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The Role of Neuron Numbers of the Petrosal Ganglion in the Determination of Blood Pressure: An Experimental Study

Abstract

Background: Baroreceptor reflexes are regulated by nerve terminals of the glossopharyngeal and vagal nerves. The body of pressure-sensitive neurons of these nerves is located in the petrosal ganglion of both nerves. We examined whether there is a relationship between the neuron numbers of the inferior ganglion of the glossopharyngeal nerve and blood pressure values. **Methods:** Petrosal ganglions were examined in 18 male hybrid rabbits divided into three equal groups: Group A normotensive (TA = 90–100 mmHg), Group B hypertensive (TA > 100 mmHg); and Group C hypotensive (TA < 90 mmHg). After examination of blood pressure for one week, all animals were sacrificed, and the petrosal ganglions extracted bilaterally and examined histopathologically using the physical dissector method. **Results:** The mean (\pm SD) neuronal density was: Group A 8700 ± 200 , Group B 7800 ± 250 and Group C 9800 ± 300 , respectively. The difference between the groups B and C as compared to A was significant ($P < 0.01$) while the difference between Groups B and C was highly significant ($P < 0.001$). **Conclusions:** An inverse relationship was noticed between the neuronal density in the petrosal ganglion and blood pressure values with potential implications in the study of the etiology of hypertension.

Key words

Glossopharyngeal nerve · petrosal ganglion · neuron number · blood pressure

Introduction

Glossopharyngeal nerve (GPN) endings located in petrosal ganglions (PG) have an important role in the regulation of blood pressure. When arterial pressure rises, increased activity in the baroreceptor afferents reduces arterial pressure by inhibition of sympathetic vasomotor activity and reduces the heart rate by activation of parasympathetic cardiac vagal efferents. When arterial pressure falls, reduced baroreceptor activation leads to increased sympathetic vasomotor activity and decreased vagal activity [1]. The baroreceptor nerve endings of the GPN and vagal nerves which innervate the aortic arch and carotid sinus detect acute fluctuations in arterial pressure [2]. The pericaria of these visceral afferent neurons are localized in the PG of the GPN. Peripheral [3] or nuclear [4] GPN injuries may result in hypertensive crises. Central endings of baroreceptors of both nerve synapses are located in the neurons of other cardiovascular-related areas such as the ventral medulla [5] and the hypothalamic paraventricular nucleus [6]. Some afferent fibers of the GPN coming from facial nerve and vagal nerve descend in the dorsal part of the spinal trigeminal tract and terminate within the marginal subdivision of the pars caudalis of the spinal trigeminal nucleus in the dorsal horn of the cervical spinal cord [7]. We report a quantitative study of neurons in the PG of normotensive and hypertensive animals, in order to establish whether the neuronal number of the petrosal ganglia has a role in the blood pressure value. We studied only PG of GPN. A stereological method was used to estimate the number of live

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