Abstract

Site-specific autonomic vasomotor responses

and their interactions in rat gingiva

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Abstract

Local blood flow in the gingiva may play an important role in improving immunity and promoting wound healing. Each function of Interdental papilla, attached gingiva, and marginal gingiva of functions is different, however, the relationship between hemodynamics and functions of the gingivae are unclear. Previous studies have reported that disturbances in the autonomic nervous system was involved in gingival dysfunction. Therefore, it is suggested that hemodynamics of the autonomic nervous system is closely related to the quality of gingival function. Broad and rapid blood flow changes evoked by parasympathetic and sympathetic nervous system might be important for orofacial hemodynamics and functions.

The present study was designed to elucidate significant relationship autonomic vasomotor responses between hemodynamics and functions in the gingiva, using following experiments for deeply urethane-anesthetized, artificially-ventilated and vagotomized rats i) whether there are differences in automatic vasomotor responses in the interdental papilla, attached gingiva, and marginal gingiva, ii) interactions between parasympathetic and sympathetic nerve system in the hemodynamics regulation of orofacial area.

Electrical stimulation at the amputation stump of the central side of the lingual nerve elicited blood flow increased in interdental papilla, attached gingiva, and marginal gingiva, indicating the most increase in the interdental papilla. The increased blood flow by lingual nerve stimulation were reduced by hexamethonium (90%), atropine (50%), and vasoactive intestinal polypeptide (VIP) antagonist (50%). The blood flow increase produced by acetylcholine was higher in interdental papilla than attached gingiva, whereas the increase evoked by VIP agonist was greater in attached gingiva than in

interdental papilla. Activation of the cervical sympathetic nerve decreased the gingival blood flow and inhibited the lingual nerve stimulation-induced blood flow increases.

Our results suggest that parasympathetic reflex vasodilation is i) more involved for the regulation of blood flow in interdental papilla than in attached gingiva or marginal gingiva, ii), and cholinergic fibers are important for vasodilation in the interdental papilla, while the non-cholinergic (VIP) fibers is involved for vasodilation in the attached gingiva, iii) in addition sympathetic vasoconstriction is mainly involved in interdental papilla and attached gingiva and inhibited to increase the blood flow by parasympathetic vasodilation in the gingivae.