

Evaluation of performance and applications of LumiSens Digital Imaging System

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Microscope imaging systems become the standard in research and clinical diagnostics. The key aspects for their robust application are automatization and data processing. The instruments become simpler yet sustaining their good performance.

The innovative LumiSens (Sensovation AG) slide-based technology based on fluorescence digital imaging microscopy was used. The instrument is equipped with an inverted microscope, blue and red LEDs, double band pass filters and high-resolution cooled 16-bit digital camera. The instrument was evaluated for its performance compared with other flow and slide-based cytometers. The dynamic range for rainbow beads (Spherotec Inc.) measurement was estimated revealing high sensitivity and similar resolution as for other standard methods. The instrument revealed the ability to detect up to 7 bead populations showing its high-performance.

LumiSens proved to be useful for absolute cell counting of leukocytes in peripheral blood which gave results comparable to routine laboratory counting. The instrument was also evaluated for its capability for immunophenotyping of CD4 or CD22 positive events. Using To-Pro3 or SytoxGreen DNA dyes the cells were identified and CD4 or CD22 positive events were counted giving the similar results to those obtained by flow cytometry.

The sensitivity of the equipment was moreover confirmed by evaluation of the CD3 antigen expression on CD4 and CD8 positive cells which gave expected results confirmed by flow cytometry measurements.

Using CD45 and CD14 staining it was also possible to obtain differential peripheral blood leukocyte picture which gave the comparable results to flow cytometry and routine laboratory values.

Finally the sensitivity of LumiSens apparatus was verified by estimation of DNA cell cycle distribution on C2C12 human skeletal muscle cell line. The cells were easily identified and the phases of the cell cycle could be shown proving the LumiSens system as suitable also for this application.

LumiSens digital imaging system is a promising, versatile and cost-effective alternative for other slide-based cytometers present in the market.