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Tinnitus Care: What Should I Know When Starting to Provide Tinnitus Care?

Presenter: William H. Martin, PhD
Professor of Otolaryngology at the
National University of Singapore

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Allied Health Media

AudiologyOnline

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Tinnitus Care: What Should I Know When Starting to Provide Tinnitus Care?

William Hal Martin, PhD
National University of Singapore
Center for Hearing, Speech & Balance

Tinnitus

- What is it?
- What causes it?
- How does it impact patients?
- Tinnitus treatment vs. management?
- Where do I start?

Tinnitus

from the Latin *tinnire*, meaning to ring

Ringling, hissing, humming, buzzing, roaring,
crackling, sizzling, wooshing, howling, grinding

...

No one else hears it but you.

What is tinnitus?

- The perception of sound, typically in the absence of an external acoustic signal.
- Objective - mechanical source
- Subjective - physiological but non-mechanical source
- Neural signals interpreted by the brain as sound

Epidemiology

- 1999-2004 National Health and Nutrition Examination Surveys (NHANES)
 - Any tinnitus: 25.3% >80 million
26.1% of men
24.9% of women
 - Frequent tinnitus: 7.9% >25 million
9.4% of men
6.5% of women

Shargorodsky 2010

Increased odds of frequent tinnitus:

- White, non-Hispanic
- > 40 years old
- Smoker
- Hypertensive
- Diabetic
- Overweight
- High cholesterol
- Noise exposure
- Major depressive disorder
- Generalized anxiety disorder
- Have hearing loss

Shargorodsky 2010

Tinnitus

- In adults, exposure to sudden or prolonged sounds is the most commonly reported factor related to the onset of tinnitus
Meikle, Creedon, Griest 2007
- Present after 90% of acoustic trauma events
Mrena et al 2004
- Tinnitus may be an early indicator of impending NIHL
Griest & Bishop 1998

One way to prevent tinnitus
is to reduce lifetime sound exposure

Tinnitus in kids

- Tinnitus in 7 year olds
12% experience tinnitus
2.5% say onset after loud sound
Holgers, K-M, 2003
- Tinnitus in 5-12 year olds
37.5% experience tinnitus “sensation”
19.6% experience tinnitus “suffering”
Noise exposure significant risk factor
Coelho et al, 2007

Tinnitus in kids

9 - 11 year old students were asked:

“Do you ever experience ringing or other noises in your ear(s) or head?”

never	24%	
rarely	28%	
sometimes	30%	} 47%
often	11%	
always	6%	

n = 1949

Martin et al. 2011

What causes tinnitus?

Mechanisms of Tinnitus

- **INDUCTION** of tinnitus usually involves peripheral pathologies that result in imbalances of activity in the CNS. Abnormal spontaneous neural activity produces tinnitus perception.
- **MAINTENANCE** of tinnitus involves central auditory structures that are not necessarily impaired.

Peripheral triggers

- Cochlear damage
- Head & neck injury
- TMJ
- Other?

Central triggers

- Metabolic
- Neurologic disease
- Stress
- Brain injury
- Other?

Long term effects

- Deafferentation
- Cytotoxicity
- Excitatory/inhibitor imbalance
- Cortical reorganization
- Thalamocortical dysrhythmias
- Other?

In what ways does tinnitus
impact a patient's life?

Difficult to concentrate	85 %
Difficult to relax	85 %
Irritable or nervous	83 %
Uncomfortable in quiet	83 %
Tired or stressed	81 %
Interfere with social activities	74 %
Hard to interact pleasantly	73 %
Problems with sleep	73 %
Cause you to feel depressed	70 %
Interfere with work activities	66 %

OHSU Tinnitus Clinic - Martin et al., 2002

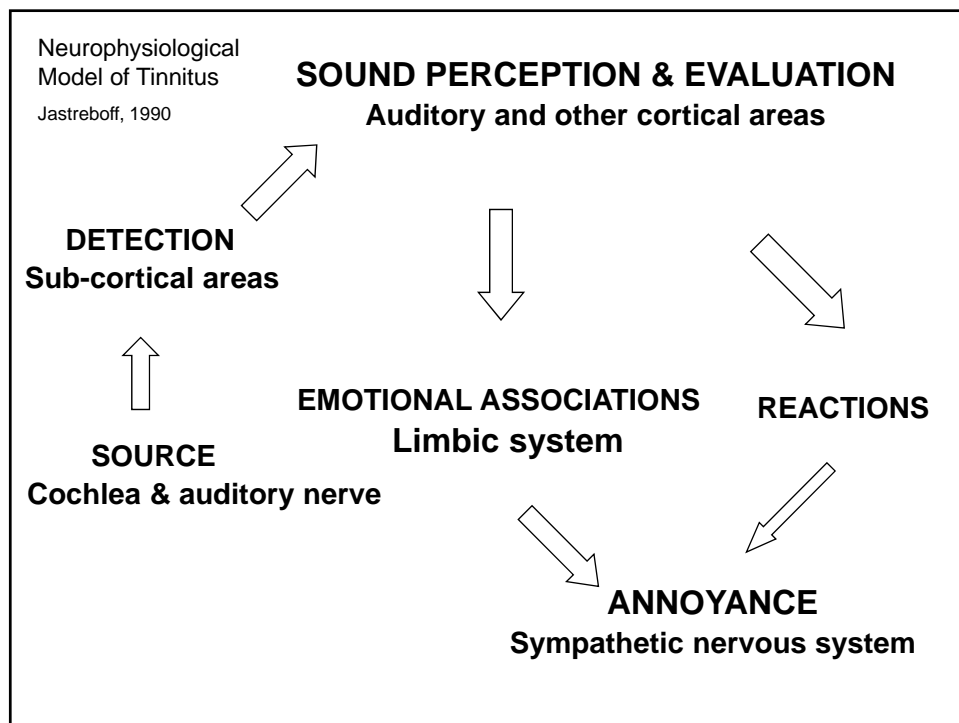
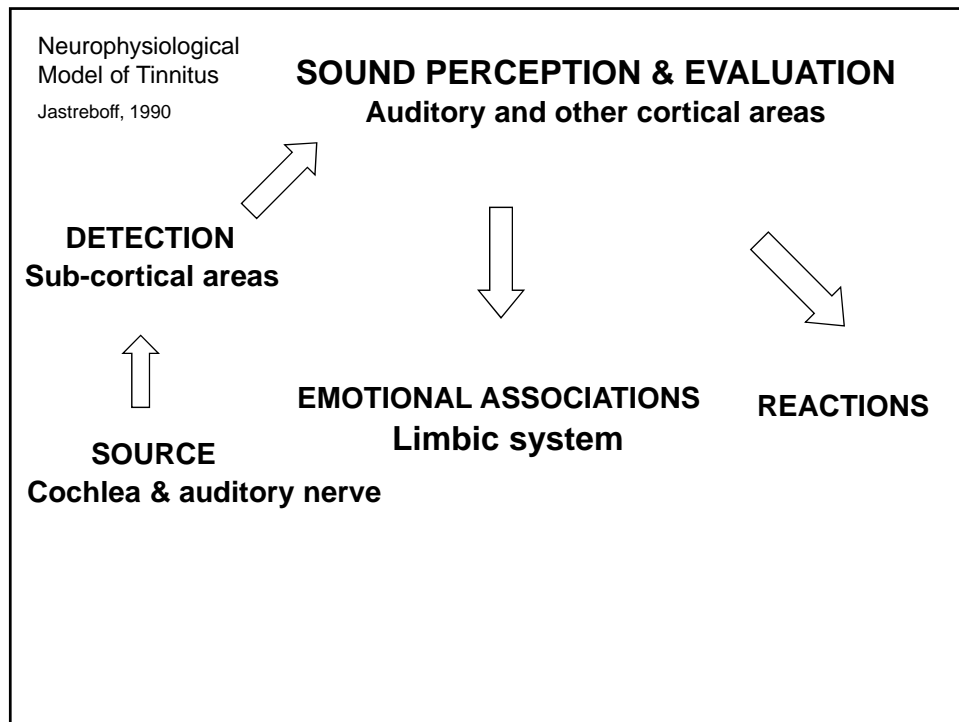
Why does tinnitus become a problem?

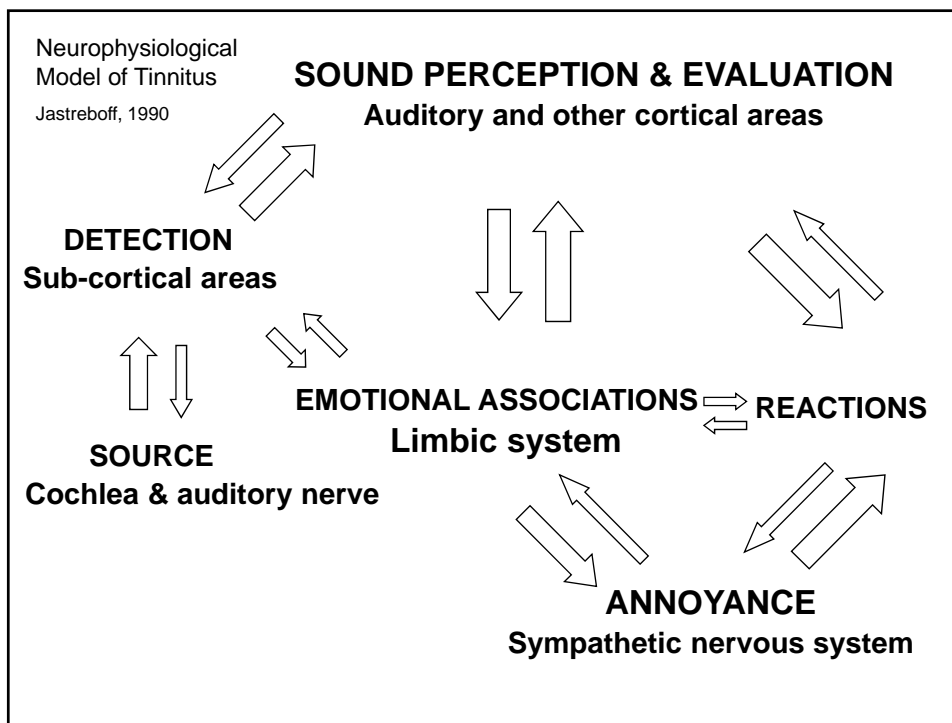
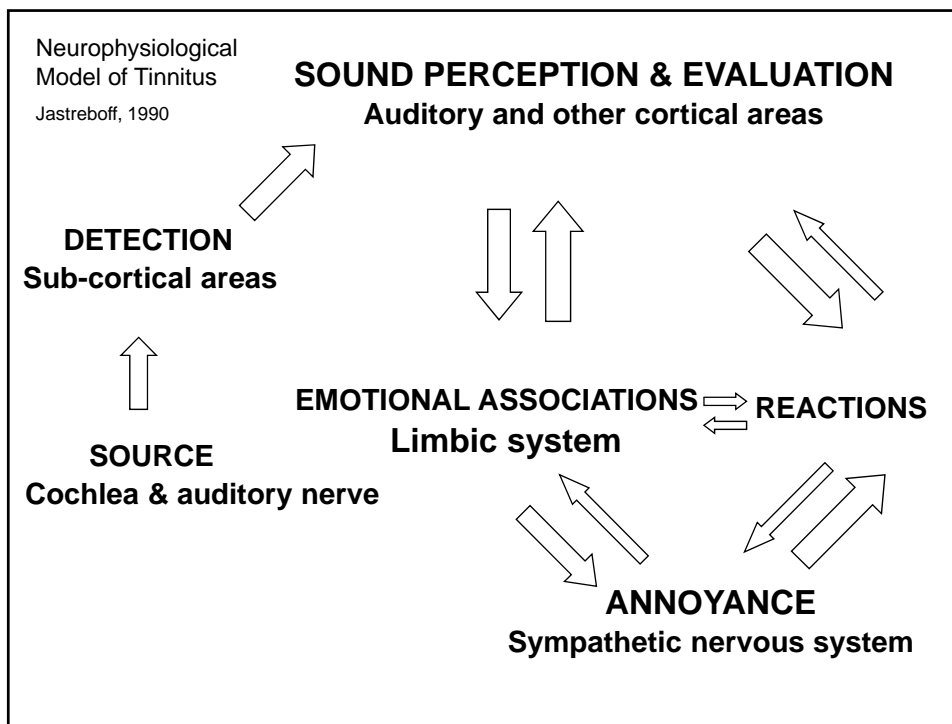
Neurophysiological
Model of Tinnitus
Jastreboff, 1990

SOUND PERCEPTION & EVALUATION
Auditory and other cortical areas

DETECTION
Sub-cortical areas

SOURCE
Cochlea & auditory nerve





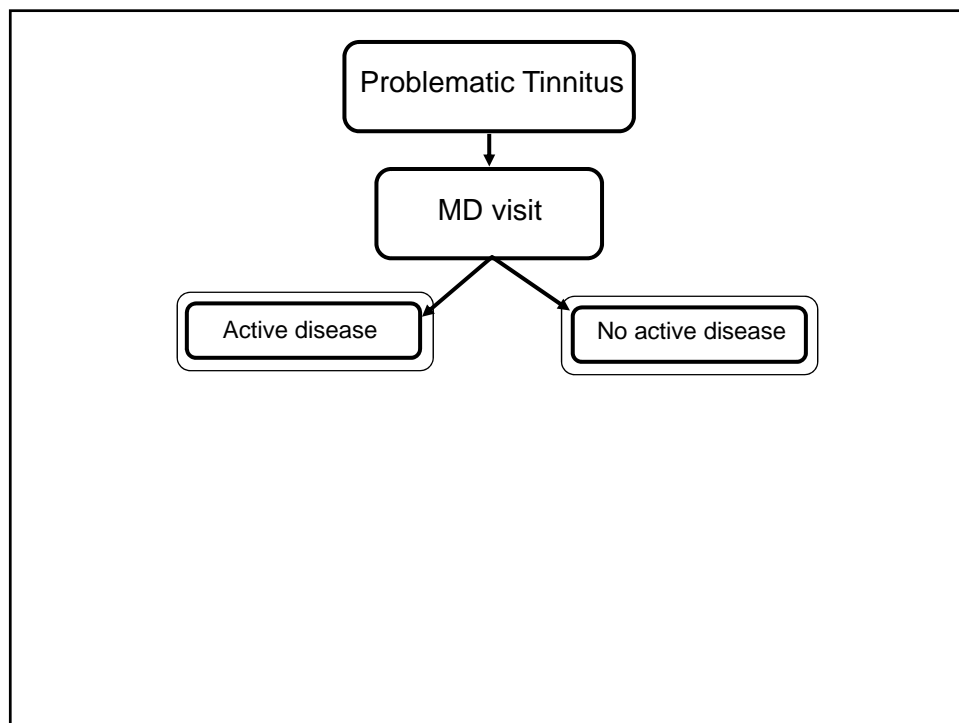
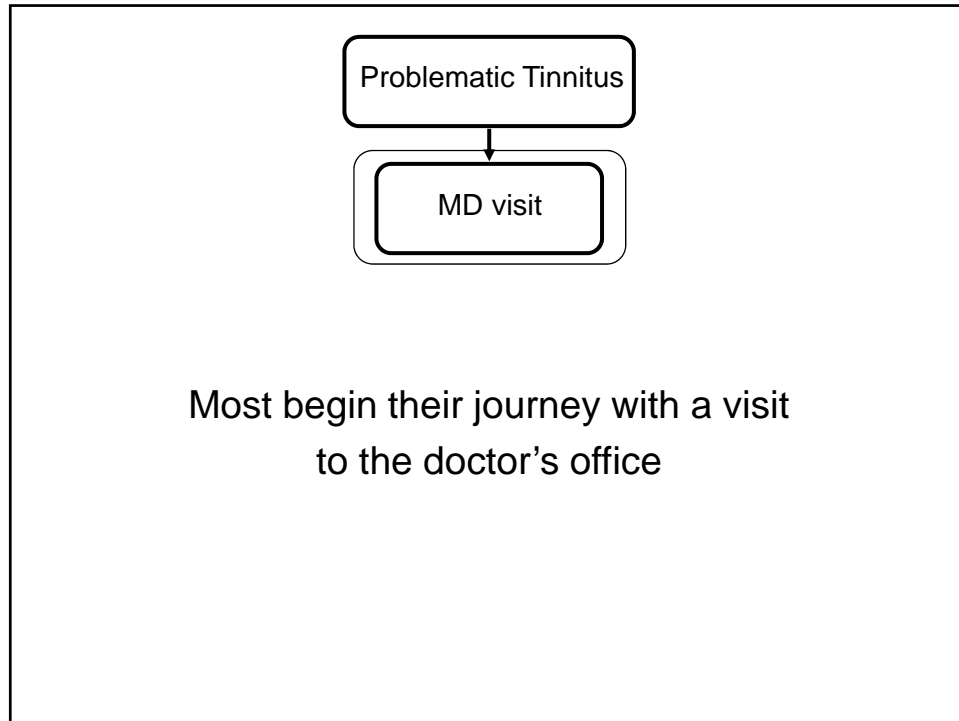
Problematic Tinnitus

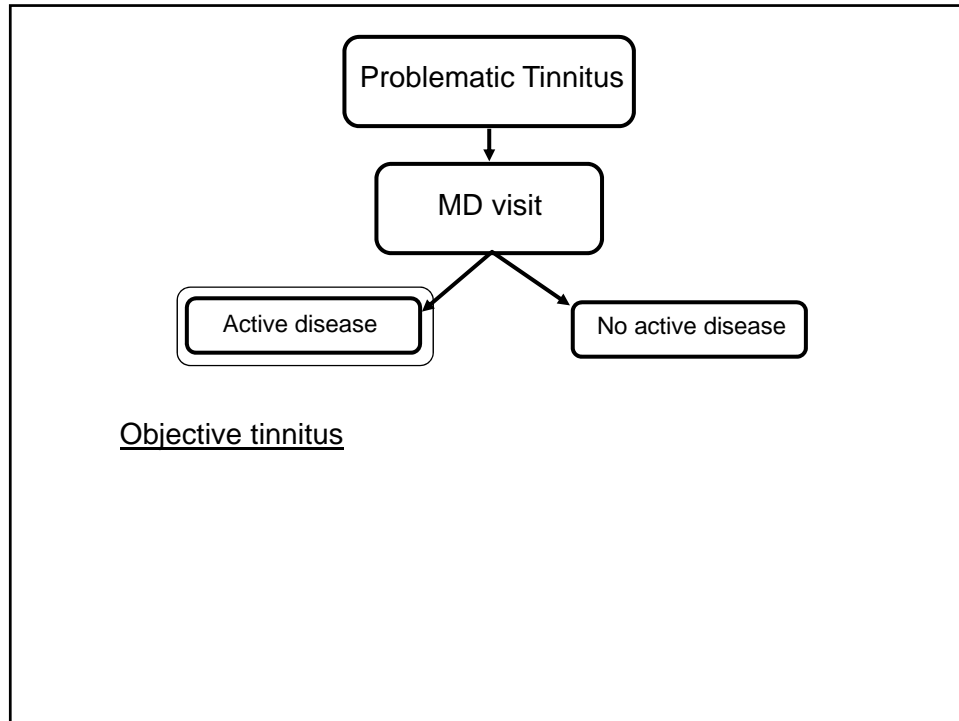
- Novelty
 - Fear
 - Selective attention
 - Reinforcement
 - Negative counseling
- “There’s nothing that can be done about it”
- “You may have a brain tumor”

Goal of Treatment Program

- To medically or surgically resolve active disease processes causing tinnitus
- To eliminate the presence of tinnitus

Whenever possible, active disease processes should be identified and treated prior to tinnitus management





Active disease

Objective tinnitus

Vascular abnormalities

- Congenital arteriovenous fistula
- Acquired arteriovenous shunt
- Glomus juglare
- High-riding carotid artery
- Carotid stenosis
- Persistent stapedial artery
- Dehiscent juglar bulb
- Vascular loop (e.g. AICA or PICA)

Active disease

Objective tinnitus

Mechanical disorders

- Patent Eustachian tube
- Palatal myoclonus
- Temporomandibular joint disorder
- Stapedial muscle spasticity

Problematic Tinnitus

MD visit

Active disease

No active disease

Subjective tinnitus

Active disease

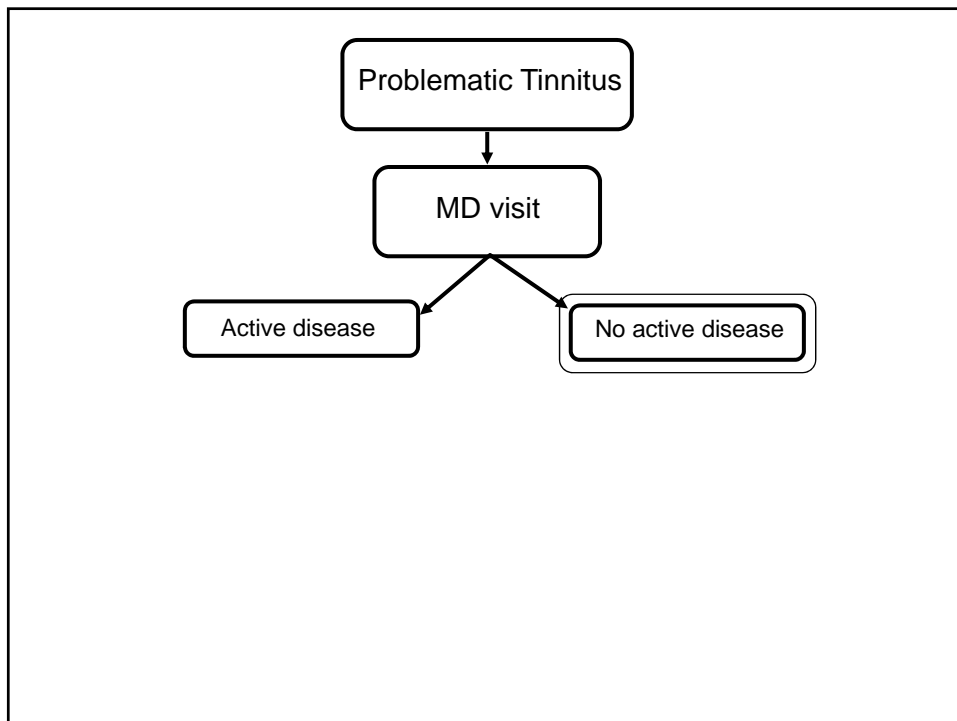
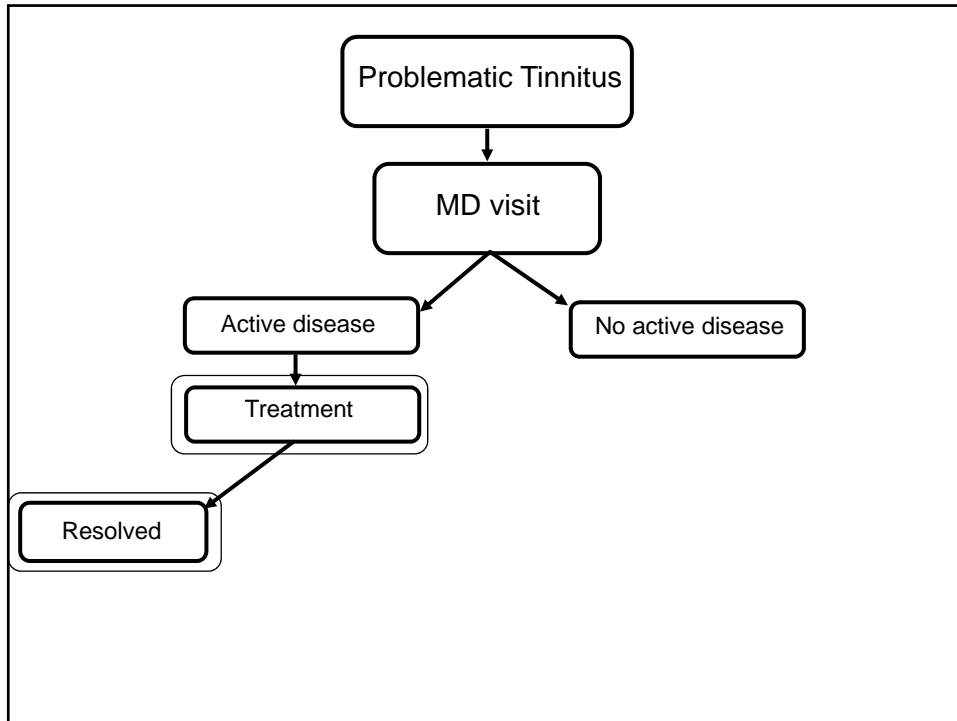
Subjective tinnitus

- Otosclerosis
- Infections – bacterial, viral, fungal
- Autoimmune hearing loss
- Endolymphatic hydrops / Meniere's
- Neoplasms
- Otitis media
- Benign intracranial hypertension

Active disease

Subjective tinnitus

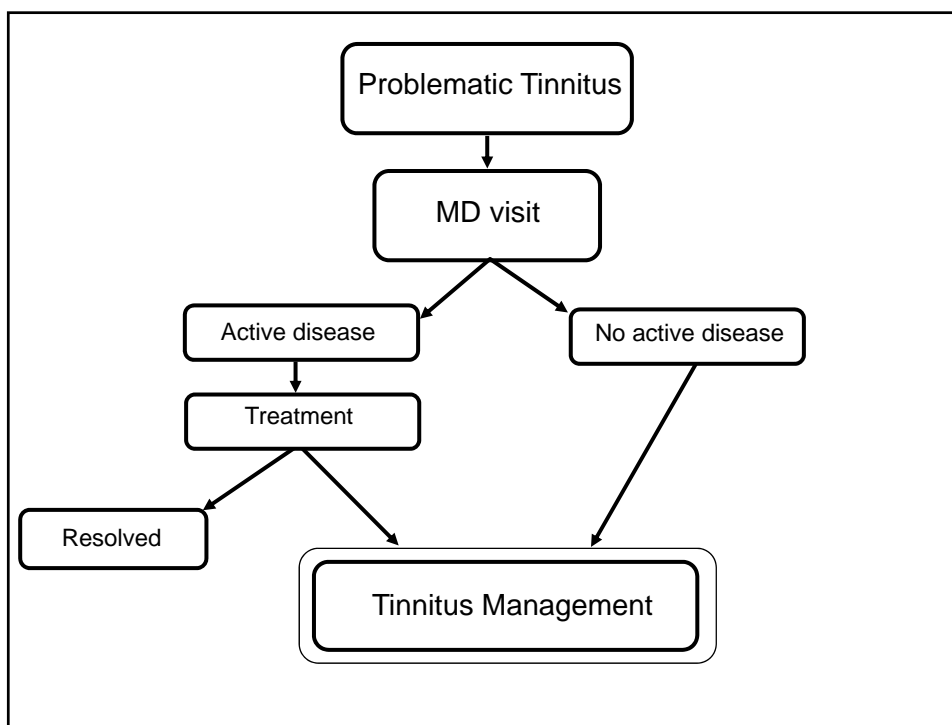
- Genetic predisposition
- Ototoxicity
- Vascular – hypertension, CVA, cerebral aneurysm, arteriosclerosis
- Metabolic – anemia, hypothyroidism, diabetes mellitus
- Head or neck injury



No active disease

Subjective tinnitus

- Presbycusis
- Noise induced hearing loss - chronic
- Noise induced hearing loss – acute
- Genetic predisposition
- Ototoxicity
- Otosclerosis
- Post-operative hearing loss
- Endolymphatic hydrops / Meniere's
- Idiopathic tinnitus



THE JOURNAL OF
**FAMILY
PRACTICE**

Tinnitus: Questions to reveal the cause, answers to
provide relief

RL Folmer, WH Martin, YB Shi

Journal of Family Practice 53(7): 532-540, 2004

“As with chronic pain, the treatment of
chronic tinnitus is more accurately described
in terms of management rather than cure.”

Duckro et al. *Biofeedback and Self-Regulation*
1984;9(4):459-469

Goal of Management Program

- Reduce **perception** of and **reaction** to tinnitus until it is no longer a controlling factor in the person's life
- Provide long-term relief and control

Where do I start?

Exploring new realms

- Captain
- Ship
- Map
- Sextant
- Supplies
- Crew
- Funding

Exploring new realms: The Captain The Tinnitus Specialist

Tinnitus Specialist

The role of the tinnitus specialist often exceeds the realm of traditional audiology in order to produce effective tinnitus management

Tinnitus Specialist

- **Identify** - all factors that impact tinnitus severity
- **Educate** – the patient regarding the impact on tinnitus
- **Persuade** – the patient to pursue parallel interventions
- **Facilitate** – assist patient in identifying needed care
- **Coordinate** – serve as intermediary between clinicians
- **Follow** – monitor progress, assist with obstacles
- **Modify** – management plan as needed

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The Ship – Setting up your tinnitus clinic

Exploring new realms: The Ship

Facility:

Test booth

Room for counseling and education

Medical exam room (later)

Equipment:

Audiometric test equipment

Hearing aid fitting and testing equipment

Specialized tinnitus matching system (later)

The Map – Choosing a course of tinnitus management

Exploring new realms: The Map

Progressive Tinnitus Management
Clinical Handbook for Audiologists

James A. Henry

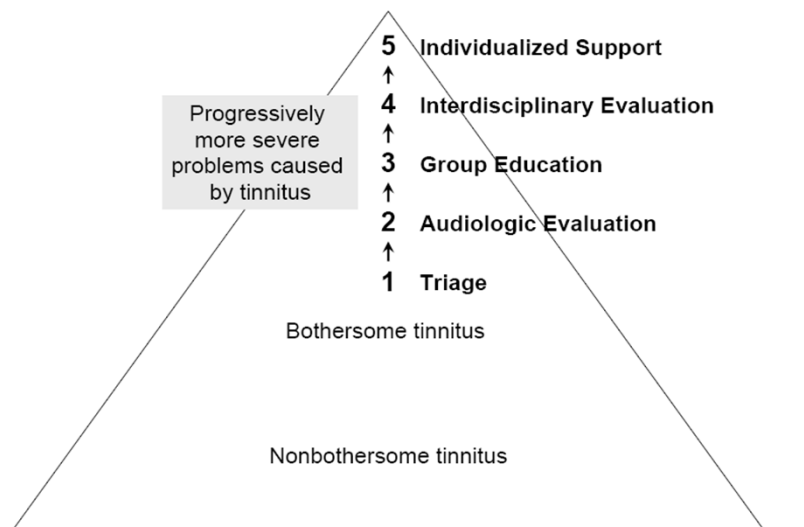
Tara L. Zaugg

Paula J. Myers

Caroline J. Kendall

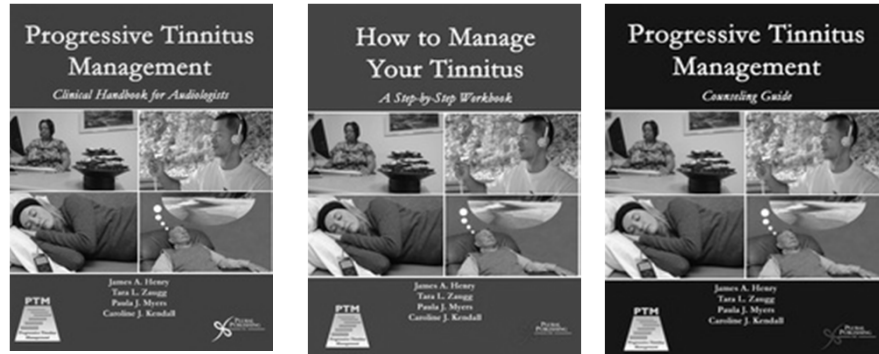


VA National Center for Rehabilitative Auditory Research



Five hierarchical levels of tinnitus management

Google: Progressive Tinnitus Management



The Sextant –
How do I know the patient is on course?

Exploring new realms: The Sextant

Questionnaires

The Questionnaires

- Tinnitus, hearing and medical histories
- Modified Beck Depression Inventory
- Anxiety index
- Tinnitus severity index

Depression inventory

Beck, A T. Beck, R W.

Screening depressed patients in family practice. A rapid technique
Postgraduate Medicine. 52(6):81-5, 1972 Dec..

Anxiety inventory

State-Trait Anxiety Inventory for Adults

Self-Evaluation Questionnaire
STAI Form Y-1 and Form Y-2

Developed by Charles D. Spielberger
in collaboration with R.L. Gorsuch, R. Lushene, P.R. Vagg, and G.A. Jacobs

Name:

Google:

Tinnitus Functional Index

TFI OHSU

Tinnitus Handicap Index

THI tinnitus

Tinnitus Handicap Questionnaire

THQ Iowa

Tinnitus Reaction Questionnaire

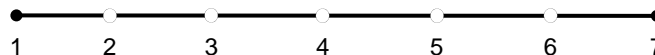
TRQ tinnitus

Rated severity indicators

Visual analogue scales



Visual numerical scales



Exploring new realms: Supplies
Gathering tinnitus management tools

Acoustical therapy: Devices

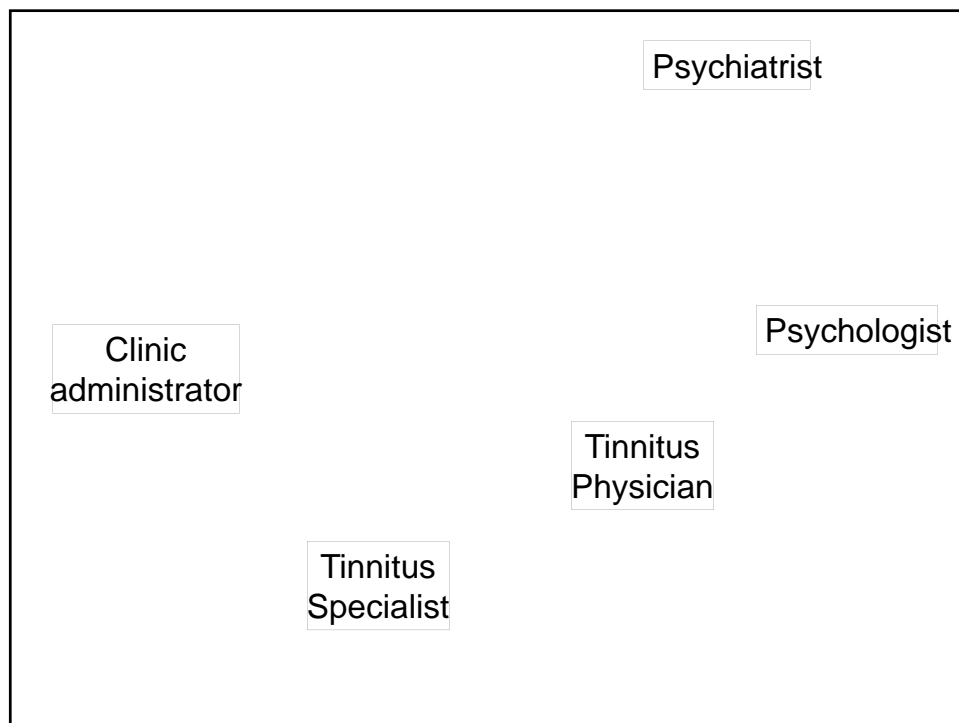
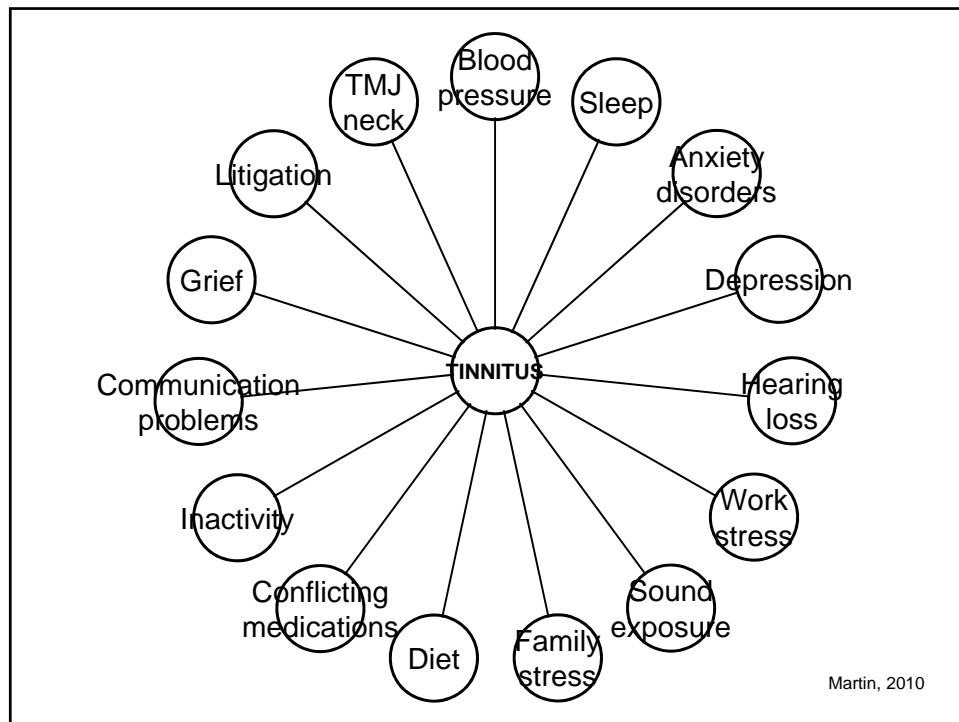
- Amplification (hearing aids)
- Ear-level sound generators
- Combination units
- Bluetooth streamers
- Table-top sound generators
- Sound pillows

Acoustical therapy: Phone apps



Best Relaxation & Meditation Apps

Exploring new realms: The Crew
Assembling your tinnitus team



Exploring new realms: Funding
How do you get paid for your work?

Exploring new realms: Funding

- Insurance coverage?
- Devices?
- Fee for service?
 - By procedure
 - Bundled services
 - Hourly

Help! Rescue us!