**Implementation of fully automated specimen processing and data acquisition for flow cytometric immunophenotyping**

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**Introduction**

Here we report the implementation of automated sample processing and data acquisition in immunophenotyping of lymphocyte subsets and hematological malignancies, using combination and adaptation of Becton Dickinson (BD) and Beckman Coulter (BC) equipment and softwares.

**Hardware and software**

Sample processing, immunofluorescence staining and data acquisition were carried out with BD

Sample Prep assistant III, Lyse-Wash assistant, and flow cytometer FACSCantoII, interfaced to the LIS and interconnected through the WorkFlow manager.

BC softwares KALUZA v1.2 and REMISOL were used for data export to the LIS.

**Challenges**

The following challenges were addressed for the implementation of the automated process:

1) Configuration of antibody panels.

2) Traceability of sample identification.

3) Precision monitoring of cell preparation stations.

4) Steamlining of data export.

**Solutions**

1. Due to diversity of the antibody combinations used, automation of sample preparation required first to rationalize and standardize the panels in order to simplify preparation sequences. Shortening of preparation times was obtained by using "home-made" or commercial antibody mixtures. The workflow manager was adapted to allow easy programming of custom panels and of order transmission from the LIS.

2) The traceability of primary samples and corresponding daughter tubes was achieved by barcode identification and the BD Sample Traceability System software.

3) Automated weekly gravimetric testing was introduced to monitor the precision of the sample prep assistant.

4) Data are exported from the CantoII to a network storage space from which they can be retrieved from any remote location. Numerical data such as lymphocyte subset quantitation are analyzed with Kaluza Batch analysis module and transmitted to REMISOL using the new communication driver V1.8.2214.1, and exported to the LIS.

**Benefits**

Sample processing, sample staining, cell lysing/washing and data acquisition are all achieved without any manual operations. The process is amenable to any custom antibody panel and has allowed significant reduction in turn around time, improvement of sample traceability, and reduction of preparation errors. A larger proportion of the technical workload has been redirected to quality assurance and to advanced cytometry and software training, thus improving the overall quality of the laboratory service.