International Agency for Research on Cancer

World Health Organization

Scientific Council **SC/51/10**
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PURCHASE OF SCIENTIFIC EQUIPMENT

1. An inter-disciplinary research approach is embedded within the IARC Medium-Term Strategy, with close integration of laboratory sciences, biostatistics, bioinformatics and epidemiology. This strategy requires high quality laboratories and availability of core items of scientific equipment. In addition, the Medium-Term Strategy foresees cooperation with outside partners for items of equipment where major in-house investment is not required or justified.

2. IARC also seeks to have centralized platforms (e.g. next-generation sequencing (NGS), mass spectrometry, Luminex for detection of multiple infectious agents) available to scientists across the Agency but with responsibility for management, training and maintenance devolved to individual Groups. Most recent acquisitions were robots for automated liquid sample handling and this investment has significantly reduced labour costs when analysing large series of samples in molecular epidemiology projects. Beyond the acquisition of such larger items of equipment, additional instruments are needed for high throughput analyses and analysing low volume samples.

3. Covering the cost of larger items of equipment on the regular budget has not been feasible in recent years and obtaining funds through competitive grant applications is difficult given the limited number of such opportunities open to the Agency as an international organization. At the same time the Agency has developed a five-year plan to replace smaller items of equipment used across different research groups and will finance this from the regular budget provision.

4. The Director would like, therefore, to request the Governing Council at its 57th Session in May 2015 to provide an allocation of €496 570 from the Governing Council Special Fund (GCSF) for essential scientific equipment. This approach is first submitted to the Scientific Council for its consideration.

5. The annual maintenance costs of the requested equipment will be covered by the regular budget as well as by collaborative programmes through grant applications.

6. 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:

a) Equipment for the DNA extraction platform

7. The Laboratory Services and Biobank Group (LSB) has undergone a major review and restructuring in 2014, with resources matched to carefully redefined service provision. One objective is to provide reliable pre-analytical sample processing services for research Groups across the Agency, including DNA extraction for large-scale epidemiological studies.

8. The platform utilizes two high-throughput DNA extractors, a Tecan liquid handling robotic instrument for aliquoting of reagents and nucleic acids and a fluorimeter to perform DNA quantification. The existing DNA extractors can only be used on large sample volumes precluding extraction of DNA from sample volumes below 500 uL or from biological materials other than whole blood and buffy coat, such as tissue or blood spots. Furthermore, the current equipment does not allow RNA extraction.

9. In addition, the current liquid handling system is fitted with an 8-channel arm to transfer extracted DNA into storage plates for DNA quantification and to prepare DNA aliquots. The increasing demand of service from the DNA extraction platform has resulted in some bottlenecks with delays in processing. The acquisition of a 96-channel pipetting head will allow a higher throughput for sample processing.

10. We are therefore seeking support to purchase the following items:

i. A DNA/RNA small volume extractor to increase the capacities of the Biobank services using low sample volumes and able to extract both DNA and RNA from diverse sample types (blood, tissue, urine, blood spots). The proposed instrument will be located within LSB in the Biological Resources Centre (BRC) building, where the two large volume DNA extractors and the liquid handling robotic are located.

ii. A 96-arm multichannel pipette system to upgrade the current Tecan liquid handling robotic system.

b) Plate reader

11. The Biomarkers Group (BMA) is commonly measuring cytokines, adipokines and inflammatory factors in serum or plasma samples from large-scale epidemiological studies. For these applications, methods must be accurate, highly sensitive, rapid and inexpensive, while operating on low sample volumes. A platform has been established which allows the measurements of several biomarkers by conventional ELISAs. However, these validated assays require a significant sample volume per cytokine measured (up to 0.2ml).

12. Recently, highly sensitive chemiluminescent or luminescent, singleplex or multiplex plate readers have been developed, with highly specific and accurate antibody-antigen reactions, avoiding antibody cross-reactivity. These highly sensitive techniques can be applied to very low sample volumes (about 5ul or less per cytokine measured). They are faster and cheaper than the ELISA techniques, thus saving time of personnel and reagents.

c) Vacuum concentrator

13. The activities of BMA are continuously expanding, and over 10 000 samples are planned to be analysed in 2015, for fatty acid, polyphenol or metabolomic measurements in large-scale collaborative epidemiological studies. The newly established techniques increase the demand for the use of the vacuum concentrator currently utilized by BMA and LSB to extract fatty acids, polyphenols, DNA and other fractions of the metabolome from various biological matrices.

14. Currently a maximum of 50 to 400 samples can be concentrated in a day, depending on the applications, and this has become a limiting factor for the research projects. Therefore we request support to purchase a new vacuum concentrator to fulfil the growing demand.

d) Thermal cyclers and real-time PCR systems

15. PCR Thermal Cyclers represent key items of equipment routinely used by researchers from all laboratory research Groups at the Agency. Some of these instruments are more than 10 years old and require replacement to ensure both reliability and sufficient throughput in order to fulfil the demand from planned large population-based studies. We therefore request the purchase of three high-throughput PCR thermal cyclers to satisfy the increasing PCR analysis demand.

16. Moreover, three Real-Time PCR detection systems are needed both to replace two items dating back more than ten years and to fulfil the increasing demand for RNA analyses.

17. Finally, we request support for a medium throughput digital droplet PCR system to enable absolute quantification of nucleic acids (DNA and RNA) from varied sample sources and low DNA template quantities. In line with the increasing need for accurate and sensitive cancer biomarkers, droplet/digital PCR is considered a promising approach for the absolute quantification of genetic and epigenetic biomarkers in biofluids, and has been tested for a variety of applications including DNA methylation. Such a system will also have utility for the quantification of viral loads and low copy number RNAs in projects focused on both cancer etiology and biomarker development.

Requested budget

	Quantity	Approximate price (€)	Total price (€)
a) DNA extraction platform			
Nucleic acid small volume extractor	1	101 470	101 470
96-channel pipetting head	1	59 000	59 000
b) ELISA Plate reader	1	50 000	50 000
c) Vacuum concentrator	1	50 000	50 000
d) PCR platform			
Modular high-throughput thermal cycler	3	28 960	86 880
Real Time detection system	3	22 000	66 000
Digital droplet PCR	1	83 220	83 220
Total equipment			**496 570**