Expansion of Phosphatidylcholine and Phosphatidylserine/Phosphatidylcholine Monolayers by Differently Charged Amphiphiles

Katarzyna Białkowska[a], Małgorzata Bobrowska-Hägerstrand[b] and Henry Hägerstrand[b,*]

[a] Institute of Biochemistry, University of Wroclaw, PL-51148, Wroclaw, Poland
[b] Department of Biology, Åbo Akademi University, FIN-20520, Åbo/Turku, Finland. Fax: +358–2–2154748. E-mail: Henry.Hagerstrand@abo.fi

* Author for correspondance and reprint requests

Z. Naturforsch. **56c,** 826–830 (2001); received April 11/May 25, 2001

Monolayer Technique, Nonionic Detergent, Erythrocyte Shape

The degree and time-course of expansion of palmitoyloleoylphosphatidylcholine (PC) and bovine brain phosphatidylserine (PS)/PC (75:25, mol/mol) monolayers at 32 mN/m caused by differently charged amphiphiles (detergents) added to the sub-phase buffer (pH 7.4, 22 °C) were followed. Amphiphiles were added to the sub-phase at a concentration/monolayer area corresponding to the concentration/erythrocytes surface area where sphero-echinocytic or sphero-stomatocytic shapes are induced (0.46–14.6 μM). Nonionic, cationic and anionic amphiphiles expanded the PS/PC monolayer significantly more (1.7–4.2 times) than the PC monolayer. A zwitterionic amphiphile expanded both monolayers to a similar extent. The initial rate of monolayer-expansion was higher for all amphiphiles (1.7–20.4 times) in the PS/PC monolayer than in the PC monolayer.

It is suggested that hydrophobic interactions govern the intercalation of amphiphiles into monolayers, and that monolayer packing, modulated by phospholipid head group interactions and alkyl chain saturation, strongly influence amphiphile intercalation. A possible relation between the monolayer-expanding effect of amphiphiles and their effect on erythrocyte shape is discussed.