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BRIEF COMMUNICATION

Microinjector for use in the Autoradiographic Neuroanatomical Tracing Method[1]

STEPHEN B. EDWARDS

Department of Anatomy, University of Virginia, School of Medicine, Charlottesville, Virginia 22901

AND

EDWARD J. SHALNA

Institute of Neurological Sciences, University of Pennsylvania, School of Medicine Philadelphia, PA 19174

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EDWARDS, S. B. AND E. J. SHALNA. *Microinjector for use in the autoradiographic neuroanatomical tracing method.* PHARMAC. BIOCHEM. BEHAV. **2**(1) 111–113, 1974. – A simple microinjector is described for use in making stereotaxic placements of minute quantities of labeled precursor in the CNS. The instrument is used in conjunction with a Hamilton microsyringe and standard stereotaxic electrode carriers. It is capable of delivering volumes as small as 0.05 μl with a high degree of accuracy and repeatability.

Microinjector Autoradiographic tracing method Neuroanatomy

THE autoradiographic neuroanatomical tracing method [1, 3, 4] is proving to be a powerful tool in the delineation of fiber pathways within the central nervous system. By injecting small quantities of tritiated amino acid into the brain one can subsequently trace with autoradiographic methods the transport of labeled protein from neuron cell bodies throughout the axon to the terminals. There is detailed information available to those wishing to adopt this tracing method on the theory and practice of autoradiography. However, there is little information available on how to make stereotaxic placements of minute quantities of labeled precursor into the central nervous system. Described in this report is a simple microinjector devised specifically for this purpose and designed to be used in conjunction with a standard stereotaxic electrode carrier and a Hamilton microliter syringe.

The microinjector is designed to accept Hamilton 701N (10 μl; 0.1 μl calibrations) and 75N (5 μl; 0.05 μl calibrations) fixed-needle syringes. Both syringes are supplied with a standard 2 in. 26 gauge needle specially drawn to 114 μ I.D. at the tip. These needles have sufficient rigidity to resist displacement of the shaft during entry and a bore sufficiently small to permit labeling of a restricted area of tissue. Upon special request to HAMILTON CO. (Hamilton Co., P.O. Box 17500, Reno, Nevada 89510) these syringes can be obtained with needles of various gauges, lengths, and tip styles.

The syringe barrel is secured firmly in the groove of a pressure clamp (C) as shown in Fig. 1. The button of the syringe plunger slides into a grooved plate (D) which is driven by a 25 mm micrometer head (E) with a spring loaded return mechanism. The micrometer is calibrated in 0.02 mm increments. A 1 mm advancement of the micrometer results in a 0.1 μl displacement of the plunger in the 701N syringes and a 0.05 μl displacement in the 75N syringes. In practice these quantities probably represent the smallest volume that can be injected with a high degree of accuracy and repeatability.

The relative positions of the barrel clamp and the micrometer advancement unit can be adjusted and securely clamped along a vertical plate (F) which measures 15.2 cm. To augment the vertical adjustment of the electrode carrier the vertical plate itself may be raised or lowered by a fine adjustment knob (G) over a 3.8 cm excursion.

[1] The microinjector or its plans are available from the first author.

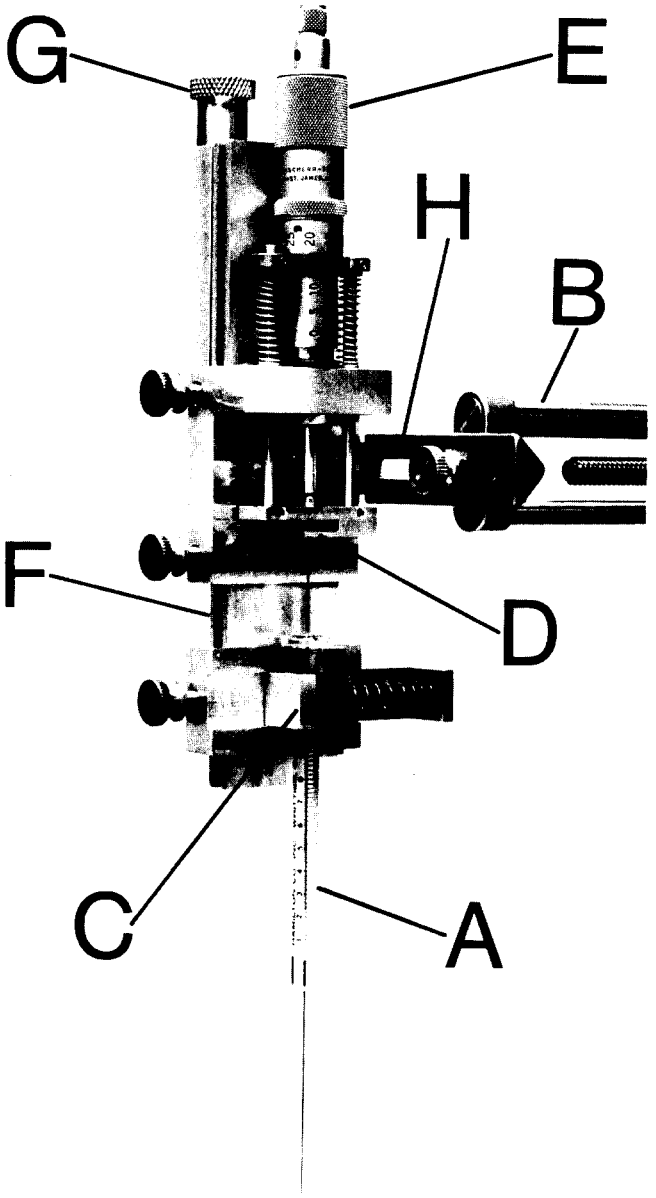

FIG. 1. Microinjector shown with a Hamilton 701N syringe (A) and attached to a David Kopf electrode carrier (B). C. syringe barrel pressure clamp. D. grooved plate for plunger button. E. 25 mm micrometer head. F. vertical adjustment plate. G. vertical adjustment knob. H. triangular attachment bar.

The microinjector unit, as shown, is attached to a David Kopf electrode carrier (David Kopf Instruments, 7324 Elmo St., Tujunga, California 91042) by a triangular bar (H) which can be placed in either the right-hand or left-hand offset positions. A slot in the triangular bar permits the microinjector to be adjusted in the antero-posterior direction over a 3 cm length. These features allow the microinjector to reach rostral or caudal positions beyond those obtainable by movement of the electrode carrier along the stereotaxic frame bars. The cylindrical attachment of the triangular bar to the microinjector allows the unit to be tilted at any angle to the vertical plane. With modification of the triangular bar, the microinjector can be used with other types of electrode carriers.

The microinjector has been used successfully to place small injections of tritiated amino acid stereotaxically in various thalamic nuclei [5], the red nucleus [3], and the reticular formation [2] of the cat. It has also been employed to place injections visually in the ventral cochlear nucleus and dorsal root ganglion also in cats. The injection procedure used in each case has been discussed [3].

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