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The continuous recording of arterial blood pressure in the conscious unrestrained rat

SIR,—Although indirect cuff methods are available to monitor blood pressures of large groups of animals, they suffer from the disadvantages that they give an interrupted record and the values obtained are influenced by the fact that the animals are restrained during the measurement. Insertion of cannulae into the aorta or carotid artery is time-consuming and difficult. Fujita & Tedeschi (1968) have recently reported blood pressure measurements using cannulation of the caudal artery with a fine polythene cannula, in rats of more than 300 g. We wish to report a similar method in smaller rats and without surgery.

Male or female Sprague-Dawley rats (Carworth Farm E strain), 80–200 g, were lightly anaesthetized with ether and a 20 s.w.g. needle connected by fine polythene tubing (Portex PP 60) to a Devices CEI transducer was inserted into the ventral caudal artery 2–2·5 cm from the base of the tail and retained in position with a strip of adhesive tape. A lateral tail vein was also cannulated with a 26 s.w.g. needle, inserted into polythene tubing (Portex PP 10), approximately 4–6 cm from the tip of the tail. A rigid plastic tube (internal diameter, 10–12 mm, length 3–4 cm longer than the rat tail) was slid over the two cannulae and anchored by a thread from the adhesive tape holding the arterial cannula (Fig. 1).

The rats may be trained to accept the tube over the tail, the length of the tube preventing the rat from chewing the cannulae, which may then be carried through the lid of a deep cage. Over a period of 5 hr no necrosis of the tail artery occurred and the patency of the cannulae is ensured by using heparinized saline (1000 u/ml) as the hydrostatic link to the transducer.

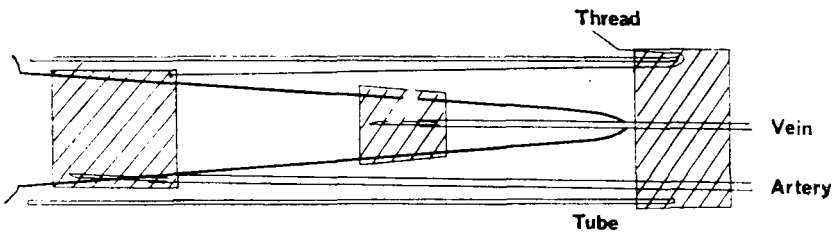

FIG. 1. Diagram showing the location of the cannulae and the protective tube for cannulation of a caudal artery and vein.

FIG. 2. Caudal and carotid arterial wave forms.

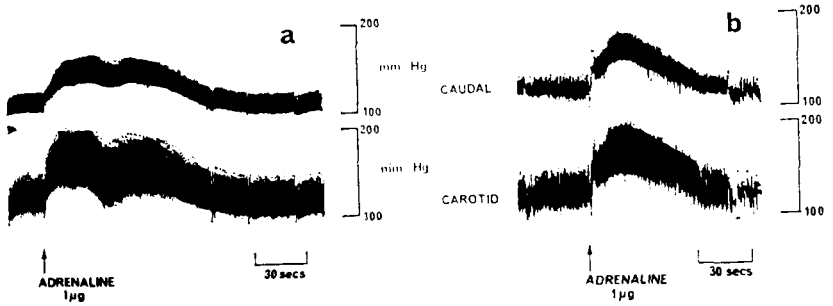

FIG. 3 (a). Simultaneous recordings of caudal and carotid arterial blood pressures showing response to adrenaline (5 µg/kg) in an anaesthetized rat.
(b) As (a), in a conscious, unrestrained rat.

Comparative studies with a caudal cannula and a carotid cannula, under light pentobarbitone anaesthesia showed similar wave forms and mean blood pressure (Fig. 2). Adrenaline (5 µg/kg) gave responses in both carotid and caudal pressure recordings which were similar in onset, magnitude and duration in anaesthetized and conscious animals (Fig. 3). Rats subjected to unilateral nephrectomy and maintained on saline with food *ad lib.* developed hypertension after 4 weeks (100·2 ± 1·4 mm Hg to 130 ± 2·5 mm) and an oral dose of guanethidine (4 mg/kg) reduced the blood pressure over 1–4 hr to 109 ± 5·1 mm.

Control groups of 8 animals were examined at weekly intervals with the caudal technique and there was no significant change in the mean blood pressure over 3 weeks (Week 1, 100·2 ± 1·4 mm Hg; Week 2, 105·5 ± 2·7 mm Hg; Week 3, 99·8 ± 1·6 mm Hg), demonstrating the value of this method in chronic experiments.

The advantages of the continuous recording of blood pressure in conscious, unrestrained animals are numerous, especially in long-term toxicological studies and in trials of potential cardiovascular drugs. In addition, the caudal artery cannula may be used for blood sampling, for instance in glucose tolerance tests.

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September 26, 1968

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