

New challenges in “Cold Applications in Life Sciences”

The 2nd IIR Workshop on “Cold Applications in Life Sciences” was held in Dresden in September 2016.

The enormous progress in cold application in life sciences correlates with new solutions for the producing, storing and handling of bio-products along the production chain up to the end-user.

New or advanced technologies have been developed for safe storage of biological material in laboratories and cryobanks. Freezing and cryoprocessing of biological tissue and biopharmaceutical substances are becoming more and more important for very different applications in life sciences.

Research and development is facing new challenges in tissue cryopreservation, in biomaterial processing and in freezing of active agents worldwide. New industrial solutions are being introduced in pharmacy and medicine.

Investigations are being carried out to find novel approaches of low temperature physics and cryogenics in the field of life sciences. For example in the development of special cryo-protocols for gentle preservation of solid tissue and tissue engineering constructs or in the research on endogenous cryoprotectives for the transplant medicine. Another challenge is the analysis and yield optimization in pharmaceutical freezing using a scientific conception of freezing steps as a part of pharmaceutical basic technologies.

To provide an interdisciplinary scientific platform for a dialog and exchange of experiences between representatives from universities, R&D-institutes and industry a special two day IIR workshop on “Cold Applications in Life Sciences” was held on September 08-09 2016 in Dresden.

The IIR Workshop was organized by the ILK Dresden Centre for Cryo Competence in Life Sciences. This scientific event was a joint activity of the IIR commissions A1 (cryophysics, cryoengineering) and C1 (cryobiology, cryomedicine).

It was the 2nd IIR workshop in Dresden after the 1st workshop in 2013. Dresden has a long history in cryomedicine. The Dresden school of cryomedicine was founded by Prof. Wolfgang Matthäus in the 1970s. He was an ophthalmologist and as a pioneer introduced cryo-treatment for different medical indications. Four decades later the Center of Cryo Competence in Life Sciences at the ILK Dresden is working as an R&D-partner in cell- and tissue cryopreservation, in cryobanking, in pharmaceutical freezing, in biomaterial development and in the cryomedicine as well. A technical tour to the ILK gave the participants of the workshop an impression of the various research works.

The 2nd IIR Workshop on “Cold Applications in Life Sciences” was focused scientifically on new approaches in following areas:

- Cryobiobanking of biologicals
- Advanced devices and procedures for cryopreservation
- 3D-scaffolds and tissue engineering for different applications
- Pharmaceutical freezing and storage of active agents

The workshop was attended by 62 participants from 12 countries. It was a great pleasure to welcome Prof. Sajio Sumida, from Tokyo, Japan, the honorary president of the International Society of Cryosurgery and one of the famous pioneers in cryobiology and cryosurgery. 33 presentations were given, 12 of them as posters. In the accompanying exhibition, 9 exhibitors gave an overview of their product portfolio. Parallel to the IIR workshop, the annual

meeting of the Society of Low Temperature Biology (SLTB) took place as a satellite event at the ILK Dresden. Thus, the participants could use the broad spectrum of both events for interesting conversations and as initiation for further co-operations.

The wide, interdisciplinary range of the IIR workshop topics included new techniques of cell- and tissue cryopreservation in the field of medicine and protection of species, new technical methods for cryobanking, the design of pharmaceutical freezing steps and the development of novel biofunctional polymers by cold application.

The saving and sterile transport, storage and revitalization of cryopreserved biological tissue requires special equipment. For example the Cryo-Rack system ensures the complete process chain from the tissue cultivation in the bioreactor, the axenic transport and the cryobanking up to ambulant revitalizing of the frozen tissue for transplantation with mobile thawing techniques. Such equipment can be used for the cryopreservation of allogeneic transplants or patient- derived tissue engineering (Fig.1).

Cryogenic solutions in biomaterial development are new approaches as well. 3-D scaffolds are used as carriers for human cells. The structural properties of the biomaterial must provide cell growth, differentiation and tissue development. Using a defined freezing process and gentle lyophilization the special ice templating procedure provides tailor-made manufacturing of high porous 3-dimensional collagen scaffolds of any size. Cryogenic pore adjustment has made anisotropic properties and pore interconnectivity possible as well. Bi-layer scaffolds for the regenerative medicine and tissue engineering are possible too (Fig.2).

As an interdisciplinary scientific event the 2nd IIR workshop has shown the variety of new challenges and the new horizons in cold applications in life sciences. It was a successful workshop with interesting presentations and a lot of talks about the topics stimulating new co-operations. It was a meeting for many young researchers as well.

Many thanks to the workshop organizers.

The 3rd IIR workshop is planned in September 2018. The IIR commissions A1 and C1 will decide about the venue and date as soon as possible.

The next important cryogenics event is the 14th Cryogenics 2017 IIR International Conference on May 15-19, 2017 in Dresden, a joint conference of IIR Commissions A1, A2 and C1 with topics regarding cryobiology and cryomedicine as well.

Dr. Ralf Herzog, President of IIR Section A

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Fig.1: Multiwell RACK for cryopreservation of allogeneic transplants



Fig.2: Biodegradable carrier material compound with bi-layer-structure from collagen manufactured by MBIT-Freeze-drying process

Photos from the workshop

