Laboratory demonstration of drug responses using the videograph recording system

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The effects of autonomic drugs in mice

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The implications of microprocessors for the curriculum in pharmacology

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Microprocessors offer a new approach to the development of individualized programmes of learning more especially in the acquisition and testing of self-knowledge. They are likely to prove much more flexible than the machines used for branch programming in the past and to encompass the development of higher level learning skills. The implications of these developments for clinical pharmacology are considered in relationship to the practical use of the microprocessor.

Autonomic outflow stimulation at different spinal cord levels and the resulting cardiovascular, gut and bladder responses in the frog

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Gillespie & Muir (1967) showed how electrical stimulation of sympathetic outflow *via* a steel electrode in the spinal canal of the pithed rat affected arterial blood pressure. Gillespie, Maclaren & Pollock (1970) successfully applied the technique to various organs—bladder, colon and heart in rat and cat.

We have extended the application to *Rana Temporaria*. A stainless steel electrode, insulated up to the tip, is inserted into the spinal cord of the pithed frog. The second electrode, bare all the way, lies under the dorsal skin of the entire trunk.

The chest is opened and the heart, 'hooked up' by thread to an isotonic transducer (Washington T2). Following femoral vein cannulation, an infusion of

tubocurarine (10 μg/ml, 0.02 ml/min) is continued just long enough to achieve skeletal neuromuscular blockade, as indicated by disappearance of all skeletal muscle contractions on 1 Hz electrical stimulation. Since excessive movements of the animal may upset the recording arrangements, stimulation is confined to 3 s periods till blockade occurs. Provided infusion is stopped on full curarization, we have no evidence of significant autonomic blockade with tubocurarine.

By placing the frog on a board with a hole over which is pinned and stretched the foot of the hind limb, the blood flow through the web is studied with the aid of a dissecting microscope, which allows sufficient working room between the preparation and the microscope.

With the electrode tip in the upper thoracic region of the vertebral column, cardio-acceleration, on stimulation, is readily obtained and prevented by, for example, intravenous infusion of propranolol hydrochloride (0.1 mg/ml, 0.02 ml/min).

The large gut may be connected by thread to a second transducer 'feeding' into a Washington MD2 ink-writing oscillograph.

With the *large* gut, contractions are obtained, on sacral level stimulation, which are abolished on atropinization (0.5 mg/ml, 0.02 ml/min).

On sacral stimulation, the lower *small* gut responds as if it were innervated *via* sacral parasympathetic routes. But this needs to be studied further.

Preliminary experience indicates that, on sacral stimulation, contractions of the urinary bladder can be readily demonstrated; and, with the 'atropine resistance' of mammalian bladder in mind, it is noted that atropine (0.5 mg/ml infused at the rat of 0.02 ml/min) had, in the case of the frog bladder, to be administered over a period roughly twice that necessary for achieving atropine blockade of the large gut of the frog.

References

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A method of illustrating changes in acid secretion and motility in the rat exteriorized stomach

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Rats, anaesthetized satisfactorily for 6 h with urethane (1.4 g/kg i.p.), readily lend themselves to investigation of the exteriorized stomach whose mucosa is displayed by a cut along the greater curvature. The rats are placed on a homoeothermic blanket and under a removable Perspex dome, the head and tail remaining uncovered. A transverse stainless steel fine rod minimizes the interference of respiration on stomach movement, provided the rod, held steady by clamping, passes along the lower curvature. The corresponding half of the stomach is then connected by a thread passing through a hole in the Perspex dome to an isotonic transducer (Washington T2) 'feeding' into a Washington MD2 ink-writing oscillograph. The dome is readily raised to permit gastric juice pH checks with narrow-range indicator paper. Provided the recording paper speed is sufficiently slow, the background respiratory interference appears as a thick line, the slower movements of the stomach showing up clearly. The effects of, for example, insulin, hexamethonium bromide and phenylbutazone can be readily studied by this procedure.