Biopsy of deep-seated brain tumors through a simple needle puncture often is a desirable procedure provided that it can be performed with safety and with a good chance to remove enough tissue for microscopic diagnosis. It is important that this procedure should be done with little trauma to the brain and minimal danger of provoking a hemorrhage. A biopsy specimen must be recovered through the needle with minimal distortion. A needle for multiple biopsies of the brain has now been designed.

**Description of Instrument**

The biopsy set is shown in Fig. 1. An 18 gauge, 12 cm. long, spinal needle (B) is filed to a blunt tip. A lateral opening of 1 by 1½ mm. is placed distally not far from the tip of the needle. It is through this hole that the specimen (S) is obtained. Another hole of the same size on the side wall of the needle is made proximally close to the hub of the needle. This hole serves for the attachment of the side arm (L) which is made of metal tubing with the same lumen as the spinal needle. Attached to this side arm is plastic tubing (P), three-way stopcock (T) and a 10 or 20 cc. syringe. The stylet (A) is filed in such a fashion that it allows negative pressure to be transmitted from the side arm to the biopsy opening near the tip of the needle on withdrawing the syringe. There is a notch in the distal portion of the stylet with a semi-circular cross-section. Once a piece is trapped in this notch, no more tissue can be suctioned and the specimen remains free from mechanical distortion. The entire biopsy set can be sterilized by autoclaving.

**Technique**

Biopsy can be performed through any type of burr hole. If necessary, particularly with small tumors in the depths of brain, the needle can be attached to different types of stereotactic apparatus. Whether stereotaxis is applied or not, the needle is introduced through the skull under roentgen-ray control until its tip is centered in the lesion as outlined by pneumography, angiography or isotopic scanning. Good results were obtained by correlating isotopic scans with anteroposterior and lateral roentgenograms of the skull of the patient to pin point the target.

After the insertion of the needle, the surgeon steadies the needle with one hand and manipulates the stylet and three-way stopcock with the other. The assistant handles the syringe. With the stylet in place, a negative pressure is exerted by pulling the tight-fitting syringe plunger to the 5 or 10 cc. mark. The stylet then is pulled back about 2 cm. and by the handle of the three-way stopcock the negative pressure in the needle and plastic tubing is released. The stylet is then turned 180 degrees on its axis and is withdrawn. A cylindrical section of tissue is trapped in the notch of the stylet corresponding to the side opening of the needle. By dipping the tip of the stylet in saline the trapped tissue is released. When the consistency of the tumor is harder than normal brain, greater negative pressure has to be exerted by withdrawing the piston of the syringe to the 10 or 20 cc. mark. After biopsy has been taken, the biopsy needle can be advanced further or withdrawn to obtain additional specimens from the marginal area of the tumor. By changing its direction, multiple specimens from various parts of the lesion and surrounding area can be secured easily.

**Discussion**

This biopsy set has first been tested in fresh cadaver brains and in experimental animals. In a slightly modified form with a sharp point, it has been used with good results and without any complication for liver biopsy in over 50 patients. Its clinical usefulness in neurosurgery is illustrated by 3 cases. The first patient had a previous craniotomy for suspected brain tumor which could not be verified at surgery. Isotopic photoscanning of the head with Hg182 labeled Neohydrin revealed concentration of this tracer in the right basal ganglia. A biopsy with the needle was carried out with ease. It revealed malignant tumor of undetermined type. The second patient had evidence of a deep temporal lesion by pneumography. Biopsy was carried out with the needle described and for control also by an ordinary biopsy needle. Tissue that lent itself to histological diagnosis was obtained only by the special biopsy needle. The third patient had a rather sudden onset of paralysis of the left arm with some weakness of the left leg. Headache persisted but the intracranial pressure remained normal over a period of 2 months. Carotid arteriography was negative. Air studies indicated a questionable displacement of the temporal horn without any definite local-
ization. A radioactive scanning with Hg$^{203}$ Neohydrin showed a small discrete lesion in the right internal capsule and caudate nucleus. Stereotactic biopsy from various portions of the small tumor recovered identical tissue which could be classified as a grade II astrocytoma.

Experience so far has shown that the instrument and the technique employed are safe and simple. Hemorrhage has not been encountered because of the blunt, dissecting tip of the needle and the small biopsy opening that prevents the trapping of blood vessels.

**Summary**

A method for multiple needle biopsies of the brain is described. This proved to be safe and useful in cases of deep-seated brain tumors when diagnosis is desirable to ascertain the patient’s prognosis and decide upon the advisability of radiation therapy.