



ASKION C-LINE[®] SYSTEM REFERENCE BROCHURE

Freezing * Storage * Automation * Transportation

ASKION C-line[®]

System

REFERENCE BROCHURE

INTRODUCTION

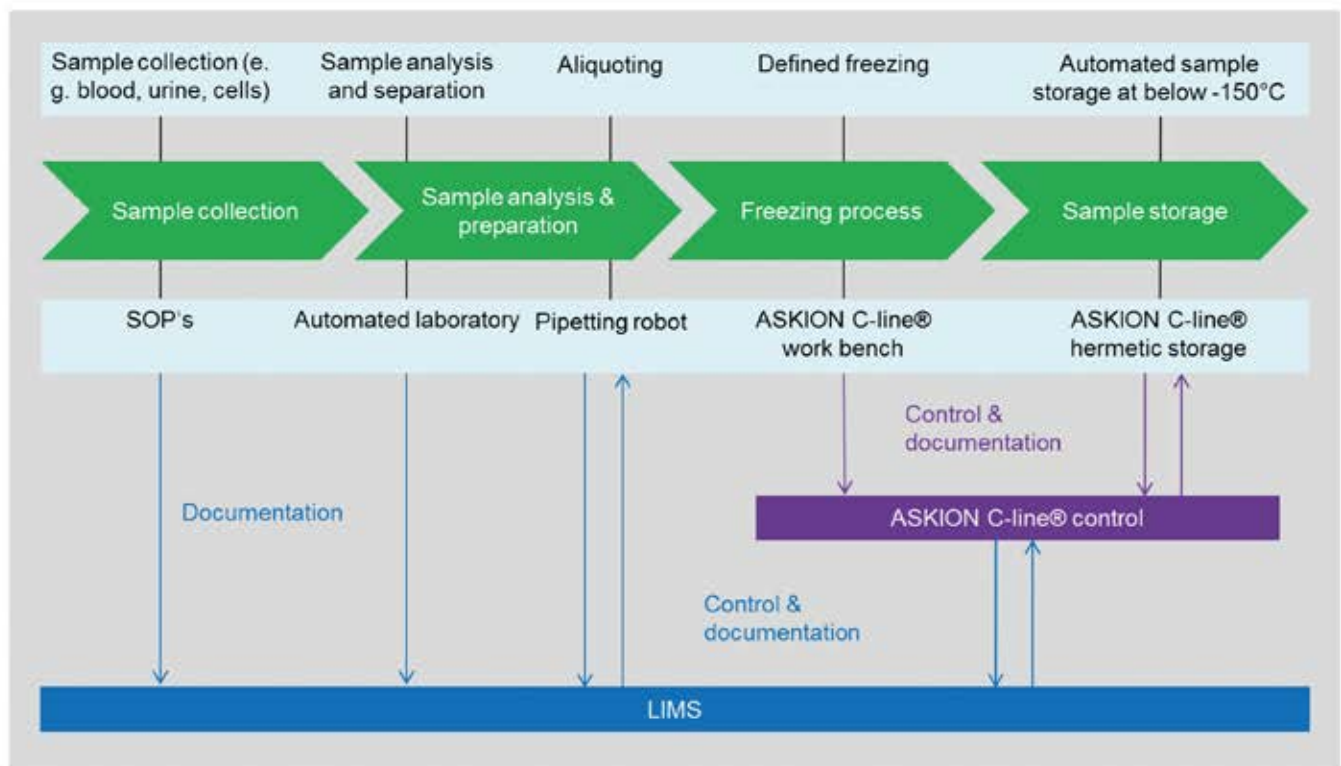
Biobanks are considered to be one of the world-changing inventions of the 21st century (Time Magazine March 23, 2009 | Vol. 173 No. 11).

A wide variety of sample materials are stored inside biobanks. By using these stored samples new therapies (e. g. for treatment of cancer) as well as markers for early detection of diseases are developed.

For this reason biobanks are indispensable for modern research.

The planning and installation of a biobank require various planning steps, beginning from the selection of the right hard- and software to the integration into the existing workflow up to the implementation into the present IT infrastructure.

To support future biobank operators during the planning process for their own biobank, current users have agreed to share their knowledge and experience. On the following pages they share their know-how and explain the workflow of their biobank.



Exemplary integration of a biobank into a workflow beginning from sample collection to sample analysis and preparation followed by freezing process and storage. By simultaneously integration into the existing IT infrastructure (e. g. by LIMS) it is possible to record the conditions for every sample during all working steps.

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BIONTECH AG

INTERVIEW WITH DR. CHRISTINE HAWNER - HEAD OF BIOSAMPLING AUTOMATION DEVELOPMENT

BioNTech AG is a fully integrated biotech company which combines all skills that are necessary for development and production of immunotherapies under one roof. The company was founded in 2008 as spin-off of the prestigious Johannes-Gutenberg University in Mainz and employs today more than 500 employees.



The biobank of BioNTech AG in Mainz, Germany

In its laboratory BioNTech isolates mononuclear cells of the peripheral blood that are frozen by the ASKION C-line® work bench and stored inside the ASKION C-line® HS200 afterwards.

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BIONTECH AG

THE SAMPLE FORMAT

BioNTech uses 1 ml barcoded tubes for filling and storing. The decision to use these tubes has been taken as they enable the automated sample handling and complete sample tracking beginning from the receipt of the sample up to the analysis.

THE BIOBANK

BioNTech preserves in its laboratory patient's blood and tumor samples. Mononuclear cells are isolated from the blood and then frozen with the ASKION C-line® work benches. Afterwards the samples will be stored automated inside the ASKION C-line® HS200 S storage tanks. Moreover, BioNTech uses the ASKION C-line® control software to manage manual storage devices, e. g. tissue storage for tissue samples. The samples are then used to analyse the mutation profile of the respective patient to produce a tailor-made immune serum against cancer for every single patient.

ADVANTAGES OF THE ASKION C-LINE® SYSTEM

The ASKION C-line® system allows BioNTech to freeze, store and retrieve patient cells in an semi-automated process without interrupting the cooling chain. This guarantees to maintain the quality of the valuable samples.

DEVICE INSTALLATION

The system had to be installed at the top floor of the BioNTech research center. Therefore a nitrogen line was installed up to the fourth floor to supply the ASKION C-line® system with nitrogen. Furthermore, the ventilation system had to be adapted to provide a sufficient air exchange.

SAMPLE MANAGEMENT

The ASKION C-line® devices are integrated into a LIMS and a Manufacturing Execution System. Freezing and storage processes are controlled and managed by these two system.



A detailed description of the requirements on the storage system, the software and the premises is very important to set up a biobank.

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FRAUNHOFER INSTITUTE FOR BIOMEDICAL ENGINEERING

INTERVIEW WITH PROFESSOR DR. HEIKO ZIMMERMANN - HEAD OF INSTITUTE

Since its foundation in 1987/1992 the Fraunhofer Institute for Biomedical Engineering (IBMT) operates at the internationally growing market of Life Sciences and Medicine/Medical engineering as technology developer and device manufacturer for customers all over the world. The strong link between a wide technological competence with profound knowledge in the medical-biological field and the availability of most-modern technology, beginning from ultrasound, from microsystem technology, cryo and nanotechnology to IT and simulation, gives the institute an outstanding position in Europe.



Professor Dr. Heiko Zimmermann

THE BIOBANK

Based on a long-standing experience in the field of biobanking, the IBMT had chosen the ASKION C-line® system as storage system for their samples. As the ASKION system is the only system that guarantees an uninterrupted cooling chain, the samples of IBMT are stored at the highest quality.

SAMPLES

IBMT stores human cell cultures, as for example induced pluripotent stem cells (iPS). The samples are stored only in 1.8 ml vials as this format has proven its suitability for cryo storage of human cell cultures.



A forward-looking planning regarding standardized vial formats, preparation of cryo labels and handling of sample data is important for building up a biobank.

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FRAUNHOFER INSTITUTE FOR BIOMEDICAL ENGINEERING



Biobank of the Fraunhofer IBMT at Sulzbach/Saar, Germany

THE WORKFLOW

The general workflow at the IBMT starts with the cell culture where already frozen samples will be expanded or kept. Afterwards the samples will be cryopreserved and prepared for long-term storage in the gas phase of liquid nitrogen at the cryogenic working area. To control the correct storage of the samples, the IBMT develops at the moment an own solution for sample management.

PREPARATION OF WORKING AREA

For the installation of the ASKION C-line® system at Fraunhofer IBMT it was necessary to install a dedicated line for the supply with liquid nitrogen. Furthermore, the working area has been equipped with alarm systems for nitrogen and oxygen sensors to ensure safe working conditions.

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CENTER OF LABORATORY MEDICINE, INSELSPITAL BERN

INTERVIEW WITH PROFESSOR DR. CARLO LARGIADÉR - HEAD OF LIQUID BIOBANK BERN

The Center of Laboratory Medicine has been commissioned by the InselSpital Bern to operate an institutional biobank for liquid biomaterial (e. g. whole-blood, serum, plasma or blood cells).

SAMPLES

The majority of the stored samples are serum and plasma samples. The Liquid Biobank Bern uses cryotubes of the company FluidX with 270 ul, 525 ul or 1.8 ml filling volume to store the biomaterial. The decision in favor of these cryotubes was made due to the reason that for today's analytical methods relatively small sample volumes are sufficient. In order to keep the costs per tube as low as possible the Liquid Biobank Bern focused on small-sized formats.



Professor Dr. Carlo Largiadér

WORKFLOW OF THE BIOBANK

The samples are collected at the clinic directly on the patient and tracked right away by bedside scan. Immediately afterwards the samples are transported manually to the Center of Laboratory Medicine. There the samples are checked-in at the LIMS and processed on the laboratory system (centrifugation). Now the aliquoting takes place using a pipetting robot. After that the samples are frozen controlled at the ASKION C-line® work bench and put there temporarily until they are stored inside the stores located at a different floor. If samples are ordered, the order management is done by the biobank information system (BIMS). The samples will be retrieved from the different stores and stored temporarily at the ASKION C-line® work bench until they are collected for shipment or processed on site.

i One of the priorities during build-up of a biobank should be the planning of the BIMS (biobank information system) and therefore the provision of enough financial reserve and buffer time for the chosen IT solutions.

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CENTER OF LABORATORY MEDICINE, INSELSPITAL BERN



Biobank of the InseleSpital Bern, Switzerland

Whereas the instrumental and spatial infrastructure can be planned pretty well with regard to financial and temporal aspects, the connection of the different devices and controlling softwares into the local IT infrastructure had been associated with unexpected difficulties and additional expenses.

DECISION FOR ASKION C-LINE® SYSTEM

The Center of Laboratory Medicine made a market analysis to figure out which system meets their requirements the most. On the basis of this analysis, the need for a fully automated storage system for sample storage below -140°C and the possibility to connect the system to a higher-level BIMS, the decision had been taken to install the ASKION C-line® system. Prior to the system installation it was necessary to build a line for the transport of the liquid nitrogen from the central storage to the biobank.

SAMPLE MANAGEMENT

The biggest challenge during the installation of the ASKION C-line® system had been the connection to the biobank information system (BIMS). All samples are managed centrally by Labvantage (LV) which communicates also with the laboratory LIMS, the pipetting robot, C-line®, Hamilton Store and with the performance withholding center.

LEIPZIG RESEARCH CENTER FOR CIVILIZATION DISEASES (LIFE)

INTERVIEW WITH DR. RONNY BABER - MANAGER BIOBANK



Dr. Ronny Baber

The biobank of the LIFE Research Center was founded in 2010 for the research project LIFE which focuses on researching the fundamentals of civilization diseases. The project made it possible to build up a comprehensive biobank infrastructure. Since 2010 the biobank has been increased two times by using fundings and offers now a capacity for 1.4 million samples. The LIFE biobank concentrates on the storage of liquid biospecimen. Most of the samples are serum, plasma and urine. In addition peripheral blood mononuclear cells and nucleic acids are extracted from whole blood of study participants and stored at the biobank. Other samples that are stored are saliva, feces, breast milk and hair. Furthermore, the LIFE biobank produces dried blood cards and preserves biopsies of umbilical cord and placenta. Due to the higher sample stability compared to conventional storage units, the biobank uses straws and cryotubes to store their samples

FROM SAMPLE COLLECTION TO SAMPLE MANAGEMENT

Blood samples and urine of the test persons are collected at the ambulances and arrive not later than 60 minutes after collection at the ambulance laboratory. After subsequently centrifugation of a majority of the samples the liquid components will be transferred to secondary tubes. Serum and plasma are then filled into 0.3 or 0.5 ml straws using an aliquoting robot (DIVA system). Afterwards the samples will be transported to the biobank on dry ice and there the frozen samples are presorted for storage at the cryogenic working area (below -100°C). Using liquid nitrogen cooled dewar containers the samples are brought into the HS200 and put to their previously allocated storage place. For sample management LIFE uses a specially them developed system called „CryoLab“. Also the HS200 can be controlled by this system and enables the automated storage and retrieval of samples.



It is advisable to attend relevant meetings to discuss with representatives of established biobanks and industry. Additionally several biobanks should be visited to learn from experienced operators.

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LEIPZIG RESEARCH CENTER FOR CIVILISATION DISEASES (LIFE)

ADVANTAGES OF THE ASKION C-LINE® SYSTEM

For the storage, retrieval and also sorting of samples it is very important to provide an uninterrupted cooling chain. As the ASKION C-line® system is the only system that guarantees the uninterrupted cooling during storage and handling, the decision for the system was taken. Another advantage is the sample storage and handling at the working area below -100°C by active cooling at the gas phase of liquid nitrogen.



Biobank of the Leipzig Research Center for Civilization Diseases (LIFE) and the Institute for Laboratory Medicine, Clinical Chemistry and Molecular Diagnostic, Leipzig University Clinic, Germany

In the process of the infrastructural development of the biobank LIFE went through three expansion steps. The first step was the installation of five HS102. During the expansion of the biobank in 2013 six HS200 S have been purchased but due to the continuously growing number of samples a

further expansion was necessary. To meet the space requirements, structural changes had to be made. By extending nitrogen lines and exhaust systems and by relocating five cryogenic freezers it was possible to make room for another four HS200 S of which three devices have been purchased in 2014.

UNIVERSITY HOSPITAL OF ANTWERP (UZA) INTERVIEW WITH SOFIE GOETHALS - BIOBANK MANAGER

In March 2008 the Belgian National Cancer Plan (NCP) was launched by Mrs. L. Onkelinx, Federal Minister of Social Affairs and Public Health. To promote translational cancer research and the collaboration between different cancer researchers in Belgium, one of the initiatives of the NCP (initiative 27) was the creation of a Belgian Virtual Tumourbank. By this initiative governmental funding was made available to create and maintain a tumourbank. Furthermore, the Flemish Biobank Initiative (formerly CMI), a non-for-profit organization, was officially founded in December 2009 through a collaborative effort between the Flemish Government, the Flemish Ministry of Economy and Scientific Affairs, the 5 Universities and the 4 University Hospitals and representatives of Healthcare Industry. The Flemish Biobank Initiative supported the realization of 5 pilot biobanks in different disease domains: sudden cardiac death, hepatotropic viruses, diabetes, inflammatory bowel disease and rheumatoid arthritis. Since 2012 the UZA focuses on sudden cardiac death, hepatotropic viral diseases.



Mrs. Sofie Goethals

DECISION FOR THE ASKION C-LINE® SYSTEM

UZA wanted a fully automated system for storage and retrieval of samples that could keep the uninterrupted cooling chain at temperatures below -100°C throughout the whole processing and storage/retrieval process of the samples.

Automated Biobank storage does not only influence the storage/retrieval process but also the complete workflow. Therefore, it is necessary to consider every detail of the process and talk to people in the field with experience in biobank automation. Furthermore, people with sound IT skills have to be involved from the beginning of the project.

At the UZA fresh frozen and paraffin embedded tissue, blood and blood products, such as plasma, serum, buffy coat and urine are stored. To enable the lab-automation and storage in the ASKION system the standardized non-label formats 2 ml and 600 µL 2D barcode bottom prelabeled vials are used. The usage of these formats speeds up the handling and registration process of the samples significantly and reduces the risk of human errors.

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UNIVERSITY HOSPITAL OF ANTWERP (UZA)

BIOBANK WORKFLOW

The UZA receives primary samples for the biobank either directly, through pathology department or clinical chemistry lab of the hospital. The samples are processed (manually) into fractions. Registration is done semi-automated using the biobank software package SLims (Genohm). Then the samples are snap-frozen in liquid nitrogen and, depending on the sample type, either stored in mechanical -80°C freezers or in the ASKION C-line® system.



Biobank of the University Hospital of Antwerp (UZA), Belgium

STRUCTURAL PREPARATION

Prior to the installation of the system a new building was created to fulfill the requirements on, for example, liquid nitrogen supply and to provide the necessary space. Furthermore, safety aspects, such as oxygen sensors and extra ventilation as well as central 24/7 alarm monitoring system, have been taken into consideration during planning.

SAMPLE MANAGEMENT

The whole sample management process is done by one LIMS system, from the Belgian-Swiss company Genohm, called SLims. SLims is connected to different other in house databases at UZA. All storage and retrieval processes of the ASKION C-line® system are completely integrated in and managed by SLims.



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