Lipid monolayer expansion by calcium-chlorotetracycline at the air/water interface and, as inferred from cell shape changes, in the human erythrocyte membrane

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Chemically induced shape changes of the human erythrocyte may result from cell membrane bending by surface tension changes at the lipid bilayer (Evans, E.A. (1947) Biophys. J. 14, 923-931) implicating differential expansion of the monolayers coupled to form the red cell membrane (Sheetz, M.P. and Singer, S.J. (1974) Proc. Natl. Acad. Sci. U.S.A. 71, 4457-4461). Interacting with calcium, the antibiotic chlorotetracycline (CTC) transforms crenated cells (echinocytes) into cup-shaped ones (stomatocytes), presumably expanding thereby the red cell membrane inner leaflet relative to the outer one (Behn, C., Lübbemeier, A. and Weskamp, P. (1977) Pflügers Arch. 372, 259-268). Whether the Ca-CTC interaction with lipid monolayers may in fact expand the latter, has now been examined by surface tension measurements at the air/water interface. CTC and lipids appeared to compete for the available sites at the air/water interface, contributing additively to its surface pressure. Ca increased both the