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

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. First test sales of the screenMATRIX are already running. For more information, team and technology, visit www.denovomatrix.com.
About ZIK B CUBE at TU Dresden
The Center for Innovation Competence (ZIK) B CUBE – Center for Molecular Bioengineering was founded in 2008 in conjunction with the funding by the BMBF-program „Unternehmen Region“ and sees itself as a bridge between life sciences and engineering sciences. The center is dedicated to research and development of biological materials in the three main axes Bioprospecting, BioNano Tools and Biomimetic Materials and contributes substantially to the profile of TU Dresden in the field of modern biotechnology and biomedicine. Here, the B CUBE works closely with the Biotechnology Center (Biotec) and the Center for Regenerative Therapies Dresden (CRTD) at the TU Dresden. Technology transfer is one of the central activities of BCUBE to actively transfer novel technologies and products to society through commercialization.

About Technische Universität Dresden
Technische Universität Dresden (TUD) is one of the largest technical universities in Germany and is among the leading and most dynamic universities in Germany. As a university with 18 faculties in five schools, TUD offers a broad variety of 122 degree courses and covers a wide research spectrum in the Research Priority Areas (RPAs) Health Sciences, Biomedicine & Bioengineering, Information Technology & Microelectronics, Smart Materials & Structures, Energy, Mobility & Environment as well as Culture & Societal Change. Since 2012, TUD is officially one of eleven “Universities of Excellence“. Its core elements are the Institutional Strategy “The Synergetic University“ with the unique research alliance DRESDEN-concept, the Clusters of Excellence “Center for Advancing Electronics Dresden“ (cfaed) and “Center for Regenerative Therapies Dresden (CRTD) as well as the Graduate School “Dresden International Graduate School for Biomedicine and Bioengineering“ (DIGS-BB). TUD stands for values such as tolerance and cosmopolitanism and expresses these regularly, publicly and visibly.

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