INTEGRATED BIOBANKING WORKFLOWS WORKING GROUP:
Workflow Case Studies and Lessons Learned Series

Workflow Case Study 2 – Cryotube decapper crushing cryotubes causes quality issues for samples and data

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Introduction

This case study is reviewing the integration difficulties of an automated cryotube decapper/capper in an automated liquid handling workflow. A 96-tube decapper could crush cryotubes due to the adhesive labels affixed to the cryotubes.

Problem

Adhesive labels were used on bottom ID barcoded cryotubes for increased security for the operator, and in order to be compliant with the ISBER Best Practices. The rack within the decapper/capper which holds the cryotubes is not meant to hold tubes with adhesive labels. It is possible to insert labeled cryotubes in the racks, however it is difficult to place the tubes deeply enough within the rack spaces so that sometimes due to lack of space, labelled cryotubes move slightly upwards after their initial positioning. When labelled cryotubes are not positioned 100% correctly, the recapping of the filled tubes creates a collision inside the decapper which crushes the caps and renders the cryotubes unusable.

Workflow Background

SOPs

- Use and Maintenance: Liquid Handler

Equipment

- Liquid handling workstation with integrated 96-tube decapper/capper, automated

Consumables

- Adhesive labels
- Cryotubes with 2D bottom barcode, 0.5 mL screw-tops

Findings/Observations

When the cryotubes were crushed during the automated workflow on the liquid handling platform, the cryotubes could no longer be properly capped due to the destruction of the thread of the cryotube. The liquid sample in the cryotube needed to be transferred quickly (to avoid evaporation) and manually into

a new cryotube. The remaining part of the automated workflow on the liquid handler needed to be restarted or performed manually. From an informatics point of view, the laboratory information management system (LIMS) export file generated by the liquid handling platform software contained the sample IDs corresponding to the IDs at the bottom of the crushed cryotubes. This export file needed to be corrected before LIMS import as the samples were transferred into new cryotubes with different bottom 2D barcodes. This action needed manual individual scanning of the new bottom 2D barcodes.

This issue with the decapper led to increased workload (in the way of reprinting and affixing the adhesive labels, manually transferring the samples, and manually correcting the export file) and increased cost (as additional cryotubes and labels were required). Furthermore, the benefits of the automated workflow were lost because of the need for manual transfer of samples into new cryotubes. Manual transferring of samples could also potentially lead to sample quality issues (e.g., sample evaporation while the cryotube is uncapped, confusion regarding the sample IDs, erroneous labeling, etc.).

Solutions

After the decapper crushed the cryotubes:

- Manually transfer the samples into new cryotubes
- Reprint and affix labels
- Correct the sample ID export file before import into the LIMS

To avoid the cryotubes being crushed:

- Manually inspect and verify correct positioning of the labeled cryotubes within the rack before starting the automated liquid handler

For the future:

- Do not affix adhesive labels to the cryotubes as samples will be identified by the 2D barcodes at the bottom of the cryotubes, this is only a solution if bottom-barcoded cryotubes are used.

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Call for participation!

The Integrated Biobanking Workflows Working Group is recruiting members to develop more case studies based on this same template and where the objective is to uncover points in workflow integration which require improvement. Case studies may come from either automated or manual processes, from processes at any throughput level, and from a biorepository of any type and size.

If you are interested or have any questions, please email:

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- Dr. Conny Mathay (Working Group Member) at conny.mathay@ibbl.lu