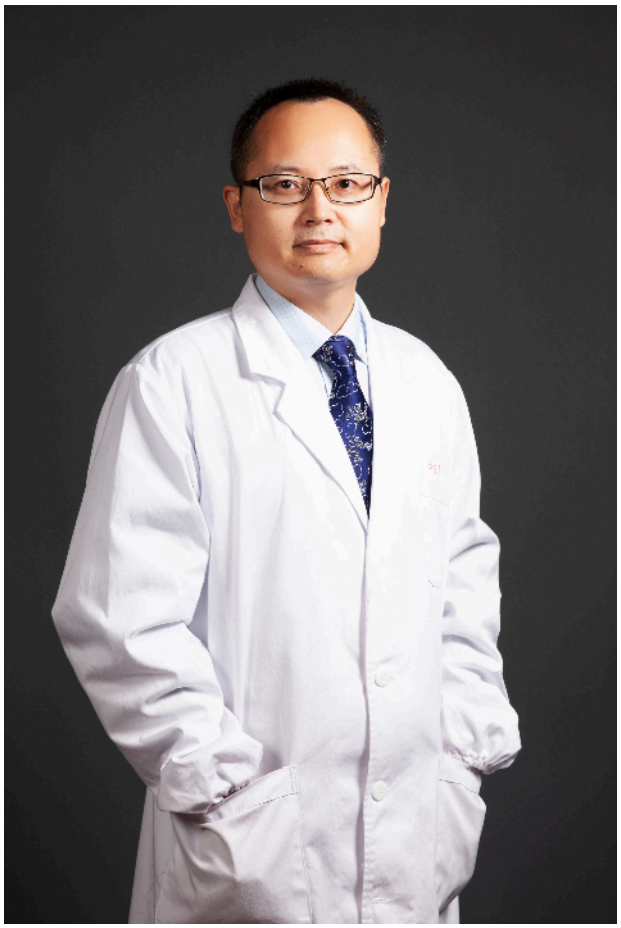
Precision Medicine for Tinnitus:

An Interview with Professor Zhao Han

Professor Zhao Han of Huadong Hospital, Fudan University, is a leading figure in the evolution of tinnitus research in China. His scientific contributions span vascular mechanisms, personalised acoustic therapy and ageing related heterogeneity, reflecting a multidisciplinary approach to both diagnosis and treatment.

ENT team at Huadong Hospital, Fudan University

The Department of Otorhinolaryngology Head and Neck Surgery, also known as the Geriatric Tinnitus and Deafness Center at Huadong Hospital, provides a full clinical pathway for tinnitus. Diagnostic assessment includes psychoacoustic testing across extended high frequencies, sound therapy trials and hearing aid evaluations to identify the likely causes of symptoms, including vascular pulsatile tinnitus. Treatment is centred on customised sound therapy, with surgical options when necessary. The department also performs advanced otoneurological skull base procedures such as cochlear implantation and acoustic neuroma surgery. Current research focuses on the relationship between peripheral deafferentation and emotions involving the amygdala, as well as epidemiology and integrative management of tinnitus in ageing populations.



Professor Zhao Han (China)

Professor Han's foundational work on venous sinus haemodynamics shifted the field toward measurable diagnostic pathways, and this continues to influence current thinking on pulsatile and vascular tinnitus. He now emphasises the need to understand why structural abnormalities in venous sinuses precede symptoms rather than causing them immediately. This delayed symptom pattern suggests the involvement of central gating mechanisms that determine whether and when patients develop tinnitus. It also raises the possibility that conservative treatment may cure many cases previously assumed to require surgery. Alongside this vascular focus, he notes possible shared mechanisms between pulsatile tinnitus and non pulsatile tinnitus associated with peripheral deafferentation, hinting at a unifying theoretical framework for what have traditionally been separate research areas.

Building on this mechanistic perspective, Han's research has also contributed to predicting which patients will respond to sound therapy. His work shows that individuals with tinnitus and hearing loss of up to 60 dB can benefit substantially from sound based interventions, but only when sleep and emotional health are addressed at the same time. Emotional dysregulation significantly reduces the effectiveness of sound therapy, even when the auditory prescription is correct. In patients with hearing loss greater than 60 dB, hearing aids should be introduced before sound therapy, as benefit is otherwise limited. Beyond these two factors, no other clinical or demographic variables consistently predict outcome, reinforcing the dominant influence of auditory and emotional processes in treatment response.

This insights connect with Han's recent focus on tinnitus, frailty and ageing. Although this work is still evolving, the effectiveness of treating hearing loss appears to play a central protective role for older adults. Listening effort may be a key mechanism linking tinnitus severity, cognitive vulnerability and functional decline, suggesting that targeted intervention for auditory effort could reduce broader ageing related risks. These observations are beginning to define a new preventive dimension to tinnitus care.

From these strands of evidence, Professor Han identifies three priorities for the next decade of tinnitus research. First, deeper investigation of peripheral deafferentation and central compensation, with particular attention to how emotional, sleep and auditory systems interact. Second, continued refinement of music based sound therapy, including optimisation of encoding strategies and methods to maximise adherence over time. Third, systematic study of tinnitus in people with clinically normal hearing, including the potential contribution of middle ear muscle dysfunction.

"PROFESSOR HAN'S CORE MESSAGE ON PULSATILE TINNITUS IS THAT VENOUS SINUS ABNORMALITIES ARE NOW A CLEARLY IDENTIFIABLE AND HIGHLY TREATABLE CAUSE, BUT SYMPTOMS EMERGE ONLY WHEN CENTRAL GATING MECHANISMS FAIL, MEANING MANY PATIENTS MAY BE CURED THROUGH PRECISE DIAGNOSIS AND TARGETED INTERVENTION RATHER THAN DEFAULTING TO SURGERY."

Taken together, Professor Han's research illustrates a coherent scientific vision in which biological mechanisms, psychological processes, vascular physiology and ageing related factors are integrated rather than siloed. The future he outlines is one of increasingly personalised, mechanism driven and clinically actionable tinnitus care, with prevention and early stratification woven into treatment planning from the outset.

ZHAO HAN ON PRECISION THERAPY

The key to future progress is recognising that tinnitus arises from the interaction between peripheral auditory changes and central gating mechanisms influenced by sleep and emotional regulation, making individualised, mechanism-based treatment both possible and necessary.