

Publication

Anchorage of a band 3 population at the erythrocyte cytoplasmic membrane surface : protein rotational diffusion measurements

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Direct physical evidence for the linkage of a band 3 population to the cytoskeleton in the erythrocyte ghost membrane is presented. The rotational diffusion of band 3 proteins was measured by observing flash-induced transient dichroism of a covalently bound eosin probe. After proteolytic release of a 40,000-dalton cytoplasmic segment of band 3 by trypsin, a considerable enhancement in the decay of the absorption anisotropy was observed. Analysis of the data indicates that proteolytic cleavage of band 3 produces a mobile band 3 population which has restricted mobility in the unperturbed membrane due to protein-protein interactions involving the cytoplasmic band 3 moiety. Band 2.1 (ankyrin) or 4.1 or both are likely to be involved in this interaction because a similar effect on band 3 mobility is observed after low-salt/high-salt extraction of these components. Quantitatively, it is estimated that up to 40% of band 3 may be linked to the cytoskeleton. Because the ankyrin-band 3 dimer stoichiometry in the membrane is approximately 1:5, only about 20% of band 3 dimers can be directly linked to ankyrin. The remainder could be explained by the existence of higher oligomers of band 3 linked to single ankyrin polypeptides or by linkages involving other components such as band 4.1 or 4.2.

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