

**Division of Physiology**  
**Department of Oral Biology**

**Outline**

We study the autonomic regulation of the orofacial blood flow that is important for maintaining orofacial functions such as mastication, salivation and swallowing. We focus on 1) peripheral and central mechanisms neurally-mediated vasomotor responses, especially the parasympathetic vasodilation, 2) interaction between neural (autonomic nerves) and humoral responses (e.g. sympathoadrenal system) and 3) the physiological role of neurally-mediated vasomotor response in the control of hemodynamics in the orofacial area. We directly observe the effect of sensory inputs (trigeminal afferent), neurotransmitters or hormones on the blood flow in the orofacial tissues (facial skin, submandibular gland and jaw muscles etc.) and systemic hemodynamics (heart rate and blood pressure) in the anesthetized animals or human. Our new results are helping us to understand how autonomic nervous system operates effectively in a wide range of conditions associated with health and disease. In addition, they can provide a strong framework to identify and investigate new avenues for therapeutic treatments of orofacial dysfunctions associated with disturbances in the autonomic nervous system.

**Faculty members**

Professor;  
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Senior Lecturer;  
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Hisayoshi ISHII



Toshiya SATO

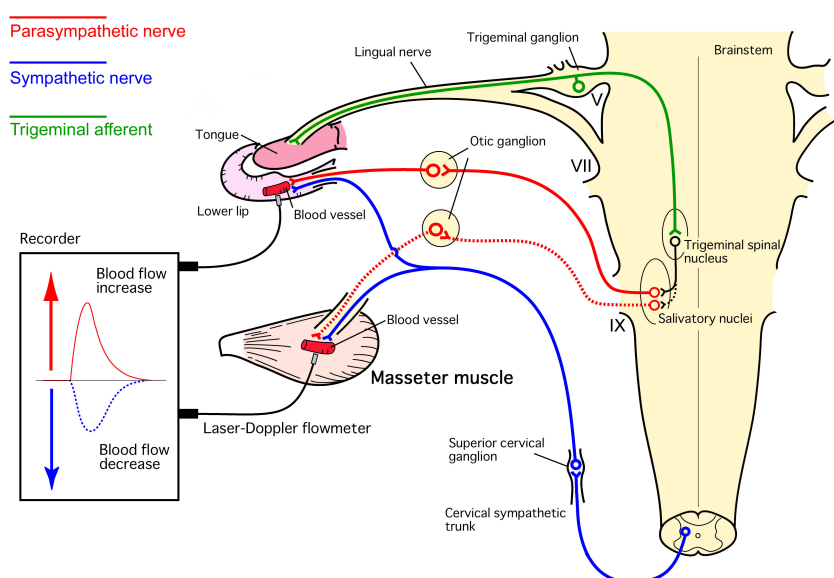


Syed Taufiqul Islam

**Main research in progress**

- 1) Age-related changes in hemodynamics in orofacial area and their mechanisms
- 2) Parasympathetic reflex vasodilation in the salivary glands
- 3) Modulation of parasympathetic reflex vasodilation mediated by GABAergic system in the orofacial tissues
- 4) Regulatory system of hemodynamics in the orofacial area mediated by interaction between oxytocin and parasympathetic vasodilation

**Neural regulatory system of blood flow in the orofacial area such as lower lip and masseter muscle**



**Current publications**

- \* Mito K, Sato T, Ishikawa R, Ramadhani R, Okada Y, Hirohata Y, Saito T and Ishii H. Age-related decrease of cholinergic parasympathetic reflex vasodilation in the rat masseter muscle. *Microvasc Res* 138: 104214, 2021.
- \* Sato T, Mito K and Ishii H. Relationship between impaired parasympathetic vasodilation and hyposalivation in parotid glands associated with type 2 diabetes mellitus. *Am J Physiol Regul Integr Comp Physiol* 318: R940-R949, 2020.