Effect of "Substance R" on the Membrane Potential of Smooth Muscle Cell of Guinea-pig Taenia Coli

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SUZUKI, T.S., FUKUSHI, Y. and SUZUKI, T. *Effect of "Substance R" on the Membrane Potential of Smooth Muscle Cell of Guinea-pig Taenia Coli.* Tohoku J. exp. Med., 1973, 110 (4), 407-408 — Substance R is a new biologically active substance extracted from bovine brain. This substance caused the hyperpolarization of membrane potential of the smooth muscle of guinea-pig taenia coli. The time course of this hyperpolarization was considerably longer than that of noradrenaline or isoproterenol. This may suggest that the mechanism of hyperpolarizing effect of Substance R is different from that of catecholamines. ——— Substance R; smooth muscle

We have obtained a new biologically active substance "Substance R" from fresh bovine brain by the modified preparatory method of Factor I (Florey and McLennan 1955). The purification was performed to eliminate proteins, polypeptides, nucleotides, potassium ion and ammonia. Substance R caused the relaxation of guinea-pig and human taenia coli and the depression of cat systemic blood pressure (Suzuki *et al.* 1971; Nishiyama *et al.* 1972; Rikimaru *et al.* 1972). Substance R was pharmacologically distinguished from catecholamine, 5-hydroxytryptamine, histamine, prostaglandins, adenine nucleotides, glycine, β -alanine, γ -amino butyric acid, glutamic acid and other amino acids. The present study was designed to investigate the effect of Substance R on the membrane potential of the smooth muscle of guinea-pig taenia coli. As shown in Fig. 1, Substance R produced a slow hyperpolarization accompanied by cessation of spike discharges. The time course

Fig. 1. The hyperpolarization of membrane potential in response to Substance R (SR). Upper trace, mechanical record. Lower trace, membrane potential recorded with sucrose-gap method.

A, Response to 0.5 B.E.* of Substance R; B, Response to 5.0 B.E. of Substance R.

*B.E.; Brain-Equivalent means the arbitrary unit of Substance R extracted from 1 g of fresh brain tissue.

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of hyperpolarization by Substance R appeared to be considerably longer than that by noradrenaline or isoproterenol, whereas the magnitude of hyperpolarization by Substance R was small compared with that by catecholamines. These results may suggest that the mechanism of hyperpolarization by Substance R is different from that by catecholamines.

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