Tinnitus Is Waking up the Dragon

Where Ancient Culture Meets the Frontier of Brain and Vascular Science

Reported tinnitus prevalence varies substantially across studies in China, with values spanning from 4.3% to 51.33% [1]. This variability was influenced by demographic factors of the study populations such as age, gender, occupation, noise exposure as well as the method in which tinnitus was defined in each survey.

"IN 2025, CHINA REPRESENTS THE UNDISPUTED CENTRE OF GRAVITY IN GLOBAL TINNITUS RESEARCH."

A bibliometric analysis of tinnitus specific PubMed records published between 1 November 2024 and 31 October 2025 identified 502 studies, of which 446 were eligible for geographic analysis. China occupied first place with 104 publications, representing 23.3 percent of all eligible studies.

The United States followed at 18.2 percent. Korea, Germany, the UK, Turkey and India formed the next tier.

Researchers from China are now publishing their tinnitus studies not only in domestic Chinese journals but also in high-impact international journals such as Hearing Research, Frontiers in Neurology, Frontiers in Neuroscience and Otology & Neurotology, reflecting a marked rise in the global visibility and scientific influence of Chinese tinnitus research. This signals the emergence of tinnitus as a defined scientific priority in China.

The thematic composition of the 104 Chinese papers reveals a distinctive scientific identity. Research on brain and neural connectivity represented the largest category at 27.9 percent. These studies established China as a leader in circuit level tinnitus mechanisms, neurochemical pathways and functional network abnormalities. Epidemiological and population-based studies constituted the second largest category at 26 percent. These studies frequently used very large datasets (not limited to data from China) to analyse associations between tinnitus and metabolic disease, sleep quality, psychological distress, cardiovascular risk and immune function. Clinical intervention studies accounted for 20.2 percent but differed noticeably from Western models that prioritise cognitive behavioural therapy (CBT) led and stepped care interventions. Chinese work demonstrated a pluralistic therapeutic culture in which neuromodulation, acupuncture, music therapy, sound-based retraining and drug combinations were studied alongside CBT. Research on surgeries and advance investigations focused on pulsatile and venous tinnitus represented 13.5 percent of the total and stands out as a highly specialised area that has not historically been explored at similar scale in other countries.

"WHOOSHING TINNITUS OFTEN COMES FROM VASCULAR STRUCTURAL PROBLEMS AND CORRECTING THEM CAN STOP THE NOISE."

The leadership behind this scientific expansion is especially evident when examining the work of specialised centres. Across Shanghai, several specialist centres have made important contributions to tinnitus science and clinical care, with multiple lines of research and treatment running simultaneously across institutions.

At the Eye & ENT Hospital of Fudan University in Shanghai, clinicians have advanced the diagnosis and treatment of pulsatile and venous pulsatile tinnitus by identifying structural causes such as sigmoid sinus wall and jugular bulb anomalies, carotid abnormalities, and venous sinus stenosis. Their dedicated pulsatile tinnitus clinic has pioneered high-resolution imaging, hemodynamic modelling, transcanal recording, and 4D-flow MRI, leading to innovative vascular reconstruction procedures. With more than 350 surgical cases and a high success rate, the centre has become a leader in surgically treatable tinnitus. They also offer comprehensive care for subjective tinnitus, supported by an integrated mobile app.

At the Department of Otorhinolaryngology Head and Neck Surgery / Geriatric Tinnitus and Deafness Center at Huadong Hospital Affiliated to Fudan University, tinnitus research and care span many areas. One component of their programme involves the use of a comprehensive tinnitus examination protocol that incorporates psychoacoustic testing across extended high frequencies, sound therapy trials and hearing aid trials to support individualised treatment planning. The department also carries out otoneurological skull base procedures relevant to tinnitus and conducts research on topics such as the interaction between peripheral deafferentation and emotional processing, as well as epidemiological studies of tinnitus and deafness in older adults. For vascular pulsatile tinnitus, ultrasound, computed tomography (CT), magnetic resonance angiography (MRA) and magnetic resonance venography (MRV) guide the use of interventions such as sigmoid sinus wall reinforcement surgery.

At the Sixth People's Hospital Affiliated to Shanghai Jiao Tong University School of Medicine, tinnitus research and clinical activity also cover multiple domains. One area of ongoing work explores precision neuromodulation for chronic subjective tinnitus, including clinical trials using repetitive transcranial magnetic stimulation (rTMS) combined with transcranial magnetic stimulation and electroencephalography (TMS-EEG) to identify neurophysiological biomarkers that could guide personalised treatment. Mechanistic studies integrating functional magnetic resonance imaging (fMRI), electroencephalography (EEG) and neuromodulation are examining neural circuits involving the prefrontal cortex, anterior cingulate and salience network and their contribution to the persistence of tinnitus.

"THIS HYBRID FIELD, PARTLY VASCULAR AND PARTLY PRECISION THERAPY, EXEMPLIFIES CHINA'S MULTIDISCIPLINARY APPROACH TO TINNITUS."

The same centre also contributes to research into the psychological and systemic dimensions of tinnitus. Studies on stress, psychological distress and anxiety, including during the COVID-19 period, have provided evidence that emotional regulation and systemic health influence tinnitus severity.
These findings add to international recognition that tinnitus severity relates not only to auditory function but also to cognitive-emotional factors and broader wellbeing.

Taken together, the work undertaken at Fudan University, Huadong Hospital and the Sixth People's Hospital represents only a fraction of the wider activity across these large and diverse centres. The examples summarised here show how vascular otology, auditory neuroscience, neural circuit research, neuromodulation, personalised acoustic therapy and psychological epidemiology are all advancing in parallel rather than in competition. The result is a multidimensional research landscape in which vascular, auditory, neural and psychological mechanisms are examined side by side. This layered growth supports immediate improvements in care for people experiencing tinnitus today while also investing in understanding the mechanisms that give rise to tinnitus and the development of potential curative treatments in the future.

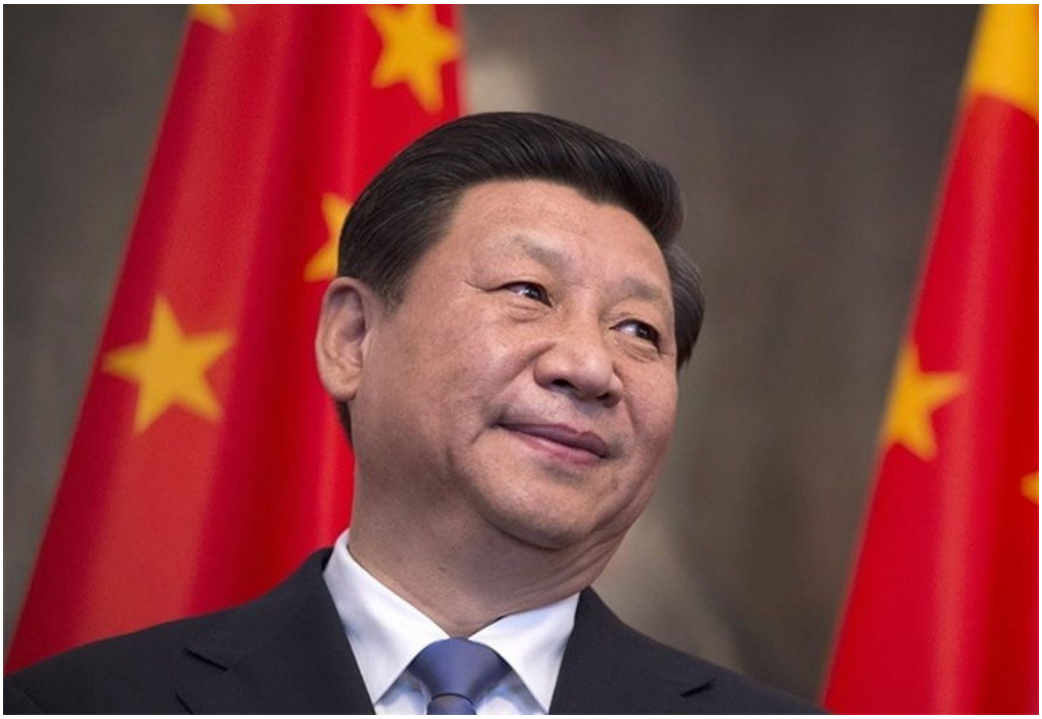
China's rapid acceleration in tinnitus research is influenced by several population and environmental factors. Rapid industrialisation, widespread occupational and recreational noise exposure, elevated urban noise levels and increasing life expectancy — reaching 79 years in 2024 — are likely contributing to a rise in noise-induced and age-related tinnitus, as well as greater visibility of the condition. National investment in brain imaging and neurosurgery has created fertile conditions for tinnitus-based neuroscience. Academic incentives encourage international publication in ENT and neurology. Specialist tinnitus units are now embedded within major hospitals. Policy makers increasingly regard tinnitus as a burden related to ageing and mental health, not just a secondary symptom of hearing loss.

"ENVIRONMENTAL NOISE AND POPULATION AGEING ARE MAJOR DRIVERS OF TINNITUS PREVALENCE, SUGGESTING THAT CHINA FACES INCREASING CLINICAL DEMAND IN THE COMING YEARS."

Ten years ago, tinnitus in China was widely viewed as a chronic condition with limited treatment options, and management often centred on traditional Chinese medicine. This picture has changed. Research across the country has shown that tinnitus has identifiable vascular, neural and systemic drivers that can be evaluated using structural imaging, neural modelling and acoustic response patterns.

These developments have pushed several once peripheral ideas into mainstream discussion, including the possibility that some tinnitus cases may be reversible through vascular reconstruction or neural reafferentation, that personalised acoustic therapy can be delivered with predictive precision, and that frailty and cognitive decline shape treatment outcomes. Evidence also supports a network-based model in which tinnitus is sustained by large-scale brain signalling rather than cochlear injury alone.
The dragon has awakened. China has moved from the periphery of tinnitus research to one of its major engines of discovery, and its momentum is reshaping direction and ambition worldwide.

The future direction of tinnitus research in China cannot be separated from the broader national strategy shaped by Xi Jinping. Medical research is viewed not simply as a clinical endeavour but as a strategic instrument of national power, scientific development and long-term economic security. Xi has repeatedly stated that medical science is a most powerful weapon against disease and has placed healthcare innovation at the centre of the Healthy China 2030 framework. Within this vision, biotechnology, precision medicine, neurotechnology and traditional Chinese medicine coexist rather than compete. The expectation is that scientific progress will arise from the integration of modern molecular and imaging techniques with millennia of accumulated medical knowledge. This policy environment strongly favours the direction in which tinnitus research in China is already heading.



Chinese President Xi Jinping reiterated China's proposal to strengthen global cooperation in health research, promoting the vision of a "human community of health for all" in 2025.

Applied to tinnitus, this framework suggests a near-term expansion of brain-based research, with advanced imaging and network analyses becoming central. Chinese laboratories already lead in brain connectivity studies, and national priorities in neuroscience and artificial intelligence position tinnitus as a model for neural circuit mapping. Techniques such as fMRI, MRS, and machine learning–based network decoding are therefore likely to enter mainstream tinnitus research for diagnosis and subtyping.

Second, the enormous national attention to longevity and anti-ageing science provides a fertile environment for studying tinnitus as part of the ageing phenotype. Recent evidence from Chinese groups linking frailty, cognition and tinnitus is perfectly aligned with national interest in healthy longevity and age-related brain health. This makes it plausible that tinnitus will increasingly be framed not only as an otological disorder but also as a biomarker of brain ageing, neuroinflammation and metabolic vulnerability. Such a perspective will strengthen funding support for large population and cohort studies and for precision stratification models.

Third, the national encouragement to combine traditional Chinese medicine (TCM) with modern biomedical innovation will influence tinnitus therapeutics. We can anticipate new clinical trials that combine personalised music or sound therapy with acupuncture, scalp electroacupuncture, herbal pharmacology, neuromodulation or stress reduction frameworks grounded in both TCM and neuroscience. Rather than an alternative or marginal addition, TCM will be positioned as a partner in system level brain regulation and neurovascular modulation. Such an integrated paradigm is far more likely to emerge in China than in Western research ecosystems.

Fourth, there is a national mandate to solve core technological weaknesses in high end medical equipment. Venous pulsatile tinnitus has already emerged as an area in which Chinese vascular otology leads the world. It is realistic to predict the development of domestically manufactured high resolution neurovascular imaging systems, low radiation skull base scanners, advanced Doppler sonography for jugular venous flow assessment and new robotic or image guided surgical tools for sigmoid wall reconstruction. Structural tinnitus pathologies will likely become a showcase for Chinese surgical engineering in the coming decade.

Fifth, Xi has repeatedly emphasised international health cooperation. For tinnitus research this will encourage cross border clinical trials, data sharing agreements and Belt and Road collaborations with partner nations. China will not conduct tinnitus research in isolation. Given that China and the United States already represent 41.5 percent of global tinnitus publications, a period of scientific competition followed by collaboration is predictable. The global tinnitus community will increasingly depend on Chinese data for neural connectivity, vascular mechanism and precision sound-based therapy, while China will increasingly engage with Western stepped care psychological treatment models and cochlear implant research.

"EARLY COMPETITION BETWEEN CHINA AND THE UNITED STATES IN TINNITUS RESEARCH IS PROBABLE, YET MUTUAL DEPENDENCE ON EACH OTHER'S DATA AND METHODS WILL GRADUALLY SHIFT THE LANDSCAPE TOWARD COLLABORATION."

Finally, the national strategy for epidemic preparedness and public health surveillance will influence tinnitus epidemiology. Large scale digital health platforms, hearing health registries and real time symptom reporting systems will allow tinnitus to be monitored at a population level. When combined with sleep, stress, cardiovascular and nutrition data, this will create the first national framework in which tinnitus is monitored as a physiological signal of public health rather than an isolated symptom. This direction will reshape global understanding of the condition.

Taken together, all of these predictions fit coherently within the scientific momentum already visible in China. Neural network mapping will intensify. Structural and vascular tinnitus surgery will expand. Personalised sound therapy will become progressively more data driven. Ageing and cognition will take a central position in tinnitus heterogeneity. Traditional Chinese medicine and modern neurotechnology will be combined rather than separated. High end medical equipment for skull base and neurovascular imaging will become an area of national innovation. International cooperation will grow rather than contract.

We can say that the trajectory of developments in tinnitus science is being shaped not only by academic decisions but also by national strategy. Tinnitus has entered the domain of state supported scientific priorities in China. If the current momentum continues, the next decade of major breakthroughs in tinnitus research is more likely to come from Beijing, Shanghai, Nanjing, Guangzhou and Wuhan than from Boston, London or Berlin. The world of tinnitus science has changed direction. **The dragon has awakened and is still rising.**

Reference:

1.Zhang D, Xu Q, Caimino C, Baguley DM. The prevalence of tinnitus in China: a systematic review of the literature. J Laryngol Otol 2021; 135: 3–9.