

Minireview

The Organization of European Cancer Institute Pathobiology Working Group and its Support of European Biobanking Infrastructures for Translational Cancer Research

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Abstract

Background: Today's translational cancer research increasingly depends on international multi-center studies. Biobanking infrastructure or comprehensive sample exchange platforms to enable networking of clinical cancer biobanks are instrumental to facilitate communication, uniform sample quality, and rules for exchange.

Methods: The Organization of European Cancer Institutes (OECI) Pathobiology Working Group supports European biobanking infrastructure by maintaining the OECI-TuBaFrost exchange platform and organizing regular meetings. This platform originated from a European Commission project and is updated with knowledge from ongoing and new biobanking projects. This overview describes how European biobanking projects that have a large impact on clinical biobanking, including EuroBoNeT, SPIDIA, and BBMRI, contribute to the update of the OECI-TuBaFrost exchange platform.

Results: Combining the results of these European projects enabled the creation of an open (upon valid registration only) catalogue view of cancer biobanks and their available samples to initiate research projects. In addition, closed environments supporting active projects could be developed together with the latest views on quality, access rules, ethics, and law.

Conclusions: With these contributions, the OECI Pathobiology Working Group contributes to and stimulates a professional attitude within biobanks at the European comprehensive cancer centers.

Impact: Improving the fundamentals of cancer sample exchange in Europe stimulates the performance of large multi-center studies, resulting in experiments with the desired statistical significance outcome. With this approach, future innovation in cancer patient care can be realized faster and more reliably. *Cancer Epidemiol Biomarkers Prev*; 19(4); 923–6. ©2010 AACR.

Introduction

Translational cancer research is largely dependent on the availability of well-documented high-quality sample material. The need for larger multi-center studies to obtain the required statistical significance has resulted in an increasing awareness of two basic important issues in exchanging samples:

- Comparable sample quality to avoid intrinsic bias
- Uniformity of data with compatible annotation to enable the exchange of data.

These prerequisites result in a need for both a professional attitude and harmonization of health care research biobanks at an international level. In parallel with this, national and international biobank networks were established to meet not only these, but also additional networking challenges concerning differences in legislation for exchange of human material, access rules, and central database applications. Implementing a more professional atmosphere prompts biobanks to adopt measures to guarantee high-quality samples and data, enabling the exchange of samples with other institutes. Therefore, standard operating procedures, norms, quality assurance, and quality control programs have been developed and implemented. In addition, an increasing number of biobanks have become accredited or certified.

In Europe, funds have been allocated for international networks of biobanks promoting translational cancer

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Note: <http://www.tubafrost.org>; <http://www.eur.nl/fgg/pathol/>

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research. The outcomes of these biobanking projects are actively disseminated in the Organization of European Cancer Institute's (OECI) community, and where applicable, added to the already existing OECI-TuBaFrost platform.

With its 67 member institutes in 27 countries, the OECI forms a strong platform for dissemination, primarily because the membership consists of comprehensive cancer centers or academic medical centers that provide comprehensive cancer care. These centers all have local OECI representatives. They maintain OECI communication within their institute, including communication with the designated working group representatives. Regular workshops, courses, and meetings covering biobanking have been organized in the OECI pathobiology working group including: "European Tissue Banking for Medical Research", held in Rotterdam, the Netherlands on March 29 and 30, 2007; "Structure and Genetics, the new Paradigm" held on October 24 and 25, 2008, at the Oncology Institute "Prof. Dr. Ion Chiricuta", Cluj, Romania. In 2010, there will be a biobanking course organized in Bari, Italy. The frequency of OECI pathobiology working group meetings is every 2 years and largely depends on offers from one of the member institutes to host the meetings. In parallel, the complete TuBaFrost platform was adopted after funding was provided by the European Commission for the web site and database application. In this overview, the contributions of European biobanking projects involving the OECI, including current and expected initiatives, with a focus on clinic-based cancer biobanks in Europe, are reported and discussed.

OECI-TuBaFrost

TuBaFrost was one of the pioneering projects, funded for 3 years by the European Commission, that started at the end of 2002. The project focused on networking frozen tissue pathology banks for cancer research (1, 2). After funding had expired, the project was further maintained by the OECI to support translational cancer research in Europe.

TuBaFrost's achievements include the development of a complete frozen tumor sample exchange infrastructure covering:

1. Standardization of the tissue collection process (3).
2. A European code of conduct for exchange of residual human material for research based on European legislation (4).
3. Access rules for local collectors protecting stakeholder investments (institutes, clinicians, and researchers; ref. 5).
4. Web-based database application access rules (5).
5. Rules for sample exchange between institutes (4, 5).
6. Web-based communication through a database application enabling an open view (only after valid registration) with an option to request samples stored in the participating biobanks (6).

Dissemination of this knowledge has resulted in further harmonization and standardization for clinic-based biobanks, particularly the frozen tumor banks. All of the features developed for this initiative, except the database application, are widely used for collection and exchange of frozen tumor samples inside and outside of Europe today. However, evaluation of a questionnaire distributed in the OECI pathobiology working group clearly showed the elaborate data upload procedure of the database application and its open character (the fear that samples become freely and widely accessible), strongly inhibit contributions. A strategic approach to overcoming this inhibitory bottleneck is outlined in the projects described below.

EuroBoNeT

This project studies bone tumors, which is a rare form of cancer. The consortium contains 25 participants (7). OECI-TuBaFrost was used as a basis to organize a virtual biobank and exchange platform for this project. The TuBaFrost exchange platform was copied, adapted, and taken over to be used in a closed project format within the EuroBoNeT consortium. After adaptation, it now has the capability to handle materials other than frozen tissues only. The database application can now handle frozen tissues, formalin-fixed and paraffin-embedded tissues, blood samples in their many forms, cell lines, tissue microarrays, and xenografts. In addition, the support of a closed project environment (consortium members only) was created. This closed project support environment in the database application was adapted and can now support a multitude of different projects on different themes. This new database application design is applied to the OECI-TuBaFrost web site to enable project support.

SPIDIA

The full title of this European project is "Standardization and improvement of generic preanalytical tools and procedures for *in vitro* diagnostics." The aims of SPIDIA are to enable standardization and improvement of generic preanalytical tools as well as procedures for diagnostics (8), according to evidence-based biobanking principles. Standardization of the diagnostic processes is encouraged in the biobanking community, especially when the resulting materials (blood and tissue) can be better conserved for research purposes, providing an increase in research opportunities. Results from this high-impact project need to be communicated and implemented in OECI-TuBaFrost.

Biobanking and Biomolecular Resources Research Infrastructure

This large project (9) has had a very high impact in Europe, stimulating harmonization and networking

for health care research biobanks. In addition, it has stimulated national fund raising. The Biobanking and Biomolecular Resources Research Infrastructure also developed useful recommendations for the appropriate national bodies and institutes (10). Although the Biobanking and Biomolecular Resources Research Infrastructure project is not focused on cancer, its aim to network and harmonize all European health care research biobanks will certainly also have a huge effect on the cancer research area. Within this project, a questionnaire was developed for population and clinical biobanks to populate a database that can function as a searchable catalogue. This principle and those questions suitable for clinic-based biobanks were included in the OECI-TuBaFrost database application, in which the open part is now a catalogue of clinical cancer biobanks. This results in a much shorter period for uploading data, which relieves the burden of regularly updating the data, while still offering the opportunity to establish comprehensive communication between collector and requestor on the basis of sample requests. Both the new OECI-TuBaFrost environments offer distinct advantages: (a) the open environment promotes the initiation of new projects based on tumor samples and (b) the closed environments for project support are already available on the web site and have been thoroughly tested. After fine-tuning, the OECI community will be invited to use this new environment.

Expected Initiatives

The last European FP7 health call (HEALTH.2010.1.1-1) covered two important issues for translational cancer research biobanking. The first involves the improvement of sample quality and exchangeability of data in a legal framework, which has the potential to extend research opportunities in translational cancer research, with only limited institutional bias in large multi-center studies. In addition, it calls for the improvement of the exchange of data and samples between biobanks of different disciplines. Population-based and clinic-based biobanks would have data interconnectivity, resulting in clinical, genotype, environmental, and lifestyle data coupled to samples, resulting in new research opportunities. The second issue is a call for a European translational cancer research initiative in which cancer biobanking plays an important role. Both initiatives will have a major effect on the professional approaches of cancer research biobanks.

Professional Clinical Cancer Biobanks

These European projects all contribute to the establishment of professional clinical cancer biobanks that are poised to distribute high-quality samples, as well as data, and have the ability to exchange samples between institutes. Professional biobanks therefore need to be part of a comprehensive cancer center. Such biobanks must be centralized and follow International Society for Biological and Environmental Repositories (ISBER) best practices (11) and Organisation for Economic Co-operation and Development (OECD) guidelines (12). Such centralized facilities could, in the near future, become certified organizations based on norms set by the community. The big advantage for researchers is that biobanking knowledge is also centralized, and the collection is established using the best and most appropriate conservation techniques described in standard operating procedures, and applied under a quality assurance and quality control program. For exchange purposes, knowledge of ethics and law as well as transport are readily available.

In addition, total awareness must be developed and maintained because without the involvement of professional biobanks, as well as a multidisciplinary research team, the needed cooperation in multi-center translational cancer research studies can be severely hampered due to institutional bias and lack of knowledge. In addition, the cooperation between centers is (in the majority of cases) essential to accrue the number of samples necessary for strong statistical significance. Still, the highly competitive nature of the research environment, driven by today's scientific output measurement, strongly encourages individualism among scientists, making cooperation and beneficial sample sharing difficult to establish. This leaves a major task for biobank managers; to convince potential sample users of the benefits of cooperating with their competitors.

Disclosure of Potential Conflicts of Interest

No potential conflicts of interest were disclosed.

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