Articles

BRAIN STEM LOCALIZATION OF NEURONS OF THE SUBDIAPHRAGMATIC VAGUS NERVE FIBRES IN THE FERRET (*MUSTELA PUTORIUS FURO*): A WGA-HRP NEUROHISTOCHEMICAL STUDY.

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ABSTRACT

The brain stem localization of neurons of nerve fibres in the ventral and dorsal abdominal vagal trunks were studied in the ferret. A total of 14 adults ferrets (Six experimental and eight controls) were used for the study. Following anesthesia with pentobarbitone sodium, an upper midline laparotomy was done to expose the abdominal trunks of the vagus nerve. After dissecting the trunks clear from the abdominal oesophagus and the cardia of the stomach the nerve trunks were cut and WGA-HRP was applied to the proximal stump of the cut trunks. Control ferrets were divided into four groups of two ferrets. In the first group normal saline instead of the tracer was applied to the proximal stump of the vagal trunks. The second group was treated in a similar manner as the experimental animal except that the application of tracer was preceded by bilateral cervical vagotomy. In the third group of controls 0.1ml of WGA-HRP was injected into the abdominal cavity and the fourth group had tracer injection into the hepatic portal vein. All animals were allowed a survival period of 48-72 hours after tracer injection following which each animal was perfused with normal saline, fixative and buffered sucrose. The brain stem was extracted and cut in transverse section (40μm thick) with the freezing microtome. Sections were then processed for WGA-HRP neurohistochemistry and subsequently viewed and analyzed under light/dark-field illuminations. In the experimental ferrets labeled cells were seen bilaterally in the dorsal motor nucleus of the vagus nerve (DMNV), the nucleus dorsomedialis (nDm), the nucleus ambiguus (nA) and the nucleus retroambiguus (nrA). The DMNV was the most intensely labeled nucleus. Sporadic distribution of labeled cells was also observed in the reticular formation (rf) between the nA and the DMNV. Labeled neurons were not seen in any of the control experiments.

Key words: Abdominal vagus; vagal nuclei; WGA-HRP; ferret.

INTRODUCTION

Over the years, the sources of vagal preganglionic parasympathetic fibres to various abdominal viscera/ structures have been investigated in various species using different nerve tracing techniques (1-11). To date, the brainstem origins of vagal fibres to the stomach, pylorus, small intestine, colon, liver, spleen and the pancreas have been investigated and documented in the ferret (12-19). The central origin of preganglionic fibres innervating several abdominal organs still remained uninvestigated in the ferret.

While several vagal brain stem nuclei have been shown to project to the abdominal viscera already studied, it is not known if there are other brain stem nuclei associated with the vagus nerve which have not been identified or labeled by earlier investigations in this species. Since all the abdominal branches of the vagus nerve are derived from the ventral and dorsal abdominal vagal trunks, it is logical to assume that tracing the origins of the vagal fibres in these trunks would reveal all the brain stem nuclei associated with the abdominal portion of the vagus nerve in this species.

The present report is the result of our investigations of the sources of fibres in the ventral and dorsal abdominal trunks of the vagus nerve in the ferret.

MATERIALS AND METHODS

Fourteen male and female adult ferrets weighing between 0.8 and 1.5 kg were used for the study. All the animals were kept in a well-ventilated and illuminated facility in the animal house and fed with ferret cubes.

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