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**PRE- AND POSTNATAL DEVELOPMENT OF MECHANICAL RESPONSES
OF RAT SMALL INTESTINE TO INTRAMURAL NERVE
STIMULATION AND TO DRUGS**

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The onset of activity of the intramural nerve and the change in drug sensitivity in the developing small intestine were examined by analyzing mechanical responses of ileum, isolated from fetuses or newborn rats.

1) The preparation (in 5 out of 9) at embryonic day 15 (ED 15) was extended longitudinally by the transmural stimulation (0.5 msec., 1~20 Hz). Acetylcholine (ACh, 1×10^{-6} M) or high K (50 mM) also extended all the preparations including those which did not respond to transmural stimulation. The extension response to transmural stimulation was observed in all the preparations up to ED 19. The response was potentiated by physostigmine (1×10^{-6} M) and almost blocked by atropine (3×10^{-7} M) or tetrodotoxin (3×10^{-7} M).

2) The response to transmural stimulation became biphasic, extension followed by shortening and vice versa, in the preparations during ED 21~2-day postnatal. The biphasic response was also elicited by ACh or high K.

3) The extension and biphasic responses were invariably converted into shortening ones in sagittally hemisected preparations.

4) Only a shortening response was induced by ACh, transmural stimulation and high K after ED 21, 4- and 6-day postnatal, respectively. The biphasic and shortening responses to transmural stimulation were blocked by atropine and tetrodotoxin.

5) The change in drug sensitivity of preparations was estimated by calculating pD_2 values of ACh for extension and shortening responses. The range of mean values was 6.7~7.4 during ED 15~6-day postnatal, and these values were not significantly different.

6) These results suggest that in the rat intestine, cholinergic innervation starts to function at about ED 15. In younger preparations, the contraction of circular muscle may be much more predominant than that of longitudinal muscle, resulting in a longitudinal extension of the preparation, and the reverse may take place following the development. It seems unlikely that the sensitivity of the small intestine to ACh changes during ED 15~6-day postnatal.