

A Route for Intravenous Injection in the Albino Rat

Drs. Everett and Sawyer¹ claim to have found that the small saphenous vein on the foot of the rat is far more satisfactory than the more commonly used tail vein for intravenous injection.

We, in this laboratory, found even this vessel in the albino rat (200 gm.) to be too small and difficult to use, and have developed the following site and technique to our greater satisfaction; this, also, is on the unanaesthetized rat.

The rat is placed quickly and comfortably into the animal restrainer², leaving one hind-limb free (30–40 sec.). The long hairs are then removed from ankle to hip on the posterior surface of the free limb, using electric clippers (10–15 sec.), then wet-shaved (about 30 sec.) to expose the quite large superficial vein—the lateral marginal vein³.

The rat can be held firmly by an assistant placing the right hand over the hips of the animal, with the free limb passing between the first and second fingers and applying sufficient pressure to cause this vein to become quite prominent without the use of any form of tourniquet. The assistant's left hand holds the foot firmly.

A 27-gauge, $\frac{1}{2}$ -in. hypodermic needle is suitable for this vein, though some operators may prefer a 26-gauge.

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Intracellular Recording from Spinal Motoneurons following Stimulation of Medullary Pyramids

ALTHOUGH a rich literature is available concerning the anatomy and the physiology of the lateral corticospinal tract, no reports have been published in which intracellular electrodes were employed in studying the synaptic connexions of the corticospinal tract in the lumbar spinal cord. Lloyd¹ used extracellular and ventral root recording, and laid the theoretical groundwork for the present study.

I have now shown that motoneurons are excited by corticospinal impulses in the same manner as that in which they are excited by afferent (orthodromic), antidromic or direct routes of stimulation^{2–7}.

Glass micropipettes filled with potassium chloride were inserted into cat spinal interneurons and motoneurons, identified according to criteria established by Eccles³ and Frank and Fuortes⁴. The potentials led off from these cells were amplified and recorded using the technique of Frank and Fuortes⁴ in one case and that of Li and Jasper⁵ in all the other experiments. Stimulation of medullary pyramids was accomplished by direct insertion of electrodes (platinum or steel, insulated to tip) following ventral neck dissection. All animals were decerebrate. Contralateral limb movement was used for identifying the position of the stimulating pair with respect to the decussation of the pyramids.

The pyramidal tract stimulus (isolated by radio-frequency) consisted in a train of seven to ten square

pulses of amplitude 7.5–10.0 V., duration 0.1 msec., at 1.0 msec. intervals. Such trains summated with potentials recorded from a motor neurone in response to dorsal root stimulation, or antidromic stimuli of insufficient intensity to invade the soma, to produce firing of motoneurons. Non-invading spikes following maximal ventral root stimulation were helped to invade the soma by pyramidal stimulation. Small responses to the second of two antidromic shocks within critical stimulus interval⁴ were also helped to invade by the pyramidal stimulus. Pyramidal stimulation alone produced graded subthreshold depolarization resembling dorsal root synaptic potential, although shorter in duration. Progressive increase in the strength and/or frequency of such stimulation resulted in the firing of motoneurons. The latency, amplitude and duration of the responses were similar to those obtained by other means. All responses exhibited inflexions in the rising phase of the spike, a finding which presupposes the mode of excitation of the motoneuron by corticospinal impulses to be the same as that found for other routes by other authors^{2,7,9}.

Thus far in the study, eight interneurons have been penetrated, and the activity of five of them following physiological stimulation (toe-pad pinch) was increased by pyramidal stimulation, while three were inhibited. The patterns of response of the interneurons fell roughly into two groups which will be described elsewhere at length. The implications of these results with respect to corticospinal control of movement will also be discussed elsewhere.

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Differentiation of Somatic and Autonomic Nerve Fibres in Tissue Sections

VARIOUS morphological types of encapsulated and non-encapsulated nerve endings in glabrous skin and mucous membranes have been described by several workers^{1,2}, and these findings have been confirmed recently in a study of the innervation of selected regions of the oral mucosa in a number of mammals³. In contrast, little attention has been given in the past to the nature of the nerve plexuses from which these terminations arise, and the investigation has been extended to include this aspect of the problem⁴.

Although the topographical features of the plexuses can be demonstrated satisfactorily using routine neurohistological methods, such as methylene blue