Operational developments in the IARC biobank and integration of new robotic platforms

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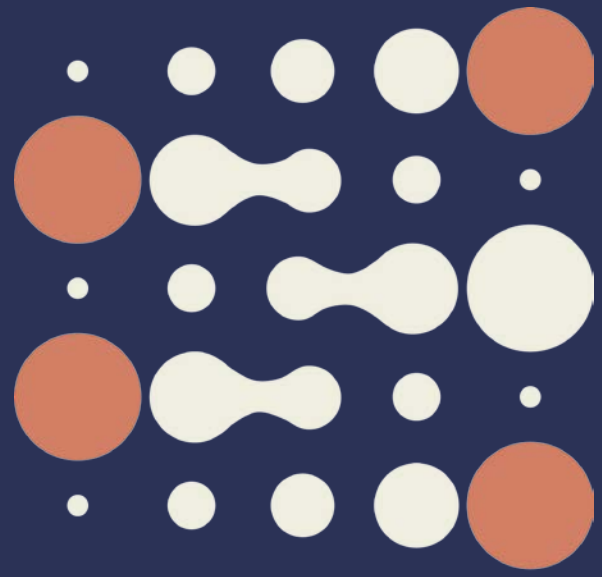

International Agency for Research on Cancer

World Health Organization

Update and upgrade of existing facilities during the move

- The move of the Agency to new, purpose-built premises in January 2023 has provided the opportunity to update and upgrade existing facilities.
- In the Biobank, new robotic platforms were obtained and integrated as part of the biological sample processing pipeline.
- The main objectives were:
  - The replacement of the obsolete equipment.
  - The increase of the sample storage capacity.
  - The improve of the facilities for more security.
  - Operation developments for a better samples flow.

Design of the facilities in the new building

- The design and the configuration of the biobank laboratories allows:
  - A better centralized workflow of the samples, from reception of its to storage into the biobank facilities.
  - A separation of the different activities: non-DNA aliquoting, DNA extraction, DNA quantification and aliquoting, samples inventory, samples expedition and reception.
- Increase of the storage space for biological samples: the current storage capacity in freezers and liquid nitrogen can be doubled.
- New liquid nitrogen facility with a centralized control system (Desigo/Siemens) for the liquid nitrogen pipelines, the automated tank filling and the oxygen level in the cryogenic rooms for more security.
- Badge and fingerprint reading system for limited and secure access to biological sample storage rooms.

Integration of new equipment during the move

Samples transfer

- **Replacement of 38 liquid nitrogen tanks** (~30 years old for some of them, risk of leaks, recurrent electronic fails)
  - transfer of ~25,000 goblets (~ 4,200,000 samples) from old tanks into the new ones during the move
  - old tanks: capacity of 720 goblets for the AirLiquide tanks, 810 goblets for the Taylor Wharton tanks
  → new tanks: capacity of 840 goblets for the Biosafe800 tanks, 1,320 goblets for Biosafe1800 tanks.

New LN2 tanks

- **Acquisition of new freezers and fridges**.

7 freezers -80˚C
3 freezers -40˚C
8 freezers -20˚C
11 tabletop freezers -20˚C

5 fridges +4˚C
11 tabletop fridges +4˚C

- **Replacement of the obsolete automated DNA extraction** systems Autopure LS (Qiagen) by Microlab Star M (Hamilton) / Omega Bio-tek DNA extraction kit.

Microlab Star M (Hamilton) / Omega Biotek DNA extraction kit with micro beads for large blood volumes

- **Acquisition of an automated capper/decapper** AutoCap (SPT Labtech) to open and close 2D barcoded racked tubes (faster than manually and more secure).
Integrated in the DNA extraction platform and non-DNA aliquoting process.
Allows the use 2D barcoded racked and screw caped tubes which improve the traceability and the samples preservation.

AutoCap

Perspectives and further improvements

The objectives of the IARC biobank is to guarantee the quality of the biological samples and their valorization with a view to their use for future studies, and to obtain the IBISA accreditation in the coming years.

To reach the objectives, the IARC biobank needs to improve the automation and the standardization to ensure:

- accuracy and reliability
- samples traceability
- optimum samples conservation
- workflow increase
- interface with LIMS

The next identified needs to integrate in the IARC biobank for processes improvements are:

- an automated tube labelling system
- an automated system for non-DNA aliquoting
- a new LIMS including more features
- additional liquid nitrogen tanks to increase the storage capacity
- an automated freezer for samples storage and handling

Related publications/References/Literature cited

Acknowledgements

Further information

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Conclusion

The automation and the standardisation are essential for the operational development of the IARC biobank, allowing traceability improvement, accuracy and reliability to guarantee samples quality and valorisation.