The use of rat atria as a simple and sensitive *in vitro* preparation for detecting pre-synaptic actions of drugs on adrenergic transmission

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Several workers have used the inotropic and chronotropic responses of mammalian heart to investigate the actions of drugs on the release of adrenergic transmitter. Sympathetic cardiac nerves have been electrically stimulated in pithed rats thereby producing tachycardia and the ability of drugs to modify this tachycardia in various ways has been examined (Armstrong & Boura, 1973; Drew, 1976). The positive inotropic response of guinea-pig atria due to electrical stimulation has been utilized by Vizi, Somogyi, Hadhazy & Knoll (1973) to investigate the role of α-adrenoceptors in adrenergic transmission.

The present demonstration shows a very simple and sensitive preparation *in vitro* which can be successfully used to monitor the actions of drugs on adrenergic transmitter release.

After killing a male albino rat by concussion, the heart is taken out and transferred to Krebs-Henseleit solution at room temperature. The atria are dissected free and set up in a 10 ml organ bath between parallel platinum electrodes in Krebs solution containing atropine sulphate (5 μM) at 37°C, and bubbled with 95% O_2, 5% CO_2 mixture. The atrial beats are recorded through an isometric transducer on a Devices Recorder. Each period of electrical field stimulation comprises of three trains, each of five pulses (0.5 ms duration, 10 Hz, 12 V) delivered at 30 s intervals. Atrial beats are counted for 10 s and are expressed as beats/minute.

Electrical field stimulation always increases the atrial rate, e.g. in 7 experiments, the increase has been: first train 34.1 ± 4.0; second train 42.1 ± 6.7; third train 46.4 ± 7.4 beats/min (mean $\pm$ s.e. mean). The increase in rate following stimulation is reversible and the atria revert back to their pre-stimulation rate within 2–5 minutes. The following observations strongly suggest that the increase in atrial rate after electrical stimulation is due to the release of noradrenaline from adrenergic nerves.

(1) Propranolol, 30 nM, abolishes the increase in auricular rate following electrical stimulation.

(2) Clonidine, 10 nM, known to possess adrenergic neurone-blocking property (Idowu & Zar, 1976), inhibits the increase in the auricular rate following field stimulation (% inhibition $\pm$ s.e. mean: 55.17 ± 9.25). This action of clonidine is lost after treatment with phentolamine (5 μM). Phentolamine itself does not exert any significant effect on the auricular rate.

References

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Effect of vinblastine and mustine on the distribution of T and B-lymphocytes

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