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GASTRIC MOTOR RESPONSE INDUCED BY STIMULATION OF SPLANCHNIC NERVES AND ITS POSSIBLE RELATION TO THE RELEASE OF SUBSTANCE P IN THE DOG

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1. The gastric response to electrical stimulation of splanchnic nerves was studied in dogs anesthetized with urethane (1g/kg i. v.) following induction with pentobarbital sodium (30mg/kg i. v.).

2. The types and magnitude of gastric responses to splanchnic nerve stimulation varied with the variations of pulse durations and frequencies used. In general, stimulation with a pulse duration of less than 0.02msec caused gastric relaxation, and that of more than 0.1msec caused a contraction, of which the magnitude attained a maximum at 0.5msec.

3. After intravenous injection of atropine (0.2–2mg/kg) plus hexamethonium (10–20mg/kg), splanchnic nerve stimulation caused a long-lasting contraction, though the magnitude of the response was smaller and the onset much more delayed than that obtained before administration of drugs.

4. Close arterial injection of substance P (SP) (2×10^{-10} mol) caused a contraction, of which the time course was prolonged by intravenous injection of atropine and hexamethonium.

5. In reserpinized dogs, stimulation of the splanchnic nerve caused only a contraction at any pulse duration used. Atropine tended to increase the time course of the contraction.

6. A sensitive and specific radioimmunoassay for SP was developed to measure SP-like immunoreactivity (SPLI) levels of the dog plasma.

7. The detection limit of SP by this assay system was 0.8 fmol/tube. Intra- and inter-assay coefficients of variation were 6% and 16%, respectively. The anti-SP serum (SP-3) recognized mainly the C-terminal region of SP. Eighty-nine percent of added SP was recovered from extracted plasma.

8. The gastric contraction induced by splanchnic nerve stimulation was accompanied by an increase in the venous outflow. After treatment with atropine plus hexamethonium, the increase in the venous outflow was abolished, though the contractile response was prolonged as mentioned above. Plasma SPLI concentration was slightly increased in response to the nerve stimulation.

9. These results suggested that SP is involved in the contraction of the stomach induced by splanchnic nerve stimulation in the dog.