TETRODOTOXIN AS AN EXPERIMENTAL TOOL IN PHARMACOLOGICAL STUDIES

Tetsurou TANEIKE

Department of Pharmacology
Faculty of Veterinary Medicine
Hokkaido University, Sapporo, Japan

(Summary of Masters thesis written under direction of Dr. A. OHGA)

The experiment was carried out to investigate whether or not tetrodotoxin can be used in pharmacological investigations as a tool to inactivate the nervous elements of innervated smooth muscle preparations.

1) Tetrodotoxin in concentrations of 5×10^{-8} g/ml or more, rapidly and reversibly abolished the contractile responses of the oesophagus of the chick and the vas deferens of the guinea-pig to stimulation via their extrinsic nerve supply, and of all of the three preparations, including the ileum of the guinea pig, to transmural stimulation (pulse duration <1 msec). These concentrations of tetrodotoxin did not alter the tone and spontaneous movements of these preparations.

2) The responses of the vas deferens and the ileum to transmural stimulation with long pulse durations (5 or 10 msec for the vas deferens and 100 to 500 msec for the ileum) were only reduced and not abolished by tetrodotoxin, 5×10^{-8} g/ml. However the remaining response, supposedly to have been elicited by direct muscle excitation, was unaltered by increasing the concentration of tetrodotoxin up to 2×10^{-6} g/ml.

3) The contraction or relaxation of these three preparations in response to drugs which act directly on muscle fibers was unaffected by tetrodotoxin, 5×10^{-8} g/ml.

4) In view of the results, it is concluded that tetrodotoxin abolishes responses mediated through nerve stimulation specifically.

5) In the presence of atropine, the ileum of the guinea pig relaxed in response to the transmural stimulation with 0.2 msec pulse duration. The relaxation remained almost unchanged after treatment with hexamethonium, but was abolished by tetrodotoxin. The result suggests that this relaxation is due to excitation of a postganglionic inhibitory neuron.