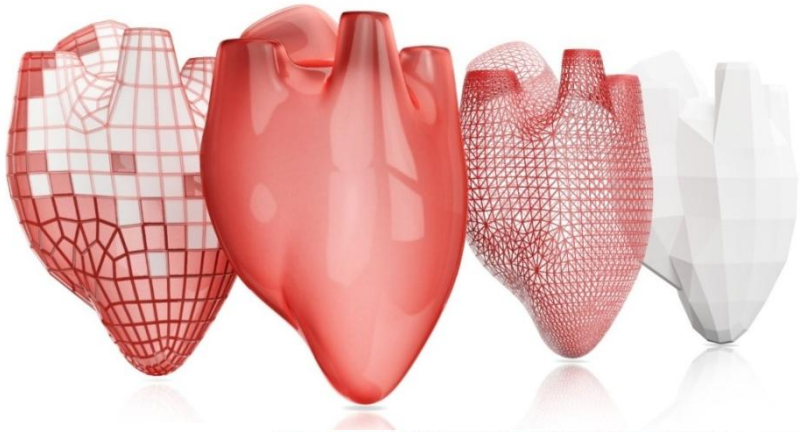
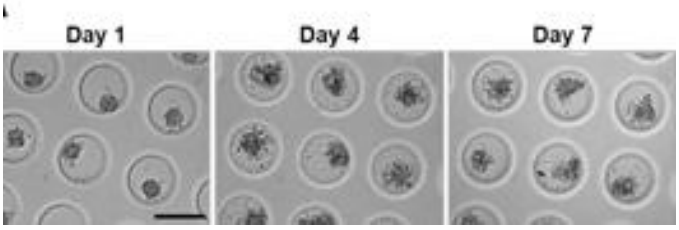
Research (What is it about?)	**Prevascularized building blocks for 3D bioprinting**
UNN authors	*Krysko D.*
We find (The result)	Uniform vascularized spheroids for bioprinting were formed that can be incorporated into a printed construct
Abstract	Biofabrication can be defined as the production of complex living and non-living biological products from raw materials such as living cells, molecules, extracellular matrices, and biomaterials. In medicine three dimensional (3D) ***bioprinting*** is the utilization of 3D printing-like techniques to combine cells, growth factors, and biomaterials to fabricate the desired tissue or organ. But overcoming the problem of ***vascularization*** (it is the process of abnormal or excessive formation of blood vessels) remains the main challenge in the field of tissue engineering. As three-dimensional (3D) bioprinting is the rising technique for the fabrication of large tissue constructs, small prevascularized building blocks were generated that can be incorporated throughout a printed construct, answering the need for a microvasculature within the small micron range (<10 μm). Uniform ***spheroids*** with an ideal geometry and diameter for bioprinting were formed, using a high-throughput non-adhesive ***agarose microwell system***. Since monoculture spheroids of endothelial cells were unable to remain stable, coculture spheroids combining endothelial cells with fibroblasts and/or adipose tissue derived ***mesenchymal stem cells*** (ADSC) as supporting cells, were created. It is shown that when applying the favorable coculture ratio, viable spheroids were obtained and endothelial cells spontaneously formed a ***capillary-like network*** and lumina. Especially the presence of ADSC led to a higher vascularization and extracellular matrix production of the microtissue. Spheroids were able to assemble at random in suspension and in a hydrogel, creating a ***macrotissue***. Combining the advantage of this natural capacity of microtissues to self-assemble and the controlled organization by bioprinting technologies, these prevascularized spheroids can be useful as building blocks for the engineering of large vascularized 3D tissues.

Representative articles 2017-2018, quartiles	1. *De Moor L., Merovci I., Baetens S., Verstraeten J., Kowalska P., Krysko D., De Vos W., Declercq H.* High-throughput fabrication of vascularized spheroids for bioprinting. Biofabrication. **10**(3):035009 (2018).	Q1
	Q-index (Qi) for the result	**4**
	high blue	

In collaboration	Ghent University, Ghent, Belgium University of Antwerp, Antwerp, Belgium University of Pristina, Pristina, Kosovo

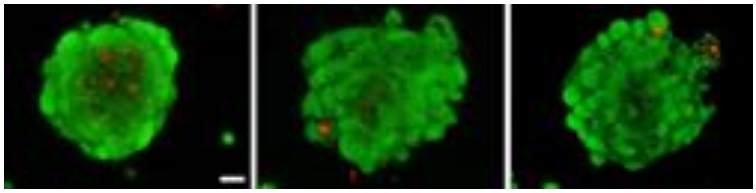


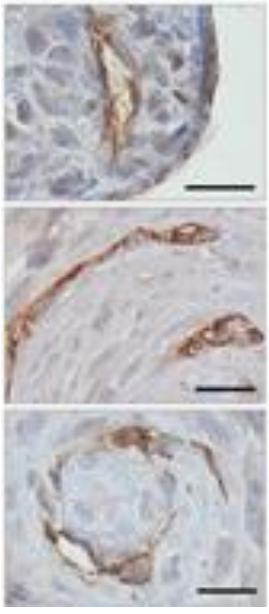
3D bioprinting



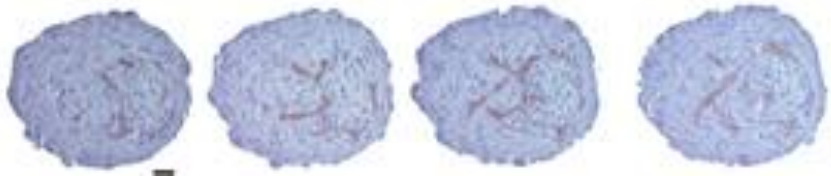
Self-assembly of monoculture spheroids after 1, 4 and 7 days of culture, scale bar = 200 μm.

Overall morphology of spheroids after 10 days of culture, scale bar = 20 µm.





Vascularization within spheroids, scale bar = 20 µm.



Four sequential sections (5 µm each) of two large spheroids, scale bar = 20 μm.