

Dynamic Responses of Artificial Membranes Composed of a Mixture of Lipids to Taste Substances

Minoru Saito

Research Laboratory, Oki Electric Industry Co., Ltd., Hachioji-shi, Tokyo 193

(Received March 6, 1992; accepted April 16, 1992)

Key words: artificial lipid membrane, self-sustained oscillation, chaotic oscillation, correlation dimension, taste sensing

We have examined dynamic responses of chaotic self-sustained oscillations of Millipore membranes infiltrated with dioleoyl phosphate (DOPH) and dioleoyl phosphatidylethanolamine (DOPE), and DOPH and cholesterol to taste substances. The change in the correlation dimensions of the oscillations of these membranes in response to taste substances was different from that observed in a membrane infiltrated with only DOPH. This result shows that we can obtain more information for taste sensing from the dynamic responses of those membranes in addition to the membrane infiltrated with only DOPH.

1. Introduction

An artificial lipid membrane composed of a Millipore filter infiltrated with a synthesized lipid, dioleoyl phosphate (DOPH) has been studied extensively.⁽¹⁻⁷⁾ The membrane potential and the membrane resistance respond to taste substances. Furthermore, the self-sustained oscillations which occur under a salt-concentration difference, an electric current or a pressure difference, also respond to taste substances.⁽⁸⁻¹¹⁾ Hence, it is suggested that this membrane can be applied to a taste sensor which can emulate the biological sense of taste. In the biological system, however, not all sensory cells respond uniformly to taste substances, and the difference between the substances is recognized in the brain by a difference in the responses of sensory cells. The difference in the responses is attributed to a