OECI Working Groups

Biobanks and Personalised Cancer Care: a timely opportunity for OECI

Olli Carpén[1,2]
1. Department of Pathology, University of Helsinki, Helsinki, Finland, Professor
2. Organisation of European Cancer Institutes, Biobanks and Molecular Pathobiology Working Group Chairperson

A PROPOSAL TO BUILD AN OECI BIOBANK NETWORK TO FOSTER CANCER RESEARCH AND CLINICAL CARE

- What and why?
- Where are we now?
- Opportunities and challenges
- What next - towards a concrete proposal

Biobanks provide answers to emerging opportunities and challenges

- (Bio)medical research is rapidly evolving – AI can analyse large multiple datasets for hypothesis generation and testing
- New technologies enable cost-effective multimodal analyses of large sample collections
- The role of genetic variant combinations in disease origin, evolution and treatment response is increasingly recognised
- New therapy options and more personalised treatments - at the same time costs are rising and patient equality remains a challenge
- How to choose the best therapy options?

nature reviews genetics

https://doi.org/10.1038/s41576-024-00794-y

Review article

Check for updates

Biobanking with genetics shapes precision medicine and global health

C. Scott Gallagher, Geoffrey S. Ginsburg & Anjené Musick

Abstract

Precision medicine provides patients with access to personally tailored treatments based on individual-level data. However, developing personalized therapies requires analyses with substantial statistical power to map genetic and epidemiologic associations that ultimately create models informing clinical decisions. As one solution, biobanks

Sections

Introduction

Biobanks and data types

Biobanks advance precision medicine

Limitations of biobanks

Biobanks serve three parallel tasks

- Support fundamental, translational, and clinical research
- Provide material for industry developing novel diagnostics and innovative therapies
- Bridge the gap and facilitate transfer of new research findings to clinical care

RESEARCH

CLINICAL CARE

Where are we now?

- Over 90 OECI centres host biobanks operating at various activity levels.
- There is virtually no coordination of activities, harmonised standards or joint projects at OECI level
- A more thorough survey of existing activities and interest in collaborative activities is needed
- Many of the OECI biobanks are also linked with BBMRI-ERIC infrastructure – possible to take advantage of their expertise

The opportunity

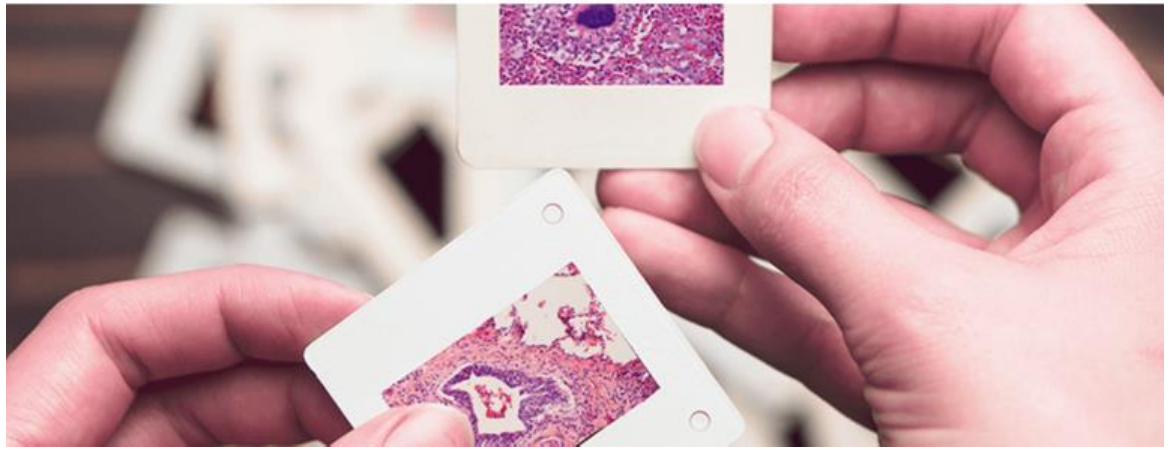
- Integration of AI tools into clinical care and personalised cancer treatment requires biological samples and phenotypic information (RWD) that can only be offered by large-scale biobanking.
- We lack multicentric initiatives that generate sufficiently large cohorts to answer targeted research questions and, in particular, fulfil the big data analysis and AI algorithm development requirements.
- **Opportunity for OECI biobanks acting together, to combine research with clinical care, foster capacity building, eventually leading to improved patient care**

Examples of potential research activities within OECI network

- Personalized cancer prevention: screening of biobank samples for genetic alterations that increase a person's cancer risk.
- Development and optimisation of new diagnostic tests for cancer detection, response evaluation or follow-up.
- AI tools for digital pathology and other applications (AI Factories)
- Longitudinal blood sample collections from (rare) cancer patients for cell-free DNA and biomarker studies
- Prospective cancer tissue collections for multiomics profiling studies
- Clinical trials, including those using molecular profiling as inclusion criteria

Virchow is trained on *1.5 million* hematoxylin and eosin stained whole slide images from diverse tissue groups

the Pathologist



Slides in the Machine

Digital pathology is the future of storing and sharing images of tissue – and combining learning could further transform the field

VIRCHOW: A MILLION-SLIDE DIGITAL PATHOLOGY FOUNDATION MODEL

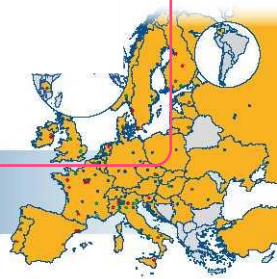
A PREPRINT

Eugene Vorontsov[†1], Alican Bozkurt[†1], Adam Casson[†1], George Shaikovski[†1], Michal Zelechowski[†1], Siqi Liu[†1], Philippe Mathieu[1], Alexander van Eck[1], Donghun Lee[1], Julian Viret[1], Eric Robert[1], Yi Kan Wang[1], Jeremy D. Kunz[1], Matthew C. H. Lee[1], Jan H. Bernhard[1], Ran A. Godrich[1], Gerard Oakley[1], Ewan Millar[2], Matthew Hanna[1,3], Juan Retamero[1], William A. Moye[1], Razik Yousfi[1], Christopher Kanan[1,4], David Klimstra[1,3], Brandon Rothrock[1], and Thomas J. Fuchs[1]

[1]Paige, NYC, NY United States
[2]NSW Health Pathology, St George Hospital, Sydney Australia
[3]Memorial Sloan Kettering Cancer Center, NYC, NY United States
[4]University of Rochester, Rochester, NY United States

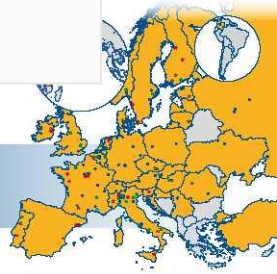
ABSTRACT

Computational pathology uses artificial intelligence to enable precision medicine and decision support systems through the analysis of whole slide images. It has the potential to revolutionize the diagnosis and treatment of cancer. However, a major challenge to this objective is that for many specific computational pathology tasks the amount of data is inadequate for development. To address this challenge, we created Virchow, a 632 million parameter deep neural network foundation model for computational pathology. Using self-supervised learning, Virchow is trained on 1.5 million



SWOT Analysis: OECI Biobank Network

Strengths	Weaknesses
- Access to diverse, high-quality biospecimens across Europe - Potential for large-scale, multicenter cancer research - Alignment with EU health and research priorities	- Complex regulatory landscape across countries - Variability in infrastructure and capabilities
Opportunities	**Threats**
- EU funding programs (e.g., Horizon Europe). - Integration with AI and precision medicine. - Public-private partnerships and pharma collaborations. - Improved treatments for cancer patients	- Data privacy breaches or ethical controversies - Lack of interest / support at institutional level



What next – steps towards a concrete plan

- A survey on the activities and resources of OECI biobanks and individuals interested to bring the proposal forward (Q3-4/2025)
- First version of a work plan with proposal of joint activities and pilot projects (Q1/2026)
- A funding plan, including opportunities for EU-funding (Q1/2026)
- Plans for collaboration with BBMRI-ERIC (quality, BBMRI catalogue, infra-dev projects etc.) (Q4/2025-Q1/2025)
- Final plan for OECI biobank network (to be presented in OECI DAYS 2026)