〈原　著〉

# 非イオン性界面活性剤のポリオキシエチレン鎖のモルモットの剥離皮膚および赤血球の溶血に及ぼす影響

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# Effect of Polyoxyethylene Chain of Nonionic Surfactants on Guinea-Pig Excised Skin and Hemolysis of Rabbit Red Blood Cells

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**Abstract**

In order to estimate the effect of polyoxyethylene (EO) chain of nonionic surfactants on biological membranes, the effect of 4 kinds of nonionic surfactants having several different EO chains was studied by using the excised abdominal skin and red blood cells. After treating the skin with 0.5% surfactant's solution for 2 h at 37℃, the cumulative amounts permeated of methylparaben (MP) or salicylic acid (SA) as a permeant through the skin were measured at ranging of 2 to 6 h. Relative flux (%) of MP or SA after treating the skin with each nonionic surfactant's solution was calculated against the flux of MP or SA obtained from 10 mM sodium dodecyl sulfate solution as a positive control. Also the red blood cells were operated with the several concentrations of nonionic surfactant's solution and their residual percentage of red blood cells was photometrically measured at 740 nm after standing of 20 min at 37℃. The residual percentage of red blood cells at 50% ($EC_{50}$) was calculated by using the linear regression. In the case of polyoxyethylene lauryl ether (POE.LE) having EO chains of 4.2 to 25, there were the good relationships between their hydrophobic/lipophilic balance (HLB) from 11.5 to 19.5 and relative flux (%) of MP and between HLB and $1/EC_{50}$. Polyoxyethylene nonyl phenyl ether (POE.NPE) having EO chains of 5 to 20 also showed the same results as POE.LE. It was clear that lauryl group on POE.LE and nonyl phenyl group on POE.NPE should give the same action on skin or the membrane of red blood cells. The relative flux (%) of SA with polyoxyethylene oleyl ether (POE.OE) having the EO chains of 2 to 50 were from 150.7 to 134.5% and the result suggested that each POE.OE might constantly affected the polar pathway of stratum corneum on skin. In the case of polyoxyethylene hydrogenated castor oil (HCO) having EO chains of 40 to 100, the hemolysis of red blood cells did not appear until the concentration of 2.5%. The result suggested that the action of HCO on the membrane of red blood cells should be low.

**Key words:** excised skin, red blood cells, nonionic surfactants, permeation, hemolysis.