ROLE OF THE MEDULLARY RAPHÉ NUCLEI IN THERMOREGULATORY VASOMOTOR CONTROL IN RATS

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The preoptic area plays a key role in body temperature regulation by integrating information about local brain temperature and other body temperatures, and by sending efferent signals to various effector organs. Recent findings suggest that the control of both heat production and heat loss are regulated mainly by signals from warm-sensitive neurones rather than those emanating from cold-sensitive neurones. That is, warm-sensitive neurones in the preoptic area send excitatory efferent signals for heat loss, and inhibitory signals for heat production. In rats non-evaporative heat loss occurs mainly through the tail skin, and is controlled by the sympathetic vasoconstrictor nerve. Recent studies suggest that the medullary raphé nuclei may play an important role in the cutaneous vasomotor control. We investigated the role of the medullary raphé in the thermoregulatory vasomotor control, and its connections with the preoptic area. Each of adult male specific pathogen-free crj-Wister rats (290-400 g) was anaesthetized with urethene (1.4 g/kg, i.p.). For preoptic warming, an electrode-thermocouple assembly was implanted into the preoptic area, and for drug application a cannula was inserted into the medullary raphé. A polyethylene catheter (filled with heparin saline, 50 U/ml) was implanted in the right femoral artery to monitor arterial blood pressure and heart rate. Vasodilation occurred in response to preoptic warming. When an excitatory amino acid, D,L-homocysteic acid (DLH:0.5 mM, 0.3 µl) was injected in the raphé nuclei during preoptic warming, vasodilation was transiently suppressed, which often accompanied with increase in blood pressure. The effective sites were restricted in the caudal part of the raphé nuclei. When GABAA receptor antagonist, bicuculline (500 µM, 0.3 µl) was injected into the DLH-effective sites, vasodilation did not occur even though the preoptic area was warmed. Finally, we injected a retrograde tracer, choleratoxin B (CTb) into the caudal part of the raphé nuclei. A large number of cells were labelled with CTb in the preoptic area and in the midbrain periaqueductal grey (PAG), where tail vasodilation is produced by electrical/chemical stimulation (Zhang *et al.*, 1997). These results suggest that vasoconstrictive neurones exit in the caudal part of the medullary raphé nuclei, and they receive inhibitory signals from the preoptic area, which would be responsible for tail vasodilation by preoptic warming. But it is uncertain whether the signals from the preoptic area are directly transmitted to the medullary raphé nuclei or via the PAG.

Zhang, Y.-H., Hosono, T., Yanase-Fujiwara, M, Chen, X.-M. & Kanosue, K. (1997) Effect of midbrain stimulation on thermoregulatory vasomotor response in rats. *J. Physiol.* 503.1, 177-186.

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