

ISBER-UHN 2026 International Biospecimen Summit Abstract Book

ORAL ABSTRACTS

Abstract 4: Rapid Implementation and Scaling of a Prospective Endocrine Surgery Biobank in a High-Volume Specialty Hospital

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Background: Endocrine disease biospecimen collections are often fragmented, limiting access to large, well-annotated cohorts collected under standardized conditions. We established a prospective biobank within a high-volume endocrine surgery hospital to create an integrated clinical and biospecimen resource supporting translational research in adrenal, parathyroid, and thyroid disease.

Methods: Following IRB approval, standardized consent, collection, processing, and informatics workflows were embedded into routine surgical care. Consented patients provide preoperative blood and urine (processed into plasma, serum, PBMCs, DNA, and urine aliquots). Tumor and normal tissues are collected intraoperatively and cryopreserved. Biospecimens are linked to clinical and pathology data and managed through a laboratory information system using standardized SOPs, temperature-controlled storage, and end-to-end traceability.

Results: Collection began November 2025, reaching full scale by February 2026. By July 31, 2026, 757 patients consented and >12,000 cryovials were banked. The cohort includes 316 adrenal (41.7%), 298 parathyroid (39.4%), and 143 thyroid patients (18.9%). Embedding research personnel within clinical workflows enabled rapid accrual of paired tissue, blood, urine, and DNA while maintaining processing consistency and quality. Within its first year, the biobank achieved College of American Pathologists (CAP) Biorepository Accreditation. Demonstrating immediate research utility, the biobank supported two published manuscripts (characterizing silent pheochromocytomas and Primary Pigmented Macronodular Adrenocortical Disease genetic variants in the Cushing syndrome background) and currently supports translational projects investigating bilateral primary aldosteronism and the clinicopathological features of oncocytic thyroid carcinoma.

Conclusions: A high-volume surgical hospital can rapidly scale a clinically annotated, disease-focused biobank by integrating workflows directly into routine care. The combination of rapid accrual, multimodal biospecimen collection, CAP Accreditation, and active research utilization within one year demonstrates that growth, scientific value, and rigorous quality can be achieved concurrently. This model provides a reproducible framework for rare endocrine diseases, creating a platform for collaborative research, biomarker discovery, and future clinical trials.

Abstract 16: Unsustainable Success: Why Productive Research Cohorts Cannot Sustain Biorepository Operations—And Strategies for Long-Term Sustainability

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Statement of the Problem: Long-term highly characterized cohort studies with biorepositories face existential sustainability threats from inflation, reduced institutional indirect costs, and NIH funding stagnation. The ALIVE cohort—a highly productive 40-year, >\$50 million NIH-funded study of 6,000+ people with a history of injecting drugs—exemplifies this paradox. Operating through the Johns Hopkins Biological Repository (JHBR) supporting nearly 100 studies with 2.5+ million specimens in 68 cryogenic tanks, ALIVE maintains 700,000+ unique aliquots linked to deep phenotyping and clinical data, generating 60 independently-funded grants (34 NIH R-type) in last five years. Annual storage costs exceed \$150,000 despite marginal per-unit increases. The fundamental problem: NIH funding mechanisms and the peer review process undervalue biorepository infrastructure, while collaborating investigators often resist broad repository support, seeking only highly-selected phenotypic samples for specific projects. Due to funding limitations, JHBR increasingly receives requests to destroy scientifically invaluable specimens from well characterized cohorts —kidney biopsies, breastmilk from HIV exposed mothers/infants, etc. Proposed Solution: Reimagine sustainability through: (1) Institutional commitment recognizing biorepository infrastructure as essential research investment; (2) Cross-sector partnerships sharing operational costs; (3) Tiered cost-sharing models reframing investigators as invested collaborative partners; (4) Federal dedicated infrastructure funding decoupled from individual grants; (5) Business model diversification including pharmaceutical partnerships and clinical trial support; (6) Philanthropic funding specifically supporting biorepository operations and long-term specimen preservation. Educate research leadership in federal and academic settings, as well as investigators that repository sustainability directly enables their future access to valuable phenotypic samples. Conclusions: Preserving research infrastructure requires systemic change integrating federal, institutional, philanthropic, and collaborative funding. Without reimagined partnerships, irreplaceable specimens and discovery capacity will be lost.

Abstract 18: Advancing Equitable Rare Disease Research: Characterizing a Diverse Pediatric Optic Pathway Glioma Cohort in the Kids Eye Biobank

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Background: Pediatric optic pathway gliomas (OPGs) are rare tumors associated with significant visual, neurological, and endocrine morbidity. Progress in rare disease research is often limited by small cohorts, fragmented datasets, and underrepresentation of diverse populations. Biobanks can address these challenges by integrating clinical, imaging, molecular, and biospecimen resources. We sought to characterize pediatric OPG patients enrolled in the Kids Eye Biobank (KEB) and evaluate the cohort's potential to support collaborative rare disease research.

Methods: We conducted a retrospective cohort study of pediatric patients with OPGs enrolled in the KEB. Demographic, molecular, imaging, treatment, and biospecimen data were analyzed using descriptive statistics. Continuous variables were summarized using medians and interquartile ranges, while categorical variables were reported as frequencies and percentages. Cohort characteristics were assessed overall and by neurofibromatosis type 1 (NF1)-associated and sporadic OPG status.

Results: Forty-five pediatric patients with OPGs were identified, including 58% with NF1-associated OPGs and 42% with sporadic OPGs. The median age at diagnosis was 46 months. Demographic characteristics were broadly similar between groups. The cohort reflected substantial racial, ethnic, cultural, and religious diversity. Genetic reports were available for 58% of patients, while pathology reports were more common among sporadic than NF1-associated OPGs (84% vs. 15%). Molecular alterations, including BRAF and FGFR1 variants, were observed primarily in sporadic tumors. Observation was more common among NF1-associated OPGs (58% vs. 5%), whereas systemic and surgical interventions were more frequent among sporadic OPGs. Biospecimens were available for 44% and images were available for 100% of the cohort. Cohort characteristics were consistent with established OPG literature, supporting the representativeness of the biobank population.

Conclusions: The Kids Eye Biobank contains a diverse and representative cohort of pediatric OPG patients with integrated imaging, molecular, treatment, and biospecimen data. Early-stage collaborations with national and international academic partners aim to expand cohort size and improve population representativeness. This resource provides a platform for biomarker discovery, precision medicine initiatives, and collaborative efforts to advance equitable pediatric OPG research.

Abstract 21: Driving Discovery: Adapting to Key Research Trends at the Ontario Tumour Bank

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Background: The Ontario Tumour Bank (OTB) is a program at the Ontario Institute for Cancer Research and 4 partner healthcare centres across Ontario that supports translational cancer research by providing cancer-related samples and data to researchers around the world. Recent research advances, most notably the widespread use of deep learning / artificial intelligence (AI) models, have demanded that OTB adapt to the changing needs of its academic and commercial research clients.

Methods: We analyzed the types of requests and samples distributed to OTB's clients over the past 5 years and identified a number of key research trends.

Results: Trends included a dramatic increase in the demand for digital H&E-stained whole slide images for AI model development; a substantial increase in demand for plasma and formalin-fixed paraffin-embedded tumour tissue for early cancer detection platforms; and an increase in demand for multiple and/or matched samples per individual participant for multi-omics assays. To meet this demand, we have made several improvements to our operations. We have doubled our accrual of blood tubes at our partner sites; implemented a new inventory management system that greatly improves sample tracking and data integrity; adopted a new business intelligence software program to better analyze accrual and distribution trends; streamlined our application process; and modified our Material Transfer Agreement template so that it can be used for multiple projects without requiring amendments. After implementing these changes, we have successfully met the year-over-year increased demand and supported our highest ever number of projects (36) and number of samples distributed (6,546) in our last fiscal year. We continue to make regular updates to OTB's inventory management system and business intelligence reports to better facilitate requests and ensure that key research trends can be readily monitored.

Conclusions: Although we have been successful at supporting a significant number of requests, OTB will need to better monitor the trends for unfulfillable requests. For example, we have identified a significant increase in the demand for samples with biomarker/molecular characterization data, which we currently cannot fulfill until a new privacy and risk assessment is completed. OTB will continue to monitor key research trends and client request patterns to adapt our operations to support the ever-changing landscape of cancer research.

Abstract 24: Engaging Participant Advisors to Inform Blood Collection: Lessons from the Ontario Health Study

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Background: Participant engagement is increasingly recognized as an important component of biobank and cohort study operations. As part of a second blood collection initiative, the Ontario Health Study (OHS) piloted a Participant Advisor program to evaluate the feasibility and value of involving participants in the review of study communications and collection strategies, while assessing the potential for a future Participant Advisory Council. **Methods:** One hundred participants eligible for the second blood collection project were invited by email to become Participant Advisors. SurveyMonkey was used to collect feedback through brief online consultations. Two assignments were conducted over four months. The first sought feedback on draft invitation emails, reminder communications, and a contraindication screening questionnaire. The second explored participant willingness to store blood collection kits at home for up to three months and solicited concerns regarding temporary kit storage. **Results:** Thirty-one participants (31%) expressed interest in serving as advisors. Of these, 24 (77.4%) completed the first consultation and 22 (71.0%) completed the second. Participant feedback was detailed, actionable, and directly informed revisions to communication materials before submission for research ethics review. Advisors also provided valuable insight into operational planning, indicating that temporary home storage of blood collection kits would be acceptable if required. The consultation process generated only two participant inquiries and no telephone calls, demonstrating that the online approach was convenient and well accepted. The pilot also resulted in the creation of a participant advisor roster to support future engagement activities. **Conclusions:** The pilot demonstrated that study participants are willing to contribute as advisors and can provide meaningful input that strengthens participant-facing communications and informs operational decision-making. The approach was feasible, scalable, and resource-efficient, supporting the development of a broader participant engagement strategy. These findings suggest that participant advisors can serve as a valuable resource for biobanks seeking to incorporate participant perspectives into study design, communications, and implementation.

Abstract 43: Evolving Best Practices for Biospecimen Resources: The Fourth Edition of the NCI Best Practices for Biospecimen Resources

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Background: Human biospecimens are the foundation of translational research and precision medicine, although the reproducibility and reliability of the data derived from them depend on consistent, appropriate collection, processing, storage, annotation, and access practices. To capture updates in U.S. policy, scientific and technological advancements in the biobanking field, and the availability of additional standards and guidance, the National Cancer Institute (NCI) has released the 4th Edition of the NCI Best Practices for Biospecimen Resources (NCI Best Practices).

Methods: NCI subject-matter experts updated their respective sections using current U.S. policies and recent standards, international guidance, and biospecimen science literature; references, web resources, and appendices. The complete draft underwent multidisciplinary review, and the final document is 508 compliant.

Results: Key revisions to the Fourth Edition include restructuring to introduce ethical, regulatory, and operational planning, and resource development considerations at the outset. The new edition also frames participants and communities as research partners, placing an onus on transparency, consent, privacy, stewardship, access, and the return of aggregate results and analytically validated individual results that are medically significant or clinically actionable. Resource sustainability, legacy, and contingency planning are approached proactively. Technical and operational information was updated, and evidence-based SOP development was highlighted as a preferred approach. Appendices were annexed to a separate document and include an updated governance-plan template, an NCI Biospecimen Evidence-Based Practice for cell-free microRNA, and a College of American Pathologists (CAP) Biorepository Accreditation Program checklist. In total, approximately 300 references were added or updated.

Conclusions: The Fourth Edition provides an adaptable, U.S.-focused framework for all human biospecimen resources, from formal biobanks to small collections, and complements international guidance such as the ISBER Best Practices. The Fourth Edition of the NCI Best Practices and its associated appendices are publicly available online.

Abstract 50: Operational Scaling of the Aswan Heart Centre Cardiovascular Biobank: Standardization, Quality, and Traceability

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Background/Purpose: From 2014 to 2026, the Aswan Heart Centre (AHC) Cardiovascular Biobank expanded in participant numbers, cardiovascular studies, clinical services, and longitudinal sampling, increasing operational complexity. Scalable and standardized processes were required to maintain biospecimen quality, traceability, and governance during scale-up.

Methods: The AHC Biobank expanded across three clinical sites in Aswan, Ballana, and Abdeen, supporting 15 research projects. Standardized SOPs for biospecimen collection, processing, storage, and quality control were implemented and reviewed annually. End-to-end traceability was established from collection through processing, storage, retrieval, and research use, including sample volume and utilization tracking. Quarterly audits assessed participant-sample linkage, record completeness, sample identification, and physical sample location across disease cohorts, with discrepancies reviewed and corrective actions undertaken. Research access was governed through scientific review, project registration, material transfer agreements, and controlled access. Data management used REDCap, HIMS, and Elo, supported by R-based auditing and data quality activities.

Results: The AHC Biobank includes 10,326 participants and 162,283 stored biospecimens and aliquots. Between 2016 and 2026, 6,064 biospecimen vials were retrieved for research, including 3,582 DNA, 2,306 serum/plasma, and 176 frozen tissue vials. SOP review and revision, quality monitoring, quarterly auditing, and strengthened governance were maintained as sample volume, participant numbers, and research utilization increased.

Implementation of a Laboratory Information Management System (LIMS) is ongoing to further integrate inventory, sample tracking, retrieval, audit trails, and reporting.

Conclusions: The AHC experience demonstrates that biobank quality systems must evolve alongside sample volume and operational complexity. Standardized SOPs, QC, auditing, traceability, and research governance provide a structured approach to maintaining quality and research readiness during scale-up. These lessons provide a practical, standards-based framework for growing biobanks seeking to expand while maintaining quality and traceability.

Abstract 51: Systematic Evaluation of Preanalytical Variables Affecting Cerebrospinal Fluid and Plasma Proteomics

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Background: Preanalytical variations (PAVs) can compromise biospecimen quality and reproducibility, yet their effects on cerebrospinal fluid (CSF) proteomics remain insufficiently characterized. We systematically evaluated common PAVs in CSF and plasma to support biobanking and biomarker studies.

Methods: CSF and plasma were collected at an ISO 20387-accredited biobank. Three CSF or four plasma biological replicates were divided into paired aliquots and exposed to variations in processing delay and temperature, storage temperature, freeze-thaw cycles, centrifugation, collection or storage tube type, and blood contamination or hemolysis. More than 7,000 proteins were measured using the SomaScan 7K assay. Only analytes with coefficients of variation <15% were analyzed. Changes were defined as $|\log_2 \text{fold change}| > 0.5$ with nominal $p < 0.05$, and selected findings were evaluated by orthogonal immunoassays.

Results: Processing delay and storage temperature had the largest effects. After 24 h at 25°C, 85 CSF analytes and 1,415 plasma analytes changed. CSF was comparatively stable at 4°C for 24 h, with 22 changed analytes, whereas plasma showed 953 changed analytes. Four weeks at -20°C caused extensive changes in CSF (349 analytes) and plasma (2,217 analytes), whereas plasma stored at -50°C was comparable to -80°C. Up to three freeze-thaw cycles produced relatively few changes, but 11 cycles altered 563 CSF and 152 plasma analytes. CSF blood contamination at ≤ 500 cells/mm³ had little effect, whereas plasma hemolysis altered 54 analytes. CSF centrifugation at 1,000–4,000 g produced no detectable changes. Tube-related effects were limited: two analytes changed among CSF collection tube types, eight after five-year CSF storage in untreated versus low-binding tubes, none between two plasma collection tubes, and one between two plasma storage tube brands. Fibrinogen and IL-8 findings showed concordant directional changes by immunoassay.

Conclusions: Plasma proteomics is more sensitive than CSF proteomics to processing delays and temperature. For proteomic applications, CSF should be processed within 4 h or kept at 4°C, plasma within 2 h, both matrices stored at $\leq -80^\circ\text{C}$, and freeze-thaw cycles limited to three. Centrifugation and tube types had comparatively minor effects under the tested conditions. These data provide a fit-for-purpose framework for biobank processing, quality assessment, and interpretation of archived biospecimens.

POSTER ABSTRACTS

Biobank Tools

Abstract 1: A Framework for a Biobank Database Build: Discovery, Build, Validation

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Problem Statement

Werfen amassed an inventory of 100,000+ human citrated plasma specimens through clinical studies, transfer agreements, and commercial suppliers over more than 20 years. The inventory supported assay development, validation studies, and quality initiatives. Historically, specimens were managed by siloed groups with tailored characterization practices, presenting a harmonization challenge. Key data elements, including collection date, source, donor diagnosis, drug therapy, instrument performance, storage location, and disposition, were recorded inconsistently. These fragmented practices limited cross-group utilization and systematic specimen reuse. Finally, the lack of real-time visibility into inventory status contributed to delays in identifying available specimens, forecasting inventory needs, and performing life-cycle management.

Solution

The team developed a dedicated FileMaker®-based biorepository inventory platform, using a three-phase approach: Discovery, Build, and Validation. During Discovery, a week-long working session detailed current practices, stakeholder needs, process gaps, and functional requirements. Over a year-long Build phase, design decisions followed a minimum viable product (MVP) approach to prioritize critical features, reduce complexity, and support trainability and maintenance. In a two-month Validation phase, governance procedures were evaluated, and each field, function, field relationships, and value list assessed against database needs.

Conclusion

Transitioning from fragmented tracking to a centralized database strengthened the ability to support research, quality, and regulatory needs. A post-implementation period of six months gave the team practical experience to reassess database features and functions. This activity reinforced the value of limiting the initial build to essential capabilities and deferring updates until operational needs were better understood. The Discovery-Build-Validation framework, combined with an MVP philosophy, enabled harmonization while controlling complexity. The database positions the biorepository as a more transparent, compliant, efficient, and scalable resource for scientific programs and cross-functional stakeholders in Werfen.

Abstract 2: Quantitative Tool for Calculating and Classifying Dried Blood Spot Surface Area on Whatman ProteinSaver Cards

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Statement of the Problem

As biobanking moves toward increasingly sensitive downstream analytical techniques, the use of participant-collected, small-volume specimens becomes more desirable to conserve storage and reduce collection costs. Dried blood spot (DBS) collections represent a cost-effective, minimally invasive, and scalable biospecimen architecture. In March 2021, the Canadian Partnership for Tomorrow's Health, which includes the Ontario Health Study (OHS), collected DBS cards from a subset of participants for COVID serology testing. At project completion, the OHS archived approximately 19,000 participant-collected whole blood specimens on Whatman ProteinSaver 903 cards at -80°C.

Initial intake and inventory scoring of the DBS cards used a qualitative 1 to 5 visual score based on technician discretion over a two-year period. This approach produced substantial scoring variability and did not capture specimen depletion following a disc punch. Consequently, when researchers requested archived samples, biobank staff discovered cards containing substantially less blood than initially documented.

Proposed Solution

To investigate inventory discrepancies, a pilot sample of N=100 cards was evaluated using an excel-based quantitative tool. Remaining blood volume was estimated from the percentage of surface area coverage across both the front and back of the five card circles, utilizing manufacturer specifications and area-to-volume calculations. Assuming a maximum card volume of 0.35mL (0.07 mL per saturated circle), one technician inputs the percent coverage for each circle into the tool. The tool calculated the estimated remaining volume of each card based on the surface area (mm²) eligible for future disc punches.

Conclusions

Comparison of the qualitative scores with a quantitative model across N=100 cards demonstrated substantial variation in subjective visual scoring. The quantitative approach provides a more standardized method for estimating remaining specimen volume and identifying cards with depleted specimens that were not reflected in the original inventory scores. The qualitative scores are not able to capture and track any subsequent specimen depletion and would require subsequent assessment and updates following any additional punches. Although manual coverage estimation remains necessary when using the tool, this Excel tool standardizes volume tracking and optimizes sample selection for future biobank requests.

Biobank Profiles

Abstract 3: Development of a National Dementia Brain Bank Network for Neurodegenerative Disease Research in Korea

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Background: Human brain tissue accompanied by clinical and neuropathological information is an important resource for dementia and neurodegenerative disease research. Since 2016, the Korea National Institute of Health has supported a national dementia brain bank program to increase the availability of these materials for research in Korea.

Methods: Four dementia brain banks recruit prospective brain donors and collect blood samples and clinical information during life. After brain donation, postmortem brain tissues are collected and undergo neuropathological assessment. Brain tissue, other biospecimens, and associated information are provided to approved research projects.

Results: Between 2016 and 2025, 2,254 individuals registered as prospective brain donors, and 306 postmortem brains were collected. Blood samples were obtained from 706 registered donors. Neuropathological assessment was completed for 261 cases. Of these, 221 (84.7%) had neurodegenerative diseases, including Alzheimer's disease and Parkinson's disease; 12 (4.6%) had other neurological diseases, including stroke and traumatic brain injury; and 28 (10.7%) were classified as other cases. Between 2017 and 2025, a total of 2,728 vials of biospecimens were distributed to 101 approved research projects.

Conclusions: Over the past decade, the national dementia brain bank program in Korea has established a system that follows prospective donors from enrollment during life through postmortem brain donation. The program brings together antemortem blood samples and clinical information with postmortem brain tissue and neuropathological findings and makes these materials available for research. This linkage between prospective donor information, antemortem samples, postmortem brain tissue, neuropathological assessment, and research use is an important feature of the national brain bank network and provides a basis for continued dementia and neurodegenerative disease research in Korea.

Abstract 5: The Journey of a Tumour Specimen

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Background: The Ontario Tumour Bank (OTB) is a province-wide program affiliated with 4 healthcare centres that collects and distributes human tumour biospecimens annotated with clinical data to support translational cancer research. At London Health Sciences Centre (LHSC), successful biospecimen banking requires multi-disciplinary coordination while navigating complex clinical workflows. The impact of these efforts is reflected in the scale of research supported by the OTB.

Methods: The workflow at LHSC was evaluated at every step to identify challenges and quality management strategies based on established standard operating procedures and operational experience. OTB distribution data in the past fiscal year was examined to characterize the contribution and research utilization of LHSC biospecimens.

Results: Key identified challenges include obtaining timely informed consent, coordinating perioperative blood and tissue collection, minimizing cold ischemia time, balancing diagnostic pathology requirements with research procurement, maintaining standardized processing and storage practices, ensuring robust quality control, and integrating complete and accurate clinical annotation. Continuous process improvement, standardized workflows, and close collaboration among various hospital and biobanking teams have strengthened quality and efficiency. OTB supported over 35 academic and industry-sponsored projects this past year, distributing more than 6,500 samples to both Canadian and global cancer researchers. One third of all samples distributed originated at LHSC, having been collected over a period of 24 years. These samples included breast, colorectal, lung, renal, ovarian, prostate, uterine, and sarcoma cancer cases. This demonstrates the capacity of a coordinated site-level biobanking workflow to generate resources across diverse disease sites to support translational research.

Conclusions: The journey of a tumour specimen extends well beyond collection. Each handoff can affect specimen quality and its ultimate scientific value, from patient consent and surgical collection through processing, storage, and distribution. The LHSC-OTB experience demonstrates that coordinated multidisciplinary workflows, rigorous quality management, and comprehensive stewardship is essential for building a resilient biobanking program capable of supporting diverse research needs. Shared practical lessons can provide a framework to optimize biospecimen quality, improve operational resilience, and maximize the scientific value of donated specimens.

Abstract 6: Unity Health Multiple Sclerosis Biobank: Creation of a Repository to Support Discovery and Validation of Biomarkers for Multiple Sclerosis

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Statement of the Problem: Multiple sclerosis (MS), a disorder where the immune system targets and destroys myelin, affects 1 in 400 Canadians. People with MS (pwMS) have diverse symptoms including vision, sensory, and gait problems. Disability can be assessed using the Expanded Disability Status Scale (EDSS), which changes over disease progression. Most (85%) patients are initially diagnosed with relapsing-remitting MS (RRMS), marked by episodic attacks with partial recovery. Over time, many develop secondary progressive MS (SPMS), with gradual worsening. About 15% have primary progressive MS (PPMS), with steady progression from onset. Disease-modifying therapies (DMTs) can prevent relapses of RRMS, though they are not effective against slowly worsening symptoms. Disease progression independent of relapse (PIRA) is a key driver of disability, even in RRMS treated with DMTs. We currently cannot predict which pwMS may benefit from a given DMT, particularly in later phases of disease. We do not yet understand the molecular pathways driving disability, their interaction with relapse biology and comorbidities, and we lack biomarkers to predict disease progression in pwMS.

Proposed Solution: We are establishing a large prospective biobank to support research aimed at elucidating mechanisms that drive clinical worsening (i.e. increasing EDSS) during early progressive MS and research into identification of protein, transcriptomic, or epigenetic biomarkers that predict disability progression. Our biobank has focused on recruiting early progressive MS, defined as pwMS with initial progressive symptoms or pwRRMS with PIRA. As a comparison, we have recruited healthy adult controls and patients with known RRMS or PPMS on DMTs, as well as people with similar rare neurological conditions including radiologically isolated syndrome, and neuromyelitis optica spectrum disorder. Patients were asked to donate serum, plasma, buffy coat, PBMCs and, where possible, cerebrospinal fluid at presentation and at clinically significant time points.

Conclusions: We are building a large-scale prospective biospecimen repository of samples and clinical data from pwMS across Canada, with a focus on capturing the biological changes that occur as patients transition from early diagnosis to more progressive disease and disability. To date we have recruited over 100 participants and are expanding this resource to advance research and improve outcomes for all people with MS.

Biobanking Structures & Cross-sector Partnerships

Abstract 7: Building a Contemporary Biobank to Enable Translational, Clinical, and Disease-Focused Research

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Background: Institutional biobanks are essential infrastructure for translational, clinical, and disease-focused research, but their value extends beyond specimen storage. A contemporary biobank is a dynamic, collaborative, future-oriented platform that partners with investigators and clinical programs to anticipate research needs and emerging technologies and adapt collection, preservation, data integration, and governance. This nimble model balances investigator needs with clinical workflows and regulatory expectations.

Approach: The Strategic Biobank, supported by the Department of Internal Medicine at the University of Arizona College of Medicine–Phoenix, supports translational, clinical, and disease-specific research through IRB-approved collection, processing, annotation, storage, and distribution of biospecimens linked to clinical data. We will describe infrastructure, biospecimen and data resources, access processes, and collaborative services. Emphasis is placed on early investigator engagement to understand study objectives and downstream analytical needs, preserve specimens according to study-specific protocols, and respond to emerging technologies (PCLs and organoids, and across variety of research platforms. Strategizing cellular, molecular, and multi-omics applications at collection helps ensure appropriate specimen types, processing, quality metrics, and preservation.

Examples and Impact: Collaborative research examples demonstrate how clinically annotated biospecimens support multidisciplinary investigations, biomarker discovery, translational studies, and clinical trials. The biobank bridges research and clinical environments by aligning collection with clinical workflows and incorporating regulatory, ethical, data-governance, and operational considerations.

Challenges, Future Opportunities and Conclusion: Priorities include increasing investigator engagement, expanding specimen availability, integrating clinical and research data, developing sustainable prospective collections, incorporating emerging technologies, and maintaining appropriate governance. Future directions include stronger clinical partnerships and scalable collection frameworks integrated into clinical workflows. As the regulatory landscape evolves, broader consent approaches, including opt-out models where institutionally, ethically, and legally appropriate, may increase collection scale and sustainability while requiring careful attention to participant autonomy, privacy, governance, communication, and clinical-partner policies.

Abstract 8: Building Organizational Readiness for a Regional Biospecimen Services Program: Lessons from the Hamilton Regional Biospecimen Services Initiative

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Statement of the Problem

Developing a regional biospecimen services program involves organizational, operational, governance, ethics, privacy, and legal considerations in addition to technical and infrastructure requirements. Researchers utilizing biospecimens and associated data often require access to participants, biospecimens, data resources, technical expertise, research services, and institutional partnerships. Within Hamilton's hospitals, these resources exist across multiple departments and programs, creating challenges related to navigation, and access.

Hamilton Health Sciences and St. Joseph's Healthcare Hamilton partnered to develop Hamilton Regional Biospecimen Services (HRBS), a regional initiative designed to address these challenges through a coordinated service model.

Proposed Solution

More than a biobank, HRBS was designed as a regional biospecimen and research support platform serving as a central hub to existing resources and expertise across participating organizations. A structured pre-implementation planning process included stakeholder consultation, feasibility assessment, business planning, funding acquisition, governance design, and protocol development.

The proposed model integrates participant recruitment, consent, sample collection, data coordination, and research support services while leveraging existing institutional infrastructure. Collection pathways include retrospective, residual, and prospective biospecimens. Governance structures supporting scientific oversight, operations, access review, consent, quality, and data governance were developed to support sustainable regional operations.

Conclusions

The HRBS initiative resulted in the development of a funded regional service model, governance framework, implementation roadmap, access review process, consent framework, operational workflows, and a comprehensive operating protocol spanning two healthcare organizations.

Key lessons learned included the importance of stakeholder engagement, executive sponsorship, business planning, governance development, and addressing ethics, privacy, and legal considerations early in program development.

The program remains in a pre-implementation phase, with final ethics and legal activities underway. Our experience suggests that organizational readiness is a foundational milestone in program development. Collection of the first biospecimen should be viewed not as the beginning of a regional biospecimen program, but as the culmination of the planning, governance, and organizational development required to support sustainable operations.

Abstract 9: Canadian Biobank Alliance: Building a Sustainable Infrastructure for Biospecimen Discovery and Research Innovation

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Statement of the problem: Canada has lacked a coordinated infrastructure for biospecimen discovery, equitable access, and rapid research mobilization. Fragmented approaches to ethics, consent, data sharing, and specimen distribution can delay research, limit collaboration, and constrain preparedness for emerging health threats.

Proposed solution: The Canadian Biobank Alliance (CBA) is a growing national network of research biobanks advancing standardized, high-quality biospecimen collection, access, and sharing. Central to the CBA model is the development of "front-end loaded" ethics, consent, and contractual frameworks that enable research innovation across academic, government, and industry sectors. In partnership with the Ottawa Health Science Network Research Ethics Board, the CBA pioneered a biobanking ethics framework that protects participant rights while enabling responsible biospecimen use and accelerating discovery.

The CBA promotes ISBER best practices in biospecimen management, discoverability, and distribution, supported through Canadian Tissue Repository Network certification. Beyond specimen stewardship, the CBA maximizes specimen value and avoids underutilized "freezer graveyards." The CBA has enabled nationally coordinated studies demonstrating impaired immune compensation for deficient antibody responses in blood cancers and linking physical fitness to persistent T-cell dysfunction in long COVID. It also facilitates complex multi-site projects, including investigations of functional cure strategies for hepatitis B virus, integrating academic expertise, clinical research, and industry partnerships.

The CBA data platform includes a growing national catalog that improves biospecimen discoverability across academia, government, and industry, increasing the value of collections for research and development in the public interest. International catalog interoperability and linkages are actively being developed to expand global collaboration and specimen discovery.

Conclusions: The CBA demonstrates a scalable and sustainable national model for biobanking, integrating governance, ethics, biospecimen discovery, and knowledge generation within a single research ecosystem. By transforming distributed collections into a coordinated national resource, the CBA is strengthening Canada's research capacity, advancing health innovation, supporting preparedness for future health threats, and positioning Canada as a leader in global biobanking collaboration.

Abstract 10: Deployment of a Biobank Information Management System Across a Network of Hospital-Based Biobanks

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Background: University Health Network (UHN) Biospecimen Services operates one of Canada's largest hospital-based biorepository networks, spanning multiple hospitals and clinical domains. Harmonizing data management across such a heterogeneous network while preserving biobank-specific workflows remains a challenge for institutions seeking structured, interoperable research data, improved sample discoverability, and stronger cross-biobank collaboration.

Methods: A commercial biobank information management system (MBioLIMS) was deployed sequentially across UHN biobanks in cardiology, orthopedics/rheumatology, and oncology. Each implementation included legacy data migration, workflow configuration, adaptation of data fields to site-specific research needs, and a shared core data model supporting institutional standardization. The system also integrates with institutional systems: Epic synchronizes patient demographics in real time, reducing manual entry and transcription risk, while REDCap, linked via Power BI on patient MRNs, connects specimen records to electronic case report forms and treatment outcomes.

Results: Three biobanks went live sequentially in 2026 (February, May, July), supporting clinically distinct programs on a common institutional platform. Approximately 1.3 million samples, including substantial legacy datasets, have been migrated. A fourth biobank (GU/COVID) is in deployment, with go-live planned for November 2026, and rollout is expected to reach eight biobanks by end of 2027, including Leukemia, Rheumatology, the Toronto Lung Transplant Program, and the Correlative Sciences Program, and nine at project completion. For the first time, UHN can measure benefits realization network-wide through three indicators: sample discoverability (proportion of biospecimens searchable via structured metadata), research throughput (studies supported using biospecimens), and cross-biobank enablement (studies drawing samples from multiple biobanks).

Conclusions: Sequential deployment across clinically distinct biobanks within a single hospital network was achievable while retaining a common core data model, demonstrating that biobank-specific configuration and network-level standardization can coexist. Beyond operational harmonization, the project establishes a scalable, replicable institutional framework for improving discoverability, measuring research utilization, enabling cross-biobank studies, and linking biospecimen and clinical research data.

Abstract 11: From Inventory to Impact: A Framework for Maximizing the Scientific Value of Biobank Collections

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Statement of the Problem: Biobanks invest substantial resources in participant recruitment, biospecimen collection, processing, annotation, and long-term storage to support biomedical research. As collections continue to expand, maximizing the scientific value of biospecimens has become an increasing priority. Published evidence and utilization trends across biobanks demonstrate that biospecimen inventories have increased, while utilization rates have grown at a slower pace. These trends suggest that collection growth alone does not translate into research impact. Factors such as accessibility, governance, operational processes, specimen suitability, associated clinical data, and alignment with investigator demand influence utilization. This highlights the need for a structured framework to evaluate the factors affecting utilization and to maximize the research value of biobank collections.

Proposed Solution: This study proposes a standardized framework for assessing and improving biospecimen utilization in biobanks. The proposed approach was developed through a literature review and operational experience. It establishes an operational definition of utilization and identifies performance indicators that extend beyond specimen distribution alone. The framework evaluates the complete utilization pathway, from participant enrollment, sample collection, processing, and storage to specimen request, access, and use. Key utilization performance domains include resource discoverability, completeness of specimen and data annotation, specimen availability, operational efficiency (measured by request fulfillment rate, time from request to specimen release, and inventory utilization rate), governance requirements, and cost recovery. By integrating standardized indicators with a structured assessment methodology and a feedback mechanism to capture barriers to utilization, the framework enables longitudinal evaluation, identifies opportunities for improvement, and supports evidence-informed decision-making to optimize utilization and research value.

Conclusions: The proposed framework offers a practical and transferable methodology for evaluating biospecimen utilization beyond traditional inventory-based metrics. By supporting standardized assessment and targeted improvement across key utilization domains, it has the potential to maximize the scientific value, research impact, and long-term sustainability of biobank collections.

Abstract 12: From Resilience to Sustainability: A Phased Framework From the PHIL LIVER Biobank in a Resource-Constrained Health System

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Background: Long-term sustainability remains a challenge for biobanks established through time-limited research funding, particularly in resource-constrained health systems. Early implementation of the PHIL LIVER Biobank in the Philippines highlighted vulnerabilities in infrastructure readiness, procurement, workforce continuity, and reliance on project-based support. We aimed to develop a context-specific framework that integrates operational resilience with long-term sustainability throughout biobank development.

Methods: Implementation challenges and adaptations encountered during the establishment of the PHIL LIVER Biobank were documented to identify sustainability priorities. Operational outputs were monitored during implementation. A narrative review of biobank sustainability literature was conducted and contextualized to the Philippine health and research environment. Evidence from the review and lessons from implementation informed a phased sustainability framework.

Results:

Despite infrastructure constraints, biobanking operations continued during facility development. As of the end of Y1, 87 participants had been enrolled, yielding 134 serum aliquots, 134 plasma aliquots, and 48 fecal specimens. Implementation experience and the narrative review informed a framework comprising three interdependent pillars: Operational Excellence, Financial Resilience, and Institutional and Research Engagement. These span three developmental phases: establishment and operational readiness, expansion and resource optimization, and institutionalization and national leadership. Governance and ethics, quality and compliance, information management, capacity building, and communication and visibility serve as cross-cutting enablers, with continuous quality improvement underpinning all phases.

Conclusion: Operational resilience and long-term sustainability should be addressed as interconnected components of biobank development. The PHIL LIVER sustainability framework integrates real-world implementation experience with sustainability evidence to provide a structured pathway from grant-supported establishment toward institutionalization and research utilization. Future implementation and longitudinal evaluation will determine its effectiveness and potential adaptability across biobanks operating in resource-constrained settings.

Abstract 13: Identifying Priorities of Underrepresented Biobank Participants: Perspectives of Black Patients with Prostate Cancer at the McCain GU Biobank

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Patient participation in research is critical to the success and sustainability of clinical biobanks. Additionally, biobanks must accurately reflect the target populations in order to support translatable research findings. However, sociodemographic factors have historically interfered with universal interest in research participation. This has led to gaps in research, particularly in areas like prostate cancer (PCa), which has strong genetic and lifestyle underpinnings. Exploring perspectives of underrepresented participants provides an opportunity to identify barriers and opportunities for diversification. This was explored in the McCain GU Biobank (MGB) at the University Health Network (UHN), by interviewing existing participants about their experience with PCa. Eligible participants included those (1) most likely to benefit from genetic findings, namely those meeting NCCN genetic testing criteria for PCa, (2) with Black ancestry as per responses from MGB intake questionnaires, and (3) indicated an interest in being contacted for future research. Interview guides were designed to prompt discussion about PCa risk factors and awareness and to identify opportunities to connect with the health system and communities and approved. Facilitation of interviews by a person with lived experience was offered to participants during consent. Interviews were conducted between November 2023 and March 2025 and recordings were transcribed and redacted for thematic analysis. Codes were identified by two independent reviewers and arranged into key themes prior to broad discussion and refinement. Based on current records 2% of MGB participants identify as Black. For this study, purposive sampling of those with high-risk PCa led to recruitment of 19 MGB participants and 3 non-MGB community representatives for interviews. A total of 19 domains were identified and compiled into themes: PCa awareness and education, Community and health system support, hereditary perspective of PCa, systematic healthcare barriers, and prioritizing personal health. Overall, participants emphasized the need to increase PCa education in community and healthcare settings. Biobanks should work with community and physician partners to develop education programs. These findings can be used to guide initiatives that can increase participation and representation in biobanks reflecting diverse communities.

Abstract 14: Korea Biobank Project 5.0 (2026–2030): Building a Digital, High-Value National Biobanking Ecosystem for Precision Medicine

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Background: The Korea Biobank Project (KBP), launched in 2008, serves as South Korea's national biobanking infrastructure connecting the National Biobank of Korea (NBK) with the Korea Biobank Network (KBN). Across Phases 1–4 (2008–2025), KBP evolved from physical specimen repositories into a data-linked network, securing resources from 1.23 million individuals, supporting 5,500 R&D projects, and producing 2,231 scientific achievements. To address population aging and chronic diseases, KBP Phase 5 (2026–2030) was initiated to transform KBP into an AI-driven, high-value digital biobank ecosystem.

Methods: KBP 5.0 establishes three strategic pillars: (1) Digital Transformation (Dx) to maximize resource value via large-scale specimen and data collection; (2) AI-driven Service Innovation (Ax) to accelerate research utilization; and (3) Governance & Standardization (Gx) for a sustainable ecosystem. Key measures include expanding multi-omics data generation, deploying KBN Common Data Model (CDM) 4.0 across 50 disease categories, incorporating post-mortem cadaveric tissue networks, operating plant-grade automated storage facilities, and enhancing distribution platforms with AI-based matching and on-demand biobanking.

Results: By 2030, KBP 5.0 aims to expand the national collection to 2.0 million individuals (including 772,000 from the National Integrated Bio Big Data Project) and support 6,500 cumulative research projects. Major targets include generating 200,000 multi-omics datasets, raising the omics data linkage rate from 15% to 30%, increasing clinical data linkage to 85%, expanding ISO 20387-certified biobanks from 3 to at least 10, elevating user satisfaction from 81.2 to 90 points, and operating over 6 disease-specific innovative consortia with secondary data redeposition.

Conclusions: KBP Phase 5 represents a paradigm shift from traditional specimen repositories to an integrated, data-centric digital biobank ecosystem. By integrating AI tools, standardized multi-omics, and national governance, KBP 5.0 will significantly enhance Korea's biomedical R&D competitiveness and serve as an international benchmark for biobank innovation.

Abstract 15: Understanding Barriers to Clinical Trial Tissue Request Fulfillment: A Biobank Perspective

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Background: Clinical trials increasingly require archived formalin-fixed paraffin-embedded (FFPE) tissue for biomarker testing, molecular profiling, and translational research. While cancer biobanks have tissue available to support studies, trial protocols often require specific pathological criteria which reduce request fulfillment rates. The objective is to understand the barriers in fulfilling clinical trial tissue requests despite specimen availability in a cancer biobank setting.

Methods: A retrospective review of clinical trial tissue requests for FFPE tissue received by UHN Biospecimen Services (UHN BSP) from 2023 to 2025 was conducted. Requests were coordinated through a standardized workflow involving inventory assessment using a biobank information management system (BIMS), pathology review with stringent study-specific criteria, tissue processing, and distribution. All requests were categorized as fulfilled or unfulfilled. Barriers to fulfillment for requests with tissue availability were classified into categories including pathology-determined unsuitability and administrative factors.

Results: UHN BSP received 284 clinical trial requests in 2023 to 2025 in which archival tissue was banked and available. Of these requests, 212 (75%) were fulfilled. Pathology review identified 46 (16%) of requests as unsuitable due to low tumour cellularity (<30%), insufficient tissue area, and/or extensive necrosis relative to trial-specific requirements. Administrative factors accounted for 26 (9%) unfulfilled requests, typically due to patient-withdrawn consent or patient ineligibility as deemed by the study team. Looking at individual tissue sites, liver cases were most requested, of which 93 (65%) were fulfilled. Lung cases were the second-most requested, with 67 (76%) fulfilled requests.

Conclusions: The fulfillment of clinical trial tissue requests is strongly dependent on pathology review, as well as inventory and administrative factors. While administrative factors are beyond biobank control, proactive strategies can improve fulfillment rates. Pre-emptive pathology review and targeted banking of high-demand tissue sites can mitigate tissue exhaustion, though dedicated pathologists, staff, and resources are required to coordinate reviews as samples are collected. These approaches facilitate tissue suitability and aid clinical trials downstream, such as through biomarker testing, DNA/RNA extraction, and next-generation sequencing to support cancer research.

Biospecimen Research, Science and Outputs

Abstract 17: “Don’t hold your pee”: How to Distribute Urine Samples in a Cancer Biobank

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Statement of Problem: We want to quantify the collection and distribution of urine biospecimens within a genitourinary cancer biobank and determine whether current urine collection practices should be continued, modified, or reduced. Low distribution of banked urine should not, by itself, be interpreted as evidence that urine lacks research value. Rather, it may reflect a mismatch between collection strategy, specimen characterization, clinical annotation, and investigator awareness. Current research reflects a large variety of samples, with little quantifiable analysis and low distribution. Within the McCain GU biobank, we have 107,641 stored urine specimens; however, only 8,228 of those samples have been distributed, which is a distribution rate of 7.64%. Our objective is to further explore the use of these samples in prostate cancer research.

Proposed Solution: Given the established and emerging use of urine in prostate cancer biomarker research, we propose a targeted evaluation before discontinuing collection. Future collection should be guided by defined research objectives and may prioritize patients with matched tissue and blood, longitudinal follow-up, clinically relevant disease states, and standardized processing metadata. A sustainable solution for urine specimens that are currently underutilized in the biobank would be to establish a urine resource program that converts surplus samples into a valuable research asset rather than discarding them. Excess urine could be processed into standardized aliquots and stored for future biomarker discovery, liquid biopsy research, assay validation, and emerging applications such as proteomics, metabolomics, transcriptomics, and extracellular vesicle analysis.

Conclusion: Further research validation is required for a meta-analysis, including less heterogeneity of urine samples and increased patient follow-up.

Abstract 19: At the Core of Precision Medicine: Validation of Bone Marrow Biopsies for Clinical Genomics - An Interim Analysis

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Background: Bone marrow examination is crucial for the diagnosis and prognosis of hematological conditions. This process involves obtaining two types of samples: a bone marrow aspirate (BMA, liquid) typically used for genetic testing, and a core biopsy (solid) used for architectural information. Up to 10% of aspirates may be poor quality or unattainable due to biologic (fibrosis, advanced disease) or technical factors, however a biopsy sample is often still attainable. The lack of BMA leaves patients and physicians without key genetic information to make treatment decisions. The purpose of this project is to extract good quality DNA and/or RNA from bone marrow biopsies, which can be used for sequencing.

Methods: Clinical surplus bone marrow core biopsies were obtained (n=23). To date, DNA/RNA was extracted from 17/23 core biopsies using TissueLyser LT, and 3/23 core biopsies using overnight Proteinase K (ProK) digestion. Invitrogen PureLink™ Genomic DNA Mini Kit was used for isolation. Genomic material quality was evaluated using a Femto Pulse for 9/23 samples. Nanodrop DNA analyzer was used for 11/23 samples to assess concentration and purity.

Results: 22/23 patients had hematological conditions, while 1 patient had metastatic prostate cancer. DNA extraction was successful for 20/23 biopsies, yielding an average concentration of 131ng/ul. Fragment sizes were calculated for 9/23 biopsies, with an average DNA fragment size of ~20Kb. These concentrations and fragment sizes are comparable to clinical liquid samples. 8/17 DNA samples that were homogenized had average 260/280 and 260/230 ratios of 1.81 and 1.71, respectively. Overnight ProK digestion resulted in average 260/280 and 260/230 ratios of 1.80 and 1.51, respectively. RNA extraction was successful for 7/23 biopsies, with an average concentration of 284ng/ul and an average DV200 score of 70%, comparable to RNA obtained from formalin-fixed paraffin-embedded samples. Sequencing of DNA/RNA samples is in progress to compare results between biopsies and liquid samples.

Conclusion: Both methods, homogenization and overnight ProK digestions work effectively in extracting quality DNA from core biopsies. Successful validation of extraction and sequencing of biopsy-derived genomic material will allow for “genomic rescue” of patients without liquid samples available for testing, thereby providing important diagnostic and prognostic information to clinicians and enabling the administration of targeted therapies.

Abstract 20: CAN-PROMISE: An Integrated Canadian Prostate Cancer Biobank Resource

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Background: Current cancer biomarker and precision medicine efforts are limited by small, single-modality datasets; incomplete linkage between biospecimens, outcomes, and pathology; and reliance on either archival FFPE or fresh-frozen tissue alone. Digital pathology and AI-based image analysis enable quantitative, reproducible extraction of morphological features from H&E whole-slide images (WSIs), but require large, well-annotated cohorts with matched molecular and clinical data. A multimodal cohort integrating biospecimens, clinical data, and 40× digitized H&E slides addresses these gaps by linking tissue architecture, molecular profiles, and outcomes. **Methods:** The CAN-PROMISE (Canadian Prostate Multimodal Integrated Specimen and Evidence Cohort) is a prospective prostate cancer biobanking initiative integrating high-quality biospecimens, comprehensive clinical annotation, and molecular data. We assembled 414 participants with matched blood and tissue biospecimens linked to longitudinal follow-up. All participants contributed serum, plasma, and buffy coat; matched frozen tumor and normal tissue were collected where available. Clinical prostate biopsy specimens were obtained from 113 participants, enabling studies across the disease continuum. Clinical data include diagnosis, treatment, surgery/pathology, outcomes, biomarkers, comorbidities, exposures, and race/ethnicity, integrated with genomic and transcriptomic data. We are developing a digital pathology library linking digitized tissue and pathology materials to clinical, genomic, and transcriptomic data.

Results: The cohort includes 414 participants with matched blood and tissue biospecimens and longitudinal follow-up. Inventory includes serum, plasma, and buffy coat from all participants, as well as matched frozen tumor and normal tissue specimens; 113 participants also have clinical prostate biopsy specimens available. A digital pathology library is underway to link 40× digitized H&E whole-slide images (WSIs) with molecular and clinical data to support integrated molecular outcome analyses. To date, sequencing has been completed for at least 14% of the cohort, providing a growing molecular dataset that can be leveraged alongside biospecimen, pathology, and clinical outcome data.

Conclusion: CAN-PROMISE provides a multimodal platform overcoming key limitations in biomarker and precision medicine by integrating biospecimens, clinical annotation, molecular data, and digital pathology. This facilitates biomarker discovery, patient stratification, outcome prediction, and precision oncology.

Ethical, Legal, and Social Issues

Abstract 23: AI-Enabled Relocation and Consent Assessment for Human Biological Samples

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Statement of the Problem: Relocation of worldwide stored Human Biological Samples (HBS) from closed clinical trials to a new Global Biobank in the USA creates compliance challenges because participants' Informed Consent Forms (ICF) may specify storage locations or other restrictions that affect whether HBS may be legally and ethically relocated to the new long-term storage location. In parallel, individual-level consent data must be verified before HBS is released for use. These activities require manual review of consent documentation and tables, which is time consuming, difficult to standardize, and vulnerable to human error.

Proposed Solution: Two locally run desktop AI-enabled solutions were developed to support HBS compliance and governance using a human in the loop review model. RELOCATE is a multi-document analysis tool that uses text extraction and rule-based pattern libraries to identify references in ICFs to storage location and restrictions, enabling assessment of whether HBS may be legally and ethically relocated to the USA for long-term storage. The Consent Data Verification tool uses an AI-developed script and desktop interface to automate file upload, participant codes, filtering of relevant consent fields, and identification of negative responses and consent withdrawals. The solution also supports generation of decision lists to confirm long-term storage or request disposal. RELOCATE can analyze 30 Informed Consent Forms in 17 seconds.

Conclusions: Together, these tools improve the efficiency, consistency, and auditability of decisions related to relocation, retention, reuse, and disposition of HBS from closed studies. By leveraging AI, manual review activities that previously took hours can be completed in minutes, accelerating access to samples and increasing the team's capacity to review more requests. They ensure that participant consent is respected, and that HBS lacking appropriate consent can be identified for disposal following governance review. This combined approach supports compliance, protects AstraZeneca's license to operate, and delivers sustainability benefits by optimizing biobank storage capacity.

Abstract 25: Exploring Patient Partnership in Ontario Biobanks: Insights from a Provincial Workshop Survey

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Background: Biobanks are essential resources for cancer research, and biobanking would not be possible without people who voluntarily participate in these programs. In recent years, there has been growing interest in involving patients and participants more directly in biobank activities to ensure their perspectives, expertise, and priorities are reflected. Despite this push, many biobanks have not yet developed formal patient partnership programs or have limited patient involvement. Ontario Biobanks, a collaborative network of biobanks across Ontario, Canada, recently welcomed 5 patient partners to help guide its work and provide patient perspectives to member biobanks.

Methods: During the 2026 Ontario Biobanks Workshop, attendees participated in a live online survey while attending a panel discussion featuring patient partners. Participants included both in-person and virtual attendees, most of whom worked in biobanks in Ontario. A total of 45 people completed at least one question. 5 questions explored their understanding of patient partnership and their experiences engaging patients in biobank activities. Responses included both ranked pre-filled choices and free-text answers.

Results: When asked what patient engagement meant to them, the most common responses were trust, compassion, collaboration, relevance, and purpose. These themes closely matched the perspectives shared by the patient partner panel. Most respondents (61%) reported currently working with patient partners, while 23% said they were starting to engage patients or planned to do so. 16% reported no patient partnership activities. When asked what would be most useful to improve patient engagement at their biobank, the top 3 choices were: providing updates on how samples are used in research, creating brochures that explain biobanking for patients and the public, and making consent forms easier to understand.

Conclusions: The results suggest strong interest in increasing patient involvement in biobanks. However, Biobanks may not have the guidance or standards needed to ensure meaningful and equitable patient involvement and avoid tokenism. To address these gaps, Ontario Biobanks plans to develop patient-friendly resources, including educational materials and brochure templates. By working closely with patient partners and biobanks across the province, Ontario Biobanks aims to strengthen patient engagement and support more patient-centered biobanking practices in Ontario and beyond.

Abstract 26: Navigating the Global Landscape of Human Biological Samples Compliance Requirements

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Statement of the Problem: Local restrictions on the collection, use, and transfer of Human Biological Samples (HBS) in clinical trials vary widely by country, region, and site. Documents such as local informed consent forms (ICFs), HBS forms, and ethics committee (EC) submissions may require customization to specify the types of HBS collected, intended use, and analysis or storage locations. These requirements are not always available in accessible formats, delaying compliant HBS use, particularly in global multicentre trials. This heterogeneity creates operational challenges and requires coordination across scientific, clinical operations, and local teams to ensure compliance with local HBS requirements.

Proposed Solution: AstraZeneca's (AZ's) HBS team established an initiative to assess and document local requirements governing the collection, use, storage, and transfer of HBS. Through workshops with local teams that interact with clinical sites and ECs, detailed assessments are completed covering HBS-related topics such as local ethics frameworks, ICF requirements, HBS documentation, and limitations on biobanking or research in each country. The outputs are synthesized into standardized HBS Country Position Statements, which capture local HBS requirements in a clear, version-controlled format accessible to all staff working with HBS from AZ-sponsored studies. To date, 17 statements are available, with additional countries underway. These statements provide a consistent source of information, reducing the need for repeated assessments.

Conclusions: HBS Country Position Statements capture valuable knowledge that strengthens compliance with local HBS requirements and supports global clinical trials and biobanking. Assessments revealed considerable variation in local ICFs, ethics review processes, and biobanking rules, highlighting the value of a standardized approach to capturing and sharing this information. The resource supports compliant use of clinical study and biobanked HBS, informs country selection for HBS analyses, and helps ensure participant rights are respected in line with local laws and ethics requirements. A limitation of this work is its reliance on information obtained from internal stakeholders and public sources. Future efforts will focus on developing an AI-assisted tool to expand the knowledge base using internal and external sources, alongside cross-Sponsor collaboration to validate findings and identify opportunities for harmonization.

Abstract 27: Public Communication Initiatives by Biobank Network Japan

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For the biobanking community in Japan, raising public awareness and understanding of biobanks remains an important challenge. Organizing public engagement activities around commemorative occasions can provide an effective way to raise awareness and encourage people to learn more about biobanks. Therefore, in 2025, Biobank Network Japan, a national alliance of 14 biobanks, registered June 6 as "Biobank Day" with the Japan Anniversary Association, as the two letters "b" in "biobank" resemble the number 6.

Marking the first anniversary of "Biobank Day," we report on the overview and outcomes of two collaborative events conducted by biobanks across Japan to engage the general public.

The first initiative, the "Nationwide Biobank Open House," involved ten participating institutions throughout Japan. Each facility hosted tailored laboratory tours and exhibitions. Approximately 200 citizens participated nationwide and had the opportunity to tour an actual biobank facility and interact with researchers.

The second initiative was a three-day exhibition and talk show series held at GALLERY ART HOUSE, an art gallery in Ginza, Tokyo, from June 5 to 7, which took a visual and sensory approach to science communication. The exhibition featured humorous educational manga created by manga artist Hebizo, along with striking photographs of research facilities captured from a unique perspective by photographer Joe Nishizawa. The talk show series comprised two dialogue sessions bringing together biobank researchers and guest speakers from diverse fields. For the first session, we invited Hiraku Ogura, a fermentation designer, and for the second session, we invited naco, a classical music YouTuber with more than 350,000 subscribers, to engage in an in-depth discussion about the unexpected commonalities between their respective fields and biobanks. Approximately 100 people attended over the three days, with about half reporting no prior knowledge of biobanks. Attendees provided highly encouraging feedback, including comments such as, "This is an important endeavor, and I hope you continue your hard work." These initiatives suggest that multifaceted approaches—incorporating art, manga, and cross-disciplinary dialogue—are effective in stimulating interest among demographics previously unfamiliar with biobanks. Continuing nationwide collaborations centered around "Biobank Day" is expected to further enhance public awareness and deepen societal understanding of biobanks moving forward.

Abstract 28: Returning Incidental Findings in Biobanking: Genes Identified and Return-to-Patient Procedures

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Background and rationale: Biobanks are coming to prominence as core infrastructures of biomedical research, often involving the accrual of genomic and health-linked information from substantial populations. As technologies such as whole-genome sequencing become increasingly integrated into biobanking activities, the likelihood of garnering incidental findings (IFs)—results that are beyond the scope of the initial purpose of the research but are of potential clinical relevance—has shown increased interest. Although participants are hardly registered with intentions of clinical diagnostics, actionable genetic variations, and particularly those involving hereditary cancer syndromes and cardiovascular risks, bear significant health implications. There is a growing need for setting out definitive IF recognition, validation, and return workflows as suitable to participants.

Objective: To describe the process of returning incidental genetic findings to biobank participants and to report the genes most frequently implicated in positive findings.

Methods: We carried out a retrospective retrieval of processed genomic data generated from a cohort of biobank participants (n = 70), who provided consent to be contacted back concerning clinically significant findings. Semi-structured interviews were done with key stakeholders such as biobank coordinators, genetic counselors, ethicists, and researchers. Pathogenic or likely pathogenic variants were considered further by a clinical genetics multidisciplinary team and confirmed before being released back to participants. We also recorded number and type of findings, involved gene(s), and recontact and genetic counseling workflow.

Conclusion: Out of the analyzed cases, 8 of the patients were reported to have incidental findings. Most of the frequently affected genes were ATM, BRCA1, and BRCA2 and were associated with actionable health risks. Timely clinical integration necessitated a systematic return process involving genetic counseling, confirmatory testing, and referral for further follow-up care. To aid participant care upon identification of clinically significant variants, our results highlight the importance of integrating return-of-results processes into biobank governance.

Abstract 29: The Brain Tissue Biobank: Improving Biobanking Education and Informed Consent Experience for Patients with Tumours of the Central Nervous System

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Statement of Problem: The Brain Tissue Biobank (BTB) at St. Michael's Hospital (SMH), part of Unity Health Toronto, was created to collect, process, and dispense high-quality clinical data and biological samples from all adult patients undergoing surgery for brain tumours ranging from benign tumours such as meningioma to aggressive types including brain metastases and glioblastoma (GBM). Limited understanding of these pathologies highlights the demand for research into non-invasive tumour detection methods and novel therapies. BTB participants donate fresh frozen (FF) tissue, FF whole blood, cell-free tumour DNA plasma, and buffy coat samples. However, many participants lack baseline knowledge of the role of biobanking in clinical research. The emergent nature of brain lesions often results in participants undergoing resection shortly after presenting symptoms, which limits the opportunity for education on biobanking prior to consent. Reviewing consent forms is further complicated if patients face language barriers.

Proposed Solution: BTB proposes a patient-centered consent pathway integrating early biobanking education and accessible communication strategies into neurosurgical care. Given the short interval between diagnosis and surgery, clinical staff can introduce BTB before formal consent, with plain-language brochures and posters reinforcing information on sample collection, and future research applications. BTB also has REB permission to consent patients after surgery and sample collection, which removes the stress of consent immediately after receiving a cancer diagnosis/decision to operate. To address language barriers, BTB integrates interpretation services into consent discussion. During in-person consent, staff can access a mobile translation application to facilitate communication with a virtual professional interpreter when required. Telephone interpretation services can similarly support patients consenting remotely. Together, these strategies aim to improve patient understanding, accessibility, and autonomy while minimizing additional burden.

Conclusions: Integrating early education on biobanking via accessible resources within existing clinical workflows, as well as implementing deferred consent and flexible interpretation services during consent process, may promote more equitable participation and strengthen informed decision-making among brain tumour patients with diverse research experiences and linguistic backgrounds.

Hot Topics

Abstract 30: A Mixed-Methods Specimen Collection Scoring Framework to Optimize Biorepository Management and Promote Scientific Utilization

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Statement of the Problem

Biorepositories must balance limited storage and operational resources with the need to preserve collections that offer the greatest scientific value. Historical specimen utilization, however, may not reliably predict future research impact, making it difficult to prioritize collections for retention, promotion, or deaccessioning. Without a standardized, objective framework that formalizes and extends practices, data-driven decision-making may be limited and high-value but underutilized collections may remain overlooked.

Proposed Solution

To address this challenge, the NIDDK Central Repository (NIDDK-CR) in collaboration with its federal contractors, Precision for Medicine and Booz Allen Hamilton, developed a specimen scoring tool that assigns quantitative and qualitative values to biospecimen collections using scientific, operational, and strategic criteria to inform retention, deaccessioning, and promotion decisions. Adapted from existing evaluation approaches and tailored to repository needs, the framework has been piloted across eight diverse collections to generate baseline assessments and inform future refinements.

Collections with strong scientific potential but limited historical use can be targeted through outreach initiatives, including a competitive research challenge in which investigators propose innovative studies using repository specimens. Selected researchers may receive no-cost specimen access and recognition through repository communications, increasing awareness and encouraging engagement with available resources.

Conclusions

The specimen scoring tool provides an objective, reproducible approach for evaluating collection value and informing strategic biobank management. Initial application identified several underutilized collections with significant scientific potential while supporting development of best practices for future acquisitions. Combined with targeted promotion strategies, the framework may increase specimen utilization, foster new collaborations, and enhance the overall impact of repository resources. This model demonstrates how mixed-method collection assessment can advance both operational sustainability and scientific outcomes in large biorepositories.

Abstract 31: A More Sustainable Biorepository - Thanks to My Green Lab Certification

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Problem: The Biorepository and Bioanalysis Centre (BBC) of the Canadian Longitudinal Study on Aging (CLSA) stores more than 3 million biospecimen aliquots in 31 liquid nitrogen (LN2) freezers and 3 ultra-low-temperature (ULT) freezers. Recognizing that biorepositories and laboratories are energy-intensive and have large carbon footprints, we explored avenues to improve sustainability.

Solution: We applied for My Green Lab (MGL) certification, a globally recognized program that assesses and guides lab sustainability. MGL has 5 certification levels, based on assessment scores from 40% to ≥80%. All BBC staff completed a baseline assessment covering 12 sustainability topics, including water, cold-storage, purchasing, waste, energy, equipment, community, and travel.

We scored 45% overall in our baseline assessment, with the lowest scores in purchasing and waste reduction, and the highest scores in resource management and large equipment. MGL provided detailed results and recommendations. Some low scores were due to limited sustainability education. Thus, we appointed a staff member to lead our “green” initiatives who completed MGL courses and educated the team on sustainability practices.

To improve purchasing practices, we consolidate shipments when possible and aim for products with the Accountability, Consistency, and Transparency (ACT) Environmental Impact Factor label. To improve recycling practices, we now collect plastics in recycling bins.

Cold Storage was already an area of strength. Most of the samples are stored in LN2 freezers, which use significantly less electricity than ULT freezers for the same number of samples. Our ULTs are maintained annually by checking door seals, defrosting, vacuuming condensers, and calibration.

We use a customized LabWare Laboratory Information Management System (LIMS) to track samples and storage locations. Specimens are stored in 2D barcoded cryotubes housed in barcoded 96-well boxes, which are within barcoded racks; this system links each tube to its precise freezer location, enabling targeted searches and reducing freezer-opening time.

We were reassessed after eight months and achieved a 90% score, reaching the highest level of certification. In June 2025, we became a Green MGL-certified facility.

Conclusions: Biorepositories can be resource-intensive, but there are ways to mitigate their environmental impact. By following MGL recommendations, we have reduced our carbon footprint and created a culture of sustainability.

Abstract 32: Building a FAIR-Aligned Ophthalmic Imaging Ecosystem within the Kids Eye Biobank to Support Collaboration, Data Sharing and AI-Enabled Innovation

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Background: AI applications in ophthalmology require access to large, well-curated and interoperable image datasets. Rare pediatric eye diseases, however, are often limited by fragmented image collections, inconsistent metadata, and challenges linking clinical images with biospecimens and health information. The Kids Eye Biobank developed a dedicated ophthalmic image repository to transform clinical imaging assets into a research-ready resource for translational discovery and future AI-enabled studies.

Methods: Standard operating procedures were implemented for image identification, extraction, quality assessment, de-identification, metadata capture, storage, and governance. Existing image assets residing in legacy systems were recovered through a structured image unarchiving process and evaluated for repository inclusion. Metadata frameworks were developed to support linkage with associated clinical and biobank datasets and to advance alignment with FAIR data principles. Repository infrastructure was established using a research picture archiving and communication system (R-PACS) to support secure image storage, user management, multi-site image contribution.

Results: Implementation of standardized imaging workflows resulted in a centralized ophthalmic image repository containing 1,981 ophthalmic and clinical images from 263 participants. Structured image recovery and unarchiving consolidated imaging assets from legacy systems, while standardized metadata capture improved image organization, traceability, and linkage with clinical and biobank data. Deployment of the R-PACS platform established a secure environment for image storage, management, and sharing across institutions. Standardized metadata capture and linkage frameworks created a multimodal data resource that supports future image annotation, integration with clinical and biospecimen data, and development of machine learning applications.

Conclusions: Establishing standardized imaging workflows, FAIR-aligned metadata practices, and R-PACS infrastructure has transformed the Kids Eye Biobank into a research-ready ophthalmic imaging repository. The resulting framework is now positioned for dissemination to partner sites, supporting distributed image contribution, harmonized data collection, and secure sharing across institutions to expand the repository through international collaborations and enable future multicentre, multimodal, and AI-enabled ophthalmic research.

Abstract 34: From Waste to Resource: Strategies in Reducing Single-use Plastics

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In 2024, the University Health Network (UHN) reported that 82 tonnes of plastic waste was eliminated by switching to a reusable alternative. Current waste management practices in many biobanks prioritize high productivity over waste prevention, leading to high volumes of plastic usage. Many of the supplies needed for biobanking activities are single use plastics such as gloves, cryovials, pipettes, and conical tubes. In hospitals and laboratories, these plastics are required when processing bodily fluids as they maintain sterility, while being affordable and versatile. However, the use of plastics requires energy-intensive methods of incineration and sterilization before landfill disposal. This contributes to increased greenhouse gas emissions – highlighting a point for improvement across UHN.

Although single-use plastics are favored across biobanks, there are various approaches to reducing plastic consumption and carbon emissions without compromising efficiency. This includes considering sustainable replacement options and vendor-based recycling programs. Sustainable replacement options include substituting single-use plastics for reusable alternatives like autoclavable micropipette tips or biodegradable substitutes. Autoclaving micropipette tips allow laboratories to sterilize and reuse tips across multiple cycles, while certain biodegradable gloves can be broken down into non-reactive and renewable resources. Additionally, several vendor-based recycling programs exist to minimize single-use plastic waste and the energy required to dispose of them. Hospitals and laboratories in UHN can participate in closed-loop recycling programs which diverts waste from landfills and refashions it into other scientific products or laboratory materials.

Overall, implementing sustainable replacement options and utilizing vendor-based recycling programs throughout laboratories in UHN can help cut down on plastic waste – reducing the organization's carbon footprint. Teams within UHN can work together to invest in and share the resources of these initiatives, allowing for the programs to be used to their fullest potential. Biobanks may also consider working closely with study teams to optimize the quantity of single-use laboratory materials required to bank samples. These initiatives will require coordinated and continuous efforts across multiple teams and levels of management but will ultimately serve to make biobanking a more sustainable practice for years to come.

Abstract 35: Sustainable Science Through Greener Biobanking

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Biobanks play a critical role in advancing biomedical research, environmental and animal health and public health. However, the infrastructure required to collect, process, store, and distribute biological specimens can also be resource intensive, consuming significant amounts of energy, water, plastics, and chemicals. As scientific organizations increasingly embrace sustainability, biobanking is uniquely positioned to lead the transition toward more environmentally responsible research practices.

This presentation will explore how greener biobanking can serve as a practical framework for achieving sustainable science. Drawing on principles from the Green Lab movement, One Health, and Green Chemistry, the session will highlight strategies that reduce environmental impact while maintaining specimen quality, regulatory compliance, and operational excellence. Topics will include reducing laboratory waste through material reuse, recycling programs, and packaging reduction; conserving energy through freezer optimization, cold-storage management, equipment sharing, and behavior-based interventions; and reducing water consumption through improved cooling systems and operational efficiencies.

The talk will also examine the application of the 12 Principles of Green Chemistry within biobanking and laboratory operations, emphasizing waste prevention, safer chemical use, energy efficiency, and pollution reduction.

Sustainable procurement practices, including the use of environmental product assessment tools such as the ACT Label, will be discussed as mechanisms for influencing supply chains and promoting responsible purchasing decisions.

Beyond technical solutions, the presentation will emphasize the importance of organizational culture and stakeholder engagement. Sustainable transformation requires more than policies and technologies; it depends on empowering scientists, laboratory personnel, and biobank leaders to adopt greener practices and foster a culture of continuous improvement. As stewards of long-term biological resources and managers of complex data and cold-chain systems, biobanks occupy a strategic position at the intersection of human, animal, and environmental health. This unique role creates an opportunity for the biobanking community to lead by example and demonstrate that scientific innovation and environmental responsibility are complementary goals.

Attendees will gain practical insights and actionable approaches for implementing greener biobanking initiatives that support both research excellence and long-term sustainability.

Innovative Technology

Abstract 36: Pathology Foundation Models for Biomarker Prediction using Whole Slide Images (WSI): The Role of Biobanks

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Statement of the problem: Actionable biomarker detection using next generation sequencing (NGS) technologies and traditional immunohistochemistry (IHC) has been a standard approach in the management of patients at cancer centers around the world. Immunofluorescence (IF) assays require special equipment, training, lengthy validation and are challenging to incorporate in clinical workflows. These technologies depend on high-quality biospecimens and sophisticated instrumentation and can have longer turnaround times and pose logistical challenges.

Proposed solution: Whole slide imaging (WSI) is now possible at high resolution and is increasingly being adopted in routine pathology workflows at large academic cancer centers. Several large academic institutions have implemented digital sign-out for primary diagnosis. As a result, large numbers of whole slide images of cancer tissues are generated at cancer centers every year. Biobanks with well-characterized tissue collections can provide specimens and associated clinical, molecular, and biomarker data that can be linked to whole slide images. These datasets can be used to develop new pathology foundation models and evaluate existing models such as TITAN (Transformer-based pathology Image and Text Alignment Network) and CHIEF (Clinical Histopathology Imaging Evaluation Foundation Model). Pathology foundation models can potentially be used for cancer biomarker prediction using hematoxylin and eosin (H&E)-stained WSIs. For example, these models could potentially predict estrogen receptor (ER), progesterone receptor (PR), and human epidermal growth factor receptor 2 (HER2) status in breast cancer.

Conclusions: Pathology foundation models of cancer offer novel opportunities for biomarker prediction, treatment selection and matching patients to clinical trials that are most likely to benefit them. Biobanks can support the development and validation of these models by linking digitized histopathologic images with well-characterized biospecimens and their associated clinical, molecular, and biomarker data.

Repository Standards

Abstract 37: A Framework for Monitoring Biobank Performance: Application of Key Performance Indicators in the Kids Eye Biobank

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Background: Biobanks require performance monitoring systems to support operational excellence and maximize research impact. Due to the diversity of biobank models and stakeholder needs, meaningful assessment depends on metrics aligned with repository-specific objectives. To support systematic evaluation, the Kids Eye Biobank, a pediatric ophthalmology biobank integrating biospecimens, clinical data, and ophthalmic imaging from children with eye diseases, developed and implemented a Key Performance Indicator (KPI) framework.

Methods: A KPI framework was established to monitor core biobank functions. Indicators were selected across five domains: participant accrual, biospecimen and derived resources, clinical and imaging data acquisition, governance and operations, and data/material access. Candidate indicators were chosen based on their alignment with the biobank's strategic objectives, measurability using existing data systems, and capacity to provide actionable insights. KPI data were collected through routine biobank activities and integrated into a centralized reporting structure for ongoing monitoring. Data are presented for the period of biobank inception (May 7, 2020) to present day (August 13, 2026).

Results: Implementation of the KPI framework established a consistent process for monitoring biobank activities and evaluating performance over time. The Kids Eye Biobank participant accrual KPIs demonstrate the enrollment of 491 participants, 54% of whom have a primary diagnosis of malignant ocular disease. The collection of 694 biospecimens, 1,981 ophthalmic and clinical images, and ongoing clinical data collection that has been completed for 87% of participants, is illustrative of the clinical and imaging data domain. Governance activities included 42 oversight meetings, with patient partners participating in all external oversight, steering committee, and material and data access project-specific reviews. Among researcher requests received, 92% originated from academic institutions, with the majority coming from international investigators.

Conclusions: A tailored KPI framework provides a practical and scalable approach for evaluating a specialized pediatric ophthalmology biobank. By linking operational activities to measurable outcomes, the framework supports quality improvement, strategic planning, and reporting of biobank impact. This approach may serve as a model for other specialized biobanks implementing structured performance evaluation systems.

Abstract 38: AI-Assisted Trending of Human Biological Sample Quality Events to Enable Risk-Based Biobank Quality Governance

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Background: Quality event (QE) trending is critical for identifying risks and driving continuous improvement but can be resource-intensive when performed retrospectively across large, multi-year datasets. This study evaluated the use of artificial intelligence (AI) to analyze five years of Human Biological Sample (HBS) Major and Critical quality events and generate actionable insights to support biobank quality governance and resource prioritization.

Methods: An AI-assisted, Human-in-the-Loop (HITL) approach was applied to HBS-related Major and Critical quality events from 2021–2025. AI was used to consolidate and classify data, identify trends and recurring themes, and assess biobank attribution using predefined criteria. Subject matter experts reviewed and validated all AI-generated outputs to ensure accuracy and consistency.

Results: A total of 144 HBS-flagged Critical and Major quality events were analyzed, including 12 Critical and 132 Major events. AI rapidly transformed multi-year datasets into structured, audit-ready insights and identified recurring themes. Sample-related events represented the largest category, while process- and knowledge-related issues were the most common root causes. Among the 12 Critical events identified over the five-year period, only one was biobank-attributable, with no biobank-attributable Critical events identified in the last four years of the analysis period. Only 14 of 132 Major events (10.6%) were confirmed as biobank-attributable. These findings demonstrate a strong quality profile for biobank operations, with biobank-attributable Major events representing a small proportion of overall HBS quality events. The analysis also highlighted opportunities to further strengthen risk-based quality oversight and support continuous improvement.

Conclusion: AI-enabled trending provided a scalable and efficient approach for transforming large quality datasets into actionable quality intelligence. Through a Human-in-the-Loop approach, AI supported rapid identification of trends and emerging risks while maintaining expert oversight of findings and interpretation. By shifting from reactive incident management to proactive, data-driven oversight, AI supports risk-based resource allocation and strengthens quality governance by focusing expert effort on prevention, continuous improvement, and operational excellence.

Abstract 39: Anatomy of Scale-Up: A Post-Mortem of the Biobank-to-Sequencing Workflow

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Statement of the Problem: The Ontario Institute for Cancer Research (OICR) was the primary site performing whole genome and transcriptome sequencing for the Marathon of Hope Cancer Centers Network in Ontario. As a result, OICR needed to support expanded demand through its central sample processing core, Tissue Portal. To meet project aims, the initiative drew from retrospective collections, including a breast cancer cohort from the Ontario Tumour Bank and the OCTANE pan-cancer cohort. Average sample throughput to sequencing rose from 650 to 1,260 monthly. The short timeframe and scale challenged capacity, and highlighted case attrition risks inherent to the use of banked collections.

Proposed Solution: In hindsight, there are opportunities to reflect on strategies that enabled the initiative's success. Our experience demonstrated that guidance for researchers, ahead of biospecimen request fulfillment, was essential. Realistic expectations for attrition need to be considered to meet case quotas. As such, the complex workflow from case selection to pathologist review, nucleic acid extraction and sequencing was iteratively optimized. In the derivatization phase, rapid scale-up planning balanced technical capability and biospecimen quality. To mobilize large cohorts from liquid nitrogen storage, pulls were strategically planned to minimize retrieval times. To increase throughput, asynchronous processing and workflow re-designs were coordinated with downstream teams. Biobanks must also accommodate storage of additional derivatives created, considering high-density storage and adaptations for inventory malleability within informatics systems used.

Conclusions: Large sequencing initiatives using biobank collections require coordinated planning across study design, derivatization, and post-project inventory management. High throughput can be achieved by considering realistic case attrition assumptions, processing in iterative batches and using asynchronous workflows that align with output. Early engagement between all project teams is critical to identify constraints. Scale-up efforts should pair flexible inventory with high-density storage and adaptable wet-lab modalities so large requests can be fulfilled while preserving biospecimen integrity and routine operations. Partnerships between biobanks, processing cores and sequencing facilities can apply this framework to expand capacity while preserving the long-term value and accessibility of biobank collections.

Abstract 40: Biobanks and Education: Building the Workforce and Vision for the Future

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Statement of the problem: Biobanks are evolving from repositories of biospecimens into dynamic, data-driven infrastructures that support precision medicine, population health, research innovation, and public health preparedness. This transformation requires not only advanced technologies and robust governance, but also a new approach to education and professional development. The future of biobanking will depend on a skilled, adaptable, and ethically grounded workforce capable of working across scientific, clinical, technological, regulatory, and societal domains.

Proposed solution: This presentation will explore a future-oriented vision for education in biobanking. It will consider how education and training can move beyond traditional laboratory-based competencies to include data stewardship, artificial intelligence, digitalisation, quality management, sustainability, cybersecurity, regulatory compliance, and responsible research practices. Particular attention will be given to the importance of interdisciplinary and continuous learning, as well as to the development of competency-based curricula that can be adapted to different institutional and national contexts.

Education should also extend beyond biobank professionals. Researchers, healthcare providers, policymakers, patients, and the wider public need a shared understanding of the value, limitations, and ethical implications of biospecimen research. Meaningful engagement and accessible education can strengthen trust, support informed participation, and promote responsible data and sample sharing.

The presentation will propose a collaborative educational ecosystem involving biobanks, universities, professional organisations, healthcare institutions, industry, and patient representatives. Such collaboration could support mentoring, international exchange, practical training, digital learning platforms, and the development of common competencies and standards.

Conclusions: Investing in education is therefore not an auxiliary activity, but a strategic prerequisite for sustainable and trustworthy biobanking. By developing people alongside infrastructure and technology, biobanks can strengthen their resilience, promote global equity, and fulfil their future role in advancing health and science.

Abstract 41: Biorepository Accreditation Program (BAP) Accreditation: Experience from the Canadian Longitudinal Study on Aging (CLSA)

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Background: The Canadian Longitudinal Study on Aging (CLSA) biorepository stores more than 3 million biospecimen aliquots collected across 11 Data Collection Sites (DCSs). To demonstrate operational quality, we pursued accreditation through the College of American Pathologists (CAP) Biorepository Accreditation Program (BAP).

Methods: A BAP project was initiated outlining the required steps. CAP and ISO 20387 accreditation requirements were reviewed to identify gaps and priorities. A cross-functional team representing biorepository operations, quality management, information technology, and CLSA leadership was assembled. Following program enrollment, we accessed the CAP BAP requirements, including the checklist and supporting resources. The team consulted CAP educational resources, other accredited biorepositories, and sought guidance from an individual with prior accreditation experience.

Results: To meet BAP requirements, a Quality Manual was developed, along with new policies, procedures, forms, and logs. Existing documents were reviewed and standardized to improve consistency, version control, and document management.

The accreditation drove many operational improvements. OMNI-ASSISTANT, a centralized electronic document management system, was implemented to support document control, version tracking, approval workflows, training, nonconformance and inventory management, audits and control points.

Additional quality indicators were introduced to support performance monitoring and continuous improvement. To strengthen data integrity, a formal ticketing system was developed for Laboratory Information Management System (LIMS) changes. Requests for data corrections, process changes, and system enhancements are documented, reviewed, approved, and tracked, creating a complete audit trail.

Inspectors from another CAP-accredited biorepository conducted the assessment and reviewed documentation, quality management practices, specimen handling processes, facilities, records, and traceability systems. Following the on-site assessment and resolution of identified findings, the CLSA Biorepository received its first CAP BAP accreditation in 2022, becoming one of only two biorepositories in Canada to achieve this designation.

Conclusions: The CAP BAP accreditation process required strong organizational commitment but resulted in a more organized and transparent system. This benefits the CLSA and gives researchers greater confidence when accessing our biospecimens.



Abstract 42: Design of a Companion Specimen Repository to Support Longitudinal Precision Oncology

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Statement of Problem: Precision oncology increasingly requires access to high-quality molecular specimens throughout a patient's clinical journey. Traditional pathology workflows preserve formalin-fixed, paraffin-embedded tissue for diagnosis, but the remaining tissue may become depleted through successive testing. When new biomarkers or therapeutic targets emerge, insufficient material may limit additional molecular analysis and contribute to the need for repeat invasive procedures.

Proposed Solution: We propose a companion specimen repository model designed to preserve cellular material captured during routine core needle biopsy that would otherwise be discarded. The recovered material forms a formalin-free Virchow Companion Specimen. Following confirmation of malignancy, the specimen would be accessioned, and its DNA and RNA quantified before division into multiple aliquots to support future testing while minimizing repeated specimen handling. Specimens would be preserved using nucleic acid stabilization chemistry. The proposed Virchow Vault® infrastructure would support specimen traceability, chain of custody, secure inventory management, controlled access, and longitudinal stewardship. Authorized clinical and research users could request specimens or testing according to applicable consent, institutional agreements, governance requirements, and regulatory standards.

Conclusions: A companion specimen repository could expand long-term access to molecular material without consuming additional diagnostic tissue or requiring additional biopsy passes. By preserving a biospecimen that would otherwise not exist, this model may support future patient testing, translational research, biomarker validation, and therapeutic development. Further implementation and evaluation are necessary to establish operational feasibility, governance requirements, clinical utility, and scalability across participating institutions.

Abstract 44: Evolving the Digital Integration Strategy for Automated Biobanking: Lessons from a Large-Scale Biocentre Implementation

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Background: As biobanks expand automation, digital integration is critical to maintaining sample traceability while enabling efficient and scalable operations. A large-scale Human Biological Samples (HBS) Biocentre currently manages approximately 6 million samples across automated and manual storage, with an annual sample volume of approximately 500,000 and 300,000 samples retained annually. Automated storage launches at approximately 6 million sample capacity and can scale to 20 million. The initial architecture incorporated horizontal orchestration layer intended to supporting multiple automation.

Methods: Integration requirements were evaluated during design, development, testing, and operational readiness activities across four core biobanking workflow areas: accessioning, storage, picking/retrieval, and processing workflows. Assessment focused on system ownership, workflow complexity and maturity, development capacity, supportability, data exchange, chain of custody, and the distinction between vertical enterprise integration and horizontal laboratory orchestration.

Results: The assessment resulted in an evolution of the integration strategy. The automated storage integration pathway was simplified from four horizontal primary integration touchpoints to three, removing one horizontal orchestration layer while maintaining required data exchange, traceability, and system control. A focused vertical integration between the biobank LIMS and storage platform was selected, with an enterprise integration layer supporting secure data exchange while the LIMS remained the authoritative source for sample and workflow information. Horizontal orchestration was retained selectively for workflows requiring coordination across multiple instruments and processing steps. Key considerations included workflow complexity, process maturity, execution ownership, system handoffs, development capacity, and sustainable support.

Conclusions: Automated biobanking does not require a single integration pattern or a uniform level of orchestration. Architecture should reflect workflow complexity, organizational readiness, scalability requirements, and the level of coordination required across laboratory systems. Distinguishing vertical integration from horizontal orchestration and applying each selectively provides a practical framework for scalable and sustainable automation while avoiding unnecessary architectural and operational complexity.

Abstract 45: From a Single Research to a Provincial Infrastructure: A Framework for Sustainable Growth Through Continuous Quality Improvement

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Background: Biobanks are often established to support a single research program but frequently face increasing requests to expand to other disease sites, hospitals, and biospecimen types. Maintaining standardized governance and biospecimen quality during growth remains a major operational challenge. In 2021, the University of Saskatchewan (USask) Biobank was established to support gynecological oncology research. This abstract describes how continuous quality improvement and research-driven expansion transformed it into a sustainable provincial biobank infrastructure.

Methods: This biobank was initially established at a single hospital with governance, quality management, and digital infrastructure designed to facilitate future expansion. A quality management system comprising 10 governance policies, 49 standard operating procedures, standardized consent form, biospecimen processing, and centralized data management through the ATiM (Advanced Tissue Management Application) was implemented. New research collaborations emerged; collection expanded to include additional hospitals, oncology specialties, and biospecimen types while maintaining standardized workflows. Quality indicators included a tissue ischemia time quality scoring system and automated monitoring of the collection to storage interval for blood and ascites samples.

Results: Since enrolling its first participant in October 2021, the biobank has expanded from one hospital to four hospitals and now covers six oncology specialties in Saskatchewan. The USask Biobank includes 532 consenting patients and 11,886 annotated biospecimens, including tissue, blood and ascites samples. It supports 8 active research projects, including 2 pan-Canadian Terry Fox initiatives. Research-driven expansion, multidisciplinary collaboration, and continuous process evaluation enabled sustainable growth while maintaining standardized governance and quality indicators.

Conclusions: Sustainable biobank growth requires more than simply increasing its collection capacity. Establishing scalable governance, quality management, and a robust database prior to any expansion allows biobanks to respond to evolving research priorities without compromising the quality of biospecimen or operational consistency. This framework may serve as a practical model for organizations developing sustainable, research-responsive biobanking programs.

Abstract 46: From Global Standards to Local Context: Developing a Comprehensive SOP Framework for an Emerging Liver Biobank in the Philippines

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Background: International biobanking standards provide essential guidance for biospecimen quality, traceability, and ethical governance, but translating these principles into locally feasible procedures can be challenging in resource-constrained settings. The PHIL LIVER Biobank is an emerging disease-focused biobank established within a multidisciplinary liver research program in the Philippines. We describe the development of a comprehensive standard operating procedure (SOP) framework that contextualizes international biobanking principles to national, institutional, and operational requirements.

Methods: The SOP framework was developed using ISBER Best Practices and ISO 20387:2018 as key references, alongside Philippine ethical and data privacy requirements, institutional policies, and applicable biosafety and transport guidance. Biobank processes were mapped across the biospecimen lifecycle and supporting operations, with procedures adapted to participating study workflows, specimen types, available infrastructure, transport conditions, and governance requirements. Draft procedures underwent iterative review and refinement as workflows and infrastructure evolved.

Results: A comprehensive draft SOP framework was developed across eight major biobanking domains: governance, participant recruitment and management, material handling and documentation, inventory management, facilities management, quality assessment, material request and release, and legacy planning. Collectively, the procedures span recruitment, consent and withdrawal; collection, processing, transport, storage, and traceability of blood, fecal, and ascitic fluid specimens; specimen access, retrieval, return, and disposal; and eventual transfer or discontinuation of biobank operations. International and national requirements were translated into context-specific procedures incorporating coded identification and barcoding, chain-of-custody documentation, controlled transport, data protection, equipment-failure contingencies, deviation management, and mechanisms for periodic review and revision.

Conclusions: Developing SOPs for emerging biobanks requires more than direct adoption of international standards. The PHIL LIVER experience demonstrates a structured approach to translating global biobanking principles into a comprehensive framework responsive to local regulatory, infrastructure, and operational realities. Continued implementation and evaluation will determine the framework's feasibility, effectiveness, and adaptability as the biobank matures.

Abstract 47: From Researcher Requests to Data Priorities: Maximizing the Value and Quality of Biobank Data

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Background: Biobanks invest substantial resources in collecting and curating clinical and biospecimen-associated data, yet the associated clinical data most frequently requested by researchers are not always available.

Understanding real-world researcher demand, together with recurring gaps in readily available data, can help guide future data collection, quality assurance (QA), and development of research-ready datasets. We aim to assess the most frequently requested data from the UHN Biospecimen Services and identify gaps between researcher needs and available clinical data.

Methods: We conducted a retrospective descriptive review of documented research data requests. Requested information was categorized into predefined data domains, including demographics, diagnosis, pathology/grade, stage, treatment, laboratory/biomarker data, genetics/genomics, imaging, longitudinal follow-up and outcomes, and biospecimen inventory.

Results: We summarized the frequency of requested data elements and identified recurring areas in which requested information was incomplete, outdated, not readily available, or required additional manual retrieval or reconciliation.

Conclusions: Researcher requests provide a real world quality-assessment approach for identifying both high-demand data elements and recurring gaps in biobank data availability. Aligning future data collection, longitudinal updating, and QA activities with these patterns may improve data completeness and accessibility, reduce repetitive manual retrieval, and facilitate the development of research-ready datasets. This demand-informed approach helps biobanks focus limited resources on the data that researchers use most, thereby maximizing the scientific and operational value of their samples.

Abstract 49: Improving Sample Collection Standards through Consistent Quality Control

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Biobanks are important for long-term storage of biospecimens in the field of biomedical research. Banking high-quality samples can provide crucial clinical data such as identifying preanalytical factors for cancer development and accurately support personalized treatments. At UHN Biospecimen Services (UHN BSP), the General Box Quality Control (QC) project aims to review 10% of the existing banked samples as well as establish a procedure for regular QC of samples and sample data going forward. With the biobank being active for over 20 years, standards for data collection under various study protocols are constantly changing. This project ensures that data in our systems are up-to-date and reflective of their quality over time.

10-15 boxes are randomly retrieved monthly, ensuring that selection bias is reduced across different studies, while also considering varying collection dates and storage conditions. Samples from each box are physically cross-checked to identify any discrepancies against the Biobank Information Management System (BIMS). Types of discrepancies can include missing aliquots, sample conditions, and variation in volume. Detected discrepancies undergo a troubleshooting process, such as locating missing samples through trackers or relabeling cryovials. Once resolved, updates to the BIMS are completed on a quarterly basis, and boxes are returned to long-term storage. The most common discrepancy found is variation in sample volume across all boxes cross-checked since the start of the project. Boxes that have an average collection year between 2018 and 2023 showcase a downward trend in detected discrepancies, highlighting the improvement of sample collection standards with time. Between 2020 and 2021, studies that underwent changes in sample collection protocol showed the highest number of discrepancies between the recorded and physical observation of sample volumes.

Conducting consistent quality control cross-checks on past samples allows for the regulation of lab protocol and long-term storage. UHN BSP strives to actively collect detailed observations on samples, ensuring their viability and reliability prior to distribution for external research teams. Opportunities for internal improvements in the protocol continue to be assessed. With ongoing advancements in technology, our methods of tracking sample data have evolved, providing access to a more robust audit trail for all samples banked under UHN BSP.

Abstract 52: Valuable Insight Gained during Concurrent Biorepository Accreditation of Princess Margaret Cancer Biobank and McCain Genitourinary Biobank Awarded by

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Background: UHN Biospecimen Services Biorepository encompasses the Princess Margaret Cancer Biobank (PMCB) and the McCain Genitourinary Biobank (MGB). Both biobanks have been jointly accredited by the College of Pathologists Biorepository Accreditation Program (CAP-BAP) and have entered their third cycle of reaccreditation. CAP-BAP establishes standardized requirements that ensure the highest quality of procurement processing, storage, distribution and data management of biospecimens for scientific research. The concurrent accreditation of two biobanks is a unique achievement in CAP-BAP history and has provided valuable insight.

Methods: The CAP-BAP requires biorepositories to identify all services they provide. This activity menu enables CAP to curate a customized checklist of standard requirements for preparing the biorepository for onsite inspection by an appointed independent inspector. Checklist domains include director and laboratory personnel qualifications, director oversight, testing method validation and verification, quality management system, chemical hygiene, document control process, competency assessment and laboratory information system(s). Onsite inspections concluded with a final assessment statement outlining recommendations and deficiencies which must be addressed within 30 days.

Results: Across three years of preparation, PMCB and MGB have been jointly accredited under UHN Biospecimen Services and have gained several key insights: 1. Accreditation readiness is continuous; revision practices must remain active in the Quality Management System (QMS). 2. QMS is an active, dynamic framework that clarifies biorepository governance, personnel roles, and system responsibilities. 3. Transparent and traceable specimen chain of custody processes, even for minor transactions, support identification of bottlenecks and influence upstream and downstream quality. 4. Documentation is equally critical as procedural execution, encompassing both intuitive and less intuitive workflows that uphold biorepository credibility. 5. Continuous equipment oversight is essential, as all instruments contribute to reliable biobank operations.

Conclusion: The concurrent accreditation of two biobanks is a unique achievement that positions UHN Biospecimen Services Biorepository as a model for supporting the accreditation of additional biobanks in the future. Biorepositories of all sizes should view CAP-BAP as an opportunity for refinement and advancement

Abstract 53: Where Does the Tissue Go? Mapping Surgical-to-Biobank Attrition: A Retrospective Analysis of Barriers to Research Tissue Collection

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Background: The transition of a surgical specimen from the operating room (OR) to a research biobank is governed by a series of clinical, pathological, and operational constraints. Tissue can be banked for research only after diagnostic requirements are met, and the intended lesion can be identified without compromising patient care. Banking is influenced by tissue availability, lesion visibility and delineation, viability, proximity to surgical margins, procedure completion, and other pre-approved criteria. We examined reasons for non-collection to identify priorities for quality improvement.

Methods: We retrospectively analyzed de-identified, unbanked surgical resection cases from patients who had consented to PMCB or study-directed tissue collection from January 2025 through June 2026. Original free-text reasons were retained for traceability, and semantically equivalent expressions were harmonized and assigned to one of eight predefined categories using a prespecified rule-based framework. Counts and proportions were calculated using pooled data. Wilson 95% confidence intervals and cumulative contribution of leading categories were assessed.

Results: Among 7005 OR cases reviewed, 2835 had documented PMCB or study-specific consent; 1206 were banked, and 1629 were non-collected. The three leading reasons across eight predefined categories accounted for 1325 cases (81.3%) of all non-collections. Insufficient tissue or tissue prioritized for clinical diagnosis was most frequent (612/1,629; 37.6%, 95% CI 35.2-39.9), followed by no grossly identifiable lesion (541/1,629; 33.2%, 95% CI 31.0-35.5) and after-hours cases (172/1,629; 10.6%, 95% CI 9.2-12.1). Together, tissue availability/clinical diagnostic requirements and lesion identification accounted for 70.8% of non-collections; after-hours cases were the leading explicitly operational barrier. Challenge profiles varied across surgical sites and were interpreted by workload and case mix rather than site performance.

Conclusion: Non-collection reflects multidimensional attrition across the surgical-to-biobank pathway rather than a single operational failure. Limited tissue availability and difficulty demarcating the targeted lesion predominated, while after-hours coverage was the leading explicitly operational barrier. These findings support mechanism-specific interventions spanning surgical-pathology coordination, tissue identification, and after-hours workflows. Standardized documentation enables prospective monitoring and targeted quality improvement.