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THE OLIVOCEREBELLAR PROJECTION TO LOBULES I AND II

E. DIETRICHS and F. WALBERG

Anatomical Institute, University of Oslo, Karl Johans gate 47, N-0162 Oslo 1, Norway

INTRODUCTION

The olivary projection to the cerebellar anterior lobe has been extensively investigated (for review, see ref. 3). However, in these studies, it has been difficult with certainty to establish the organization of the projection to lobules I and II. The main reason for this is the inaccessibility and small size of these lobules. Injections of tracer into this cerebellar region almost inadvertently leads to a spread to the neighbouring cerebellar folia, and only in one previous study (12) has it been possible to restrict the injections to these lobules.

Recently, Mori *et al.* (14) have described a technique for implantation of crystalline horseradish peroxidase (HRP). We have modified this technique and previously used it for implantation of wheat germ agglutinin-horseradish peroxidase complex (WGA-HRP) in crystalline form in the cerebellar nuclei and nodulus (see e.g., refs. 7 and 17). We describe here 15 cases with implants restricted to the anteriormost parts of the cerebellar cortex with no contamination along the track of the glass cannula.

MATERIAL AND METHODS

From a larger material 15 adult cats (weight 2.0-3.4 kg) were selected for the present study. They were operated on under deep pentobarbital anaesthesia. WGA-HRP implants were made stereotactically from a dorsal approach. (The readers are referred to Dietrichs *et al.* (7) for further methodological details). After one day, again under deep anaesthesia, the cats were perfused intracardially with physiological saline followed by a mixture of 1% paraformaldehyde and 1.25% glutaraldehyde in phosphate buffer at pH 7.4. The perfusion was terminated with a cold solution of 10% sucrose in phosphate buffer. The cerebellum was isolated and cut in parasagittal sections at 50 μm on a freezing microtome. Each section was stored separately, and they were all processed with tetramethylbenzidine as described by Mesulam (13). The two first of every five sections were mounted, the first unstained, the other stained with Neutral red. Through the implantation site also the remaining three sections were usually mounted and stained. By this procedure it was possible with accuracy to measure the mediolateral extent of the cerebellar implants.

After isolation, the brain stem was cut in transverse sections. These sections were collected in groups of five, and two sections from each group were processed as mentioned above. One series was mounted unstained, the other stained with Neutral red.

All sections were examined microscopically with bright field illumination and in polarized light. The implantation site was carefully checked to decide if staining had occurred along the needle track. Only cases which were negative in this respect were used. The location