

3<sup>rd</sup> International Conference & Exhibition on

## TISSUE PRESERVATION AND BIOBANKING &

6<sup>th</sup> International Conference on

## TISSUE ENGINEERING AND REGENERATIVE MEDICINE

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#### **Improved methods and procedures for pluripotent stem cell preservation, storage stability and validation**

The project EBiSC aims to build up a European biobank for research grade human induced pluripotent stem cells (hiPSCs). The vision of EBiSC leads to the demand for upscaled production methods, these kinds of cells leading to the need for automated systems and procedures in stem cell processing and banking. An overview of existing state-of-the-art automation systems is given and the specifications for different applications are compared. Furthermore, modules and concepts for automated cell identification, pluripotency testing, and viability and functionality tests are drawn and results are shown. Scalable label-free analysis of pluripotent stem cells using quantitative life cell imaging and on-line image analysis is shown. A specialized system, the automated hanging drop technique (DropTech®) is shown. The DropTech system allows fully automated cultivation of hiPSCs on micro carrier using the hanging drop technology and enables applications like the automated Embryonic Stem cell Test (EST) for standardized embryo toxicity tests. The last part of the talk deals with the technology of cryopreservation, banking and validation frozen samples. The method of surface-based vitrification of pluripotent stem cells is introduced and the need for a completely closed cool chain is derived from experimental results. Solutions for automated industrial scale biobanking with closed cool chains and with minimal harmful thermal fluctuations are shown and the effect on functionality of cryopreserved cells compared to standard technology is shown. A method for non-invasive monitoring of re-crystallization and de-vitrification effects using Raman micro-spectroscopy is presented.

#### **Biography**

Heiko Zimmermann is the Director and Head of Fraunhofer IBMT and Chair in Molecular and Cellular Biotechnology at the Saarland University and has been working as Physicist since 1997 in the field of cell biophysics. He coordinated the EU-project HYPERLAB in FP7 and was WP leader in several other EU-projects. Within EBiSC, he is Leader of WP 3 and is additionally coordinating the translational project DropTech® in FP7. He received the first permission for working with hESCs within the Fraunhofer Gesellschaft. He is the author of more than 70 peer-reviewed papers and book chapters. His research expertise covers cryobiology, cryotechnology and biopolymers for clinical scaffolds. He is inventor of more than 50 granted patent families from which more than 20 have been commercially licensed.

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