Biobank Networks and Their Importance for Sector Development

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The Imperative of Collaboration

"Why should biobanks work in isolation if the future of science depends on collaboration?"

Evolution of Biobanking: From Local to Global

Biobanking has evolved significantly, transitioning from isolated local collections to expansive global networks. This shift is driven by the increasing complexity of scientific inquiry, which often requires access to vast, diverse, and high-quality biological samples and associated data.

Global Networks

Prominent examples include **BBMRI-ERIC** (Biobanking and Biomolecular Resources Research Infrastructure - European Research Infrastructure Consortium), **CTRNet** (Canadian Tumour Repository Network), and the **UK Biobank**. These initiatives demonstrate the power of coordinated efforts to gather and manage biological resources on an unprecedented scale.

Integration with Modern Science

Networking facilitates seamless integration with advanced scientific disciplines such as **-omics sciences** (genomics, proteomics, metabolomics), **big data analytics**, and the development of **personalized medicine**. This interconnectedness accelerates discovery and translation of research findings into clinical practice.

Adherence to Standards

To ensure quality and interoperability, global biobank networks adhere to rigorous international standards like **ISO 20387** (Biorepositories — General requirements for biobanking) and **ISBER Best Practices** (International Society for Biological and Environmental Repositories). These guidelines promote ethical conduct, quality management, and data integrity.

Key Benefits of Biobank Networking

Working in networks unlocks a multitude of advantages that are otherwise unattainable for individual biobanks. These benefits span across access, efficiency, innovation, and public trust.

- **Access to large, diverse, high-quality samples and data:** Pooling resources provides researchers with broader and more representative datasets, crucial for robust studies.
- **Standardization and harmonization of SOPs:** Ensures consistency and comparability of samples and data across different locations.
- **Efficiency: reduced costs and timelines:** Shared infrastructure and expertise optimize resource utilization and accelerate research cycles.
- **Innovation in biomarkers, therapies, diagnostics:** Large, well-annotated collections enable the discovery and validation of new biomarkers, leading to novel therapeutic and diagnostic tools.
- **Transparency and public trust:** Networked biobanks often adopt more robust governance and ethical oversight, fostering greater public confidence in the use of human biological samples for research.

Global Landscape of Biobank Networks

Biobank networks are flourishing worldwide, reflecting a shared understanding of their importance. Different regions have developed their own unique models, tailored to local needs and research priorities, while contributing to the global scientific effort.

Europe: BBMRI-ERIC

A distributed research infrastructure that provides access to high-quality biological samples and data across Europe, fostering collaborative biomedical research.

Canada: CTRNet

A national platform dedicated to accelerating cancer research by providing high-quality human biological samples and data.

Latin America

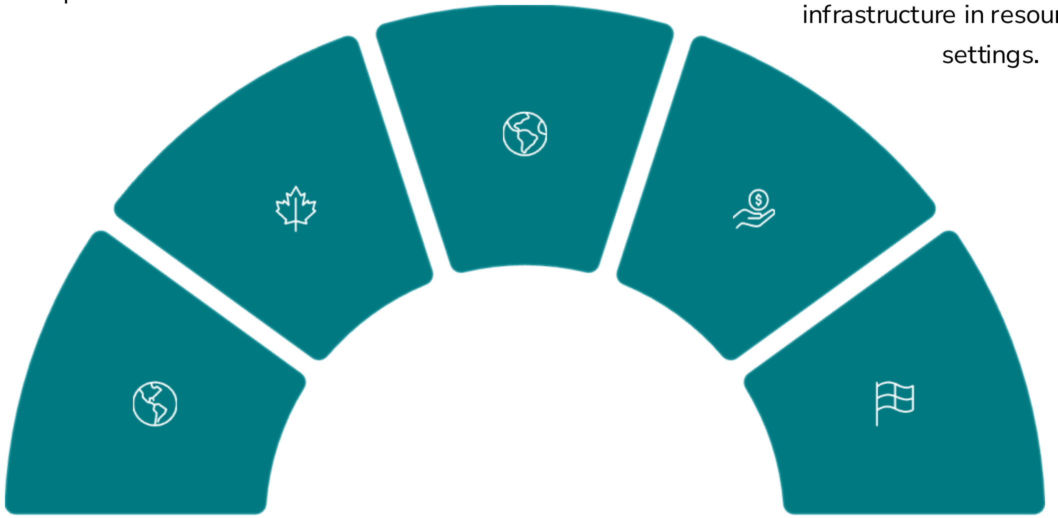
Emerging networks in countries like Brazil, Chile, and Colombia are building regional collaborations to address specific health challenges and leverage diverse populations for research.

LMICs: BCNet/IARC

Initiatives focusing on Low and Middle-Income Countries, such as the BCNet (Biobank Collaboration Network) in partnership with IARC (International Agency for Research on Cancer), aim to strengthen biobanking capacity and infrastructure in resource-limited settings.

Brazil: RFBB (Fiocruz Biobank Network)

Brazil: RFBB (Fiocruz Biobank Network) – national reference integrating accredited and developing biobanks, with working groups on SOP harmonization, consent models, IT systems, and best practices.



REDE FIOCRUZ DE BIOBANCOS

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Uma rede colaborativa dos Biobancos da Fiocruz que proporciona à comunidade científica acesso a materiais biológicos humanos e dados associados, com qualidade.

Equipe Contratada

Coordenação (3)
Equipe Biobancos (8)

Capacidade de Armazenamento

- 1.6 milhão de amostras

Aquisiçoes (2024 - 2026)

Investimentos em equipamentos essenciais, insumos e planejamento para operacionalização e expansão.

5 depósitos concluídos

10 depósitos em andamento

3 novos de depósitos previstos

208 mil amostras a serem depositadas (2025-2026)

5 Biobancos credenciados

5 Biobancos em desenvolvimento

Comitê Gestor da RFBB
Representantes de 19 UTC, PR e Fórum de CEP

✓ 15 cursos e Treinamentos
equipe interna e externa (2024-2025)

✓ 1 Catálogo em desenvolvimento
Com Sistema de Solicitação de Material Biológico (Cogetic)

* Aquisições via VPPCB para iniciar Biobancos.
As UTC assumem as necessárias à operação dos biobancos.

"The trustworthiness of a biobank is, therefore, determined in large part by the perceived trustworthiness of the representative of the biobank – whether a clinician, scientist, or laboratory technician. This individual's trustworthiness is, in turn, grounded in their professional attributes and behaviours, as well as the credentials of the institution that they represent. The process of seeking consent from biobank donors for example, can be an important way that the trustworthiness of the institution is communicated to the donor."

Dive L, et al. Public trust and global biobank networks. BMC Med Ethics. 2020 Aug 15;21(1):73. doi: 10.1186/s12910-020-00515-0.

Addressing the Challenges in Network Development

While the benefits of biobank networks are clear, their establishment and maintenance face significant challenges. Overcoming these obstacles is crucial for the sustainable growth and effectiveness of these collaborative infrastructures.

Heterogeneous Infrastructure & IT

Differing standards and systems across biobanks can hinder data interoperability and sample exchange.

Sustainability and Funding

Securing long-term, stable funding is essential for the continuous operation and expansion of biobank networks.

Consent and Ethical Issues

Navigating diverse ethical guidelines and consent models across jurisdictions requires careful consideration and harmonization.

Governance and Public Trust

Establishing clear governance structures and maintaining public trust through transparency are paramount.

Training and Human Resources

Ensuring a skilled workforce and continuous training are vital for high-quality biobanking practices.

The Impact of Networks on Public Health and Innovation

Biobank networks are not merely repositories; they are active catalysts for advancing public health and driving innovation. Their integrated nature allows for broader impact and more efficient resource utilization across the research ecosystem.

Health Policies & Precision Medicine

Facilitate the integration of research findings into national health policies and the development of tailored precision medicine approaches.

Innovation & Industry Partnerships

Support the translation of research into tangible products and solutions through collaboration with industry.

Efficient Resource Sharing

Optimize the use of valuable samples and data, preventing duplication of effort and maximizing research output.

Impact on Public Health

Significantly contribute to understanding and combating diseases such as rare diseases, cancer, and infectious diseases by providing crucial research materials.

Alignment with Global Initiatives

Contribute to the United Nations Sustainable Development Goals (SDGs) and World Health Organization (WHO) initiatives, fostering global health equity.

Pillars of a Successful Biobank Network

For biobank networks to thrive and fulfill their potential, they must be built upon a foundation of robust principles that ensure ethical conduct, data integrity, and long-term sustainability. These pillars are critical for fostering trust and maximizing scientific impact.

Clear Governance and Sustainability

Well-defined structures and secure funding models are essential for long-term operation and accountability.

Robust Quality and Risk Management

Implementing stringent quality control measures and risk assessment protocols safeguards the integrity of samples and data.

FAIR Data Principles

Ensuring data is Findable, Accessible, Interoperable, and Reusable (FAIR) maximizes its utility for the wider scientific community.

Transparent and Inclusive Consent

Ethical practices around consent, including broad and dynamic consent models, are fundamental for respecting donor autonomy and fostering trust.

Community Engagement and Communication

Active dialogue with donors and the broader community builds confidence and ensures research aligns with societal values.

Connecting Science, Ethics, and Society

Biobank networks serve as crucial bridges, ensuring that scientific advancements are conducted ethically and in alignment with societal values. This interconnectedness is vital for building a sustainable future for biomedical research.

Empowering Brazil's Networks

How can Brazil further strengthen its national biobank networks to maximize their impact on health research and innovation?

RFBB's Role in Latin America

What is the strategic role of the Fiocruz Biobank Network (RFBB) in fostering collaborative biobanking across Latin America?

Conclusion and Future Outlook

The future of biomedical research is undeniably collaborative. Biobank networks are pivotal in providing the foundational resources—high-quality samples and data—needed to address complex global health challenges. Their continued development, guided by strong ethical principles and sustainable models, will be key to unlocking new scientific breakthroughs and improving human health worldwide.

Call to Action

We encourage researchers, policymakers, and funding bodies to actively support and engage with biobank networks. Collaborative efforts are essential to leverage these invaluable resources for the advancement of precision medicine, public health initiatives, and a deeper understanding of human biology.

OBRIGADA!

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