Scientists at Scandinavian Real Heart and at the University of Bath Publish the World's First Computer Simulation Method for Dual Mechanical Heart Valves in Series

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Scandinavian Real Heart (the "Company") today announced the publication of the world's first combined computational fluid dynamics (CFD) and fluid-structure interaction (FSI) methodology for simulating positive displacement bileaflet valves in series. The article "Overset meshing in combination with novel blended weak-strong fluid-structure interactions for simulations of a translating valve in series with a second valve" is the result of an international collaboration of scientists at Scandinavian Real Heart and researchers at the University of Bath (UK) and was published in the scientific journal "Computer Methods in Biomechanics and Biomedical Engineering".

The researcher group, led by K. Fraser, at the Department of Mechanical Engineering of the University of Bath, have created an efficient and accurate method for simulating two mechanical heart valves in series, a fundamental requirement for simulations of the Realheart® TAH (Total Artificial Heart). The team has achieved this by using sophisticated CFD tools (overset meshing together with a blend of weak and strong coupling) to generate accurate calculations of the fluid shear stress in critical regions during the opening and closing of mechanical heart valves. By doing so, the scientists were able to balance the computational efficiency needed to simulate the whole Realheart® TAH with the accuracy required to resolve the dynamics of blood flow.

"Heart valves are notoriously difficult to model. The Realheart® TAH contains a two valves in series design so that the up and down movement of the first valve creates the pressures that moves the second valve. This makes computational modelling more complex," commented Ina Laura Perkins, CEO of Realheart and one of the co-authors of the study. "The model published here is the foundation for the Realheart® TAH computational modelling methodology developed by the Company that was recently published in Nature Scientific Reports (http://www.nature.com/articles/s41598-023-32141-2). Developing and using such breakthrough computational modelling tools enables us to learn more from simulations, thus saving significant development and testing time and resources," Ina Laura Perkins, added.

Computer Methods in Biomechanics and Biomedical Engineering Publishes research on computational biomechanics and biomedical engineering, including cell mechanics, biofluids, hemodynamics, modeling, design and assessment. It is affiliated with the European Society of Biomechanics and published by Taylor & Francis. The article can be accessed here: http://www.tandfonline.com/doi/full/10.1080/10255842.2023.2199903

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Scandinavian Real Heart AB develops a total artificial heart (TAH) for implantation in patients with life-threatening heart failure. Realheart® TAH has a patented design that resembles that of the natural human heart. The artificial heart consists of a four-chamber system (two atria and two ventricles) designed to generate a physiological blood flow pattern that mimics the body's natural circulation. A unique concept in the medical technology world.