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Mitochondrial Mechanisms and Research Progress in Nonsyndromic Hearing Loss: A Comprehensive Review

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KEYWORDS Nonsyndromic Hearing Loss. mtDNA. Mitochondria. Oxidative Stress. ATP Deficiency. Mitochondrial DNA

ABSTRACT Mitochondrial dysfunction is a key contributor to nonsyndromic hearing loss (NSHL). This review aims to synthesise current knowledge on how mitochondrial mechanisms, including mtDNA mutations, oxidative stress, and ATP deficiency, influence auditory function. By analysing recent studies, the researchers highlight the role of genetic diagnostics (for example, next-generation sequencing) in uncovering mtDNA variants linked to NSHL and the interplay between oxidative stress and mitochondrial damage in cochlear cells. The review concludes by emphasising the need for innovative therapeutic strategies targeting mitochondrial dysfunction to mitigate NSHL.