

Lipid Bilayer as Odor Sensor: Effects of Changed Lipid Composition and Addition of Peptides and Proteins on Odor Specificity

Shuichi Enomoto, Sachiyo Kawashima, Atsuko Yoshimura
and Kenzo Kurihara*

Faculty of Pharmaceutical Sciences, Hokkaido University, Sapporo 060, Japan

(Received June 10, 1992; accepted July 9, 1992)

Key words: odor sensor, lipid bilayer, odor specificity, proteoliposome, membrane potential change

The membrane potential changes of liposomes having different compositions in response to odorants were measured with a voltage-sensitive fluorescence dye. Addition of phosphatidylserine (PS) or phosphatidic acid (PA) to phosphatidylcholine (PC) liposomes enhanced the responses to most odorants examined, but the degree of the enhancement varied with the species of odorants, indicating that addition of PS or PA changes the odor specificity of liposomes. Addition of proteins (concanavalin A and membrane proteins of canine erythrocytes) and peptides (leucyl-leucine and poly-l-lysine) also changed the odor specificity of the liposomes. The magnitudes of the responses to various odorants in seven liposomes having different compositions were compared. Odorants having similar odors showed similar response patterns among these liposomes, and odorants having different odors showed different patterns. It was suggested that various odorants can be identified by the response patterns of liposomes having different compositions.

1. Introduction

There is an increased demand for chemical sensors in various fields, and

*Correspondence to Professor Kenzo Kurihara, Faculty of Pharmaceutical Sciences, Hokkaido University, Sapporo 060, Japan