



EUROPE BIOBANK WEEK CONGRESS 19-22 MAY 2026

POSTER SESSIONS

Abstracts

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Department of Outreach, Education and Communications

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TRACK 1. Biobanking

Without Borders: Connecting Biodiversity, Medicine, and Innovation

3A: Preserving biodiversity: Challenges and opportunities in non-human biobanking

719: Animal Models to Histology: BMB
NORD Enabling the Preclinical to Clinical
Research

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*Topic: 3A: Preserving Biodiversity: Challenges
and Opportunities in Non-human Biobanking*

Presenter Name: Karoline I. Gaede

*Keywords: Animals, Non-human Biobanking,
Preclinical Biobanking, Preclinical-to-Clinical
Research*

Introduction

Biobanks are essential infrastructures in translational research, enabling standardized collection, processing, storage, and management of biological specimens and associated data. Along the research pipeline, biological material progresses from in vitro systems and animal models to human biospecimens and clinical studies. Although animal facilities and human biobanks are typically organized separately, integrating animal-derived samples into human biobank infrastructures can improve continuity across translational research stages. This project aimed to integrate mouse tissue samples into the human-centered biobank infrastructure of BMB Nord to better link animal model research with downstream human focused analyses.

Materials and Methods

Mouse tissues were collected in accordance with approved ethical guidelines and processed into FFPE blocks using an automated tissue processor. Structured biospecimen metadata were documented using standardized digital workflows. As no formal SPREC standard exists for animal biospecimens, a customized metadata framework inspired by SPREC was developed. Recorded variables included animal identifiers, tissue type, organ of origin, fixation parameters, and storage conditions. Metadata quality and logical consistency were evaluated using a pilot dataset prior to implementation in the biobank information management system.

Results

The CentraXX system (IQVIA Health Data Research Platform) was successfully configured to support animal-specific metadata and dual animal identification. Animal-derived FFPE samples were registered, QR-labeled, and managed within the existing biobank infrastructure.

Conclusion

This study demonstrates that animal biospecimens can be effectively integrated into biobank infrastructures originally designed for human samples, enhancing translational continuity and enabling harmonized sample and data management across research stages.

672: Preserving biodiversity: challenges and opportunities with biobank establishment and long-term storage of marine microbial isolates and invertebrate tissues

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Abstract ID: 672

Topic: 3A: Preserving Biodiversity: Challenges and Opportunities in Non-human Biobanking

Presenter Name: Miroslava Atanassova

Keywords: long term storage, marine microorganisms, primary cells, sea cucumbers, tissues, viability assays

Marine microorganisms and invertebrates present fundamentally different preservation challenges rooted in cellular complexity and physical parameters. Marine bacteria achieve substantially higher preservation success rates. The primary challenges for microorganisms involve contamination and genetic drift during long-term maintenance. Sea cucumber cells have already been investigated for survival after freezing in Dorisol and standard media. Marine invertebrate tissues and cells face obstacles as high sensitivity to cryoprotectant toxicity, chilling sensitivity, etc.

Sea cucumber *Parastichopus tremulus* individuals were collected as bycatch from commercial crustacean trawl and pot fisheries. The sampling for sea cucumber body wall associated microbiota has been done on three different sea cucumber batches, coming from two different locations. Different body wall

tissues have been preserved in parallel. The sea cucumber culturable microbiota isolates, identified to the species level by Sanger sequencing, have been stored at different conditions and their viability checked every year for a 3-year storage. Body wall tissue samples were stored in two different media, at -20°C and -80°C as well as in liquid nitrogen and release of viable cells was monitored every month over a 3-month period.

About 5% of the marine microorganisms stored at -80°C have lost viability after frozen storage for 3 years in 20% glycerol, while 3% have lost viability after frozen storage at -20°C in 20% glycerol. Viable cells were released into the cell culture medium after thawing in all storage condition cases, with different %. Numerous challenges exist regarding the correct maintenance and identification of marine environmental isolates for in-house culture collection establishment.

621: From Sample to Sequence: An Automated Microbiome Workflow for Diverse Sample Types

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Abstract ID: 621

Topic: 3A: Preserving Biodiversity: Challenges and Opportunities in Non-human Biobanking

Presenter Name: Timm Weber

Keywords: Automation, Bacteria, Birth Cohort, Children, DNA Extraction, Environmental Samples, Microbiome, NGS

Microbiome analysis, from human host-associated to environmental, is gaining importance across diverse fields. Biobanks already process and store a broad spectrum of sample types; the growing demand for microbiome studies further expands this diversity. Key requirements include the unbiased and reproducible isolation of microbial DNA from various samples. Additionally, large cohort studies require automated workflows. One particularly extensive project supported by our biobank is the longitudinal birth cohort “Little Owls”, currently enrolling 200 children, with a projected total of 1,000. Microbial DNA is isolated from samples collected from the children, family members, and their environment at multiple time points over >10 years. Sample matrices include meconium, stool, urine, breast milk, skin- and mucosal swabs, fingernails, house dust, and soil. To enable automated, standardized processing, we have established a platform for DNA isolation, quantification, and normalization (Hamilton/ThermoFisher). Normalized DNA is provided as a seamless interface to the university’s Next Generation Sequencing core facility (CF-NGS) for downstream applications such as 16S rRNA gene sequencing and Oxford Nanopore metagenome sequencing. To accommodate diverse sample types within one unified workflow, we implemented a modular SOP framework that allows for matrix-specific adaptations while maintaining an overall harmonized process. Quality is monitored throughout the workflow using a bacterial

standard and aliquots from a fixed pool of realworld samples. In conjunction with the CF-NGS, this allows us to provide researchers and clinicians with a standardized workflow from primary sample to sequence, offering flexibility, quality, and scalability.

600: CIRM-CFBP: strategic resources for plant health. From single strains to complex microbiota

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Abstract ID: 600

Topic: 3A: Preserving Biodiversity: Challenges and Opportunities in Non-human Biobanking

Presenter Name: Perrine Portier

Keywords: Microbiome, Plant associated bacteria

The French Collection for Plant-associated Bacteria (CIRM-CFBP, <https://cirm-cfbp.fr/>) was created in 1973. Since then, it expanded and now holds more than 7000 strains. With several representatives for each taxa, ensuring the representation of the whole known diversity for several of the main plant-pathogenic bacterial genera, and increasing number of taxa isolated from plant microbiome, these resources are strategic for plant health.

Resources from CIRM-CFBP are used widely by researchers, plant breeders, and national plant protection organisations, for basic research, design of diagnostic tools, epidemiology, etc. CIRM-CFBP is also part of infrastructures such as MIRRI-ERIC (<https://www.mirri-eric.eu/>).

Driven by the user's needs, CIRM-CFBP has evolved, implementing new tools, organisation or integrating new resources.

The last questions about the preservation of microbiomes is not trivial. Applying the usual techniques for isolated strains will not be as effective as not all microbiomes' members are cultivable. Thus, preservation will alter the taxonomic composition and in turn will alter the functional diversity of these communities.

Within the framework of the MICROBE project (<https://www.microbeproject.eu/>), we are now exploring new ways to preserve seed-associated microbiota.

Microbiota were extracted from bean seed lots and preserved following nine different preservation modalities. The experiments were conducted jointly among three partners of the project (INRAE / AIT / CABI). The taxonomic composition had been assessed by metabarcoding (ITS/*gyrB*/16S rRNA markers) and the functional diversity by Biolog Ecoplates.

This project will enable the collection to better preserve whole communities and pave the way to a new era for biological resources centers.

549: Lessons from the human microbiome field: Pre-analytical variables for reliable non-human biobanking and research

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Abstract ID: 549

Topic: 3A: Preserving Biodiversity: Challenges and Opportunities in Non-human Biobanking

Presenter Name: Cornelia Stumptner

Keywords: metadata, microbiome, non-human, plant, pre-analytic, quality, standardization

Introduction

The pre-analytical phase is a vulnerable and decisive part of the laboratory testing process and samples/data reuse. For human microbiome samples, the SPIDIA4P-/BBMRI.at contributed standard CEN/TS 17626 specifies pre-analytical requirements. By contrast, preanalytics in non-human microbiome fields (e.g., plants, soil, marine) are often underestimated. The more advanced human field can serve as a best-practice exemplar to support non-human biobanking.

Material & methods

Within the EU project MICROBE, we used CEN/TS 17626:2021 as an exemplar and combined a structured literature review with workshops involving EPSO and/or MICROBE experts. This approach delineated the pre-analytical workflows and defined sample-type-specific variables and metadata needs for plant, soil, and marine water specimens.

Results

We defined discrete pre-analytical steps from in-situ sampling through collection, intermediate storage, preservation, transport, laboratory processing, analyte isolation and storage. For each step we identified principal variables that can alter microbial community composition or biomolecule profiles: sampling location and timing, host characteristics (e.g., species, age), collection tools and techniques, time and conditions before preservation, preservation method, transport conditions, subsampling and homogenization, and analyte extraction method. Key variables include undesired microbial growth or loss, contamination with external cells/RNA/DNA, as well as differential lysis efficiencies, inhibitory compounds, and host RNA/DNA co-isolation during extraction.

Discussion & conclusion

Mapping these steps and variables provides a foundation for harmonized procedures and metadata collection and development of guidelines. Standardized documentation and processes are needed to reduce variability, improve reproducibility, and enable interoperable non-human microbiome biobanking that advance conservation, ecological restoration, and integrated One Health research.

538: Comparative Medicine: Bridging Species

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Abstract ID: 538

Topic: 3A: Preserving Biodiversity: Challenges and Opportunities in Non-human Biobanking

Presenter Name: Melanie Stargardt

Keywords: Comparative medicine, companion animal tumors, companion animals, non-human biobanking, one health, veterinary biobank

Comparative medicine examines health and disease across species, using similarities and differences between animals and humans to uncover mechanisms, identify biomarkers and target structures, and translate diagnostics, prevention, and treatments.

Companion animals such as dogs and cats serve as valuable models that complement human cohorts and help overcome the limitations of human-only research. These companion animals spontaneously develop cancers, cardiometabolic, neurological, and immune diseases that mirror human pathophysiology and treatment responses, while sharing same environments and exposures.

To advance this research approach, it is essential to establish harmonized biobanks for both humans and animals, ensuring that samples and data meet equivalent quality standards. The VetBiobank at Vetmeduni Vienna, part of the Austrian node (BBMRI.at) of the European biobanking infrastructure (BBMRI-ERIC), has already implemented appropriate quality standards for collecting tissue samples from clinical patients. Furthermore, it is actively working to build a network with other veterinary collections to aggregate high-quality, well annotated clinical samples for comparative research. This initiative positions veterinary biobanks as key contributors to foster comparative research.

Strategic collaboration between human and veterinary research networks, as highlighted in the BBMRI-ERIC's 10-year roadmap, will strengthen comparative medicine research projects and drive One Health diagnostics and therapies that benefit both animals and humans.

534: Towards microbiome preservation: First insights from soil microbiome preservation experiment

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Abstract ID: 534

Topic: 3A: Preserving Biodiversity: Challenges and Opportunities in Non-human Biobanking

Presenter Name: Sara Pipponzi

Keywords: Microbiome biobanking, cryopreservation, preservation methods, soil microbiome

Introduction:

Microbiomes are complex communities of microorganisms that, together with their "theatre of activity", define a specific habitat and provide essential ecosystem services critical to the health of plants, animals and the environment. Among these, the soil microbiome is particularly important because of its complexity and the wide range of functions and ecosystem services it provides. In addition, it plays a significant role in human

health through its influence on the food system. For these reasons, the soil microbiome has been selected as a use case for investigation within the EU-funded MICROBE (Microbiome Biobanking (RI) Enabler) project.

Material & methods:

The MICROBE project addresses the critical challenges of microbiome preservation and current challenges faced by culture collections and biobanks that need new approaches for sample preservation and metadata management. By establishing standardised protocols and optimising preservation methods, the project aims to ensure the long-term stability of microbial communities and their functionality, as well as, the storage of metadata associated with samples, to enable future scientific research and industrial applications. To this end, the project has conducted a comprehensive study evaluating different preservation strategies on well-characterised soil samples, including different storage temperatures, cryoprotectants and cooling rates.

Results:

Preliminary results suggest that these methods successfully maintain bacterial and fungal culturability over time, while ongoing assessments explore their effects on community composition.

Conclusion:

The insights gained from these efforts will provide a blueprint for microbiome biobanking across different systems, fostering collaboration between academic and industrial stakeholders while promoting best practices in data sharing and long-term resource accessibility.

514: Insights into molecular mechanisms behind biological effects of polyphenolic compounds from *Helichrysum italicum* by a novel inverse molecular docking fingerprinting approach

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Abstract ID: 514

Topic: 3A: Preserving Biodiversity: Challenges and Opportunities in Non-human Biobanking

Presenter Name: Urban Bren

Keywords: *Helichrysum italicum*, biological activity, inverse molecular docking fingerprints, molecular mechanisms, polyphenols, protein targets, synergistic effects

Natural compounds occupy a distinct chemical space, and *Helichrysum italicum*, a medicinal plant widely used in traditional medicine, is a rich source of polyphenolic compounds with reported diverse or even polypharmacological activity. In this study, we systematically examine eight major *Helichrysum italicum* polyphenols, including α -pyrones—arzanol and ethylpyrone; flavonols—gnaphaliin, kaempferol, and quercetin; and flavanones—naringenin, pinocembrin, and hesperetin—using an inverse molecular docking approach. More than 40 000 human proteins from the Protein Data Bank (PDB) database were screened to predict potential molecular targets. This work represents a methodological evolution of our previous research on inverse molecular docking-based target profiling. A novel inverse docking fingerprint method based on hierarchical clustering reveals similar binding patterns among structurally related polyphenols and suggests possible synergistic effects across the examined compound classes. Favorable interactions were observed for PPAR- γ and CARM1, indicating therapeutic potential in inflammation and cancer. Additional targets associated with cancer, neurodegeneration, and osteoporosis were also identified. Overall, this study demonstrates the utility of inverse molecular docking fingerprints as a robust tool for mechanism-oriented natural product research and supports the potential of

Helichrysum italicum polyphenols as promising starting points for medicinal chemistry and drug discovery campaigns.

5A: Building excellence: Developing skills for future biobanking

721: Inventory of Available Biobank Capabilities and Services: A Standardized Service Catalogue for BBMRI-ERIC

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Abstract ID: 721

Topic: 5A: Building Excellence: Developing Skills for Future Biobanking

Presenter Name: Sten Hanke

Keywords: BBMRI directory, BBMRI locator, biobank service

Introduction

Modern biobanks have evolved beyond simple sample storage to become integrated service hubs offering comprehensive capabilities from sample collection to advanced multi-omics analysis, bioinformatics support, and regulatory compliance assistance.

This work presents a standardized, MIABIS-compliant inventory of biobank services designed to enhance discoverability, interoperability, and service access across the BBMRIERIC network. The catalogue aims to transform biobanks into active research partners by systematically documenting their full range of capabilities and facilitating their

integration into European discovery platforms including the BBMRI Directory and Locator.

Materials and Methods

The service inventory was developed through collaborative engagement with the MIABIS Working Group and biobanks across the BBMRI-ERIC network. Service descriptions were solicited through initial consultation meetings and targeted calls to biobanks, national nodes, and research consortia within the European biobanking community. This process yielded 556 service descriptions representing the diverse capabilities offered by participating biobanks and their host institutions.

All collected services were structured according to the MIABIS (Minimum Information About Biobank data Sharing) Core 3.0 Biobank Services component to ensure semantic interoperability and machine-readable metadata. Each service entry was standardized with essential attributes including service type, category, description, technology platform, quality metrics, and procedural context. The MIABIS Working Group led multiple rounds of validation meetings to harmonize overlapping services, consolidate terminology, and align service scopes across different institutional contexts.

Results

The enhanced service catalogue documents over 75 distinct service types subsequently organized into five major categories representing the biobanking lifecycle: biobanking services, bioanalytical and imaging services, cell and animal services, bioinformatics and data science services, and research design and training services.

User survey results demonstrated strong demand for DNA/RNA extraction and quantification, proteomics capabilities, bioinformatics support, and FAIR data curation services. Integration mechanisms for the BBMRI Directory platform were designed to enable standardized service metadata input, searchable service filtering, and automated service discovery through federated queries.

Discussion and Conclusion

The standardized service catalogue represents a significant advancement in biobank datafication and service transparency. By adopting the MIABIS framework, the inventory ensures harmonized service descriptions across diverse institutional contexts, enabling researchers to efficiently identify and access relevant biobank capabilities.

Integration into BBMRI-ERIC discovery platforms will transform passive service listings into active, queryable resources that match researcher needs with biobank capabilities. Future work will focus on continuous catalogue refinement based on user feedback, expansion to additional service domains including single-cell technologies and spatial omics, and development of automated service recommendation systems leveraging artificial intelligence.

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565: Upscaling Global Biobanking through Education: Impact and Evolution of the CAS in Biobanking

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Abstract ID: 565

Topic: 5A: Building Excellence: Developing Skills
for Future Biobanking

Presenter Name: Valeria Di Cola

Keywords: biobanking education, capacity
building, global harmonization, professional
development, training

The Certificate of Advanced Studies (CAS) in Biobanking—a collaboration between the University of Geneva, Swiss Biobanking Platform, Pasteur Institute, and HSeT Foundation—has evolved from a pioneering Swiss initiative into a global educational hub. Following its inaugural 2025 cohort, this abstract explores the program's impact on advancing the international biobanking workforce.

In 2025, 19 students completed the full CAS, plus three following the introductory module only. The 2026 cycle maintains this momentum with 14 participants from Switzerland, Singapore, the Bahamas, Laos, and Belgium. This diversity fosters a "global classroom" for exchanging best practices across varying regulatory landscapes. Furthermore, the program's success has enabled a limited number of scholarships for participants from developing countries, removing financial barriers to professional advancement.

The three-module blended learning structure equips professionals to standardize biobanking practices worldwide. While primarily distance-learning, the program uniquely incorporates physical site visits to state-of-the-art biobanks, allowing the cohort to meet in person and observe operational excellence firsthand; these visits are recorded for those unable to travel to ensure equitable access.

By empowering this diverse cohort, the curriculum successfully bridges the gap between high-resource environments and emerging research hubs. We are not merely teaching individual competencies; we are building the essential infrastructure for future

global health collaborations and harmonizing quality management on a global scale.

558: Continuous training to reinforce key strategic roles of biomedical research biobanks

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Abstract ID: 558

Topic: 5A: Building Excellence: Developing Skills
for Future Biobanking

Presenter Name: Isabel Novoa

Keywords: biobank training

Introduction

Biobanking training is growing as biobanks develop to more complex activities. Very often has been detected a lack of knowledge of biobanks and their procedures to access to sample and data. In addition, biobank personnel need training in new skills to adapt new challenges. Altogether this highlights the need to develop new training actions to cover the needs of different professionals.

Methods

An analysis was done at the HUVH Biobank to find training gaps to develop new actions.

In addition, a collaborative training analysis between HUVH Biobank and GIMM Biobank

was done as part of the European project GIMM Care which goal is to promote clinical and translational research at the Gulbekian Institute for Molecular Medicine (GIMM, Lisboa).

Results

The training actions developed and implemented are:

- A training program for biobank personnel of new incorporation
- An annual feed-back interview for biobank personnel to detect development and training needs.
- A biobanking training course to cover legal, ethical and methodological aspects of human biological research.
- Biobank exchange program: an exchange program of personnel between two biobanks to review specific issues to learn from the biobank experience.
- Train the trainers program: a program for managers/directors to visit reference biobanks with the aim of learning from these biobanks experience.

Conclusion

The training actions developed reinforce the strategic role of biobanks through the improvement personnel competencies and the promotion of knowledge of biobank role in the biomedical research of quality.

553: Building quality competence in biobanking through Swiss–Czech collaboration: a stepwise train-the-trainer framework for ISO 20387 implementation

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Abstract ID: 553

*Topic: 5A: Building Excellence: Developing Skills
for Future Biobanking*

Presenter Name: Sabine Bavamian

Keywords: Biobanking; ISO 20387; Quality management; Capacity building; Train-the-trainer; Cross collaboration

Introduction

Ensuring high-quality biobanks requires robust quality management and a skilled workforce able to implement standards such as ISO 20387. Across Europe, biobanks face challenges including heterogeneous expertise, limited training, and a lack of structured accreditation pathways. To address these gaps, a collaboration between BBMRI.ch and BBMRI.cz building on the Swiss Biobanking Platform (SBP) stepwise quality strategy supports this capacity building.

Materials and Methods

In the project, a train-the-trainer model is implemented to transfer quality management competencies from the Swiss to the Czech Node. The SBP labelling framework, aligned with ISO 20387 requirements and the BBMRI-ERIC Quality Programme, serves as a structured implementation pathway. Swiss experts conduct compliance reviews in selected Czech biobanks, support gap analyses, and provide targeted training and documentation. The Czech Quality Manager learns throughout the process to gain experience with assessment and labelling procedures.

Results

Pilot biobanks will progress through the SBP labels, strengthening governance and quality management practices. In parallel, the Czech Node will develop the skills to independently conduct quality assessments and manage the labelling process, enabling preparedness for the BBMRI-ERIC Quality Label and, where applicable, ISO 20387 accreditation.

Discussion and Conclusion

This approach demonstrates how structured competency transfer combined with a progressive quality framework can build lasting expertise within national biobanking infrastructures. It provides a scalable and

transferable model for developing the skilled workforce required to sustain excellence in biobanking across Europe.

510: Dutch biobank course for professionals

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Abstract ID: 510

*Topic: 5A: Building Excellence: Developing Skills
for Future Biobanking*

Presenter Name: Peggy Manders

*Keywords: BBMRI.nl, education, professionals,
teaching course*

Biobanks are in a flow of change driven by innovation and socio-political agendas that ask for ongoing knowledge exchange within the field and beyond. To educate (upcoming) professionals in biobanking and related topics, BBMRI.nl has set up an annual 3-days course to provide (new) employees of central biobank facilities, researchers with a focus on biobanks, and other interested professionals with insight into the many facets of biobanking from an interdisciplinary perspective.

The course features interactive lectures on biobanking and related topics, including medical-ethical considerations, biomaterial pre-analytics, data management, green/sustainable biobank practices and public and patient involvement and engagement.

The lecturers are experts in their respective fields.

The first edition of the course takes place in January 2026. A total of 12 professionals with different expertise participates. At the end of the course, the design and scope of the topics are extensively evaluated. The results will be presented during the Europe Biobank Week 2026.

By engaging with biobank personnel, users, and other stakeholders through the biobank course, BBMRI.nl aims to increase awareness that a biobank is much more than the sum of its stored biological materials. It is an active player in the research landscape, supporting researchers with expertise, advice, and quality standards.

493: Knowledge management to empower the next generation biobankers

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Abstract ID: 493

*Topic: 5A: Building Excellence: Developing Skills
for Future Biobanking*

Presenter Name: Marianne Henderson

*Keywords: mentoring; tool; knowledge
management*

Introduction: The breadth of knowledge and expertise held by experienced biobankers has been widely recognized through global publications and presentations. However, this expertise often remains localized within individual organizations and is underutilized as a shared resource. Addressing this gap is essential to strengthening biobanking practices, workforce development, and long-term sustainability across diverse biorepository settings.

Materials and Methods: In 2024, the ISBER Mentorship Task Force launched a pilot Mentoring Program designed to connect mentees with experienced volunteer mentors from the global biobanking community. The pilot incorporated structured enrollment, defined mentoring scopes, and now a newly developed automation for registration and mentor-mentee matching. Program engagement data, participant feedback, and operational observations were collected and reviewed to evaluate feasibility, accessibility, and perceived value.

Results: The pilot demonstrated that short-term, no-cost mentoring engagements

effectively facilitated knowledge transfer across human, veterinary, environmental, and rare disease biobanking domains. Participants reported increased awareness of best practices in biorepository management, biospecimen collection and processing, operations, and regulatory considerations. Automation improved efficiency, reduced administrative burden, and supported equitable matching.

Discussion and Conclusion: The ISBER Mentoring Program represents a scalable, practical approach to leveraging existing expertise within the biobanking community. By promoting knowledge exchange and increasing awareness of ISBER tools and resources, the program supports workforce development and institutional sustainability. These findings may guide other organizations seeking to implement structured mentorship models to strengthen biobanking capacity globally, foster collaboration, and maximize the impact of existing professional expertise across evolving scientific and operational landscapes for future biorepository innovation and resilience worldwide efforts.

6A: Biobanks as local hubs: Interfaces and facilitators

713: Developing a Biobank network among major sarcoma treatment centers to improve biomedical research: recent advantages in the PANORAMA project

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Abstract ID: 713

Topic: 6A: Biobanks as Local Hubs: Interfaces and Facilitators

Presenter Name: Michela Russo

Keywords: Biobanking, Network, Sarcoma

Introduction

Sarcomas are rare musculoskeletal tumors comprising over 120 histotypes, making diagnosis and treatment exceptionally

complex. Due to their rarity, individual centers often lack the volume of samples necessary for statistically robust research. Funded by the PNRR, the PANORAMA project establishes a certified network among four major Italian institutions to create a structured infrastructure for sharing biological samples and clinical data.

Materials & Methods

As the Coordinating Unit, the IRCCS Istituto Ortopedico Rizzoli leads the harmonization of procedures and data management across the network. The unit focuses on the management and sharing of clinical data through a LIMS platform enriched with electronic case report form (eCRF) modules, compliant with FAIR principles to ensure full traceability and interoperability. In parallel, comprehensive molecular characterization of samples is performed through in-depth DNA and RNA analyses, together with rigorous quality control protocols to guarantee the qualitative and quantitative suitability of biological material for storage and distribution.

Results

We have successfully implemented our LIMS data management system, including eCRF modules for all clinical data that were previously harmonized across the units. We are currently beginning the characterization of samples and finalizing the construction of a preanalytical workflow.

Conclusion

By integrating standardized biobanking procedures with advanced molecular characterization and shared data resources, PANORAMA enhances the capacity of sarcoma centers to conduct collaborative translational and biomarker-driven research.

708: Integrating Healthcare, Biobanking, and Clinical Research Systems within Regional Digital Medicine Centres in Poland

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Topic: 6A: Biobanks as Local Hubs: Interfaces and
Facilitators

Presenter Name: Mateusz Sikora

Keywords: IT system, data integration, data
warehouse, diagnostics optimization, digital
medicine

Introduction:

The DISRUPTOR project aims to establish the Regional Digital Medicine Centre (RDMC) at the Wroclaw Medical University and the University Hospital in cooperation with the WMU Biobank and the University Clinical Trials Support Centre. The RDMC, as national structures, will connect the databases of universities, hospitals and biobanking facilities to standardise the collection and processing of high quality medical data for the purposes of research and analysis, as well as to ensure safe sharing of structured information.

Material & methods:

Currently, dedicated IT systems based on integrated data warehouse, feasibility module and physician assistant have been designed and implemented within a one-year period. The RDMC system must ensure strict control of data access, as well as maximum data protection, also in the context of cybersecurity that meet the regulatory requirements.

Findings:

The following data will be collected: hospital information systems, laboratory diagnostics, imaging and pathological diagnostics, medical telemetry, life cycle of biobank samples, individual standardised international questionnaires and omics data.

Discussion:

The integration of heterogeneous data and development of adaptable analytical tools will improve diagnostic processes, therapeutic decisions and quality of patients life. The dualmodel approach ensures flexibility and scalability to other medical fields in the future. The project is expected to generate scientific, clinical and social benefits to support the longterm expansion of digital medicine in Poland.

References:

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Key words: digital medicine, diagnostics optimization, data integration, IT system, data warehouse

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693: The I FAIR Program: a collective space for independent clinical research in Sardinia

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Abstract ID: 693

Topic: 6A: Biobanks as Local Hubs: Interfaces and Facilitators

Presenter Name: Franco Cappai | Caterina Giorgia Carboni

Keywords: FAIR data principles, Independent

clinical research, Metadata registries, Patient

involvement

Sardinia is an isolated genetic area; its population has made important contributions to several disorders comprehension [e.g., Uda,2008;Mansilla-Soto,2016].

Sardinia experienced also the challenges faced by biobanking regulation with the controversial bankruptcy case of one of the first Italian public-private biobank: SharDNA [Piciocchi,2017].

These conditions paved the way for the development of a new practice of collecting and sharing clinical research data and *The I FAIR Program – valorization of Independent and FAIR clinical studies*, launched in 2018 [Wilkinson,2026;Cappai,2019].

I FAIR is a collective space where clinical research scientists apply for data stewardship funds and collaborate with experts in bioethics, research methodology, health data and patient organizations in the study protocol design, consent material and data set.

At the center is the Regional Registry for Biomedical Research (R3B), a FAIR-compliant public registry. R3B collect and serve metadata describing clinical studies and is designed with FAIR Data Point (FDP) specifications, the state-of-the-art reference for FAIRified metadata sharing [Meloni,2021].

As of today, 28 independent clinical studies joined I FAIR, 20 approved by the local Institutional Review Board and 7 are published on R3B.

I FAIR is a space to be fair collectively that promotes data sharing among scientists, involves patients in the study design, and provides a common system for storing and accessing metadata about data and specimens collected in independent clinical studies in Sardinia.

617: Networking for Translational Impact in the German Centres for Health Research (DZG): Biobanks as Interfaces and Facilitators

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Abstract ID: 617

*Topic: 6A: Biobanks as Local Hubs: Interfaces and
Facilitators*

Presenter Name: Cäcilia Engels

*Keywords: best practice, biobank, biosample
expertise, disease-focused, network*

High-quality biobanking is a prerequisite for translational biomedical research. However, fragmentation of informed consent procedures, heterogeneous standards, and access pathways can limit the efficient use of biospecimens and associated data. Within the German Centers for Health Research (DZG), biobanks are locally embedded in clinical and public research institutions and act as interfaces between healthcare and research across disease-focused centers.

The DZG Biobanking Working Group (WG) aims to align biobanking activities across all DZGs through a collaborative network approach. The group promotes exchange of expertise by sharing standard operating procedures (SOPs), best practices, and coordinated strategies for ethical and legal compliance. To assess the current biobanking landscape, a survey with > 50 questions focusing on liquid biospecimens was conducted in 2025, covering biobank structures, quality management systems, preanalytical variables, and availability of associated clinical data.

More than 20 DZG-associated biobanks participated, providing a comprehensive overview of liquid biobanking practices. Analyses revealed fundamental similarities in biobank structures and sample handling, alongside specific deviations in collection, processing, and storage. These findings offer first insights into method comparability and

interoperability across DZGs and form a robust basis for developing cooperative standards. A comparative tissue-focused survey is planned for 2026.

The DZG Biobanking WG has established a networking platform collaborating closely with national partner networks such as the German Biobank Network (GBN) and Network University Medicine (NUM). Thus interconnected biobanks enhance collaboration, reduces duplication, and strengthens their translational impact, providing a model for integrated biobanking ecosystems.

578: Biobankers as Catalysts for Transforming Research Laboratory Cold Storage

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Abstract ID: 578

*Topic: 6A: Biobanks as Local Hubs: Interfaces and
Facilitators*

Presenter Name: Katheryn Shea

Keywords: Biobank, champion, space efficiency

Cold storage is critical to life science research, enabling the preservation of samples and reagents essential to scientific discovery. Despite its importance, cold storage in laboratories is frequently inefficiently used. Unlike biobanks where materials are centrally governed, tracked, and managed, research laboratory storage is often decentralized, poorly organized, and inconsistently maintained. Biobankers are uniquely positioned to champion change by extending proven principles of governance and tracking across the institutions they support.

An assessment of 90 research facilities and more than 4,500 cold storage units revealed that only 54 percent of available capacity was utilized, and over half of stored materials were considered unusable by researchers. These findings underscore the need for a systematic, scalable approach to storage optimization that

aligns operational efficiency with scientific priorities.

External evaluations of equipment condition, maintenance and backup systems, with internal reviews of sample organization, frost accumulation, and space utilization. Stakeholder interviews identified gaps in tracking, operational constraints, and key pain points. These insights informed actionable recommendations and quantified the impact of a Better Storage Management program, including improved accessibility, cost savings, and carbon reduction.

Implementation followed a detailed project plan supported by trained staff, appropriate equipment, and targeted communications. Change management tools and standardized decision guides enabled scientists to rationalize materials, supported by consistent data practices and emerging vision-based technologies. Organizations adopting this approach reduced cold storage units by up to 47 percent, saving up to \$2.7 million annually while cutting carbon emissions by more than 2,000 metric tons.

573: Comparison of two MSI testing methods for Biobank Colorectal Cohort

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Abstract ID: 573

Topic: 6A: Biobanks as Local Hubs: Interfaces and Facilitators

Presenter Name: Christine Greene

Keywords: MSI testing, Quality samples

Introduction:

Northern Ireland Biobank (NIB) stores high quality biological samples including blood, bodily fluids and tissue samples (fresh frozen

tissue and formalin fixed paraffin embedded) on consented patients undergoing cancer treatment.

Microsatellite Instability (MSI) testing is routinely performed on colorectal tumour samples in NHS diagnostic laboratories. Two different methods are available for use in NI diagnostic and research facilities. Historically a Promega method has been used however with the emergence of Next Generational Sequencing (NGS) for diagnostic use; the concordance of MSI testing methods were assessed.

Aim(s):

1. Determine concordance between different MSI testing methods.
2. Confirm suitability and quality of tissue samples stored in NI Biobank for high throughput analysis.

Materials & Methods:

Colorectal tumour blocks (n=561) from NI Biobank were selected to test the concordance between two MSI testing methods; Promega and NGS. 561 FFPE blocks were sectioned, tumour area annotated and DNA extracted by automated Promega Maxwell FFPE kit. DNA samples were run on Applied Biosystems™ 3500/3500xL Genetic Analyzer using Promega MSI kit and NGS using Small Pan-Cancer Solid Tumour NGS panel on NovaSeq 6000. MSI status for determined by each testing method was recorded and compared.

Results:

541 samples gave results for both methods. From this 99.45% concordance rate was found.

Discussion & Conclusion

NIB found the results from both testing methods was overwhelmingly concordant, showing that either testing method was suitable for routine diagnostic use. NIB stored samples are of sufficient quality for high throughput analysis on different platforms.

References:

<https://nibiobank.org.uk/>

479: Accelerating Biobank Datafication through a Two-Level ETL Strategy: The Swiss Node Contribution to the national (NExT) and European (BBMRI-ERIC) e-catalogues

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Abstract ID: 479

Topic: 6A: Biobanks as Local Hubs: Interfaces and Facilitators

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Keywords: Data pipeline, ETL, FAIR, data quality, datafication

Introduction

Heterogeneous data structures remain a major barrier to biobank visibility and interoperability. In alignment with the Evolve project's mission to accelerate biobank datafication, the Swiss Biobanking Platform (SBP) is developing a centralized infrastructure to improve the discoverability of high-quality samples. Our goal is to establish data processing pipelines that seamlessly connect local biobanks to both the national NExT e-catalogue and the European BBMRI-ERIC e-catalogue.

Material & Methods

SBP collaborates with Swiss biobanks to standardize data through an initial pipeline transforming local data for the NExT e-catalogue. This mapping step harmonizes heterogeneous metadata using SBP datasets, a national common data model. A second process transforms NExT-standardized data into BBMRI-ERIC formats. Custom Pythonbased scripts automate these workflows, ensuring scalable and efficient datafication.

Results

By performing semantic and structural mapping at the NExT level, subsequent transformation for the BBMRI-ERIC e-catalogue is significantly simplified. This two-level approach reduces redundancy, accelerates onboarding of biobanks, and increases data consistency and visibility at both national and European levels.

Discussion and Conclusion

This two-stage strategy provides a practical model for National Nodes to bridge the gap between local data and international standards. By reducing the technical burden on biobanks and supporting FAIR principles, these data processing pipelines strengthen interoperability, significantly streamlining the workload while enabling the early identification of quality issues. Current efforts are focused on scaling these processing steps to support a wider range of Swiss biobanks in their increasing effort for data quality, interoperability and visibility.

8A: Unlocking health insights from donated human tissues

716: The Netherlands Heart Tissue Bank Strengthening the cardiovascular research infrastructure with an open access Cardiac Tissue Repository

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Abstract ID: 716

Topic: 8A: Unlocking Health Insights from Donated Human Tissues

Presenter Name: Erik van Iperen

Keywords: Biological specimen banks, Heart diseases, Registries, Tissue banks, Translational research

Aim: Cardiac diseases remain a leading cause of cardiovascular disease (CVD) related hospitalisation and mortality. That is why research to improve our understanding of pathophysiological processes underlying cardiac diseases is of great importance. There is a strong need for healthy and diseased human cardiac tissue and related clinical data to accomplish this, since currently used animal and in vitro disease models do not fully grasp the pathophysiological processes observed in humans. This abstract describes the initiative of the Netherlands Heart Tissue Bank (NHTB) that aims to boost CVD-related research by providing an open-access biobank.

Methods: The NHTB, founded in June 2020, is a non-profit biobank that collects and stores biomaterial (including but not limited to myocardial tissue and blood samples) and clinical data of individuals with and without previously known cardiac diseases. All individuals aged ≥ 18 years living in the Netherlands are eligible for inclusion as a potential future donor. The stored samples and clinical data will be available upon request for cardiovascular researchers.

Conclusion: To improve the availability of cardiac tissue for cardiovascular research, the NHTB will include extensive (cardiac) biosamples, medical images, and clinical data of donors with and without a previously known cardiac disease. As such, the NHTB will function as a translational bridge to boost a wide range of cardiac disease-related fundamental and translational studies.

712: Substantial genetic findings in post-mortem donated tissues prompting the need for data integration with in-vivo findings: A legal approach.

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Abstract ID: 712

Topic: 8A: Unlocking Health Insights from Donated Human Tissues

Presenter Name: Erdina Ene

Keywords: ethics, genetic, law, tissue

The General Data Protection Regulation does not apply to deceased individuals. As a result, genetic findings from post-mortem donated tissues do not rejoice protection from the GDPR. Nonetheless, this does not mean that the GDPR does not affect this particular set of data. Oftentimes, there is a need to integrate health data of deceased individuals with that of living individuals. What legal challenges and unforeseen legal dynamics does this interplay bring? The answer depends on many variables like the moment of donation and the purpose of donation. It is also important to recognize what portion of this interplay is governed by ethics and what is governed by law and which of them must evolve more for data integration to be seamless. The final objective is for this paper to become a good basis for researchers to better understand how to work with post-mortem donated tissues without compromising the lawfulness of their research project.

11A: Inside the biobank: Organisational structures, strategies, and success stories

726: Getting the Word Out: The Value of a Dedicated Journal for Biobanking and Biopreservation

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Abstract ID: 726

Topic: 11A: Inside the Biobank: Organisational Structures, Strategies, and Success Stories

Presenter Name: Marianna J Bledsoe

Keywords: biobanking and biopreservation, journal, publication, value

Introduction:

Publishing research on biopreservation, biobanking and biospecimen research is essential for advancing the field, as it facilitates the dissemination of knowledge and enables other researchers to build upon existing evidence. Selection of an appropriate journal plays an important role in maximizing the reach of the research and ensuring its value for the intended audience.

Methods and Results:

We provide an overview of the reach and metrics of journals within the biobanking journal landscape, focusing on the most prominent biobanking research journal, Biopreservation and Biobanking (BIO). This will include a discussion of BIO's scope, audience, and examples of highly cited papers. Furthermore, we will address the types of feature articles published, highlight publications on recent advancements and hot topics in the field, and provide a preview of upcoming special issues. Finally, we will address how potential authors and guest editors can support the organization of, and publish, feature articles and special issues or sections in BIO.

Discussion and Conclusion:

Publishing in an appropriate biobanking research journal is essential not only for securing recognition and visibility for individual researchers, but also for ensuring that research reaches key stakeholders, supports the sustainability of biobanks, and collectively advances the biobanking field.

[700: From Concept to Operation: The Establishment of the AlmaMicrobiome Biobank](#)

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Abstract ID: 700

Topic: 11A: Inside the Biobank: Organisational Structures, Strategies, and Success Stories

Presenter Name: Monica Forni

Keywords: PNRR, Strengthening *BBMRI.it*, *microbioma biobank*

Introduction

The Italian National Recovery and Resilience Plan (PNRR), through the *Strengthening BBMRI.it* project, aims to enhance national biobanking capacity and integration within European research infrastructures. In this framework, the establishment of **AlmaMicrobiome**, the human microbiome biobank of the University of Bologna, represents a strategic initiative to support high-quality, standardized microbiome research.

Materials and Methods

AlmaMicrobiome was formally established on 17 June 2025 and subsequently received a favorable opinion for its establishment and operation from the Area Vasta Emilia Centro Ethics Committee. A comprehensive quality management system is currently under development, including standard operating procedures and documentation aligned with international biobanking standards. The biobank supports standardized collection, processing, and long-term preservation of microbiome samples and is integrated with interoperable data management systems compliant with FAIR principles.

Scientific activities are grounded in the internationally recognized expertise of the research group in human microbiome characterization and host-microbe interactions. Biobank staff actively participate, through *BBMRI-ERIC*, in the analysis of the new

Self-Assessment Survey based on CEN/TS 17626.

Conclusions

AlmaMicrobiome is now equipped with a cryopreservation room and five fully equipped laboratories dedicated to fecal sample processing, processing of 'clean' samples (e.g., saliva), molecular analyses, culturomics, metabolomics, and cell culture. As a key outcome of the *Strengthening BBMRI* project, AlmaMicrobiome strengthens Italy's microbiome research capacity and its contribution to European biobanking infrastructures.

691: A Project-Integrated, Standardized Biobanking Model for Translational Research Applications

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Abstract ID: 691

Topic: 11A: Inside the Biobank: Organisational Structures, Strategies, and Success Stories

Presenter Name: Huma Gunay

Keywords: A Project-Integrated, Standardized Biobanking Model for Translational Research Applications

Introduction

The Acibadem University Biobank Unit (ACU Biobank) was established in 2018 and has been operational since 2022, with an initial research focus on rare and undiagnosed diseases. Currently, the biobank has evolved into a project-integrated infrastructure supporting a wide range of translational research. Here, we present the operational capacity, and research outputs of ACU Biobank, demonstrating how a FAIR-oriented and standardized framework enables high-quality, project-driven translational research.

Materials & Methods

The ACU Biobank operates on standard procedures, ensuring consistency and minimizing pre-analytical variability during sample collection, processing, and long-term storage. Procedures are designed to support data traceability, quality control, and interoperability, through a project-based biobanking model. The biobank supports high-throughput sequencing data and various samples types.

Results

ACU Biobank provides services to research projects on rare and undiagnosed diseases, childhood hematologic malignancies, adult leukemias, and gastrointestinal cancers. Within the biobank, a total of 1,855 biological samples (1,064 DNA, 324 RNA, 965 white blood cells and 158 PBMC/BMCs) from 1,668 individuals have been archived. Moreover, the biobank

archived BAM files (157 WES and 29 WGS), for controlled reanalysis or metadata analysis. During the 2024-2025 period, the ACU Biobank facilitated a training program, 16 research projects, and participated in 10 national/international conferences.

Discussion & Conclusion

The transformation of ACU Biobank into a project-integrated infrastructure highlights the importance of standardized biobanking models. ACU Biobank serves as a sustainable and scalable resource that maximizes research outputs, promotes efficient use of biological materials, and contributes to national/international translational research efforts.

686: Developing a Cost Recovery Model for Italian Biobanks: A BBMRI.it Working Group Initiative

Authors:

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Abstract ID: 686

Topic: 11A: Inside the Biobank: Organisational Structures, Strategies, and Success Stories

Presenter Name: Francesco Colaci

Keywords: Financial Sustainability; Cost Recovery Model; Biobank Business Planning; Process Optimization; Harmonization; FAIR.

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Introduction: Defining cost recovery strategies is essential for biobanks' long-term sustainability and regulatory compliance. A transparent, standardized model supports efficient resource management, service

continuity, and reduces dependence on short-term public funding.

Material & methods: A BBMRI.it working group representing 20 Italian biobanks developed a versatile cost calculation tool. Users input financial data, distinguishing fixed from variable costs and separating direct biobank expenses from institutional contributions. The model processes these inputs to calculate the overall cost recovery rate and the average cost per sample.

Results: The model provides a standardized financial analysis framework. It enables biobanks to identify actual costs per sample and assess recovery capabilities. Preliminary network testing confirms the tool effectively highlights cost drivers, facilitating improved financial planning and transparent pricing strategies for stakeholders.

Discussion and conclusion: This tool advances financial harmonization for Italian biobanks. Future updates will extend the model to generate price lists tailored to specific matrices and services. This granular approach enables service-based pricing using consistent parameters, enhancing sustainability and fostering fair access to biological resources.

682: Re-Engineering an Existing Research Management System (RMS) for Fresh Human Biological Samples (HBS)

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Abstract ID: 682

Topic: 11A: Inside the Biobank: Organisational Structures, Strategies, and Success Stories

Presenter Name: Fabricio Barros | Harika Nadapana

Keywords: Custodianship, Fresh Human Samples, Governance, HTA, Research Management System, Standardisation

Introduction

Fresh HBS workflows lack consistent metadata capturing mechanisms enforcing project governance and trace custodianship. By repurposing existing RMS, we delivered centralised platform at our campus for fresh HBS that improves oversight for regulatory requirements, automates follow up actions, and achieves substantial cost savings through reuse rather than re-designing a new digital platform.

Material & methods

At Fresh HBS creation, RMS captures standardised metadata and Operational/governance fields. RMS serves as centralised intake for fresh HBS under UK HTA license. Automated emails remind users to mark samples exhausted and complete derivative registration within set timeframes.

Results

Delivery end-to-end oversight: accurate sample creation, active governance flags, automated emails for exhaustion and derivative registration, HTA compliant workflows, and cross project and disposal reporting within centralised system.

Discussion and conclusion

Capturing essential metadata with governance flags and automated prompts for exhaustion and derivative tracking, strengthens traceability and operational oversight for HBS workflows. Repurposing RMS as centralised system for fresh HBS log, delivered costefficient standardisation and HTA aligned governance across teams. Post deployment evaluation will assess metadata completeness, visibility from creation to disposal, adherence to derivative registration, notification effectiveness, and operational savings realised through reuse. Collaboration with Safety Health Environment will introduce a new function by flagging potentially high-infectious samples, reducing risks of infections within the building.

References

Internal SOPs and project governance.

666: Advancing Cancer Research through High-Quality Biobanking at the BBIRE Biobank Regina Elena Cancer Institute

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Abstract ID: 666

Topic: 11A: Inside the Biobank: Organisational Structures, Strategies, and Success Stories

Presenter Name: Federica Rossi

Keywords: Cancer research; ovarian cancer; Translational research; Biobanking

Introduction

Biobanks play a pivotal role in cancer research by ensuring high-quality biological samples and associated data. Participation in national and international networks, such as BBMRI.it, represents a key added value, enhancing standardization of procedures, sample and data quality, visibility and accessibility of biological resources, thereby fostering collaborative research. The Regina Elena National Cancer Institute Biobank (BBIRE) stores body fluids, snap-frozen, paraffin-embedded and fresh frozen tissues, for retrospective studies and model generation.

Material and Methods

In collaboration with several Surgery Units, BBIRE collects biological samples and clinical data after Informed Consent. Upon sample receipt, Standard Operating Procedures are applied to perform appropriate preservation. Samples and associated data are registered in the Biobank Information Management System, guaranteeing traceability and data security. Samples included in research projects undergo DNA or RNA sequencing, followed by data processing, quality control, and analysis using pipelines tailored to the sample type.

Results

Thanks to its high biobanking standard and partnership in BBMRI.it, BBIRE actively participates in calls promoted by "Strengthening BBMRI.it" project, funded by #NextGenerationEU (<https://next-generation-eu.europa.eu/>), aimed at reinforcing Italian Biobanks. In this context, BBIRE successfully participated in an Open Call funded by BBMRI.it and CNR, characterizing 30 ovarian cancer tissue and blood samples, using

OCAplus panel (Thermo Fisher Scientific) targeting genomic alteration across 517 cancer genes. The analysis identified 134 somatic mutations, currently under validation with clinically-ready NGS panels, further enriching biobanks resources.

Discussion and Conclusion

Collaboration with Surgery Units, participation in biobanking networks and high-quality standards enable the continuous growth of BBIRE resources and molecular data collection, supporting translational research and precision oncology.

660: Tissue Banks and Biobanks: Differences in the Preparation of Cell and Tissue Grafts for Clinical Use and Samples for Scientific Purposes.

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Abstract ID: 660

Topic: 11A: Inside the Biobank: Organisational Structures, Strategies, and Success Stories

Presenter Name: Katerina Jirsova

Keywords: biobanks, differences, terminology, tissue banks Introduction

Tissue banks (TBs) and banks of biological material (biobanks, BBMs) represent essential infrastructures of modern medicine, providing cells, tissues, and other biomaterials for clinical

(TBs) and research (BBMs) purposes, respectively. However, the rapid expansion of biobanking activities and the increasing global exchange of biospecimens have led to frequent confusion and overlap in the use of the terms tissue bank and biobank. These terms are often used interchangeably in the scientific literature, despite referring to facilities with distinct missions, regulatory frameworks, and end uses.

Materials and Methods

This work is based on an analysis of peer-reviewed literature, quality standards, and regulatory documents. The historical development, organizational structures, and operational workflows of TBs and BBMs are reviewed, with particular emphasis on donor recruitment or biomaterial collection, processing, storage, and distribution. Ethical and legal frameworks applicable to each facility type are also examined.

Results

Although TBs and BBMs share similar operational workflows, they differ fundamentally in their primary objectives. TBs are clinically oriented establishments that prepare cells and tissues for transplantation or therapeutic application under strict safety and traceability requirements. In contrast, BBMs focus on the long-term collection, preservation, and distribution of biomaterial and associated data to support biomedical research.

Discussion and Conclusion

The confusion between tissue banks and biobanks is not merely semantic. Clarification of terminology has important implications for accurate communication among clinicians, researchers, regulatory authorities, and the public. At the same time, TBs and BBMs form a complementary system supporting transplantation medicine and biomedical research, ultimately contributing to improved patient care and public health.

647: The Road to BBMRI-ERIC Quality Label and ISO 20387: Implementing a Quality Management System at the BioCor Biobank

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Topic: 11A: Inside the Biobank: Organisational Structures, Strategies, and Success Stories

Presenter Name: Renna Laura Valentina

Keywords: BBMRI Quality label, accreditation, certification, quality, quality management system

Introduction: BioCor, which is part of the BBMRI network, was established in 2019 at IRCCS Policlinico San Donato as a disease-oriented biobank supporting standardized collection, processing and preservation of

human biological materials and related data for cardiovascular research. BioCor stored more than 150000 biological samples and associated data, primarily blood derived samples.

Methods: By 2023, BioCor completed its infrastructure design, role definition, documentation of processes and implementation of traceability systems. In 2024, our Institute obtained scope extension of ISO9001:2015 certification for biobanking activities, confirming the maturity of BioCor quality management system. Following this milestone, BioCor focused on strengthening biobanking specific technical quality requirements in alignment with ISO20387. Systematic quality control (QC) procedures for biological samples (DNA, serum/plasma, PBMC) and associated data were defined. QCs include evaluations of sample integrity, viability, stability and fitness for purpose. In 2025, BioCor submitted its application for the BBMRI-ERIC Quality Label.

Results: More than 170 approved documents have been produced and electronically managed using the quality management software “Qualibus”. Documents were organized into six categories: standard operating procedures, forms, checklists, manuals, educational documents and external documents relevant to biobanking. A manual describing the entire BioCor biobanking process has been created. Finally, BioCor ensures continuous improvement through integrated risk management, KPIs monitoring, periodic management reviews, CAPA workflows and periodic internal and third-party audits. **Conclusions:** BioCor has implemented a compliant, traceable, and continuously improving biobanking system according to ISO9001, ISO20387, and BBMRI-ERIC quality principles, representing a scalable model for disease-oriented biobanks within European research infrastructures.

[637: TNGB new era in the Advancement of Rare Disease Biobanking](#)

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Abstract ID: 637

Topic: 11A: Inside the Biobank: Organisational Structures, Strategies, and Success Stories

Presenter Name: Marta Calzolari

Keywords: biobanking, network, rare diseases

Introduction The Fondazione Telethon Network of Genetic Biobanks (TNGB) is the first Italian non-profit network of RD-biobanks founded in 2007 with the mission to support the RD research by providing high-quality biospecimens and associated data to the scientific community.

TNGB’s uniqueness resides in the adoption of a centralised IT platform enhancing biospecimens accessibility and managing the entire network workflow.

TNGB has always coped with ELSI topics to protect participants’ confidentiality as well as to enhance their awareness and trust in biobanking by designing comprehensive Informed Consent and Material Transfer Agreement templates. TNGB increases its impact by collaborating with RD-Patient Organisations and several European RD-realities.

Material & Methods TNGB is entering now a new period of its existence where already established processes and procedures will be consolidated and improved. Additionally, having a strategic look towards the biobanking environment evolution, the new services next-generation sequencing and patient-derived cell cultures will be introduced, contributing to

have the biobanked samples associated with a richer well-annotated dataset and sample type variety.

Results The catalogue lists over 130,000 RD-samples representing circa 1,500 RDs. Over 50% of the available samples have been distributed worldwide both for diagnosis and research purposes, contributing to over 800 publications.

Discussion & Conclusion The TNGB's experience has demonstrated the critical importance of networking, implementing common policy and procedures respecting ethical standards and maintaining transparency.

The forthcoming TNGB era will allow TNGB enrichment in terms of size, sample variety and expertise allowing TNGB to stay abreast of the requests coming from the scientific community for contributing to the RD research advancement.

[635: A picture is worth a thousand words – visual representation of a clearly understandable workflow for optimising biobank processes](#)

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Abstract ID: 635

Topic: 11A: Inside the Biobank: Organisational Structures, Strategies, and Success Stories

Presenter Name: Rebecca Schönmehl

Keywords: Tissue Biobanking;

Process optimisation; Quality management;

Biobank workflow

Introduction

Standardised biobank processes are essential to ensure consistently high-quality samples. However, workflows often involve numerous stakeholders, decision points and procedural steps, which can make it difficult to navigate and interpret written standard operating procedures. To address this challenge, we developed a workflow diagram and supplementary graphics to translate the processes involved in sample storage into an easy-to-understand format. These visual aids are designed to support training, process transparency and facilitate the consistent implementation of biobank procedures across user groups.

Material & methods

To create our workflow, we systematically went through all stages and individuals involved and documented the necessary work steps. We used draw.io to visualise our workflow and converted it into .pdf for better accessibility. The additional graphics were created using BioRender for use in our procedural instructions.

Results

After introducing the graphical workflow, we noticed a reduction in sample handling errors. After gathering feedback from all stakeholders, we also noticed an increased understanding of the factors that determine the feasibility of tissue sampling for biobanking and a better understanding of sample collection priorities.

Conclusion

Through close consultation between the staff of the Integrated Biobank Mannheim and the staff of the Pathological Institute, we were able to jointly develop the colour-coded workflow currently in use and supplementary illustrations. Both were well received and led to an overall improvement in our sample collection and in the contentment of all parties involved. Nonetheless we will continue to review and adjust our workflow to keep on improving processes and thus sample quality.

624: Strengthening the Common Service IT of BBMRI.it

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Abstract ID: 624

Topic: 11A: Inside the Biobank: Organisational Structures, Strategies, and Success Stories

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Keywords: KPIs, helpdesk, service catalogue

Introduction: The Common Service-IT (CS-IT) play a key role in strengthening the digital backbone of the node by developing IT services supporting biobank operations and access to resources.

Materials & Methods: CS-IT activities focused on the design and implementation of three services.

A new dedicated helpdesk platform was implemented to support structured service management. The system enables centralized orchestration of multiple service queues, each managed by multiple authorized operators, supporting role-based access, parallel ticket handling and request traceability.

An online service catalogue was developed to provide structured and consistent access to services offered by the national node. A key activity addressed the harmonization of service

descriptions, adopting controlled vocabularies and standardized metadata to ensure uniform service discovery and evaluation.

A KPI monitoring platform was implemented to support the systematic collection and evaluation of ESFRI-required indicators. The platform integrates node-level data collected through infrastructure sensors and biobank-level data submitted via structured online forms, providing thematic views and time-based monitoring to support performance assessment and strategic planning.

Results: The integration of these services resulted in a coherent IT ecosystem that enhanced the visibility, accessibility, and efficiency of the Italian BBMRI node. The service catalogue supports sustainable service provision, the helpdesk improves responsiveness, and the monitoring platform enables evidence-based performance assessment.

Discussion & Conclusion: The implemented services are fully operational and actively support the activities of BBMRI.it. These activities are supported by the funding of the European Union (NextGenerationEU), Italian NRRP project code IR0000031-Strengthening [BBMRI.it](https://www.bbmri.it)-CUP B53C22001820006.

608: The Moli-sani Study and the Moli-Bank: Twenty Years of Population-Based Epidemiology, Biobanking, and International Collaboration

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Topic: 11A: Inside the Biobank: Organisational Structures, Strategies, and Success Stories

Presenter Name: Sara Magnacca

Keywords: biobank, epidemiology study, population-based cohort

Introduction

Moli-sani, a population-based cohort study, randomly recruited individuals from the general population of the Molise Region to investigate gene/environment interactions underlying chronic degenerative diseases. Central to the study is the Moli-Bank, a population-based biorepository established to support research in epidemiology, genetics, and precision medicine.

Methods

Between 2005 and 2010, 24,325 individuals (35-98 years, 52% women) were recruited for standardized clinical examinations, comprehensive questionnaires on lifestyle, diet, psychosocial, educational/economic characteristics. Biological samples collected, processed, and stored using standardized protocols in the Moli-Bank, which currently preserves more than 1,000,000 samples (plasma, serum, buffy-coat, DNA, urine). Longitudinal follow-up over approximately 20 years has captured hospitalization, morbidity and mortality. Notably, Moli-Bank samples have been repeatedly used to perform high-technology measurements of novel biomarkers inconceivable twenty years ago, highlighting the biobank's pivotal role in cutting-edge research.

Results

Moli-sani cohort has generated extensive evidence on determinants of health and disease outcomes, largely thanks to the high-quality samples of the Moli-Bank. New cardiovascular risk tools (by traditional and AI methods), biological aging markers, and investigations of nutritional, molecular, psychosocial, and environmental exposures were developed. Additionally, research consists in multidisciplinary and international collaborations, including Human Technopole (genetics), and European Consortia as BiomarCaRE (traditional/novelty cardiovascular markers), EXPANSE (cardiometabolic/pulmonary health) and DISCERN (cancer). These resources enabled large-scale genetic, epigenetic, omics, and molecular analyses (over 180 peer-reviewed papers).

Conclusions

Supported by the Moli-Bank, the Moli-sani Project represents one of the largest and longestrunning epidemiological cohorts in Southern Europe, for population health and disease prevention.

In memory of Mariarosaria Persichillo (+3/11/2025)

585: A Collaborative Communications Toolkit to Strengthen Stakeholder Engagement in European Biobanking

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Topic: 11A: Inside the Biobank: Organisational Structures, Strategies, and Success Stories

Presenter Name: Verena Huth

Keywords: BBMRI-ERIC Taskforce 9, Co-creation, Communication, Engagement, EvolveBBMRI project, Visibility

Introduction - background/problem

Effective communication is essential to build trust, increase visibility and foster meaningful engagement. However, many biobanks and BBMRI-ERIC National Nodes lack easily accessible, professionally designed communication resources. To address this, a collaborative Communications and Outreach Toolkit was developed within the EU project EvolveBBMRI (Work Package 4).

Material & methods

The Toolkit was co-developed by BBMRI-ERIC Taskforce 9 (Communications and Outreach), comprising communication representatives from the National Nodes. Community needs were assessed through a survey and feedback rounds. Existing best-practice materials were adapted into reusable templates. The Toolkit combines downloadable SharePoint resources and customisable design assets hosted on Canva, allowing National Nodes to easily apply their own branding. It also includes the Evolve image library – National Node contributed high quality creative commons granted photographs depicting biobank activity.

Results or findings

The launched Toolkit has been introduced to the BBMRI-ERIC community through Taskforce meetings and a dedicated webinar. It provides ready-to-use posters, flyers and social media templates, an image database and practical guidance to support outreach. A living resource, the Toolkit is a project under continual collaborative revision to meet the communication and outreach needs of the biobanking community.

Discussion and conclusion

This poster will showcase the Toolkit's components, demonstrate practical use cases, and encourage wider adoption. By sharing lessons learned from its development, the contribution supports community-driven creation and harmonised communication across BBMRI-ERIC.

583: UBiLim: A Federated Biobank Model for Advancing Translational Research in Belgium

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Abstract ID: 583

Topic: 11A: Inside the Biobank: Organisational Structures, Strategies, and Success Stories

Presenter Name: Kimberly Vanhees

Keywords: Biobank governance, Federated biobank model, Sustainability of biobanks,

Translational research

The University Biobank Limburg (UBiLim) evolved from a clinical archive of bone marrow smears at Jessa Hospital into a professional

biobank. Through validated sample processing, ISO-aligned quality management, and the implementation of a biobank information management system, UBiLim progressively developed into a state-of-the-art facility. In collaboration with Hasselt University and Hospital Oost-Limburg, UBiLim transitioned from a single-site, disease-focused collection to a federated biobank spanning three institutions and supporting diverse research domains. We currently store about 300,000 samples in our biobank from around 90 different studies. Most samples are liquid, mainly plasma, serum, and PBMCs. They come primarily from patients with inflammatory, immune-related, and hematological disorders. Over the past 10 years, about 15% of the samples have been used, mainly by researchers from our own institution.

UBiLim operates with a central governance structure while maintaining federated operations, enabling harmonization across sites with local flexibility. Public funding played a key role during UBiLim's development into a federated biobank, though it has not been available for five years recent. Consequently, the three institutions now primarily fund UBiLim to keep costs low for local researchers. Despite recurrent funding challenges and evolving political and legislative landscapes, UBiLim has demonstrated resilience, supporting an increasing number of studies and projects, highlighting its value in translational research.

While long-term sustainability remains a challenge, particularly regarding funding, the federated biobank model with central governance has proven effective in facilitating translational research and maximizing the impact of biospecimens, offering a replicable approach for biobanks in complex institutional and regulatory environments.

[569: Optimizing Biobank Quality Systems and Communication with Accessible Digital Tools: The Valdecilla Biobank Experience](#)

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Topic: 11A: Inside the Biobank: Organisational Structures, Strategies, and Success Stories

Presenter Name: INES SANTIUSTE

Keywords: Biobank management; Quality management systems, Digital platforms, Internal communication,

Process optimisation, SharePoint

Introduction

Modern biobank management requires digital integration and flexible systems that ensure traceability, documentation control, and effective internal communication. Many institutions already have access to digital platforms such as Microsoft SharePoint; however, these tools are often underutilized or poorly adapted to biobank specific workflows. In addition, commercial software solutions frequently require adapting processes to predefined software structures, limiting flexibility and alignment with real laboratory activities.

Material & methods

Microsoft Lists, libraries, and automated workflows were designed and implemented at **Valdecilla Biobank (IDIVAL)** to support Quality Management System-related activities. A platform was developed following a modular and continuously evolving approach, allowing modules to be added, modified, or removed as operational needs emerge or change.

Results

The platform integrates modules for:

- non-conformity registration and follow-up, corrective actions, opportunities for improvement, equipment and reagent inventories, automated alerts (e.g. reagent expiry),
- documentation control,
- internal communication workflows

with assigned responsibilities and reminders.

A share space is also included for the dissemination of biobank operational information (news and key events). Centralizing these elements has improved traceability, coordination, and visibility of quality-related and daily operational activities.

Discussion and conclusion

This integrated digital environment was developed in accordance with quality management principles applicable to biobanks, supporting compliance with relevant quality standards. Its flexibility, scalability, and reliance on widely available Microsoft tools make it a practical and transferable solution for biobanks seeking to progressively improve their digital organization and internal communication.

Integrated contract and financial management within the BioSLIMS platform: towards automated and traceable biobank administration

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Abstract ID: 556

Topic: 11A: Inside the Biobank: Organisational Structures, Strategies, and Success Stories

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Keywords: LIMS; contract management; financial management; automation

Efficient management of contracts and associated financial flows is a critical component of sustainable biobank operations. Within the BioSLIMS system, we have developed and implemented an integrated

study module that enables end-to-end management of contractual agreements and their corresponding financial follow-up.

This module provides a structured framework for registering and monitoring study-specific contracts, directly linked to financial reference tables that allow systematic tracking of costs, revenues and agreed financial conditions. By centralizing contract data and financial parameters within a single platform, BioSLIMS ensures improved traceability, consistency and transparency throughout the lifecycle of a study.

Financial data can be extracted directly from the BioSLIMS environment using SQL-based queries, enabling seamless integration with an internal invoicing tool. This approach reduces manual handling, minimizes the risk of errors and supports timely and accurate billing based on contractually agreed terms.

Ongoing efforts focus on further digitalization and automation of these processes, with the aim of achieving a fully integrated workflow from contract creation to invoicing. This development supports more efficient administrative processes, enhances data integrity and contributes to scalable and compliant biobank management

548: Moli-Bank: challenges and opportunities in aligning a historical population biobank with ISO 20387:2018

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Abstract ID: 548

Topic: 11A: Inside the Biobank: Organisational Structures, Strategies, and Success Stories

Presenter Name: amalia de curtis

Keywords: ISO 20387, Population Biobank

Background:

Moli-Bank was established in 2005 for the Moli-sani population cohort, enrolled over 24,000 subjects from the general population recruited in 30 villages of the Molise region to investigate risk factors for chronic degenerative diseases. Hosted at the Neuromed Biobank Center (IRCCS Neuromed, Pozzilli, Italy), Moli-Bank represents one of the first and largest population biobanks in Italy.

Methods:

Moli-Bank preserves different biological samples, including whole blood, serum, plasma, DNA (at $-196\text{ }^{\circ}\text{C}$ in liquid nitrogen vapor), and urine (at $-80\text{ }^{\circ}\text{C}$), all linked to clinical and epidemiological data. The biobank supports biomolecular, epidemiological, and translational research. Compliance with the ISO 20387:2018 international standard was considered, with particular attention to the challenges encountered by long-established (“historical”) biobanks.

Results:

Key critical issues emerged: (i) sustainability and institutionalization, as ISO-compliant quality management systems require substantial investments in infrastructure, qualified personnel, and periodic audits; (ii) document management and sample traceability, particularly the transition from legacy systems (e.g., Excel-based databases or in-house tools) to integrated biobank information management systems (BIMS); (iii) quality control and standardization, including the revision and harmonization of historical standard operating procedures not fully aligned with ISO 20387 requirements; and (iv) ethical and legal compliance, notably the updating of informed consent and data protection procedures in accordance with GDPR, affecting data and sample sharing.

Conclusions:

Institutionalization emerges as a key factor to ensure long-term sustainability, transparent governance, and operational continuity. Formalizing roles, responsibilities, and procedures strengthens quality, reliability, and compliance with international standards, consolidating the biobank as a modern, high-value research infrastructure

453: Biobanking on Demand: A Future Model for Biobanking? Insights from the EU Project DIOPTRA

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Abstract ID: 543

Topic: 11A: Inside the Biobank: Organisational
Structures, Strategies, and Success Stories

Presenter Name: Monika Valjan

Keywords: CRC, EU project, Olink, biomedical
research, colorectal cancer, fitness for purpose,
proteomics

Introduction

Biobanking has evolved from traditional
collection and storage to an adaptive

framework that responds to specific research
needs. The EU project DIOPTRA
(<https://dioptra-project.eu/>) serves as a
model. Requested colorectal (CRC) cancer
pretreatment fluid samples, which were not
available in our biobank, indicate potential
limitations of conventional biobanking.

Material and Methods

We established a needs driven CRC collection
of plasma samples and clinical data at the
University Hospital Graz and the Barmherzige
Brüder Krankenhaus Graz aligned with the
projects in- and exclusion criteria. A positively
signed informed consent was a prerequisite.
Samples were collected according to the
project's specifications (K2EDTA plasma tubes
before any treatment or surgical removal;
centrifugation: 2300g, 10min, 24oC; storage of
500µL aliquots at -80oC until shipment to
testing facility). The samples were analysed
using Olink Reveal proximity assay technology,
measuring over 1000 human proteins. A
bioinformatics analysis scheme of principal
component and differential protein expression
analyses was applied on the Olink data
comparing CRC samples from GRAZ to other
DIOPTRA clinical partners.

Results

We established an on-demand CRC collection,
with sample quality and fitness for purpose
confirmed through Olink proteomics.
Secondary use of remaining samples is
possible, as patients gave their approval
through the Biobank Graz informed consent.

Conclusion

By focusing on specific needs of research
projects like DIOPTRA, we explore potential
benefits of a flexible, demand-driven
biobanking approach that enhances the
availability of critical samples for research.
This investigation seeks to foster a dialogue on
innovative biobanking strategies that align with
rapid advancements in biomedical research.

541: Integrated Crisis Management and Cold Chain Resilience: Responding to a National Grid Failure in a Multi-Site Biobank Network.

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Abstract ID: 541

Topic: 11A: Inside the Biobank: Organisational Structures, Strategies, and Success Stories

Presenter Name: T. Diaz | P. Ferro | A. Jimenez

Keywords: Cold Chain Resilience, Contingency Planning, Crisis Management, Risk Assessment

Title: Integrated Crisis Management and Cold Chain Resilience: Responding to a National Grid Failure in a Multi-Site Biobank Network.

Introduction: The Provincial Biobank of Málaga (SSPA node; IBIMA-BIONAND ECAI) manages extensive collections across multiple hospital centers. In April 2025, a nationwide blackout caused a total power failure, threatening hundreds of thousands of stored samples.

This study evaluates contingency protocols and resilience under extreme conditions.

Material & Methods: Following a 4-hour power and monitoring loss, a coordinated response was activated focusing on: 1) Tactical staff deployment to critical nodes; 2) Implementing temporary power bypasses for units lacking emergency network support; and 3) Coordinating fuel supply with emergency

services. Stability was verified via manual monitoring and data recovery.

Results: Despite remote monitoring failure, the cold chain remained intact. Data logs confirmed ULT units stayed within stability margins. A single mechanical failure was mitigated through a pre-established translocation protocol. The response resulted in **zero sample loss**, validating the risk management system.

Discussion and Conclusion: This stress test demonstrated that resilience depends on technical redundancy and staff proactivity. The incident prompted a QMS revision and a new Integrated Emergency Plan, prioritizing universal emergency grid connectivity and external collaboration.

537: Relocation of a biobank: critical points and planification

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Abstract ID: 537

Topic: 11A: Inside the Biobank: Organisational Structures, Strategies, and Success Stories

Presenter Name: Isabel Novoa

Keywords: biobank, relocation, sample quality

Introduction

Biobanks have complex infrastructures that allow long term storage of samples in conditions to warranty their quality for use in biomedical research and to fulfill regulatory requirements. It is frequent that during

biobank life a relocation to a new site can happen for different reasons (1). This relocation involves the transfer of documents, equipment, personnel and rearrangement of sample circuits.

Methods

A relocation plan was established taking in consideration all the elements that needed to be relocated and their requisites for a proper transfer, analyzing the samples circuits, and analyzing the different stakeholders affected.

Results

A relocation plan was established to relocate the HUVH Biobank in a new building within the Vall d'Hebron Campus. This plan included general aspects regarding the requirements, design and review of the new space, transfer of freezers, fridges, reagents, laboratory fungible, transfer of equipment and transfer of computer systems and documentation.

The biobank personnel together with other units involved in the relocation had regular meetings to inform and solve questions about the relocation, and a follow-up plan was designed with people responsible to achieve the different objectives. Finally, a communication plan was prepared to be send to all the biobank services users, collaborators and providers.

The relocation was successful with a small interruption of our services, and only a minor incidence was detected that did not affect samples quality.

Conclusion

Establishing a biobank relocation plan helps to organize all the stakeholders and is crucial to warranty a successful transfer to a new site.

525: Transformative Quality Management: ISO 9001 Tools Driving Service Excellence in Biobank Administration

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Abstract ID: 525

Topic: 11A: Inside the Biobank: Organisational
Structures, Strategies, and Success Stories

Presenter Name: Alessandro Grodziecki

Keywords: Change Management, Friendly Audit,
ISO 20387, ISO 9001:2015, Lean
Management, Multi-Site
Biobanking, Satisfaction Survey

Introduction

In complex academic environments, biobank administrations must bridge the gap between rigid public structures and high-performance research demands. The BioMaterialBank Heidelberg (BMBH), an umbrella organization of ten specialized biobanks in Heidelberg, provides IT-, QM- and administrative services. To transit from a coordinating platform to a proactive service partner, a DIN EN ISO 9001:2015 QMS was implemented.

Material & Methods

The primary challenge was shifting staff's mindsets from traditional public service roles

toward a process-oriented research service. To overcome this, we integrated lean tools: Kanban-based visualization for task /IT management, 8D reporting for systematic root-cause analysis, and standardized stakeholder satisfaction survey. We implemented a "Friendly Audit" program for member biobanks. KPI analysis from our 2025 survey was used to validate the system's effectiveness.

Results

This systematic approach demonstrated a measurable transformation in operational efficiency. Kanban tracking standardized IT response times and increased transparency, while 8D reports and an automated ticket system reduced recurring errors. The "Friendly Audit" service supported members in adapting to ISO 20387 standards. Furthermore, a collaborative LIMS manual secured vital organizational knowledge. Our 2025 survey confirmed high trust and acceptance providing a baseline for future quality objectives.

Discussion and Conclusion

The "Heidelberg Model" confirms that lean ISO 9001 tools effectively reduce error rates and enhance stakeholder satisfaction in academic administrations. This scalable roadmap serves as a blueprint for multi-site networks to achieve operational excellence by aligning public frameworks with standardized management tools.

508: Strengthening Biobank Sustainability: Adapting an Evaluation Framework for Storing Biobank Collections within the Belgian context

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Abstract ID: 508

Topic: 11A: Inside the Biobank: Organisational Structures, Strategies, and Success Stories

Presenter Name: David Triest

Keywords: Evaluation of collections, Sustainability

The long-term sustainability of biobank collections is an increasingly important challenge, as the costs, infrastructure needs, and ethical responsibilities associated with preserving biological materials continue to grow. To support evidence-based decisions on whether collections should be retained or discontinued, BBMRI.nl developed a guideline that helps researchers assess the scientific, ethical, operational, and societal value of existing materials. This framework evaluates aspects such as collection quality, relevance for research, utilization rates, costs, governance obligations, and alignment with (inter)national standards. Its goal is to ensure transparent, well-founded, and responsible decisions

regarding the continuation or termination of collections.

The BBMRI.be Sustainability Working Group reviewed this Dutch guideline to determine its applicability in the Belgian biobank landscape. The evaluation considered national regulatory differences, funding structures, varying levels of biobank maturity, and operational constraints across institutions. The group also took into account the needs of Belgian researchers and biobank managers, including diverse institutional policies, stakeholder expectations, and usage levels of existing collections.

The review showed that the Dutch guideline requires several adaptations to suit the Belgian context. Necessary modifications include clarifying decision criteria, integrating Belgian ethical and legal requirements, and offering practical tools to assess the scientific value of legacy collections. The next step is to translate these adjustments into a concise, user-friendly checklist for Belgian researchers and biobanks. Once developed, the checklist will be tested in practice by distributing it to investigators through BBMRI.be. This tool is expected to facilitate systematic evaluation of older collections and support informed decisions about their future.

507: Role of JFM CU in Establishing Systematic Biobanking in Slovakia

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Abstract ID: 507

Topic: 11A: Inside the Biobank: Organisational Structures, Strategies, and Success Stories

Presenter Name: Romana Zahumenska

Keywords: biobanking ecosystem, development, infrastructure, systematic biobanking

The establishment of systematic biobanking in Slovakia has progressed from early conceptual planning to coordinated national infrastructure supporting high-quality biomedical research, translational science, and personalized medicine. The Jessenius Faculty of Medicine in Martin, Comenius University in Bratislava (JFM CU), has been the leading force behind this transformation, shaping the scientific, organizational, and technological foundations of the country's biobanking ecosystem.

Between 2017- 2019, JFM CU experts collaborated with the Ministry of Health of the Slovak Republic to define national priorities, align procedures with European biobanking standards, and design a sustainable national framework. A major breakthrough followed with the approval of the BIOFORD – Systemic Public Infrastructure: Biobank for Cancer and Rare Diseases project, which enabled the construction of Slovakia's first national biobank. The new facility is equipped with advanced automated storage systems, high-capacity cryogenic and ultra-low-temperature technologies, and infrastructure capable of storing millions of biological samples. Green roof and A-level energy certification reflect a strong commitment to sustainability and modern biobanking standards.

Beyond infrastructure development, JFM CU has significantly strengthened Slovakia's scientific capacity by producing peer-reviewed publications, organizing specialized trainings, and systematically raising national awareness of biobanking. Together with institutional partners, the faculty established the first national biobanking network, creating unified platform that now forms the backbone of systemic biobanking activities in Slovakia.

In June 2025, Slovakia became a full member of BBMRI-ERIC, with JFM CU appointed as the National Node. This milestone confirms the faculty's leadership and long-term commitment to building a robust,

interconnected, and internationally aligned biobanking ecosystem.

499: BBMRI.nl as integral part of a sustainable national health and life science data infrastructure

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Abstract ID: 499

Topic: 11A: Inside the Biobank: Organisational Structures, Strategies, and Success Stories

Presenter Name: Jörg Hamann

Keywords: BBMRI, Infrastructure, National Node

Introduction – The Netherlands has been a member of BBMRI-ERIC since its establishment. In 2020, BBMRI.nl became a partner of Health-RI, the organization dedicated to improving the reuse of health data for policy, research, and innovation.

Results – Health-RI is developing a sustainable, integrated health and life sciences data infrastructure. Within this framework, BBMRI.nl operates through a hub-and-node model, with regional nodes embedded in the central biobank facilities of Dutch academic hospitals.

BBMRI.nl facilitates the harmonized processing, storage, and reuse of health data, biomaterials, and imaging data from a wide range of collections. Core activities include evidence-based standardization of sample and data processing, alignment with national standards, and the provision of services that support data and sample discovery and sharing. BBMRI.nl also disseminates expertise to the Dutch biobank and cohort community,

with the annual National Biobank Day serving as a central meeting point.

BBMRI.nl is entering a new phase aligned with Health-RI's transition from a National Growth Fund project to a sustainable, integrated national infrastructure for health and life sciences data reuse, in line with the upcoming European Health Data Space (EHDS). In parallel, BBMRI.nl aims to strengthen its contribution to the BBMRI-ERIC Work Programme 2025–2027, particularly in the areas of CS-IT, quality management, ELSI, and biobank development.

Conclusions – BBMRI.nl's organizational model strengthens its role as the Dutch national node of BBMRI-ERIC, enhances alignment with national and international research infrastructure agendas, and increases its added value for the Dutch research community.

491: Specimen Processing and Biobank Operations: Cold-Chain Management and Digital Traceability in an Accredited Repository

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Abstract ID: 491

Topic: 11A: Inside the Biobank: Organisational Structures, Strategies, and Success Stories

Presenter Name: Asanda Msweli

Keywords: N/A

Background:

At the Africa Health Research Institute (AHRI), specimen processing and biobank stations safeguard biospecimen integrity for long-term research, clinical trials, and diagnostics. These stations ensure standardized handling, temperature control, and traceability in line with ISBER Best Practices and SANAS accreditation.

Methods

Processing follows approved SOPs for aliquoting, preparation, and quality control. For temperature-sensitive studies, dry ice is used during aliquoting into FluidX tubes to prevent thawing. Metadata, study associations, and quality indicators are captured in the

Laboratory Information Management System (LIMS). The biobank provides centralized storage at $-20\text{ }^{\circ}\text{C}$, $-80\text{ }^{\circ}\text{C}$, and $-196\text{ }^{\circ}\text{C}$ (liquid nitrogen). During accessioning, verification, and relocation, dry ice maintains ultra-low temperatures for $-80\text{ }^{\circ}\text{C}$ and cryogenic specimens. LIMS maps the storage hierarchy, enabling precise sample tracking and retrieval.

Results

Integrating dry ice into workflows reduces pre-analytical variability and preserves molecular and cellular integrity. Digital-to-physical integration through LIMS enhances traceability, minimizes errors, and supports SANAS audit readiness. Routine documentation, staff training, and continuous quality improvement strengthen sustainability and scalability.

Conclusion

AHRI's specimen processing and biobank stations provide a robust, accreditation-aligned framework for biospecimen preservation. Strategic use of dry ice, combined with standardized workflows and digital traceability, ensures specimen quality, supports global collaboration, and reinforces sustainable biobanking in African research contexts.

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2. SANAS ISO 15189:2022 Medical Laboratories – Requirements for Quality and Competence.
3. AHRI Quality Management System Documentation (Isango, 2024).

490: Ensuring Traceability and Cold-Chain Integrity Through Kit Manufacturing and Receiving Stations in a SANAS Accredited Biorepository

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Abstract ID: 490

Topic: 11A: Inside the Biobank: Organisational Structures, Strategies, and Success Stories
Presenter Name: Langelihle Mlambo
Keywords: N/A

Background:

The Africa Health Research Institute (AHRI) biorepository supports South Africa's contribution to global health research through standardized, accredited biospecimen management. The kit manufacturing room and receiving stations serve as critical front-end components in the biobanking workflow, ensuring consistency, traceability, and regulatory compliance from collection through intake.

Methods:

Standardized collection kits are manufactured and distributed to partner sites to harmonize biospecimen acquisition. Lung tissue collection kits incorporate dry ice to maintain ultra-low temperatures at the point of collection, preserving biospecimen stability. Dry ice is also used for distributing lung tissue and plasma to internal and external laboratories, ensuring coldchain continuity. Upon receipt, samples undergo verification, labeling checks, and accessioning into Laboratory Information Management Systems (LIMS) and REDCap. Standard operating procedures (SOPs), aligned with ISBER Best Practices and SANAS accreditation requirements, guide integrity assessment, documentation, and chain-of-custody control.

Results:

Integrated use of LIMS and REDCap enhances traceability, reduces pre-analytical errors, and strengthens compliance with SANAS quality management systems. Structured intake workflows ensure biospecimens meet predefined quality criteria and remain fit for downstream processing. Cold-chain standardization using dry ice supports reliable interlaboratory transfer while maintaining molecular and cellular integrity, collectively improving turnaround times for diagnostic and research applications.

Conclusion:

The coordinated operation of kit manufacturing and receiving stations establishes a scalable, sustainable, accreditation-ready biobanking model. Standardized intake systems, robust cold-chain logistics, and digital traceability strengthen quality assurance and support compliant biorepository operations across African research environments.

References

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SANAS ISO 15189:2022 Medical Laboratories – Requirements for Quality and Competence.
AHRI Quality Management System Documentation (ISango, 2024).

[487: The Sciensano Biobank – Milestones in a Belgian legal and quality context](#)

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Abstract ID: 487

Topic: 11A: Inside the Biobank: Organisational Structures, Strategies, and Success Stories
Presenter Name: David Triest
Keywords: Organization ; Achievements ; Collaborations

The Royal Decree on biobanks (2018) significantly impacted the Belgian biobanking landscape. Since then, it became legally

required that an official biobank is needed to do scientific research studies with HBM. This led to the decision to install a biobank structure at the Belgian health institute Sciensano. The Sciensano Biobank is organized in different biobank-modules with objectives that cover the HBM activities taking place in the Sciensano departments. This strategy was chosen to ensure close collaboration with Sciensano scientists making use of the biobank. Biobank-modules are supported by a Central Biobank Platform (CBP) for which dedicated personnel is appointed. The biobank structure and biobank-modules objectives were ethics committee approved and officially notified at the overseeing authority. The CBP was developed, thereby committing itself to follow a roadmap towards ISO20387 accreditation. Different achievements were made: (1) BIMS implementation to manage the sample registries ; (2) Ensuring legal compliance by obtaining ethics committee approval for our required biannual reports ; (3) Development of various quality procedures for using the biobank. We also joined the (inter)national biobanking community via BBMRI and ESBB. Installment of our biobank is a success story as it allowed Sciensano to keep valuable HBM collections. Currently ± 140.000 samples are stored and available for future scientific research (internal/external). Various studies, especially during Covid pandemic, were supported to fulfil their biobanking activities and obligations, many being collaborations between Sciensano and other institutes. The CBP is now also launching own innovative quality control projects, like the QUEST-FFP project (poster 242 @EBW25).

482: BioCF success story: A Centralized Resource for Biological Samples, Genomic and Phenotypic Data from Five Large French Population-Based Cohorts”

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Abstract ID: 482

Topic: 11A: Inside the Biobank: Organisational Structures, Strategies, and Success Stories

Presenter Name: Hélène Blanché

Keywords: Biobank, CONSTANCES, E3N-Generations, cohort, population-based

The BioCF (French Cohorts’ Biobank) initiative, funded by the French National Research Agency, aims to establish a centralized national resource for the collection, storage, and use of biological samples from five large French population-based cohorts. BioCF relies on the technical and scientific expertise of the CEPH Biobank in Paris, the first European biobank certified ISO 20387 in March 2020, where all collections have been centralized.

The five participating cohorts (CONSTANCES, E3N-Generations, ELFE, EPIPAGE2, and GAZEL) include nearly 400,000 volunteers with active follow-up ranging from several years to multiple decades. To date, around 130,000 participants have consented to provide biological samples, and approximately 70,000 have contributed multiple specimen types, including blood, urine, feces, saliva...

A total of 1.57 million samples previously stored at several sites in France and Luxembourg were successfully transferred to the CEPH-Biobank through four major phases involving liquid nitrogen and dry ice shipments. DNA was extracted from buffy coats and saliva samples using high-throughput automated platforms, followed by comprehensive quality control. About 75,000 DNA samples were transferred at the CNRGGH where genome-wide genotyping of 56,000 individuals has already been completed with an average success rate of 99,3%.

By integrating genome-wide genotyping data with extensive longitudinal phenotypic, environmental, lifestyle, and health-related information, BioCF success story provides a unique French resource for academic and industrial researchers, enabling large-scale studies such as GWAS and gene–environment or gene–drug interaction analyses. This initiative positions France alongside other countries with large, integrated population biobanks and strengthens international biomedical research capacity.

477: Monitoring biobank utilization using OpenSpecimen: Insights into storage growth and sample use

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Abstract ID: 477

Topic: 11A: Inside the Biobank: Organisational Structures, Strategies, and Success Stories

Presenter Name: Erik van Iperen

Keywords: BIMS, Data, Distribution, Samples, Sustainability, Utilization

Sustainable biobanking depends on balancing sample intake, long-term storage, and utilization for research. In practice, collections lack standardized and reproducible metrics to quantify how stored biospecimens are utilized. Using OpenSpecimen, Amsterdam UMC Biobank developed a data-driven framework to monitor utilization at both biobank and collection level.

An API-based extraction and post-processing pipeline was implemented to calculate key performance indicators for the Amsterdam UMC biobank repository. Metrics were derived for 2024 and 2025 and include: (1) overall utilization rate, defined as distributed specimens relative to the total number of stored specimens; (2) utilization restricted to active collections, defined as collections with at least one distribution in the analysis window; and (3) collection-level utilization proxies, calculated as distributed specimens relative to the currently stored inventory. Additional indicators quantify each collection's share of total storage and share of total distributions. Overall utilization rates were low, reflecting substantial growth in stored inventory relative to annual distribution. When the analysis was restricted to active collections, utilization rates increased substantially, indicating that a limited subset of collections accounts for most sample use. Collection-level analyses showed substantial heterogeneity in utilization efficiency. In 2024 and 2025, increased intake combined with lower distribution resulted in a lower overall utilization rate.

OpenSpecimen-derived utilization metrics provide a transparent and reproducible basis for monitoring biobank performance. Distinguishing between total holdings and active collections offers management tools for governance, capacity planning, and long-term sustainability.

Track 2: Ethics, regulation and digital innovation: Navigating the future of biobanking

5B: AI-enhanced biobank research: Integrating, analysing and advancing biomedical discovery

729: Biobank of Eastern Finland provides multimodal data resources for AI-driven biomedical research

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Abstract ID: 729

Topic: 5B: AI-Enhanced Biobank Research: Integrating, Analysing, and Advancing Biomedical Discovery

Presenter Name: Ella Ikonen

Keywords: AI-driven biomedical research, multimodal data, personalized medicine

Biobank of Eastern Finland is a hospital biobank that enables access to biological samples and clinical data from a genetically unique population. The population base of Eastern Finland exceeds 550 000 individuals. Biobank samples are obtained during clinical or research procedures from individuals who have given voluntary biobank consent. Our sample collections include a wide range of sample types, including CSF, fibroblasts, and PBMCs. Sample donors can be recontacted for additional biomedical research, such as lifestyle questionnaires, or participation in clinical trials.

In addition to high-quality biological samples, we provide comprehensive longitudinal clinical data, including follow-up information. Integrating genotype data with phenotype information creates substantial opportunities for the development of AI-driven approaches in personalized medicine. We provide digitized

histopathology slides, multimodal imaging data (e.g., CT, MRI, X-ray, mammography, OCT), and image-analysis metrics to support diverse AI model development. We also have ECG and pulmonary function data to further complement these datasets. Furthermore, our biobank projects generate an increasing amount of analytical data, including GWAS, HLA imputation, sequencing, and proteomics.

A concrete example of the patient-level benefit of biobank research is the ability to use returned genomic data to identify donors with a significantly elevated cancer risk. In a pilot project (GenomiTerveys) we contacted 17 carriers of pathogenic variants of *BRCA1-2* and *PALB2*. Sample donors had no information regarding their carrier status in their medical records. 9 of 17 carriers (53 %) opted to attend the genetic counselling. Pilot insights motivate us to continue returning risk variant data to sample donors.

562: Federating Research Infrastructure Data for AI-Driven Life Sciences: The RI-SCALE Data Exploitation Platforms

Authors:

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Abstract ID: 562

Topic: 5B: AI-Enhanced Biobank Research: Integrating, Analysing, and Advancing Biomedical Discovery

Presenter Name: Robert Harb

Keywords: AI, Data Transfer, Federated Analysis, RI

Introduction:

Research infrastructures (RI) generate increasingly large and complex datasets critical for scientific advancement. However, the reuse of these data is often limited by technical, computational, and integration challenges. The RI-SCALE project addresses these challenges by developing Data Exploitation Platforms (DEPs) that provide federated, scalable, and AI-ready access to RI data holdings, enabling reproducible analyses and crossRI collaboration across multiple life science domains and beyond.

Materials & Methods:

RI-SCALE brings together thematic RIs, compute providers, and data spaces to co-design and deploy DEPs. The platforms integrate federated data management, harmonised metadata, and AI frameworks to support large-scale analyses. Pilot deployments employ AI pipelines for predictive modelling, data harmonisation, and quality assessment, ensuring ethical, legal, and privacy compliance.

Results / Findings:

Biomedical pilots with BBMRI-ERIC apply explainable AI to colorectal cancer histopathology data, enabling novel biomarker discovery and improved risk stratification, while synthetic whole slide images support privacy-preserving data sharing and AI training. Complementary Euro-Biolmaging pilots focus on developing a foundation AI model for heterogeneous biological imaging data. Trained on diverse modalities and experimental conditions, the model generates high-quality embeddings that improve data categorisation, search, and reuse, enhancing the value and accessibility of imaging archives.

Discussion / Conclusion:

RI-SCALE illustrate how federated AI-ready platforms can enhance biobank-based research, enabling large-scale biomedical discovery while fostering collaboration, reproducibility, and innovation.

6B: Secure, fair and smart: Best practices for biobank data integration

706: European Whole Slide Image Cohorts: Pathology Data Presentation Using cBioPortal and xOpat

Authors:

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Abstract ID: 706

Topic: 6B: Secure, Fair and Smart: Best Practices for Biobank Data Integration

Presenter Name: Jiří Horák

Keywords: CRCC, cBioPortal, cancer, cohort, xOpat

Introduction:

BBMRI-ERIC, in addition to facilitate data sharing aims to provide direct access to high quality digital datasets. Ensuring data availability is essential for developing modern research infrastructures. The combined deployment of cBioPortal[1] with the xOpat[2] digital pathology viewer represents a first step toward offering intuitive data exploration tools and advanced visualization capabilities within the BBMRI community.

Materials and Methods:

cBioPortal is an open-source platform widely used for the visualisation and exploration of cancer datasets, offering rich statistical overviews. It supports integration with external applications such as whole-slide image (WSI) viewers. xOpat, co-developed within BBMRI, is a modular viewer designed for interoperability. The combined setup allows to explore cohort-level statistics and seamlessly open WSIs in xOpat when available. This deployment serves as a demonstrator of BBMRI-ERIC's emerging digital services and is expected to expand.

Results:

The development was carried out within canSERV[3] project. Two portals have been deployed: a secure instance for sensitive data requiring two-factor authentication and study level data access authorisation, and a second instance hosting anonymized datasets with simplified access. Each portal currently hosts one dataset: the sensitive CRC Cohort[4] and the MICAN collection from MMCI. Access is governed through Life Science AAI[5].

Discussion and Conclusion:

The integrated platform is an effective exploratory analysis interface. Nevertheless, several areas for improvement remain. CBioPortal's authorisation lacks flexibility, necessitating dataset fragmentation that complicates dataset visualisation. Its management interface requires manual data imports or updates. Continued development is

anticipated as direct slide access is not optimal and additional datasets are incorporated.

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674: Operationalizing a Standardized, EHR-Integrated Framework for Precision Medicine: The Dubai Health Biobank Model

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Abstract ID: 674

Topic: 6B: Secure, Fair and Smart: Best Practices for Biobank Data Integration

Presenter Name: Osman Zin AlAbdin

Keywords: Biobank Data Integration, Data management, EHR, FAIR

Introduction: Biobanks require harmonized data to drive precision medicine. The Dubai Health Biobank established a framework integrated with Epic EHR to streamline

recruitment and electronic consent, piloted through the Dubai Women's Health Study (DWHS).

Material and Methods: The multi-layered infrastructure captures data via Epic EHR and LIS, registering participants in OpenSpecimen (BIMS). During the DWHS pilot at Latifa Hospital (July 2025–January 2026), participants provided e-Consent directly in Epic. HL7 protocols automated data flows, while PPID-based pseudonymization and automated storage (–80 °C BioStore) ensured security and traceability.

Results: A six-category harmonized data dictionary was established, spanning demographics to molecular data. The pilot successfully enrolled 63 participants and processed 56 collection orders. Integration achieved high physician acceptance due to minimal workflow disruption and accurate automated demographic capture.

Discussion: The synergy between Epic, LIS, and BIMS demonstrates that HL7-enabled integration is both operationally effective and technically viable. This success highlights the necessity of cross-team collaboration to enhance research utility while strictly maintaining participant confidentiality and governance.

Conclusion: This FAIR-compliant platform provides a scalable roadmap for future population-based research and precision health initiatives across Dubai.

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626: GDPR conform data integration and provision at the iBDF

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Abstract ID: 626

Topic: 6B: Secure, Fair and Smart: Best Practices for Biobank Data Integration

Presenter Name: Kristina Goetze

Keywords: FHIR, OMOP, data integration

As medical research grows ever more complex and data driven, patient samples are needed that are annotated not only with a basic sample data set but with comprehensive and complex clinical data sets. These data can encompass routine clinical information, lab results or data from disease-specific registries. To annotate its samples, the interdisciplinary Biobank and Database Frankfurt (iBDF) collects and integrates data from various sources, like the clinical information system, the laboratory system or the local cancer registry and integrates these into the BIMS (CentraXX).

To provide GDPR conform data for research projects the iBDF implemented an ITInfrastructure centered around CentraXX within the protected clinical environment. For data provision the structured information in CentraXX is transferred to project-specific FHIR repositories via standardized FHIR interfaces and pseudonymized there. If additional data from other systems is required, it is added to the repositories by the Data Integration Center (DIC). To meet international standards, the data can be transformed into the OMOP Common Data Model. With this workflow the iBDF ensures data privacy and compliance with data

protection regulations. The flexible, standards-based, and extensible architecture facilitates the provision of samples and extensive clinical data for various research projects.

It also allows to easily connect to new data sources or external infrastructures.

Currently, researchers are encouraged to store their scientific data in CentraXX in a manner that complies with data protection regulations. For the future, the iBDF plans to retrieve research results in collaboration with the DIC to enable sustainable use of samples.

614: From Local Biobank to European Federated Ecosystem: Implementing Interoperability, Provenance and AI for Secure Data Reuse

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Abstract ID: 614

Topic: 6B: Secure, Fair and Smart: Best Practices for Biobank Data Integration

Presenter Name: Garcia-Molina E

Keywords: Biobank interoperability, Federated Platform, Federated data access, Semantic harmonisation

Introduction

The IMIB Biobank is a core biomedical research infrastructure that addresses the growing need for high-quality, ethically governed biological samples and interoperable health data to support translational and precision medicine.

Methods

The IMIB Biobank, certified at ISO 9001:2015, manages samples and associated clinical data, harmonised through international standards and ontologies: OMOP, SNOMED-CT, LOINC, HPO and Phenopackets.

Advanced semantic web technologies, big data platforms and Large Language Models are applied to structure free-text clinical records, integrate multi-omics and pathology data, and enable federated access.

The computing infrastructure developed by the IMIB's Biomedical Informatics and Bioinformatics Platform (IBIBP), complies with EU-GMP and GDPR requirements.

The IMIB Biobank submitted an Expression of Interest to join the BBMRI-ERIC Federated Platform (BBMRIFP) as part of the BBMRI.es.

Results

IMIB Biobank currently has semantically annotated data from 4,001 patients, including 1,360 diagnoses, comorbidities, and clinical phenotypes, as well as 634 distinct treatments. IMIB Biobank has been selected for onboarding into the BBMRIFP. Following the signing of an agreement, we will be on board the BBMRIFP with a provenance model for biological material and data in accordance with ISO 23494-1:2023 by June.

Discussion

Its federated, standards-based approach enhances data reuse, cross-border collaboration and secure access, positioning IMIB as a strategic node for European biomedical research and sustainable health data spaces.

503: A Framework for Linking Precision Nutrition Data with the National Integrated Bio Big Data Project in South Korea

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Abstract ID: 503

Topic: 6B: Secure, Fair and Smart: Best Practices for Biobank Data Integration

Presenter Name: Lee, Haeng-Shin

Keywords: Bio Big Data, Precision Nutrition, dietary and lifestyle data, national biobank framework

Introduction

This study, conducted as a research project (2025–2029) funded by the Ministry of Food and Drug Safety (MFDS), aims to provide foundational evidence for precision nutrition-based personalized interventions and health management strategies for individuals with chronic diseases in Korea, with the findings to be linked to the National Integrated Bio Big Data Project.

Material & methods

We performed a comprehensive analysis of the governance structures, ethical review procedures, and data management workflows of integrated bio big data initiatives in major countries. We delineated the roles and responsibilities of participating institutions within a multi-institutional framework and established standardized protocols covering the full data lifecycle, including data collection, management, storage, and utilization.

Results

The study developed practical guidelines for integrating precision nutrition data into the national biobank infrastructure. In addition, a continuous data quality management system was implemented to ensure data reliability, interoperability, and long-term usability.

Discussion and conclusion

This governance-based framework enables secure and scalable integration of heterogeneous nutrition-related data without excessive centralization of raw data. It provides a transferable model for expanding national biobank utility toward precision health research that incorporates dietary and lifestyle information.

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497: Cybersecurity in Biobanking: the Legal Framework protecting and securing data

Authors:

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Abstract ID: 497

Topic: 6B: Secure, Fair and Smart: Best Practices for Biobank Data Integration

Presenter Name: Catarina Almeida

Keywords: Cybersecurity, Data Protection, Data security, European Union, Legal Framework

Biobanks operate under the premise of data sharing, including personal and sensitive personal data, as defined by the GDPR. The GDPR provides key mechanisms and features for safeguarding personal data, such as the obligation, in certain circumstances, to conduct data protection impact assessments and implement technical and organizational measures to secure the data. The framework for personal data sharing will become more complex with the advent of the implementation of the EHDS Regulation. Cyberattacks on health infrastructures show that healthcare and research systems face growing digital threats. Biobanking infrastructures are complex organizational structures, with a wide network of actors, which may conceal cybersecurity vulnerabilities. Therefore, the field of cybersecurity is increasingly prominent and compliance with legal acts such as the NIS 2 Directive are critical in this instance, and affect hospitals and research institutions, in the prevention and mitigation of (malicious and non-malicious) cyber incidents.

Legal desk research undertaken by BBMRI.at's WP2, *inter alia* resorting to published materials on the topic.

The current regulatory framework for data protection and information security at both national and EU levels will be analyzed. This is relevant to ensure the sustainability and resilience of biobanks long term, ensuring data quality, storage and preservation compatible with the need for data sharing and secondary use in scientific research.

The focus of the poster will be on the data protection and security challenges encountered by biobanks and the legal

framework currently in place to protect and secure data, from the GDPR, EHDS and NIS 2 Directive.

488: Multimodal Data Integration at the Biospecimen Level: Metadata Schema for Linked Genomic, Radiological and Whole Slide Imaging Data

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Abstract ID: 488

Topic: 6B: Secure, Fair and Smart: Best Practices for Biobank Data Integration

Presenter Name: Radoslava Kacová

Keywords: FAIRification, data integration, metadata catalogue, metadata schema, secondary use

In the digital era, biobanks have a unique opportunity to evolve into sophisticated data hubs. Beyond traditional biospecimen stewardship, they can now integrate vast streams of genomic, radiological, and digital pathology data linked directly to samples. However, this requires a shift from fragmented data silos toward systematic integration through standardised metadata. To ensure data are discoverable for external researchers, a metadata catalogue is essential as a unified point of presentation. The success of such a catalogue depends on a robust metadata schema that enables the comprehensive description of integrated data at the biospecimen level.

We extended the **FAIR Genomes schema** (<https://doi.org/10.1038/s41597-022-01265-x>), originally linking specimens to clinical and sequencing data, to incorporate metadata for radiological and Whole Slide Imaging. Following an extensive review of imaging standards and ontologies, we synthesised a unified model by integrating attributes from DICOM, OMOP-CDM, HL7 FHIR, the EUCAIM Hyperontology, MIABIS Digital Pathology, and XNAT, among others. This modular approach harmonises diverse genomic and imaging

parameters into a single, comprehensive framework.

The resulting schema establishes a structured framework for representing linked multimodal data. By anchoring disparate data types to the biospecimen, the schema enables complex, cross-modal queries within a single portal. Researchers can identify cohorts using simultaneous criteria, such as selecting sequenced biospecimens with a specific diagnosis (e.g., C50) and available breast CT imaging.

This schema can help biobanks with transition into digital data hubs. By standardising the presentation of linked genomic and imaging data, biobanks can eliminate silos, significantly enhancing data discoverability and fostering multi-disciplinary collaboration in personalised medicine.

722: Enabling AI-driven research through ethical governance and standardized imaging integration in biobanks: The Bologna Neuroscience Biobank workflow

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Abstract ID: 722

Topic: 6B: Secure, Fair and Smart: Best Practices for Biobank Data Integration

Presenter Name: Michele Fruci | Sara Mechregui

Keywords: AI, AI TRAINING, Biobank, Consent, DICOM, Ethic, FAIR, GDPR, Governance, Informed, Privacy, Workflow, images, imagin data

Introduction

The digitization of healthcare has produced an increase in the availability of genomic and imaging data, which represent strategic resources for Artificial Intelligence (AI) model trainings. However, biobanks encounter challenges to make them accessible to the researchers. The issues focus on transparency of data use for sample donors as addressed by GDPR 679/2016, as well as the heterogeneity of image acquisition protocols. The Neuroscience Biobank of Bologna (BNB) is setting up a structured workflow to address these issues.

Materials and Methods

BNB revised its informed consent model, approved by the Ethics Committee, which explicitly includes the use of genomics and imaging data for research. The workflow involves the pseudonymization of DICOM images and harmonization according to MIABIS and FAIR principles.

BNB is also participating in the National Health Big Data project, whose goals include the standardization of image processing pipelines and the creation of shared computing infrastructures, thus setting the stage for Federated Learning.

Results

This workflow allows the training of AI models utilizing the biobank images while maintaining regulatory compliance.

Discussion and Conclusion

Medical imaging data are resources with great potential, but their valorization requires an approach that intertwines ethical governance and technical standardization. The BNB model faces these challenges with explicit informed consent and data standardization. This could be one possible best practice for the

integration of imaging data into biobanks and a step toward the implementation of precision medicine, especially in rare disease contexts where data need to be pooled to achieve significant statistical power.

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8B: Balancing ethics and innovation: ELSI in biobanking

728: Social Acceptance of Artificial Intelligence in Biobanking

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Abstract ID: 728

Topic: 8B: Balancing Ethics and Innovation: ELSI in Biobanking

Presenter Name: Zisis Kozlakidis

Keywords: AI, Artificial intelligence, biobanking, social acceptance

The implementation of computer-based approaches in healthcare and biomedical research has been discussed since the late 1950s, alongside some of the earliest applications in clinical settings. However, for decades these discussions lacked strong commitment and large-scale impact. This situation changed significantly in recent years, largely due to major international initiatives such as the Human Genome Project. Such flagship projects reshaped expectations regarding the role of computational technologies in healthcare and stimulated substantial investments, enabling the broader development of digital and datadriven approaches.

Within this evolving landscape, artificial intelligence (AI) has emerged as a key tool in biobanking. Its main applications include

sample management, data management, quality control, and digital pathology. Biobanks depend on standardized tissue collection to enhance scientific quality and advance research. By systematically gathering large numbers of biological samples, they contribute to the “datafication” of biomedical research. In this context, datafication involves two main dimensions: the extensive collection of demographic and clinical data, and the generation of molecular, imaging, and omics data derived from sample analysis. As a result, tissue-based research is increasingly becoming an informatics driven endeavor.

Despite these technological advances, important ethical questions remain. The integration of AI into biobanking raises concerns that require careful consideration. Successful implementation of such technologies depends not only on technical performance but also on ethical and social acceptance. Social acceptance can be analyzed through three dimensions: sociopolitical acceptance (regulatory and policy frameworks), community acceptance (among professionals, patients, and donors), and market acceptance (willingness to invest in and fund these technologies).

This poster will present a practical framework for the social acceptance of AI in biobanking, based on the experience and lessons learned from other sectors

Reference:

Artificial Intelligence in Biobanking: Ethical, Legal and Societal Challenges (1st Edition) Edited By [Michaela Th. Mayrhofer](#), [Santa Slokenberga](#), [Signe Mežinska](#)

ISBN 9781032619927 - 244 Pages 2 B/W Illustrations - Published August 7, 2025 by Routledge

685: The Italian “Code of Conduct for the processing of personal data for statistical and scientific purposes” under review: the key role of [BBMRI.it](#)

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Abstract ID: 685

Topic: 8B: Balancing Ethics and Innovation: ELSI in Biobanking

Presenter Name: Sara Casati

Keywords: biobank definition, code of conduct, community engagement, processing of personal data, scientific diplomacy, scientific purposes

Following a parliamentary amendment to Article 110 of the Privacy Code, the Italian Privacy Authority, which is responsible for establishing safeguards for the health data processing, under Article 9 of the GDPR 2016/679, for medical, biomedical and epidemiological research purposes when consent isn't possible, has promoted a new Code of Conduct for statistical or scientific research under Articles 2-quater and 106 of the National Privacy Law. The Authority invited private and public stakeholders to participate. [BBMRI.it](#) was recognised as a qualified stakeholder; for the first time, the biobanking community and research infrastructure have been involved in shaping legislation that impacts research and biobanking. Starting in 2025, the work is organised into three groups comprising all stakeholders, from industry to translational research hospitals. [BBMRI.it](#) facilitates Group 1 in updating key articles on scope, definitions, prerequisites, and consent guarantees, and provides the three groups with support and infrastructure services, such as the community of practice platform, a collegial, monitored workplace. Through scientific diplomacy and the involvement of all [BBMRI](#) biobanks and their corresponding DPOs, [BBMRI.it](#) proposed a definition of Research Biobank and added a specific article ex-novo, identifying research infrastructures, such as biobanks and registries, as one of the preconditions for data processing for scientific purposes. This marks a major step in a country where biobanking is unregulated. Finally, participation in drafting the new Code of Conduct has created the opportunity for direct dialogue between [BBMRI.it](#) and the Authority,

establishing a biobanking roundtable that is still ongoing.

550: Beyond the Algorithm: Trustworthy AI and the Role of Biobanking Infrastructures in Pathology and Imaging

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Abstract ID: 550

Topic: 8B: *Balancing Ethics and Innovation: ELSI in Biobanking*

Presenter Name: *Melanie Goisauf*

Keywords: *Biobanking Infrastructures, Data Governance, Digital Pathology, Ethics, Medical Imaging, Trustworthy AI*

Introduction

Artificial intelligence (AI) is increasingly embedded in data-intensive fields such as digital pathology and medical imaging, promising improved diagnostics and efficiency. At the same time, AI deployment raises ethical, social, and governance challenges related to data quality, representativeness, accountability, and trust. Biobanking infrastructures play a key yet often implicit role in shaping these conditions by governing biospecimens, imaging data, metadata, and access frameworks.

Material & methods

This talk draws on qualitative research conducted in two European research contexts—digital pathology and oncological imaging—combining structured literature reviews with empirical stakeholder engagement. Methods included participatory workshops and semi-structured interviews with clinicians, AI developers, researchers, and patient representatives. Data were analysed using thematic analysis to explore how trustworthy AI is understood and operationalised across infrastructures.

Results

Across both cases, trustworthiness emerged as a relational and context-dependent achievement rather than an intrinsic property of AI systems. Key themes included data

governance, bias and representativeness, validation across sites, transparency, accountability, and human oversight. Participants highlighted that heterogeneity in biospecimen handling, imaging protocols, annotation practices, and institutional infrastructures significantly shapes AI performance and trust. Biobanks and data platforms were identified as central actors in ensuring data quality, traceability, and responsible reuse.

Discussion and conclusion

Trustworthy AI in pathology and imaging depends on robust biobanking and data infrastructures that embed ethical governance throughout the AI lifecycle. For biobanks, this highlights their strategic role not only as data providers but as enablers of responsible, trustworthy AI in biomedical research.

468: Building Biobank-Centered Collaboration in Rare and Undiagnosed Diseases under ELSI Principles

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Abstract ID: 468

Topic: 8B: *Balancing Ethics and Innovation: ELSI in Biobanking*

Presenter Name: *Beste Özkalay*

Keywords: *Biobanking, ELSI (Ethical, Interdisciplinary training, Legal, Rare diseases, Undiagnosed diseases, and Social Implications)*

Modern research in the field of rare and undiagnosed diseases relies on systematic

management of biological samples and related data. Their low prevalence and high genetic diversity pose significant challenges in diagnosis and treatment. Combined with the absence of high-quality, standardized sample collections and the complexity of ethical, legal, and societal (ELSI) regulations, these issues hinder the development of diagnostic and therapeutic strategies in rare and undiagnosed disease research.

This study describes how the İzmir Biomedicine and Genome Center Biobank (IBG Biobank) facilitates implementation of ELSI principles in the Horizon 2020 ERA Chairs program-funded project, RareBoost (<https://rareboost.ibg.edu.tr/>). To ensure the sustainability to promote a shared understanding of ELSI principles among stakeholders and enhance this operational model, IBG Biobank organizes multi-stakeholder seminars and interdisciplinary training activities with Rareboost project partners. These events gather clinical experts, researchers, ethicists, legal professionals, and patient representatives to collectively explore the ethical, legal, and social aspects of biobanking processes in rare diseases. In this context, IBG Biobank has actively participated in organizing international, national, and institutional training activities that provided clinicians and researchers with practical insights into how regulations like the GDPR and the European Health Data Space (EHDS) impact biobank operations. Through case studies and interactive sessions, the program promotes interdisciplinary knowledge sharing and critical thinking. Furthermore, tailored training sessions boost the engagement of health professionals with biobanking procedures, ethical duties, and data governance frameworks. Such initiatives not only support the integration of ELSI compliance into routine practice but also foster trust-based, sustainable research collaborations.

Strengthening biobank networks through the development of sustainable, standardized biobank systems based on ELSI principles and aligning them with initiatives such as the

European Health Data Space (EHDS) remains a critical priority.

11B: Paediatric biobanking

652: Bridging the Common and the Rare: Guidelines for good practices in Rare Disease Biobanks

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Abstract ID: 652

Topic: 11B: Paediatric Biobanking

Presenter Name: Anna Codina

Keywords: Paediatric Biobank, good practices, patient engagement

Introduction

In paediatric biobanks, ethical frameworks have historically been strict to protect donors, but these rules are at present insufficient to address current biomedical challenges. Excessive protection of minors can limit paediatric research. In rare paediatric diseases, diagnosis and research faces challenges such as limited and small patient population, and insufficient data sharing. Strengthening donor involvement in biobank science could help overcome these difficulties.

Materials & Methods

Participation in the *Paediatric Biobanking and Engagement: Join & Share Practices* call. Creation of a working group to organize a paediatric session at the *Europe Biobank Week*

Roadshow in Rome. Additionally, we developed a leaflet to promote patient engagement and outreach biobank activities.

Results

The development of an open guideline of good practices for future generations, together with a leaflet promoting patient engagement, provides a foundation for involving patients and citizens in the science of biological samples and in understanding the roles of biobanks.

Discussion & Conclusion

Biobanking of human samples and associated data is essential for advancing biomedical research. Patient and citizen engagement is crucial to improve biobank practices and research quality. Although ethical frameworks remain strict in paediatric research, biobanks are required to help donors understand the importance of participation, facilitating both ethical protection and scientific progress.

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627: Pediatric Biobanks on Social Networks: A Perspective from Convergent Ethics in Communication Strategies.

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Abstract ID: 627

Topic: 11B: Paediatric Biobanking

Presenter Name: Dr. Liliana Virginia Siede

Keywords: Pediatric biobanks, communication strategies, conflict, convergent ethics

Pediatric biobanks are a key tool for developing research on children and adolescents in areas such as cancer. This study analyzes how pediatric biobanks are perceived in Argentina on social media (benefits, risks, trust, and values) using digital ethnography and grounded theory.

The research will analyze public data such as information and conversations on platforms like Twitter, X, and Facebook, among others, over a specific period. The aim is to gain an overview of the concerns and opinions of the population regarding this central issue, bioethics, and human rights related to cancer. The study seeks to identify prevailing myths and misinformation in order to propose recommendations for institutional and general public policies and communication strategies.

604: DIMOBANK: A Pediatric Collection for the Study of Complex Intestinal Motility Disorders

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Abstract ID: 604

Topic: 11B: Paediatric Biobanking

Presenter Name: Roberta Libener |

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Keywords: Hirschsprung disease,

Intestinal motility disorders,

Pediatric biobank, Rare diseases,

Translational research

Introduction

Complex intestinal motility disorders, such as Hirschsprung disease and chronic intestinal pseudo-obstruction, are rare, heterogeneous conditions with major diagnostic challenges[1,2]. Biobanks are a key resource for research with high-quality samples and clinical data, supporting advances in diagnosis and therapy[3].

Material and Methods

In 2025, DIMOBANK was established within the Alessandria Biobank as part of a multicenter, non-profit observational study, collaborating with the Pediatric Surgery Unit, a national referral center for Hirschsprung disease and ERNICA network member. The collection includes biological samples linked to pseudonymized clinical data in a REDCap database, with planned multi-omics analyses.

Results

To date, samples and clinical data from 16 pediatric patients with HD or CIPO have been collected, including blood derivatives, PBMCs, biopsies, urine, and stool samples.

Discussion and Conclusion

DIMOBANK is a structured resource for translational research in pediatric intestinal motility disorders, supporting studies on disease mechanisms, biomarker discovery, and personalized therapies.

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598: PEDNET-LC Biobank: A Multicenter, Register-Linked Biobanking Pipeline for Post-Acute Infection and Vaccination Syndromes of children and adolescents

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Abstract ID: 598

Topic: 11B: Paediatric Biobanking

Presenter Name: Helene Kraus

Keywords: Pediatric biobank, Post-Acute Infection and Vaccination

Syndromes (PAIVS); Myalgic

Encephalomyelitis/Chronic Fatigue Syndrome (ME/CFS), Register-linked

multicenter study; Longitudinal

biospecimen collection

Introduction: Post-acute infection and vaccination syndromes (PAIVS) and myalgic encephalomyelitis/chronic fatigue syndrome (ME/CFS) are closely related, complex disorders with substantial diagnostic uncertainty and high disease burden. No specific biomarkers or validated diagnostic tests are available, making differential diagnosis challenging. Multiple pathophysiological hypotheses suggest that combinations of biomarkers may be needed for better patient stratification.

Post-acute sequelae of COVID-19 are estimated in 1–10% of infected individuals. Before the pandemic, around 90.000 children and adolescents in Germany were estimated to have ME/CFS, with further increases observed since.

Methods: To address the urgent need for high-quality, harmonized biospecimens linked to detailed clinical data, we have established the PEDNET-LC Biobank, a register-based, prospective, nation-wide biobank for children and adolescents with PAIVS and/or ME/CFS. Biospecimens are collected longitudinally, processed in compliance with the NAPKON manual for pediatric samples, and hosted by university central biobanks in Freiburg and Dresden. Using a TMF-compliant data integration system, samples are securely linked to the PAIVS-MECFS registry via double pseudonymization. Longitudinal samples are obtained by trained staff at 20 study centers across Germany and via patient-led home sampling for subgroups of severely affected patients.

Results/Conclusion: Here, we provide insight in the set-up of the register-based biobank, present the standardized biobanking pipeline from sample collection to shipment, processing and centralized storage, and summarize the Status Quo after 10 months operation.

Embedded within the federally funded project the PEDNET-LC Biobank provides a scalable and sustainable infrastructure for translational research in this highly understudied field.

Track 3: Fit-for-purpose biobanking: Enhancing sample quality from collection to analysis

3C: Biobank advanced technologies: Challenges, opportunities and solutions

698: 3D printing in biobanking – what doesn't fit is made to fit.

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Abstract ID: 698

Topic: 3C: Biobank Advanced Technologies: Challenges, Opportunities and Solutions

Presenter Name: Alexander Brobeil

Keywords: 3D printing; labware; made to fit

Modern biobanking is characterized by rapidly evolving technologies and increasingly specialized workflows, which place new demands on laboratory equipment and infrastructure. Standardized, commercially available labware is often not designed to accommodate cutting-edge methods or highly

specific experimental requirements. Even simple items such as specimen holders or preparation boxes may not be available in the required dimensions, materials, or configurations. To address these limitations, three dimensional (3D) printing offers a flexible and cost-effective solution for the rapid production of custom-made laboratory equipment. In this context, we implemented an inhouse 3D printing approach to design and manufacture tailored labware for biobanking applications. Custom-designed components can be quickly adapted to specific protocols, optimized for compatibility with existing instruments, and produced on demand. This approach enhances workflow efficiency, reduces dependency on external suppliers, and enables rapid prototyping and iterative improvement. Overall, 3D printing represents a powerful tool to bridge gaps between standardized laboratory products and the specific needs of modern biobanking, allowing what does not fit to be made to fit.

696: An automated analysis platform deriving novel data on cellular lipid metabolism for biobanks and in clinical studies

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Abstract ID: 696

Topic: 3C: Biobank Advanced Technologies: Challenges, Opportunities and Solutions

Presenter Name: Simon Pfisterer

Keywords: automated microscopy, bridging multi-omics, cellular lipid metabolism

Introduction: Alterations in cellular lipid metabolism underlie major human diseases,

including cardiovascular disease (CVD), obesity, cancer, and neurological disorders. Yet, systematically quantifying differential regulation of cellular lipid metabolism at a scale suitable for biobanks and large clinical studies has remained a major challenge.

Methods/Results: MONCYTE Health has established an automated analysis platform that enables systematic and scalable quantification of cellular lipid metabolism in white blood cells at single-cell resolution. The platform integrates robotic cell processing, automated high-content microscopy, and cloud-based, AI-driven image analysis. Both frozen white blood cells and fresh blood samples can be processed, enabling analysis of existing biobank material and prospective sample collections. This approach allows quantification of more than 120 parameters of cellular lipoprotein uptake and lipid storage, generating unprecedented insight into cellular disease mechanisms. These data open new opportunities to interconnect cellular phenotypes with multi-omic datasets, supporting the development of novel precision medicine applications and the identification of previously unrecognized disease-modifying factors.

MONCYTE Health spearheads this approach within a multidisciplinary consortium FH-EARLY (Horizon Europe, referenced in Safe Hearts Plan) focused on advancing personalised prevention and precision medicine in familial hypercholesterolaemia (FH) and CVD. MONCYTE Health has demonstrated the value of cellular lipid metabolism profiling in biobank settings, extracting novel datapoints for precision medicine applications in dyslipidaemia and individualized cardiovascular risk assessment (1).

Discussion: At European Biobank Week, MONCYTE Health aims to establish new partnerships with biobanks, CROs, etc. to unlock the full potential of existing and future sample collections through deep insight into cellular disease mechanisms.

670: Essential Requirements for a Federated Biobank Infrastructure: BIO-STREAMS' Operational Implementation Across Six European Countries

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Abstract ID: 670

Topic: 3C: Biobank Advanced Technologies: Challenges, Opportunities and Solutions

Presenter Name: Ioannis Vezakis

Keywords: Digital Biobank, Federated Architecture, Interoperability, Paediatric Research, Synthetic Data

Introduction: Biobank initiatives fail in data sustainability, cross-project interoperability, and stakeholder engagement after funding ends. We derive foundational architectural principles through BIO-STREAMS's deployment of federated infrastructure across seven sites.

Material & Methods: BIO-STREAMS, a federated biobank spanning six countries, implements a distributed Node Bundle architecture, CDISC SDTM harmonization via custom ontologies, tiered data sharing using synthetic data generation, and GDPR Article 26

distributed governance. This implementation led to essential requirements addressing infrastructure gaps.

Results: Operational validation revealed four essential requirements. **Federated sustainability architecture**, permanent institutional nodes with distributed governance prevent post-project data loss, enabling network persistence beyond funding; **Cross-project interoperability standards** - common data models (CDISC-SDTM) enable federated analysis without institutional data transfers, maintaining local data ownership while enabling collaboration; **Tiered data sharing**, stratified access use synthetic data for wider distribution, balancing openness with privacy protection; **Multi-stakeholder engagement infrastructure**, role-based interfaces keeping stakeholder groups engaged and connected over time. Technical validation demonstrated 100% CDISC-compliance, successful federated queries across sites, and privacy protection.

Discussion & Conclusion: Operational deployment reveals that digital biobank resilience requires architectural decisions prioritizing federation over centralization, standardization enabling collaboration without data movement, and tiered sharing mechanisms. These requirements provide actionable frameworks for European Health Data Space implementation and address systematic infrastructure failures in research ecosystems.

BIO-STREAMS, member of the EU Obesity Cluster (ObeClust) propagates its architecture to fellow projects. Alternatively, by joining forces with EOSC RAISE Suite project through shared partners, allows for a sustainable federated biobank across and beyond ObeClust.

653: From compliance to practice: embedding MIABIS standard as active constraints in biobanking.

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Abstract ID: 653

Topic: 3C: Biobank Advanced Technologies: Challenges, Opportunities and Solutions

Presenter Name: Bozza Angela

Keywords: BBMRI.it, LIMS, MIABIS, extracellular vesicles, iPSCs

Introduction

Rigorous tracking of patient data and specimen processing from collection to storage is challenging for high-complexity biospecimens such as induced pluripotent stem cells (iPSCs) and extracellular vesicles (EVs), which require multiple handling steps and stringent quality controls (QC). This work describes an operational model at the IRBIO Biobank where MIABIS principles are embedded as active constraints within challenging workflows through an integrated BIMS rather than post-hoc reporting.

Materials & Methods

MIABIS core attributes define structured data capture points across the specimen lifecycle within SMPL, a biobank workflow tool implemented in the DiData LIMS, ensuring metadata completeness from registration through derivation. In alignment with the BBMRI.it minimum dataset, standardized SOPs were established to support interoperability with the BBMRI-ERIC directory. A genealogical model links primary specimens to derived EV fractions, iPSC lines, and aliquots, while a digital storage topology maps containers to physical locations.

Results

Derivation relationships are preserved for EV and iPSC workflows with all entities linked to originating specimens. Lineage integrity is maintained with no orphaned entities during validation. MIABIS core attributes are instantiated at registration and propagated across derivative levels, enabling consistent metadata aggregation. Data structures satisfies MIABIS conformance and supports BBMRI-ERIC export.

Discussion & Conclusion

Embedding MIABIS and BBMRI.it standards as active constraints is streamlined by SMPL, where these frameworks are natively included. This methodology enables user-driven adaptation to evolving, complex workflows without overloading daily procedures, providing a methodological reference for biobanks navigating international harmonization.

648: FHIR-2-OMOP ETL: the first step towards Biobank-driven Digital Clinical Trials

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Topic: 3C: Biobank Advanced Technologies: Challenges, Opportunities and Solutions

Presenter Name: Pallocca,M

Keywords: Biobanking, Clinical Bioinformatics, Clinical Informatics, Common Data Models, FAIR, Federated Search, Health Information Interoperability, Interoperability, OMOP

Introduction

A strategic goal of the BBMRI-ERIC biobanking infrastructure is to enable the discoverability of high-quality samples through Federated Search(FS). BBMRI-ERIC Informatic communities implemented several frameworks to enable FS through Common Data Models (CDM), with Extract, Transform, Load (ETL) processes towards HL7 FHIR CDMs[1][2]. Standardized processes are lacking for biobank transformation into OMOP, the de facto standard for observational digital clinical trials[3]. We hereby present a novel proposal to empower BBMRI biobanks with this powerful standard.

Material & methods

BBMRI.it developed an ETL pipeline, FHIR-2-OMOP, to integrate biobank data represented in HL7 FHIR format into the OMOP Common Data Model (CDM). The pipeline, implemented in Java, extracts a targeted subset of FHIR resources (Patient, Condition, and Specimen) retrieved from the biobank's FHIR endpoints. Extracted resources are processed through a rule-based transformation module designed to

align FHIR elements with the corresponding OMOP CDM tables. Details on model implementation are presented in Figure 1.

Results

The FHIR-2-OMOP ETL was tested on three BBMRI.it biobanks already adhering to the Federated Platform, Rome-BBIRE, Rome-OPBG and Naples-Pascale. Testing phase comprised of in-house conversion workflow from local bridgeheads and OMOP-DB setup.

Discussion

The initial ETL conversion between two data models has been implemented with the objective of facilitating the conversion process for a particular secondary purpose through the automation of the process. It's anticipated that the incorporation of additional profiles will enhance the efficiency of data conversion for each resource. We expect to collaborate with the FS Task Force and BBMRI-ERIC CS IT to implement and test a novel OMOP Locator Pilot.

643: Implementation of a Centralized BIMS for Harmonized Sample and Data Management within the Italian Cardiology Biobank Network (BBDCARDIO)

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Abstract ID: 643

Topic: 3C: Biobank Advanced Technologies: Challenges, Opportunities and Solutions

Presenter Name: Renna Laura Valentina

Keywords: BIMS, network, software, traceability

Introduction: A great challenge for biobank networks is the harmonized management of biological samples and associated data across multiple institutions. The adoption of a centralized Biobank Information Management System (BIMS) is essential to ensure standardization, traceability, and integration within network research initiatives (1). The widespread cardiovascular biobank BBDCARDIO supports large-scale research within the Italian Cardiology Network and is organized according to a Hub&Spoke model, comprising two coordinating hubs and eighteen spoke biobanks.

Methods: To support the BBDCARDIO project, EasyTrack2D software was selected and configured as the shared BIMS within the network, integrating data from REDCap eCRF and pseudonymization procedures using a defined *minimum data set* to harmonize sample properties, participant data and storage conditions. Access to the BIMS is granted with personal credentials with role-based authorization levels. Each biobank configuration comprises different user groups granting access to data, ensuring compliance with GDPR and allowing designated supervisors to access collection statistics.

Results: To date, the BBDCARDIO collection consists of biological samples and associated data from two collaborative cardiovascular research studies. More than 115,000 aliquots including whole blood, blood derivatives and saliva were collected from approximately 18,000 subjects. Sample data were successfully

recorded within the BIMS, enabling full traceability, standardized documentation and cross-center data consistency.

Conclusions: The implementation of a centralized BIMS in support to the large-scale BBDCARDIO biobank network has proven its critical role in enabling harmonized sample lifecycle management, deploying a standardized *minimum data set* and metadata integration ensuring coordinated governance, data integrity and quality management for multicentric cardiovascular research.

641: Optimizing PBMC Isolation for High-Quality Biobanking: Manual versus Automated Approaches

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Abstract ID: 641

Topic: 3C: Biobank Advanced Technologies: Challenges, Opportunities and Solutions

Presenter Name: Lavinia Curini

Keywords: PBMC AUTOMATIZATION QUALITY SYSTEM

Introduction Peripheral blood mononuclear cells (PBMCs) are a critical resource for immunological research and biobanking, where long-term sample integrity is crucial to ensure reproducible results. High PBMCs purity and viability are essential for downstream applications, particularly in longitudinal and large-scale studies. Conventional isolation methods-such as density gradient

centrifugation-may result in residual red blood cell (RBCs) and granulocyte contamination, compromising sample quality. This study compares manual and automated PBMCs isolation methods to identify the most effective approach for obtaining high-quality samples suitable for biobanking and immunological research.

Material & methods: Three PBMCs isolation methods were evaluated: i) manual density gradient centrifugation; ii) manual isolation with RBCs sedimentation; iii) automated isolation using the autoMACS NEO Separator (Miltenyi Biotec). Granulocyte contamination was used as the primary indicator of sample purity. PBMCs were assessed using the 8-Color Immunophenotyping Kit and the flow cytometry MACSQuant Analyzer, both on fresh and cryopreserved samples. Cryopreservation was done with controlled-rate freezing and liquid nitrogen storage.

Results: The autoMACS-NEO Separator achieved the highest PBMCs purity, with minimal neutrophil contamination (1–3%) and eosinophil contamination (0.1–0.3%), outperforming manual methods. Manual isolation with RBCs sedimentation improved purity but resulted in reduced cell yield and viability. The automated method showed greater consistency and reproducibility across samples. Controlled-rate freezing and liquid nitrogen storage effectively preserved PBMCs viability and immunophenotypic integrity.

Conclusion: Automated PBMCs isolation using the autoMACS NEO Separator improves sample purity, reproducibility and standardization compared to manual techniques, supporting its use in biobanking workflows and large-scale studies.

638: Biobank Automation: Understanding and Comparing Available Options

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Abstract ID: 638

*Topic: 3C: Biobank Advanced Technologies:
Challenges, Opportunities and Solutions
Presenter Name: Jan Horký*

*Keywords: automation, bespoke, biobank,
hybrid, laboratory automation, off-the-shelf,
sample handling*

Introduction Biobanks can automate in different ways. Off-the-shelf systems provide standardized, validated workflows. Bespoke systems offer flexibility in scale and budget. Hybrid configurations combine both approaches. Each has different implications for validation, flexibility, and adaptability. This presentation compares these options from a component technology perspective.

Materials & Methods We supply automation components to the life science industry, including diagnostics, pharma, and laboratory equipment. We compared three automation pathways: off-the-shelf, bespoke, and hybrid. For each, we looked at procurement, flexibility, validation needs, and the underlying technologies.

Results Off-the-shelf systems offer streamlined procurement and pre-validated workflows. Bespoke systems offer flexibility in scale, budget, and integration with existing infrastructure. Hybrid approaches combine standardized platforms with custom elements for specific bottlenecks. Regardless of approach, similar component technologies underpin all solutions: positioning systems achieving repeatability in the hundredths of a millimeter, dispensing systems capable of sub-microliter volumes, and cleanroom-compatible motion platforms.

Conclusions No single approach suits all biobanks. The choice depends on workflow needs, flexibility requirements, and existing infrastructure. Understanding that all solutions share common underlying technologies helps biobanks evaluate options and engage effectively with vendors.

592: Opportunities in recontacting participants from the biobanks – lessons learned during the first 10 years

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*Topic: 3C: Biobank Advanced Technologies:
Challenges, Opportunities and Solutions
Presenter Name: Johanna Mäkelä*

*Keywords: Biobanks, Fingenious Service, Process
harmonization, Recontacting, Recruit*

Introduction: For the past 10 years in Finland, biobank consents have included the possibility to consent for recontacting to clinical studies. The opportunity to recruit preselected participants through biobanks has been utilized by academic and industry researchers in several studies. The national Fingenious(R) service also includes services designed for recontacting. While studies have been conducted, a comprehensive analysis of recruitment success or failure is currently lacking.

Materials & methods: In this analysis we gathered the available information on recontacting conducted by Finnish biobanks for recruitment to clinical studies. We focused on the methods of recruitment and the recruitment success rate in the studies to determine key factors for recruitment success.

Results and findings: Preliminary findings indicate that the key success factors for higher recruitment and participation rate include low-intensity protocol for the participants (perceived ease of participation), and on the other hand the severity of the disease, indicating that studies on more severe diseases are more likely to gain high participation rate. Analysis on the recruitment method (digital or traditional methods) is currently underway.

Discussion and conclusion: Preliminary findings will require more in-depth analysis. When completed, the results can be utilized when designing new studies and to improve recruitment methods.

591: TRACEABILITY OF SAMPLE STORAGE TEMPERATURE IN THE BIOBANK INFORMATION MANAGEMENT SYSTEM (BIMS) THROUGH INTEGRATION WITH THE EQUIPMENT MONITORING SYSTEM (EMS)

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Topic: 3C: Biobank Advanced Technologies: Challenges, Opportunities and Solutions

Presenter Name: Ana María Sánchez-López

Keywords: BIMS, Biobank Information

Management System, EMS, Equipment

Management System,

Temperature, sample quality

Introduction

Traceability of sample storage temperature is crucial in biobanks. Biobanks have equipment monitoring system (EMS), which trace temperature continuously and manage the alarms when their ranges are altered. These alterations could affect the quality of samples, so the historical temperature storage report of each sample is crucial for research and can be helpfully to adequate their purpose. Therefore, in the Andalusian Public Health System Biobank (SSPA BB) an integration between the BIMS and the EMS have been developed in order to associate the temperature storage to each sample.

Material and methods

A pilot project in the Coordinating Node of the SSPA BB has been developed using SCRUM methodology for this integration.

Results

The information related to temperature is available in the BIMS at different levels:

- Equipment: the temperature for each equipment and their established maximum and minimum threshold are displayed.
- Sample: alarms and temperature values of each equipment where the sample has been stored are shown so well as a link to the real time monitoring graph of the equipment in the EMS.
- Sample list: temperature alarms and thresholds values of each equipment where the sample has been stored are shown for a list of samples.

Discussion and conclusion

Traceability of sample storage temperature has been implemented in the BIMS, offering the possibility to check this information associated to equipment and each sample. Moreover, it

allows to obtain reports with a list of samples, which will be helpfully to adequate use samples for each research project.

577: Optimizing LN2 Sample Retrieval: Minimizing Thermal Exposure to Protect Sample Integrity

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Abstract ID: 577

Topic: 3C: Biobank Advanced Technologies: Challenges, Opportunities and Solutions

Presenter Name: Katheryn Shea

Keywords: Cells, Cryopreservation, Warming

Reliable research depends not only upstream processing and data analytics but also rigorous sample handling and controlled storage conditions between workflow stages. Although the impact of handling and storage on many biomarkers remains poorly defined, emerging translational data and operational experience with primary cells highlight the need for validated, harmonized cryogenic cold-chain practices throughout the sample lifecycle. Long-term sample integrity is influenced by post-freeze events, including retrieval, transport, and thawing. Critical quality attributes such as cellular function and content can be jeopardized by transient warming.

We conducted two thermal-mapping studies and one functional cell-quality assessment. First, LN2-stored vials (1.0 mL water) in boxes were retrieved and returned after 30, 90, 145, or 180 seconds; warming rates were recorded during and after handling. Second, vials filled to 100% or 25% working volume were retrieved and held at ambient temperature or on dry ice, with temperatures recorded until ambient samples reached 0°C. Finally, mesenchymal stem cells were analyzed pre-freeze and post-thaw after three months. One cohort remained undisturbed; another experienced 20 simulated retrieval cycles to -110°C.

Vials continued warming after return to LN2, with samples retrieved at 145 and 180 seconds exceeding the glass transition temperature of water (GTTW). Dry ice-exposed samples

crossed GTTW fastest (20–22 seconds). MSCs showed reduced viability (90%) and markedly decreased recovery (46%) after repeated cycling versus controls (96% viability, 90% recovery).

These results demonstrate that transient warming during routine handling can compromise sample integrity. Standardized LN2 handling processes and tools are essential to minimize warming events and preserve sample quality.

484: Automation in Biobanking: Efficiency, Safety, and Sustainability

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Abstract ID: 484

Topic: 3C: Biobank Advanced Technologies: Challenges, Opportunities and Solutions

Presenter Name: Pavel Piler

Keywords: Automated biobanking, population study

Automation of biobanking processes enhances the quality, safety, and efficiency of biological sample storage.

A key component is the liquid handling system (LQH) enables rapid processing of large sample volumes, process unification, reduction of human errors (via 2D/QR codes), and use of SBS-format cryotubes. The SBS format enables seamless automated analysis of biobanked samples. Miniaturization of cryotubes results in more efficient utilization of storage space.

Another pillar is the automated storage system, featuring a robotic unit capable of storing, handling, and retrieving cryotubes at low

temperatures (-100°C). Operation in a uniform and stable environment ensures high sample quality for future research. Automation and robotics further simplify sample inventory (eliminating partially empty freezers), reduce error risks, and enable continuous 24/7 operation.

A robust information system integrates all processes into a cohesive workflow, ensuring sample integrity and supporting population-based research with reliable data.

471: Documenting participant Consent in archival records: Aligning yesterday's practices with today's processes

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Abstract ID: 471

Topic: 3C: Biobank Advanced Technologies: Challenges, Opportunities and Solutions

Presenter Name: Nimitha Kuriakose

Keywords: Biobank network, Biospecimen access, Data annotation and management, Ethical governance,

Informed consent, Quality control, Quality data, Research reproducibility

The Cancer Biobank collects, processes, stores and distributes biological specimens and associated data from consenting participants, under a joint data controllership agreement between the University of Galway and HSE West and North West. Working towards improved transparency with the requirements of ISO 20387 Biobanking accreditation, the Cancer Biobank has supported clinical trials and translational research for over 20 years. The process of consent acquisition has evolved since the earliest samples (and data) were collected for research in 1998. With the introduction of GDPR in 2018, a consent declaration was sought from the HRCDC to store personal data of participants recruited to the Cancer Biobank when versions 1 and 2 of the consent documentation were in use. This work outlines the process of clarifying which ICF versions were used to recruit participants from 1998–2025.

Methods and Results

The task of verifying consent documentation for 8,925 participants recruited to the Cancer Biobank between 1998 and 2025 required detailed manual checking, recording, and scanning of all paper and electronic consent forms. Among these participants, 65% had signed Cancer Biobank consent forms, 14% had other types of study-specific consent forms and 21% had no proof of consent on file.

Discussion and Conclusion

Consent auditing is essential in biobanking to safeguard participant data. Applying modern compliance standards to archival biobank records has involved navigating incomplete and incompatible consents, evolving ethical norms, upgrading privacy protections, managing operational challenges and securing appropriate regulatory approval, namely a consent waiver. This complex environment requires adaptive governance strategies balancing legal, ethical and scientific priorities for responsible public interest biobanking.

Background

5C: Tools and processes for quality implementation and use cases

709: Evaluation of Urine Sample Quality after Long-Term Storage at -80°C : A Quality Control Perspective within ISO 20387

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Abstract ID: 709

Topic: 5C: Tools and Processes for Quality Implementation and Use Cases

Presenter Name: Jakub Milewski

Keywords: Biobanking, ISO 20387, LC-MS, Long-term storage, Metabolomics, Quality Control, Urine

Introduction: Urine as a valuable biological material is widely used in clinical diagnostics and biomarker research due to its non-invasive collection and rich metabolic composition. However, urinary metabolites are sensitive to

pre-analytical variables and storage conditions, which may affect sample integrity and metabolomic data quality. Compliance with ISO 20387 requires standardized storage conditions and documented QC strategies to ensure biospecimen fitness for purpose. Although storage at -80°C is generally regarded as optimal, systematic evaluation of long-term storage effects remains essential.

Materials and Methods: The aim of this study was to assess the impact of long-term storage of urine samples at -80°C on sample quality, with particular emphasis on metabolite stability as a key quality attribute under ISO 20387. An untargeted LC-MS workflow was applied using an ACQUITY UPLC BEH Amide column coupled to an Ultimate 3000 (Dionex) system and a Compact ESI-Q-TOF mass spectrometer (Bruker Daltonik) operating in positive and negative ion modes. Data processing was performed using MetaboScape[®] 2021 software and Python-based tools. Approximately 70–90 metabolites were selected based on predefined quality criteria.

Results: Most metabolites exhibited stable signal intensities throughout long-term storage at -80°C . Observed variations were limited and showed no consistent trend related to storage duration.

Conclusions: Long-term storage of urine samples at -80°C effectively preserves metabolite stability and supports reliable untargeted LC-MS analysis. The applied QC approach is consistent with ISO 20387 requirements and supports the use of -80°C storage in accredited biobanking.

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703: Metadata for the masses: FISMA makes the biomaterials of LUMC's neuromuscular diseases biobank FAIR and interoperable (and those of other Dutch biobanks, too)

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Abstract ID: 703

Topic: 5C: Tools and Processes for Quality Implementation and Use Cases

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Keywords: BIMS, Becker muscular dystrophy, Duchenne Centre Netherlands, Duchenne muscular dystrophy, FAIR, FISMA, LUMC Biobank Facility, Netherlands, Parelsnoer, Sample Navigator, biomaterials, protocols.io, real-world data, registration at the source

At LUMC, the central Biobank Facility hosts a variety of specialism- and disease-specific biobanks, some of which date as far back as the mid 2000s. At that time, in an attempt to upscale cohorts of rare diseases, all Dutch university hospitals (University Medical Centre, UMC) joined forces in a nationwide alliance, called Parelsnoer Initiative (String of pearls initiative, PSI). To enable data exchange and pooling, this collaboration focussed on harmonisation of data standards, as well as collection protocols.

LUMC's Duchenne and Becker muscular dystrophy (DBMD) biobank was originally part of PSI. After PSI was disbanded, all scientists associated with DBMD, under the coordination of Duchenne Center Netherlands (DCN), kept collaborating together to expand clinical standards of care, as well as collect data for scientific research to further the understanding of DBMD.

In an effort to make real world data FAIR, DCN developed FISMA (Framework for Information Specification, Modelling and Architecture). One of the guiding principles of FISMA is that every observable entity, including biomaterials, should be embedded in a rich cloud of metadata to describe its observational context – to curate at, and thus make it FAIR from the source.

For the first time since PSI came into existence, its collection protocols are now publicly available through open science principles, thereby immediately providing all historical materials of DBMD (as well as NMD) with a rich context that allows interoperability – and as a corollary, also all PSI materials of LUMC Biobank Facility *in toto* (and potentially, other Dutch UMC biobanks as well)

697: Does biological material retain its integrity after long-term storage in biobanks?

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Abstract ID: 697

Topic: 5C: Tools and Processes for Quality Implementation and Use Cases

Presenter Name: Eva Ruckova

Keywords: RNA integrity, fresh frozen tissue sample, long term storage, protein stability, quality

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Biobanks play an irreplaceable role in biomedical research by providing access to high quality and well-characterised biological samples. However, the long-term integrity and usability of stored material remain a concern, particularly for studies requiring precise molecular analyses. We evaluated the impact of long-term storage on the quality of tissue specimens. In our biobank we store tissue and serum samples in -80 °C since 2000 and in liquid nitrogen vapour since 2006. During that time, we have created an extensive collection and therefore there was a need to verify the quality of stored material. We assessed RNA and protein integrity, including phosphorylation status, in 120 fresh frozen tumour specimens from breast, colon and ovarian carcinomas collected between 2000 and 2023 and maintained for up to 23 years. RNA integrity was evaluated using the Agilent 2100 Bioanalyzer, while protein quality was examined by Western blotting and immunohistochemistry targeting total and phosphorylated p44/42 MAPK. Our results demonstrate that samples stored in liquid nitrogen vapor retained high RIN values and also the protein stability. These findings support the use of long term archived tissues in translational biomedical research, provided that specimens are processed correctly from the outset and stored at ultra-low temperatures.

Supported by the project SALVAGE (P JAC; reg. no. CZ.02.01.01/00/22_008/0004644) – funded by the European Union and by the State Budget of the Czech Republic, MH CZ DRO (MMCI, 00209805) and BBMRI.CZ no. LM2023033.

677: The path of the Biobank at Masaryk Memorial Cancer Institute to setting up Quality Management

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Abstract ID: 677

Topic: 5C: Tools and Processes for Quality Implementation and Use Cases

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Keywords: ISO 20387, quality management

The path of the Bank of Biological Material of the Masaryk Memorial Cancer Institute (BBM MMCI) towards accreditation was gradual and built on existing quality frameworks. Laboratories processing samples for the biobank were accredited according to ISO 15189:2013 for medical laboratories; however, the biobank itself initially operated without a fully established quality management system. BBM obtained a Quality Label in accordance with ISO 20189:2019 for a collection of genomic DNA through BBMRI-ERIC in 2021.

In 2022, BBM MMCI participated in a pilot project organized by the Czech Accreditation Institute to assess the implementation of a Quality Management System according to ISO 20387:2021. Based on the assessment of established processes and activities, compliance with the requirements of this standard was approved. In March 2023, BBM MMCI became the first biobank in the Czech Republic to be accredited according to ISO 20387:2021. In 2026, the biobank is scheduled to undergo reaccreditation.

The experience shows that achieving and maintaining accreditation requires significant time investment related to the implementation of standard requirements, as well as financial costs associated with assessment fees charged by the national accreditation body. One of the key requirements of ISO 20387:2021 is the active involvement of all personnel in the

quality management system, including the systematic establishment, regular review, and ongoing maintenance of documentation and related records.

Supported by the project SALVAGE (P JAC; reg. no. CZ.02.01.01/00/22_008/0004644) – funded by the European Union and by the State Budget of the Czech Republic, MH CZ DRO (MMCI, 00209805) and BBMRI.CZ no. LM2023033.

668: Implementing ISO 20387 Across Belgian Biobanks: Findings From the B3-ISO Quality Improvement Program

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Abstract ID: 668

Topic: 5C: Tools and Processes for Quality Implementation and Use Cases

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Keywords: ISO20387, Processes, Quality implementation, Tools

Introduction

Innovative approaches to biobank quality are essential for advancing translational and clinical research. The B3-ISO project, led by BBMRI.be - the Belgian node of BBMRI-ERIC represents a pioneering initiative that aims to harmonize and elevate quality standards across

21 Belgian biobanks. The project supports the implementation of ISO20387 'General Requirements for Biobanking', including accreditation.

Methods

To harmonize the BBMRI.be biobanks, a stepwise quality improvement program is implemented. In cooperation with the participating biobanks, BBMRI.be coordinates the development of guidelines, templates and policies, provides networking opportunities and offers structured training through webinars & workshops. Frequently Asked Questions are also addressed. BBMRI-ERIC quality tools, including the SAS and audit program, are implemented, and ISO 20387 accreditation pathways are facilitated. These harmonization efforts have produced a common minimal data set that supports synoptic reporting, harmonized informed consent templates, mutual acceptance of material and data transfer agreements, and a validated tool for cost structure analysis. Oversight committees and periodic evaluations through surveys and discussions ensure continuous improvement.

Findings

Templates have been successfully harmonized across IT, ELSI and sustainability domains, and have been validated by biobanks and stakeholders. Although initial surveys indicated that biobanks aimed to be ISO 20387-accredited by mid-2026, they now anticipate needing more time for implementation due to resource limitations. Nevertheless, significant quality improvements have been achieved and there is still strong interest in ISO20387 implementation.

Discussion

The program offers a road for integrating ISO20387 into daily biobanking practices. Its outcomes will support quality improvement, enhancing research reliability and foster collaboration between industry and academia.

632: A toolbox for implementing ISO 20387 in Biobanking: A Structured Roadmap Approach in rare disease scenario

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Abstract ID: 632

Topic: 5C: Tools and Processes for Quality Implementation and Use Cases

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Keywords: ISO 20387, Rare diseases, biobanking, quality, structured roadmap

Introduction Quality is a foundational pillar for modern biobanking, underpinning the reliability, reproducibility, and translational value of results obtained by biospecimens and associated data used in biomedical research¹. In this work, we explored ISO 20387 standard²⁻³ and the legislative framework in which it operates⁴⁻⁵ to provide guidance and support for

anyone wishing to conduct biobanking for research purposes.

Material and methods We examined the different subject areas covered by ISO 20387, in rare diseases perspective: general, structural, resource, process, and quality-management system requirements³. For each of them, scenarios and possible operational strategies were evaluated, as well as ethical recommendations. To complete the analysis, the entire accreditation process according to Accredia, the Italian accreditation body, was also examined.

Results Starting from an analysis of the standards framework governing biobanking activities, we developed a roadmap for the implementation of ISO 20387. This document outlines operational implementation approaches, ethical-legal recommendations for biobanking activities, and also highlights and examines both strengths and critical aspects of the standard. Based on the work carried out, we also designed a checklist to summarize the key points that an institution must consider during the setting up of a biobank.

Conclusion This roadmap for implementing ISO 20387 in rare diseases field is a valuable tool for supporting professionals towards a high-quality biobanking model in connection with high-value data within disease registries. The checklist will provide the basis for a feasibility study aimed at identifying the barriers and facilitators encountered by an organization in establishing a biobank.

622: From gap analysis to improvement: operationalising the ISO 20387 standard in the PRIM-TECH3R pilot mouse biobank

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Topic: 5C: Tools and Processes for Quality Implementation and Use Cases

Presenter Name: From gap analysis to improvement: operationalising the ISO 20387 standard in the PRIM-TECH3R pilot mouse biobank

Keywords: ISO 20387, Keywords: pilot mouse biobank, gap analysis, improvements

Introduction

The biobanking standard ISO 20387 with its broad scope applies to many types of biobanks including human and non-human biobanks. Its broad applicability is being leveraged in the Horizon Europe project PRIM-TECH3R, which focuses on the development of mouse and human complex in vitro models (CIVMs) for preclinical studies using advanced technologies, aiming to reduce and refine the use of animal models. Project coordinator INFRAFRONTIER ERIC, BBMRI-ERIC and other consortium partners are pooling their expertise to achieve this goal.

Material and Methods

A key activity is the establishment of a pilot biobank for murine embryonic stem cells and primary cells which form the basis for the CIVMs. To apply a "Quality by Design" approach within this project, the biobanking standard was used as the basis. First, a gap analysis was performed using the BBMRI-ERIC Self-Assessment Survey (SAS) for the biobanking standard. Secondly, measures were derived based on the gap analysis and will be implemented where possible.

Results

The evaluation of the SAS responses and the subsequent discussion with the team responsible for the pilot mouse biobank led to the identification of areas where standard requirements are not yet (fully) met. Improvements to be implemented were defined, considering feasibility and effort.

Conclusion

The approach pursued will lead to significant improvements, enabling the pilot mouse biobank to better meet the biobanking standard's requirements. This will also positively impact the project goal of developing reliable CIVMs for preclinical studies, for which standardisation and reproducibility are of great importance.

619: From Self-Assessment to Certification: A Practical Pathway towards ISO 20387 and the BBMRI-ERIC Quality Label

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Abstract ID: 619

Topic: 5C: Tools and Processes for Quality Implementation and Use Cases

Presenter Name: Garcia-Molina E

Keywords: Audit programme,

BBMRI-ERIC Self-Assessment Surveys (SAS), ISO 20387:2018, Quality Label

Introduction

Quality management systems underpin trust, sustainability and interoperability in biobanking, yet progression from ISO 9001 to ISO 20387 accreditation remains challenging. This work describes the IMIB Biobank's transition from structured self-assessment to an accreditation-ready pathway aligned with the BBMRI-ERIC Quality Label.

Methods

In 2025, the BBMRI-ERIC ISO 20387 Self-Assessment Survey (SAS) was used to establish a baseline and define an action plan aligned with the intended accreditation scope. Building on an ISO 9001-certified system, the biobank applied for the BBMRI Quality Label and engaged external expertise to support staged gap assessments and preparation for second and third-level audits within the ISO 20387 scope.

Results

A critical gap with high downstream impact was identified: the lack of a formally defined External Quality Assessment (EQA) procedure covering pre-analytical and sample processing activities. Addressing this required strengthened competence management, enhanced traceability, risk-based controls and improved documentation governance. Implementation of the SAS-driven action plan enabled entry into the ISO 20387 pre-audit preparation phase, with national accreditation planned in the coming months.

Discussion

The combination of standard-linked self-assessment, staged audits and targeted process development accelerated professionalisation and reinforced governance, traceability and monitoring. This case study offers a practical, transferable roadmap for biobanks progressing from self-assessment to ISO 20387 accreditation, supporting a sustainable quality culture and fit-for-purpose biospecimens within the One Health framework.

616: Cryo-on-Wheels: Performing a Temperature Validation Procedure for a Cryocart

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Abstract ID: 616

Topic: 5C: Tools and Processes for Quality Implementation and Use Cases

Presenter Name: Wouter Fannes

Keywords: Cryocart, cold chain, temperature validation

Introduction

A cryocart is a liquid-nitrogen-cooled trolley for transporting samples at cryogenic temperatures. In addition, cryocarts can function as mobile workbenches for sample handling and sorting. As such, they may play an important role in ensuring cold chain continuity. Here, we present an overview of the temperature validation procedure we recently conducted on a newly purchased cryocart to assess its potential implementation in daily biobank operations.

Material & methods

The cryocart evaluated was a Haier Biomedical YDC-3000H transport trolley. To map the temperature distribution within the storage compartment, four AeroScout sensors were used.

Results

The validation procedure comprised three main tests. In the first test, we examined how long the cryocart could maintain temperatures below -140°C when the storage compartment was empty and when no additional liquid nitrogen was supplied. The second test assessed the impact of routine operation, including a fully or partially loaded storage compartment and active sample sorting. Finally, we assessed the effect of leaving one or both lids open for an extended period of time.

Discussion

We discuss the practical organization and outcomes of the tests, with particular emphasis on factors such as sensor placement and critical liquid nitrogen levels. The results indicate that the cryocart can effectively preserve sample integrity by maintaining temperature during operations. By outlining these practical and methodological aspects, this work aims to support biobank staff in performing comparable validation procedures.

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610: Tools and methods for systematic data quality assessment in Vilnius Santaros Klinikos Biobank

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Abstract ID: 610

Topic: 5C: Tools and Processes for Quality Implementation and Use Cases

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Keywords: Data quality, accuracy, completeness, consistency, data, quality control, traceability

Introduction

Vilnius Santaros Klinikos Biobank developed and implemented formalized data management procedures for systematic measurement and assessment of data quality. These efforts aim to reduce risks related to data accuracy, completeness, consistency, and traceability, while also supporting alignment with ISO 20387:2018.

Materials & methods

The criticality of the entire digitally stored biobank dataset, comprising 373 data elements, was assessed based on its impact on legal and ethical compliance as well as the reliability and reproducibility of research. Each data element was assigned a data quality threshold proportional to its criticality category, reflecting the severity of potential data quality issues and supporting prioritization of resources during investigation and remediation. A toolset for measuring accuracy, completeness, consistency and traceability was developed based on research-oriented data quality literature [1-3] and ISO

20387:2018 guidelines. Using this toolset, a total of across the elements were evaluated.

Results

A total of four data quality checks were conducted on randomly selected elements across the entire dataset. During the initial testing phase, results were aggregated to produce overall values for each of the four data quality metrics. The analysis indicated opportunities for improvement across several key acceptance criteria, with accuracy and traceability identified as priority areas (Figure 1).

Discussion and conclusion

The developed tools and methods proved effective for testing and assessing data quality within the Biobank. The findings demonstrate that the implemented methods provide a foundation for continued improvement of both Biobank data quality and quality control processes, including set pathways towards automation

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599: Beyond Storage: Implementing International Standards for Quality-Driven and Sustainable Biobanking in Oncology

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Abstract ID: 599

Topic: 5C: Tools and Processes for Quality Implementation and Use Cases

Presenter Name: Francesca Piccotti

Keywords: ISO 20387:2018; MIABIS 3.0; Quality Assessment; Cancer Collection; Plasma Sample; Biobank Sustainability

Introduction: Adopting ISO 20387 is a strategic pivot from simple sample storage to highquality resource management. This transition involved implementing sample quality controls and aligning data systems with international standards to enhance interoperability and ensure long-term sustainability.

Material & Methods: We conducted a systematic audit of the management software of the Bruno Boerci Biobank of Maugeri, to support new international requirements. A pilot study was performed on a collection of plasma samples from cancer patients treated at the Surgery Department of Maugeri hospital. Standard operating procedures for plasma preparation and data recording were systematically reviewed, and a quality management model was designed through comparison with the MIABIS 3.0 standard (Eklund et al., 2024). To validate our quality management system and ensure data confidence, we underwent an interlab proficiency testing focusing on blood processing (centrifugation and aliquoting) and shipping, strengthening our validation strategies for sample integrity.

Results: We implemented a Sample/Data Quality Assessment framework, integrating individual-level components and event-related data according to MIABIS 3.0. This approach—

significantly improved inventory accuracy and visibility. The proficiency test enabled the verification of the adequacy of existing procedures applied to the critical parameters assessed. The integration of granular clinical and quality data ensured full sample and data tracking from collection to research.

Discussion and conclusion: This transparency, aligned with international guidelines, increases attractiveness for global collaborations. Integrating ISO 20387 with MIABIS 3.0 transforms biobanks into proactive partners. Our model demonstrates that rigorous quality controls and standardized data sharing are essential to provide the oncology community with reliable, "fit-for-purpose" resources.

594: Quality Control Tools and Processes in the HCB-IDIBAPS Biobank

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Abstract ID: 594

Topic: 5C: Tools and Processes for Quality Implementation and Use Cases

Presenter Name: Núria Peiró-Gabà

Keywords: ISO 20387 accreditation, sample technical quality, standardization and governance

Introduction: Quality implementation in biobanking requires practical tools and well-defined processes to ensure reproducibility, robustness, and confidence both in stored samples and associated procedures. The HCB-IDIBAPS Biobank has adapted structured quality management frameworks aligned with the requirements of

ISO 20387 accreditation, with particular emphasis on technical quality across biological samples and routine biobank operations supporting research activities.

Material and Methods: We established an internal technical committee, including a specialized senior specialist and a quality manager, to implement and evaluate sample quality controls and organizational processes aligned with ISO 20387 accreditation requirements. Furthermore, regular staff training monitoring, quality follow-up procedures, and continuous assessment of technical quality have been implemented in Biobank routines. Participation in national and international proficiency testing programs was included as a central quality process to support standardization and external benchmarking.

Results: The implementation of a technical committee and designated personnel exclusively dedicated to quality were key to enabling systematic monitoring of quality indicators, while also promoting staff engagement and guaranteeing the long-term viability of the changes adopted. Proficiency testing programs results revealed variability between centers and confirmed the absence of consensus on technical quality criteria, underlining current limitations and the need for harmonized quality thresholds aligned with ISO 20387 requirements.

Discussion and Conclusion: Our experience shows that combining technical quality control tools with structured governance and participation in intercomparison tests is essential for achieving ISO 20387 accreditation. Addressing identified limitations through standardization, well-defined procedures, and dedicated quality personnel strengthens biobanking quality assurance, ensuring robust, reproducible and long-term sustainable processes.

587: Impact of Plasma Separation Techniques on Extracellular Vesicle Analysis

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Abstract ID: 587

Topic: 5C: Tools and Processes for Quality Implementation and Use Cases

Presenter Name: Truffi Marta

Keywords: DC, DGC, EVs, compliance, isolation, preanalytical parameters

Introduction: The reliability of plasma-based extracellular vesicle (EV) assays is often compromised by non-standardized pre-analytical phases, including platelet contamination and haemolysis. This study aimed to validate the quality of breast cancer plasma samples stored at the Bruno Boerci Biobank, ensuring compliance with International Society for Extracellular Vesicles

(ISEV) guidelines, and to analyse the impact of two plasma isolation methods on EVs analysis.

Material & Methods: Direct centrifugation (DC) and density gradient centrifugation (DGC) methods were applied on EDTA-treated venous blood samples to isolate plasma. Plasma EVs were characterized using ultra-sensitive single molecule array (Simoa), utilizing magnetic beads conjugated with membrane-sensing peptides and biotinylated antibodies specific for EVs markers. EVs levels were correlated with preanalytical parameters such as hemolysis, lipemia, residual platelets and lipoproteins.

Results: Simoa analysis revealed a higher concentration of EVs in DGC-isolated samples compared to DC, showing a strong positive correlation between the degree of platelet contamination and the EV level especially in the DGC group, consistent with the higher degree of platelet contamination associated with this method. Furthermore, an association was observed between EV markers and LDL cholesterol levels, which were found to be more elevated in DC-isolated plasma samples.

Discussion and conclusion: The plasma isolation protocol significantly influences the biochemical profile and EV yield. Adopting harmonized, "fit-for-purpose" protocols is essential to ensure reproducibility in EV-based clinical research.

545: Adapting proficiency tests to modern tissue biobanking: Eight years of experience and a new modular quality assessment framework

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Abstract ID: 545

Topic: 5C: Tools and Processes for Quality Implementation and Use Cases

Presenter Name: Carolin Kaufhold-Wedel

Keywords: accreditation, proficiency test, quality assurance, tissue

External quality assessment schemes are essential instruments for ensuring high and reproducible biospecimen quality, particularly with regard to preanalytical variability and downstream molecular and morphological analyses. Since 2017, the Tissue Bank of the National Center for Tumor Diseases (NCT), in collaboration with the German Biobank Network (GBN), has been coordinating a national proficiency test for German tissue biobanks. Over multiple successful rounds, porcine liver and human tissue samples were distributed to participating biobanks. Participants processed the material according to their routine workflows, prepared H&E-stained sections, and extracted RNA. In addition, digital slides were provided for histopathological assessment. Samples and analysis results were returned to the coordinating center for reference analyses, standardized RNA extraction, and systematic histomorphological evaluation. Performance benchmarking enabled the identification of process-specific improvement potential, which was communicated through detailed reports and feedback.

Based on the experience gained over five rounds and in response to evolving biobank needs, the proficiency test concept was fundamentally revised for its sixth iteration. Instead of an all-in-one participation, the new design follows a fully modular approach, allowing biobanks to register for individual modules aligned with their specific processes

and quality objectives. The current module portfolio comprises cryopreserved tissue processing, FFPE tissue processing (sectioning, H&E staining, suitability for immunohistochemistry, immunofluorescence and spatial analysis), histopathological assessment, and virtual microscopy (scan quality).

Here, we present the revised modular concept. The adaptive design aims to support sustainable quality assurance, process harmonization, and continuous improvement across tissue biobanks, thereby strengthening the reliability of translational research.

544: Accreditation Journey of IBG-Biobank Part I: Implementing ISO 20387:2018 — From Quality Management Systems to Operational Excellence and Trust

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Topic: 5C: Tools and Processes for Quality Implementation and Use Cases

Presenter Name: SANEM TERCAN-AVCI

Keywords: Biobank, ISO 20387, Quality Management, Standardized biobanking

Izmir Biomedicine and Genome Center (IBG) Biobank aims to support high-quality biomedical research by providing reliable, traceable, and ethically governed biospecimens. In this context, IBG-Biobank has completed its accreditation application process in accordance with TS EN ISO 20387:2018 “*Biotechnology — Biobanking — General Requirements for Biobanking*” and has entered the evaluation phase conducted by TURKAK.

This study presents the biobank’s accreditation journey, focusing on the establishment of a robust quality management system, harmonization of operational workflows, enhancement of staff competencies, and integration of risk management and

continuous improvement practices. Key biobanking processes, including biospecimen collection, processing, storage, data management, and distribution, were systematically aligned with ISO 20387 requirements to ensure consistency, traceability, and fitness for purpose of biological materials.

Challenges encountered during implementation, such as infrastructure adaptation, documentation harmonization, and stakeholder engagement, are discussed alongside the solutions developed to achieve sustainable compliance. This structured approach has strengthened institutional governance, improved operational efficiency, and enhanced user confidence in biospecimen quality.

The IBG-Biobank accreditation experience is expected to contribute to the advancement of standardized biobanking practices in Türkiye and to serve as a practical reference model for other biobanks pursuing international quality standards.

540: Road to ISO 20387 accreditation

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Abstract ID: 540

Topic: 5C: Tools and Processes for Quality Implementation and Use Cases

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Keywords: Accreditation, BBMRI quality label, ISO 20387

Introduction

ISO 20387 accreditation represents an important quality milestone for biobanks. Achieving this accreditation requires a structured quality approach, extensive internal evaluation, and continuous improvement. This abstract describes the structured approach taken by Biobank Antwerp in its journey towards ISO 20387 accreditation.

Material & methods

Biobank Antwerp operated under an internal QMS. To align with the ISO requirements,

thematic chapters were defined and internal audits were used to assess compliance with ISO 20387. Actions were defined and monitored through the Biobank BIMS. The accreditation process was explicitly framed as a team effort, with ISO 20387 established as a shared objective for all biobank staff.

Results

Risk assessment, equipment management, change management, CAPA and training plans were identified as primary areas for improvement. BIMS enabled transparent monitoring, clear accountability and efficient communication. Following the internal audit cycle and action implementation, a BBMRI-ERIC quality audit will serve as a final external assessment prior to the ISO20387 accreditation.

Discussion and conclusion

Biobank Antwerp participates in B3-ISO, a Belgian collaborative project to enable ISO 20387 accreditation. Key hurdles and developments were discussed within BBMRI.be which functioned as sounding board. Although internal responses to problems often outsped developments on the national level, results there were incorporated where fit. Another internal audit cycle will evaluate whether modifications were fully implemented and sufficient. The BBMRI-ERIC quality label should be achieved prior EBW2026 and Biobank Antwerp will be on route toward accreditation, with the ambition of becoming the first ISO 20387 accredited biobank in Belgium.

530: Automatic sample processing and assessment of HIL indice at a large hospital biobank

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Topic: 5C: Tools and Processes for Quality Implementation and Use Cases

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Keywords: HIL indice, sample processing, sample quality

Introduction: Hemolysis (H), icterus (I) and lipaemia (L) in plasma and serum samples are conditions that may interfere with laboratory measurements (1,2). Measuring HIL indices in biobank samples provides important information about sample quality and suitability. Furthermore, automated detection of HIL indices is recommended over visual detection due to higher accuracy and precision (2).

Material and methods: At Østfold Hospital Trust, several disease-oriented biobanks have been established to accommodate research in different medical fields. Blood samples for biobanking are collected and processed according to the hospital's routine for clinical samples. The biobank samples undergo a fully automated processing procedure (registration, centrifugation and fractionation) at the Inpeco FlexLab system. Quality measurement of serum and plasma is done by measuring the HIL indices using Abbott Architect c16000. The HIL indices are then transferred to the laboratory information management system (LIMS).

Results: For clinical samples, HIL threshold values determine whether analyses can be performed, and samples outside these limits may be rejected. Biobank samples, however, are not rejected, but their HIL indices are documented in LIMS to ensure that future research can be based on sample quality.

Discussion and conclusion: Our work shows an example of efficient processing and quality measurement of biobank samples at a hospital laboratory.

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samples in clinical laboratories. *Critical Reviews in Clinical Laboratory Sciences* 2020; VOL.57, NO.1, 1-21

519: Therapy-Oriented Dental Cell Biobanking: Clinical-Grade Processing, Cryostorage, and Post-Thaw Maintenance of MSC Properties

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Topic: 5C: Tools and Processes for Quality Implementation and Use Cases

Presenter Name: Mai Mochizuki

Keywords: Dental cell bank; Dental stem cells; Clinical-grade standards; Regenerative medicine

Introduction

Banking autologous cells in advance requires not only cryostorage but also quality controlled processing suitable for future clinical use. Dental-derived cells obtained from extracted teeth exhibit mesenchymal stem/stromal cell (MSC) characteristics and represent a unique autologous cell source. Unlike research-oriented biobanks, we operate a therapy oriented dental cell biobanking system (Dental Cell Bank) for regenerative medicine under a strict regulatory framework in Japan. This study evaluated clinical-grade standard operating procedures (SOPs) for isolation, culture, cryopreservation, and post-thaw characterization of dental-derived MSCs (dMSCs) at a nationally-approved cell processing facility (CPF).

Methods

Teeth scheduled for clinically indicated extraction were screened using predefined criteria for cell-bankable teeth to minimize microbial contamination. Extracted teeth were transported using a dedicated system and processed at the CPF. Cell isolation, expansion, and cryopreservation were performed using materials compliant with national standards for

biological raw materials. Cryopreserved cell stocks were thawed and evaluated for post thaw viability, proliferation, MSC surface marker expression, and differentiation potential.

Results

Post-thaw viability of dMSCs consistently exceeded 80%. Thawed cells showed stable proliferation during subsequent passages, expressed MSC-associated surface markers, and retained osteogenic and adipogenic differentiation capacity.

Conclusion

These results demonstrate that a therapy-oriented, regulatory-compliant dental cell biobanking system can preserve key MSC characteristics after cryopreservation, supporting its feasibility as a reliable source of autologous cells for future regenerative therapies.

Reference

Mochizuki M et al. (2025) Establishing clinical-grade standards for dental stem cell banking: a pathway to regenerative therapy and personalized medicine. In: Shinomiya N, Shimada Y (eds) *Applications of Cell Culture. Current Human Cell Research and Applications*. Springer, Singapore. https://doi.org/10.1007/978-981-95-0587-6_2

513: Development of a Quality Assessment Survey for BBMRI.es Biobanks

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Abstract ID: 513

Topic: 5C: Tools and Processes for Quality Implementation and Use Cases

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Keywords: Biobanks, QMS, survey

Introduction:

High-quality biobank processes are essential to ensure sample integrity and reliable biomedical research. However, significant heterogeneity persists in the implementation of quality management systems (QMS) across biobanks, limiting standardization. Within **BBMRI.es (the Spanish ISCIII Platform for Biomodels and Biobanks, PISCIIBB)**, structured tools are therefore needed to objectively assess QMS maturity and implementation level.

Objectives:

To (1) assess the maturity and implementation level of QMS across biobanks participating in BBMRI.es; (2) generate evidence to support the design of a BBMRI.es (PISCIIBB) quality label; and (3) establish an annual self-assessment framework to monitor progress and enable anonymous benchmarking within the network.

Methodology:

A quality survey was developed based on international standards (ISO 9001:2015 and ISO 20387:2018) and reference tools, including the Swiss Biobanking Platform survey and the BBMRI-ERIC Self-Assessment Survey. The questionnaire uses an adaptive structure: depending on the reported development stage

of the QMS, respondents are directed to specific sections assessing alignment with ISO 9001:2015 and/or ISO 20387:2018 requirements. Internal validation was performed. The survey was distributed on 08/09/2025 and responses are currently being collected for analysis.

Preliminary results:

Forty biobanks (71% of PISCIIBB biobanks) have responded. Among them, 70% report an implemented QMS at an advanced level of maturity.

Conclusions:

This survey provides an overall view of QMS implementation across PISCIIBB and BBMRI.es biobanks. Full participation is required to ensure robust conclusions. Annual use of the tool will support continuous monitoring, foster harmonization of best practices and quality standards nationwide, and inform the development of a dedicated PISCIIBB quality label.

[505: Comparison of cryopreservation methods for peripheral blood polymorphonuclear cells under FBS:DMSO 9:1 conditions vs Bambanker freezing medium](#)

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Abstract ID: 505

Topic: 5C: Tools and Processes for Quality Implementation and Use Cases

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Keywords: Bambanker, FBS:DMSO, PBMCs, cryopreservation

Introduction

The Biobank of the Aragon Health System (BSSA) uses FBS:DMSO (9:1) at -196°C as a method for cryopreserving peripheral blood mononuclear cells (PBMCs). DMSO helps to maintain cell viability during freezing by preventing the formation of ice crystals. However, it is a hazardous and environmentally polluting compound. Besides keeping cells in a nitrogen tank at -196°C entails maintenance costs, together with manipulation risks, which are worth minimizing.

Objectives

To evaluate an alternative cryopreservation medium and method that maintains the viability of different cell populations.

Materials and Methods

PBMCs isolation from leukopacks was performed using a Ficoll gradient from 10 healthy donors. They were divided into 10 aliquots of 15 million cells. Baseline aliquot was analyzed without freezing. The remaining aliquots were frozen in groups of 3, under standard conditions (FBS:DMSO (9:1) -196°C ; Bambanker medium, -80°C ; and Bambanker medium -196°C).

One aliquot from each condition was thawed at 1, and 6 months after freezing. In each aliquot, at the specified time points, cell count, viability, and evaluation of cell populations by flow cytometry were carried out.

Results

Cell viability after 1 month of freezing with Bambanker medium (-80°C and -196°C) was not significantly altered ($p>0.05$) compared to the standard condition, FBS:DMSO 9:1 (-196°C).

However, after 6 months of freezing, both conditions with Bambanker medium showed significantly lower cell viability than the standard condition ($p<0.05$).

Conclusions

Regarding our results, it is not recommended to modify the current PBMC freezing conditions, with a 9:1 dilution of FBS:DMSO at -196°C .

501: ISO 20387 Accreditation for hPSC Deposit and Distribution: Quality Tools and Processes at the SSPA Biobank

Authors:

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Abstract ID: 501

Topic: 5C: Tools and Processes for Quality Implementation and Use Cases

Presenter Name: Purificación Catalina Carmona

Keywords: ISO 20387:2018;The Andalusian Public Health System (SSPA) Biobank

Introduction

The Andalusian Public Health System (SSPA) Biobank has achieved ISO 20387 accreditation for the deposit, quality control, and distribution of human pluripotent stem cell (hPSC) lines as a Node of the Spanish National Stem Cell Bank (BNLC). In Spain, the deposit of hPSC lines, in the BNLC is a legal requirement to ensure their availability for biomedical research. Given the strategic relevance of this activity, the SSPA Biobank selected hPSC deposit and distribution as the first scope for ISO 20387 accreditation.

Materials and Methods

An integrated analysis of the hPSC life cycle processes was conducted at the SSPA Biobank. Standard operating procedures, quality documentation, and records were reviewed and adapted to comply with ISO 20387:2018 requirements. Specific controls were implemented for critical equipment, personnel qualification and training, data integrity, and sample traceability. Biobank operations were evaluated through internal and external audits to assess compliance with the standard.

Results and Conclusions

The evaluation of the quality management system and associated procedures allowed the identification and resolution of gaps relative to ISO 20387:2018 requirements through the implementation of new quality controls, records, and specific protocols. As a result, the SSPA Biobank demonstrated its technical competence in the receipt, verification, storage, and distribution of hPSC lines, achieving ISO 20387 accreditation for this

specific scope. This recognition positions the biobank as the first facility in Spain accredited for hPSC management, consolidating its role as a reference infrastructure and BNLC node and ensuring the quality, traceability, safety, and long-term availability of hPSC lines.

492: Valuation of collections, an important aspect in the transformation process of a sustainable biobank

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Abstract ID: 492

Topic: 5C: Tools and Processes for Quality Implementation and Use Cases

Presenter Name: Marianne Henderson

Keywords: valuation; fit-for-purpose; tool;

Background: Kessler, Johnson, and Henderson¹ developed an automated, web-based tool to support systematic valuation of stored biospecimen collections beyond traditional economic metrics. Biobankers often lack standardized approaches for assessing the intrinsic, operational, and scientific value of collections, limiting effective stewardship, collaboration, and reuse.

Methods: The free tool² enables biobank managers and collection-originating researchers to evaluate noneconomic value using common attributes and predefined criteria relevant to operations, collection context, and biospecimen characteristics. Users enter collection specific information reflecting their in-depth knowledge of specimen provenance, quality, and associated data. The tool applies a structured ranking approach to generate fit-for purpose value assessments. User-entered data are not retained; instead, results are returned as a downloadable PDF via email. A voluntary feedback survey supports iterative refinement.

Results: The tool enhances characterization and comparability of biospecimen collections within and across biobanks. Ranked outputs,

accompanied by annotations such as associated data, collection methods, and quality measures, support transparent decision making. Alignment with FAIR principles facilitates discovery of trusted, fit-for-purpose collections for research while also identifying low-value collections that may be candidates for culling.

Conclusions: This valuation approach provides biobankers with a practical, scalable method to assess collection value from a management & research perspective. By promoting standardized characterization, informed stewardship, collaboration, and data sharing, the tool supports optimized use of biospecimen resources. The tool is publicly available and may be used repeatedly to generate ranked value assessments for stored collections. Widespread adoption may strengthen sustainability planning, prioritization, and long-term impact across diverse biobanking infrastructures worldwide.

^[1]DOI: 10.1177/19475535251374854

^[2]<https://go.nih.gov/jB1NfyS>

486: Implementing Quality Controls in Sample Biobanking

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Abstract ID: 486

Topic: 5C: Tools and Processes for Quality Implementation and Use Cases
Presenter Name: Claudia Maestriperi | Claudia Caparelli
Keywords: Biobank, QC

Introduction

The INMI-BIOBANK stores clinical specimens, as well as viral and bacterial strains, to support biomedical research. ISO 20387 requires establishing and implementing of quality control measures for stored biological materials, and assigns biobanks the responsibility for selecting and validating appropriate methods. This study assessed the effectiveness of preservation procedures in maintaining viability and functional integrity of peripheral blood mononuclear cells (PBMCs).

Materials and Methods

Twenty-three PBMCs samples, collected between 2006 and 2010 and stored in liquid nitrogen vapor at -196°C , were thawed and prepared for viability assessment. After dilution in PBS, the Count & Viability reagent was added, and samples were analysed using the automated Guava Muse cell analyser to determine cell viability.

Results and Conclusions

Most samples showed high viability even after long-term storage. Mean viability was 80.16% for 2006, 72.01% for 2007, 78.36% for 2008, 75.42% for 2009, and 63.13% for 2010. These results confirm that the preservation and storage procedures maintain cellular integrity for over ten years, highlight the robustness of biobank QC processes, and provide a reproducible model for QC of stored materials. The data support continued use of these samples in biomedical studies and reinforce the importance of periodic monitoring to ensure quality and reproducibility.

472: Implementing a new BIMS in an established biobank – challenge accepted!

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Topic: 5C: Tools and Processes for Quality Implementation and Use Cases
Presenter Name: Juliane Weikert

Keywords: BIMS, CentraXX, data quality

Introduction

The Leipzig Medical Biobank started sample collection in March 2011. At that time, an inhouse BIMS (Cryolab) was developed and implemented to document biosample data of samples stored in the gaseous phase of liquid nitrogen, while Excel was used for all other samples.

In 2024, CentraXX 4.0 was selected to replace the existing systems and to professionalise biobanking processes.

Material and Methods

Prior to the implementation of CentraXX, a number of preparatory actions were necessary. These included software configuration (e.g. storage system, sample types, projects, measurement profiles); risk assessment; validation; creation of SOPs; employee training; mapping of all biobank processes; creation of reports; development of a workflow for sample receipt, and import of all previous biosamples.

Results

The workflow took two years from planning to final use. However, it was beneficial in terms of saving time, was easy to use, and increased acceptance in the biobank.

Setting up the storage system and working in parallel with Excel, Cryolab, and CentraXX led to some errors that had to be corrected later in a time-consuming manner.

Importing previous data (>10 years) revealed several data quality issues, such as missing patient assignment and erroneous information with regard to the date, sample type, or sample

identifier. A data quality checklist was thus formulated to identify and eradicate any issues prior to the execution of the CentraXX import process.

Discussion

Professionalising biobanking is worthwhile. However, achieving this can be a long and challenging process. In particular, importing previous data revealed several data quality issues.

733: Enabling sustainable liquid biopsy research by validating miRNA detection and quantification in archival blood samples

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Abstract ID: 733

Topic: 5C: Tools and Processes for Quality Implementation and Use Cases

Presenter Name: Amina Arar | Nimitha Kuriakose

Keywords: ISO 20387; Quality management systems; Standardised workflow; Analytical validation; Reproducibility; Workflow automation; RT-qPCR; Biobanking.

Biobanks support the sustainable reuse of archived biospecimens while meeting international quality standards (ISO 20387).

Circulating mi(cro)RNAs are promising liquid biopsy biomarkers in breast cancer research; however, their analytical reliability depends on robust pre-analytical and analytical workflows, particularly when using samples stored long-term. The aim of this study was to validate a standardised pipeline using surplus blood samples collected during a clinical trial investigating response to neoadjuvant chemotherapy in breast cancer patients (ICORG-ClinicalTrials.gov-NCT01722851).

Archived blood samples were collected at five timepoints. Blood was drawn into PAXgene tubes and stored at -70°C . RNA was extracted using the Qiagen EZ2 Connect automated DNA/RNA system. Expression of candidate miRNAs (miR-16, miR-21, miR-195 and miR-425) was quantified using Target-specific and Advanced TaqMan miRNA assays. Data analysis was performed using qbase+ and Python.

RNA of sufficient integrity and yield was obtained from all samples, and all candidate miRNAs were consistently detectable across longitudinal timepoints. Comparison of calibrated normalized relative quantities (CNRQ) values demonstrated assay-dependent differences for miR-21 and miR-195, with differing mean values and variability across timepoints and limited concordance in absolute expression levels. Correlation analysis showed target-dependent agreement, with moderate concordance for miR-195 (Spearman's $\rho = 0.462$, $p = 0.020$) and weak, non-significant correlation for miR-21 (Spearman's $\rho = 0.177$, $p = 0.397$).

This study demonstrates the feasibility of extracting and quantifying clinically relevant circulating miRNAs from long-term biobanked PAXgene blood samples using a standardised, automated workflow aligned with ISO-20387 requirements for fitness-for-purpose, traceability and reproducibility.

687: Bridging Standards to Practice: Quality Control Tools and Processes in a Multispecialty Biobank

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Abstract ID: 687

Topic: 5C: Tools and Processes for Quality Implementation and Use Cases

Presenter Name: Marta Barba | Clara Perrone

Keywords: Multispecialistic biobank, Oct-tissue, Plasma, Quality control, Serum, Standard quality

Introduction: The Research Biobank of Fondazione Policlinico Universitario Gemelli IRCCS is a multispecialty biobank that manages biological samples for distribution to research projects ethically approved. Biobank supports four scientific areas: gynecological oncology, breast oncology, inflammatory bowel disease, COVID-19. It manages over 40,000 biological samples, including serum, plasma, and OCT-embedded tissue, from patients admitted to

the hospital. Biobank joined ISO 9001 and is implementing a quality management system compliant with ISO 20387. Within this framework, a standardized workflow for quality control (QC) of plasma, serum, and OCT-embedded tissue samples was developed.

Methods: Patients were enrolled after providing specific informed consent. Serum and plasma samples were analyzed by the Hospital Unit of Clinical Chemistry to assess sodium and potassium levels and hemolysis. All tests were requested and documented through the hospital's internal TrackCare system. Tissue samples were evaluated in collaboration with the Immunohistochemistry and Pathology Unit, which assessed sample quality, necrosis, flogosis and percentage of tumor cells.

Results: All OCT biopsies stored in the Biobank are evaluated for sample quality. To date, 2,047 OCT biopsies have been analyzed, and 51% of these show a tumor cell content greater than 50%. Plasma and serum QC procedures were optimized by analyzing representative aliquots, enabling the definition of quality thresholds for potassium and sodium. Routine QC assessment will be applied to 5% of collected samples.

Conclusion: Standardized quality control procedures are essential to ensure sample reliability, reproducibility, and suitability for downstream analyses, thereby supporting highquality translational and clinical research in accordance with international biobanking standards.

531: A simple in-house approach for evaluating storage tube leakage to support long-term biobank sample integrity

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Abstract ID: 531

Topic: 5C: Tools and Processes for Quality Implementation and Use Cases

Presenter Name: Samer Kadibalban | Jeanette Franzenburg

Keywords: Long-term preservation, Seal performance, Tube leakage

Long-term preservation of biological samples in biobanks depends critically on the integrity of storage tubes. Even minimal leakage can alter sample volume, concentration, and suitability for downstream analyses, posing a risk to data quality and reproducibility. Despite this, routine evaluation of tube seal performance is uncommon, largely due to the lack of standardized methods and the perceived need for specialized equipment. This work presents a simple, reproducible in-house approach for assessing tube leakage under biobank-relevant storage conditions and supporting evidence-based selection of storage consumables.

Laboratory storage tubes from three manufacturers were evaluated over a 12-month period under five commonly used biobank storage conditions: room temperature (RT), -20 °C manual storage, -20 °C automated storage, -80 °C manual storage, and -80 °C automated storage. RT storage was intentionally included as an accelerated condition to induce faster mass loss and enable early discrimination of tube performance. Tube mass was measured at baseline and after 1, 3, 6, 9, and 12 months, and seal performance was quantified as relative content mass loss.

Clear manufacturer-dependent differences in leakage behavior under all conditions were observed. Notably, significant differences in volume loss between tube categories were already detectable after one month, demonstrating the sensitivity of this approach and its suitability for rapid screening. Overall, this low-cost and high-end equipment-

independent method enables biobanks to proactively evaluate tube integrity, reduce long-term storage risks, and strengthen quality assurance within routine operations.

6C: Ensuring excellence: Elevating data quality in biobanking

701: FISMA for high quality and interoperable real-world data on Dystrophinopathies - FAIR curation at the source: a practical approach

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Abstract ID: 701

Topic: 6C: Ensuring Excellence: Elevating Data Quality in Biobanking

Presenter Name: Roger Snijder

Keywords: Becker muscular dystrophy, Duchenne Centre Netherlands, Duchenne muscular dystrophy,

FAIR, FISMA, Netherlands, Open Terminology Server, biomaterials, real-world data, registration at the source

Real-world data is crucial to gain deeper insights and improve care for patients with neuromuscular diseases. FISMA (Framework for Information Specification, Modelling and Architecture) makes this data interoperable, exchangeable by adding context and enhances data quality at the source.

Duchenne Center Netherlands has developed and adopted a conceptual framework, FISMA, that allows capturing real-world data (RWD) as relevant, re-usable and semantically interoperable data. FISMA is drafted with expansion in mind: both within the field of dystrophinopathies (Duchenne and Becker

muscular dystrophy), as beyond, to other neuromuscular diseases.

This presentation is a follow-up to last year's award-winning introduction to FISMA. At the request of BBMRI's Data Quality WG, this same presentation was given there as well. Since then, several concepts that were still in draft at time of presentation in Bologna 2025, have now been implemented, adding observational context and interoperability to biomaterials. This presentation focusses on the practical approach and tools used, as well as the implications for reusability of biobank materials.

FISMA has progressed from a (digital) paper-based exercise to a truly digitally publishable multidimensional, multi-modal methodology, owing to OTS, Open Terminology Server, allowing FISMA to be expanded to other neuromuscular diseases, and beyond, as well as represented in a wealth of ontologies and code systems with very little effort. We will detail the transformation from 'paper' to OTS, and why this allows unlimited expansion.

671: BBMRI-ERIC Directory: 10(+) years of making biobanks findable (FAIR)

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Abstract ID: 671

Topic: 6C: Ensuring Excellence: Elevating Data Quality in Biobanking

Presenter Name: Bella Anna Binoy

Keywords: BBMRI, Biobanks, Data catalogue, Metadata

The BBMRI-ERIC Directory is the world's largest, centralized online catalogue for metadata describing biobanks (400+), biomolecular resources, collections of data and samples (3500+), and additional services. Since its launch in 2015, the BBMRI-ERIC Directory has continuously evolved to support biobanks and researchers, advancing FAIR principles through integration with key tools and services and the adoption of standard metadata models.

Material & methods used to obtain and analyse the data

The Directory aggregates metadata from national nodes of the BBMRI network. It achieves interoperability by adopting MIABIS for biobank-specific metadata, DCAT for standardized data cataloguing, and aligning with EHDS requirements for seamless health data exchange across European infrastructures. The Directory is built using the MOLGENIS platform which enables building of flexible online databases, offers programmatic access via an API, and secures user interactions through Authentication and Authorization Infrastructure (AAI). Integrated tools like BBMRI Negotiator connect researchers directly with sample owners, BBMRI Locator allows sample count queries, while the use of medical ontologies such as ICD-10 and ORPHAnet enables advanced search functions. The BBMRI Directory supports robust data stewardship in the form of quality management labels and the facts table summarising key biobank statistics and attributes for users.

Discussion and conclusion that will help others in their work

The Directory evolved from a collection of national biobank registries into a centralized, pan-European searchable catalogue. Via the MOLGENIS platform, it is part of a suite of FAIR data applications that also includes cohort catalogues, rare disease patient registries, LIMS like database, and federated analysis (also see INTEGRATE-LMedC demonstrator), growing closer and closer together.

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620: Self-assessment tool for biobank data quality capabilities

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Abstract ID: 620

Topic: 6C: Ensuring Excellence: Elevating Data Quality in Biobanking

Presenter Name: Niina Eklund

Keywords: data management, data quality, framework, governance, tool development

Introduction

BBMRI.QM has developed a new tool for biobanks seeking to confirm the quality of the organisational framework for data management and governance. The Data Quality Self Assessment Survey (DQ SAS) provides a structured checklist to verify that the organisational requirements are in place. After completing the DQ SAS the biobank can optionally proceed to the BBMRI.QM Audit Programme that can result in the award of a Quality Label.

Material and Methods

The SAS is grounded on a holistic review of internationally recognised standards for data quality and information security, complemented by relevant standards addressing biobanking practices. Together, these form a comprehensive basis for assessing the maturity and robustness of a biobank's data management and governance framework. Following an extensive review of domain-relevant standards, we identified those most relevant to biobank data management processes. Their requirements were translated into practical questions, grouped to logical sequence and revised to reduce unnecessary technical complexity.

Results

The BBMRI.QM DQ SAS enables biobanks to demonstrate that their data quality framework is sufficiently mature to support reliable, high-quality data operations. Although the tool does not assess individual datasets or row-level entries, it verifies that the biobank has the capabilities and prerequisites needed to evaluate technical data quality using its preferred methods.

Conclusions

Successful completion of the BBMRI.QM DQ SAS and Audit Programme confirms that the biobank has sufficient knowledge on data quality, data management, and governance, and that its practices aligned with relevant international standards.

590: Smarter Biobank Databases: Performance-Driven Redesign of a High-Dimensional Neurological Tissue Biobank Database

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Abstract ID: 590

Topic: 6C: Ensuring Excellence: Elevating Data Quality in Biobanking

Presenter Name: Judith Sabaté del Río

Keywords: LIMS, data integrity, data migration, database optimization, quality

Introduction: Neurological tissue bank from HCB-IDIBAPS Biobank relies on complex donor and sample datasets to support biomedical research. This information has been historically managed using Microsoft Access, which has become obsolete and inefficient due to the accumulation of more than 850 variables from more than 2350 donors. High dimensionality has limited data export, slowed down data querying and compromised data security. The primary objective was to optimize database performance and usability by reducing and restructuring variables and migrating all data to our Laboratory Information Management System (LIMS). A secondary objective was to conduct comprehensive data integrity and quality assessments.

Materials and Methods: We designed an optimized database schema through

evaluation of variable completeness, relevance, and redundancy. Variables were eliminated, consolidated, or redefined, and duplicated or obsolete information was identified. The redesigned model was implemented in NorayBanks LIMS, and all information migrated. Complete sample inventory, data transformation and integrity checks were performed using custom Python scripts.

Results: The pilot study shows it is feasible to optimize database structure to reduce variable count and improve performance, which enables faster querying, complete dataset exports and more efficient identification of eligible samples. Data security has enhanced through centralized management, and the elimination of duplicate data entry workflows can reduce the risk of human error. The new architecture improves maintainability, interoperability, and operational efficiency.

Discussion and Conclusion: This project highlights the benefits of structured database optimization and migration to a modern LIMS for large-scale biobank data management, which will be crucial for the compliance of ISO20387 standard.

586: Ethical and Practical Challenges of Digital Recruitment in a Latvian National Biobank

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Abstract ID: 586

Topic: 6C: Ensuring Excellence: Elevating Data Quality in Biobanking

Presenter Name: Angelika Voronova

Keywords: Biobanking, Data verification, Digital recruitment, Electronic informed consent (e-consent)

Introduction

Electronic application systems are increasingly used in large-scale studies. Nevertheless, full digitalisation of the process is not always feasible and hybrid systems are frequently

employed, which may introduce ethical and data integrity challenges. We will share our experience in the implementation of electronic recruitment as part of the Latvian population genome reference project.

Materials and Methods

Applicant data were reviewed for eligibility, including age (≥ 18 years), unrelatedness and regional representation. Recruitment was conducted digitally with phone contact used when clarification was required. Confirmed participants received a secure link to questionnaire and document file, including informed consent forms and referrals for sample collection. Samples were pseudonymised at registration, genetic data were double-anonymised.

Results

More than 5,000 individuals completed the initial electronic survey and consented to be contacted. A total of 3,218 participants were enrolled for the first-time and 620 existing biobank participants signed study specific e-consent. Only one third of confirmed applicants ultimately donated samples. Media advertising did not increase full involvement rates, whereas targeted follow-up calls raised number of consented participants. Most participants were able to independently use digital tools, with only a small number requiring individual assistance. Identified challenges included detection of relatedness document sharing within households, duplicate enrolment, implementation of data verification.

Conclusion

Hybrid approaches involving several parties pose ethical, data verification and integrity challenges. Integration of national auto-identification into digital workflows could substantially reduce errors and improve data quality in large-scale biobank recruitment.

528: Ensuring Data Integrity in the DZD DiaMet Biobank: A Multi-Layered Monitoring Approach

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Abstract ID: 528

Topic: 6C: Ensuring Excellence: Elevating Data
Quality in Biobanking

Presenter Name: Amélie Schellenbauer

Keywords: checks, data integrity, monitoring,
standardization

Precision medicine for diabetes prevention and treatment requires robust clinical and biospecimen data. The German Center for Diabetes Research (DZD) conducts multi-center studies to identify subtype-specific biomarkers and mechanisms of (pre)diabetes. Supporting these efforts, the DZD DiaMet Biobank provides harmonized biospecimen and clinical data collection across ten sites under standardized SOPs, software, and labware. Long-term data integrity is a critical challenge for biobanks, as undetected errors can compromise cohort formation and research validity. To address this, we implemented a multilayered monitoring framework:

Key Standardization and Monitoring Components:

- 1. Harmonized Clinical Data Set:** Use of the standardized DZD Core Data Set comprising over 140 clinician-coordinated parameters ensures consistent and comparable clinical data acquisition across all DZD studies.
- 2. Clinical and Laboratory Data Plausibility Checks:** Automated detection of implausible values (Z-score, IQR, Mahalanobis distance) within the MySQL source system flags anomalies for expert review.
- 3. Biospecimen Data Integrity Monitoring:** An automated monitoring process

that verifies SPREC codes, study identifiers, and visit metadata using MySQL queries with visual oversight via Power BI.

- 4. Labware Quality Control:** Centralized monitoring of lot numbers and expiration dates of primary containers ensures expired materials are identified, and affected aliquots are excluded from use.

The integration of harmonized data structures with real-time monitoring substantially strengthens data reliability and supports high-quality precision medicine research.

Two Years of OpenSpecimen at Amsterdam UMC: Advancing Biobank Operations, Data Integration, and Researcher Access

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Abstract ID: 476

Topic: 6C: Ensuring Excellence: Elevating Data
Quality in Biobanking

Presenter Name: Erik van Iperen

Keywords: BIMS, Data, FAIR, Workflow

The Amsterdam UMC biobank stores over 3 million biospecimen across more than 500 collections. After implementing OpenSpecimen in 2023, substantial progress was made in strengthening biobank operations. Pre-analytical workflows and data structure were standardized, and accessibility was improved.

Work processes of two pre-analytical laboratories were consolidated into a unified workflow environment, supported by

standardized OpenSpecimen workflows for intake, processing, and storage. Workflow adoption significantly reduced manual entry variability and improved traceability. The integration of rack scanners enabled rapid, accurate inventory management of barcoded samples and boxes. Bulk import processes for externally sourced biomaterials were optimized to improve throughput and data quality. Furthermore, an invoicing procedure was implemented via OpenSpecimen's API to facilitate storage cost recovery and administrative workflows.

Major steps were taken to improve data integration and researcher engagement. Biospecimen metadata became fully accessible through the Research Data Platform (RDP), facilitating linkage with clinical and research datasets. Metadata export pipelines were developed for both internal and external catalogues, including preparation for publication in the national health data catalogue hosted by Health-RI. Research groups received access to OpenSpecimen, enabling them to search for available biosamples, compile picklists, and initiate sample requests independently.

Across the two-year period, OpenSpecimen supported the intake of 638,284 biospecimens and the distribution of 191,928 samples. Together, these developments have transformed OpenSpecimen into a central component of the institutional research infrastructure, enhancing operational efficiency, data quality, and visibility of biobank resources.

469: Privacy-Preserving Data Quality Assessment for Federated Health Data Networks

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Abstract ID: 469

Topic: 6C: Ensuring Excellence: Elevating Data Quality in Biobanking

Presenter Name: Radovan Tomášik

Keywords: bbmri, data, differential privacy, federated, fhir

Introduction

Assessing data quality in federated health data networks is challenging due to legal and ethical constraints that prevent centralised access to sensitive data. Conventional data quality assessment methods rely on direct inspection of raw datasets, which conflicts with requirements for data sovereignty and patient privacy.

Material & methods

We propose a privacy-preserving framework for federated data quality assessment based on differential privacy. Standardised data quality metrics—including completeness, consistency, and accuracy—are computed locally at each data-holding node. Only aggregated, noise-obfuscated results are shared and federated, ensuring that individual-level information or small cohort characteristics cannot be inferred.

Results

A proof-of-concept implementation was evaluated using synthetic health datasets modelled on common clinical data standards. The results demonstrate that meaningful data quality insights can be obtained under a fixed privacy budget, while maintaining strong privacy guarantees across participating nodes.

Discussion and conclusion

The framework is data-model agnostic and applicable across diverse biomedical domains. It demonstrates how differential privacy can enable scalable, decentralised, and privacy compliant data quality transparency, supporting federated research infrastructures such as BBMRI-ERIC.

8C: Mastering pre-analytics: Key to reliable biobanking and biomedical research

699: Establishing a chapter in the context of the Quality Management System at the Centro Risorse Biologiche of the AOM IRCCS Ospedale Policlinico San Martino

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Topic: 8C: Mastering Pre-Analytics: Key to Reliable Biobanking and Biomedical Research

Presenter Name: Soulef Bouakkaz

Keywords: Biobank, Biomarker, Quality Management System, Sample Stability, Translational Medicine.

Biobanks play a crucial role in translational research and precision medicine by guaranteeing the collection, processing, storage, and distribution of high-quality, well annotated biological material.

Within the Quality Management System (QMS) of the Centro Risorse Biologiche (CRBHSM), a conceptual framework was developed to investigate short- and long-term stability of

biological samples. Some biomarkers were selected based on literature review and public datasets, as preliminary observations suggest that integrating biomarker-based criteria into biobank workflows may improve quality control strategies. Key pre-analytical variables, including processing time, storage conditions, and freeze–thaw cycles, are potential indicators of sample stability.

This study proposes a structured approach to assess sample stability in biobanking. The integration of biomarker-based indicators into quality management systems may enhance the reliability and reproducibility of biobank-derived research and support the development of standardized quality assessment strategies. At CRB-HSM, we aim to enrich its QMS, by adding a new quality chapter to preserve sample short- and long-term stability, via the analysis of a specific set of biomarkers, in different sample types and across various diseases.

Different types of biobanked tissues and biological fluids will be analyzed to explore biomarker stability under diverse storage conditions. Molecular and protein-based markers will be assessed using RT-qPCR and immunoenzymatic assays to investigate their potential role as indicators of samples integrity in biobanking.

664: Maximizing the Potential of Adult Mesenchymal Stem Cells: A 4.0 Biobanking Model for Precision Medicine

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Abstract ID: 664

Topic: 8C: Mastering Pre-Analytics: Key to Reliable Biobanking and Biomedical Research

Presenter Name: Alessia Leone

Keywords: Biobanking 4.0, Mesenchymal Stem Cells, Multi-omics Integration, Precision Medicine, Translational Research

Introduction: Within the framework of the PNRR project “Strengthening BBMRI.it”, the Institute CNR-IEOMI has established a cutting-edge Biobanking 4.0 infrastructure. This Infrastructure focuses on the standardized collection and high-quality processing of Mesenchymal Stem Cells (MSCs) derived from adipose tissue and bone marrow. The CNR-IEOMI Biobank will act as a strategic engine for precision medicine, providing high dimensional biological resources to unravel the molecular drivers of metabolic, inflammatory, and degenerative pathologies.

Material and Methods: The Biobank has implemented rigorous Standard Operating Procedures (SOPs) to ensure the integrity of MSCs. To guarantee sample quality, isolated cells will be characterized based on three fundamental criteria: growth in adhesion, the presence or absence of surface markers, and tri-lineage differentiation potential into adipocytes, chondrocytes, and osteoblasts.

Results: The expected results will focus on creating an organized collection of high-quality samples integrated with multi-omic profiles. Leveraging advanced molecular techniques, the Biobank will generate comprehensive data including genomic/epigenomic profiles, metabolomic and secretome analysis.

Discussion and Conclusion: By applying the Biobank 4.0 model and a dedicated Information Management System (BIMS), IEOMI will ensure total traceability and data security. This infrastructure will provide a reproducible foundation for cell-free therapies and personalized medicine, enhancing the predictive power of translational research. Furthermore, the integration of multi-omic data with detailed clinical and lifestyle information will create a unique resource for identifying specific endotypes. Ultimately, this infrastructure will act as a vital bridge between basic research and clinical application, significantly enhancing the predictive power of translational studies and fostering new therapeutic approaches for complex diseases.

658: Effects of Pre-Analytical Sample Stabilization on Soil Microbiome Analysis Using Nanopore Sequencing

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Abstract ID: 658

Topic: 8C: Mastering Pre-Analytics: Key to Reliable Biobanking and Biomedical Research

Presenter Name: Sonja Langthaler

Keywords: DNA stabilization, Illumina sequencing, Nanopore sequencing, Sample preservation, Soil microbiome

Introduction:

In-field sample preservation is essential for reliable microbiome biobanking and analysis to reduce alterations caused by transport time and pre-storage handling. However, conventional stabilization methods such as freezing are impractical and chemical buffers are therefore often used as an alternative.[1] Nonetheless, these methods may substantially affect DNA recovery, integrity and downstream taxonomic resolution. Within the EU-project MICROBE, we tested a chemical stabilizer commonly used for Illumina sequencing to evaluate its suitability for Nanopore-based soil microbiome profiling and compared the results with Illumina data.

Methods:

Soil samples (stored at 4°C for app. 30 days) were either (1) directly subjected to DNA isolation without stabilization, or (2) treated with PowerProtect stabilizer (QIAGEN) and stored at room temperature for 3 days prior to

extraction. Nanopore data were analyzed using a custom long-read pipeline; Illumina data with DADA2 [2]. Taxonomic profiles were compared at genus level.

Results:

DNA samples without stabilizer showed the highest genus richness in Nanopore, outperforming Illumina sequencing by 3-fold. Stabilizer treatment markedly reduced detectable genera in Nanopore data, while Illumina remained largely unaffected. An additional cleaning step enabled recovery of a substantial fraction of Nanopore-detected genera, reaching approximately two-thirds of the genus richness observed with Illumina.

Discussion/Conclusion:

The stabilizer suppressed microbial diversity detection in Nanopore workflows. Cleaning partially improved sequencing output, increasing comparability with Illumina results, although platform-specific differences remained.

These findings highlight the need to evaluate stabilizer use when applying it to other sequencing technologies. Overall, method-aware handling and analysis are essential for reliable soil microbiome profiling.

References:

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- [2] <https://doi.org/10.1038/nmeth.3869>

649: STANDARD B-CELL IMMORTALIZACION USING EPSTEIN BARR VIRUS: WHAT CAN GO WRONG?

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Abstract ID: 649

Topic: 8C: Mastering Pre-Analytics: Key to
Reliable Biobanking and Biomedical Research

Presenter Name: Mariona Arañó Loyo

Keywords: B-cell, epstein barr virus,
immortalization, immunodeficiency

Introduction

Protocols for Epstein–Barr virus (EBV)–mediated B-cell immortalization describe an apparently simple and robust technique. However, when implementing it in our biobank setting, we identified several unaddressed factors that strongly limit reproducibility.

M&M

Peripheral blood isolated B cells underwent EBV-mediated transformation under standard conditions. EBV preparation was produced in-house using the B95-8 cell line, following standard protocols.

Results

Conventional glutamine was initially used for media preparation, but accumulation of ammonia as a degradation product led to B-cell death. Switching to a stable formulation prevented toxic metabolite buildup for culture survival.

Obtained EBV supernatant used for transformation presented considerable variability in viral titer across batches. We optimized the EBV titer to B-cell concentration ratio for culture success as protocols only provide a volume to volume ratio.

For some donors, only a fraction of initially infected B cells became immortalized. Incorporating a Ficoll-based density gradient centrifugation 12-15 days post-infection improved long-term success by removing non-transformed cells from the culture.

Discussion

These findings highlight critical variables affecting EBV-mediated B-cell immortalization. We aim to improve reproducibility and success rates across biobanks and laboratory settings,

enabling better culture survival even in the most challenging cases- particularly in primary immunodeficient patients with low lymphoid cell count.

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- [10.3390/microorganisms11122936](https://doi.org/10.3390/microorganisms11122936)

645: DNA Quality-Driven Material Optimization in Biobanking: Buffy Coat vs All Cell Pellet

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Abstract ID: 645

Topic: 8C: Mastering Pre-Analytics: Key to
Reliable Biobanking and Biomedical Research

Presenter Name: Madè Alisia

Keywords: DNA, quality control

Introduction: High-quality DNA is essential for reliable genomic analyses in biobanking. Although whole blood (WB) is considered the gold-standard source for DNA extraction, it is not always available in biobank collections. Alternative blood-derived fractions such as buffy coat (BC) and all cell pellet (ACP) are commonly stored and represent valuable resources. This study aimed to identify the most suitable alternative to WB for obtaining high quality DNA supporting both analytical performance and sustainable biobanking practices.

Materials and Methods: Samples from healthy donors stored at -80°C, including WB, BC and ACP, were analysed. BC and ACP were obtained from EDTA-WB by centrifugation at 1500×g for 15 minutes. Following plasma removal, ACP was prepared by resuspending the leukocyte–platelet layer in the red blood cell fraction, while BC was collected as a single leukocyte-rich aliquot. DNA was extracted using the automated Maxwell system (Promega). Both BC and ACP were processed either undiluted or diluted 1:1 in PBS. DNA concentration and purity were assessed using NanoDrop spectrophotometry.

Results: DNA purity was comparable between diluted and undiluted samples. Sample dilution improved extraction performance by reducing bead carryover. Diluted BC yielded significantly higher DNA quantities compared to diluted ACP (p=0.01). Although BC provides higher DNA yields, its single-use availability limits repeated extractions. Conversely, ACP, despite lower yields, can be obtained in larger volumes and shows comparable DNA purity.

Conclusions: Although BC offers the highest DNA yields, ACP represents a practical and reliable alternative for large-scale and repeated biobanking applications supporting long-term sustainability of genomic resources.

Precision Capabilities in Laboratory Automation Components: A Technical Reference for Pre-analytical Sample Handling

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Abstract ID: 639

Topic: 8C: Mastering Pre-Analytics: Key to Reliable Biobanking and Biomedical Research

Presenter Name: Jan Horký

Keywords: automation, biobank, liquid handling, pre-analytical, precision, reproducibility, sample integrity

Introduction Pre-analytical sample handling requires precise control of liquid volumes, accurate positioning, and consistent motion—parameters that directly impact specimen integrity and downstream reproducibility. Volume inconsistencies affect aliquot comparability; positioning variability introduces mechanical stress; operator-dependent handling undermines standardization. When specifying automation, biobanks benefit from understanding what precision current component technologies can achieve.

Materials & Methods We compiled performance characteristics from automation components used in regulated life science applications, focusing on parameters relevant to pre-analytical quality: liquid handling precision affecting aliquot consistency, positioning repeatability affecting sample transfer reliability, and motion control replacing operator dependent variability. Performance characteristics represent documented capabilities under controlled test conditions.

Results Under laboratory validation conditions, current dispensing systems achieve submicroliter accuracy with high repeatability—precision that supports consistent aliquoting and preserves analytical comparability. Positioning systems demonstrate repeatability in the hundredths of a millimeter, enabling reliable plate handling with minimal mechanical disruption. Automated motion sequences eliminate operator-dependent variations in mixing, transfer, and timing. Actual operational performance varies with integration and environment, but these capabilities indicate what precision is achievable.

Conclusions Precise control during sample collection and handling directly enhances specimen value for long-term storage. Component-level capabilities provide biobanks with benchmarks for quality planning—not guarantees, but reference points for what current technology enables. Understanding achievable automation precision supports

informed decisions about where investment in pre-analytical control delivers the greatest return.

596: Are cryopreserved PBMCs fit-for-purpose? A systematic Review.

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Abstract ID: 596

Topic: 8C: Mastering Pre-Analytics: Key to Reliable Biobanking and Biomedical Research

Presenter Name: Dr. rer. nat. Philipp Schöppner

Keywords: PBMC, fit-for-purpose, quality score, systematic review

Introduction: High-quality PBMC-based research results require standardized processing protocols and complete, transparent documentation. Fit-for-purpose PBMC biobanking depends on a clear understanding how pre-analytical factors (e.g., blood collection tubes, processing time, cryopreservation, and storage conditions) affect PBMC integrity and downstream analytical readouts. The German Biobank Network (GBN) working group “PBMC” is conducting a systematic review to identify critical processing parameters and increase awareness of pre-analytical pitfalls.

Methods: A systematic literature search was conducted on studies directly comparing fresh versus cryopreserved PBMCs to identify workflows that generate fit-for-purpose PBMCs across assays and analytes. After removal of duplicates, and screening of title/abstracts 618 records were identified; 128 studies were retained for data extraction after full-text screening. The study quality was assessed using a quality score (0–10, 10 = complete reporting of all items) covering predefined key pre-analytical parameters.

Results: 49 studies achieved a quality score of 10, 53 scored 8–9, and 26 scored ≤7. Protocols and findings were synthesized to correlate PBMC handling with downstream analytical outcomes and support selection of workflows

for specific experimental setups. Outcomes were grouped into five domains: PBMC recovery, immunophenotyping, functionality, cell manufacturing, and OMICs, facilitating the identification of assay-specific sensitivities and evidence gaps.

Conclusion: The review is ongoing, initially focussing on blood collection tubes. Early findings suggest that tube type and associated handling conditions can influence PBMC yield and assay readouts, while incomplete documentation limits cross-study comparability. The final review will provide practical guidelines to improve standardization, reproducibility, and interpretation of PBMC-based analyses across laboratories.

589: RAISE@IBBJ | Robotics system for the automated isolation and separation of single-cell suspensions

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Abstract ID: 589

Topic: 8C: Mastering Pre-Analytics: Key to Reliable Biobanking and Biomedical Research

Presenter Name: Christine Hess

Keywords: PBMC, antibody-magnetic-beads, automated cell separation, single celltype

The Integrated Biobank Jena (IBBJ) objects the automatization of cell isolation procedures as part of the Health Care Integrated Biobank pipeline at the Jena University Hospital (JUH)

and within the scope of its DIN EN ISO 20387 accreditation.

Therefore, a concept based on the needs of JUH collaborators and beyond such as the Leibniz Center for Photonics and Infection research (LPI) was developed: A robotic system consisting of three functional units - I. Aliquotation of liquid samples, II. Mononuclear cell isolation (1) and III. preparation of single-celltype suspensions based on antibody – magnetic bead separation from human liquid samples.

Subsequently, a proposal was submitted to the Thüringer Aufbaubank (FTI-Thüringen FORSCHUNG) and funding was approved end of 2025 (2025 FGI 0020). In the cause of 2026, the acquisition, installation, and validation will take place. Validation of unit one and two will be performed according to existing automated (aliquotation) and manual isolation (SepMate and CPT technique for mononuclear cells) protocols. For unit three, however, the isolation protocol will be newly developed in collaboration with the company and subsequently validated. Preanalytical work of automated cell isolation by RoboSep™ Cell Separation System (Stemcell Technologies) was already performed and validated.

The concept of the system, the results of preparatory preanalytical work and the procedure of implementation into Health Care Integrated Biobank pipeline will be presented.

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563: Development of an Automation-Compatible Method for Determination of Serum Indices Using Standard Biobank Laboratory Equipment

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Abstract ID: 563

Topic: 8C: Mastering Pre-Analytics: Key to Reliable Biobanking and Biomedical Research

Presenter Name: Joerg Geiger

Keywords: HIL-index, Nanodrop, automation, platereader, spectrophotometry

Introduction

The determination of many clinical analytes is significantly affected by the presence of free hemoglobin, bilirubin, and lipids in serum or plasma. For this reason, hemolysis, icterus, and lipemia (HIL) indices are routinely assessed in clinical laboratories to evaluate sample suitability for analytical methods. Biobanks that are not integrated into clinical laboratory workflows often lack the infrastructure to perform serum index determination. To address this limitation, we developed a method that relies on commonly available biobank laboratory equipment and can be integrated into an automated biobank workflow.

Materials and Methods

The method was developed and validated using a micro-volume photometer, a micro-plate reader, and a COBAS 8000 analyzer. Defined concentrations of hemoglobin, bilirubinditaurate, and Intralipid® were prepared in plasma and serum matrices as test samples. The method was validated using authentic donor samples. Measurement result files were converted and processed using spectral deconvolution, and serum indices were extracted within an automated analysis tool-chain implemented using Perl and R scripts.

Results

Hemoglobin, bilirubin, and lipid concentrations were determined with high repeatability and adequate precision across the tested concentration ranges. In particular, at elevated lipid and/or hemoglobin concentrations, spectral deconvolution effectively reduced

background interference, resulting in improved quantification of hemoglobin and bilirubin compared to direct absorbance-based approaches.

Discussion

The developed method proved to be reliable and enables the determination of serum indices in a biobank setting without the need for additional specialized equipment. Automated data processing eliminates manual intervention and facilitates seamless documentation and transfer of results to a biobank information management system.

547: Viable cryo-preservation of human cancer tissue: a cellular integrity assessment

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Abstract ID: 547

Topic: 8C: Mastering Pre-Analytics: Key to Reliable Biobanking and Biomedical Research

Presenter Name: Anna Christina Schmidt

Keywords: oncology, patient derived spheroids, viable cryo-preservation

Introduction

Fresh human tumor tissue is crucial in personalized medicine studies. However, their susceptibility to rapid degradation limits long term usage and poses logistical challenges. We aim to cryopreserve tumor tissues in a medium, allowing them to be stored for extended periods while maintaining their viability and function. This would exhibit great

advantages for the generation of patient derived 3D-models.

Methods

Half of the tissue, collected from cancer surgeries, was processed immediately, while the other half was cut into small pieces and slowly frozen (-1°C/h) in various cryo-media before being analogously processed. Viability of cell populations was quantified using flow cytometry. Tissue integrity was examined using histological staining. Spheroids were cultivated and their response to tumor treatments evaluated.

Results

After thawing, preliminary results show good cell viability (77%) and only a slight viability decrease (71%) after 120 h cultivation. Cryo-robustness differs between subtypes of immunological cells, indicated by an increase of Annexin V+ cells for CD45+/CD19+ (fresh: 17,5%; cryo: 30%) and CD45+/CD14+ (fresh: 4,5%; cryo: 17,5%), but not for CD45+/CD3+ (fresh: 20%; cryo: 15,5%) population. Drug response in tumor spheroids was influenced by the cryo-media used.

Outlook

Viable cryo-preservation retains to a certain degree cell viability, structural tissue integrity and biomarker expression. However, maintenance of biological complexity requires further adaptation of the cryo-preservation technique.

546: Lessons from the human microbiome field: Pre-analytical variables for reliable non-human biobanking and research

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MICROBE Consortium members, EU-project MICROBE No. 101094353

(<https://www.microbeproject.eu/consortium>)

ESPO WG 'Plants and Microbiome', European Plant Science Organisation's (EPSO) Working Group

'Plants and Microbiome'

(<https://epsoweb.org/working-groups/plants-and-microbiomes/>)

Abstract ID: 546

Topic: 8C: Mastering Pre-Analytics: Key to Reliable Biobanking and Biomedical Research

Presenter Name: Cornelia Stumptner

Keywords: *biomedical research, metadata, microbiome, non-human, pre-analytics, quality, standardization*

Introduction

The pre-analytical phase is a vulnerable and decisive part of the laboratory testing process and of samples/data reuse in biomedical research. For human microbiome samples, the SPIDIA4P-/BBMRI.at-contributed standard CEN/TS 17626 specifies pre-analytical requirements. By contrast, pre-analytics in non-human microbiome fields (e.g., plants, soil, marine) are often underestimated. The more advanced human field can serve as a bestpractice exemplar for improving research reproducibility and comparability.

Material & methods

Within the EU project MICROBE, we used CEN/TS 17626:2021 as an exemplar and combined a structured literature review with workshops involving EPSO and/or MICROBE experts. This approach delineated the pre-analytical workflows and defined sample-typespecific variables and metadata needs for plant, soil, and marine water specimens.

Results

We defined discrete pre-analytical steps from in-situ sampling through collection, intermediate storage, preservation, transport, laboratory processing, analyte isolation, and storage. For each step we identified principal variables that can alter microbial community composition or biomolecule profiles: sampling location and timing, host characteristics (e.g., species, age), collection tools and techniques, time and conditions before preservation, preservation method, transport conditions, subsampling and homogenization, and analyte

extraction method. Key variables include undesired microbial growth or loss, contamination with external cells/RNA/DNA, as well as differential lysis efficiencies, inhibitory compounds, and host RNA/DNA co-isolation during extraction.

Discussion & conclusion

Mapping these steps and variables provides a foundation for harmonized procedures and metadata capture, and development of guidelines. Standardized documentation and processes are needed to reduce variability, improve reproducibility, and enable interoperable biobanking for microbiome research.

524: Beyond Biomarkers: Modular Proficiency Testing for Liquid Biobanking Reveals Persistent Pre-Analytical Variability

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Topic: 8C: Mastering Pre-Analytics: Key to Reliable Biobanking and Biomedical Research

Presenter Name: Sven Heiling

Keywords: *Proficiency test, biobank-specific processes, harmonization, pre-analytical variability, standardization*

Background: Standardized and reproducible sample-processing workflows in biobanks are essential for high-quality biomedical research, as pre-analytical variability can compromise the reliability of omics analyses. Despite growing recognition, few proficiency testing (PT) programs address biobank-specific process requirements. To close this gap, we initiated a modular PT program for liquid biobanking to systematically assess key steps along the sample-handling chain and support continuous quality improvement across sites.

Methods: Over recent years, four PTs were conducted (two national & two international involving 54 unique biobanks). Modules

covered entry control/documentation, aliquoting accuracy, aliquot homogeneity, shipping temperature monitoring, NMR-based contamination screening, and longitudinal progress checks. Questionnaires captured sitespecific workflows to contextualize deviations and identify optimization potential.

Results: Across multiple PT rounds, inhomogeneous samples recurred, indicating persistent pre-analytical variability and challenging root-cause attribution. Harmonization needs were most evident for centrifugation conditions. Volume accuracy assessments revealed substantial deviations, mainly associated with manual pipetting. In contrast, entry control improved markedly over time, especially regarding the recognition and documentation of fill levels. Questionnaires systematically captured typical process variations and helped to prioritize optimization and corrective actions. Progress checks enabled the early identification of structural quality issues, including recurrent insufficient cryotube closure at certain sites.

Conclusions: Iterative PT development shifted the program from cross-sectional assessment towards longitudinal monitoring and targeted process stabilization. Future work will broaden the PT portfolio to additional biospecimens and modules (phase-separation cleanliness, end-to-end temperature profiling) and extend applicability to multicenter studies to further strengthen standardization and reproducibility in liquid biobanking.

523: BLACKOUT – Preparing for the Unexpected

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Abstract ID: 523

Topic: 8C: Mastering Pre-Analytics: Key to Reliable Biobanking and Biomedical Research

Presenter Name: Petra Tauscher

Keywords: Blackout, power outage, quality assurance

Introduction:

Following a multi-year development stage, Biobank Graz (BBMRI.at partner) implemented a blackout concept in 2025, which shall guarantee the maintenance of specified storage conditions for up to 14 days of power outage.

Methods:

All supply lines and device functions were questioned and checked for emergency power supply. Based on the results, a spare refrigeration system and personnel protection measures were retrofitted, LN₂ refueling intervals reduced and the supply via diesel generator redesigned. The Biobank Graz is secured in terms of supplies and equipment, but... BLACKOUT.....WHAT NOW?

Results:

In addition to technical retrofitting further measures were set, such as an annual training on the organizational level; assigning key personnel for on-site presence in case of a blackout; regular full load testing of the emergency power system; defining meeting points in terms of time and location. Furthermore, checklists for monitoring the devices and work instructions were elaborated; a blackout box containing potentially essential items such as a radio, power banks, flashlights, walkie-talkies, etc., completes the biobank's blackout package.

Discussion and Conclusion:

Blackouts most likely happen unexpectedly and it is difficult to fully anticipate their impact. Nonetheless, the Biobank Graz team has tried to consider all eventualities as thoroughly as possible by performing a multifaceted evaluation of the circumstances and an extensive organizational planning to ensure the safety of personnel and the sample quality.

474: Culture medium as a key determinant of ADSC quality in biobanking and biomedical research

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Abstract ID: 474

Topic: 8C: Mastering Pre-Analytics: Key to Reliable Biobanking and Biomedical Research

Presenter Name: Agnieszka Mroczko

Keywords: Adipose-derived stem cells, biobanking, multiomics profiling, pre-analytical variability, xeno-free culture

Introduction

Pre-analytical factors, including cell handling and culture conditions, significantly impact biospecimen quality and the reliability of downstream analyses. Adipose-derived stem cells (ADSCs) are widely utilized in regenerative medicine due to their accessibility, high yield, and immunomodulatory properties. However, the lack of standardized expansion protocols remains a major barrier to clinical translation. Even short-term exposure to different media can profoundly alter cellular phenotypes, compromising reproducibility, data integrity, and GMP-compliant manufacturing.

Materials & methods

ADSCs were isolated from lipoaspirates of healthy female donors under approved ethical protocols. Cells were expanded either in serum-containing DMEM supplemented with 10% FBS or in xeno-free NutriStem medium until 70% confluence (2–4 days) at passage 2, then cultured for 10 days in DMEM. Integrated multi-omics profiling included RNA sequencing and LC–MS/MS proteomics. Differential expression was defined at adjusted $p < 0.05$ and $|\log_2FC| \geq 1$, followed by Reactome pathway enrichment analysis.

Results

Transcriptomic analysis revealed 3,864 significantly altered genes, while proteomics

identified 230 differentially expressed proteins. Data integration demonstrated strong concordance (Pearson $r = 0.57$), confirming consistent medium-dependent molecular reprogramming. NutriStem-cultured ADSCs exhibited higher proliferative activity and genomic stability, whereas DMEM-expanded cells displayed oxidative stress and immunoprime phenotypes.

Discussion & conclusion

Culture medium is a decisive pre-analytical factor shaping ADSC quality and influencing downstream outcomes. Xeno-free NutriStem preserved stem-like features and minimized stress-induced variability, emphasizing the need for stringent pre-analytical standardization to improve reproducibility and the long-term value of biobanked cellular models. Even short-term serum exposure can shift ADSCs toward a stress-responsive state, while xeno-free conditions better maintain therapeutic potential.

11C: Samples ready for multi-omics research

580: Development of a Glioma Patients Collection at the Latvian National Biobank for Multi-Omics and Precision Medicine Studies

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Abstract ID: 580

Topic: 11C: Samples Ready for Multi-Omics Research

Presenter Name: Vita Rovite

Keywords: biobank, glioma, personalized medicine

Background

Gliomas, including glioblastoma, are highly aggressive brain tumors with poor prognosis and marked inter-patient heterogeneity. Well-characterized patient collections integrating biological samples with clinical data are essential to support precision medicine and translational research. The Latvian National Biobank has initiated a dedicated glioma patient collection to enable national and international collaborative studies.

Methods

Glioma patients undergoing neurosurgical treatment were recruited, and biological samples including peripheral blood and tumor tissue were collected alongside harmonized clinical data. To date, approximately 100 patients have been enrolled. The collection has been utilized in two research projects: the international Glioma-PerMed project, focusing on genomic characterization and patient-derived tumor models, and the CanServ spatial transcriptomics project, aimed at investigating tumor heterogeneity and microenvironmental interactions.

Results

The established collection provides high-quality biospecimens suitable for multi-omics analyses, including whole-exome sequencing and spatial transcriptomics. Initial studies demonstrated the feasibility of integrating biobank resources with advanced experimental platforms, enabling mutational profiling, model development, and spatially resolved transcriptomic analyses of glioma tissue.

Conclusions

The glioma patient collection at the Latvian National Biobank represents a valuable resource for precision oncology research. Its successful application in international projects highlights the role of biobanks in facilitating translational studies and advancing personalized approaches for glioma patients.

665: The UNMC HOPE Biorepository: A Rapid Recovery Autopsy Program Enabling Basic and Translational Research

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Topic: 11C: Samples Ready for Multi-Omics Research

Presenter Name: Paul Grandgenett

Keywords: biobank, omics, pancreas cancer, rapid autopsy program, tissue donation, warm autopsy program

Introduction: The University of Nebraska Medical Center H.O.P.E. Program is a human tissue repository critical to the study of various cancers and provides a resource for advancing basic and translational research. Focusing on pancreas, prostate, and lung cancers, as well as normal tissues, its goal is to rapidly (1-3hrs postmortem) archive and distribute biospecimens necessary for local, national, and international study of early and late-stage disease, including next-generation multi-omics research.

Materials & Methods: The repository houses >238kg of tissue samples and >83 liters of biofluids from 191 hepatopancreatobiliary cancer donors, 133 non-cancer donors, 5 prostate cancer and 1 squamous cell carcinoma donor. This archive also includes >13k FFPE

blocks and >100 PDX models available for studies. Various omic-techniques, including CosMX, GeoMX, Visium, as well as AI-powered Deep Visual Proteomics (DVP) were used to study these samples.

Results: The study of pancreas cancer PanIN lesions using DVP illustrate early inflammatory response, changes in glycosylation patterns, immune and antigen presentation, and metabolic and membrane adaptations, while spatial analysis of advanced primary and metastatic lesions demonstrates significant transcriptomic and tumor microenvironment heterogeneity.

Conclusions & Discussion: Rapid collection procedures allow for omic-based analysis of early disease lesions, organ-specific effects, advanced disease progression, and how cancer impacts unaffected tissues. These samples have contributed to high-impact publications in Cancer Discovery 2026 (in-review), Nature 2025, Cell 2025, and Nature Medicine 2024. UNMC H.O.P.E. Program samples are available to all investigators with meritorious projects through collaborations designed to better understand how cancer develops, grows, and responds to treatment.

Track 4: Advancing biobanking: Skills, partnerships and sustainable solutions for the future

3D: Returning biobank data to participants: Closing the loop

629: Return of the Genomic Laboratory Database: Perspective ethical

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Abstract ID: 629

Topic: 3D: Returning biobank data to participants: Closing the loop

Presenter Name: Liliana Siede

Keywords: Human rights, Returning data, bioethics., unexpected outcomes

In the process of communicating DNA study data, ethical conflicts can arise due to unknown origins or unexpected results. Returning data to patients, from a conflict perspective, requires genetic literacy for those involved, from the perspective of convergent ethics. This approach recognizes the right to research or exploration, mediated by the need to know the history of origin, and the right to precaution, preparing for both preventive and unexpected outcomes.

Furthermore, it considers individual and collective rights regarding the resulting data, mediated by the principle of convergence. This will allow for decisions that weigh risks and benefits to establish a communication strategy that, from an ethical perspective, protects patients from the data. This study examines the interaction between biobanks, patients, and communities on social networks through digital ethnography and grounded theory.

623: Biodiversity Preservation: Challenges and Opportunities in Non-Human Biobanks Biobank for environmental studies. Ethical perspective in the experience in Argentina - 2026

Authors:

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Abstract ID: 623

Topic: 3D: Returning biobank data to participants: Closing the loop

Presenter Name: Liliana Virginia

Keywords: Biodiversity, Bioethics, conservation strategies, ethics of consideration

The importance of the environment and its impact not only on the country's geography and population but also on global society means that biobanks, dedicated to the study of animal and plant specimens, among others, constitute a key tool for their protection. This allows for the development of conservation strategies based on an ethics of consideration, grounded in scientific research.

In Argentina, the Misiones Institute of Biodiversity is carrying out essential work in a context where other parts of the country, such as Argentine Patagonia, are experiencing significant biodiversity loss due to the lack of effective conservation policies. This paper proposes a social media research project using digital ethnography and grounded theory.

5D: From biobanks to precision medicine: Mechanistic disease modules, AI and ethics by design

690: Tumour Banking in a New Era: Organoid Integration in Belgian Cancer Biobanking

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Abstract ID: 690

Topic: 5D: From Biobanks to Precision Medicine: Mechanistic Disease Modules, AI and Ethics by Design

Presenter Name: Natascha Perales Selva

Keywords: BVT, biobank infrastructures, liquid biopsies, organoids, tumourbank

Introduction:

Belgium initiated a Cancer Registry in 2008 as well as an associated Belgian Virtual Tumourbank (BVT), aimed to be a well-

documented catalogue of solid tumour tissue samples. Biobank Antwerp participated from the beginning. BVT inspired most biobanks to collect an array of samples and data even well beyond the original solid tissue, making it a valuable integrated resource.

Results:

These more elaborate local sample collections drove BVT toward inclusion of associated liquid biopsies and subsequently DNA, urine and other biomaterials. Despite some expansion of the initial associated dataset, the recent datafication of the biobanks did not yet fully find its translation on a BVT level. More recently, Biobank Antwerp included the creation of organoids in its standard onco-sample processing flow. With the decline of available residual tumour material due to earlier tumour detection, improved surgical resection techniques, and advances in oncological treatments, such sample types have gained increasing importance and are thought to complement traditional biobanked materials.

Discussion and Conclusion:

Under impetus of local organoid experts, Biobank Antwerp joined forces with other Belgian biobanks active in the organoid field. Plans to establish a Flemish organoid biobank are becoming concrete. In this changing landscape, infrastructures such as the BVT are at risk of not responding rapidly enough while cooperation between BVT and this Flemish organoid initiative could be beneficial to both.

575: Serum GFAP as a Biomarker in Multiple Sclerosis and NMOSD: The key Role of Biobanking in Generating Reliable and Reproducible Clinical Evidence

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Abstract ID: 575

Topic: 5D: From Biobanks to Precision Medicine: Mechanistic Disease Modules, AI and Ethics by Design

Presenter Name: Valentino Paola

Keywords: Biomarker, GFAP, Multiple Sclerosis, NMOSD, neurology

Introduction. Serum glial fibrillary acidic protein (sGFAP), a protein released after astrocytic injury, has emerged as a promising biomarker associated with disease activity in neuromyelitis optica spectrum disorder (NMOSD) and progressive multiple sclerosis (PMS). However, its reference values and clinical utility are not yet fully established. In this setting, biobanks play a fundamental role by providing high-quality, standardized, and ethically managed biospecimens, enabling reliable and reproducible research, in the respect of participants' rights. This study aimed to define normative values for sGFAP, evaluate its effectiveness in monitoring NMOSD activity and explore its role in multidimensional monitoring of MS progression.

Materials and Methods Serum samples were obtained from 139 healthy controls, 15 NMOSD patients (99 samples), and 31 PMS patients (93 samples). All samples were provided by the CRESM Biobank (Orbassano, Italy), part of BBMRI-ERIC. sGFAP was measured by Simoa (Quanterix)

Results Normative values were established by age decades. Application of these reference ranges showed that NMOSD patients with sGFAP above the 75th percentile were more frequent in an acute disease phase. RRMS patients with progression independent from relapse activity showed a trend toward higher prevalence of sGFAP above the 90th percentile.

Baseline sGFAP above the 90th percentile predicted worsening cognitive performance at 12 months.

Conclusions sGFAP appears to be a promising, non-invasive biomarker for personalized clinical monitoring. This work also highlights the crucial role of biobanks in providing high quality samples and data, ensuring ethical standards, and supporting reliable and reproducible research in multiple sclerosis and related neurological and autoimmune diseases.

555: Raman Spectroscopy–Based Detection of FLT3-ITD–Driven Metabolic Signatures and Early Gilteritinib Response in Biobanked Primary AML Cells

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Topic: 5D: From Biobanks to Precision Medicine: Mechanistic Disease Modules, AI and Ethics by Design

Presenter Name: Piotr Mrówka

Keywords: Acute myeloid leukemia (AML), FLT3-ITD, Raman Spectroscopy, drug response

Introduction Acute myeloid leukemia (AML) is characterized by marked molecular heterogeneity, with FLT3 internal tandem duplication (FLT3-ITD) representing one of the most frequent oncogenic alterations. Rapid, label-free approaches capable of identifying mutation-associated metabolic phenotypes and early therapeutic responses could support precision medicine strategies. Raman spectroscopy (RS) provides molecular fingerprints of cells and may enable functional drug response profiling.

Materials and Methods We applied RS microscopy to AML models (FLT3-ITD-positive THP-1 vs wild-type controls) and primary patient samples to characterize FLT3-ITD-associated spectral features and responses to FLT3 inhibitor gilteritinib. Hyperspectral Raman datasets were analyzed using k-means clustering, principal component analysis (PCA), and partial least squares discriminant analysis. Findings were validated using primary AML cells from the IHiT biobank, including FLT3-ITD-positive and FLT3 wild-type specimens, before and after gilteritinib exposure.

Results: Distinct Raman signatures differentiated FLT3-ITD from wild-type AML cells, primarily reflecting alterations in lipid content, hemoproteins, and protein-associated bands. A classification model derived from these spectra enabled discrimination of FLT3 mutational status. Low-dose gilteritinib induced an early spectral shift in FLT3-ITD cells toward a wildtype-like profile in PCA space, whereas wild-type cells showed minimal changes. Consistently, biobanked primary FLT3-ITD AML samples exhibited treatment-associated spectral remodeling, most prominently in lipid- and protein-related regions.

Conclusions Our results demonstrate that RS detects subtle metabolic adaptations to targeted FLT3 inhibition before overt cytotoxicity. The successful application to primary AML cells highlights RS as a promising,

non-destructive platform for functional assessment of drug response and molecular characterization in hematologic malignancies, supporting its future integration into precision medicine diagnostics.

498: Patient-derived Organoids from colorectal lung metastases as a preclinical model for Natural Killer cell therapy

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Topic: 5D: From Biobanks to Precision Medicine: Mechanistic Disease Modules, AI and Ethics by Design

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Keywords: NKs, Organoids, immunotherapy

Introduction

Colorectal cancer (CRC) lung metastasis lacks reliable models for evaluating immunotherapies like Natural Killer (NK) cells. Patient-derived organoids (PDOs) offer a platform to study metastatic niche interactions. We found CRC lung metastasis PDOs show

enhanced growth in lung-specific media, highlighting the microenvironment's role in tumor fitness and providing an optimized model for NK therapeutic testing.

Material & methods

Metastatic PDOs were generated from three patients. To ensure parental tumor recapitulation, models were characterized via H&E staining, IHC, and RNA profiling. Organoids were cultured in organ-specific media to assess growth. Finally, NK cytotoxic activity against PDOs was quantified using CellTiter-Glo® assays to evaluate efficacy.

Results

Characterization confirmed PDOs retained malignant features, displaying dense and cystic morphologies. Inverted microscopy revealed enhanced growth and superior viability in lung-specific media. Regarding immunotherapy assays, a 1:5 (PDO:NK) ratio after 48 hours was identified as the most effective condition, resulting in significant NK-mediated cytotoxicity.

Discussion and conclusion

Results demonstrate that the metastatic microenvironment influences PDO viability; lung-specific factors are essential for maintaining tumor fitness *ex vivo*. By optimizing culture conditions, we established a robust platform reflecting the metastatic niche. This model serves as a "therapeutic probe" for screening NK efficacy, paving the way for personalized immunotherapy in advanced colorectal cancer.

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6D: Patient-centric biobanking: Strategies for engagement and participation

710: Empowering Patients and Aggregating Data in Regional Digital Medicine Centers: Building a Comprehensive Data Infrastructure based on Integration and Biobanking

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Abstract ID: 710

Topic: 6D: Patient-Centric Biobanking: Strategies for Engagement and Participation

Presenter Name: Emilia Spyrka

Keywords: Digital medicine; data integration;

multi-omics-compatible samples; patient-

reported outcomes

Introduction

Digital medicine depends on the integration of heterogeneous data from multiple sources, including clinical, biological, imaging, biobanking, and patient-reported data. The DISRUPTOR project aims to establish a Regional Digital Medicine Center (RDMC) to facilitate the collection, integration, and use of these data for both research and clinical practice.

Materials and Methods

Biological material and data are collected across two clinical domains: rare diseases, characterized by high data diversity from relatively small patient populations, and cardiovascular diseases, involving larger, more homogeneous cohorts. Biological samples are stored in the Wroclaw Medical University Biobank, with full ISO20387 compliance. Moreover, WGS data are generated in accordance with the European 1+ MG initiative. Patient-reported outcomes are collected via a health status questionnaire developed by the Medical Research Agency, standardized quality-of-life instruments (e.g., EQ-5D-5L), and a digital literacy questionnaire.

Results

All datasets are preprocessed and prepared for integration to provide a comprehensive representation of patient information. Survey and patient-reported data are standardized and linked with biobank and clinical datasets, enabling multidimensional analyses and

facilitating comparison across different clinical scenarios.

Discussion and Conclusions

The Biobank, as a core component of the RDMC, is continuously expanding its collection of biological material and associated data. Planned integration of additional data types will support multimodal analyses and enable the progressive inclusion of further clinical domains. This approach demonstrates the potential of RDMCs to generate high-quality, interoperable datasets that support both translational research and clinical decision-making in compliance with ISO 20387.

References

This research was supported by the project “Digital Medicine: an Innovative Approach for Support and Upgrade of Diagnosis and Therapy Based on Research (RCMC ‘DISRUPTOR’ at Wroclaw Medical University)”, financed by the Medical Research Agency under contract No. 2023/ABM/02/00003-00. The study was approved by the Bioethics Committee (Resolution No. KB 316/2024 of April 26, 2024).

579: Understanding Patient and Public Involvement and Engagement (PPIE) in Biobanking

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Abstract ID: 579

Topic: 6D: Patient-Centric Biobanking: Strategies for Engagement and Participation

Presenter Name: Manuela Pausan

Keywords: PPIE in biobanking, engagement, involvement, partnerships, survey

Constant dialogue with patients, caregivers, and the public is a key guiding principle in biobanking. However, public and patient involvement, often referred to as research participant engagement, has not yet become the usual practice across biobanks. In many biobanks, engagement is often limited to one-

way communication, with participants being informed rather than involved. Public and Patient Involvement and Engagement (PPIE) in research is defined as "research being carried out 'with' or 'by' members of the public rather than 'to,' 'about' or 'for' them". Valuing the opinions and experiences of patients, caregivers, and the public in all kinds of research activities will bring about meaningful insights that will ultimately benefit the whole biobanking community. While some biobanks have begun integrating patient and public perspectives into the development of informed consent materials, recruitment strategies, and other ethical, legal and societal aspects in biobanking, such practices are not yet common across the biobanking landscape.

We aim to systematically map how biobanks currently involve and engage patients, caregivers and public representatives in shaping biobank initiatives and decisions. Through a Europe-wide survey conducted by the BBMRI-ERIC team, we plan to identify existing approaches, best practices, and gaps in PPIE implementation. The goal is to understand how biobanks collaborate with their communities and collect best practices that can support biobanks in strengthening or expanding their PPIE activities. During EBW26, we would like to share preliminary findings from the survey that was launched in 2025.

568: “PERIFORMANCE: A new approach to Stakeholder Engagement and ELSI for trustworthy Cancer Mission innovation”

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Abstract ID: 568

Topic: 6D: Patient-Centric Biobanking: Strategies for Engagement and Participation

Presenter Name: Pilar Caro

Keywords: EU Cancer Mission; Stakeholder Engagement; ELSI; Responsible AI; Health Data; Biobanks;

Active Participation; Patients and citizens empowerment

PERIFORMANCE (Public Engagement in Research Infrastructures for Mission Cancer) aims to transform **EU Mission on Cancer** by reshaping stakeholder engagement and strengthening the ethical, legal and social perspective within the cancer research process.

The **EU Mission** aims to accelerate knowledge and improve clinical outcomes and evidence-based policy across prevention, diagnosis, treatment and quality of life¹ with the implementation of emerging technologies and infrastructures - such as Artificial Intelligence and the European Health Data Space (EHDS)– creating new opportunities for advancing research through improved data access, interoperability and collaboration. However, to ensure these innovations benefit all citizens and reduce health inequalities, it is essential to foster equitable and trustworthy progress, which requires meaningful engagement to embed social values and needs, while promoting public trust into research design, governance and technological development^{3,4}.

PERIFORMANCE, coordinated by BBMRI-ERIC, aims to build capacity and expertise on stakeholder engagement and the ethical, legal, and societal implications of AI and EHDS, supporting local participatory initiatives, providing training to foster social innovation aligned with the Mission; and shifting engagement from a peripheral activity to a core and co-creative process.

For this, **PERIFORMANCE** uses a mixed-methods approach that includes systematic reviews, focus groups, local participatory projects and multi-country case studies, to identify gaps, barriers and best practices in stakeholder engagement across diverse contexts. In doing so, **PERIFORMANCE** seeks to enhance the relevance, fairness and impact of cancer research by aligning technological innovation with societal values and needs. Ultimately, this will promote a more inclusive, responsive and trusted cancer landscape across Europe.

551: Learning from recruitment to build a better follow-up: the Cantabria Cohort experience

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Abstract ID: 551

Topic: 6D: Patient-Centric Biobanking: Strategies for Engagement and Participation

Presenter Name: María José Marín Vidalled

Keywords: population-based Cohort, questionnaires, survey, user experince

Introduction

Cantabria Cohort is a prospective population-based study led by IDIVAL and Marqués de Valdecilla University Hospital. It has recruited 50,000 Cantabria residents aged 40–70 years and integrates a collection of biological samples with extensive lifestyle, socioeconomic and clinical data.

Material & Methods

To assess participants' experience during the recruitment phase, several feedback and monitoring tools were implemented using REDCap. These included opinion questionnaires, user experiences with 20 participants, as well as continuous logging of daily incidents and participant queries.

Results, Discussion and Conclusion

Findings from the recruitment phase led to adaptations aimed at improving participation,

data quality and long-term follow-up. Attendance rates improved by 7.3% after optimizing the reminder protocol, including telephone calls two days before visits. Opinion survey results (n = 9,400) showed that 13% of participants did not receive any questionnaire, 18% experienced difficulties completing them, 28% did not find appropriate response options, and 27% considered them too long. In response, delivery systems were adapted to increase response rates, offering an interview-based completion format and improving usability of digital tools. Besides, 60.4% of respondents accessed to answer the questionnaires via WhatsApp. Participants also expressed strong interest (93.2%) in a more comprehensive assessment, leading to the inclusion of additional exams. Result reporting was enhanced by integrating laboratory reports into electronic health records for potential clinical use. Altogether, these measures support participant retention and provide transferable lessons for sustainable follow-up.

539: Integration of an Established Cohort into a Biobank: A Collaborative Success Story in Leukemia Research

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Topic: 6D: Patient-Centric Biobanking: Strategies for Engagement and Participation

Presenter Name: Monika Valjan

Keywords: , ISO-certified, collaboration, hematology, leukemia, new therapies, patient care, patient engagement

Introduction

Since 1995, the Clinical Division of Hematology has been engaged in leukemia biobanking, preserving viable blood and bone marrow samples from leukemia patients in liquid nitrogen for future research. This initiative is vital for studying leukemia's underlying mechanisms and developing new therapies. While initially research-focused, the biobank's applications have expanded into clinical routine, aiding in therapy confirmation and family analyses.

Material and Methods

The integration of the existing leukemia sample collection of the Division of Hematology into the Biobank of the Medical University of Graz (BBMRI.at partner) is a strategic collaboration. This partnership was further supported by the patient-organized charity "Leukämiehilfe Steiermark", which funded a liquid nitrogen tank and a one-year technician position—both essential for establishing and implementing the collaboration.

Results

This collaboration expanded the portfolio of Biobank Graz and introduced ISO-certified quality standards into the leukemia sample collection of the Division of Hematology. It established a unique, high-quality biospecimen resource that enhances leukemia research, patient care, and the attractiveness of both partners for national and international collaborations.

Conclusion:

The successful integration of the leukemia biobank highlights the importance of collaboration among clinicians, biobanks, and patients. This model enhances the quality and

applicability of biobanked samples, advancing leukemia research and improving therapy development. The findings emphasize biobanking's crucial role in clinical settings and its increasing impact on treatment decisions and research initiatives. Ultimately, the project demonstrates that active involvement of the public and patient-organized charities can substantially improve the feasibility and implementation of infrastructural improvements within universities.

11D: Eco-friendly green biobanking: Innovations and solutions

705: Towards a more sustainable and efficient use of freezer space – National Freezer challenge in the Netherlands

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Abstract ID: 705

Topic: 11D: Eco-Friendly Green Biobanking: Innovations and Solutions

Presenter Name: Ellis Niemantsverdriet

Keywords: Greening, ULTs, cold-storage

INTRODUCTION

Cold-storage is essential for biomedical research but represents one of the most energy consumers in the laboratory infrastructure. Ultra-low temperature (ULT) freezers operating at -80°C consume approximately the same amount of electricity as two average Dutch households, while liquid-nitrogen systems require even more. Additionally, institutions operate large number of -20°C freezers, which contribute substantially to overall energy use. The

[National Dutch Freezer Challenge 2025](#) aims to reduce CO₂ emissions and operational costs by promoting more efficient use of cold-storage capacity.

METHODS

Institutions were encouraged to identify and remove redundant or outdated samples to optimize storage space and avoid the purchase of freezers. In parallel, the central biobank facility of the Leiden University Medical Center (LUMC) initiated the centralization of ULTs. All departments with decentral ULTs were obligated to provide a complete sample inventory, enabling an evaluation of whether stored materials remained valuable for retention. Subsequently, legal and ethical compliance checks were performed, and once approved, the freezer and its inventory was entrusted to the biobank facility for centralized management.

RESULTS

Preliminary results from the LUMC, show that reducing storage volume can lead to measurable energy savings. The largest reduction occurred in the -80°C ULTs, where 6225 boxes were removed – equivalent to the capacity of approximately eleven standalone ULT freezers.

CONCLUSIONS

Efficient freezer management enhances laboratory sustainability. By critically evaluating which materials must be retained, institutions can consolidate storage, reduce the number of active freezers, avoid unnecessary purchases, and switch off outdated units, resulting in immediate energy and cost savings.

603: Validation of plasma lyophilisation as an alternative to deep freezing for biobanks

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Abstract ID: 603

Topic: 11D: Eco-Friendly Green Biobanking:
Innovations and Solutions

Presenter Name: Daniel Alba-Olano

Keywords: Biospecimen science, Lyophilization,
Sample preservation, Sustainability

Introduction: A more sustainable alternative to freezing for preserving samples stored in biobanks is lyophilization, a method of dehydrating biological samples that allows them to be kept at room temperature for long periods of time. The objective of the study was to validate plasma lyophilisation as a room-temperature storage format equivalent to freezing, evaluating the quality and functionality of samples.

Methods: Plasma samples collected in tubes with different anticoagulants, such as EDTA and citrate, from 20 donors from the CNIO Biobank were studied. Samples were stored by freezing(-80 °C) and at room temperature, after being lyophilised using the S3 system (300K Solutions). Cytokines IL-8 and IL-16 were determined as plasma quality markers by ELISA at three storage times(0,+2 and +6 months). Overall protein integrity was assessed by polyacrylamide gel electrophoresis.

Results: Cytokines showed no significant differences over time or by type of anticoagulant after 6 months of storage. No significant interaction between anticoagulant and time was observed. Although nor frozen or lyophilised samples were fully comparable with fresh samples (gold standard) for cytokine quantification, no significant differences were detected between lyophilisation and freezing in most of the conditions evaluated. Overall protein profiles remained comparable between storage methods and storage times.

Conclusions: Plasma stabilisation by lyophilisation with the S3 system and storage at room temperature maintains analytical quality parameters comparable to freezing at -80 °C for the biomarkers studied, supporting its use as a viable and reliable alternative to freezing in biobanks and research centres, with

potential impact on the sustainability and logistics of multicentre studies.

597: Optimizing human sample storage in biobank: 300k solutions technology as an alternative to freezing

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Topic: 11D: Eco-Friendly Green Biobanking: Innovations and Solutions

Presenter Name: Tatiana Díaz | Pedro Ferro

Keywords: 300k solutions technology, Biobanking, Protein stability, Room temperature storage, Sustainability

Biobanks are platforms that support biomedical research, where biological samples of human origin are preserved according to criteria of optimal quality, traceability, harmonization, and safety.

Standard storage equipment used by these platforms consists of -80°C ultra-low temperature freezers. This represents a high economic and environmental cost.

Therefore, they are exploring alternatives to the established sample preservation model. Storing samples at room temperature presents a great opportunity as long as it guarantees their quality and integrity in the long term.

The objective of this study was to perform a long-term comparison of the preservation of lyophilized serum samples using 300k solutions technology stored at room temperature.

20 controls and 30 obese patients were selected, and a blood sample was taken and processed at the BBSSPA, Malaga Provincial Node. One serum sample was frozen at 80°C and another was processed using 300K technology. Both samples were stored for 6 and 12 months and analyzed by ELISA to determine two proteins levels: Leptin and CRP.

Data obtained show that the levels of both proteins remained at the same concentrations with respect to time zero in the two tested conditions and it was observed no statistically significant differences between the samples kept cold and those kept at room temperature with the 300k technology.

In conclusion, 300k technology is positioned as a good alternative for the preservation of human biological samples at room temperature, which would represent a great energy and economic saving for biobanks and facilitate the transport of samples between research centers.

571: Effects of room temperature storage and different fixatives on blood clots for obtaining nucleic acids

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Abstract ID: 571

Topic: 11D: Eco-Friendly Green Biobanking: Innovations and Solutions

Presenter Name: Pedro Ferro

Keywords: Blood coats, DNA extraction, biobank, room temperature storage

Human biobanks are biorepositories of biological sample collections and health information that facilitate biomedical research to improve our understanding of various human diseases, such as cancer, allergies, and rare diseases, thus providing answers to current diagnostic and treatment challenges. One of the biggest challenges they currently face is finding new storage methods that allow for the preservation of biological samples at room temperature, thereby reducing the costs of maintaining sample collections and creating much more sustainable biobanks.

The objective of this study was to assess whether the inclusion of blood clots in paraffin could be an alternative to preservibiobanking blood at room temperature.

Five tubes of blood without anticoagulant were collected from 10 volunteers. After clotting, one tube was frozen, and the others were fixed for 12 and 24 hours in four different fixatives:

4% formalin, 2% acetic acid, 4% acetic acid, and absolute ethanol. After fixation, the samples were embedded in paraffin and stored for eight years. Then, DNA and RNA were extracted, purified and quantified from the samples using commercial Qiagen kits.

Results show that the best yields were obtained for the frozen samples, but the samples included in 4% acetic acid showed a high yield with very good quality in relation to the rest of the fixatives tested, for obtaining DNA, although the results in RNA were not as promising.

In conclusion, fixation with 4% acetic acid could be a storage proposal for blood samples in order to obtain DNA under optimal conditions.

536: Biobank greening in the Netherlands: Extending the BBMRI-ERIC survey

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Abstract ID: 536

Topic: 11D: Eco-Friendly Green Biobanking: Innovations and Solutions

Presenter Name: Jörg Hamann

Keywords: Biobank, Greening, Survey

Introduction – In 2024, BBMRI-ERIC conducted a survey on biobank greening among affiliated biobanks. BBMRI.nl extended this survey for the Netherlands.

Methods – Central biobanks at seven academic medical centers and two specialized oncological research hospitals participated, together supporting over 1,000 individual biobank collections. These facilities mainly provide sample storage services, and several also perform pre-analytical workflows. In addition, Lifelines – the largest Dutch

population based biobank with 157,000 participants and independent logistics – contributed data. Overall, the survey is more than 90% representative for biobank sample storage in the Netherlands and partially representative for pre-analytical processes.

Results – All participating biobanks reported using energy-intensive infrastructure, including ultra-low temperature (ULT) freezers, cryogenic storage systems, and heating, ventilation, and air conditioning (HVAC) systems. Large-scale ULT storage units (Carnot systems) are operational at four biobanks. Key challenges to greening biobank operations include limited funding, lack of knowledge or expertise, regulatory constraints, limited availability of sustainable equipment, and insufficient management support. One biobank has established long-term environmental plans, while four others are developing such strategies. Environmental sustainability was rated as extremely important by two biobanks and somewhat important by seven. Priority areas include energy efficiency, sustainable sourcing, and waste reduction.

Conclusions – Interest in biobank greening is growing within the Dutch biobank community, but challenges and effective solutions are not yet fully defined. Energy consumption is currently the main focus, with progress depending on technical innovation and optimized collection management. Greater national alignment should help biobanks prioritize sustainability measures and support broader adoption of effective practices.

473: Green Biobanking: Frameworks, Implementation, and Impact Measurement

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Abstract ID: 473

Topic: 11D: Eco-Friendly Green Biobanking: Innovations and Solutions

Presenter Name: Dr Stéphanie Villar

Keywords: Carbon emissions, Environmental footprint, Green Biobanking, Research infrastructures, Sustainability

The escalating environmental footprint of biobanking operations underscores an urgent need for sustainable practices across the research infrastructure landscape. Green Biobanking—the systematic integration of environmental stewardship into biobank management—offers pathways to reduce carbon emissions, minimize resource consumption, enhance operational resilience. As part of the BBMRI-ERIC Strategic Objective 3.2 ‘Foster green biobanking and Research Infrastructure operations’ (SO3.2), IARC/WHO in collaboration with the School of Public Health at City St. George’s University of London, conducted a review of existing sustainability frameworks applicable to biobanking, including international standards, institutional policies, sector-specific guidelines. We assessed the strengths and limitations of these frameworks in addressing the unique challenges of biobanks, such as energy-intensive cold storage, sample transport logistics, lifecycle impacts of consumables.

Despite the proliferation of sustainability principles, there remains a critical gap in understanding how these frameworks can be effectively implemented within diverse biobank contexts and, importantly, how their

impact can be measured and reported. This work discusses the practical implementation challenges—ranging from governance and behavioural change to infrastructure constraints—and explores tools and indicators for measuring progress, such as carbon accounting, resource use metrics, benchmarking approaches. By fostering shared learning and aligning on measurable targets, biobanks can transition from aspirational commitments to tangible environmental outcomes.

This work highlights the necessity for collaborative efforts to refine existing frameworks, develop actionable implementation strategies, establish robust metrics that enable continuous improvement. As part of SO3.2 it aims to advance green biobanking to support both scientific excellence and environmental responsibility across biobanks and the wider landscape of European research infrastructures.

Special sessions

9A: Disease domain-specific biobanks – Rare disease insights

570: Harmonization of Common Data Elements for Rare Disease Biobanks and Registries Using the CARE-SM Semantic Model

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Abstract ID: 570

Topic: 9A: Disease Domain-specific Biobanks – Rare Disease Insights

Presenter Name: Kristina Vodorezova

Keywords: rare diseases; biobank data integration; common data elements; semantic interoperability; patient registries

Introduction

Rare disease biobanks are essential for research and diagnostics, yet their value is limited by a lack of semantic interoperability between biobanks and patient registries, hindering collaboration and reuse of scarce biospecimens. This gap is reflected in the RD-Connect Sample Catalogue, where patient registry data are available for only 1 out of 15 registered biobanks [1].

Methods

The CARE Semantic Model (CARE-SM) [2], originally designed for rare disease patient registries, was extended to support semantic integration with biobank data. Researcher data requests from Amsterdam UMC and biobank management system schemas (OpenSpecimen) were used to identify biobank-related common data elements (CDE) requiring interoperability with registry-related data elements. A three-way mapping was performed between OpenSpecimen data dictionaries, standardized researcher data request schemas, and CARE-SM data elements.

Results

CARE-SM was extended with data elements relevant to rare disease research and biobanking, such as cohort description. Existing elements were refined to support modeling of biospecimen-related concepts, including biobank and consent. All data elements were represented using relevant domain ontologies and aligned with Semantic Science Integrated Ontology, the foundational ontology of CARE-SM.

Discussion and Conclusion

This work presents a preliminary semantic modeling effort aimed at improving biobank data integration. It focuses on harmonizing common data elements between rare disease biobanks and patient registries and demonstrates the feasibility of interoperability testing.

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714: The Bank of Biological Materials of Institute of Rheumatology

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Abstract ID: 714

Topic:

9A: Disease Domain-specific Biobanks – Rare Disease Insights

Presenter Name: Blanka Stiburkova

Keywords: biobank, rare diseases, rheumatic diseases

Introduction

The Bank of Biological Materials at the Institute of Rheumatology is a specialized facility focused on the collection, processing, and long-term storage of human biological samples. It provides high-quality material for immunological, proteomic, and genetic research.

Methods

Biological samples are obtained from patients at the Institute of Rheumatology during routine clinical visits. Collection follows standardized protocols based on patient diagnosis and current treatment, including individuals receiving biologic therapy. All samples are processed in accordance with standard operating procedures to ensure consistent quality and reproducibility. The biobank also maintains longitudinal collections that enable monitoring of dynamic changes in biological, laboratory, and clinical parameters over time.

Results

By the end of 2025, the BBM RU biobank stored more than 246,000 aliquots of biological material, including serum, plasma, whole blood, urine, genomic DNA, RNA, PBMCs, and synovial fluid. These samples were collected from patients with conditions such as arthralgia, ankylosing spondylitis, hyperuricemia and hypouricemia, gout, myositis, psoriatic arthritis, rheumatoid arthritis, juvenile idiopathic arthritis,

osteoarthritis, Raynaud's phenomenon, scleroderma, systemic lupus erythematosus, vasculitides, and VEXAS syndrome. Between 2024 and 2025, eight peer-reviewed Q1 journal publications utilized BBM RÚ samples, underscoring the biobank's active contribution to reproducible clinical and translational research.

Conclusion

By linking well-characterized, high-quality biological samples with detailed clinical data, specialized biobanks enable reproducible research, accelerate the development of new diagnostics and therapies, and promote collaboration among clinicians, academic researchers, and industry partners. The resulting publications demonstrate the systematic use of the biobank in both clinical and translational research and confirm its role as a key infrastructure supporting robust scientific investigation.

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657: CCM_Italia biobank: a longitudinal, national biobanking infrastructure for Familial Cerebral Cavernous Malformations

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Abstract ID: 657

Topic: 9A: Disease Domain-specific Biobanks – Rare Disease Insights

Presenter Name: Deborah Novelli

Keywords: biomarkers, familial cerebral cavernous malformation, longitudinal biobank, rare disease

Introduction

Familial cerebral cavernous malformations (fCCMs) are a rare autosomal dominant cerebrovascular disorder caused by mutations in CCM1, CCM2, or CCM3 genes. Clinical manifestations range from asymptomatic to intracerebral hemorrhage and focal neurological deficits, potentially leading to severe disability or death. To date, the lack of large, well-characterized longitudinal cohorts supported by a dedicated biobanking infrastructure integrating biological, clinical, and imaging data, limits biomarkers discovery and translational research in fCCMs.

Material & methods

Within the CCM_Italia multicenter observational study, we are establishing a prospective, longitudinal Italian fCCM biobank, enrolling pediatric and adult patients, both symptomatic and asymptomatic. Participants are followed over a 2-year period with clinical assessments, brain MRI, and systematic blood collection at baseline, 12, and 24 months. Whole blood, EDTA and citrate plasma are collected, processed according to standard operating procedures shared to clinical centers and are linked to clinical, genetic, and radiological metadata. All samples are centralized and stored in -80°C freezer with continuous temperature monitoring at SATURNE biobank at the Mario Negri Institute for Pharmacological Research (Milan, Italy).

Results

The SATURNE Biobank currently holds centralized baseline samples from 96 patients, and the collection of 1-year follow-up samples is ongoing.

Conclusion

CCM_Italia samples, together with the TREAT_CCM samples already stored in our biobank, will represent the largest Italian biobanking resource dedicated to fCCMs, supporting longitudinal follow-up and standardized data and sample collection. By providing a high quality and well-annotated infrastructure, this biobank will facilitate collaborative biomarkers identification studies and research aimed at achieving a deeper understanding of disease progression and heterogeneity.

628: biobank.cy as a Facilitator Between Researchers and Clinicians for the Molecular Examination of Retinal Dystrophies in Cyprus

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Abstract ID: 628 Topic: 9A: Disease Domain-specific Biobanks – Rare Disease Insights

Presenter Name: Maria Kalogerou

Keywords: Inherited retinal dystrophy, biobank.cy, clinical diagnosis, genomics

Background

Inherited retinal dystrophies (IRDs) form a genetically heterogeneous group of eye diseases that can lead to debilitating visual impairment and even blindness. The present study aims to genetically characterize IRDs in Cyprus through a population representative cohort of ocularly-tested and exome sequenced individuals, addressing a longstanding gap in genomic research on the island.

Methods

1021 individuals recruited to biobank.cy through a single eye medical center were

subjected to comprehensive clinical evaluation and whole exome sequencing (WES). Exomes of patients with clinically defined IRD symptoms were *in silico* examined to identify phenotypecausative alterations, further validated via Sanger sequencing. Computational search for IRD-causing variants was extended to the rest of the cohort.

Results

Of the 23 patients (2.5%) clinically suspected of typical IRD, genetic testing confirmed the diagnosis in 18 cases (78.3%), and led to subtype reclassification in one patient after clinical re-evaluation. *In silico* search for IRD causing variants in the rest of the cohort pinpointed another set of 10 (1% of the cohort) potentially clinically unrecognized individuals. Analyses identified a set of extremely rare IRD-related variants, one novel, and two geographically clustered variants, while pinpointing a presumable founder event.

Conclusion

This first comprehensive examination of IRDs in individuals of Cypriot origin reveals previously unknown genetic characteristics of the population, with important implications for future IRD case management. It also highlights the importance of integrating genetic and clinical practice and demonstrates the value of biobanks as platforms for collaboration between clinicians and researchers to benefit public health.

582: From protocol to research impact: rapid implementation and high demand for a longitudinal acute myeloid leukemia collection at Vilnius Santaros Klinikos Biobank

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Abstract ID: 582

Topic: 9A: Disease Domain-specific Biobanks – Rare Disease Insights

Presenter Name: Laurinaitytė I

Keywords: AI, AML, Acute myeloid leukemia, disease-specific biobank, longitudinal collection

Introduction

Acute myeloid leukemia (AML) is a malignant blood disease arising from uncontrolled proliferation of clonal hematopoietic cells [1]. In Lithuania, approximately 100–110 new cases are diagnosed each year [2]. We established a dedicated AML collection in April 2025, directly initiated by hematologists, who identified a critical need for high-quality longitudinal samples integrated with clinical data to improve disease monitoring and overcome therapy resistance.

Material & methods

We implemented a standardized collection protocol (Figure 1). Peripheral blood and bone marrow samples are collected at specific clinical timepoints based on the treatment method. Samples are processed into viable mononuclear cells and leukocytes fixed in methanol, then linked to pseudonymized health data via our Biobank information management system. To address the lack of clinical detail in ICD-10 coding and achieve granular stratification across 19 ICC subtypes and 3 ELN risk classes, we are also developing a custom EHR-integrated, GDPR-compliant AI pipeline.

Results

Since its inception in April 2025, the collection has rapidly scaled (Figure 2), facilitating six requests in progress for samples and

associated health data. The longitudinal design—capturing the evolutionary trajectory of the disease—has been the primary driver for these requests. Furthermore, initial validation of our AI pipeline on 10 expert-reviewed cases demonstrates its high-level data enrichment capabilities, significantly enhancing the value of the clinical datasets.

Discussion and conclusion

The success of this collection underscores the importance of clinician-biobanker synergy. This framework serves as a model for disease-specific biobanks to accelerate precision medicine and biomarker validation in oncohematology.

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9B: Disease domain-specific biobanks – Oncology insights

692: Novel Concepts in Serum and Plasma Biobanking for Tumor Marker Research

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Abstract ID: 692

Topic: 9B: Disease Domain-specific Biobanks – Oncology Insights

Presenter Name: Marie Karlikova

Keywords: tumor biomarkers - preanalytics multiplex

Introduction

Serum and plasma biobanks are key infrastructures in modern oncology, supporting the discovery, validation, and clinical application of tumor biomarkers. Historically, tumor marker research relied on single

analytes measured at isolated time points, often providing limited biological and clinical insight. Recent advances in serum and plasma biobanking have fundamentally shifted this approach toward longitudinal, data-rich biomarker analyses.

Methods

Contemporary biobanks emphasize repeated sampling across disease stages and treatment courses, enabling assessment of tumor marker dynamics rather than static concentrations. Improved preanalytical standardization, including matrix-specific protocols for serum and plasma, has enhanced biomarker stability and reproducibility, particularly for lowabundance and immune-related markers. The growing use of multiplex and ultra-sensitive analytical platforms allows simultaneous measurement of multiple tumor markers from minimal sample volumes, supporting integrated and functional interpretations of tumor biology.

Conclusion

Increasingly, serum and plasma biobanks are designed to meet translational and regulatory requirements, facilitating biomarker qualification and integration into precision oncology trials. Together, these developments position serum and plasma biobanking as a central driver of clinically meaningful tumor marker research.

656: Cryomolds as morphologic and molecular qualitative controls of frozen tissues

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Abstract ID: 656

Topic: 9B: Disease Domain-specific Biobanks – Oncology Insights

Presenter Name: Zanetti, E

Keywords: breast cancer, cryomold, frozen tissue

Breast cancer is characterized by marked morphological and molecular heterogeneity, which may affect the downstream use of biobanked frozen tissues. Ensuring sample quality and representativeness is essential. To address this issue, we investigated the use of tissue samples embedded in Optimal Cutting Temperature (OCT) medium as long-term qualitative controls for frozen breast cancer specimens.

Surgical breast cancer specimens were evaluated by a qualified pathologist. When eligibility criteria were met (tumoural area ≥ 2 cm, no neoadjuvant therapy), samples from tumoural and adjacent healthy tissue were collected and snap-frozen in liquid nitrogen. A contiguous portion of selected samples was embedded in OCT and stored as cryomolds. Ten cryomolds collected between 2016 and 2025 were retrospectively analyzed. Hematoxylin and eosin (EE)-stained sections were examined to assess concordance with the original diagnosis. IHC for estrogen receptor and cERB2 was performed. DNA was extracted from cryomolds and matched FFPE tissue.

EE cryomold sections allowed histotype discrimination (ductal versus lobular carcinoma) in all cases. Tumour grade was reliably assessable only in samples with marked nuclear pleomorphism. Freezing artifacts were observed in 3 out of 10 samples, particularly in morphologically heterogeneous tissues. DNA was successfully extracted from all cryomolds, with concentrations ranging from 20.5 to 66.6 ng/ μ L. Amplification of a 400 bp sequence showed higher yield in cryomolds compared with two matched FFPE samples collected in 2016.

OCT-embedded cryomolds collected alongside frozen biobank samples represent a valuable long-term resource for morphological and molecular quality control, supporting informed sample selection for future studies.

646: The EMTBN outcome registry – A Pan-European Molecular Tumour Board Outcome Registry within the canSERV Project

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Abstract ID: 646

*Topic: 9B: Disease Domain-specific Biobanks –
Oncology Insights*

Presenter Name: Milos Terzic

*Keywords: Molecular Tumor Board, Precision
Oncology, Real-world evidence, Registries,
canSERV*

Introduction

Molecular Tumour Boards (MTBs) are central to precision oncology, integrating molecular profiling with multidisciplinary expertise to guide personalised cancer treatment. However, outcomes of MTB discussions and subsequent therapeutic decisions are typically documented locally, limiting cross-institutional learning. Within the European canSERV project, the European Molecular Tumour Board Network (EMTBN) was established. Under the EMTBN a Pan-European registry is being developed to collect and make searchable MTB case recommendations and observed treatment outcomes.

Materials and Methods

The registry is implemented using MOLGENIS, a metadata-driven platform leveraging GraphQL to enable powerful and flexible search functionality. Data submission is supported through an interactive web-based interface and via standardised spreadsheet uploads, accommodating centers with different technical capabilities. To ensure data quality and consistency, a detailed data manager manual and training materials have

been provided. For development and demonstration purposes, the outcome registry has been populated with anonymised, publicly available case studies from the Caris Molecular Tumor Board.

Results

The registry successfully supports the structured storage and advanced querying of complex MTB data. Tests using the Caris dataset demonstrated the platform's ability to execute cross-case searches based on real-world molecular and clinical attributes, validating the data model and user workflows.

Discussion

This registry provides a scalable and user-friendly infrastructure for sharing MTB knowledge across Europe. By enabling clinicians to explore previously discussed cases and associated outcomes, the platform supports evidence-informed decision-making and contributes to real-world evidence generation. Integrated within canSERV, the registry lays the foundation for sustainable international collaboration and learning in precision oncology.

566: canSERV – providing cutting edge cancer research services across Europe: Achievements and BBMRI Community Involvement

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Topic: 9B: Disease Domain-specific Biobanks –
Oncology Insights

Presenter Name: Manuela Pausan

Keywords: biobanks, cancer research,
precision medicine, research infrastructures,
research services

canSERV is a € 15 Mio. funded EU project offering cutting-edge research services, enabling innovative R&D projects and fostering precision medicine for patients benefit. canSERV involves 18 leading organizations across Europe including Research Infrastructures, key organisations and oncology experts.

canSERV's main objectives are: offer at least 200 different unique Personalised Oncology relevant and valuable cutting-edge services; establish a single, unified, transnational access platform to request services and trainings; ensure oncology-related data provided will be fully compliant with FAIR principles, complement and synergise with other EU initiatives and ensure long-term sustainability beyond project duration. canSERV establishes the European Molecular Tumour Board Network (EMTBN) open for anyone to join. The EMTBN develops MTB consensus guidelines, an MTB outcome registry, and provides advice to scientists, clinicians, and MTBs.

In the last three years, canSERV has opened a series of calls for access to services in the amount of ~ € 9 Mio. The calls were designed to support researchers to develop innovative research projects exploring cutting-edge methodologies and target critical gaps in cancer research by providing access to services. canSERV launched 8 calls resulting in 447 submissions from 45 countries worldwide, out of which 154 proposals were selected, so far, for service provision. From BBMRI-ERIC community, 71 services providers were involved including 32 biobanks offering access to more than 150 services. Sixty-one BBMRI services were approved for service provisions today.

canSERV presents an unparalleled opportunity to accelerate cancer research, drive innovation, and improve patient outcomes. canSERV is granted by the EU Horizon programme under #101058620.

554: BBMRI-ERIC's role in UNCAN.eu, the European Initiative to UNDERstand CANCER

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Abstract ID: 554

Topic: 9B: Disease Domain-specific Biobanks –
Oncology Insights

Presenter Name: Garcia Alvarez, Eva

Keywords: Europe, cancer, collaborative network, interoperability

Introduction

BBMRI-ERIC[1] (Biobanking and BioMolecular resources Research Infrastructure) contributes to key initiatives related to cancer research, including UNCAN.eu, the European Initiative to UNderstand CANcer.

Methods

UNCAN.eu aims to establish a Decentralised Collaborative Network for Advancing Cancer Research and Innovation, integrating diverse cancer research datasets. To achieve this, UNCAN.eu[2] developed a strategic roadmap, identifying scientific and medical challenges. BBMRI-ERIC leads the governance and infrastructure set-up of the newly launched UNCAN-Connect[3] project, which will establish the central platform for the decentralised collaborative cancer research network, co-developed based on requirements from use cases across multiple cancer types. The National Cancer Data Nodes (NCDNs) within this network, are being conceptualized through CANDLE[4], a synergy project where BBMRI-ERIC is involved in developing best practices for data use, enhancing interoperability with the UNCAN.eu platform and the European Health Data Space, and identifying core skills of NCDNs. Both initiatives collaborate with the EU-CIP[5] project, which develops European Cancer Information Portals, providing reliable information for citizens, with BBMRI-ERIC actively involved, including leading the dissemination and communication tasks.

Results

UNCAN.eu builds on previous projects, such as canSERV[6], which brings together a multidisciplinary consortium to offer oncology research services and is led by BBMRI-ERIC. Another example is EOSC4Cancer[7], where BBMRI-ERIC's participation ensures that biological samples, associated data and biomolecular resources are integrated into this ecosystem.

Conclusion

BBMRI-ERIC plays a pivotal role in shaping cancer research in Europe by ensuring that high-quality biological samples and data are accessible, interoperable, legally and ethically managed.

References

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- [7]<https://eosc4cancer.eu/>

522: European Thoracic Oncology Platform Lungscope project: Matched primary NSCLC and metastases

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*Topic: 9B: Disease Domain-specific Biobanks –
Oncology Insights*

Presenter Name: Rosita Kammler

*Keywords: FFPE tumor tissue, cross-disciplinary
collaboration, multicentric, primary resected
NSCLC and matched metastases*

Background

ETOP Lungscope aims to evaluate the molecular epidemiology of metastatic non-small cell lung (NSCLC) by translational analysis of clinically well-annotated primary resected NSCLC and matched metastases (met).

Methods

Lungscope is a retrospective translational platform study and decentralized biobank, consisting of paired primary NSCLC and met biomaterial, with accompanying comprehensive clinical annotation. The primary endpoints include: concordance between primary tumor and metastasis, time-to-met, association of primary/met features with survival outcomes. A total sample size of 600 matched pairs is planned.

Patients with stage IIIB (pN2+)/IV (8th TNM edition) and available biospecimens (excision/large biopsies for TMA construction and NGS, <12 years old) were eligible.

Clinical annotation required cross-disciplinary collaboration across oncology, pathology, radiology and molecular medicine and included patients demographics, tumor features, treatment and survival outcomes.

In addition to IHC- and ISH-based analyses on TMAs, RNA and DNA will be extracted for NGS-based profiling. The first subproject, IHC scoring for PD-L1, CD8, MTAP, CD73, cMET is ongoing. Staining is centralized in one lab but scoring on the digitalized TMA sections is shared by 15 collaborating pathologists.

Results

Up to 14 October 2025, 353 matched cases were included from 13 centers across 8 countries, with median follow-up 61 months. Primary tumor diagnosis ranged from 2007 to 2025.

Conclusion

The Lungscope iBiobank is the first multicentric comprehensive clinically-annotated database of paired primary NSCLC and met. It provides the unique opportunity to investigate the heterogeneity and clinical significance of biomarkers in primary and matched met

NSCLC, to accelerate and drive breakthroughs in diagnosis, treatment and personalised therapies.

489: Melanoma Biobank for research purposes: fresh tissue, blood and dermoscopy

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Abstract ID: 489

Topic: 9B: Disease Domain-specific Biobanks – Oncology Insights

Presenter Name: Zanetti, E

Keywords: dermoscopy, melanoma

Dermoscopy is the most widely used diagnostic tool for the rapid discrimination between melanoma and other pigmented skin lesions. The melanoma collection of our research biobank includes solid tissues (FFPE and fresh frozen), plasma, PBMCs, and dermoscopic images.

We prospectively recruited patients who were clinically and dermoscopically diagnosed at the Skin Cancer Unit with primary melanoma or melanoma metastases. Only skin specimens presenting as nodular or flat pigmented lesions, or metastases larger than 0.5 cm in diameter, were eligible for biobanking. Lesions were surgically excised with narrow margins and transferred to the Pathology Unit within a maximum of 5 minutes. To preserve tissue for accurate assessment of Breslow thickness, when nodular lesions measured approximately 0.5 cm at the greatest axis, the thickest portion was reserved for routine histopathological

evaluation, while a peripheral area (approximately 20% of the tumour) was sampled for biobanking. For flat lesions, one or two 3-mm punch biopsies were collected from the lesion margins. All sampled tumour tissues, together with matched normal skin, were snap frozen.

Fresh frozen tissue samples were collected from 103 patients, while blood-derived materials were obtained from 77 patients. For five patients, biological samples were collected both at diagnosis and at relapse. Dermoscopic images (ranging from one to six per lesion) were available for 88 patients (78%).

This integrated workflow highlights how close collaboration among biobankers, clinicians, pathologists, and researchers is essential to generate high-quality, well-annotated biospecimens enriched with multidisciplinary data, thereby maximizing their value for translational melanoma research.

481: Generation of Biobanking-Compatible Patient-Derived Organoids (PDOs) from Lung Adenocarcinoma

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Topic: 9B: Disease Domain-specific Biobanks – Oncology Insights

Presenter Name: Zanetti, E

Keywords: lung, organoids, quality control

Primary 3D cultures are an invaluable tool for investigating tumour molecular mechanisms and drug response. Different culturing strategies with varying success rates have been reported in literature for the establishment of lung cancer patients'-derived organoids (PDO). We setup a two-step protocol, allowing for simultaneous isolation of tumorinfiltrating lymphocytes (TILs) and PDOs.

A board-certified pathologist selected samples from lung adenocarcinoma surgical resections of patients enrolled in our institutional biobank. Tissue specimens were partially enzymatically digested to isolate major cellular aggregates, namely the cancer tissueoriginated spheroids (CTOSs). Sequential filtration through strainers with different pore sizes also allowed the recovery of single cells and TILs from the same tissue.

CTOS cultures were further dissociated into single-cell suspensions and embedded in a 3D matrix to generate PDO cultures. After sufficient growth, we setup tight quality check to ensure the fidelity of the PDOs to the original patient. Each PDO was subject to formalin-fix and paraffin-embed to assess morphological features and specific marker expression, by immunohistochemistry (IHC). Mutational profiles of the PDO were compared with diagnostic data from the corresponding tissue of origin by NGS. Organoid growth was monitored using a real-time automated image acquisition system.

From 2021 onwards, 50 lung adenocarcinoma surgical samples were processed, obtaining 16 PDO cultures, growing for more than 5 passages, with a 32% success rate. The successfully established PDOs and corresponding TILs have been biobanked and successfully recovered from freezing. Additionally, the PDOs showed sensitivity to lung cancer specific drugs matching the mutational profile, showing suitability for drug screening.

595: Comprehensive CAR-T cell biobank as platform for patient centered research in Germany

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Abstract ID: 595

Topic: 9B: Disease Domain-specific Biobanks – Oncology Insights

Presenter Name: Dr. med. Theresa Weber | Dr. rer. nat. Philipp Schöppner

Keywords: CAR-T cells, data integration, disease domain-specific biobank, patient-centered research

Introduction

Chimeric antigen receptor (CAR) bearing T cells are genetically modified cells that can selectively recognize and eliminate target cells such as cancer cells¹. They have become a standard of care in several hematologic malignancies². This highly innovative immunotherapy is reshaping the treatment landscape in hematologic oncology by significantly improving patient outcomes. However, the requirements for performing CAR-T cell therapies are strict and restricted to few specialized centers³. Therefore, the accessibility of primary patient samples for research is limited and may hinder patientcentered research.

Material & methods

We established a CAR-T cell biobank creating a unique opportunity for researchers to apply for primary care patient samples. High-quality cellular and plasmatic samples are generated using standardized processing and documentation procedures and are stored according to common gene-modified organism conditions, rendering them fit for purpose for complex laboratory analyses. Additional routine clinical data can be linked to these samples in collaboration with the local data

integration center, tremendously expanding their value for patient-centered research.

Results and discussion

Our new biobank infrastructure involves a close collaboration with the clinic for hematology and our local data integration center for acquiring and collecting primary CAR-T patient samples and linking them to additional clinical data via standardized consenting, processing and documentation workflows. Providing these samples and associated data via online sample location tools, we hope that our easily accessible, high-quality samples will promote research to better understand mechanisms of efficacy and safety of CAR-T cell therapies.

9C: Disease domain-specific biobanks – Neuroscience insights

478: Air pollution and Parkinson's disease: A prospective cohort study with sex-stratified analysis in the UK biobank

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Abstract ID: 478

Topic: 9C: Disease Domain-specific Biobanks – Neuroscience Insights

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Keywords: Air Pollution; Nitrogen Dioxide; Parkinson's Disease; Particulate Matter; Sex Difference.

Air pollution has been suggested as a potential environmental risk factor for Parkinson's disease (PD), but findings remain inconsistent, and sex-specific effects are understudied. This study examined associations between exposure to nitrogen dioxide (NO₂) and particulate matter $\leq 10 \mu\text{m}$ (PM₁₀) and

incident PD, using data from the UK Biobank. Annual levels of NO₂ (2005-2007) and PM₁₀ (2007) were estimated based on residential addresses. Logistic regression models assessed the associations between air pollution exposure and PD onset, adjusting for age, sex, smoking status, and family history of PD. Competing risk models and inverse probability weighting were applied to address survivorship bias and missing data. Sex-stratified analyses explored potential differences by sex. Among 210,417 participants (mean follow-up = 9.17 years), 2592 developed PD. Higher exposure to both NO₂ and PM₁₀ was associated with increased PD risk. In sex-specific models, the associations remained significant in males but not in females. Competing risk models confirmed elevated PD risk with NO₂ (HR = 1.05; 95 % CI: 1.01-1.09) and PM₁₀ (HR = 1.08; 95 % CI: 1.03-1.13) in the overall cohort, with similar or stronger associations in males (NO₂: HR = 1.07; 95 % CI: 1.02-1.13; PM₁₀: HR = 1.07; 95 % CI: 1.02-1.14). In conclusion, long-term exposure to NO₂ and PM₁₀ was linked to increased PD risk, particularly in males. These findings highlight the importance of incorporating sex-specific analyses