

Subtyping of tinnitus patients – implications for diagnosis and therapy

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Introduction

Subjective tinnitus perception and related psychiatric comorbidity have major medical (1) and economical impact (2), due to high prevalence (1) and debilitating character of underlying pathologies (3). Basic research has increased the understanding of pathophysiological mechanisms behind the symptom of tinnitus perception (4) and led to a pattern of clinically diverse clusters of patients with specific diagnostic criteria and treatment necessities (5).

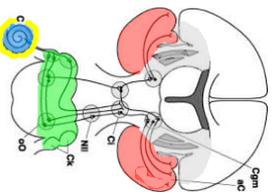


Fig 1: Structures of origin in tinnitus pathophysiology

Describing subtypes with distinct pathophysiological characteristics therefore represents a fundamental tool for clinical trials and the treatment of tinnitus patients, since it can help to specify research and deliver a rational basis for a differential diagnosis as a foundation for medical treatment. This study tries to enhance the coherence between basic research and clinical routine with tinnitus patients by describing relevant subgroup-features in medical history, clinical investigation and neurootological phenomena.

Materials and methods

100 consecutive patients, investigated for their acute or chronic tinnitus perception in a specialized center were categorized for their subtype, using a procedure of different clinical diagnostics: general medical, psychological, otological, orthopedic, orthodontic, immunological and dental. Further, tinnitus-specific features were: localization of tinnitus perception, tinnitus-pitch, presence of sensorineural hearing loss with or without acoustic trauma, somatosensory modulation characteristics, onset description of the patient, vertigo symptoms, hyperacusis and perception pattern during daytime.

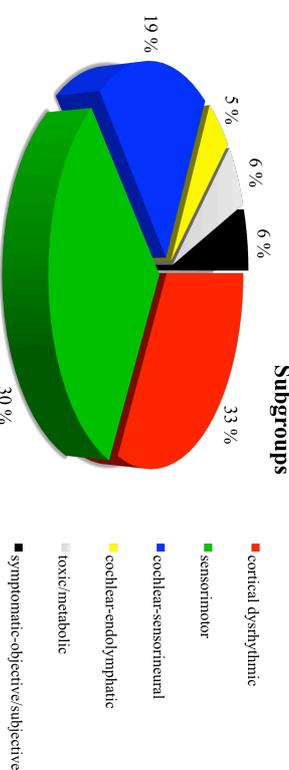
Results

Subtyping led to five clusters with distinct clinical and tinnitus-specific features, which seem to represent known pathophysiological pathways (Fig. 1+2). A small number of patients showed rare forms of objective, symptomatic (pulsatile, myoclonal) or subjective, symptomatic (pulsatile) forms of tinnitus perception (6%).

Localization	binaural	monaural	monaural 70%	monaural 90%	binaural
Pitch	high	high tonal low hissing	high	low hissing	High middle
Hearing loss	optional	no	yes	yes	no
Onset	slow on/off	sudden	sudden	attack	sudden
Vertigo	no	no	no	yes	no
Hyperacusis	50%	monaural resonance	50%	no	no
Psychiatric comorbidity	50% causal	25% symptomatic	20% symptomatic	70% symptomatic	20% symptomatic
Somatosensory modulation	30%	>70%	<20%	<20%	<20%

Fig 2: Clusters of clinical characteristics

Their quantitative distribution shows a major clinical importance of three subgroups: cortical-dysrhythmic, sensorimotor and cochlear-sensorineural, covering 82% of patients.



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Conclusions

1. Clinical characteristics of tinnitus patients show clear subtype-pattern – they allow a clinical subgrouping and are coherent with known pathophysiological pathways.
2. Three distinct subtypes cover more than 80% of patients. Their understanding lets medical professionals simplify their diagnosis of tinnitus patients.
3. State-of-the-art differential diagnosis and therapy are complex and interdisciplinary in nature. Therefore an interdisciplinary tinnitus team is necessary.
4. Psychiatric comorbidity and tinnitus perception are often linked – but in a subtle and differentiated way. Neither is their connect self-evident, nor is it psychotherapy for tinnitus patients.
5. Subtype-specificity in research and clinical practice plays a major role in optimizing cost efficacy, practical result-value and treatment outcome.

References

1. Shargorodsky J, Curhan GC, Farwell WR. (2010). Prevalence and characteristics of tinnitus among US adults. *Am J Med.* 20 Aug; 123(8):711-8
2. Maes IH1, Cima RF, Vlaeyen JW, Anteunis LJ, Joore MA (2013) Tinnitus: a cost study. *Ear Hear.* Jul-Aug;34(4):508-14
3. Reynolds P, Gardner D, Lee R. (2004). Tinnitus and psychological morbidity: a cross-sectional study to investigate psychological morbidity in tinnitus patients and its relationship with severity of symptoms and illness perceptions. *ClinOtolaryngol Allied Sci.*; 29(6): 628-634
4. Roberts LE, Eggermont JJ, Caspary DM, Shore SE, Melcher JR, et al. (2010) Ringing ears: the neuroscience of tinnitus. *J Neurosci* 30: 14972–14979
5. Chan Y (2009) Tinnitus: etiology, classification, characteristics, and treatment. *Discov Med* 8: 133–136