International Agency for Research on Cancer

World Health Organization

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PURCHASE OF SCIENTIFIC EQUIPMENT – MEDIUM-TERM SUPPORT TO THE BIOBANK

1. The IARC Biobank is a key resource supporting the Agency's mission of coordinating and conducting research on cancer by housing biospecimens from large cohort studies among other study designs. The inter-disciplinary research strategy of the Agency means the Biobank will continue to be a core resource. Maintaining samples in a stable and secure environment is, therefore, an important priority of the Biobank and critical for long-term continuity of IARC's research.

2. The centralization and cataloguing of the IARC Biobank under the Laboratory Services and Biobank Group (LSB) has allowed the Agency to have a central, focal point for coordinating the reception, storage and distribution of biological samples worldwide. This development has been achieved over a five year period, transforming a dispersed and uncoordinated approach into an efficient, high-quality platform for research.

3. The IARC Biobank now stores over six million biological samples from studies conducted in collaboration with or coordinated by IARC scientists. In addition, the Biobank provides storage space for studies conducted in low- and middle-income countries where sub-optimal conditions exist for medium- to long-term sample storage or, in some cases, provides facilities to store duplicate samples to provide security for valuable resources of IARC's collaborators.

4. Currently the Biobank infrastructure consists of 46 large liquid nitrogen tanks (600 litres) plus 10 additional smaller ones (30–55 litres) as well as over 150 freezers.

5. This storage capacity has become too limited to accommodate the continuous flow of new collections received at IARC, currently accumulating at over 50 000 new samples per year.

6. An additional problem arises from the ageing of the current nitrogen tanks and freezers. Over 50% of the liquid nitrogen tanks at IARC were purchased over 20 years ago and 50% of the freezers are older than 10 years. This has resulted in frequent breakdowns and an increased requirement in the volume of available back-up space. Good practice is to have 15% of storage back-up space available for each type of storage conditions (-20°C, -40°C and -80°C). To date we are unable to maintain this proportion for -80°C and -20°C freezers (8% available at -80°C and 4% at -20°C).

7. Therefore accommodating an increasing number of stored samples and maintaining the highest level of security for storage is a constant preoccupation for IARC. The mid- to long-term solution is integral to the Biobank plans within the “Nouveau Centre”, which have anticipated an increase in both capacity and quality of infrastructure (presented to the Scientific Council in 2013 (see document SC/49/10)).

8. Good biobanking practice implies duplicate sample storage in aliquots in order to increase sample security in case of catastrophic events and to minimize the number of freeze/thaw cycles when specimens are analysed. The current system of storing aliquots of the same sample in the same freezer or liquid nitrogen tank does not provide adequate safety for the samples. Consequently, the strategy of the Biobank is to move progressively towards a hybrid system with duplicate samples split between ultra-low storage facilities (liquid nitrogen) and -80°C freezers, with increased emphasis for day-to-day access on the -80°C freezers.

9. Specific equipment is also required for storage of IARC cell lines. The cells are currently stored in 10 small individual liquid nitrogen tanks, which are not connected to the automatic filling system and require manual filling. An automated system is recommended practice for storing collections regularly accessed by multiple users from different research groups, notably through the use of LN2 tanks with an automatic filling system which has a built-in security system providing restricted access only to authorized personnel. The system also reduces risk of injury to staff by minimizing manual manipulation during sample retrieval.

10. In summary the current requirements are to: replace malfunctioning and aged storage units, including for cell lines, as well as to initiate the introduction of the hybrid storage system particularly for newly arriving collections.

11. The current strategy of replacing malfunctioning storage units has been through funds from the regular budgets and grants; this has only allowed for the most urgent replacement of equipment. However resources have been insufficient to allow for provision of additional units to cater for expansion and an adequate number of back-up units for the Biobank’s security as well as for any upgrading of the facility to take advantage of new technologies.

12. In response, a three year plan has been prepared based on data obtained on future needs for storage capacity across the Agency, the need to upgrade the current facilities and an estimation of adequate back-up space to maintain the security of the current and future sample collections.

13. In this regard, six liquid nitrogen tanks (including one automatic LN2 unit), twelve -80°C freezers and three -40°C freezers are required.

14. In addition, an upgrading and expansion of the automatic pipeline will be necessary with the acquisition of the LN2 tanks. The tanks will be accommodated in the Biological Resource Centre building.

15. The annual maintenance costs of the requested equipment will be integrated into the IARC regular budget as well as from extra-budgetary sources and invoicing for the Biobank services.

16. The Director would like to request the Governing Council at its 58th Session in May 2016 to provide a total allocation of €492 500 from the Governing Council Special Fund (GCSF) for a period of three years (2016–2018) for the purchase of essential cold storage equipment to cater for the storage expansion and adequate back-up facilities in the IARC Biobank. This approach is first submitted to the Scientific Council for its consideration.

17. The Scientific Council is requested to advise the Director and the Governing Council on the proposed request to use funds from the GCSF to purchase the following equipment for the Biobank.

(a) Automatic liquid nitrogen tank (x1)

18. The automatic liquid nitrogen tank will be used for cell lines. Automation provides easy access for storage and retrieval of samples. The ergonomic design minimizes risk to staff and has secured access which is restricted to preauthorized users. The system is flexible and can hold up to 252 cryoboxes, compatible with most consumable types.

19. The system provides comprehensive facilities for inventory, audit trail, reports, LIMS connectivity and has minimum consumption of liquid nitrogen.

(b) Liquid nitrogen tanks (x5)

20. Three new conventional large (600 litres) liquid nitrogen tanks will replace the same number of old tanks that have developed technical faults making them unsafe. Maintenance of these old tanks is no longer assured by the manufacturer or they are not connected to the automatic filling system.

21. In order to accommodate new needs for storage in liquid nitrogen, two additional large (600 litres) liquid nitrogen tanks are also requested. The proposed new tanks have a capacity of 29 400 tubes (2ml).

(c) -80°C freezers with racks and temperature monitoring device (x12)

22. We propose to acquire 12 vertical freezers (temperature range: -60°C to -82°C) with an internal capacity of 1000 litres and storage capacity of 72 000 cryotubes (2ml) and appropriate racks, trays and temperature monitoring device.

(d) -40°C freezers with racks and temperature monitoring device (x3)

23. We finally propose to acquire three horizontal freezers with internal capacity of 416 litres (temperature range of 10°C to -45°C).

Requested Budget

Item	Quantity	Approximate unit price (€)	Total price (€)
2016			
Automatic LN2 tank (including delivery, installation and training)	1	112 000	112 000
Liquid nitrogen tank	3	30 000	90 000
Liquid nitrogen piping	1	40 000	40 000
-80°C freezers	4	11 000	44 000
-40°C freezers	1	2 200	2 200
Racks	72	150	10 800
Monitoring system for freezers	5	300	1 500
Monitoring system for LN2 tanks	25	300	7 500
2017			
-80°C freezers	4	11 000	44 000
-40°C freezers	1	2 200	2 200
Liquid nitrogen tank	2	30 000	60 000
Racks	72	150	10 800
Monitoring system for freezers	5	300	1 500
Monitoring system for LN2 tanks	25	300	7 500
2018			
-80°C freezers	4	11 000	44 000
-40°C freezers	1	2 200	2 200
Racks	72	150	10 800
Monitoring system for freezers	5	300	1 500
TOTAL			**492 500**