

Music to your ears? New research examines evidence of damage to your hearing

August 19 2014

Many people listen to loud music without realizing that this can affect their hearing. This could lead to difficulties in understanding speech during age-related hearing loss which affects up to half of people over the age of 65.

New research led by the University of Leicester has examined the cellular mechanisms that underlie hearing loss and tinnitus triggered by exposure to loud sound.

It has demonstrated that physical changes in myelin itself -the coating of the [auditory nerve](#) carrying sound signals to the brain – affect our ability to hear.

Dr Martine Hamann, Lecturer in Neurosciences at the University of Leicester, said: "People who suffer from hearing loss have difficulties in understanding speech, particularly when the environment is noisy and when other people are talking nearby.

"Understanding speech relies on fast transmission of auditory signals. Therefore it is important to understand how the speed of signal transmission gets decreased during hearing loss. Understanding these underlying phenomena means that it could be possible to find medicines to improve auditory perception, specifically in noisy backgrounds."

The research, funded by Action on Hearing Loss, and led by Leicester, was done in collaboration with Dr Angus Brown of the University of

Nottingham. The research, Computational modelling of the effects of auditory nerve dysmyelination is published in Frontiers in Neuroanatomy.

Dr Ralph Holme, Head of Biomedical Research at Action on Hearing Loss, the only UK charity dedicated to funding research into hearing loss said: "There is an urgent need for effective treatments to prevent hearing loss - a condition that affects 10 million people in the UK and all too often isolates people from friends and family. This research further increases our understanding of the biological consequences of exposure to loud noise. Knowledge that we hope will lead to effective treatments for hearing loss within a generation."

In previous research, researchers have shown that after exposure to loud sounds leading to hearing loss, the myelin coat surrounding the auditory nerve becomes thinner. An important property of auditory signal transmission consists of electrical signals "jumping" from one myelin domain to the other. Those domains, called Nodes of Ranvier, become elongated after exposure to loud sound.

Dr Hamann said: "Although we showed that transmission of auditory signals (electrical signals transmitted along the auditory nerve) was slowed down after exposure to loud sound leading to hearing loss, the question remained: Is this due to the actual change of the physical properties of the myelin or is it due to the redistribution of channels occurring subsequent to those changes?

"This work is a theoretical work whereby we tested the hypothesis that myelin was the prime reason for the decreased signal transmission. We simulated how physical changes to the myelin and/or redistribution of channels influenced the [signal transmission](#) along the auditory nerve. We found that the redistribution of channels had only small effect on the conduction velocity whereas physical changes to myelin were primarily

responsible for the effects."

The research has shown for the first time the closer links between a deficit in the "myelin" sheath surrounding the auditory nerve and hearing loss. "This research is innovative because data modelling (simulations) was used on previous morphological data and assessed that physical changes to the myelin coat were the principal cause of the deficit," said Dr Hamman.

"We have come closer to understanding the reasons behind deficits in auditory perception. This means that we can also get closer to target those deficits, for example by promoting myelin repair after acoustic trauma or during age related hearing loss."

Dr Hamann said the work will help prevention as well as progression into finding appropriate cures for hearing loss and possibly tinnitus developing from hearing loss.

"The sense of achievement comes from the fact that it could help ageing people to better understand their relatives on the phone," said Dr Hamann.

The next step is to test drugs that could promote myelin repair and improve hearing after [hearing loss](#).

More information: Computational modelling of the effects of auditory nerve dysmyelination, Angus M. Brown and Martine Hamann, *Frontiers in Neuroanatomy*, 01 August 2014 | [DOI: 10.3389/fnana.2014.00073](#)

Citation: Music to your ears? New research examines evidence of damage to your hearing (2014, August 19) retrieved 9 April 2024 from <https://medicalxpress.com/news/2014-08-music-ears-evidence.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.