TECHNICAL NOTE

*A SIMPLE INTRACRANIAL NEEDLE GUIDE FOR
PREVENTING BACKFLOW OF INJECTANT¹*

Quantitative intraventricular injections by needle in rats constantly meet the problem of backflow of the injectant. A simple needle guide has been devised to surmount this problem.

The guide consists of a 20-gauge disposable needle. The colored plastic nub was removed with pliers, leaving a shaft of tubing with a small white plastic collar. The pointed end was then ground off square to a length of 3 to 3.5 mm from tip to plastic collar. This was the appropriate depth for reaching the lateral ventricle of Holtzman albino rats of about 150 g. After washing in alcohol for 10 min to remove grease and metal filings, the end of the tubing was dipped into a drop of silicone rubber adhesive/sealant (General Electric RTV 102) so that some of the rubber was forced into the lumen of the tubing. This drop of rubber, which dried overnight at room temperature, acted as a septum to prevent backflow. The other end of the tubing was closed in the same manner. This served to keep any dirt from entering the exposed end of the needle guide.

The hair was shaved from the scalp of an anesthetized rat. An incision was made along the midline of the scalp, starting at a line connecting the caudal edges of the eyes and extending posterior for 12 to 15 mm. The skull was then scraped clean and two holes were drilled into but not through it using a No. B-3 polishing dental burr. Two optician screws (Hilco 5½ Bbl. thread 105) were tapped into these holes to serve as anchors for a cement cap. A third hole was drilled completely through the skull tangential to the caudal edge of the bregma and centered 2 mm lateral to the sagittal suture. The needle guide was pushed through this hole, puncturing the dura. The guide was then inserted perpendicularly to the skull surface to its full depth, *i.e.*, so that the plastic collar rested on the skull. This was done without the use of a stereotaxic instrument (Noble, Wurtman, and Axelrod, 1967).

A quick drying Epoxy glue (Klenk's Fast Set Epoxy, Zynolite Products, Co.) was then placed around both the guide and the screws in sufficient quantity to cover

the edges of the incision. The Epoxy hardened in about 5 min and no stitches or wound clips were used to close the wound. The skin healed under the edges of cement and animals kept up to two weeks showed no signs of irritation, inflammation, or infection. Caps made of similar substances have been kept in place up to six months with the only problem being slight bone necrosis, which probably also occurs with the more conventional surgical cements. However, since the Epoxy might eventually produce some skin irritation or bone necrosis, cranial cement or dental acrylic could be used in longer term studies.

Injections were made with a 10-μl Hamilton syringe (Cat. No. 701 NW/G). To control the depth of injection, a piece of 18-gauge hypodermic tubing was slipped over the needle. This served to stop the insertion of the needle into the guide at the point at which the level of the needle just completely protruded from the lower tip of the guide. The needle readily pierced the silicone rubber in the lower tip of the guide, and on withdrawal, the rubber closed behind it, preventing welling back of fluid or injectant from the brain.

In this manner rats could be injected by one person without assistance and without anesthesia. There was minimal stress, no fresh wound at the time of injection, and no apparent adverse effects on the animals' behavior. This needle guide has been used successfully in over 50 animals. Radioactive precursors of RNA have been injected in studies relating brain RNA metabolism and behavior. A histological dye, Brilliant Blue, was routinely included in the injectant and in all cases was found completely distributed throughout the ventricular system when the animals were sacrificed, 30 min after injection.

REFERENCE

- Noble, E. P., Wurtman, R. J., and Axelrod, J. A simple and rapid method for injecting H³-norepinephrine into the lateral ventricle of the rat brain. *Life Sciences*, 1967, 6, 281-291.

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