CAUDAL RAPHE NEURONS AND THERMOREGULATORY EFFERENT CONTROL

R.M. McAllen, J.A. Rathner, Y. Ootsuka, N.C. Owens and D. Trevaks, Howard Florey Institute, University of Melbourne, 3010, Australia.

The rat's tail is a major organ of heat loss. Its thermoregulatory function depends on blood flow, which is under sympathetic control. The central efferent pathways for this are poorly understood. Three lines of experiment were performed on urethane-anesthetized rats (1-1.5 g / kg, i.v. after surgery under 2 % isofluorane). In the first, microinjections of sodium glutamate were used to activate the cell bodies of sympathetic premotor neuron groups in the medulla, while sympathetic activity was recorded from postganglionic axons in the tail and, for comparison, simultaneously from the renal nerve. Neurons in the rostral ventrolateral medulla strongly excited the renal nerve but only weakly affected tail sympathetic activity. Conversely, medullary raphé neurons had little effect on the renal nerve, but strongly stimulated tail units (Rathner and McAllen, 1999). In a second series, a water jacket around the animal's shaved trunk was briefly perfused with cold rather than warm water, which lowered trunk skin temperature by 2-10°C from resting warm conditions (35-40°C). Repeated episodes also lowered core (rectal) temperature. Cooling of either core or skin temperature independently activated tail sympathetic fibre activity. This activation could be completely blocked by microinjecting the inhibitory amino acid, glycine (200nl, 0.5M), into the rostral medullary raphé (n=6). The critical area encompassed the nuclei raphé magnus and pallidus at the level of the caudal part of the facial nucleus. A third series was performed on rats anaesthetised as described above, but given bolus doses of pancuronium (2 mg/kg, i.v.) during recording periods. Paralysis was allowed to wear off between doses, and satisfactory anaesthesia confirmed by absent withdrawal reflexes. Single neurons were recorded from the same raphé region described above, and these were antidromically activated from the upper lumbar spinal cord (the level of the tail sympathetic outflow). A subset of these raphe-spinal neurons was reproducibly activated when the trunk skin was cooled. Taken together, these findings suggest that the sympathetic premotor neurons for thermoregulatory control of rat tail vessels reside in the rostral medullary raphé.

Rathner, J.A. and McAllen, R.M. (1999) Differential control of sympathetic drive to the rat tail artery and kidney by medullary premotor cell groups. *Brain Res.* 834:196-199.

rmca@hfi.unimelb.edu.au