

Tinnitus study signals new advance in understanding link between exposure to loud sounds and hearing loss

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(Medical Xpress)—A research team investigating tinnitus, from the University of Leicester, has revealed new insights into the link between the exposure to loud sounds and hearing loss.

Their study, published this week in *Journal of Neuroscience*, helps to understand how damage to myelin – a protection sheet around cells - alters the transmission of auditory signals occurring during hearing loss.

The three-year study was derived from a PhD studentship funded by Action on Hearing Loss. It was led by Dr Martine Hamann, Lecturer in Neurosciences at the University's Department of Cell Physiology and Pharmacology.

Dr Hamann said: "A previous publication has shown that exposure to loud sound damages the myelin which is the protection sheet around cells. We have now shown the closer links between a deficit in the "myelin" sheath surrounding the auditory nerve and [hearing loss](#). It becomes obvious why hearing loss is correlated with auditory signals failing to get transmitted along the [auditory nerve](#).

"Understanding [cellular mechanisms](#) behind hearing loss and [tinnitus](#) allows for developing strategies to prevent or alleviate the symptoms of deafness or tinnitus - for example by using specific drug therapies.

"This new study is particularly important because it allows us to understand the pathway from exposure to loud sound leading to the hearing loss. We now have a better idea about the mechanisms behind the auditory signals failing to get transmitted accurately from the cochlea to the brain. Consequently, targeting myelin and promoting its repair after exposure to loud sound could be proven effective in noise induced hearing loss."

Dr Hamann added that getting to dissect the cellular mechanisms underlying hearing loss is likely to bring a very significant healthcare benefit to a wide population.

She said: "Understanding mechanisms responsible for hearing loss represents a significant unmet need that is likely to increase as the incidence of the disorder increases due to an ageing population and the increasing impact of recreational and workplace noise.

"I am very excited by this research. The work will help prevention as well as progression into finding appropriate cures for hearing loss and possibly tinnitus developing from hearing loss."

Dr Hamann's team at the University of Leicester included Thomas Tagoe who performed all the electrophysiological experiments, Matt Barker and Natalie Allcock who performed the electron microscopy and the imaging experiments. Andrew Jones, a project student in the lab performed computer modelling.

Dr Ralph Holme Action on Hearing Loss' Head of Biomedical Research says: "We know that exposure to loud noise can lead to hearing loss. Protecting your ears should always be the first line of defence, but medical treatments to combat unavoidable or accidental exposure to noise are also urgently needed. The research we have been funding at University of Leicester makes an important contribution to increasing

our understanding of how noise damages the hearing system - knowledge we hope will ultimately lead to medical treatments for this common type of hearing loss."

More information: "Auditory Nerve Perinodal Dysmyelination in Noise-Induced Hearing Loss", Thomas Tagoe, Matt Barker, Andrew Jones, Natalie Allcock, and Martine Hamann, published in *The Journal of Neuroscience*, 12 February 2014, 34(7): 2684-2688; [DOI: 10.1523/JNEUROSCI.3977-13.2014](https://doi.org/10.1523/JNEUROSCI.3977-13.2014)

Provided by University of Leicester

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