tion of the drug in distilled water were applied to the organ of the mudpuppy. When a solution of neomycin with a concentration of 10^{-4}g/ml was applied to the neuromast for 5 min, the afferent synchronization to the mechanical vibration was completely suppressed. The suppressive effects of neomycin were reversed by application of excess calcium. These results are consistent with the proposed model of neomycin ototoxicity. We suggest that the action site of calcium for enhancement of mechano-sensitivity is related to membrane lipids. However, the chemical responses of the lateral-line organ to cations were unchanged by neomycin. From the results of experiments on the lateral-line organ of tadpoles, Yoshioka *et al.*[5] proposed the existence of chemical adsorption of ions on the receptor cell membrane. They explained the chemical responses with the aid of a site-binding chemical adsorption model and suggested that these sites were in the protein at the membrane surface.

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Auditory afferent and efferent neyrons in the mouse brain stem studied by axonal transport of horseradish peroxidase

IKUO TANIGUCHI

Department of Physiology, Dokkyo University School of Medicine, Mibu, Shimotsuga, Tochigi, 321-02 Japan

Anatomical evidence of the olivocochlear bundle which contains efferent fibers from the superior olivary complex to the cochlea was presented by Rasmussen.[1] Since then, it has been suggested that the olivocochlear bundle forms a feedback loop from the central nervous system to a peripheral receptor. Rasmussen identified two components of the olivocochlear bundle in the cat: one (approximately 400 fibers) was shown to originate from the contralateral superior olivary complex; the other (approximately 100 fibers) originated from the ipsilateral superior olivary complex.

Revision of a number of current conceptions regarding the olivocochlear bundle was suggested by Warr (1975). He determined the origin and number of olivocochlear efferent neurons of the cat brain stem by retrograde axonal transport of horseradish peroxidase (HRP) injected into the cochlea. Warr showed that 1700–1800 neurons were labelled by HRP in the superior olivary complex bilaterally, and that approximately 60% of the neurons in total were located on the side ipsilateral to the injection of HRP.

In the present study, distribution of HRP labelled neurons in the superior olivary complex and the cochlear nucleus of mice was investigated by injection of a 30 % solution of HRP into either the inferior colliculus or the cochlea. I intended to observe differences in distributions of the afferent and the efferent neurons in the superior olivary complex and those of the primary and the secondary auditory neurons in the cochlear nucleus.

Distribution of labelled cells within the superior olivary complex

The general distribution of labelled cells in the superior olivary complex following a large injection of HRP into either the inferior colliculus or the scala tympani of the cochlea is schematically illustrated in Fig. 1. A large injection of HRP into the inferior colliculus resulted in labelled cells within the ipsilateral medial and lateral superior olivary nuclei. Occasionally, a few labelled cells were observed in the contralateral medial superior olivary nucleus.

After a large injection into the cochlea, labelled cells were found bilaterally in the subdivisions of trapezoid body: medial, lateral, and ventral nuclei. These cells in the restricted regions may be the sources of the olivocochlear bundle. The bilateral distribution of the labelled cells in the superior olivary complex coincides with the previous result.[2)]

Distribution of labelled cells within the cochlear nucleus

A large injection of HRP into the inferior colliculus resulted in the scattered labelled cells within the contralateral cochlear nucleus as shown in Figs. 1 and 2. These labelled cells are the secondary afferent neurons projecting from the cochlea to the opposite inferior colliculus.

After a large injection into the cochlea, labelled cells were observed in the restricted region of the ventral cochlear nucleus ipsilaterally as shown in Figs. 1 and 2. These labelled cells were fusiform cells and identified as the primary auditory neurons. They may form the synaptic connections with the secondary neurons in the cochlear nucleus described above.

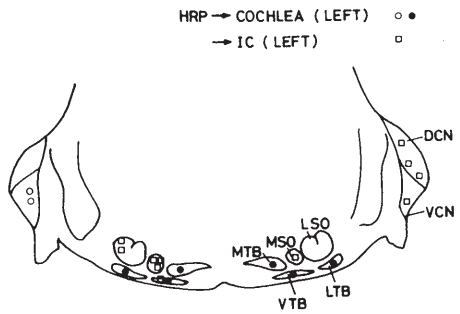

Fig. 1. Distribution of labelled neurons in the superior olivary complex and the cochlear nucleus. HRP was injected into either the left cochlea (○, ●) or the left inferior colliculus (□). DCN: dorsal cochlear nucleus; VCN: ventral cochlear nucleus; MTB: medial nucleus of the trapezoid body; VTB: ventral nucleus of the trapezoid body; VTB: ventral nucleus of the trapezoid body; LTB: lateral nucleus of the trapezoid body; MSO: medial superior olivary nucleus; LSO: lateral superior olivary nucleus; IC: the inferior colliculus.

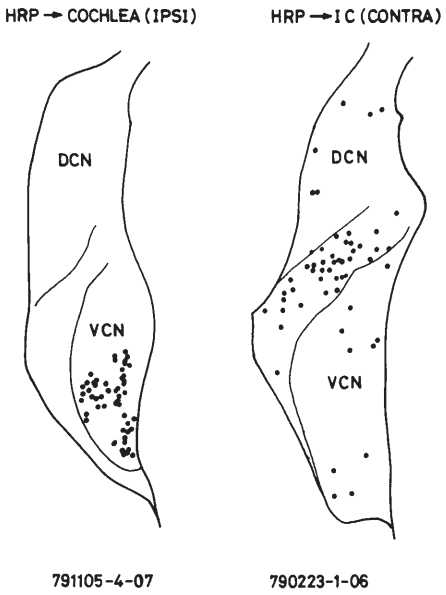

Fig. 2. Distribution of labelled neurons in the cochlear nucleus. HRP was injected into either the ipsilateral cochlea or the contralateral inferior colliculus. DCN: dorsal cochlear nucleus; VCN: ventral cochlear nucleus; IC: the inferior colliculus.

Recently, Ross *et al.*[3] reported the acute ototoxic effect of HRP injected into the cochlea of the guinea pig. They found no retrograde transport of HRP to spiral ganglion cells or to brain stem neurons when 1 % and 10 % solutions of HRP were used.

The uptake of HRP into the nervous system may depend on the concentration of HRP injected. Especially in the cochlea, HRP is considerably diluted by the perilymphatic fluid. Therefore, further studies are necessary to clarify this problem.

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