Miniature Cell Factory
“B CUBE” spin-off paves the way to innovative therapies

04.05.2018 - Scientists from the start-up project denovoMATRIX at the B CUBE Center for Molecular Bioengineering at Technische Universität Dresden have developed a platform to create novel, tailor-made biomaterials for cell culture applications. Their vision is to enable the discovery of cell culture conditions close to those found in the human body.

Cell therapies are the therapeutic approach of the future. To successfully develop them, scientists are investigating cells and their behaviour outside the human body in experimental settings, which are still often performed on plastic surfaces. However, this approach is dated and not biologically relevant, since plastic provides the cells with a completely different biochemical and biomechanical environment than the human body leading to different cell behaviour. Alternatively, some researchers cultivate their cells on Matrigel, an extract of rat tumour tissue, which faces particular challenges such as differences from batch to batch and - due to its animal origin – is unsuitable for application to the clinics.

The denovoMATRIX team members began their research in the lab of Professor Yixin Zhang at the B CUBE Center for Molecular Bioengineering at Technische Universität Dresden. Prof. Zhang’s research has helped them develop a solution with which the cell microenvironment within the body can be recapitulated, and even tailored to various cells and applications in an easy-to-use and chemically defined manner. "Our goal is to recreate the essential aspects of human extracellular matrix biology in the artificial system ‘cell culture’ as closely as possible," explains project leader Dr. Richard Wetzel. For this purpose, a novel type of biomaterial, which is synthesized from different sugar molecules (glycosaminoglycans) and peptides, is applied as an thin layer to the plastic surface of the cell culture carrier before the cells can be cultivated on it. Importantly, sugar molecules and peptide sequences can be combined very easily and individually. This allows up to 96 different combinations of the material to be tested at once to quickly and efficiently identify material on which cells grow and develop best. This screening plate is called "screenMATRIX" and will be the first denovoMATRIX product. The identified
best biomaterials are called “myMATRIX” products, and are provided as powders or pre-coated cell culture carriers.

"With our materials, we were able to achieve a 10-fold increase in the rate of differentiation of neurons, for example. We were able to triple the growth of neural progenitor cells derived from induced pluripotent stem cells compared to the current standard", highlights Richard Wetzel, on the relevance of the new materials.

The underlying patented technology has been validated in the last two years as part of an EXIST research transfer project and has recently been published in the peer-reviewed journal "Advanced Materials". In order to make the developed biomaterials available for other scientists, we will spin-off from the Dresden University of Technology in summer," said the designated managing director of the future Dresden-based start-up, Dejan Husman.

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