Researchers develop new lab technique for cardiovascular testing

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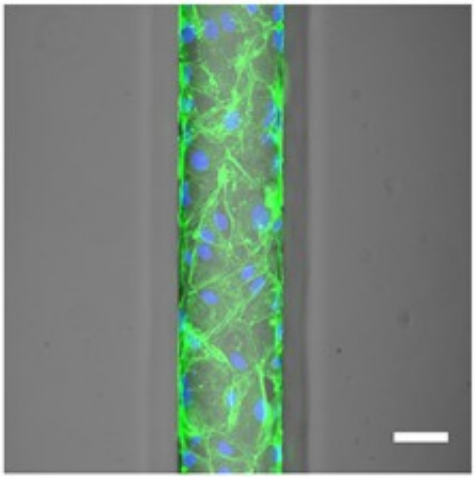

Combined image of a microscopic-phase contrast image of a microfluidic channel (100 micrometres wide) with endothelial cells that have been grown in this channel.

Cardiovascular disease is one of the most significant causes of death in the world, and around 1 million Dutch citizens have a cardiovascular condition. Andries van der Meer of the University of Twente, The Netherlands, has developed a new laboratory technique for cardiovascular testing. The advantage of the new technique is a considerable reduction in the quantity of cells that needs to be cultivated, so that the testing is speeded up significantly.

Vascular endothelial cells form the interior lining of the blood vessels.

The blood that flows along the endothelial cells causes a certain tension on the vascular walls: the shear stress. If the shear stress changes, e.g. because of increased heart rate, the endothelial cells respond to this. An irregular shear stress, in combination with an unhealthy lifestyle, can cause vascular disease. In certain parts of the vascular system the blood flow is not constant but turbulent, for example in the neck and around the heart. The response of the endothelial cells to this plays a part in the onset and development of vascular disease (such as arteriosclerosis).

Andries van der Meer examines the response of endothelial cells to shear stress by means of microfluidic technology. Previously, a large laboratory setup of several square centimetres (5 by 10 centimetres) was required in order to cultivate the endothelial cells and to track the response of the cells to shear stress.

Van der Meer developed a new laboratory technique on a micrometre scale. The quantity of tissue required is lower by a factor of a hundred, and the quantity of fluid that flows through the system is lower by a factor of a thousand. This enables researchers to follow many times more cell biological processes in the same amount of time. The use of microtechnology thus greatly accelerates testing for cardiovascular disease.

Van der Meer was awarded his PhD on 10 March at the Faculty of Applied Sciences.

Provided by University of Twente