Features

Fluorescence-free morphological and functional characterization of blood cells

37 fundamental characteristics and 218 statistically derived parameters

Automatic quality control without calibration blood

Super-resolved analysis of Red blood cell morphology and functions

Shape index and activated fractions of platelets

Apoptotic index of lymphocytes

Size and shape of microvesicles

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C&B

Enhanced fluorescence-free characterization of blood cells by Scanning Flow Cytometry

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Scanning flow cytomer[1-3]

Cells	Concentration	Characteristics	
		Morphology	Function
Red Blood Cells	+	Volume, Hemoglobin, Diameter, Thickness, Shape index[4-6]	Membrane elasticity and permeability[7]. Activation index[8]
Platelets	+	Volume, shape index[9]	Aggregation[11] and activation[10] index
Lymphocytes	+	Cell and nucleus size, nucleus and cytoplasm density[12]	Apoptotic index
Monocytes	+	Cell and nucleus size, nucleus and cytoplasm density	Apoptotic index
Neutrophils	+	Size[13]	
Eosinophils	+	Size[13]	
Basophils	+	Size[13]	
Microvesicles Chylomicrons	+	Size, density[14]	

Characteristics marked in gray color are measured by most advanced hematological analyzers.
Characteristics marked in red color can only be measured by a Scanning Flow Cytometer.

Cellular characteristic forms blood cell parameters. Examples:

- Red Blood Cell Volume and Hemoglobin form the following hematological parameters: RBC, HGB, HCT, MCV, MCH, MCHC, RDW-SD, RDW-CV.
- Platelet Shape index forms the following: %RP and %FAP are the percentages of resting, and fully activated platelets; MPSI-R, MPSI-FA, and MPSI-PA are the mean platelet shape index for resting, fully activated, and partially activated fractions, respectively; PSIDW-R, PSIDW-FA, and PSIDW-PA are platelet-shape-index distribution widths for resting, fully activated, and partially activated fractions, respectively.

Peer-reviewed papers

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3. Maltsev *et al.* in *Flow Cytometry: Principles, Methodology and Applications* (ed. Papandreou, S.) 79–103 (Nova Science Publishers, 2013).
4. Semyanov *et al.* Calibration-free method to determine the size and hemoglobin concentration of individual red blood cells from light scattering. *Appl. Opt*. **39**, 5884–5889 (2000).
5. Yurkin *et al.* Experimental and theoretical study of light scattering by individual mature red blood cells by use of scanning flow cytometry and a discrete dipole approximation. *Appl. Opt.* **44**, 5249–5256 (2005).
6. Gilev *et al.* Mature red blood cells: from optical model to inverse light-scattering problem. *Biomed. Opt. Express* **7**, 1305-1310 (2016).
7. Chernyshev *et al.* Erythrocyte lysis in isotonic solution of ammonium chloride: Theoretical modeling and experimental verification. *J. Theor. Biol.* **251**, 93–107 (2008).
8. Chernyshova *et al.* Influence of magnesium sulfate on HCO3/Cl transmembrane exchange rate in human erythrocytes. *J. Theor. Biol.* **393**, 194-202 (2016).
9. Moskalensky *et al.* Accurate measurement of volume and shape of resting and activated blood platelets from light scattering. *J. Biomed. Opt.* **18**, 017001 (2013).
10. Litvinenko *et al.* Shape index of resting, partially activated, and fully activated_platelets: methodological issues. *Cytometry A* **89**, 1010-1016 (2016).
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12. Strokotov *et al.* Is there a difference between T- and B-lymphocyte morphology. *J. Biomed. Opt.* **14**, 064036 (2009).
13. Orlova *et al.* Light scattering by neutrophils: model, simulation, and experiment. *J. Biomed. Opt.* **13**, 054057 (2008).
14. Konokhova *et al.* Super-resolved calibration-free flow cytometric characterization of platelets and cell-derived microparticles in platelet-rich plasma. *Cytometry A* **89**, 159–168 (2016).
15. Konokhova *et al.* Light-scattering gating and characterization of plasma microparticles. *J. Biomed. Opt.* **21**, 115003 (2016).

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