MICRO-MINIATURE CONNECTORS USED AS PERMANENT ELECTRODE HOLDERS IN THE RAT

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The main requisites for a technique of permanent electrode implantation are: (1) easy access for connecting the animal to the stimulation or recording apparatus, (2) permanence, (3) electrically good contacts, (4) minimal discomfort to the animal, and (5) preferably, the use of commercially available materials. Connectors have met these demands in cats (Bradley and Elkes 1953) and monkeys (Nicholson 1964) and also fulfil these criteria in rats. The method of implantation is described here.

Seven-pin micro-miniature connectors (2B 12101-7 Continental Connector Corp. 34-63,

56 Street, New York) are used (Fig. 1a). The guide bolts are removed and the shape modified by filing (Fig. 1b). For anchoring to the skull the heads of two stainless steel bolts (12 mm long, 2.2 mm diameter, No. 2 ANF or 8 B.A. thread) are filed down to a rectangular shape so that a flange head 0.2-0.5 mm thick is made.

During the operation a rectangular hole is made in the *Os interparietale* with a dental bur. The flange head of one of the bolts is introduced into the hole and turned 90° (Fig. 1c). In this position the bolt is clamped to the skull by a lock nut (Fig. 1d) with the flange

above the *Dura mater*. The guide hole of the socket is fitted over the bolt and the position of the other bolt marked on the *Os frontale*. The second bolt is then similarly emplaced. The leads from recording or stimulating electrodes can be soldered to the socket pins before being placed in position and one of the bolts can be used for grounding. When electrode implantation is complete the socket is moved into place over the two bolts and acrylic cement (non-toxic) built up around it. Finally, lock nuts are applied to the bolts above the socket (Fig. 1e). The appropriate connector plug (SM7-20H) is incorporated with a multi-core cable and inserted in the socket during experiments. The plugs fit tightly and make a good connection without guide bolts. Normally the plug can be removed from the socket by using a fine screwdriver tip as a lever, although during a convulsion detachment may occur—to the advantage of the rat.

This method has been successfully used in behavioral studies (Bradley and Nikolova, 1966) and is permanent. No ill effects have been observed in rats which have been kept for up to one year after the operation and no apparent effects of pressure on the cortex has been seen at postmortem. The sockets are re-usable when the dental cement has been removed by chloroform.

REFERENCES

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