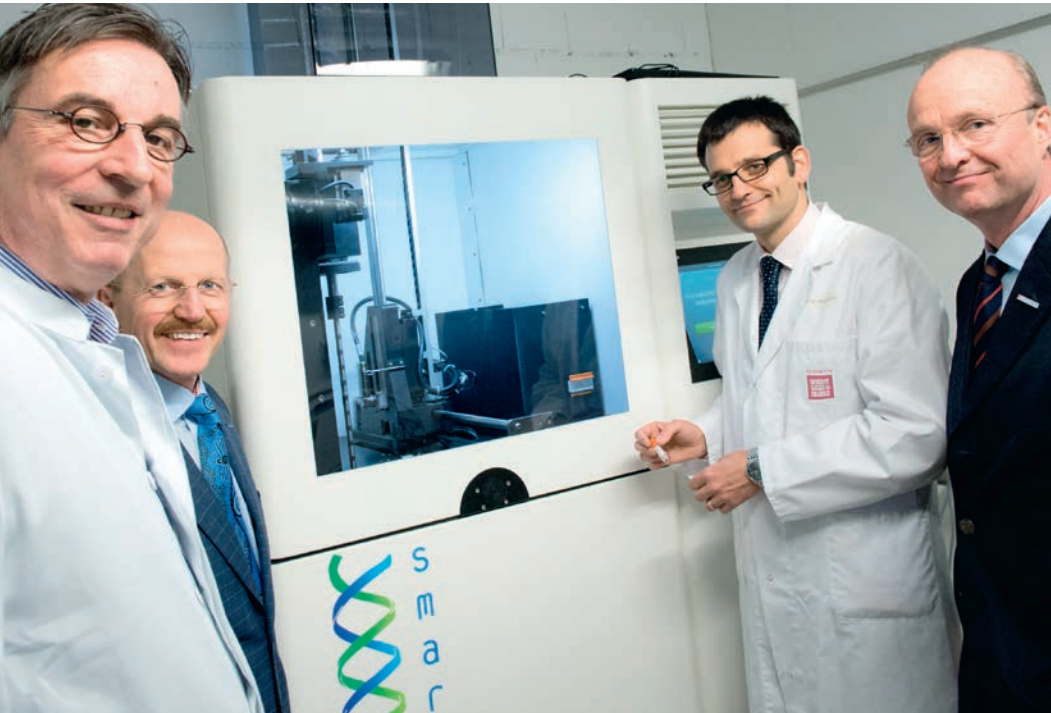


GLOBAL USER REPORT

ISSUE 01 | JULY 2015

PRESERVATION OF
FUNCTIONAL MOLECULES
FOR CELL METABOLISM





Institute of Pathology
UCT Mainz
University Medical Center of the
Johannes Gutenberg University Mainz

SMARTFREEZER

'Smartfreezer is the first fully automated Cryogenic System for individual storage and retrieval of vials in vapour phase of liquid nitrogen. Sample protection, inventory management, traceability and operator safety are combined into a single device. The Smartfreezer system offers the ultimate storage solution for Biobanks and Biorepositories, without sample exposure to transient warming.*'

* Interview with PD Dr. Christoph Brochhausen
Senior Consultant Pathologist
Head of the Tissue Biobank Mainz



University Medical Center of the
Johannes Gutenberg University Mainz
PD Dr. Christoph Brochhausen
Senior Consultant Pathologist
Head of the Tissue Biobank Mainz

'University Medical Center of the Johannes Gutenberg University Mainz is using the Smartfreezer for the highest sample quality storage at -180 °C.

We will describe how the system is utilised and will share with you our experience of the system and the service we are now able to offer for personalized medicine and research.'*

WHEN DID YOU START WITH BIOBANKING FOR PERSONALIZED MEDICINE AND WHAT HAS BEEN GAINED FROM THE INTRODUCTION OF THE SMARTFREEZER SYSTEM?

'Actually, we started in 2002. At that time we just had -80°C freezer available with limitations in sample quality and quality control. Now with the -180°C Smartfreezer (storage in vapour phase) we can guarantee highest sample quality, controlled with our monitoring system.

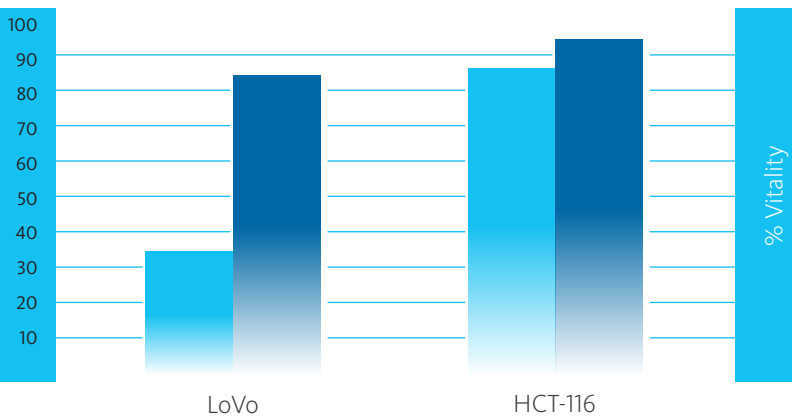
This is the basic requirement for reliable research and the potential use of tissue samples also for regenerative medicine.*

-180°C





Percent of vitality immediately after defreezing



Growing behaviour of LoVo and HCT-116 cells 5 years after storing in -80 °C and -180 °C. Colony formation and growing as a monolayer shows better viability after -180 °C storage.

■ -80 °C
■ LN2



Source: University Medical Center of the Johannes Gutenberg University Mainz, PD Dr. C. Brochhausen, Nerviano Medical Science, Dr. D. Ballinari



HOW CAN YOU GUARANTEE TO MAINTAIN CONSTANT HIGH SAMPLE QUALITY?

'In order to improve outcome of clinical studies it is mandatory to provide highest biomaterial quality.

Based on the fully automated Smartfreezer robotic system, we have developed a monitoring system, which involves real time monitoring for different parameter, including:

Fig 1: LN2-filling level arithmetic mean 24 h over 7 days.

Fig 2: LN2-consumption arithmetic mean 24 h over 7 days.

Fig 3: Real time temperature monitoring (°C) arithmetic mean 24 h over 7 days.

This safety monitoring concept allows immediately reaction in case of any technical interruption.*

Smartfreezer is designed to be installed in biorepositories and biobanks, where advanced-evidence biobanking practice is the goal to strive for.



Various Parameter Monitoring

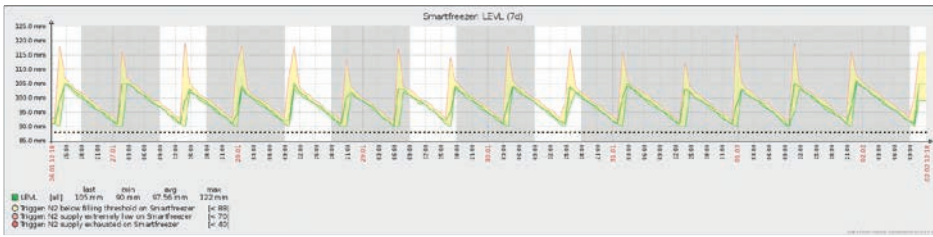


Fig 1: Level of LN2 (mm)

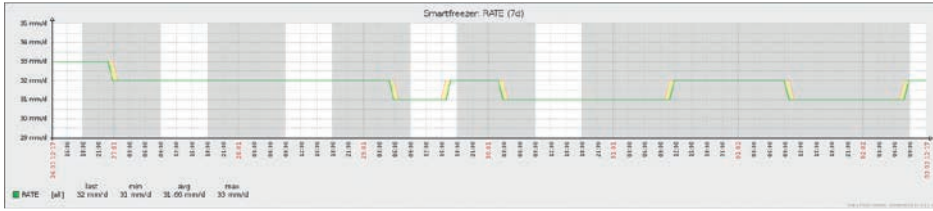


Fig 2: Consumption of LN2 (day)
30 mm corresponds to 13 L of LN2

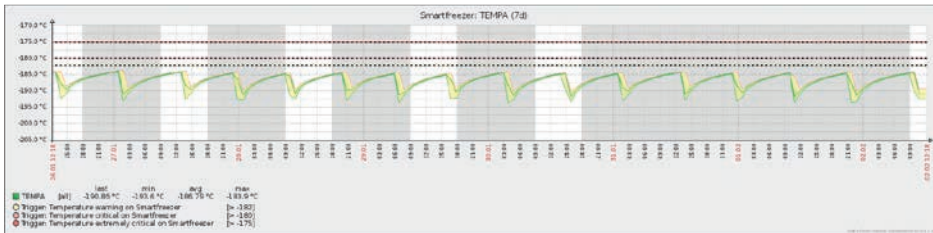


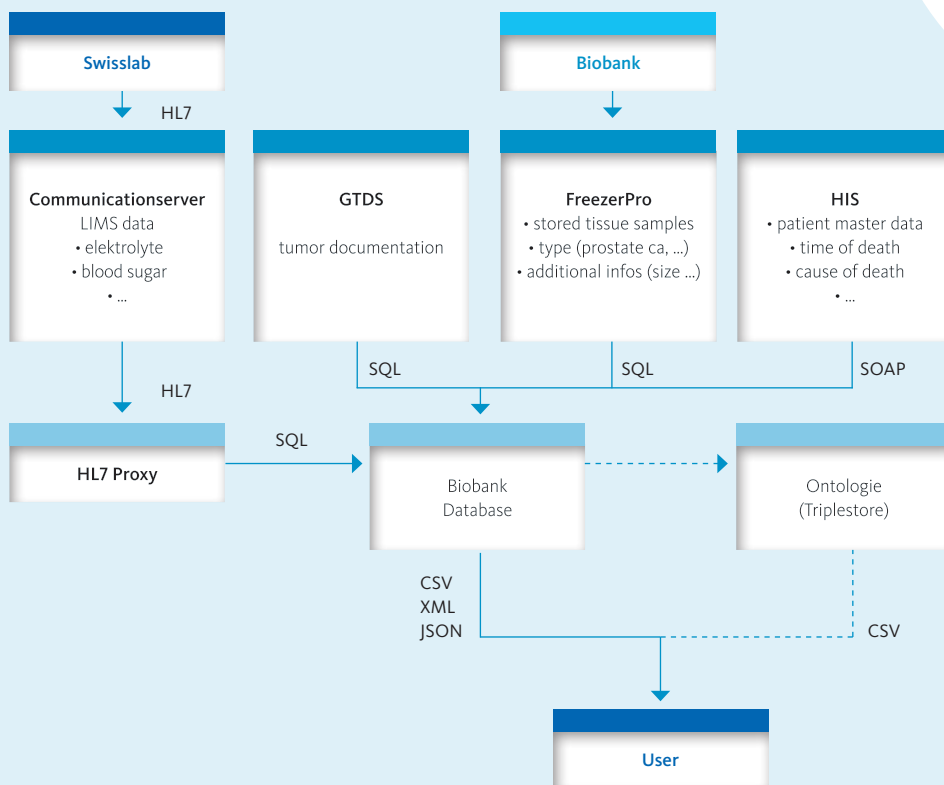
Fig 3: Temperature (°C)

HOW DO YOU HANDLE 'BIG DATA' FROM YOUR PATIENTS?

'We have developed a system which brings clinical data from different information systems together into a document-based database. Parallel to this, data are prepared which include normalization and linking of data together. With this database, complex queries are possible with the MapReduce method.

To enhance data quality and permit easier integration of data from heterogeneous resources we will implement a data management, which will use an ontology coded in Web Ontology language. For this purpose we will re-use and extend the pre-existing ontology OMIABIS, which was developed by the University of Arkansas for Medical Sciences, Little Rock, USA in cooperation with BBMRI Sweden and based in the MIABIS dataset.*

Biobank Mainz Ontology System



Source:
(Brochhausen *et al.*, publication in preparation)

OMIABIS Ontology System

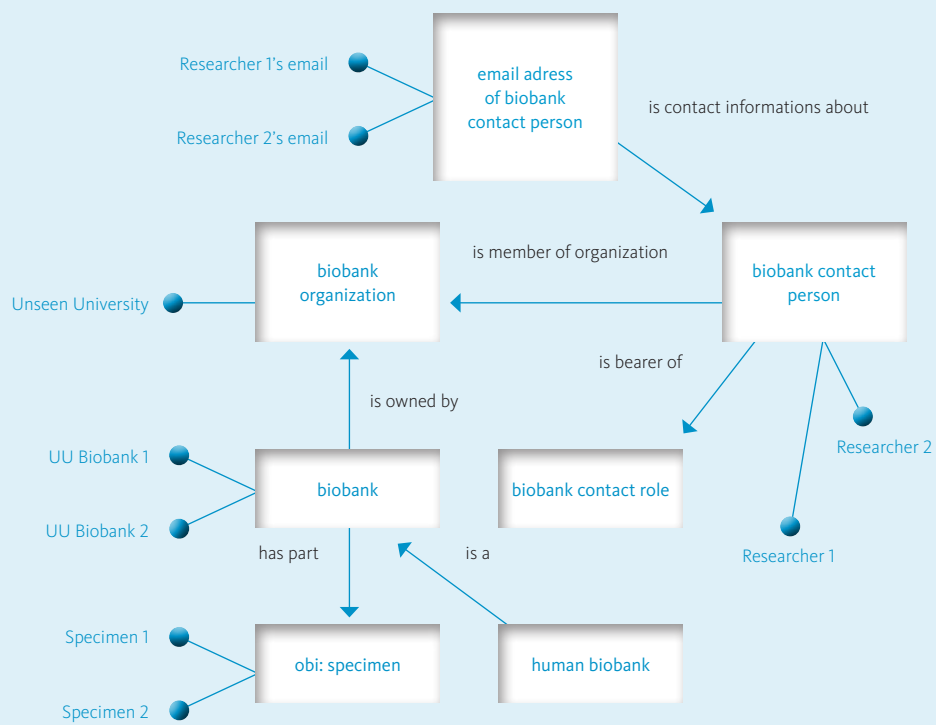


Illustration of the central OMIABIS classes. The figure shows the central classes of OMIABIS and the object properties connecting them. Light blue rectangles are classes; light blue arrows are object properties. Dark blue circles and edges represent instances that can be retrieved using OMIABIS.

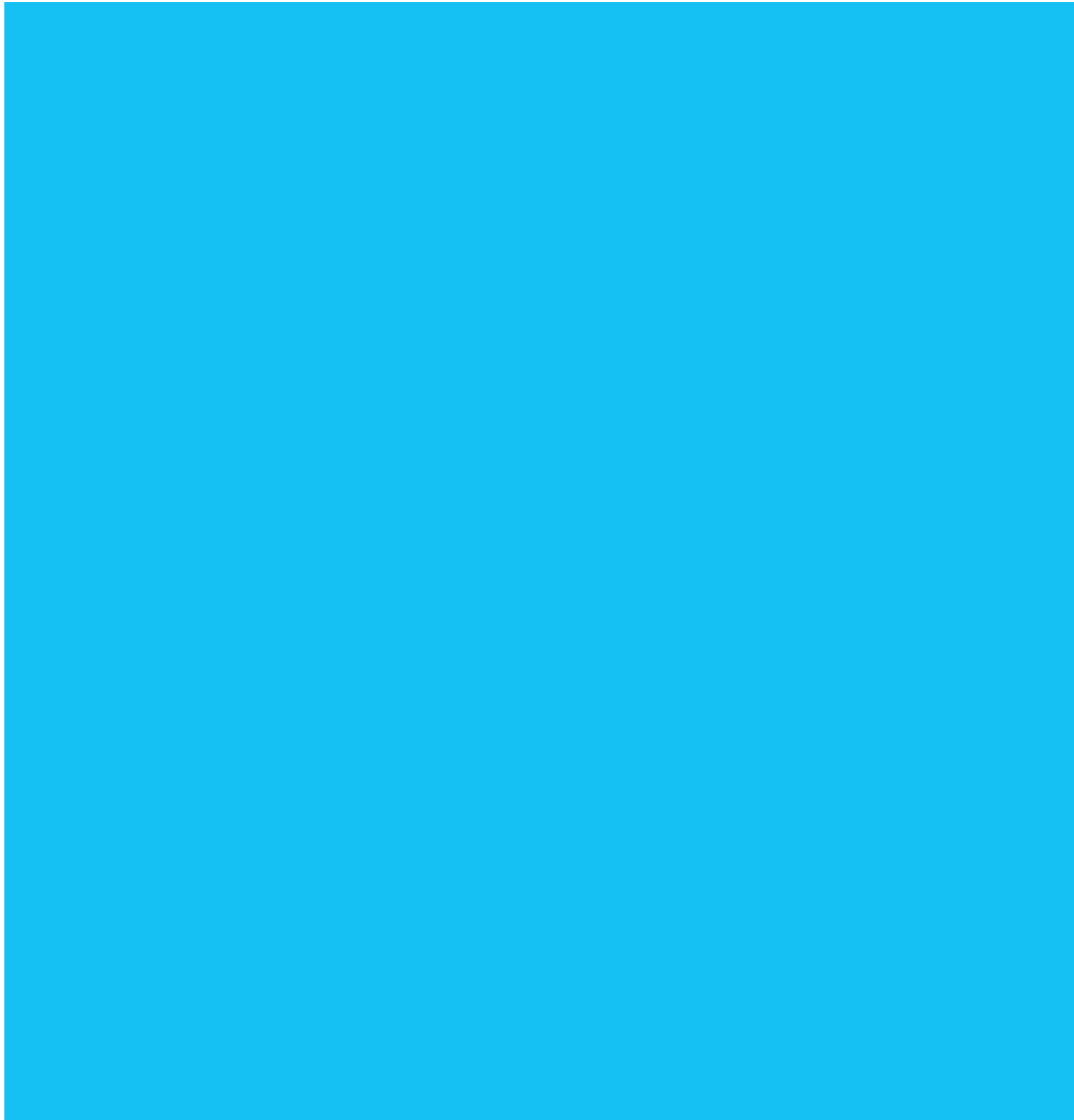
Sources:
 Professor Dr. Mathis Brochhausen, Biomedical Informatics, University of Arkansas for Medical Sciences, Little Rock; 'Developing a semantically rich ontology for the biobank-administration domain'. Journal of Biomedical Semantics 2013;4:23.

‘We can show that:
• **Vitality** • **Growth behavior** • **Structural integrity**
of cells are more favorable with
the -180°C Smartfreezer System.’*

The unique fully automated Smartfreezer robotic system has many advantages:

- The ‘Cherry Picking Concept’ allows storage and retrieval of each single specimen tube. None of the adjacent tubes will be exposed to temperature deviations.
- Each storage or retrieval process is fast and takes just 15 seconds.
- In daily routine the Smartfreezer is very easy to handle and safe for the staff.
- Maintenance of sample collection integrity can be reached on the basis of the uninterrupted permanent storage below -150°C (storage in LN2 vapour phase).
- The Air dryer system eliminates ice crystal formation.
- FreezerPro software offers complete audit trail of sample history and user activities. It is developed according to FDA and CFR 21 part 11 standards.

* Interview with PD Dr. Christoph Brochhausen
Senior Consultant Pathologist
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