

Neural Science Study Points to Lasting Impact of Mild Hearing Loss

By James Devitt

Mild to moderate forms of hearing loss can have a lasting impact on the auditory cortex, according to findings by researchers at NYU's Center for Neural Science. The study, which is the first to show central effects of mild hearing loss, appeared in the *Journal of Neuroscience*.

Previously, researchers had been unable to conclusively determine the neurological impact of mild forms of hearing loss, which occurs when the pathway by which sound reaches the cochlea is disrupted—such as is experienced with middle ear infections during childhood. The NYU study sought to address this question in an animal model by measuring the impact of conductive hearing loss without injury to the cochlea.

The study was authored by NYU scientists Han Xu, Vibhakar Kotak, and Dan Sanes, working in NYU's Center for Neural Science.

The researchers induced hearing loss in rodents during early development, then measured the functionality of neural connections within the subjects' auditory cortex, which processes all acoustic cues.



The results showed that the projection to auditory cortex had changed following a brief period of hearing loss. Specifically, the researchers found that the synaptic response of the auditory neurons adapted more rapidly and to a greater extent (“adaptation” is what neuroscientists label a decrease in auditory cortex neuron response). Although the synaptic response was weaker, individual auditory cortex neurons themselves became more sensitive to direct stimulation. This suggests that hearing loss may be accompanied by abnormally high discharge rates when sound intensity is relatively loud.

These findings indicate that auditory cortex function is susceptible to relatively modest loss of hearing during development and suggest that perceptual deficits may be linked, in part, to alterations in the central nervous system.

Source: [NYU Today](http://www.nyu.edu/nyutoday/archives/21/02/PageOneStories/hearing-loss.html) (link to: <http://www.nyu.edu/nyutoday/archives/21/02/PageOneStories/hearing-loss.html>), October 21, 2007, Volume 21, No. 2