

Stem Cell Researchers Take It To The Next Level **Dynamic Cultures Driving Cell Growth**

For the first time, at the 3rd International Meeting of the Stem Cell Network NRW on 15 – 16 May 2006 in Muenster, Germany, stem cell scientists discussed new techniques for the controlled cultivation of stem cells. The scientists Thomas Noll, Wilhelm Jahnen-Dechent, Peter W. Zandstra and Joaquim Cabral chaired the workshop “Development of Bioreactors and Scale-Up” on challenges and technical approaches to optimize cell growth and to control differentiation. Sound knowledge about these processes enables today’s cell pioneers to identify crucial parameters more and more. Academia but also early companies such as Stem Cell Therapeutics (Calgary, Canada), now starting clinical tests with its stem cell based cell types, are facing new tasks and questions as:

Perfusion and Separation Increase Cell Numbers

One characteristic behavior of stem cells is their adherence to each other as well as to various surfaces. This agglomeration inhibits cell growth, as scientists found out. The question that arose is, how to increase cell numbers to the quantities required? Separating cells and keeping them in suspension could be a solution:

Professor Peter W. Zandstra from the Institute of Biomaterials and Biomedical Engineering at the University of Toronto demonstrated that differentiating embryonic stem cells can be grown in DASGIP bioreactors, and that this growth is much more efficient when agglomeration of cells is inhibited using microencapsulation.

Dr. Zandstra is now developing a method to achieve scalable quantities of human embryonic stem cell derived cells, cardiac cells and blood cells, in a controlled bioreactor system.

Oxygen Tension Influences Cell Differentiation

Systematic variation of cultivation conditions permits deeper insight into growth and differentiation. For example, oxygen tension has a significant impact on the generation of cardiomyocytes, as Dr. Zandstra found out.

Such analysis combined with cell growth under controlled conditions gives access to a new approach to optimize cell expansion and targeted differentiation. Until now few cultivation products allow to work on stem cells without harming them. But: “DASGIP systems are characterized by high flexibility and precision concerning monitoring and control of cultivation parameters”, says Professor Thomas Noll, Director of the cell culture technology group at the University of Bielefeld, Germany. At the International Stem Cell Meeting in Muenster he pointed out: “Measurement and Control with the DASGIP system provided us with insight into processes which can tell us the key parameters of growth and differentiation conditions”.

Right Tools For Stem Cell Research

Other research groups such as at the Institute for Reconstructive Neurobiology, University Bonn in Germany, benefit from DASGIP’s technology on their way to tomorrow’s medicine. Oliver Brüstle, not only Professor at this Institute, but also Managing Director of the company Life & Brain, currently is exploring the impact of oxygen concentration and pH level on his microcarrier based stem cell cultures. His project is supported by a public grant initiated by the Stem Cell Network North Rhine Westphalia. Professor Hans Schöler, spokesman of the Network, appreciates the cooperation with DASGIP: “Whenever scientists and industrial partners work together early, it

helps to take crucial results faster to the next level. This is useful for both partners and, as them being from the same area as in this case, beneficial for the region, too.”

DASGIPs stem cell activities are not limited by regional borders: Beside the cooperation with the University of Toronto the company works on additional projects with European partners. Since its incorporation in 1991 the cultivation specialist focuses on interdisciplinary and application oriented products. More than 40 experts, counting bioprocess engineers, IT-specialists, molecular and cell biologists among them, as well as several development projects with research and industrial partners have made this idea come true during the last decade. ■

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