozdawczego oraz najważniejsze dotychczasowe rezultaty

The research within the CALLIRHEO project comprised of five work packages, distributed over the 24-month duration of the project. The work plan also included several milestones and deliverables that were all completed on time. The work packages were designed to ensure the optimal impact for the success of the project and achieve each objective.

We managed to integrate several computational fluid dynamic methods to achieve reliable and efficient multi-scale models that could be useful in the clinical practice. Patient-specific image data from normal and obese patients were faithfully reconstructed and matched with phase-contrast MRI (PC-MRI) measurements of the same patient, thus performing personalised simulations. Based on uniquely-complex multi-scan continuous 3D data, we also achieved, for the first time, high-precision models of the entire patient-specific vasculature, from the aortic arch down to the smaller arteries of the arm. The relationship between blood flow development and flow-related disease markers was investigated and analysed. Results from this work have been presented on several occasions.

Dissemination started from the very first month of the project and resulted, by the end of it, in 41 scientific outputs and 39 activities, including contributions to journals, conferences, workshops, and seminars, organisation of workshops and minisymposia, etc. A patent application was also made during the project.

A dedicated website for the CALLIRHEO project was set up and is accessible via the following URL: https://callirheo.wordpress.com/. A full list of publications can be found in the project’s website.

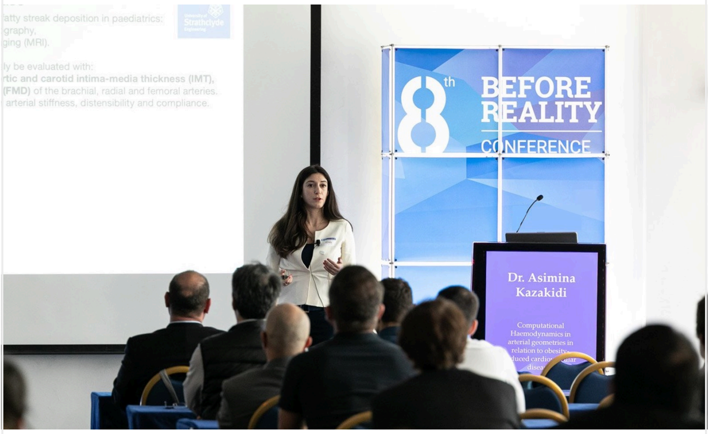
The CALLIRHEO project also successfully delivered 10 public engagement activities, reaching out to a very large number of pupils and adults of all ages and from across all sections of society, thus increasing its overall impact.

Innowacyjność oraz oczekiwany potencjalny wpływ (w tym dotychczasowe znaczenie społeczno-gospodarcze i szersze implikacje społeczne projektu)

This is the first time that a research project addresses childhood obesity from a hemodynamics perspective, utilising advanced computational fluid dynamics (CFD) methodologies. Thus, the novelty and scientific impact of the CALLIRHEO project are very high, both in the fields of numerical modelling and biomedical engineering.

The CALLIRHEO project managed to have a wider societal impact, evidenced through multiple public engagement activities to pupils and adults, increasing the awareness of childhood obesity and the project’s objectives.

In conclusion, this project led to 41 scientific outputs, while other journal research manuscripts are currently under review and more are in preparation. The research within the CALLIRHEO project has set the foundations for further future studies and new research opportunities, both within academia and industry, with significant socio-economic benefits.



Dr Asimina Kazakidi presenting results of the CALLIRHEO project at an international conference

Ostatnia aktualizacja: 6 Czerwca 2020

Permalink: https://cordis.europa.eu/project/id/749185/reporting/pl