Automated Frozen Sample Aliquotter
No-Thaw Automated Extraction of Multiple Frozen Aliquots from One Frozen Sample

introduction

Biotechnology tools hold potential for exponential progress in molecular medicine and biomarker discovery. Yet, quality results depend on quality materials, and optimal preservation and sampling are crucial to ensure banked sample integrity and promote ideal conditions for analysis.

Current methods and tools force biobanking into sample storage and processing trade-offs which can impact operations and costs significantly; sometimes affecting sample quality. For example, repeated freeze/thaw cycling may degrade critical biological molecules, and minimizing sampling frequency is recommended to reduce potential sample molecular damage.

frozen sample aliquotter

Conceived and designed to serve the needs of modern biobanking, the Automated Frozen Sample Aliquotter helps optimize frozen sample integrity and sampling efficiency:

- Extract multiple frozen cores from one single cryotube of frozen plasma or serum
- Deliver hands-free, automated operation (e.g. source vial selection, de-capping/capping, coring, dispensing, cleaning) after sample loading
- Achieve volumetric consistency on every extracted core (never <100µL from 1.8mL cryotube)
- Maintain ultra-cold conditions pre-, during, post-coring
- Avoid carryover between samples

demonstrated capabilities

Independent evaluation of a proof-of-concept instrument at the R.I. BioBank successfully demonstrated that it can extract multiple frozen, uniformly-sized, consistently homogeneous frozen cores from one frozen plasma sample stored in a 1.8mL cryotube. The extracted cores give reproducible results with very low variability when analyzed for common analytes.

Consistently Homogenous Cores with Low Variability

Reproducibility Study (few donors, many repeats)

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<tr>
<th>Core</th>
<th>Lipid</th>
<th>glucose</th>
<th>IgG</th>
<th>average</th>
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<td>Controls vs. Reproducibility</td>
<td>100%</td>
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<td>Reproducibility Study of Controls vs. Reproducibility</td>
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Reproducibility Study Coefficient of Variation (CV) (few donors, many repeats)

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Reproducibility Study of Controls vs. Reproducibility of Controls | 6.6% | 6.6% | 6.6% | 6.6% |

productivity gains

scenario

- Clinical biobank
- Samples frozen in 1.8mL/2.0mL tubes
- Request for 2 aliquots X150 samples = 300 aliquots

tasks

- Process 1 source/2 destinations
- Sub-aliquot remaining sample material
- Distribute samples
- Return unused sample to freezer

collection & storage optimization

scenario

- 20 donors/day, 4.5 mL serum/ea.
- 32 cu. ft. upright
- 5,000 donors/year
- 35 racks 56,700 x 1.8mL vial capacity

approach

- Freeze sample in multiple small aliquots (pre-aliquot)

Current Process

Pre-aliquot

1.8mL vials
5.0 mL/ea.
X 5,000 donors
45,000 vials/year (28 freezer racks)
80% of freezer space

Introduce aFSA

Freeze in larger volume

1.8mL vials
X 5,000 donors
15,600 vials/year (10 freezer racks)
29% of freezer space

NOTE: All results were normalized using the assay results from the controls

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