Neutrophils in the Spotlight—Analysis of PMN Function in ARDS

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native, unfiltered endotracheal aspirates	
Index	CC20
Standardization	X
Counting	X
Viability	
Volume	

The Challenge:

Acute respiratory distress syndrome (ARDS) is a life-threatening condition characterized by diffuse pulmonary inflammation and damage to the alveolar-capillary barrier. Neutrophils (PMNs) are central to this damage through the production of reactive oxygen species (ROS) and the formation of extracellular traps. Investigating these cells is technically challenging because PMNs in lung secretions (tPMNs) must be isolated from highly viscous, complex clinical samples while maintaining their functional state for analysis.

CASY's Contribution:

The CASY Cell Counter was used to provide high-precision, automated quantification of cells within native, unfiltered endotracheal aspirates. This "gold standard" count allowed researchers to calculate precisely how many cells were lost during the complex homogenization and filtering steps required to prepare samples for flow cytometry.

Key Benefits to Researchers:

Process Optimization: Identified that filtering methods initially reduced cell numbers to 1/25th of the native content, enabling the team to improve and validate isolation protocols.

Quality Control: Provided a foundational "cell count control" to perform plausibility checks on flow cytometric tubes; low counts in CASY could explain subsequent implausible fluorescence values.

High-Resolution Quantification: Counted all particles > 8 µm to specifically target neutrophils while excluding smaller debris in difficult clinical samples

Table 3. Comparison of cell measurements using CASY and flow cytometry.

CASY	Homogenization Filtering Pipetting Loss Cell Isolation	Flow Cytometry
Native sample Endotracheal aspirate Cell content: 262/µL	 >	Prepared Sample Aspirate Cell content: 11/µL

CASY provided the essential technical benchmark required to handle complex clinical specimens like tracheal secretions. By delivering accurate automated counts of the native sample, the system allowed researchers to validate their isolation methods.