

FEEDBACK ON THE OPERATION OF THE BIOBANK ACTIVITIES

1. The activities of the Laboratory Services and Biobank (LSB) Group include the provision of generic laboratory support services (technical management of health and safety, provision of glassware services, maintenance of supplies of basic laboratory items and supervision of equipment maintenance) and of biobanking services for IARC and externally funded projects.
2. This report provides an update on the restructuring of the LSB with a particular focus on the biobank component.

A. Scope of IARC Biobank and specimen collections

3. Over the years, IARC has developed or coordinated a considerable number of large molecular epidemiological studies involving specimen collections. These studies are extremely diverse in their size, design, governance and in the type of biomarker analyses involved. The largest study in the IARC Biobank is EPIC (European Prospective Investigation into Nutrition and Cancer). In 2009, the IARC Biobank worked on over a dozen projects, however, 70% of requests were from EPIC. The total workload involved the retrieval of over 85 000 straws from liquid nitrogen, 8000 DNA extractions and shipment of over 100 packages of biological samples.
4. Although an integral part of the IARC Biobank, the EPIC collection has its own governance under the general guidance of the EPIC Steering Committee. Nevertheless, the size and level of activity of the EPIC study have a strong impact on the Biobank services, in particular on the type of infrastructure IARC uses for its other collections. In addition to the EPIC study, the IARC Biobank holds large collections from HPV prevalence and oral cancer studies (from the Section of Infections (INF)), risk factor studies on oesophageal cancer (from the Section of Genetics (GEN)) and multiple smaller collections, often corresponding to small pilot studies on specimens collected in low-resource countries. Although the majority of these studies are active, some of these collections are archives of important past studies which are not the subject of current research.
5. Over the past 10 years, the emergence of “omics” technologies has made it necessary to develop laboratory workflows for pre-analytical processing of large series of specimens. Therefore, biobanking activities at IARC encompass a number of laboratory service activities such as high throughput extraction of DNA, aliquoting of various types of specimens, and shipment of specimens or of their products to collaborating analytical platforms.

6. From a budgetary viewpoint, the IARC Biobank operates on a cost-recovery basis, with a strong contribution from the central IARC regular budget for infrastructure and staff salaries. Most of the consumables and specific staff costs associated with defined biobanking operations are charged, at least to some extent, to the users, using various administrative mechanisms (joint grant applications, collaborative research agreements, invoicing). However, the principles and mechanisms of cost recovery require constant adaptation to reflect the growing diversity and workload of biobanking activities. A revision of these principles and mechanisms is currently under development.

B. Biobank structure

7. The first structural revision of a central Biobank at IARC took place in 2000–2002 with an extensive physical review of the contents of all storage containers, and the creation of rooms dedicated to liquid nitrogen tanks or deep-freezer storage. In 2005, with the departure of Dr Riboli, the coordinator of EPIC, to Imperial College London, IARC's Biobank was further extended to encompass the EPIC Biobank. In 2007, IARC developed and published a reference biobanking document (see reference 9 in Publication List below). This document describes the basis of the technical standards applied at IARC and provides recommendations for the development of biobanking operations by IARC collaborators worldwide. Since its publication, this document has been endorsed as a basic technical standard by the European Biobanking and Biomolecular Research Infrastructure (BBMRI) programme.

8. To address the growing complexity and workload of biobanking operations, a new biobank structure was put in place in 2009, supported by the creation of a Laboratory Manager position (P2 scientist) and a Biobank Steering Committee (BSC). This complemented the Laboratory Steering Committee (LSC) which provides an opportunity for all laboratory Groups at the Agency to shape the future of the Agency's laboratories, including priorities for equipment acquisition (see Figure 1 below – Organizational structure).

9. The above structure, particularly with respect to the IARC Biobank, became fully functional with the arrival of Dr Maimuna Mendy at the beginning of October 2010 and the first meeting of the BSC was held at the end of November. The Laboratory Manager is in charge of all biobank operations and supervises biobank staff. The BSC has an advisory role, both to the Laboratory Manager and to the Director of IARC, on long-term strategic issues regarding general biobank developments.

10. The Biobank is supported by an administrative budget assistant and by a secretary, who handles general documentation and budget exchanges between the Biobank and its "users" in-house and outside IARC. All LSB staff have offices in the Biological Resource Centre (BRC) building, which was refurbished in 2010.

11. The Biobank part of the LSB currently consists of nine members of staff, including seven laboratory technicians. This group is responsible for running the biobank platform and for providing a range of services: sample archiving and shipment of biological samples to

collaborators; pre-analytical sample processing; extraction of nucleic acid and DNA quantification and aliquoting.

12. The role of each of the positions will be reviewed in the coming year to create a coherent team, meeting the requirements of the Agency's Groups and external collaborators.

13. In order to maximize the potential of the biobank and to create new opportunities, a website will be launched describing the resources and facilities available. It will contain a catalogue of the collections and information on laboratory facilities including relevant standard operating procedures (SOPs). It will also describe the mechanism for access to IARC's collections and will help scientists of the Agency's collaborative networks to identify potential new collaborations in order to make the best use of the specimens maintained in storage.

C. Reorganization of the resources

Extra Budgetary activities

14. The expenditure for staff salaries and purchase of laboratory consumables needs to be largely financed from extra budgetary (EB) funds. Under the new structure a financial plan will be established which will support the continuation of staff contracts through EB activities. The cost base system under IARC's cost recovery policy has been already reviewed and work will continue to refine this approach: existing cost for access to samples and sample preparation will be further revised and costing for additional activities such as archiving of new sample collections will be introduced.

15. SOPs are being developed, to be used by principal investigators for accurate budgeting of grant applications.

Storage facilities

16. Samples kept at IARC are stored in liquid nitrogen, or in freezers under various temperature conditions or at room temperature (in the case of blood filter papers). The liquid nitrogen facilities are centralized with all the tanks situated in the BRC building, however, freezers are located in multiple locations: in the BRC (10%), in the laboratories (65%) and in the basement of the tower building (25%). In line with the plans outlined in the Medium-Term Strategy, the Biobank, with the cooperation of the research groups, will provide an up-to-date listing of stored samples and implement procedures to manage and monitor the movement of samples (see below). The storage facilities will be reviewed periodically to assess future need for storage capacity.

17. Using the framework of the EPIC-Biobank sample management system, an in-house sample management information system for IARC (SAMI) was developed for archiving and retrieval of biological samples. The software is currently being validated and an implementation strategy is being developed with the cooperation of the BSC. A training workshop will be conducted for potential users of the software. The LSB will provide support to research groups in organizing their sample collection, obtain up-to-date records and verify the accuracy of the electronic records.

Equipment maintenance and purchasing plan

18. A review of maintenance and service contracts for major equipment will be conducted with the aim of developing an equipment replacement plan for essential shared equipment. In the plan, a review of the function and performance of equipment over five years old will be carried out with the aim of replacing the older equipment one to two years before they become obsolete. The plan will also include the upgrading of critical equipment.

D. Involvement in International biobanking activities

19. Due to its leading role in molecular epidemiology and its strong international visibility, IARC is strongly involved in developing recommendations, standards and publications aimed at developing international biobanking practice. IARC is a founding member of FIBO (Forum of International Biobanking Organization) and a participant of BBMRI, ISBER (International Society for Biological and Environmental Repositories), and the Marble Arch think-tank. IARC is also providing expertise and advice to the development of National Biobanking programmes (e.g. the recent Irish National Biobanking project). This activity will continue to be developed through in-house expertise and participation in key external committees and organizations.

Publication list

1. Zatloukal K, Hainaut P. Human tissue biobanks as instruments for drug discovery and developments: impact on personalized medicine. *Biomarkers in Medicine J*. In press.
2. Hewitt R, Hainaut P. Biobanking in a fast moving world: an international perspective. *JNCI Monograph*. In press.
3. Hainaut P, Vozar B, Rinaldi S, Riboli E, Caboux E. The European Prospective Investigation into Cancer and Nutrition biobank. *Methods Mol Biol*. 2011;675:179-91.
4. Voegelé C, Alteyrac L, Caboux E, Smans M, Lesueur F, Le Calvez-Kelm F, Hainaut P. A sample storage management system for biobanks. *Bioinformatics*. 2010 Nov;26(21):2798-800.
5. Hainaut P, Caboux E, Bevilacqua G, Bosman F, et al. Pathology as the cornerstone of Human Tissue Banking: European Consensus Expert Group Report. *Biopreservation and Biobanking* 2010 Sept;7(3):157-160.
6. Bevilacqua G, Bosman F, Dassel T, Höfler H, et al. The role of the pathologist in tissue banking: European Consensus Expert Group Report. *Virchows Arch*. 2010 Apr;456(4):449-54.
7. Vaught JB, Caboux E, Hainaut P. International efforts to develop biospecimen best practices. *Cancer Epidemiol Biomarkers Prev*. 2010 Apr;19(4):912-5.
8. Field JK, Liloglou T, Niaz A, Bryan J, et al. EUELC project: a multi-centre, multipurpose study to investigate early stage NSCLC, and to establish a biobank for ongoing collaboration. *Eur Respir J*. 2009 Dec;34(6):1477-86.
9. Caboux E, Plymoth A and Hainaut P. Common Minimum Technical Standards and Protocols for Biological Resource Centres dedicated to Cancer Research. Eds, IARC Work Group Report 2; 2007.
10. Gormally E, Hainaut P, Caboux E, Airoldi L, et al. Amount of DNA in plasma and cancer risk: a prospective study. *Int J Cancer*. 2004 Sep;111(5):746-9. Erratum in: *Int J Cancer*. 2006 Jul;119(2):476.

Figure 1: Organizational structure of Laboratory Services and Biobank

