The animals were allowed to recover for two days before the descending aorta was cannulated for direct blood pressure (b.p.) and heart rate (h.r.) monitoring using the method described by Weeks & Jones (1960). After a two day recovery period the rats were used for a period of up to two weeks.

The guide tubes, stylets and injection cannulae were made to the specifications shown in Figure 1. The holes drilled in the perspex for the guide tubes were made with a size 72 (0.025 inch) drill bit which made holes slightly smaller than the 22 gauge guide tubes. 22 Gauge × 1 inch hypodermic needles were then forced through these holes which made glueing unnecessary. The Luer fittings were broken off and the needles were ground flush with the perspex and to the correct length with a 45° bevel.

This relatively simple method enables examination of the effect of drugs injected bilaterally into the N.T.S. on b.p. and heart rate of conscious rats. Bilateral electrolytic lesions of the N.T.S. using the coordinates given in this paper have also been attempted and they produced acute fulminating hypertension suggesting that the injection site is clearly in the region of the N.T.S. Electrodes and electrical parameters used to produce the lesions were as described by Doba & Reis (1973).

The effect of bilateral injection of adrenoceptor agonists and antagonists into the region of the N.T.S. on b.p. and heart rate of conscious rats using the method described above will be demonstrated.

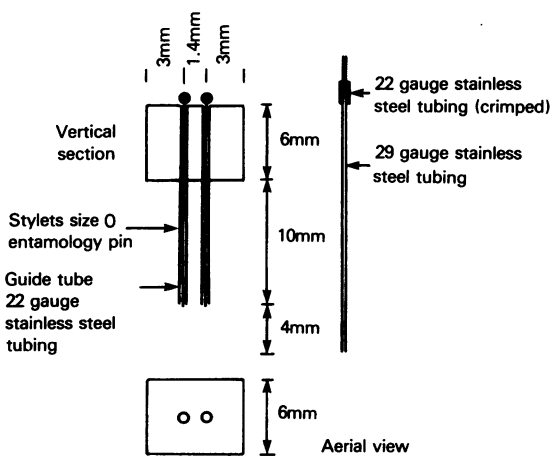

Figure 1 Dimensions of the guide tubes and injection cannula used for bilateral injection of drugs into the nucleus tractus solitarii.

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A novel modification of the isolated perfused heart preparation

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Several attempts have been made to modify the Langendorff perfused heart preparation so that it performs external work (see Morgan, Neely, Wood, Liebecq, Liebermeister & Park, 1965; Flynn, Gristwood & Owen, 1977). These attempts have concentrated on the principle of delivering perfusate to the left ventricle via the left atrium. We have designed a preparation which permits the right ventricle to do pumping work on fluid delivered via the right atrium. The coronary circuit is perfused separately via the aorta.

The thorax of a freshly killed rat was opened and the aorta cannulated. Ice-cold physiological saline (NaCl, 118 mM; KCl, 4.7 mM; $CaCl_2$, 2.5 mM;

$MgSO_4$, 1.2 mM; $NaHCO_3$, 30 mM; NaH_2PO_4, 1 mM; glucose, 11.1 mM; heparin 1500 iu/litre) initially passed retrogradely through this cannula to perfuse the coronary circulation. Cannulae were also inserted into the inferior vena cava and common pulmonary artery. The superior venae cavae were ligated. The heart was then excised from the animal and connected to the perfusion apparatus.

The coronary circulation was perfused with physiological saline (composition above) containing $NaNO_2$ (1 μg/ml), gassed with 95% O_2/5% CO_2, delivered to the heart at 37°C and at pressure of approximately 110 mm Hg. The perfusion line incorporated a bubble trap and a PALL Ultipore blood transfusion filter (SQ40) proximal to the heart to prevent coronary emboli.

A second perfusion circuit involved delivery of normal saline to the right atrium via the inferior vena caval cannula. This saline was ejected by the right ventricle, through the pulmonary artery against a resistance provided by an adjustable constriction in the arterial cannula. Pulmonary arterial pressure was measured using a blood pressure transducer (Bell & Howell 4-422) and the resistance adjusted to give a mean pressure of 15–20 mm Hg. Physiological elastance and compliance of the pulmonary arterial circuit was mimicked by the connection of a 1 ml air-filled chamber to a side arm on the arterial cannula.

The preparation thus permits evaluation of right-side cardiac performance. Coronary flow was measured by recording the decrease in weight of the fluid reservoir supplying the aortic cannula. The base to apex surface electrocardiogram was recorded by including one nichrome wire electrode in the ligature on the interior vena cava which secured its cannula in position. A second nichrome wire electrode was sutured to the apex of the left ventricle. The fluid in the coronary perfusion reservoir was connected to earth.

The preparation has been used to examine the effects of high (8 mM) and low (0.5 mM) potassium concentrations in, and removal of calcium from the coronary perfusion fluid. A videotape showing all these experiments was demonstrated.

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An analysis of the response of the perfused vas deferens of the rat to field stimulation

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A method for the perfusion of tubular organs using a flow-variable apparatus has been described (Jackson, Short & Tomlinson, 1978). This method permits constrictor responses of tubular organs to be generated with concomitant and measurable reductions in perfusate flow and hence very small changes in transmural pressure. When compared with the conventional method of perfusion at constant flow whilst recording changes in perfusion pressure (Fastier & Smirk, 1947), the flow-sensitive apparatus is advantageous in that very brisk constrictor responses are not damped by the compliance of the organ and apparatus and potentially damaging transmural pressures are not generated.

Vasa deferentia from 200 to 250 g rats were perfused with Krebs' solution, previously gassed with 95% O_2/5% CO_2, delivered to the tissue at 37°C from a Mariotte bottle at a pressure head of 80 cm H_2O. The vas was immersed in Krebs' solution (gassed as above) between parallel platinum wire electrodes at 37°C in an organ bath. The flow of perfusate through the system was measured as described by Jackson, Short & Tomlinson (1978).

The response of the vas to field stimulation for periods of 10 s or longer at frequencies of 1 Hz or above (200 μs pulses at 150 V) was biphasic comprising a very rapid and brief occlusion ('phase 1') followed by a slower sustained constriction ('phase 2'). The latter achieved complete occlusion at frequencies greater than 4 Hz.

Both phases of the response were completely absent in the presence of tetrodotoxin (1×10^{-6} M) though increasing the pulse width to 5 ms achieved direct electrical activation of the smooth muscle of the vas.

Phase 1 of the response could be elicited without the slower Phase 2 by very brief pulse trains; indeed, in many vasa, a single pulse generated a brief but