

Renal sympathoexcitatory response evoked from the dorsomedial hypothalamic nucleus is mediated by presympathetic vasomotor neurons in the rostral ventrolateral medulla

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The dorsomedial hypothalamic nucleus (DMH) plays a critical role in mediating the cardiovascular response to an acute stress (Stotz-Potter, *et al.*, 1996). Activation of neurons in the DMH causes an increase in arterial pressure, heart rate and renal sympathetic nerve activity (Fontes *et al.*, 2001). We have previously shown that the sympathoexcitatory vasomotor, but not cardiac, component of the DMH-evoked response is dependent upon a synapse in the rostral ventrolateral medulla (Fontes *et al.*, 2001). On the other hand, Samuels *et al.* (2002) showed that the cardiac component of the response is mediated by neurons in the midline raphe pallidus (RP) in the medulla, but did not examine the sympathoexcitatory vasomotor component. The aims of this study were (1) to determine if inhibition of RP neurons affects the sympathoexcitatory component of the DMH-evoked response, and (2) to determine the extent to which, at the single neuron level, RVLM presympathetic neurons are influenced by inputs from the DMH.

Experiments were performed on rats anaesthetised with urethane (1.4 g/kg i.p). Mean arterial pressure (MAP), heart rate (HR) and either renal sympathetic nerve activity (RSNA) or the extracellular activity of barosensitive and spinally-projecting RVLM neuron were recorded. Unilateral microinjections of the GABA receptor antagonist bicuculline (0.1-40pmol in 20nl) into the DMH resulted in dose-dependent increases in MAP, HR and rSNA. Inhibition of the RP by injections of muscimol (80pmol in 100nl) did not alter the increase in rSNA evoked by bicuculline (40pmol) in the DMH, whereas increases in MAP and HR were significantly attenuated, as Samuels *et al.* (2002) previously reported. In addition, the extracellular activity of 5 out of 6 barosensitive and spinally-projecting neurons in the RVLM were strongly excited (increase in firing rate of $417 \pm 125\%$) by unilateral injection of bicuculline (40pmol) into the DMH. The results demonstrate that the cardiac and sympathoexcitatory vasomotor components of the cardiovascular response elicited by disinhibition of the DMH are mediated via at least two different descending pathways in the medulla.

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Samuels, B.C., Zaretsky, D.V. & DiMicco, J.A. (2002) *Journal of Physiology*, 538, 941-946.

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