

# The Tinnitus Hotline Keeps Ringing: Evidence-Based & Patient-Centered Interventions

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# Speaker Disclosures

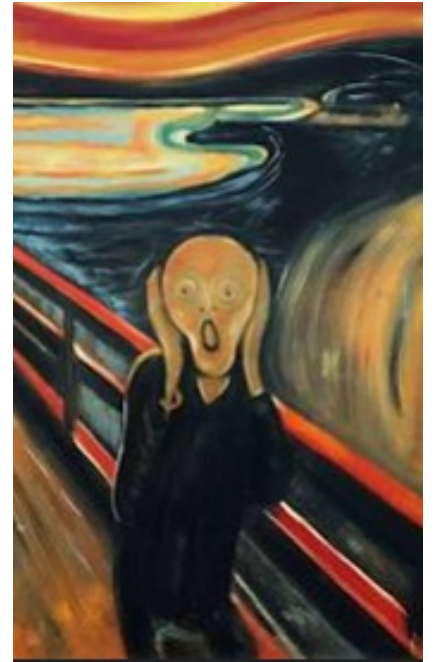
- No financial disclosures
- Volunteer board member of SPA-OHNS
  - Director at Large
- Volunteer board member of Academy of Communication in Healthcare
  - Vice President of External Education

# Learning Objectives

1. Define chronic subjective tinnitus and distinguish this from other types of tinnitus.
2. Utilize highest quality evidence to guide patients in tinnitus habituation strategies.
3. Engage with patients using a relationship-centered framework for both interviewing and treatment discussion.

# Session Roadmap

- Tinnitus definitions and distinctions
- History-taking for diagnostic & therapeutic success
- Exam and diagnostics
- Treatment
  - Current evidence and future possibilities
  - Evidence-based patient guidance
  - Shared decision-making



# Defining our terms

- Acute vs Chronic vs Long-standing
  - Tonal vs Pulsatile
  - Subjective vs Objective
  - Primary vs Secondary
- 
- This session is NOT about pulsatile or objective tinnitus  
*pulsing, whooshing, clicking, tapping*
  - This session IS about primary or secondary,  
**chronic (tonal) subjective tinnitus**



# Chronic Subjective Tinnitus

From the Latin *tinnire*

Definition: A phantom auditory percept in the absence of a corresponding external acoustic stimulus

- Tinnitus prevalence = 10-15%
  - Prevalence of transitory bursts of tinnitus = nearly universal
  - Prevalence of severely impairing tinnitus = 1-2%
    - 20% of tinnitus patients are severely impaired
  - Higher incidence with age
  - Men > Women
- Localized to one ear, both ears, or head
- Described as: *ringing, roaring, humming, buzzing, chirping, beeping, static, blowing, grinding, whistling, hissing, ...*



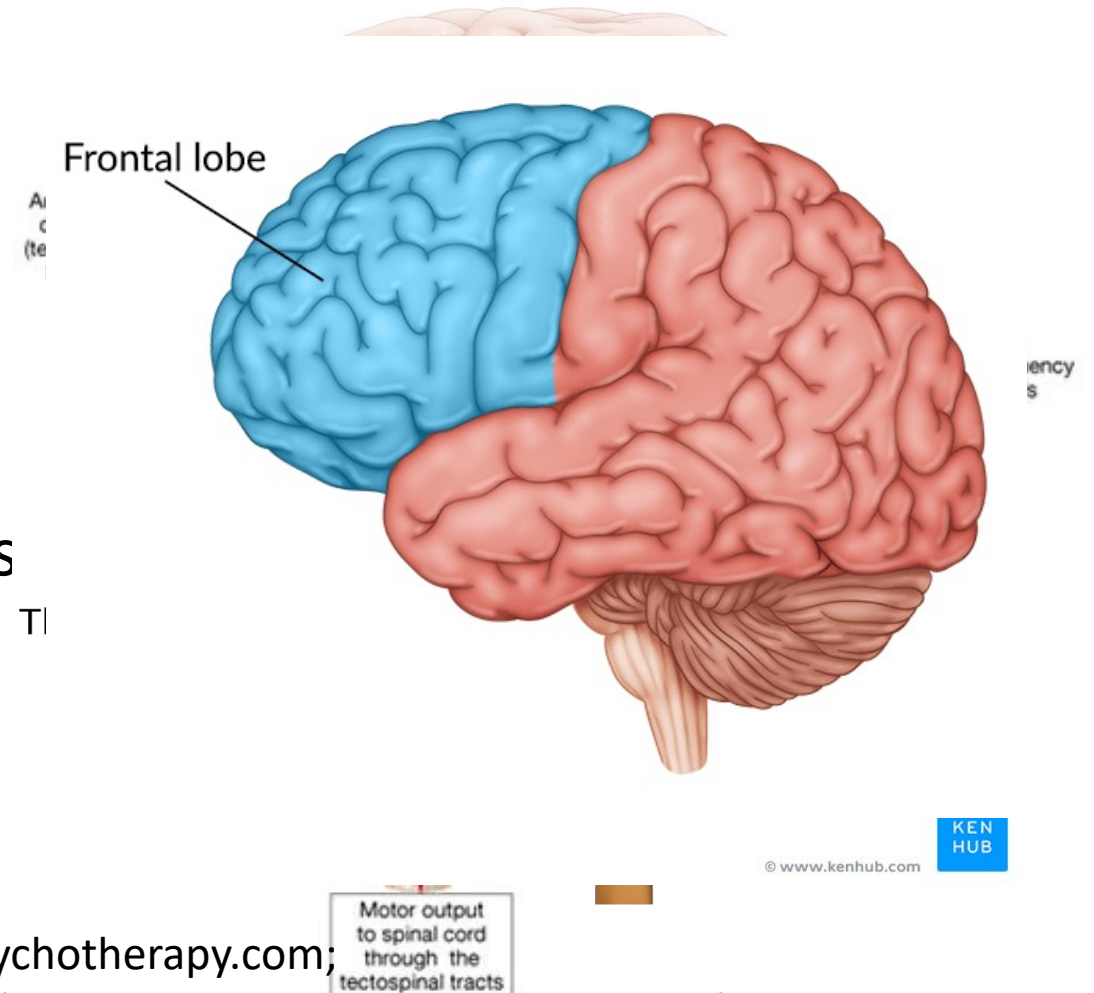
<https://www.thetinnitusclinic.co.uk/about-tinnitus/tinnitus-sounds>

Lockwood, A. Tinnitus. *Neurol Clin.* 2005; Morgenstern, L. The Bells are Ringing. *Perspect Biol Med.* 2005

# Pathophysiology of CST

Otologic → Neurophysiologic model

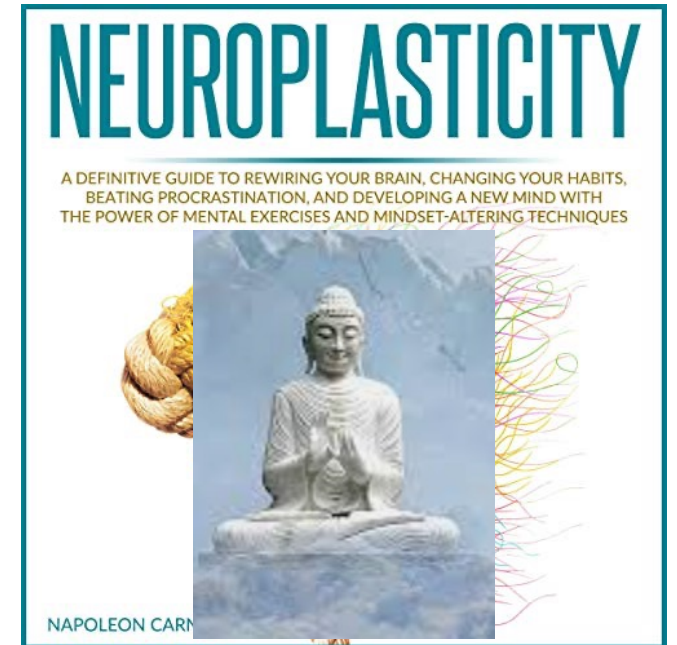
- Auditory pathways
- Amygdala
  - Limbic excitation
- Parietal - Caudate nucleus
  - Somatosensory-auditory interactions
- Frontal
  - Attention, explanatory model,  
interpretation of emotions



Images - SAMedicalblogspot.com; thescienceofpsychotherapy.com;  
Saunders, J. The Role of Central Nervous System Plasticity in Tinnitus. *J Commun Disord*. 2007

# Neuroplasticity

- Dynamic neuronal wiring
  - Sensory input
  - Chemical environment
- Maladaptive phenomenon AND possibilities for habituation
  - Excitatory perpetuation      Inhibitory interventions
- Phantom limb syndrome of the ear



Møller, A. Neural Plasticity in Tinnitus. *Prog Brain Res*, 2006.

Saunders, J. The Role of Central Nervous System Plasticity in Tinnitus. *J Commun Disord*. 2007



# Tinnitus symptom measures

- Tinnitus Sample Case History Questionnaire
- Tinnitus Severity Index (TSI)
- Tinnitus Questionnaire (TQ)
- **Tinnitus Handicap Inventory (THI)**
- Tinnitus Reaction Questionnaire (TRQ)
- Tinnitus Functional Index (TFI)
- Major Depression Inventory
- Quality of Life - World Health Organization QOL BREF



Grade	Label	THI Score Band
1	light or No Handicap	0 - 16
2	Mild Handicap	18 - 36
3	Moderate Handicap	38 - 56
4	Severe Handicap	58 - 76
5	Catastrophic Handicap	78 - 100



# Narrative History Taking

## CODIERS

- Chronology
- Onset
- Description/Details
- Intensity
- Exacerbation
- Remission/Relief
- Symptoms associated

“Take me back to the very beginning and tell me the story of your tinnitus.”

- Listen without interrupting
- Get a more accurate history... and higher patient satisfaction!

Marvel, et al. *JAMA* 1999.

# History Taking to Elicit Etiology

- History of risk factors
  - Audiologic
    - Sudden, chronic, or fluctuating HL
      - age, Meniere's, autoimmune disease, post-surgical, post-traumatic, etc...
    - Noise exposure
    - Temporary CHL - cerumen, OE, etc
  - Physiologic
    - H&N tension, pain
    - Headaches
  - Pharmacologic
    - Aspirin, NSAIDs
    - Ototoxic side effects: IV diuretics, aminoglycosides, cisplatin, etc...
  - Dietary
    - Caffeine
  - Neurologic
    - TBI, COVID
    - (COVID vaccination??)

# Relationship-Centered History Taking

To understand the patient's experience, values, & goals

- "I ICE" © questions

- Ideas *What **ideas** do you have about what influences your tinnitus?*
- Impact *How has your tinnitus **impacted** your life?*
- Concerns *What **concerns** you about this?*
- Expectations *What **expectations** do you have for this visit today?*



# Compassion as healing

- Explicitly attend to emotion with compassion  
*annoyance, frustration, anger, anxiousness, depression, despair*
- **PEARLS** ©
  - Partnership *I will work with you to find ways to improve this.*
  - Emotion *This sounds incredibly maddening.*
  - Apology *I'm sorry others have not offered you any strategies.*
  - Respect *I can see how persistently you've advocated for yourself.*
  - Legitimization *I think anyone might feel frustrated in your situation.*
  - Support *We are here for you.*



# Physical Examination

- Otoscopy
- TMJ
  - tension, arthropathy
- Neck
  - muscle tension, C-spine ROM

midtowndentalcareassociates.com/services/tmj-disorders/  
View site information

## TMJ Treatment in Midtown NYC

### Signs and Symptoms

**Head Pain, Headache**

1. Forehead
2. Temples
3. "Migraine" type
4. Sinus type
5. Shooting pain up back of head
6. Hair and/or scalp painful to touch

**Ear Problems**

1. Hissing
2. Decreased hearing
3. Ear pain, ear ache (no infection)
4. Clogged, "itchy" ears
5. Vertigo, dizziness
6. Tinnitus

**Jaw Problems**

1. Clicking, popping jaw joints
2. Grating sounds
3. Pain in cheek muscles
4. Uncontrollable jaw and/or tongue movements

**Ear Problems**

1. Lack of mobility, stiffness
2. Neck pain
3. Tired sore muscles
4. Shoulder aches and backaches
5. Arm and finger numbness and/or pain

**Throat**

1. Swallowing difficulties
2. Laryngitis
3. Sore throat (with no infection)
4. Voice irregularities
5. Frequent coughing or constant clearing of throat

**Eyes**

1. Pain behind eyes
2. Bloodshot eyes
3. May bulge out
4. Sensitive to light

**Mouth**

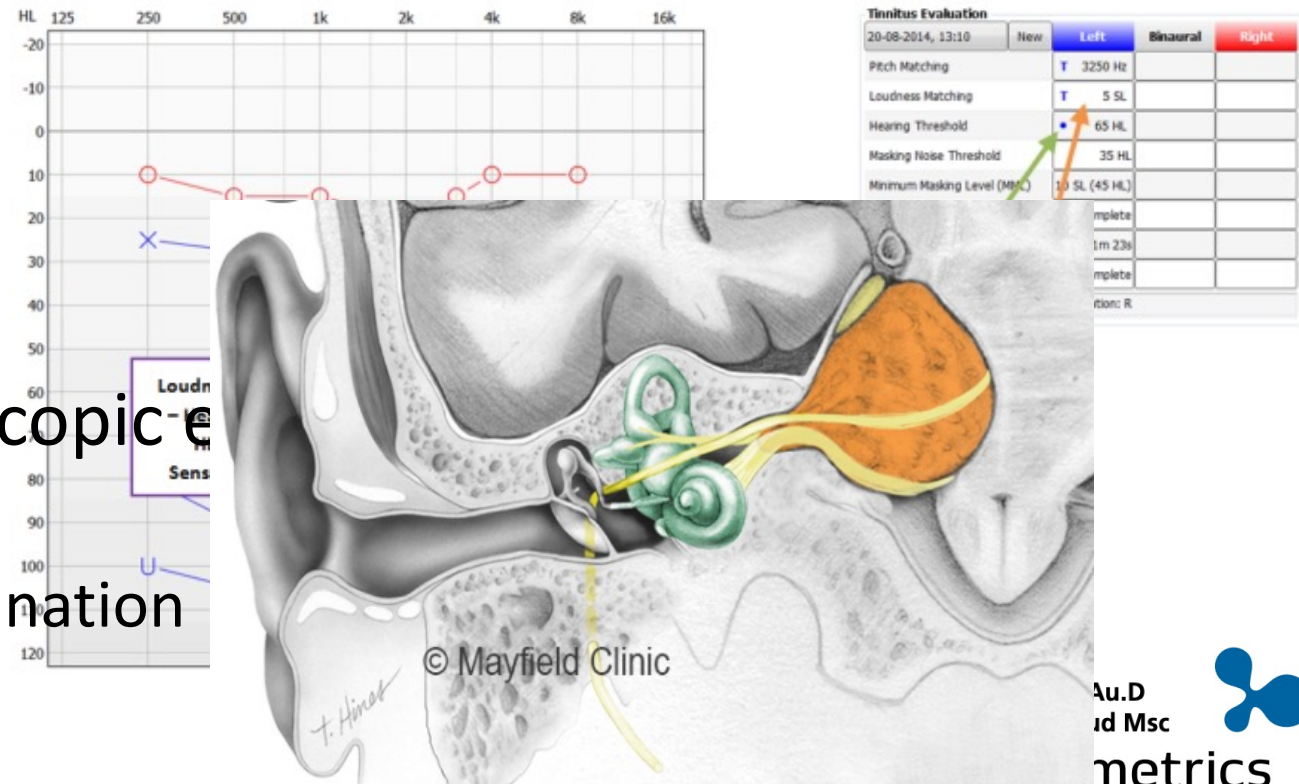
1. Discomfort
2. Limited opening of mouth
3. Inability to open smoothly
4. Jaw often deviates to the affected side upon opening
5. Locks shut or open
6. Can't find bite

**Teeth**

1. Clenching, grinding at night
2. Localized or generalized soreness of teeth
3. Thermal sensitivity

# Diagnostics

- Audiogram
  - +/- UHF thresholds
  - +/- Sound tolerance
- Tinnitus pitch-matching
  - Psychoacoustical measures
- Referral for ENT otomicroscopic exam
- MRI IAC protocol
  - If unilateral tinnitus w/o explanation
  - To rule out acoustic neuroma*



# Prognosis

- Acute –vs- Chronic –vs- Long-standing Chronic
  - Acute <3 months → 12-23%\* full remission by 6mo
  - Chronic 3-48 months → remission possible, 79% gradual
  - Long-standing, chronic 3-4 years → structural + functional brain changes
- Positive prognosticators:
  - SSNHL; Females; shorter duration, less hyperacusis, lower alcohol use
- Negative prognosticators:
  - Tinnitus-attributed sleep disturbance, anxiety, low life-satisfaction (56%)
  - Underlying anxiety, psych stress, depression, low global function

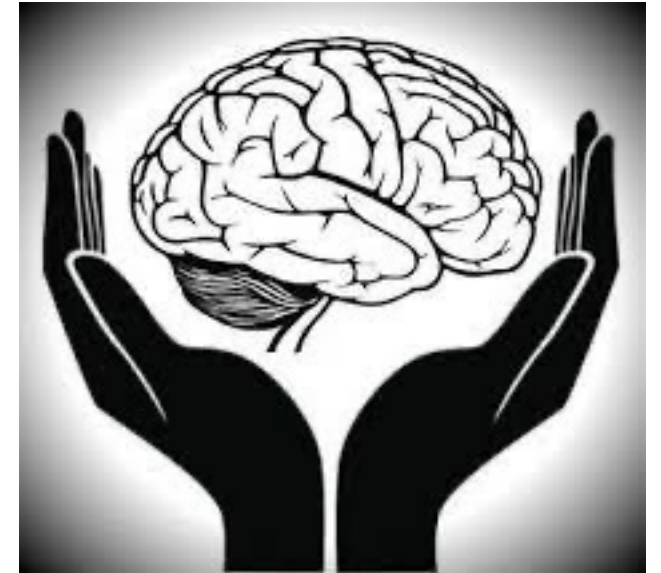
Schlee, W, et al. *BMC Neurosci.* 2009.    Chen, Q. et al. *Neurosci,* 2020.

Sanchez, T. *Prog Brain Res.* 2021;    Vielsmier, V, et al. From acute to chronic tinnitus. *Neurol.* 2020.



# Goals in Tinnitus Treatment

- Evidence-based treatment
- Interprofessional, holistic care
- Patient counseling
  - With shared decision-making



# What's out there?

- Oral remedies
  - Supplements, Rx meds
- Psychological interventions
  - CBT
- Hearing rehab
  - Hearing aids, CI
- Acoustic therapies
  - Masking, neuromonics
  - Notched & custom music
  - TRT (counseling + sound therapy program)
- Electromagnetic stimulation therapies

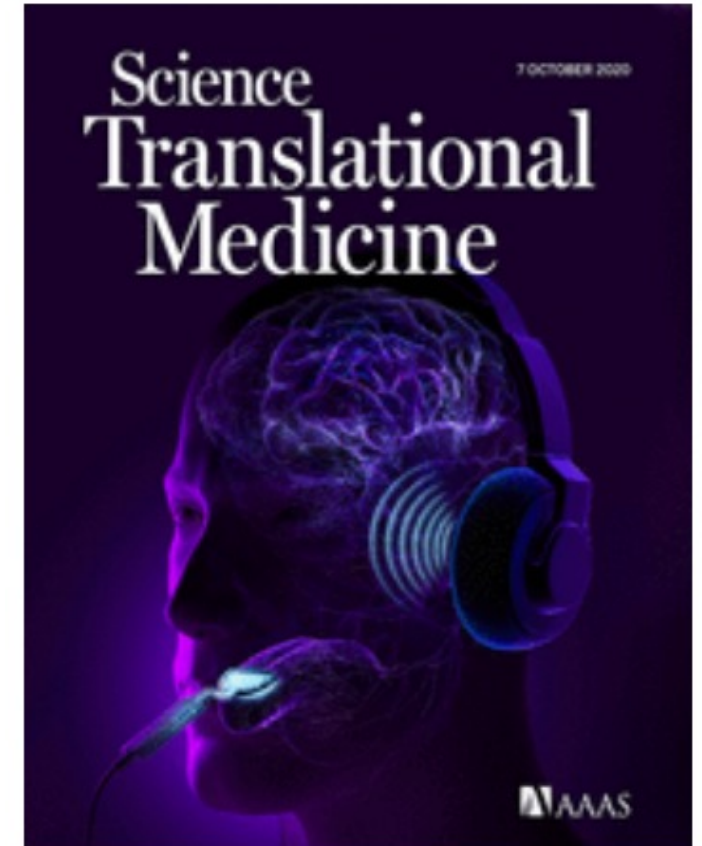
**\$2-4k pp/yr mean expense**

HC, patient/family, lost productivity  
\$26 billion annually in US



# THE EVIDENCE

- Scoping reviews
- Systematic reviews
- Clinical Practice Guidelines
  
- Future therapeutic possibilities



# Scoping reviews

- Heterogeneity across all factors
- Small sample sizes
- Lack of clear sham/control groups

**\$26 billion**



*“Given the confounding variables that include length of therapy, tinnitus severity and subject population, the overall level of evidence is equivocal.”*

*“...appears to have potential as a treatment method”*

*“Does not allow robust conclusions”*

*“Considerable room for future research”*

*“No reliable study exists on this topic as yet.”*

*Elarbed A, et al. Int J Audiol, 2021. Makar SK, et al. Int Tinn J. 2017. Tutaj L, et al. Ear Hear. 2018.  
Duda V, et al. Otolaryngol Clin North Am. 2020.*

# 14 Systematic reviews by Cochrane

- Betahistine no 2018
- Ginko biloba no 2013
- Zinc no 2016
- Lipoflavonoids no 2018
- Anticonvulsants unlikely 2011
- Antidepressants insuff evid 2011
- **CBT limited evid 2020**
- **TRT better than masking 2012**
- **Hearing aids yes; if HL present 2014**
- Sound therapy no; not differentiated 2018
- rTMS very ltd evid; safe short term 2011



# Clinical Practice Guideline: Tinnitus

This guideline was published in the October 2014 issue of *Otolaryngology–Head and Neck Surgery* on October 1.

Published Guideline

Executive Summary

Plain Language Summary

CPG

Tinnitus

David E. Tunkel, MD, Carol A. Bauer, MD, Gordon H. Sun, MD, MS, Richard M. Rosenfeld, MD, MPH, [Show less ^](#)  
Sujana S. Chandrasekhar, MD, Eugene R. Cunningham, Jr, MS, Sanford M. Archer, MD, Brian W. Blakley,  
MD, PhD, John M. Carter, MD, Evelyn C. Granieri, MD, MPH, MEd, James A. Henry, PhD, Deena Hollingsworth, RN,  
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Omole, MD, C. Douglas Phillips, MD, Shannon K. Robinson, MD, Malcolm B. Taw, MD, Richard S. Tyler, PhD, Richard  
Waguespack, MD, Elizabeth J. Whamond

First Published October 1, 2014 | Research Article | [Find in PubMed](#)



<https://doi.org/10.1177/0194599814545325>

# AAO-HNS CPG 2014

- **Strong recommendations**
  - Differentiate bothersome from non-bothersome
  - No routine imaging
- **Recommendations**
  - Targeted H&P, address contributors
  - Audiological eval for unilat, >6mo, or w hearing difficulties
  - Prioritize intervention and counseling <6mo duration
  - For persistent (>6mo), bothersome tinnitus
    - Educate re: management strategies
    - Hearing aid if HL present
    - Recommend CBT



# AAO-HNS CPG 2014

- **Recommend against**
  - Prescription medications:
    - Antidepressants, anxiolytics
    - Anticonvulsants
  - IT therapies
  - Supplements
    - Ginkgo biloba
    - Melatonin
    - Zinc
    - Other dietary supplements
  - TMS – Transcranial magnetic stimulation





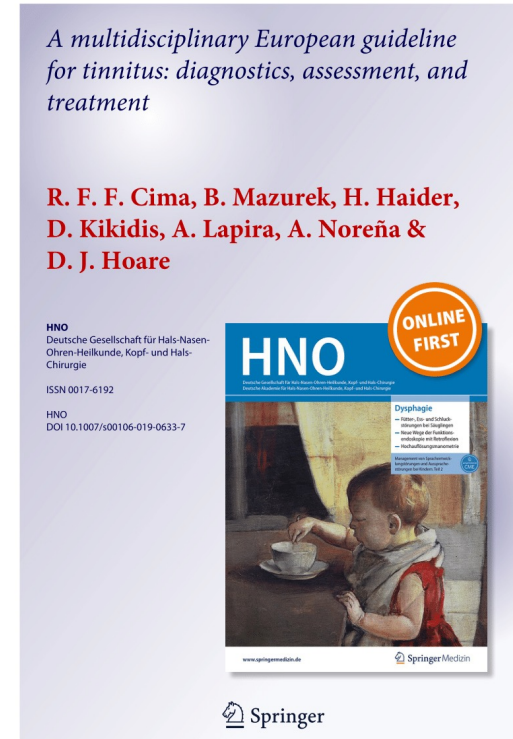
# AAO-HNS CPG 2014

- **Options**
  - Audiogram for all presenting w tinnitus
  - Sound therapy for persistent, bothersome tinnitus
- **No recommendation**
  - Acupuncture



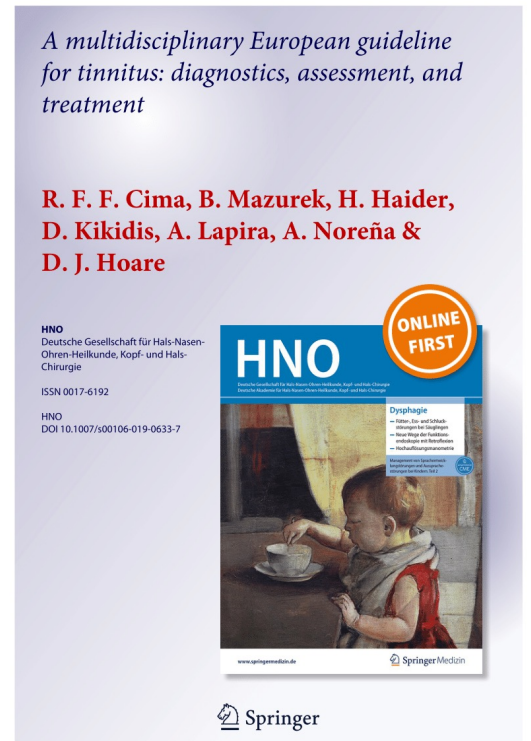
# Multidisciplinary European CPG 2017

- Strong recommendation for
  - CBT
  - Education/counseling
  - Relaxation
- Weak recommendation for
  - Hearing aids
- Weak recommendation against
  - Pharmacologic interventions for tinnitus
- Recommendation against
  - Repetitive transcranial magnetic stim (unclear safety or efficacy)
  - Supplements (no proven efficacy, potential harm)

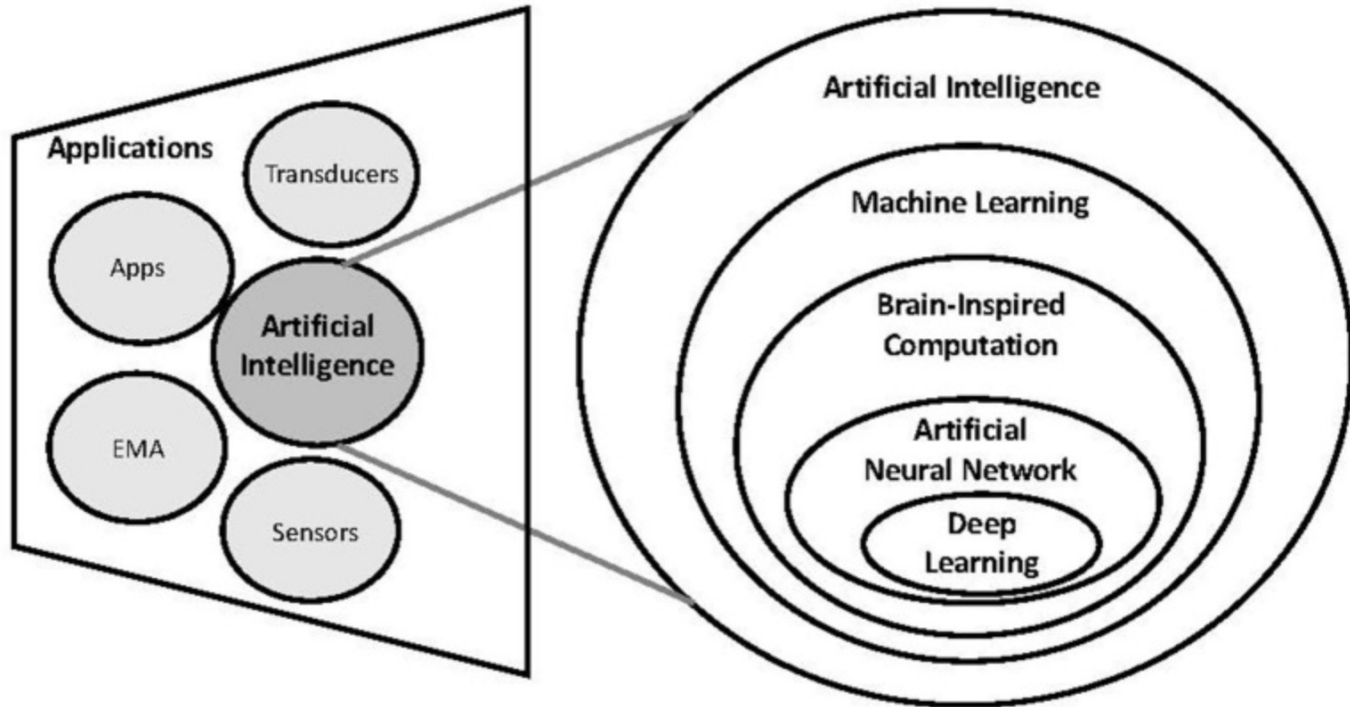


# Multidisciplinary European CPG 2017

- No recommendation:
  - Acupuncture
  - Sound therapy
  - Tinnitus retraining therapy
  - CI (for tinnitus)
  - Transcranial e-stim (safe, unclear efficacy)
  - Vagus nerve stim (safe, unclear efficacy)
  - Invasive neurostim (unclear safety or efficacy)



# Future possibilities for interventions



- Digital technologies
  - AI
- Personalized sound therapies
- Non-invasive electromagnetic stim

*Searchfield G, et al. Front Digit Health. 2021.*

*Yang, T. Ther Adv Chr Dis. 2021.*

# FREE Tinnitus Habituation Apps

- [Rewiring Tinnitus Relief Project](#)
  - guided tinnitus meditation tracks, sleep induction tracks, guided tinnitus “spike relief” techniques, relaxation tracks
- [Quieten](#)
  - audio and video educational content for habituation, meditations, coping tools, relaxation techniques
- [OTO: Tinnitus Relief and Therapy](#)
  - CBT, relaxation techniques, breathing, masking library, mindfulness training

<https://rewiringtinnitus.com/relief/>

<https://www.quietenapp.com/>

<https://www.joinoto.com/>

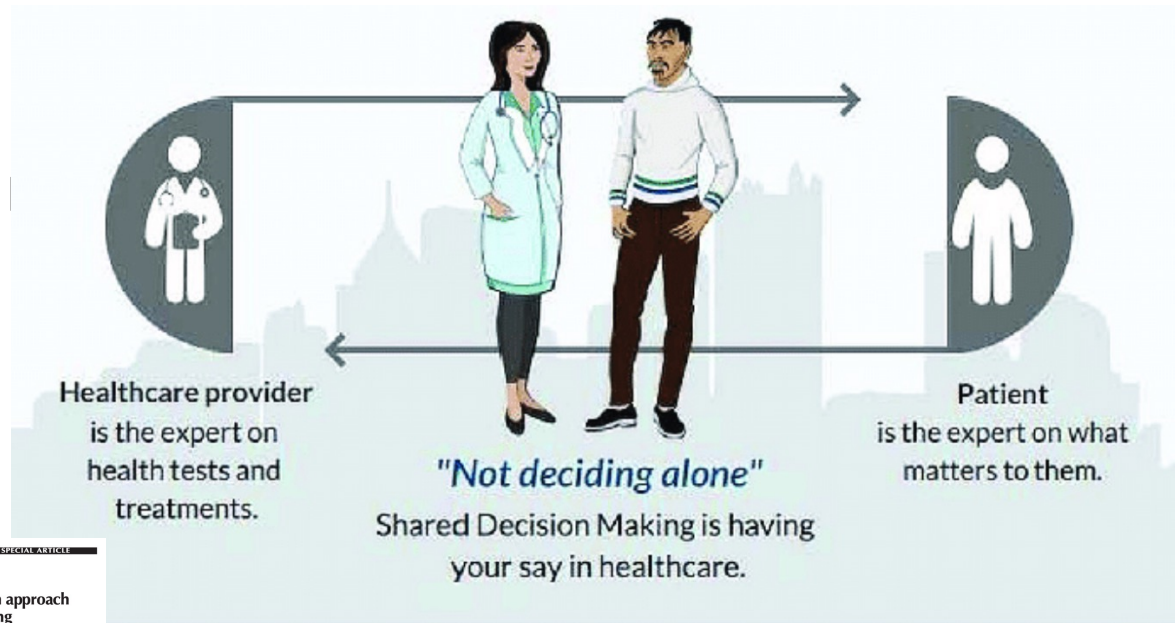
# Holistic Care

Otologic → Neurophysiologic model

- Auditory pathways → • Hearing aids, sound therapy
- Amygdala → • Psychotherapy, CBT, tinnitus counseling
  - Limbic excitation
- Parietal - Caudate nucleus → • Yoga, mindfulness
  - Somatosensory-auditory
- Frontal → • PT/acupuncture -neck, jaw
  - Attention, explanatory model, emotion interpretation

# Patient counseling: shared decision-making

- Individualized care
  - Impact + Ideas + Concerns + Expectations / Goals
- Evidence (possibility of benefit + lack of risk + expense)
- Education
  - AAO plain language
  - ATA link

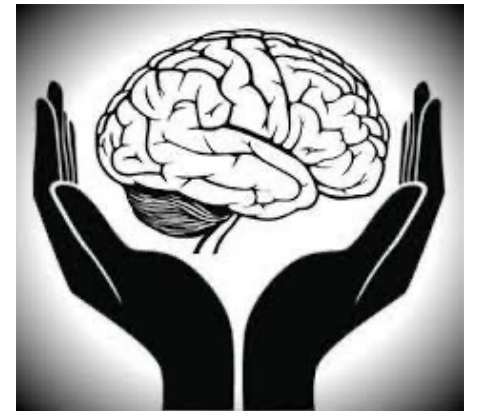


**ONCOLOGY**  
An integrated knowledge translation approach to develop a shared decision-making strategy for use by Inuit in cancer care: a qualitative study  
J. Hill et al., A. Hazlewood et al., A.J. Sheppard et al., A. Kewey et al., P. Dearing et al., L. MacLeod et al., G. Joubert et al., J. Poirer et al., D. Danchner et al., The Inuit Medical Interpreter Team et al., R. Boudreau et al., M. Boudreau et al., R. Boudreau et al.

<https://www.entnet.org/wp-content/uploads/files/TinnitusGuidelinePLS.pdf>

# Tinnitus Take-aways

- CST patients need our well-informed support for their distress
  - NOT “there’s nothing you can do”
  - Empathic partnership
  - Individualized interventions to minimize risks/contributors
- \$\$\$ is spent on tinnitus interventions, with little evidence
- Evidence-based interventions include:
  - Mitigate sources of secondary tinnitus
  - Education
  - Hearing aids, if appropriate
  - Cognitive Behavioral Therapy (+/- TRT by audiology)
  - +/- Sound therapy





# Questions?

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