

FULLY AUTOMATED POINT-OF-CARE FLOW CYTOMETRY COMBINED WITH INTELLIGENT SOFTWARE ALLOWS FOR ON-SITE DIAGNOSIS OF BACTERIAL AND/OR VIRAL INFECTIONS

Introduction

During infection, innate immune effector cells, such as neutrophils and monocytes, change their phenotype. This change can be used as a complex biomarker that can be picked up by flow cytometry combined with intelligent software: the “innate cells as an inflammatometer” concept.

Methodology

Cohort: patients suspected of infection at emergency department of a university medical center.

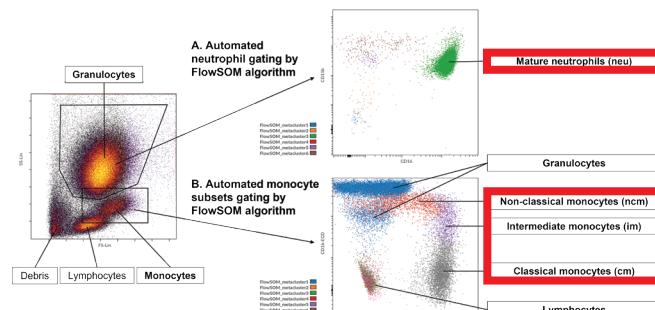
Procedure: Venipuncture and start of analysis by emergency department personnel

Analysis: Point-of-Care, automated flow cytometry.

Neutrophil panel: CD64, CD11b, CD16, CD62L, CD10

Monocyte panel: CD169, HLA-DR, CD16, CD14, CD11b

Gating: manual FSC/SSC gating, followed by FlowSOM gating algorithm



Diagnostic value of automated flow cytometry leukocyte markers

Results:

86 patients:

- 21 no infection
- 35 bacterial infection
- 30 viral infection

Diagnostic value for bacterial infections

- AUROC 0.73: neuCD64
- **AUROC 0.86:** neuCD64, cmCD11b, cmCD14, imCD11b, imCD14, imCD16, ncmCD169

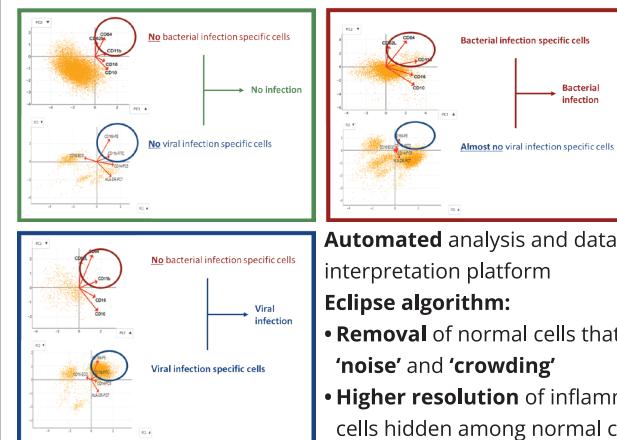
Diagnostic value for viral infections

- AUROC 0.79: cmCD169
- **AUROC 0.93:** neuCD64, neuCD10, imCD14, imHLA-DR, ncmCD14, ncmCD16, ncmCD169, ncmHLA-DR

Objective

To test whether fast point-of-care automated flow cytometry combined with analysis with two intelligent multidimensional algorithms could discriminate between absence or presence of viral and/or bacterial infections in patients at risk of infection at the emergency department.

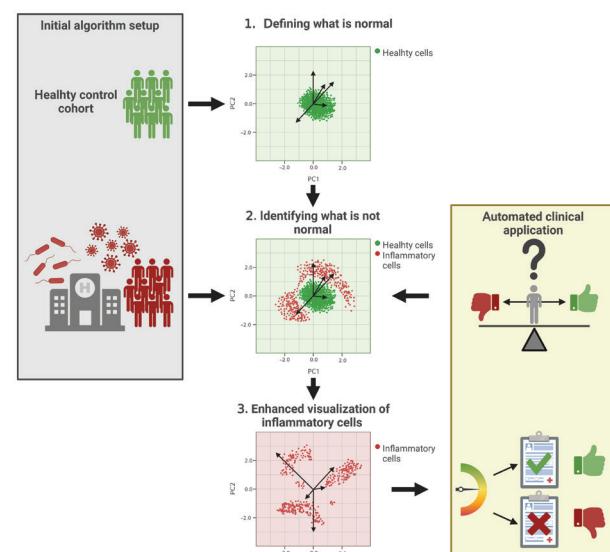
Automated visualization of disease specific cells by the ASUDES platform



Automated analysis and data interpretation platform

Eclipse algorithm:

- Removal of normal cells that cause ‘noise’ and ‘crowding’
- Higher resolution of inflammatory cells hidden among normal cells
- Specific patterns for type of infection



Conclusion

Automated point-of-care flow cytometry allows fast, on-site diagnostics and discrimination of bacterial vs viral vs no infections. The next step is the automated integration of these algorithms with the flow data allowing the automated analysis independently of human interference. This would result in a fast and fully automated diagnostic platform that can be performed and analyzed 24/7, even by non-specialists such as clinical support personnel.