

Manual storage or fully-automated innovative storage system? What and how?

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Background

Today, most biobanks still keep their fluid samples in manual freezers, while only a very small percentage of biobanks uses automated systems. The major disadvantage of manual freezers is tube handling at room temperature, which leads to the fact that quality of samples cannot be ensured.

Methods

Biobank Graz has four generations of storage systems: (1) Historically inherited freezers that are running since more than two decades, (2) water-cooled freezers, (3) a fully automated storage system with storage at -80°C and tube picking at -20°C , and finally (4) a fully automated system with storage and tube picking both at -80°C in combination with a -80°C walk-in manual store for non-automatable legacy samples. As all systems are in use at Biobank Graz, we have a clear picture of all features of the systems, advantages as well as disadvantages, which have been systematically reviewed and evaluated.

Results

Each of the storage systems is specifically suitable for storage of different kinds of fluid samples at -80°C , depending on vial type and volume, identification type (e.g. 2D barcoded or hand-written labels), amount of daily incoming aliquots, sample distribution frequency etc.

First generation freezer
Electrical cooling



Second generation freezer
Water cooling



Fully automated storage system
Storage at -80°C , picking at -20°C

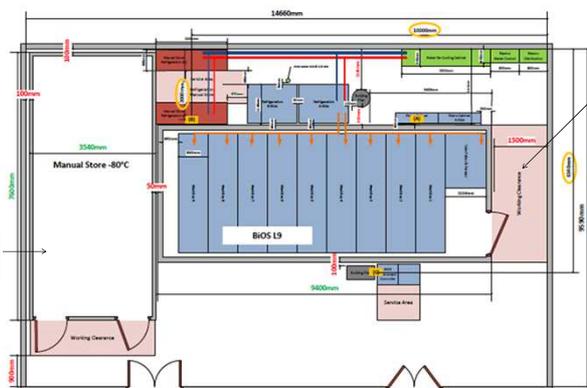
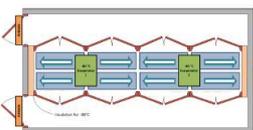


Combined manual and fully automated system of -80°C

Walk-in system

Manual storage system for any format

- Storage of tubes at -80°C
- Tube picking at -20°C



-80°C fully automated storage system

- > 5 million tubes
- Storage of tubes at -80°C
- Single tube picking at -80°C



Conclusion

To ensure and maintain sample quality, fully automated storage systems with storage and tube picking at -80°C in combination with high density storage capacities are state-of-the-art today. Other storage alternatives (manual freezers) may be functional and suitable but lower qualities need to be taken into account, depending on local technical requirements and sample turnover capability.