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Integrating ACT™ into clinical practice

Ashley Hughes, AuD, Field Trainer, e3 Diagnostics
Virginia Ramachandran, AuD, PhD, Vice-President, Audiology, Oticon, Inc.

oticon
life-changing technology

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vira@Oticon.com



Speaker Disclosure

Relevant financial relationships:

- Employee of Oticon, Inc. and receives a salary
- Author & Associate Editor, Plural Publishing, Inc.

Non-financial relationships:

- Past-president American Academy of Audiology

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Speaker Disclosure

Relevant financial relationships:

- Employee of e3 Diagnostics and receives a salary

Learner Outcomes

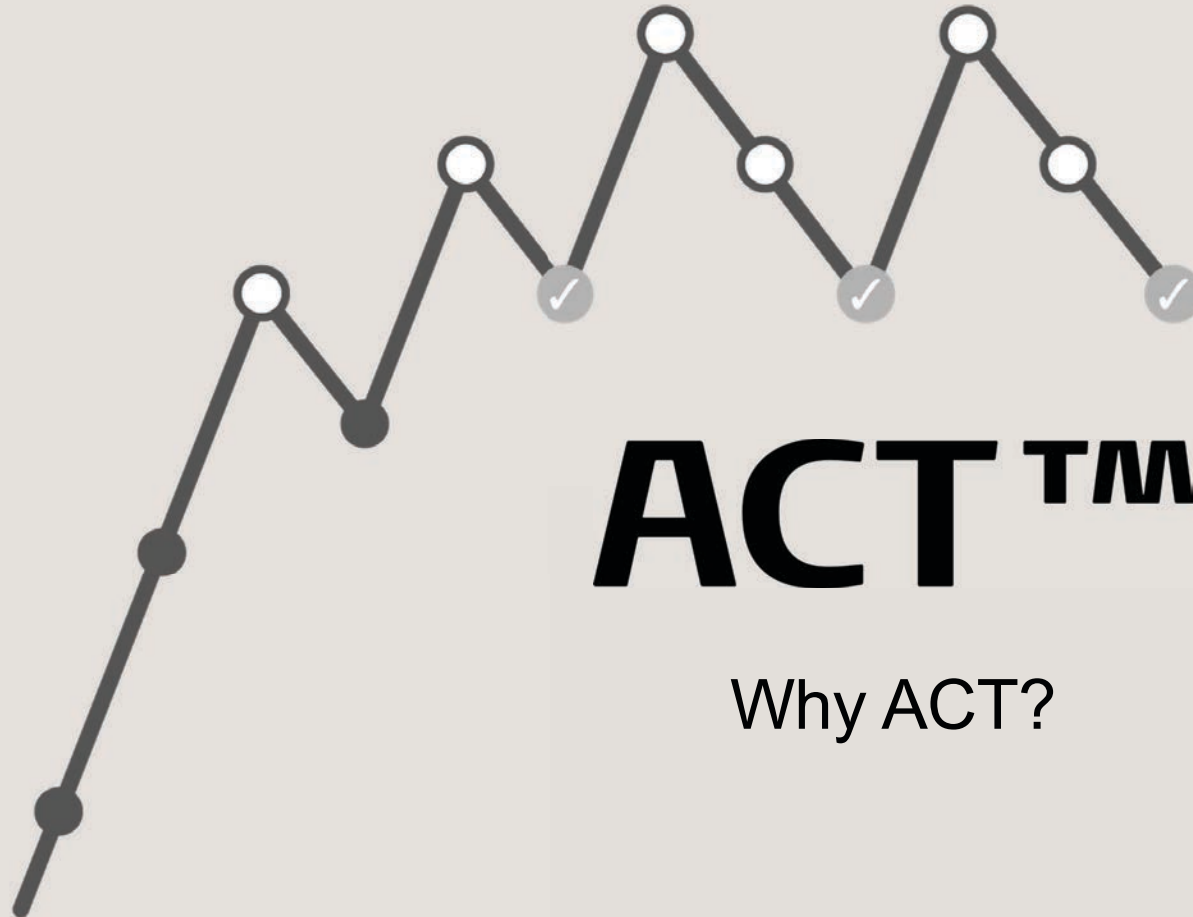
1. After this course, participants will be able to discuss the benefits of adding ACT to their test battery for individual patients.
2. After this course, participants will be able to describe the results of the recent ACT usability studies related to clinical feasibility and patient benefits.
3. After this course, participants will be able to explain how the ACT score can be implemented seamlessly into Oticon hearing aid fittings to personalize noise reduction settings for patients.

Risks / benefits

- The applicability and accuracy of the course content may vary by the clinical, geographical, and cultural context; you should evaluate the course accordingly.
- As healthcare is rapidly evolving, new findings may change the validity of the information presented in this course. Providers should always consult the latest research and guidelines from professional associations.
- The interventions discussed in this course may be limited in generalizability, requiring practitioners to consider specific individual and population factors.
- The course may not cover all possible risk factors, diagnostic methods, or treatment options, and complex cases may require additional considerations.
- Healthcare providers should apply cultural competence and sensitivity to ensure effective and respectful care based on their patients' diverse needs.
- Providers should always evaluate the limitations of diagnostic and screening tools, considering their potential for false results as well as any ethical implications.
- It is the responsibility of course participants to critically evaluate the evidence from multiple sources to guide professional practice.

Agenda

- ACT as a diagnostic tool
- A diagnostic clinical feasibility study
- ACT as a treatment tool
- A treatment clinical usage study



ACT™

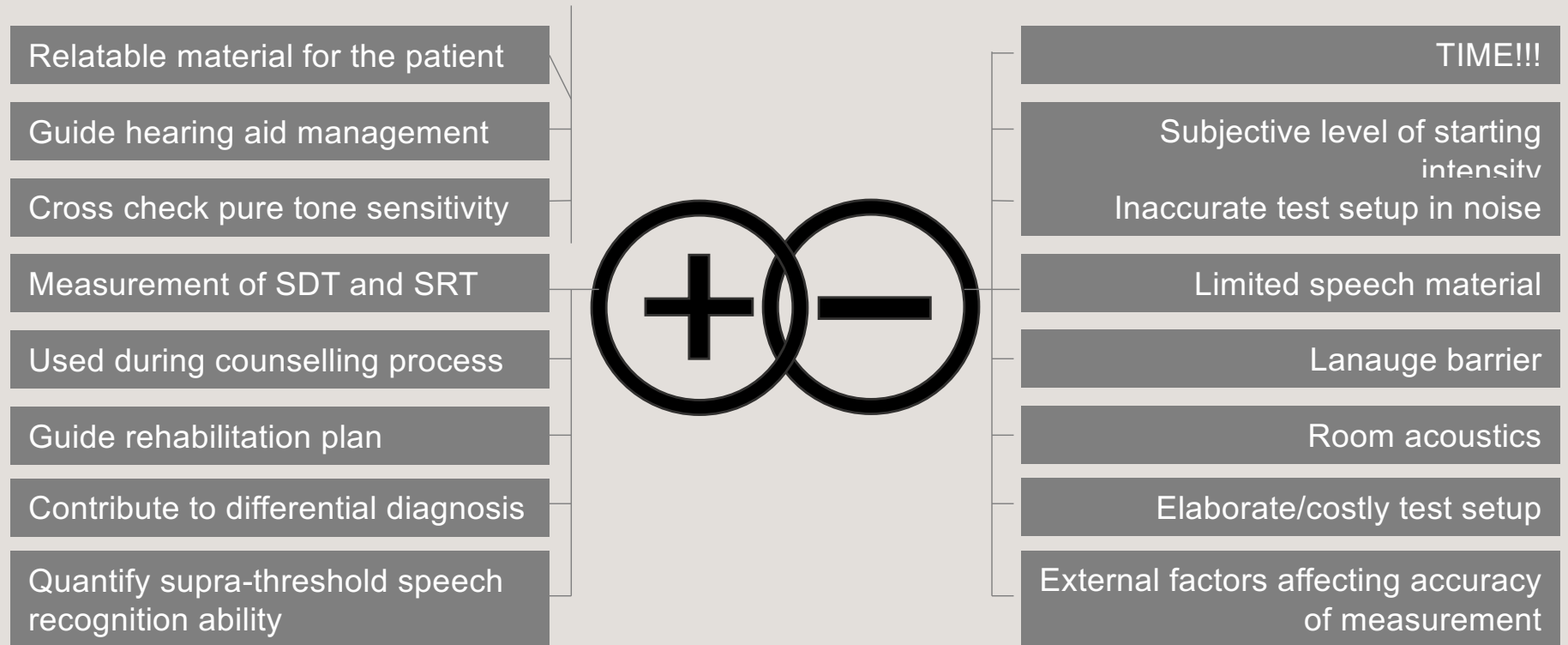
Why ACT?

What information do we not get from audiometry?

How the person will
perform in the **real world**



Speech Audiometry - Benefits and Limitations





ACT™

Research to diagnostic implementation

Who has been involved?



CAAR, Hearing Aids, Demant



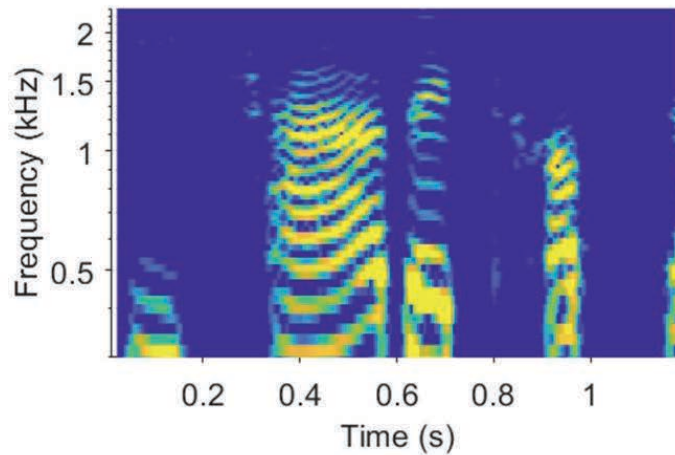
Spectro-Temporal Modulation (STM)

- Refers to the variations in both the spectral (frequency) and temporal (time) domains of a sound signal. It is a key concept in understanding how the auditory system processes complex sounds, such as speech and music
- **Spectral Modulation:** Changes in the frequency content of a stimulus over time. This can include variations in pitch or the presence of different harmonics.
- **Temporal Modulation:** Changes in the amplitude or intensity of a stimulus over time. This includes rhythms, beats, and other time-based patterns.

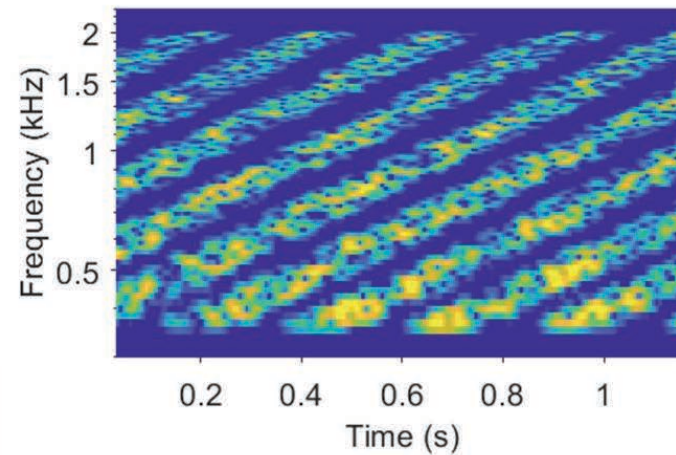
Where did it all begin?

ACT is a test of spectro-temporal modulation (STM) ability

Speech
spectrogram



Early ACT stimulus
spectrogram





ACT™

How to perform ACT



Required equipment

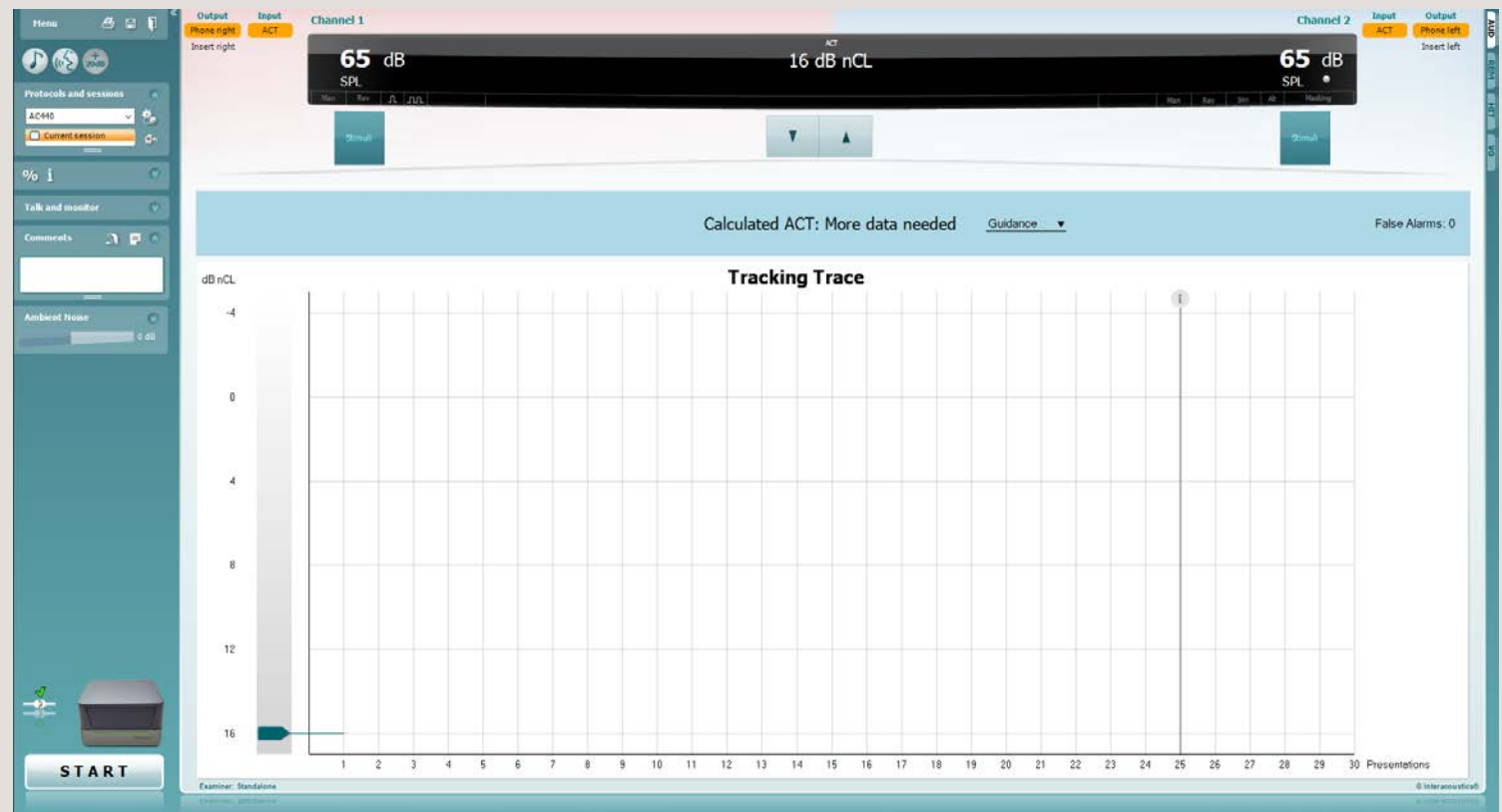
- Compatible audiometer, transducers, patient response button
- Compatible equipment:
 - GSI AudioStar Pro (firmware version 2)
 - GSI Pello (firmware version 2)
 - Interacoustics Affinity Compact (software version 2.20 and onwards)
 - Interacoustics Equinox Evo
 - MedRx: AVANT ARC, AVANT A2D+, AWRC, and AVANT (Stealth)

Santurette, S. & Laugesen, S. (2023)

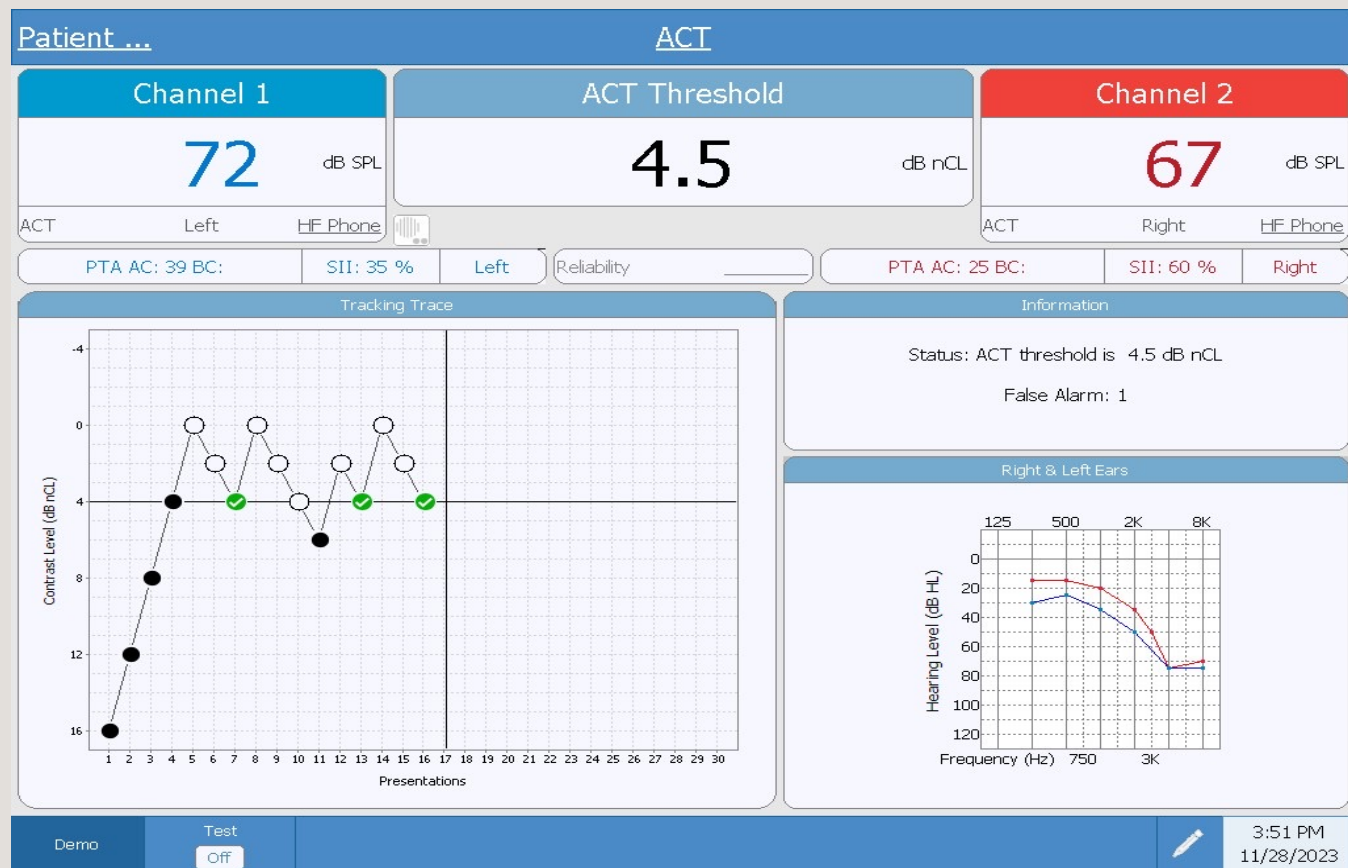
Performing ACT



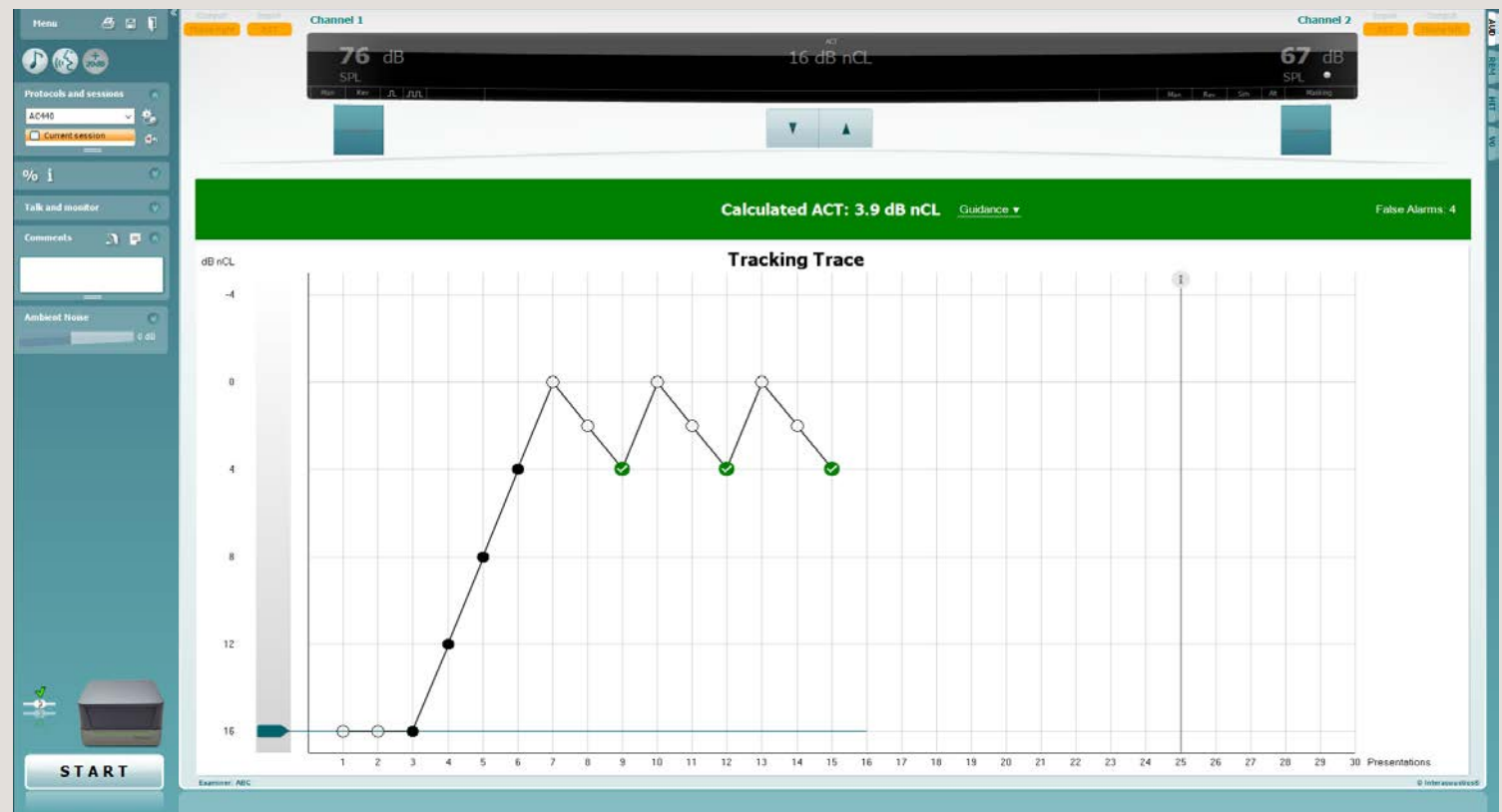
Performing ACT



Establishing Threshold

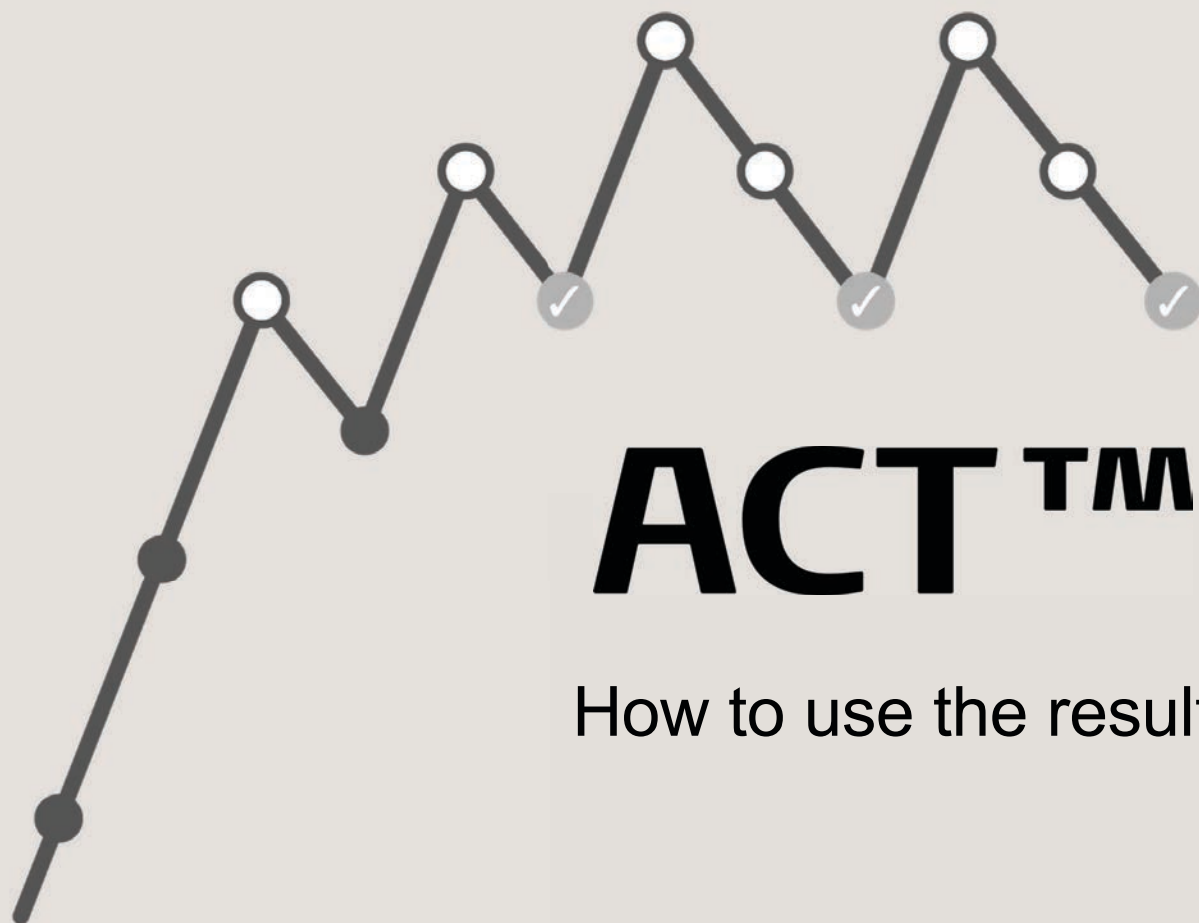


Establishing Threshold



Psychometric Function Fit





ACT™

How to use the result

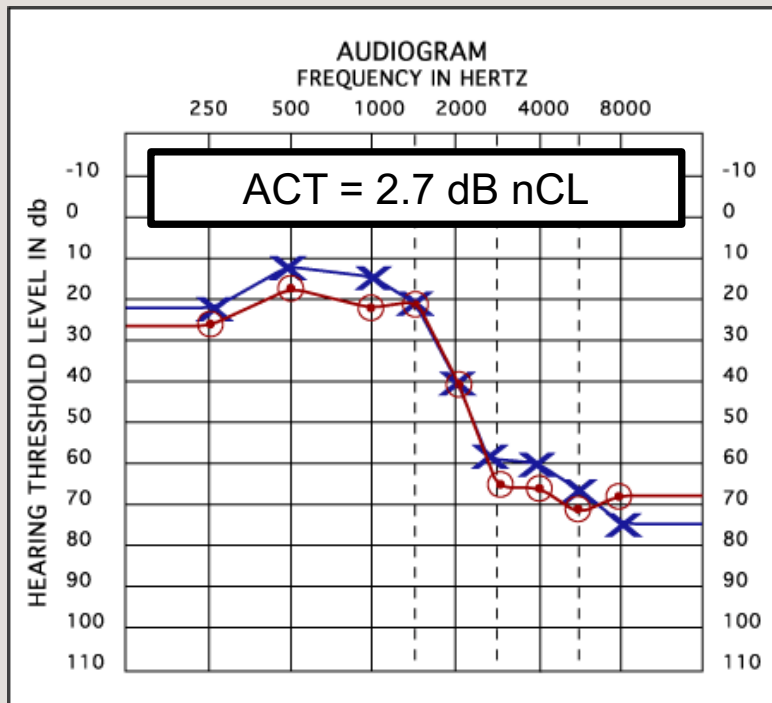
ACT Value Guide – Hearing Aid Fitting



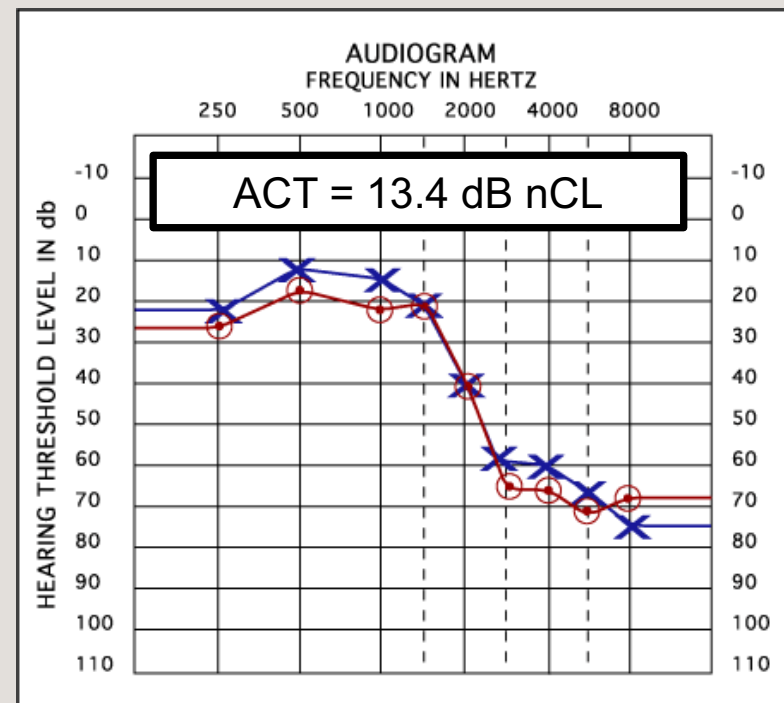
Help from the hearing aids in noise



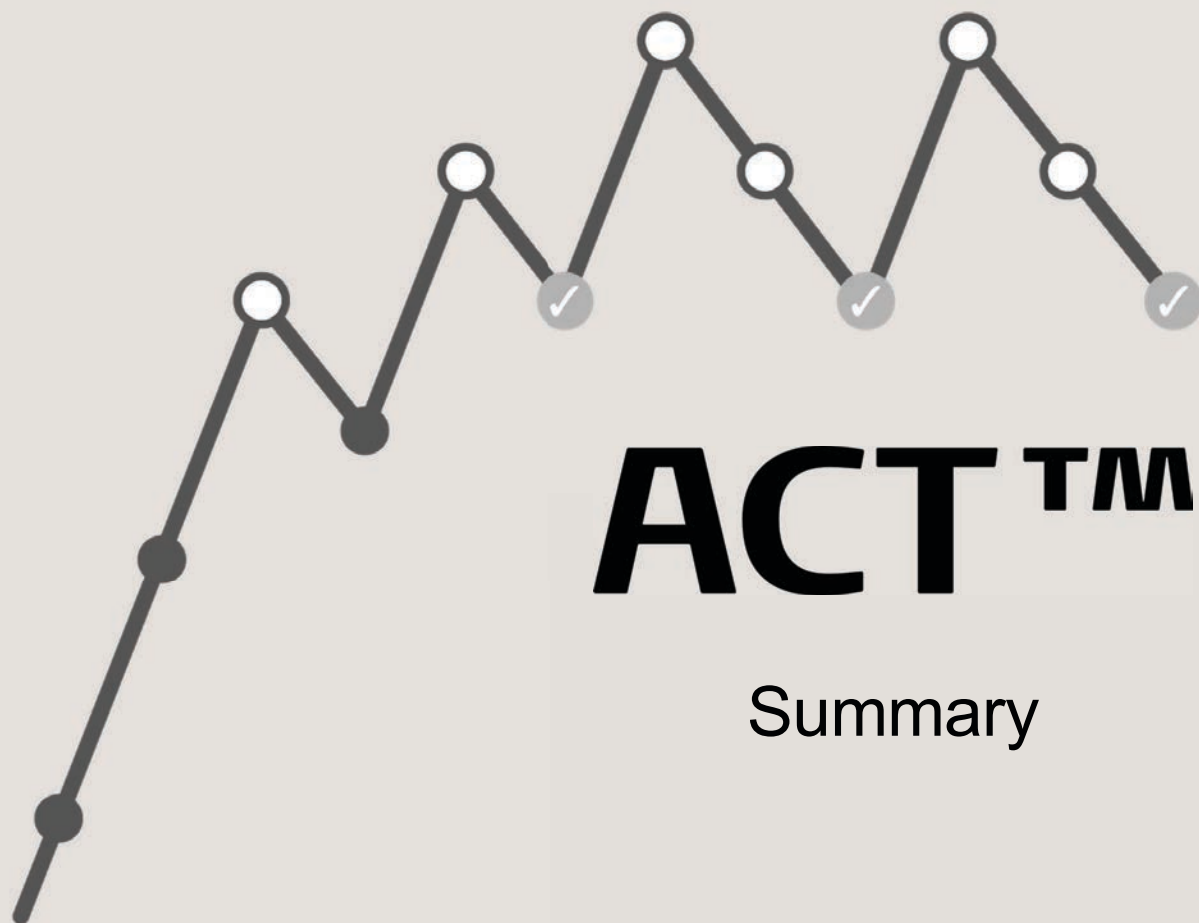
ACT score dB <u>nCL</u>	Contrast Loss	Predicted Aided Speech-in-Noise Performance	Fitting Advice
-4 to 4	Normal	Normal range	Adaptive features set to minimum level – help preserve natural sound in all environments
4 to 7	Mild	Mildly poorer than normal	Adaptive features set to slightly higher than minimum level – help preserve natural sound and improve speech understanding in the noisiest environments
7 to 10	Moderate	Moderately poorer than normal	Adaptive features set to slightly lower than the maximum level – help balance speech understanding while maintaining natural sound in moderately noisy environments
10 to 16	Severe	Severely poorer than normal	Adaptive features set to maximum level – help prioritize speech understanding in even the least noisy environments. Also consider streaming devices and communication training.



- Audiologist has the confidence to set low setting of help in noise features



- Highest setting of help-in noise features; highest technology level recommended
- Suggest remote microphone etc.
- Set realistic expectations, add additional counseling



ACT™

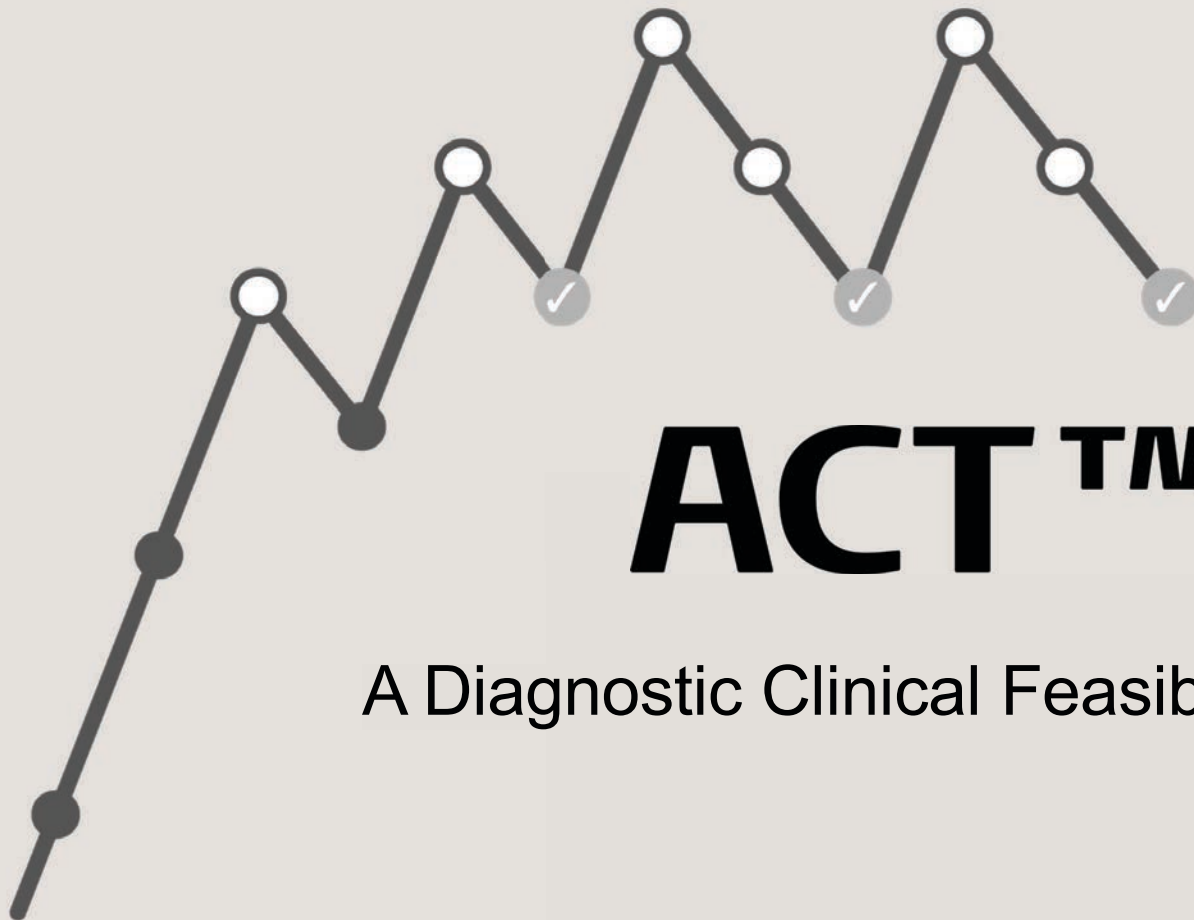
Summary

Summary

- Foundation for a **better first fit**
- First ever **language-independent** diagnostics of speech-in-noise ability
- **Fast and familiar** test
- **Uses the audiogram** to individually shape the stimuli to ensure full audibility
- A measure of an individual's predicted **AIDED hearing-in-noise ability** in realistic conditions
- Uses a novel **nCL scale (normalized Contrast Level)**

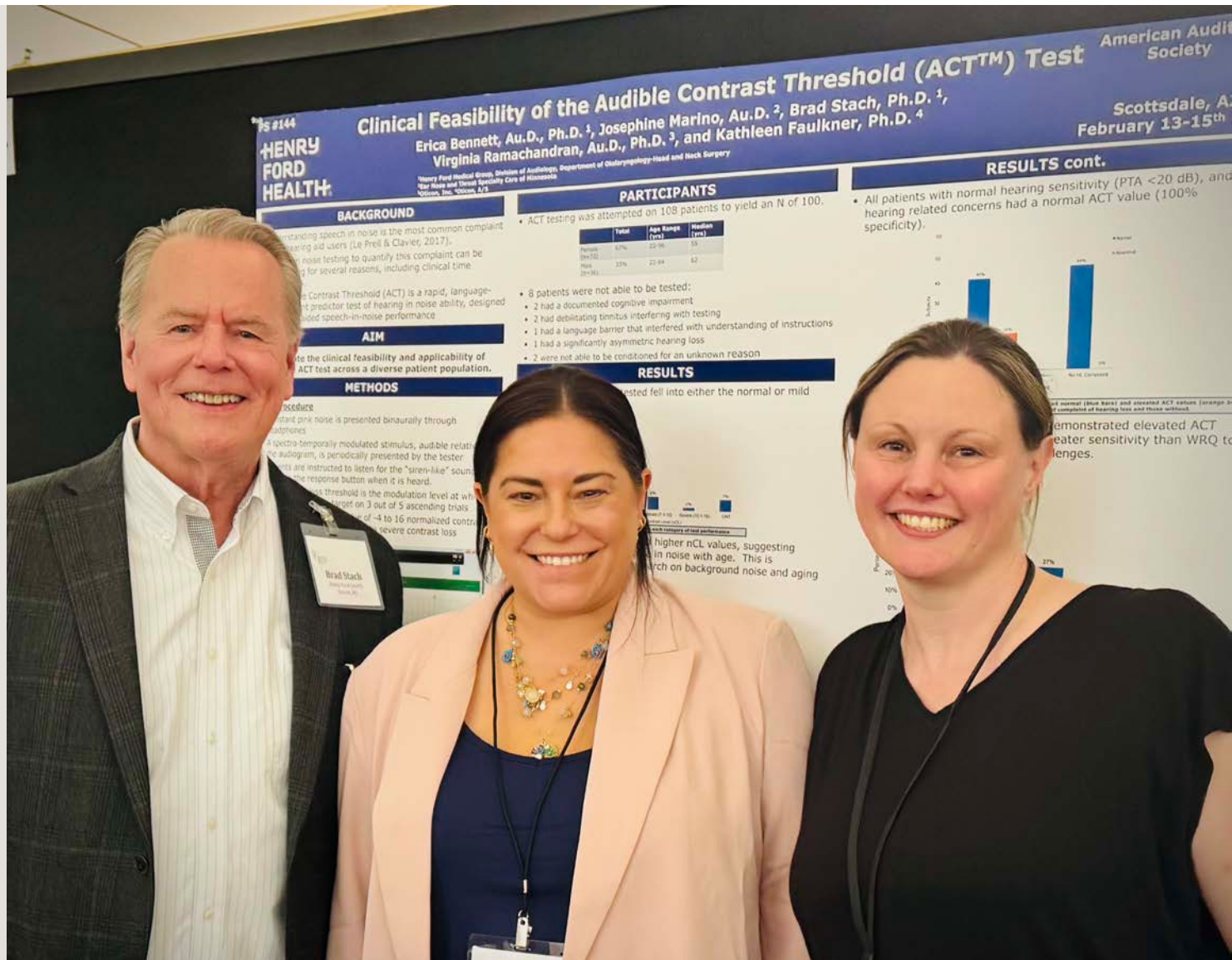
Resources:

- <https://www.grason-stadler.com/act>
- <https://www.interacoustics.com/act>



ACT™

A Diagnostic Clinical Feasibility Study



Method

Data collected in real-life, operational clinics

108 clients included

Median age of **61 years**

ACT incorporated
in clinical battery



Results

ACT is feasible and easy to integrate in clinical practice



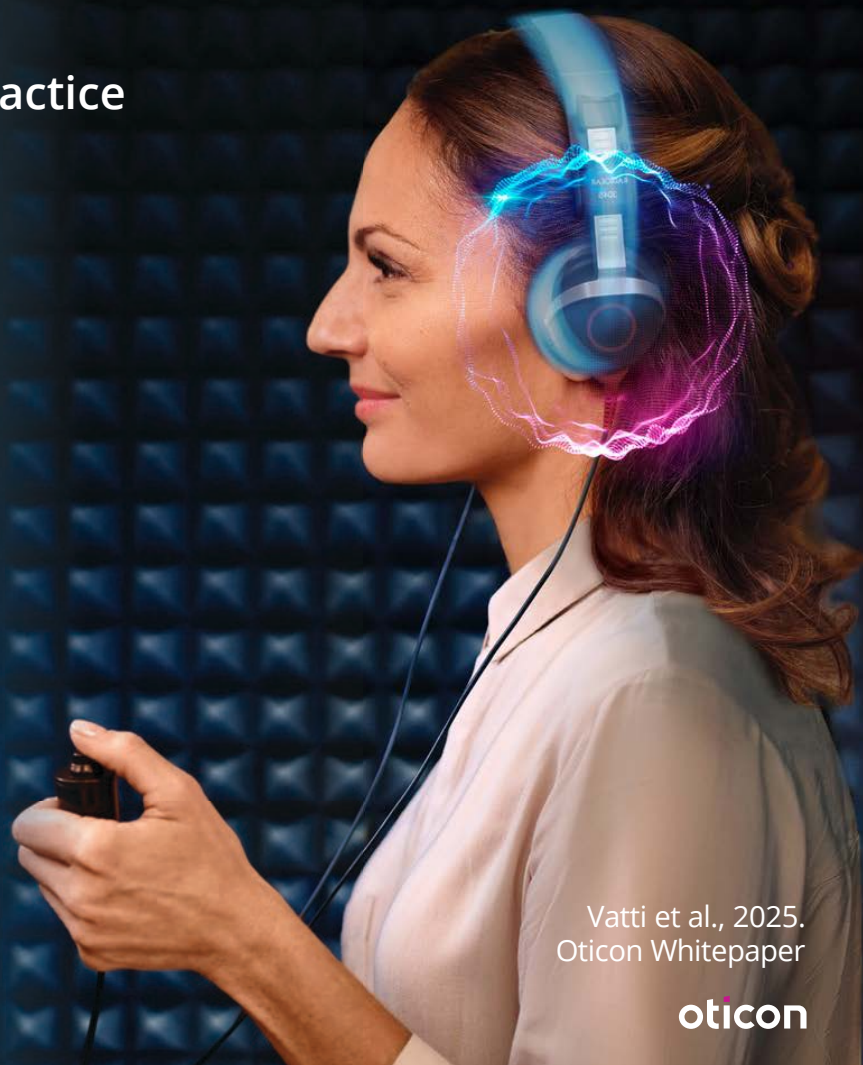
Fast

**1 – 3
minutes**
added to
test battery



Easy
to complete

93%
successfully
completed
the test



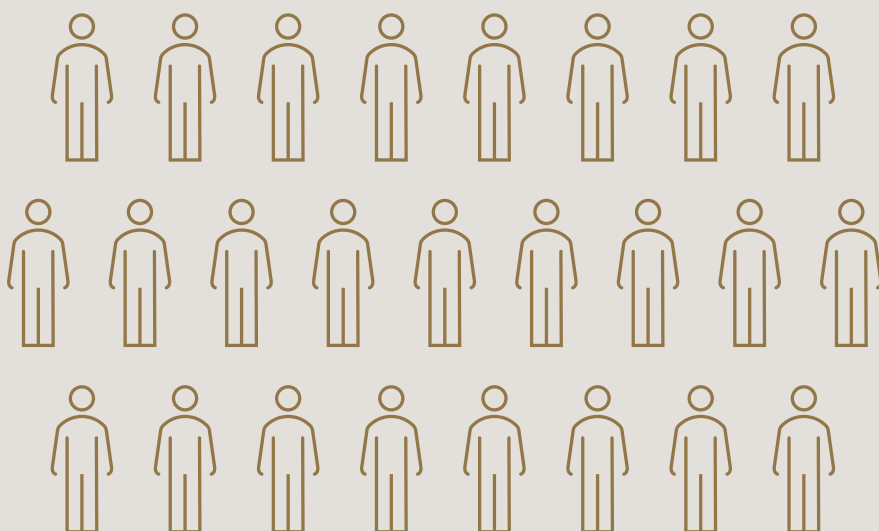
Vatti et al., 2025.
Oticon Whitepaper

oticon

Results

ACT adds information beyond the audiogram

Vatti et al., 2025.
Oticon Whitepaper



25 with **normal**
pure tone thresholds



14 with **perceived**
hearing complaint



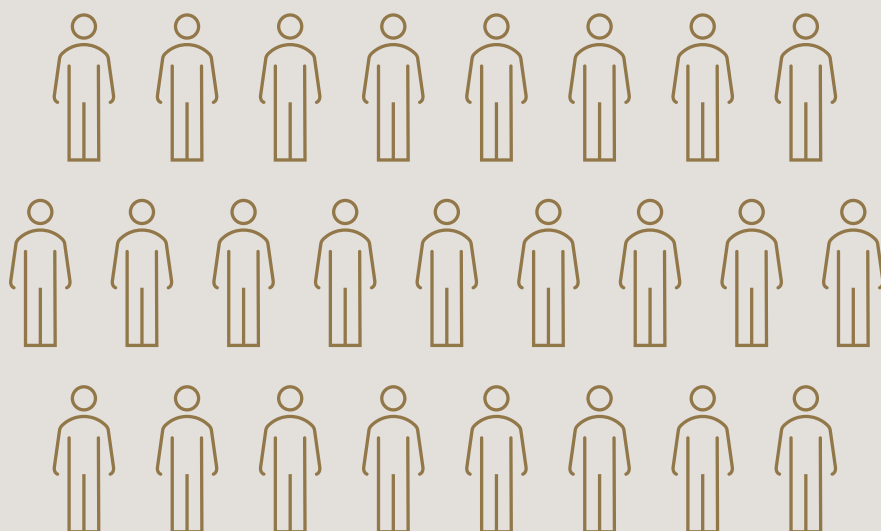
4 with **elevated**
ACT values



Results

ACT adds information beyond the audiogram

Vatti et al., 2025.
Oticon Whitepaper



25 with **normal**
pure tone thresholds



11 without **perceived**
hearing complaint



11 with **normal**
ACT values

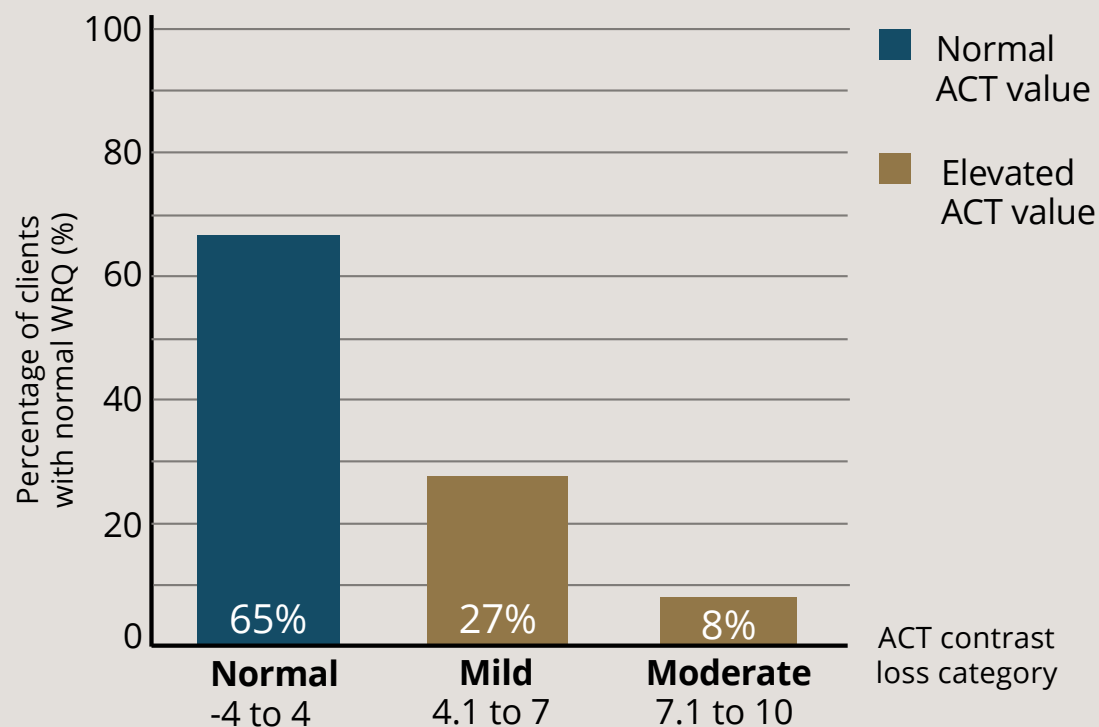


Results

ACT adds information
beyond word recognition
testing in quiet (WRQ)

Vatti et al., 2025.
Oticon Whitepaper

**ACT was
elevated** for 35%
of those with normal
word recognition
in quiet



Summary

ACT enhances client care

ACT is **fast, practical**
and **easy to implement**

ACT **enhances**
counselling and helps set
realistic expectations

ACT gives a **deeper**
understanding of the
client's hearing abilities

ACT provides an
initial first fit that is
meaningful to HCPs

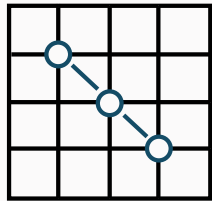


ACT™

ACT as a Treatment Tool

How do you choose the
best **help-in-noise settings**
for your client?

ACT as part of the hearing aid fitting



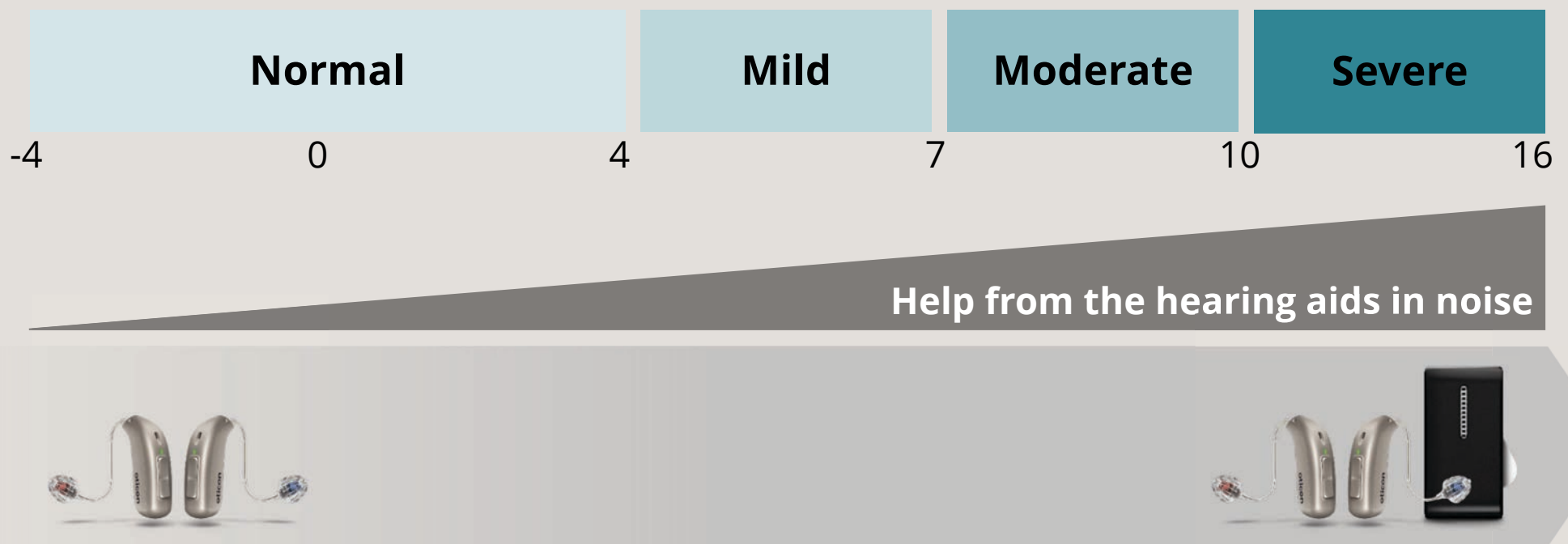
Audiogram

Foundation for **amplification**



Foundation for **help in noise settings**

ACT as part of the hearing aid fitting





Putting ACT to the test

A multi-site study

First international multi-site clinical study

Independent research in Germany and Japan



University of Applied Sciences, Lübeck



General Incorporated Association Shinden-Ogawa
Audiology and Hearing Aid Laboratory,
OTO Clinic Tokyo, and Keio University School of
Medicine, Tokyo;
Saiseikai Utsunomiya Hospital, Utsunomiya

Confirming applicability across the globe

oticon

Research questions

Does the relationship between ACT values and speech understanding in noise in two very different real-life user groups still hold?

Can ACT increase the prediction of speech-in-noise ability substantially compared to using the audiogram alone?

Participants

Three stylized human figures are positioned in the background of the slide. Each figure consists of a large circle for the head and a curved line for the shoulders and upper torso. The figures are light gray and serve as a decorative element.

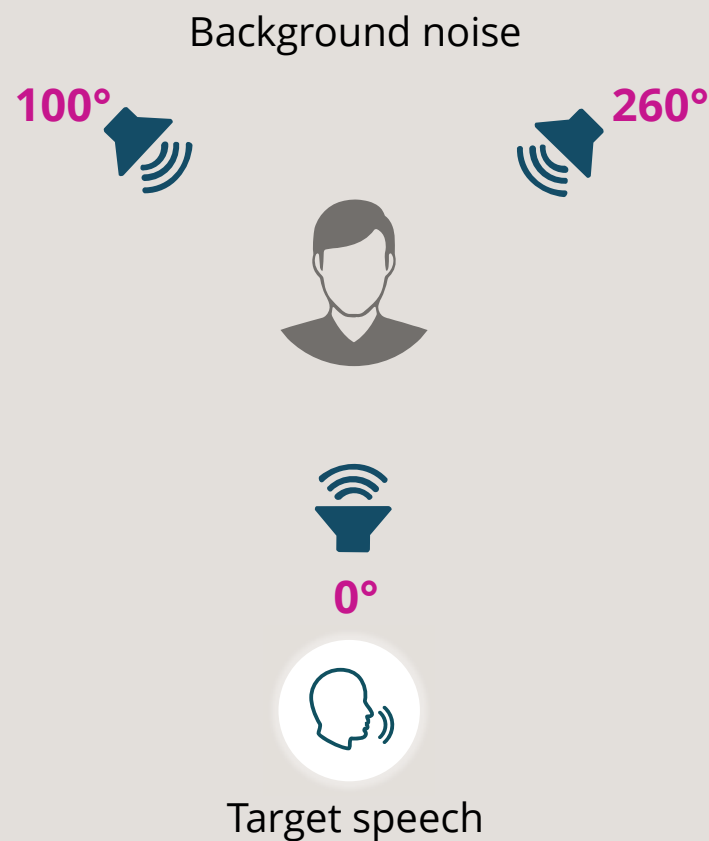
- 100 participants
- Pure-tone average of 29 to 79 dB HL
- 32 to 79 years of age
- Standard fitting with Oticon More 1 hearing aids

Test setup

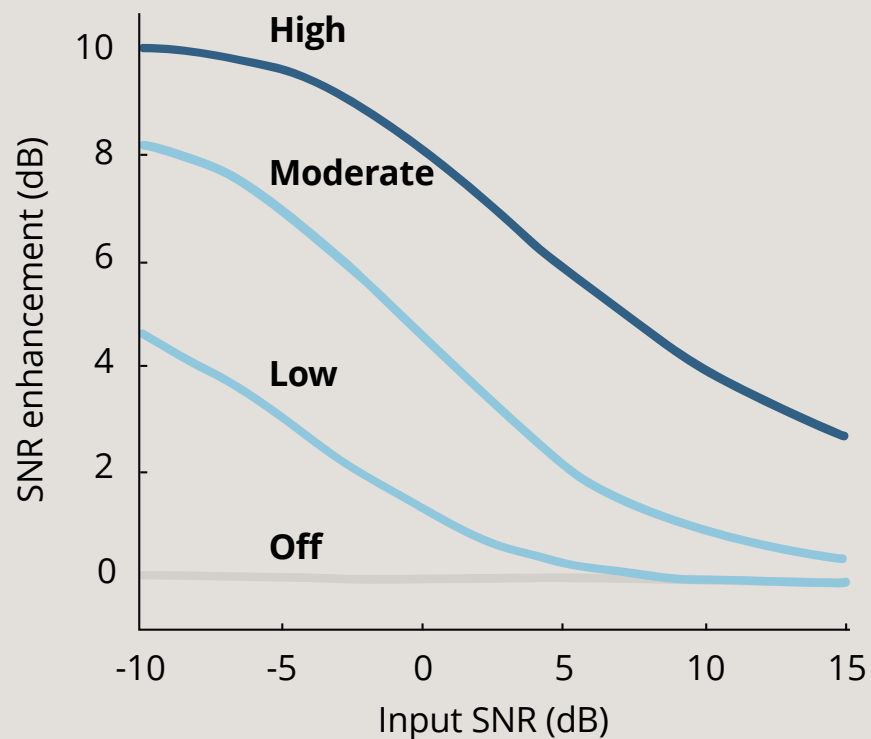
Test conditions:

- ACT
- Hearing in noise test (HINT)
- Ecologically valid sound scene - Target speech at 65 dB SPL
- Interfering speech from male talker mixed with speech-shaped noise at 100° and 260°
- Level of background speech was set
- Test person placed in the middle

Santurette, S. & Laugesen, S. (2023)



Verification of help levels



MoreSound Intelligence
adapts the degree of
processing progressively
as the sound scene
becomes more complex

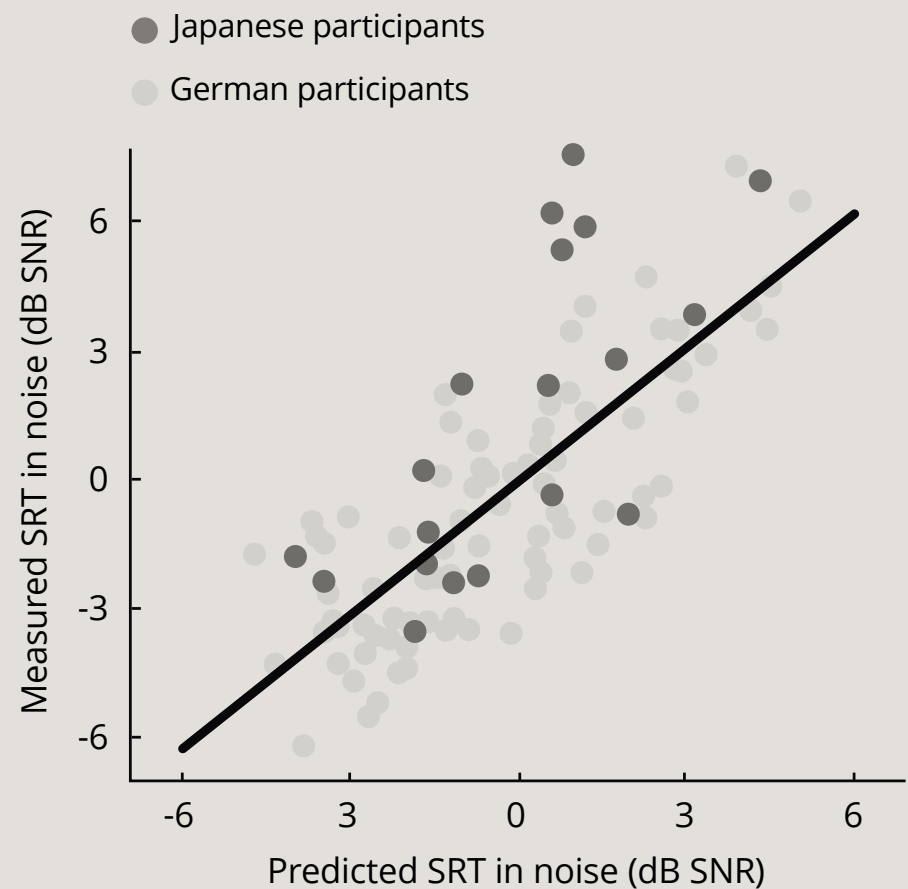
Santurette, S. & Laugesen, S. (2023)



Results

Relationship between predicted and measured SRTs in noise

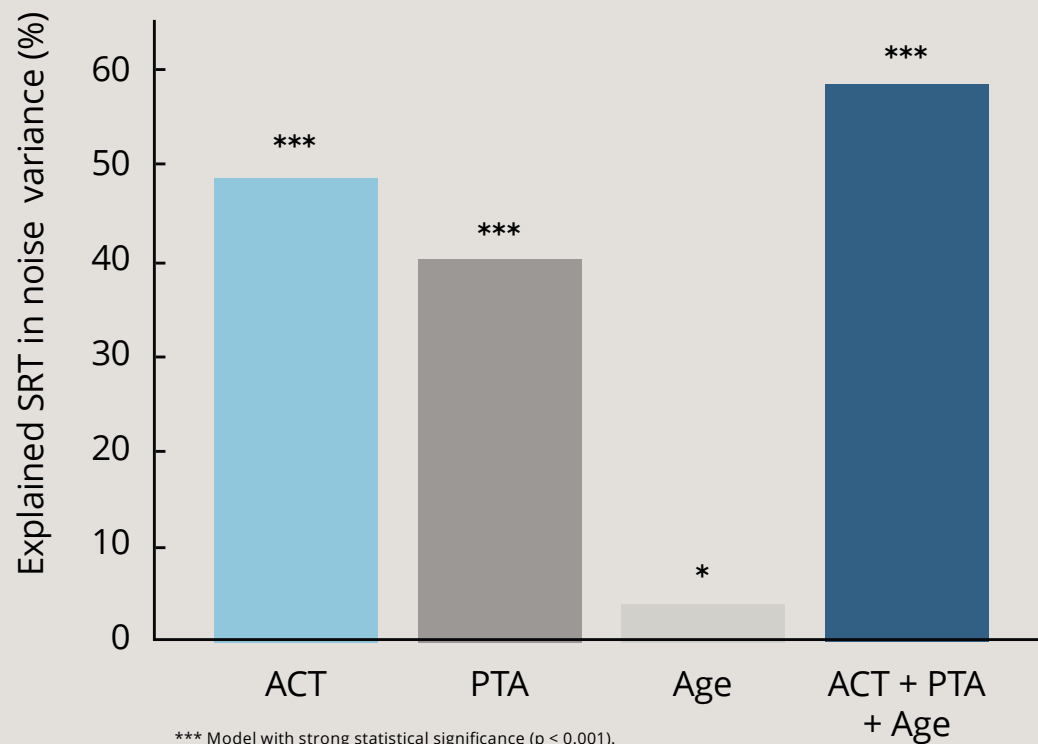
Correlation between predicted and measured values was significant



Santurette, S. & Laugesen, S. (2023)

SRTs in noise explained by ACT, PTA, and age

The combination of ACT and PTA can predict a user's speech-in-noise ability **more precisely than PTA alone**

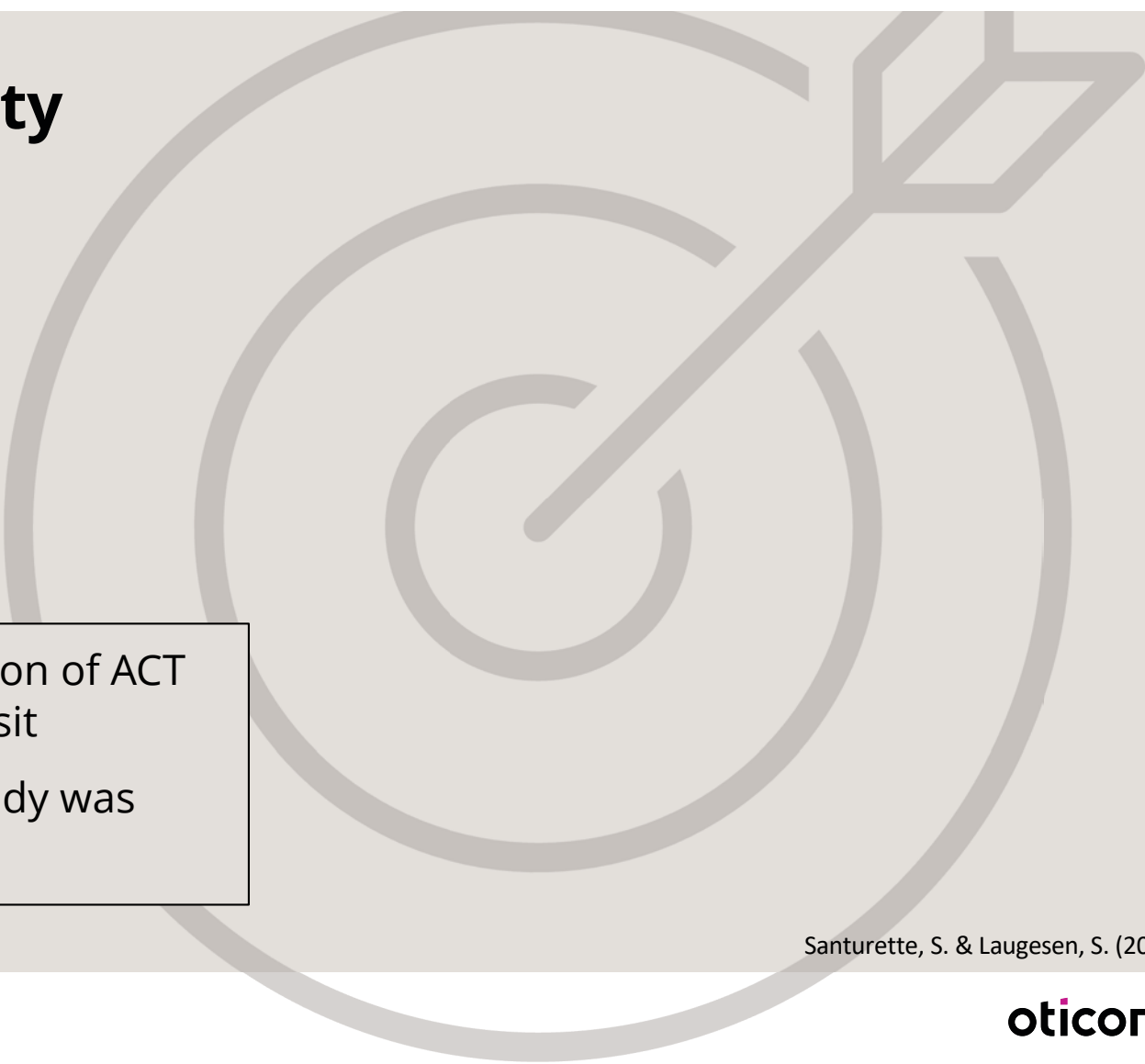


*** Model with strong statistical significance ($p < 0.001$).

* Model with weak statistical significance ($p < 0.05$).

Santurette, S. & Laugesen, S. (2023)

Test-retest reliability



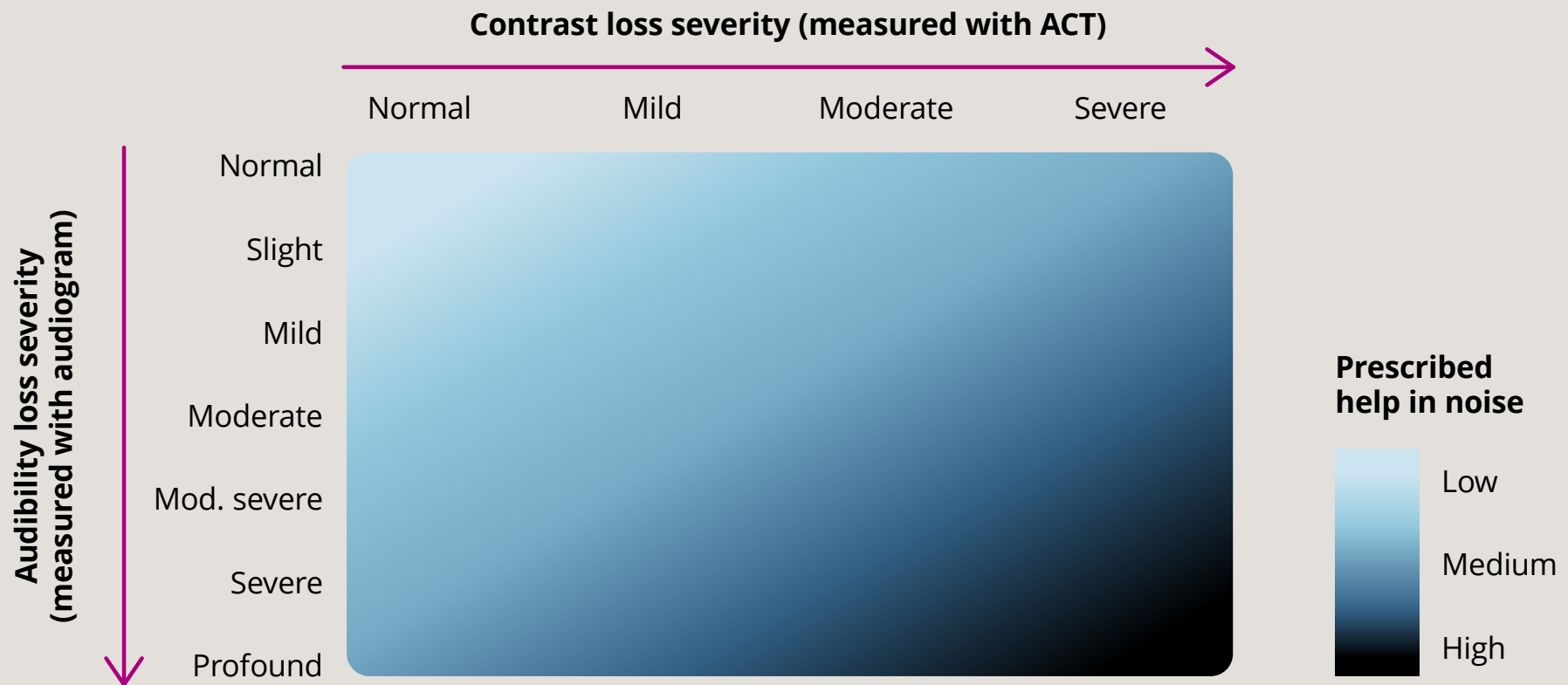
- Test-retest standard deviation of ACT was 0.96 dB within same visit
- Average test time in the study was found to be 100 seconds

Santurette, S. & Laugesen, S. (2023)

Research questions

Can ACT provide prescriptions that lead to better outcomes than our current default?

Prescribed level of help in noise



Santurette, S. & Laugesen, S. (2023)

Verifying the prescription



Good hearing-in-noise ability



Moderate hearing-in-noise ability



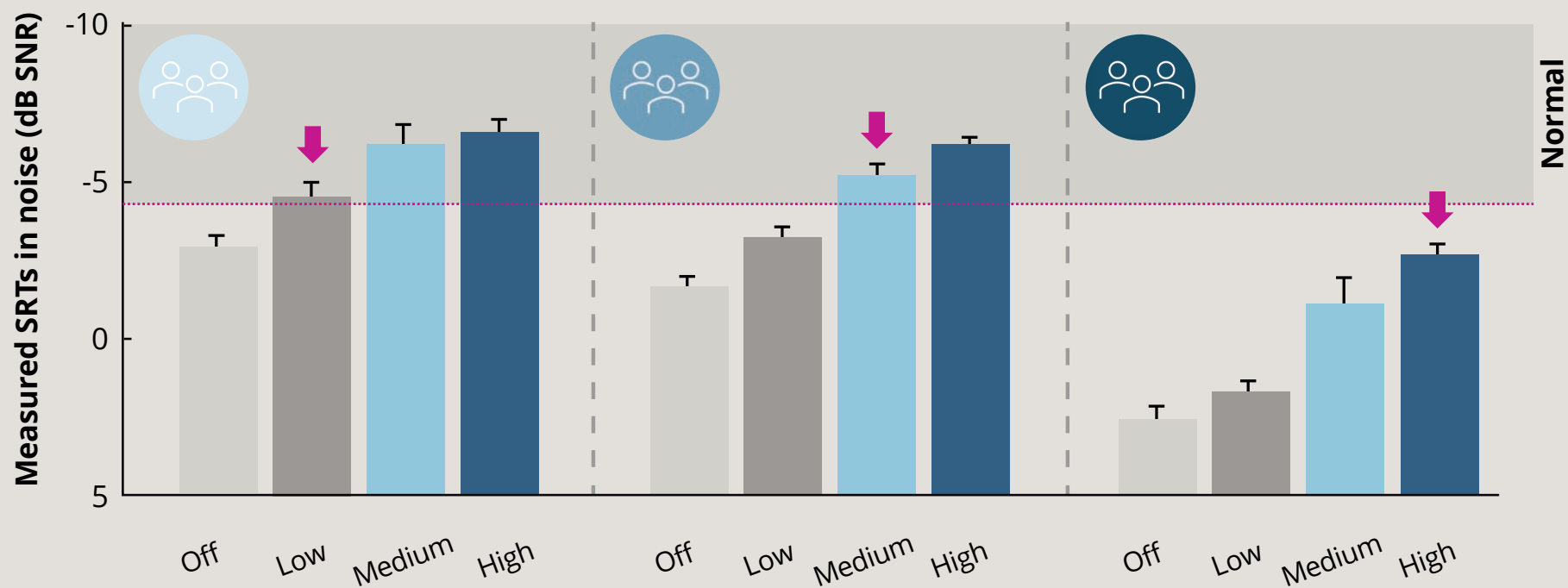
Poor hearing-in-noise ability

**Comparison of how
the SRTs in noise changed
when measured with 4
different help levels**

Santurette, S. & Laugesen, S. (2023)

SRTs in noise of three user groups

Four MoreSound Intelligence help levels



MoreSound Intelligence help-in-noise setting

Santurette, S. & Laugesen, S. (2023)

Oticon Genie 2 Implementation



50% of users will receive a different MoreSound Intelligence setting than default

Santurette, S. & Laugesen, S. (2023)



ACT™

A Treatment Clinical Feasibility Study



To be adopted in clinic,
what properties should a
new **clinical test** have?

Method

Anonymised online survey
with five categories



Usability
of ACT



Clinical
value



Counselling
value



Hearing aid
fitting value



Overall
recommendation

Method

Data collected in operational, real-life clinics

30 HCPs from Demant clinics

ACT incorporated in clinical battery

Nearly **3000 clients** tested with ACT



Method

11-point Likert scale



0 - 3
Disagree

4 - 6
Neutral

7 - 10
Agree

Results

Usability of ACT

Vatti et al., 2025.
Oticon Whitepaper

77%
agree

Simple to
administer

93%
agree

Easy to integrate
into clinical routine

77%
agree

Easy to explain
instructions

100%
agree

Understandable
implementation

80%
agree

Feeling of
confidence

Results

Clinical value

Vatti et al., 2025.
Oticon Whitepaper

84%
agree

A **clinically relevant** tool

74%
agree

Helps **characterise** speech-in-noise abilities **more precisely**

70%
agree

Gives **confidence** identifying clients with **challenges** in noise

Results

Counseling value

Vatti et al., 2025.
Oticon Whitepaper

89%
agree

Improve communication
with clients and loved ones
about hearing challenges

85%
agree

Give more confidence
in **recommending**
hearing aid technology

70%
agree

Give more confidence that
customers **will return for**
the fitting appointment

Results

Hearing aid fitting value

Vatti et al., 2025.
Oticon Whitepaper

96%
agree

Confidence using
ACT to **fit help-in-
noise** settings

89%
agree

Confidence in
the hearing aid
first fit

78%
agree

Perceive that you
receive fewer complaints
related to help-in-noise

74%
agree

Perceive that **fewer**
help-in-noise-related
adjustments are needed

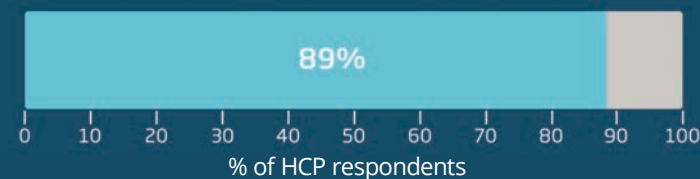
Results

Overall recommendation

Vatti et al., 2025.
Oticon Whitepaper



How likely would you
be to **recommend ACT**
to other clinicians?



● Agree (7-10) ● Neutral (4-6) ● Disagree (0-3)

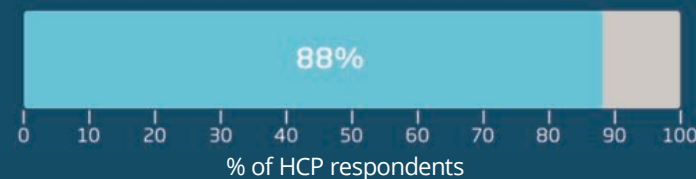
Results

Overall recommendation

Vatti et al., 2025.
Oticon Whitepaper



ACT makes me stand out
compared to standard
clinical practice



● Agree (7-10) ● Neutral (4-6) ● Disagree (0-3)

References

- Beck, D. L., Ng, E., Jensen, J. J. (2019). A scoping review 2019: OpenSound navigator. *The Hearing Review* 26(2), 28-31.
- Jorgensen, L. & Novak, M. (2020). Factors Influencing Hearing Aid Adoption. *Seminars in hearing*, 41(1).
- Manchaiah, V., Picou, E. M., Bailey, A., & Rodrigo, H. (2021). Consumer Ratings of the Most Desirable Hearing Aid Attributes. *Journal of the American Academy of Audiology*, 32(8), 537–546.
- Santurette, S. & Laugesen, S. (2023). *Audible Contrast Threshold (ACT™)* [White paper]. Oticon.
- Vatti, M., Ratanjee-Vanmali, H., Laugesen, S. & Ghamkhar M. (2025). *ACT™ in action: Enhancing client care with the Audible Contrast Threshold (ACT) test* [White paper]. Oticon.
- Zaar, J., Ihly, P., Nishiyama, T., Laugesen, S., Santurette, S., Tanaka, C., Jones, G., Vatti, M., Suzuki, D., Kitama, T., Ogawa, K., Tchorz, J., Shinden, S., & Jürgens, T. (2023). Predicting speech-in-noise reception in hearing-impaired listeners with hearing aids using the Audible Contrast Threshold (ACT™) test [Preprint]. *PsyArXiv*.

