

Restore hearing thanks to new drug

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Researchers from the University of Auckland, New Zealand, have discovered that a potent new drug restores hearing after noise-induced hearing loss in rats. The landmark discovery found that injection of an agent called 'ADAC', activates adenosine receptors in cochlear tissues, resulting in recovery of hearing function. The finding paves the way for effective non-surgical therapies to restore hearing loss after noise-induced injury. Dr. Srdjan Vlajkovic and his team's work is published in a special edition of Springer's journal *Purinergic Signalling*, focusing on the inner ear.

Hearing loss from noise exposure is a leading occupational disease with up to five percent of the population at risk worldwide. It is particularly common in the military and in industrial settings (construction workers, mining, forestry and airline industry). At the present time, the only treatment strategies for hearing loss are [hearing aids](#) and [cochlear implants](#). Drug therapies for noise-induced hearing loss have only recently been proposed and, to date, there are virtually no treatments that can repair the damage to the [inner ear](#) and reduce the impact of hearing loss.

Vlajkovic and his team's study investigates the potential of adenosine amine congener (ADAC) - a selective A1 adenosine receptor agonist - in the treatment of noise-induced hearing loss. Wistar rats were exposed to narrow-band noise for 2 - 24 hours in an acoustic chamber to induce cochlear damage and permanent hearing loss. ADAC or placebo control was then administered by injection(s) in the abdomen, either as a single injection at six hours or multiple daily injections. The researchers measured the hearing in the rats before and after the treatments using a technique known as auditory brainstem response (ABR). They also used histological techniques to determine the number of missing cochlear [sensory hair cells](#) after noise exposure and the noise-induced production of [free radicals](#).

Their results show that cochlear injury and hearing loss in rats exposed to narrow-band noise can be

substantially restored by ADAC administration after noise exposure. Early treatment starting six hours after noise exposure was the most effective and provided greater recovery than late treatment starting 24 hours after noise exposure. The most sustainable treatment strategy was the one involving multiple injections of ADAC for five days after [noise exposure](#). This therapy significantly attenuated noise-induced hearing loss and improved sensory hair cell survival.

The authors conclude: "This study underpins an important role of adenosine signaling in mitigation of cochlear injury caused by oxidative stress. ADAC in particular emerges as an attractive pharmacological agent for therapeutic interventions in noise-induced cochlear injury in instances of both acute and extended noise exposures."

More information: Vlajkovic SM et al (2010). Adenosine amine congener mitigates noise-induced cochlear injury. *Purinergic Signalling*; 10.1007/s11302-010-9188-5

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