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DEVELOPMENT OF NON-ADRENERGIC INHIBITORY RESPONSE AND VIP-CONTAINING NEURONES IN ISOLATED RAT STOMACH

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1. Correlation between the development of non-adrenergic inhibitory response and that of VIP-containing neurones was studied by observing mechanical response to transmural stimulation and by using the technique of immunohistochemistry and radioimmunoassay in isolated smooth muscle strips of foetal and neonatal rat stomach.

2. From an embryonic day (ED) 16 to 7 days-postnatal, all preparations showed a contraction by transmural stimulation. The responses were potentiated by physostigmine and were inhibited, but not were abolished, by atropine.

3. When the preparations were precontracted by carbachol, a slight relaxation was observed after a contraction was caused by transmural stimulation in one preparation at ED 17, but in most of preparations at ED 18.

4. Responses to transmural stimulation in precontracted preparations changed in their shape with the development. Transmural stimulation caused a contraction, followed by a relaxation, in most of the preparations until ED 19, but in about one third of the preparations, the relaxation quickly appeared at ED 20 without preceding contraction. In all preparations of neonatals, transmural stimulation elicited rapid relaxation followed by a contraction, which was caused during or after the stimulation. These responses were not affected by guanethidine, but were abolished by TTX.

5. The response to VIP was observed at ED 16, and the sensitivity to VIP gradually increased with the development.

6. Relaxation caused by transmural stimulation was inhibited by exposure to anti-VIP serum at 1, 2 and 7 days-postnatal.

7. Immunohistochemical studies showed that VIP-like immunoreactive neurones appeared in the myenteric plexus at ED 18 and in the circular muscle layer at ED 20. The number and intensity of the fluorescence increased with the development.

8. The concentrations of VIP in rat stomach particularly increased up to 6 fold during the periods from ED 18 to ED 21.

9. The development of the non-adrenergic inhibitory nerve-mediated responses and the VIP-containing neurones seems to be correlated, suggesting that VIP is a neurotransmitter of non-adrenergic inhibitory nerves.