Central regulation mechanisms for brain nicotinic acetylcholine receptor-mediated activation of the sympatho-adrenomedullary outflow

Takahiro Shimizu, Shogo Shimizu, Youichirou Higashi, Motoaki Saito

Dept. of Pharmacol., Kochi Med. Sch., Kochi Univ.

During exposure to stress, the stress-related information is conveyed to the brain, which recruits neuronal and neuroendocrine systems, thereby inducing physical and behavioral responses including activation of the sympatho-adrenomedullary (SA) system for adaptation to stress. This system is essential for adaptation to stressful conditions, while excessive or sustained exposure to stress can play a pathogenic role in triggering and sustaining a variety of diseases such as hypertension and arrhythmia via excessive or sustained activation of the SA system. Therefore, it is necessary to clarify "central" regulation mechanisms for the SA outflow to elucidate fundamental mechanisms for development of these diseases in response to stress. We have investigated central regulation mechanisms for the SA outflow focusing on brain nicotinic acetylcholine receptors (nAChRs), because stress can increase smoking and (-)-nicotine, a major component of cigarette smoke, is reported to exert hypertension via not only peripheral but also central nAChRs. In this presentation, we will introduce our data showing central regulation mechanisms for brain nAChR-mediated activation of the SA outflow, focusing on brain prostanoids, cannabinoid receptors and nitric oxide.