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Research Papers

Optical properties of platelets and blood plasma and their influence on the optical behavior of whole blood in the visible to near infrared wavelength range

Martina Meinke ; Gerhard Müller ; Jürgen Helfmann ; Moritz Friebel[\[+\] Author Affiliations](#)*J. Biomed. Opt.* 12(1), 014024 (February 02, 2007). doi:10.1117/1.2435177

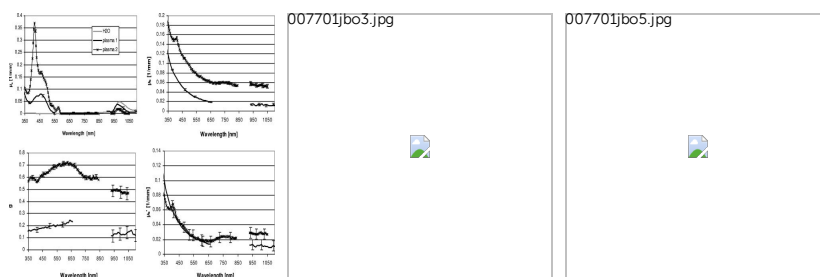
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Abstract

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The optical parameters absorption coefficient, scattering coefficient, and the anisotropy factor of platelets (PLTs) suspended in plasma and cell-free blood plasma are determined by measuring the diffuse reflectance, total and diffuse transmission, and subsequently by inverse Monte Carlo simulation. Furthermore, the optical behavior of PLTs and red blood cells suspended in plasma are compared with those suspended in saline solution. Cell-free plasma shows a higher scattering coefficient and anisotropy factor than expected for Rayleigh scattering by plasma proteins. The scattering coefficient of PLTs increases linearly with the PLT concentration. The existence of physiological concentrations of leukocytes has no measurable influence on the absorption and scattering properties of whole blood. In summary, red blood cells predominate over the other blood components by two to three orders of magnitude with regard to absorption and effective scattering. However, substituting saline solution for plasma leads to a significant increase in the effective scattering coefficient and therefore should be taken into consideration.



Figures in this Article

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Topics

Blood ; Optical properties ; Plasmas ; Scattering

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