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DESCENDING FIBERS IN THE BRAINSTEM AUDITORY PATHWAY

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The specific afferents of various order, ascending in the lateral lemniscus (LL) terminate and make synaptic contact with the relay cells and interneurons in the Central Nucleus of the Inferior Colliculus (CNIC). The aim of the present study was to localize the termination of the descending fiber components of the LL originating from the CNIC, where they may influence the incoming information.

In the experiments BDA (dextran biotin, 10 000MW lysine, Molecular Probes) was administered with iontophoretic microinjections and HRP (Peroxidase from horseradish 550 U/mg, Serva) by pressure injection with Hamilton syringe in rat and double labeling was carried out. In deep anesthesia, the animals received first the anterograde tracer into the CNIC, and five days later in a second step the retrograde tracer was injected in the same animal into the contralateral CNIC. Following the optimal survival period the animals were perfused and the brainstem sections were processed according to immunocytochemical procedures and examined with light microscope.

In the experiments the appearance of HRP labelled neurons ipsilaterally in the LL, superior olivary nuclei and in the contralateral dorsal LL, lateral superior olivary and cochlear nuclei confirmed the result of previous studies.

BDA labelled terminals were found in the dorsal and ventral LL, medial and lateral superior olivary and cochlear nuclei ipsilaterally. In all periolivary areas labelled terminals were seen on the side of the BDA injection and the ventral periolivary areas were the only sites on the opposite side where labelled terminals could be observed. In the cochlear nuclei, the labelled fibers - giving off fine collaterals terminating in knob-like fashion - were followed into the cochlear nerve.

On the basis of these findings the descending terminals may play a role in the forwarding processes in the ipsilateral relay nuclei and the cochlear receptor and via the ventral periolivary neurons in the contralateral receptor organ, respectively. The difference in the distribution of the descending fibers compared with the ascending pathways may call attention to the functional significance of the commissural and crossed connections between the brainstem auditory nuclei at olivary, lemniscal and collicular levels.