



## Tinnitus Evaluation Outside the Tinnitus Specialty Clinic: Using the Astera<sup>2</sup> Tinnitus Module

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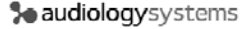
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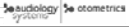
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### Today's Focus

- Tinnitus Evaluation Components
- The Madsen Astera<sup>2</sup> Audiometer
  - Overview
  - Tinnitus Module
    - Questionnaires
    - Pitch Matching
    - Loudness Matching
    - Maskability
    - Residual Inhibition
  - Loudness Scaling Module

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### Tinnitus Evaluation – Why?

- Allows us to quantify the characteristics of a patient's tinnitus
- Allows us to (at least partially) evaluate how they experience and perceive their tinnitus
- Helps us identify patients who need mental health or other forms of support
- Sets a baseline for future improvements or fluctuation
- Acknowledges the 'realness' of a distressing issue that is often unacknowledged by others, including other hearing care professionals
- \*\*Begins the dialogue necessary for treatment\*\***

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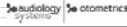


### Tinnitus Evaluation – Why Not?

- Time
- Complexity
- Unfamiliarity

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## Madsen Astera<sup>2</sup> – Tinnitus Module



- Launched in 2013, integrated module provides the tools necessary to add Tinnitus Evaluation to clinical test procedures
- Loudness/Pitch Matching; Maskability; and Residual Inhibition
- Questionnaires
- Dedicated Tinnitus Report
- Available for existing Astera users as no-charge software upgrade
- Allows Tinnitus Evaluation to be implemented efficiently

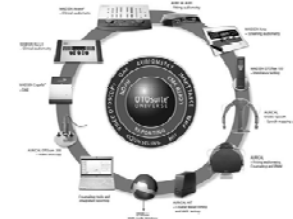
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## Tinnitus Evaluation Components

- Audiologic Evaluation
  - Standard Audiometric Evaluation
  - Loudness Discomfort Levels
  - High Frequency Audiometry
  - Otoacoustic Emissions
- Tinnitus Surveys/Questionnaires
- Psychoacoustic Tinnitus Evaluation
- Loudness Scaling

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## OTOSuite Overview



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### OTOSuite Overview

- OTOSuite connects and synchronizes results across devices under Noah
- Improves workflow by reducing data entry and allowing for customization via User Tests
- Ensures that hardware investments stay relevant by relying on software updates (i.e. Tinnitus Evaluation; QuickSIN; LipRead) rather than replacement purchases
- Electronic data storage increases level of data security (via Noah or OTObase EMR software)



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### Audiometric Evaluation


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### Madsen Astera<sup>2</sup> - Overview

- PC-based 2-channel clinical audiometer
  - Can be driven from keyboard, mouse, ACP, or even touchscreen
  - Integrates with OTOSuite and Noah
  - Combined audiometry & immittance reporting; shared info with other modules
- Full range of testing capabilities including:
  - Integrated speech files
  - High frequency testing (125-20000 Hz)
  - Tinnitus module
  - Loudness Scaling module
  - Pediatric module with integrated VRA



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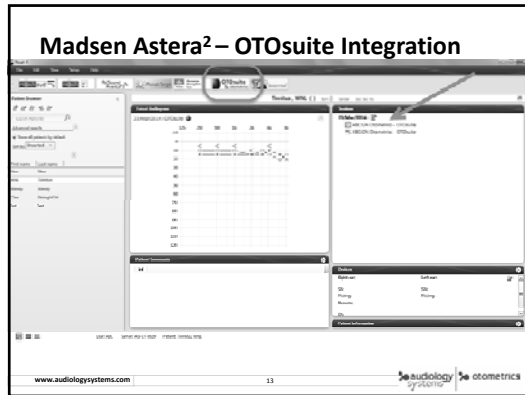
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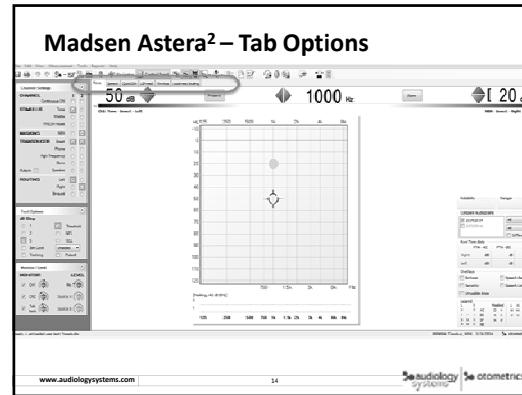
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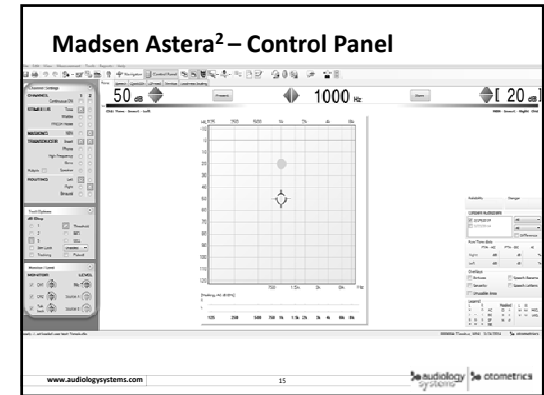
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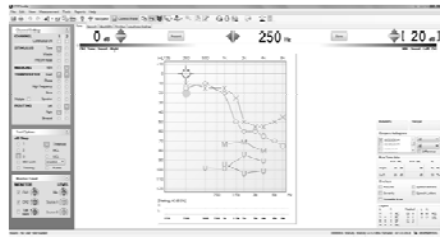
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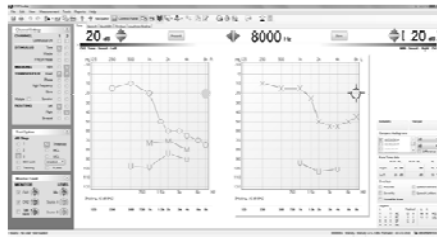
### Madsen Astera<sup>2</sup> – Audiometric Data



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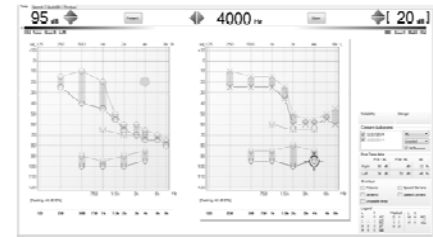
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## High Frequency Audiometry

- Evaluates thresholds above 8000Hz for greater sensitivity of cochlear damage. May provide additional useful information when thresholds through 8000Hz are WNL.
- Due to output limitations, may want to test only through 16,000Hz.
- Occasionally may need to use these frequencies for pitch matching.

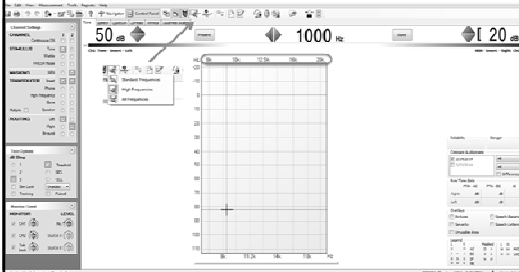
Fabigunda A. et al (2012). The relationship between distortion product otoacoustic emissions and extended high-frequency audiometry in tinnitus patients. Part 1: Normally hearing patients with unilateral tinnitus. Med Sci Monit. 18(12): CR765-770. <http://www.medicinesciences.com/abstract/doi/10.12659/MSM.1180100>

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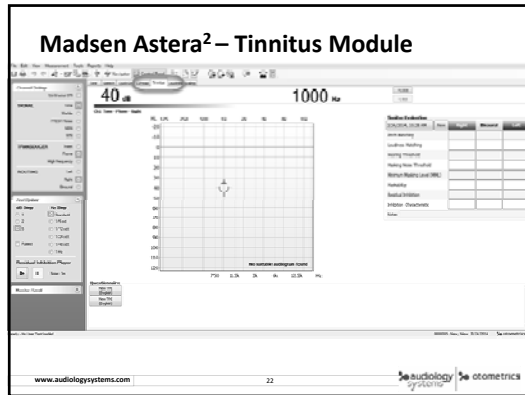


## Tinnitus Evaluation

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## Surveys/Questionnaires

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- ### Madsen Astera<sup>2</sup> Surveys/Questionnaires
- Often used to assess the impact of tinnitus as well as monitor progress or changes over time
  - Can also provide guidance on what the next step(s) should be
    - For evaluation
    - For treatment options
    - For referrals to other professionals
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## Madsen Astera<sup>2</sup> Surveys/Questionnaires

- **Tinnitus Handicap Inventory (THI)** : commonly used 25-question inventory to assess self-reported handicap
- **Tinnitus Functional Index (TFI)** : 25 questions covering 8 subscales (including sleep disturbance, relaxation, quality of life)
- **Tinnitus and Hearing Survey (THS)**: 10 questions covering tinnitus, hearing, and loudness tolerance

## Madsen Astera<sup>2</sup> Surveys/Questionnaires

- **Tinnitus Handicap Inventory (THI)** : commonly used 25-question inventory to assess self-reported handicap
  - Score is categorized into level, from Slight/None to Severe Handicap
  - Based on this score, can also 'grade' patient to determine next step
    - Grade 1-2: amplification if hearing loss present; monitoring if no loss
    - Grade 3: tinnitus evaluation and/or treatment program
    - Grade 4-5: full medical/psychological evaluation

McCombe A, Baguley D, Coles R, McKenna L, McKinney C, & Windle-Taylor P. (2001). Guidelines for the grading of tinnitus severity: the results of a working group commissioned by the British Association of Otolaryngologists, Head and Neck Surgeons. 999. Clin. Otolaryngol 26, 388-393

Newman, C.W., Jacobson, G.P., & Spitzer, J.B. (1996). Development of the Tinnitus Handicap Inventory. *Archives of Otolaryngology*, 122, 143-148

ReSound THI Flowchart <http://www.resound.com/-/media/DownloadLibrary/ReSound/Products/Verso/2015/Print/PrintBack/THIFlowchart.pdf>

## Madsen Astera<sup>2</sup> Surveys/Questionnaires

[illegible]

Newman, C.W., Jacobson, G.P., & Spitzer, J.B. (1996). Development of the Tinnitus Handicap Inventory. *Archives of Otolaryngology*, 122, 143-148.

### Madsen Astera<sup>2</sup> Surveys/Questionnaires

ReSound TFI Flowchart <http://www.research.com/~media/DownloadLibrary/ReSound/Products/Versu/2015/ExtMapPack/TFIFlowchart.pdf>

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### Madsen Astera<sup>2</sup> Surveys/Questionnaires

- Tinnitus Functional Index (TFI) : 25 questions covering 8 subscales (including sleep disturbance, relaxation, quality of life)
- Designed for scaling both the severity as well as the negative impacts of tinnitus
- Used for intake and monitoring over time, appropriate for clinical and research applications

<http://www.phsu.edu/ed/health/services/ent/tinnitus-clinic/tinnitus-functional-index.cfm>

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### Madsen Astera<sup>2</sup> Surveys/Questionnaires


<http://www.phsu.edu/ed/health/services/ent/tinnitus-clinic/tinnitus-functional-index.cfm>

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### Madsen Astera<sup>2</sup> Surveys/Questionnaires

- Tinnitus and Hearing Survey (THS): 10 questions covering tinnitus, hearing, and loudness tolerance
- Allows for differentiation of issues between hearing and tinnitus, helpful for counseling when issues are co-existing
- Not validated as primary outcome measure but can serve as supplement to other measures (ex. THI)

<http://www.nrcr-research.va.gov/Education/Documents/TinnitusDocuments/THS.pdf>

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### Madsen Astera<sup>2</sup> Surveys/Questionnaires

#### Tinnitus and Hearing Survey

**A. Tinnitus**

Do you ever hear ringing, buzzing, or other sounds in your ears when no one else can hear them?	1	2	3	4	5
How often do you hear these sounds?	1	2	3	4	5
How much do these sounds bother you?	1	2	3	4	5
Do these sounds ever bother you a great deal?	1	2	3	4	5


**B. Hearing**

Do you ever have trouble hearing people when they are talking to you?	1	2	3	4	5
Do you ever have trouble hearing people when they are talking to you in a noisy place?	1	2	3	4	5
Do you ever have trouble hearing people when they are talking to you in a quiet place?	1	2	3	4	5
Do you ever have trouble hearing people when they are talking to you in a noisy place?	1	2	3	4	5

**C. Sound Tolerance**

Do you ever have trouble hearing people when they are talking to you in a noisy place?	1	2	3	4	5
Do you ever have trouble hearing people when they are talking to you in a noisy place?	1	2	3	4	5
Do you ever have trouble hearing people when they are talking to you in a noisy place?	1	2	3	4	5
Do you ever have trouble hearing people when they are talking to you in a noisy place?	1	2	3	4	5

<http://www.nrcr-research.va.gov/Education/Documents/TinnitusDocuments/THS.pdf>

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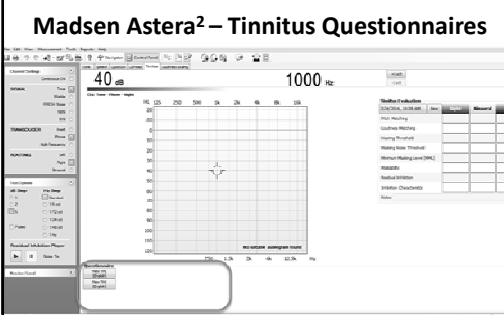
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### Madsen Astera<sup>2</sup> – Tinnitus Questionnaires



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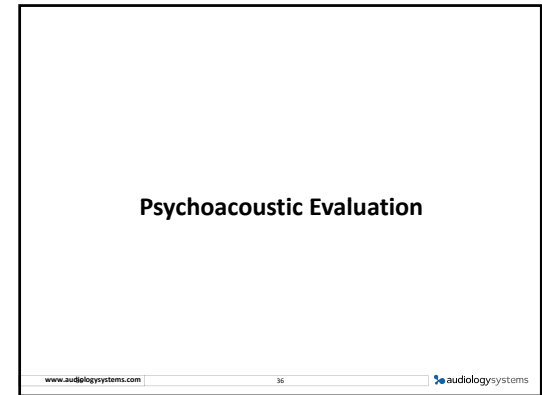
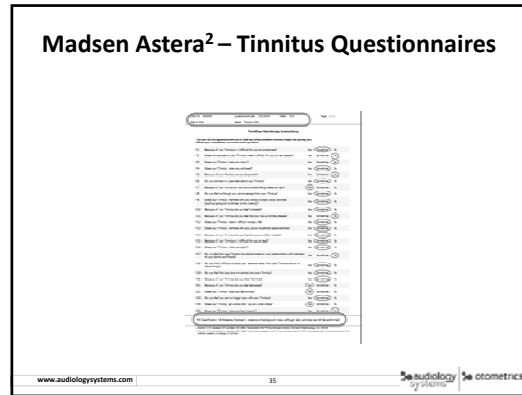
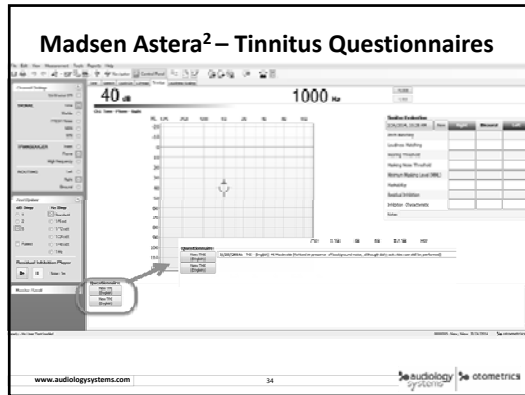
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### Pitch Matching

- Obtained by matching the pitch of the predominant tinnitus tone(s). Often found in 3000-4000Hz range.
- Results can be applied for certain sound therapies/treatments.
- Generally measured ipsilaterally using varying pairs of tones, but NBN or FRESH noise can provide an alternative.
- Can vary from session to session; can be confused with loudness; and sometimes a 'match' is made an octave below the actual match so using 'Octave Test' before recording the response is helpful.

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### Loudness Matching

- Obtained by finding the perceived volume of the patient's tinnitus. Often only a few dB above threshold.
- Results can be useful for counseling as it highlights the perceptual components of tinnitus (although patient's perception of the loudness they match may be more consistent with HL rather than SL value).
- Measured by presenting pitch match tone, using an ascending technique. 1-2dB increments are recommended, with multiple trials to obtain final match.

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### Minimum Masking Level

- Obtained by finding the minimum intensity level for narrowband and/or broadband noise needed to obtain masking of the tinnitus.
- Can provide information about whether masking may be a useful treatment option.
- Measured by presenting at pitch matched frequency, using an ascending technique. A plateau may be reached before 'full' masking is achieved.
- Caution should be used to not exceed comfort levels.

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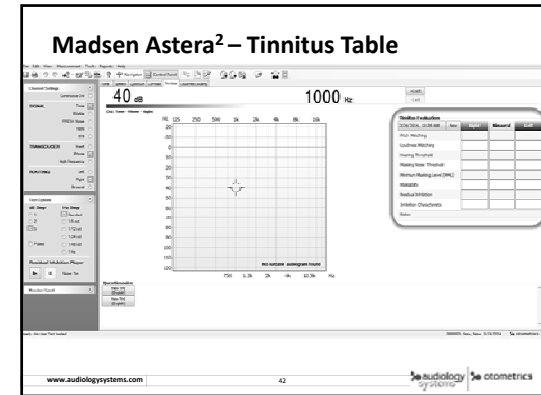
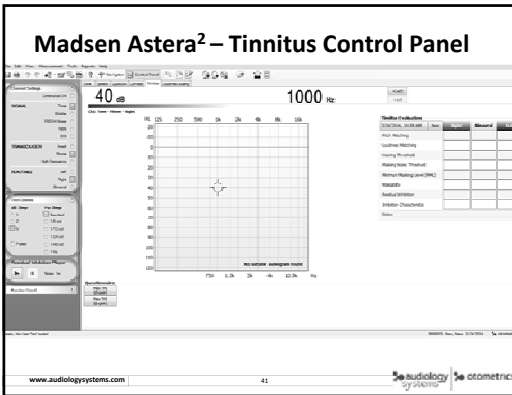
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## Residual Inhibition

- Measures change in perception (if any) following 60-second presentation of masking noise as well as the duration of the effect.
- Alerts clinician to patients with 'rebound' effect whose tinnitus may actually worsen following the application of masking noise.
- Measured by presenting BBN at MML level + 10dB for 60 seconds. Patient is asked to report on the effect on their tinnitus as well as when the tinnitus returns to previous levels.




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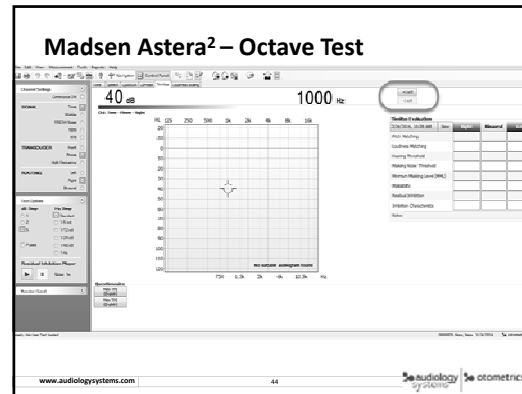
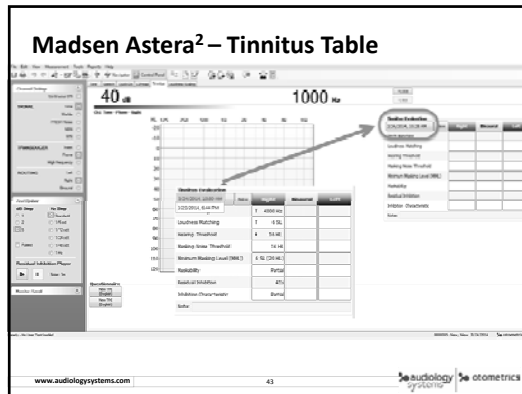
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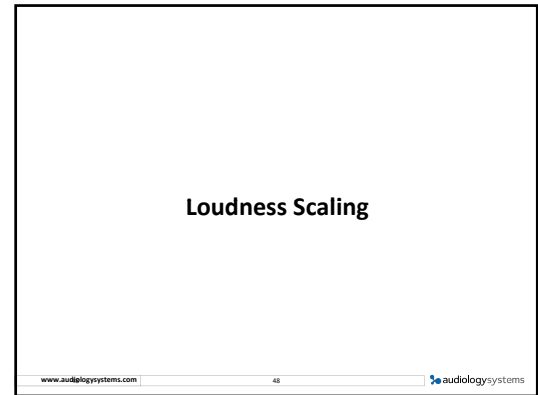
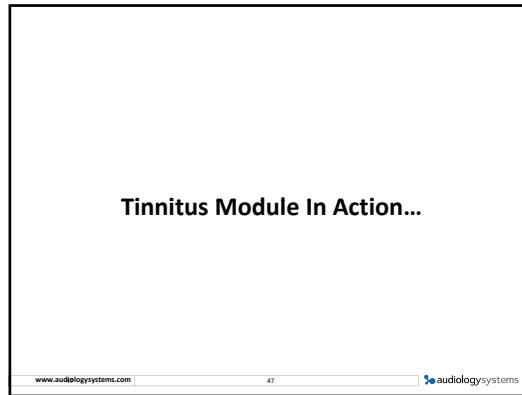
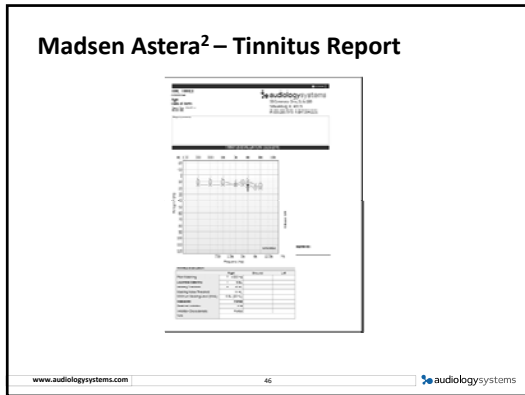
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## Madsen Astera<sup>2</sup> – Tinnitus Module

- Supports and documents the requirements for Tinnitus Evaluation – 92625
- Requires Pitch Matching, Loudness Matching, Maskability, and Residual Inhibition Measures
- <http://www.audiology.org/practice/coding/pages/tinnitus.aspx>



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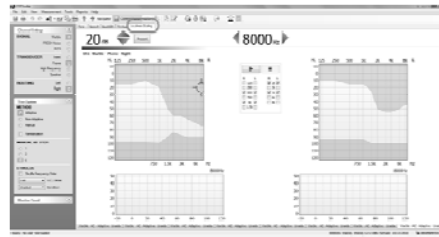


### Loudness Scaling

- Provides another method to evaluate auditory sensitivity for patients with tinnitus and/or hyperacusis, beyond simply LDL measurements
- Allows for comparison to 'normal' growth curve patterns
- Secondary to hearing aid use and tinnitus treatments, expansion in dynamic range has been demonstrated for both hyperacusic and non-hyperacusic (recruiting) patients with hearing loss

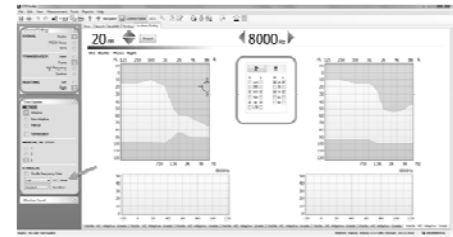
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### Madsen Astera<sup>2</sup> – Loudness Scaling



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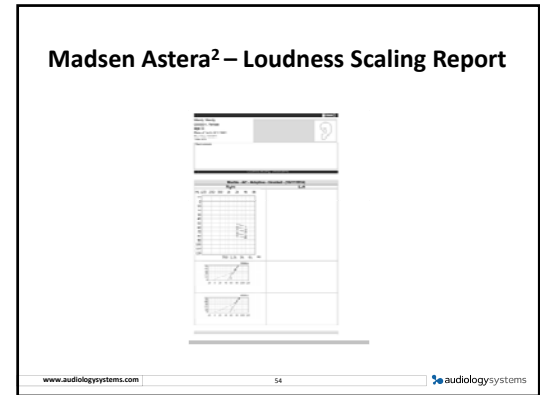
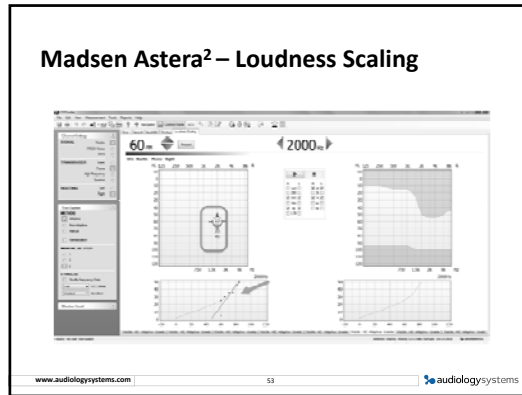
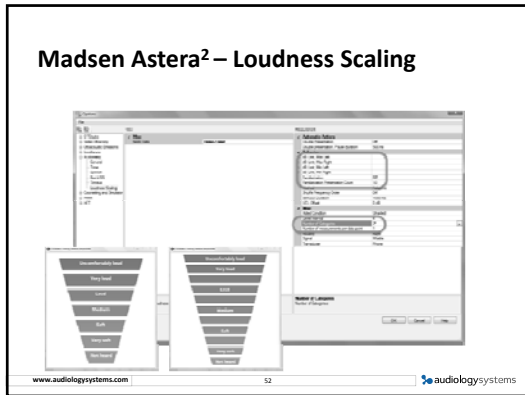
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**Loudness Scaling In Action...**

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**Thank you!**

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