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Effect of free fatty acids on erythrocyte morphology and membrane fluidity.

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Abstract

Changes in red blood cell shape and membrane properties in response to the interaction with free fatty acids and their derivatives were studied by light scattering at small and large angles, light microscopy and fluorescence anisotropy. The influence of these agents depended on the end groups and increased with increasing chain length. The fatty acids exerted a biphasic effect on the cell size, shape and surface properties, and induced erythrocyte aggregation. After transient size alteration with a reduction in diameter, caused by low free fatty acid concentrations (up to 5-10 microM in the case of palmitic acid), fatty acids increased the erythrocyte diameter at higher concentrations (20-60 microM in the case of palmitic acid). The aliphatic aldehydes and methyl esters of fatty acids significantly decreased the cell diameter at the concentrations used. Changes in erythrocyte shape and size were accompanied by changes in membrane microviscosity. Palmitic acid decreased the rotational diffusion of the fluorescence probe incorporated into the membrane whereas methyl ester of palmitic acid and lauric aldehyde increased probe mobility. Also the erythrocyte modification by malondialdehyde influenced cell morphology and highly decreased membrane fluidity.