Altered depressor response to microinjection of adenosine A₂ agonist into the nucleus tractus solitarii of SHR.

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Adenosine has various physiological functions in the central nerve system as a neuromodulator or as a neurotransmitter. According to pharmacological study, adenosine receptors on the nerve cell membrane are classified into A₁ and A₂. We investigated the cardiovascular effects of microinjection of adenosine and specific A₂ agonist (2-octynyladenosine) into the nucleus tractus solitarii(NTS). In addition, to analyze whether cardiovascular regulations by purinergic system in the NTS contribute to a change of central cardiovascular system in hypertension, adenosine and 2-octynyladenosine were microinjected into the NTS of Wistar Kyoto rats(WKY) and SHR.

The experiments were carried out in urethane anesthetized (1.2g/kg) male Wistar rats, 8- to 9- weeks-old WKY and SHR. Microinjections into the NTS were performed with pulled glass micropipettes (outside tips' diameter were about 50µm). Adenosine (30-300ng) and 2-octynyladenosine(0.5-5ng) were injected into the NTS in a volume of 50 nl in 5 seconds. Sympathetic nerve activity was measured by means of spike count method that processed signals from nerve bundle entering celiac ganglion with a bipolar stainless electrode.

Results obtained were as followings ; (1) Microinjections of adenosine into the NTS elicited depressor and bradycardic responses dose-dependently accompanying with sympathetic nerve inhibition in Wistar rats. (2) These responses to adenosine were significantly smaller than in SHR than those in WKY. (3) Microinjections of 2-octynyladenosine also induced depressor and bradycardic responses dose-dependently in normotensive rats, which were not inhibited by DPCPX (adenosine A₁ antagonist) pretreatment. (4) Depressor responses to microinjections of 2-octynyladenosine into the NTS were significantly smaller in SHR than that in WKY.

These findings suggest that adenosine in the NTS can regulate the cardiovascular system in the central nerve system, and that this inhibitory actions may be deranged in SHR. Moreover, adenosine A₂ receptor mechanisms in NTS can regulate cardiovascular system and this depressor system may be altered in SHR.