EFFECTS OF CHRONIC ELECTRICAL STIMULATION ON COCHLEAR NUCLEAR NEURON SIZE IN DEAF KITTENS

Atsushi Kawano¹, HL Seldon², GM Clark², Eiji Hakuhisa¹, Sotaro Funasaka¹

¹Department of Otolaryngology, Tokyo Medical College, 6-7-1 Nishi-shinjuku, Shinjuku-ku, Tokyo, 160 Japan, ²Department of Otolaryngology, University of Melbourne 32 Gisborne St., East Melbourne, VIC 3002, Australia

It is now well recognized that normal afferent innervation is necessary for the development. This study investigated the effect of chronic electrical stimulation of the auditory nerve on the maturation of cochlear nucleus soma area of the neonatally deafened kittens. Eight kittens were deafened using kanamycin and ethacrynic acid, received a stimulated intracochlear implant in left side and a dummy implant in right side, and classified two groups - the stimulated and the control group. In the stimulated group, they were chronically stimulated after 98-142 days for approximately 1000 hours at 2XERABR threshold. After the chronic stimulation, each animal was injected with 2-deoxyglucose and stimulated electrically for 45 minutes. And after sacrifice, the cross-sectional areas (CSA) of approximately 40,000 neuron nuclei were measured with an image-analysis system. First in the control group, the results showed the CSA had substantially individual difference and right and left difference, and that of the portions with 2DG uptake (2DG') were not significantly larger than that without 2DG uptake (non-2DG'). Second in the stimulated group, there were no significant differences between left and right side, but the CSA of 2DG' were larger, with mostly statistical significance, than that of non-2DG' in three subdivisions - anteroventral cochlear nucleus, postventral cochlear nucleus and dorsal cochlear nucleus. In other words, the chronological intracochlear electrical restricted stimulation of the auditory nerve elicits a functional response of the limited portion of cochlear nucleus, and these results implicates the chronological electrical stimulation in the maturation of cochlear nucleus somata area at least limited portion before the critical periods.

II. Basic Study 

P - 8
Minerva Access is the Institutional Repository of The University of Melbourne

Author/s:
Kawano, Atsushi; Seldon, H. Lee; Clark, Graeme M.; Kakuhsa, Eiji; Funasaka, Sotaro

Title:
Effects of chronic electrical stimulation on cochlear nuclear neuron size in deaf kittens
[Abstract]

Date:
1996

Citation:

Persistent Link:
http://hdl.handle.net/11343/26952

File Description:
Effects of chronic electrical stimulation on cochlear nuclear neuron size in deaf kittens
[Abstract]