



# Welcome!

Judy Grobstein, AuD-FAAA, MACAud  
Manager of Education and Audiology



Best option for audio is to call in using  
Phone Number: 02 8518 1923 Access Code: 802 832 511


For technical questions or log-in information please contact Dan Towns  
Direct line: 02 8823 9005 Dan\_towns@Starkey.com.au

## Housekeeping


Webinar Experience

If not using speakers and you haven't already, please call into the call center number 02 8518 1923 and enter access code 802 832 511

**Please be sure to keep microphones muted**

If you have any questions, please type them in the chat box. You can view the chat box by clicking the chat bubble at the bottom of your screen 

If you have any technical issues, please contact Dan Towns at Dan\_towns@starkey.com.au or call him direct at 02 8823 9005



## Housekeeping


Endorsed Session

This Session is endorsed for ACAud, AudA and HAASA points

You must stay logged on for the full session

AudA members must complete a 10 questions quiz with a passing score of 70% as well as your CPD Reflections and Evaluations

ACAud, HAASA and NZAS members must complete the quiz to receive full points.




## Housekeeping

Learning Objectives

Identify the noise management features accessed within the Sound Manager screen of the Inspire programming software

Identify what microphone modalities are available for Livio AI and Livio devices

Describe how to successfully fit and fine-tune Starkey's frequency lowering feature



## Mastering Advanced Features

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## Agenda

Hearing Reality

Frequency Lowering

Stream Boost

CROS





livio<sup>AI</sup>

Our Best Sounding  
And Best Performing  
Hearing Aid Ever



## The Heart of Starkey Sound Quality

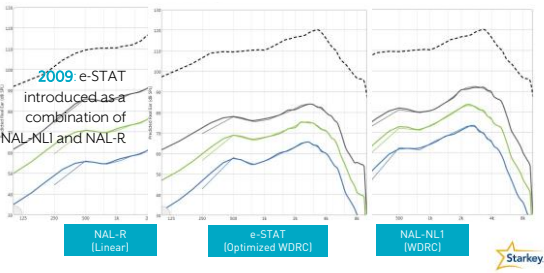
Multicore Twin Compressors and  
eSTAT Starkey's Proprietary Fitting Formula



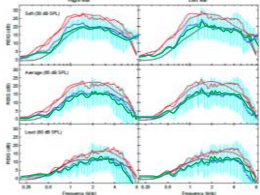
## eSTAT: Starkey's Proprietary Fitting Formula

- Emphasizes audibility for speech understanding
- Developed for Starkey's proprietary compression architecture
- Optimizes response modeling regardless of hearing aid style
- Optimizes vent hearing aid interaction





Results: eStat Targets (Starkey's Proprietary Fitting Formula)  
Real-ear insertion gains (REIGs) and targets for speech (ISTS)



Starting from **NAL-NL1** targets, gains were usually adjusted downward on the **first visit**, based on participants' feedback.

Little change was made **after 1 month**

Adjusted gains were often relatively close to **eStat targets**

Relating hearing-aid gain settings to clinical outcome measures  
Christophe Micheyl<sup>1</sup>, William S. Messer<sup>2</sup>, Joyce Rosenbluth<sup>3</sup>, Sridhar Kaluri<sup>4</sup>, Peter Johansson<sup>5</sup>, Joan L. Blanco<sup>6</sup>, Patricia Perez-Gonzalez<sup>7</sup>, Enrique A. Lopez-Poveda<sup>8</sup>, Brent Edwards<sup>9</sup>  
<sup>1</sup>Starkey Hearing Research Center, Berkeley, CA <sup>2</sup>Starkey Hearing Technologies, Eden Prairie, MN <sup>3</sup>University of Salamanca, Salamanca Spain <sup>4</sup>Universitat de València, Valencia, Spain



Comfort and Personalization Redefined

Twin Compression Architecture

Utilizes wide dynamic range for a fuller perception of loudness and natural sound quality & unique music approach

Feedback Cancellation

Automatically applies personalized sensitivity settings and auto gain adjust for a feedback-free start with reduced artifacts and distortion

Comprehensive Sound Manager

Hearing Reality seamlessly categorizes complex listening situations to enhance and adapt in all environments



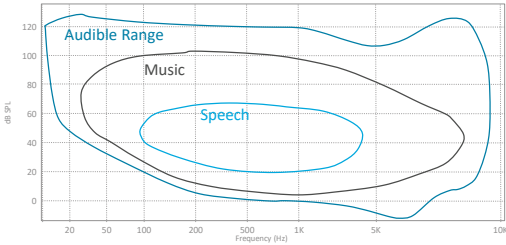
Speech Optimization

- Starkey WDRC compression system gain changes track speech input smoothly, quickly and accurately
- Allows for precise, intuitive management of speech by allowing discrete gain adjustments
  - Per channel changes to soft, moderate and loud speech inputs
- Compression Ratios change based on the gain required at each frequency and input level

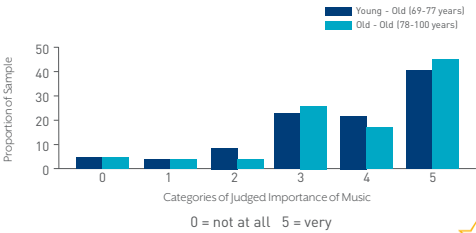


Multicore Twin Compressors

Giving speech and music the individual attention they deserve for an exceptional listening experience



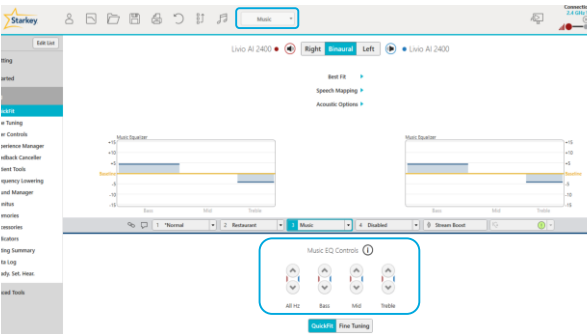
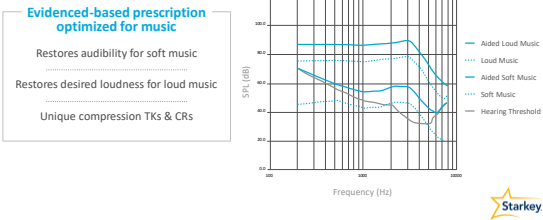
Music is Important



"The Importance of Music To Seniors"  
A. Cohen, B. Bailey and T. Nilsson Psychosomatics 2003



Proprietary Fitting Formula

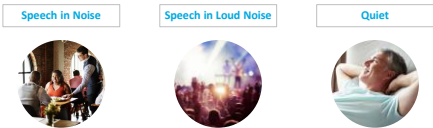


Hearing Reality

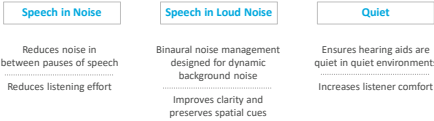
Continuous optimization of audibility, intelligibility, comfort and sound



Sound Enhancement



Sound Enhancement



Speech in Noise

Ultra fast processing to instantly track and filter noise even between the syllables of speech

- Active 100% of the time
- Makes very quick decisions over a wide range of input levels
- Recognizes speech vs. noise patterns



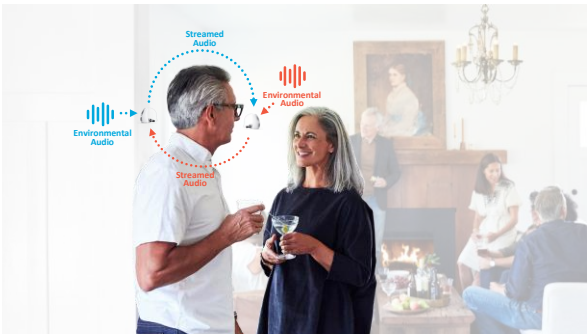
Inspire Settings for Speech in Noise



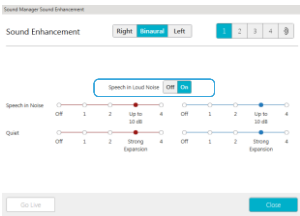
- 1 = up to 6 dB
- 2 = up to 8 dB
- 3 = up to 10dB
- 4 = up to 20 dB

Spatial Speech Enhancement

Reduces steady-state and dynamic background noise  
Reduces interfering sounds from the sides  
Preserves interaural level differences for localization



Inspire Settings for Speech in Loud Noise



Attenuation follows setting of **Speech in Noise**

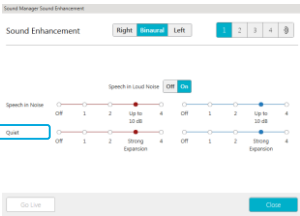


Quiet

Enhancing expansion with our patented fast-acting noise management, **Quiet** makes hearing aids quieter in low level environments than what is possible with Expansion alone.



Inspire Settings for Quiet




- 1 = Minimum
- 2 = Moderate
- 3 = Strong
- 4 = Maximum




Situational Sound Management


Transients




Wind



Machine Noise



Auto Music



Situational Sound Management

Transients

Quickly attenuates brief loud sounds  
Increases listener comfort

Wind

Reduces sound of turbulence over microphone  
Increases listener comfort

Machine Noise


Reduces level of steady state noise  
Increases listening comfort


Auto Music

Optimizes environmental music without compromising speech  
Enhances perception of music

Transient Noise Reduction


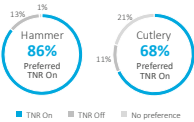
- Improves comfort for loud, transient sounds
- Quickly attenuates brief, loud sounds
- No distortion of other environmental or speech sounds
- Preserves natural sound quality






Transient Noise Reduction


Preferred (vs. off) to better tolerate hammer and cutlery transient sounds






Wind


Designed to keep patients comfortable in windy environments






Machine Noise

Designed to deliver comfort for loud steady state noise





Auto Music

Designed to automatically deliver an optimized sound quality of music when it is the primary signal



Situational Sound Management



Directionality

Directionality

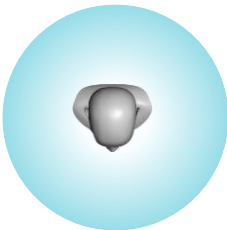
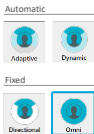


Directionality

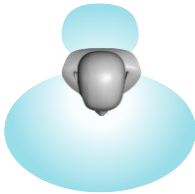
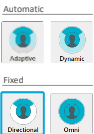
Directionality

Improves speech understanding in noise  
Optimizes speech in noise

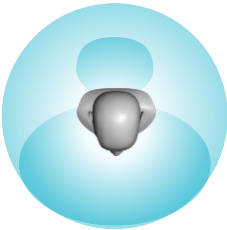
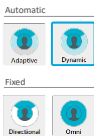
Directionality



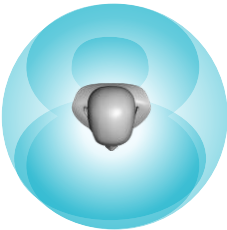
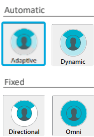
Directionality



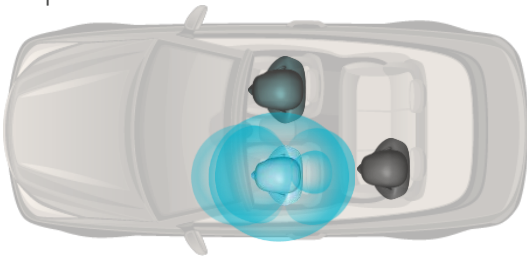
Directionality



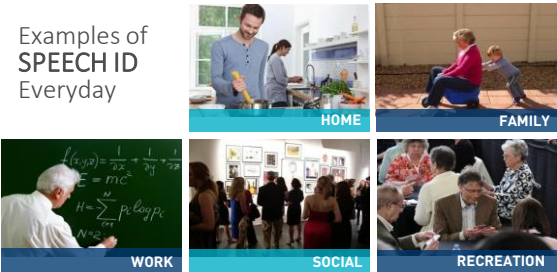
Directionality



Speech ID



Examples of  
SPEECH ID  
Everyday



Directionality



Maximum Noise Management

Maximum Gain Adaptation			
Speech and Noise		Directionality Plus	
85 dB SPL		80 dB SPL	
2400	20 dB	2400	20 dB
2000	8 dB	2000	15 dB
1600	6 dB	1600	10 dB

Whenever, wherever, patient needs it



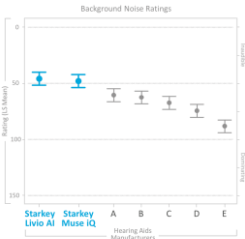
Maximum Noise Management

Maximum Gain Adaptation					
Speech and Noise 85 dB SPL		Directionality Plus 80 dB SPL		Comfort Boost 75 dB SPL	
2400	20 dB	2400	20 dB	2400	20 dB
2000	8 dB	2000	15 dB	2000	20 dB
1600	6 dB	1600	10 dB	1600	20 dB

Whenever, wherever, patient needs it



Effortless and Enjoyable Listening  
Top rated for reducing background noise in noisy environments



\* Delta Semantics (2018, November). Research evaluation of spatial noise management in hearing aids. VOICE Technology Corporation & 2019 University, Denmark.



Frequency Lowering



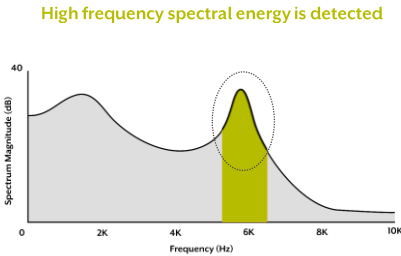
Speech Shift

- Smart Candidacy Criteria
- Maintains broad bandwidth
- Preserves harmonic structure to minimize distortion
- Active only for high frequency speech sounds



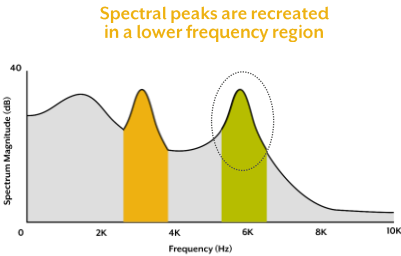
Speech Shift

Fulop, Fitz & O'Shaughnessy (2011)



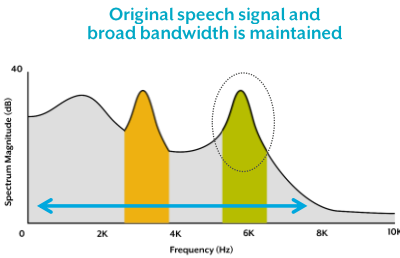
Speech Shift

Fulop, Fitz & O'Shaughnessy (2011)



# Speech Shift

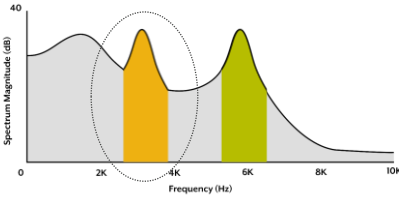
Fulop, Fitz & O'Shaughnessy (2011)



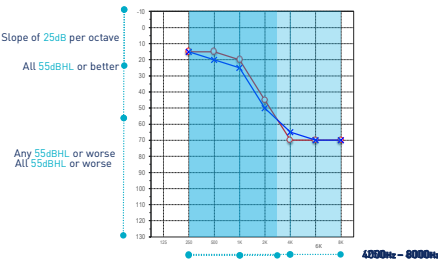
Harmonic structure is preserved

# Speech Shift

Fulop, Fitz & O'Shaughnessy (2011)



## Smart Candidacy Criteria



Starkey

## Inspire Settings for Frequency Lowering



Starkey

## Inspire Settings for Frequency Lowering

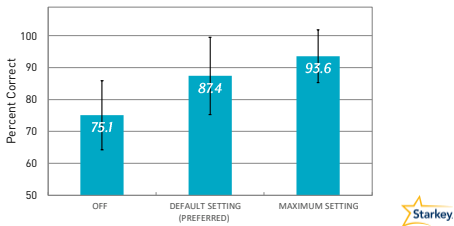


Starkey

Frequency Lowering Validation	
INSTRUCTIONS FOR LIVE VOICE VALIDATION	
1. Make frequency lowering off (control words from a prior word list) available in page 2 (live voice validation) for validation.	
2. Add the patient to the list.	
3. Run the validation procedure as described.	
4. Calculate the patient's score as percent correct.	
5. Run the validation procedure as described and report back to the patient's score.	
6. Compare patient's score to the target score.	
7. If the patient's score is 100%, increase the gain by 1 dB and re-evaluate performance.	
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PLURAL WORD LISTS FOR FREQUENCY LOWERING VALIDATION			
LIST 1	SCORE	LIST 2	SCORE
1. cat		1. cat	
2. dog		2. dog	
3. bird		3. bird	
4. fish		4. fish	
5. horse		5. horse	
6. cow		6. cow	
7. pig		7. pig	
8. sheep		8. sheep	
9. goat		9. goat	
10. lion		10. lion	
11. tiger		11. tiger	
12. elephant		12. elephant	
13. bear		13. bear	
14. wolf		14. wolf	
15. fox		15. fox	
16. rabbit		16. rabbit	
17. squirrel		17. squirrel	
18. mouse		18. mouse	
19. hamster		19. hamster	
20. guinea pig		20. guinea pig	
21. ferret		21. ferret	
22. snake		22. snake	
23. lizard		23. lizard	
24. turtle		24. turtle	
25. frog		25. frog	
26. toad		26. toad	
27. salamander		27. salamander	
28. newt		28. newt	
29. crayfish		29. crayfish	
30. shrimp		30. shrimp	
31. lobster		31. lobster	
32. crab		32. crab	
33. octopus		33. octopus	
34. squid		34. squid	
35. cuttlefish		35. cuttlefish	
36. nautilus		36. nautilus	
37. jellyfish		37. jellyfish	
38. starfish		38. starfish	
39. sea urchin		39. sea urchin	
40. clam		40. clam	
41. mussel		41. mussel	
42. scallop		42. scallop	
43. oyster		43. oyster	
44. nautilus		44. nautilus	
45. squid		45. squid	
46. cuttlefish		46. cuttlefish	
47. nautilus		47. nautilus	
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51. squid		51. squid	
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91. cuttlefish		91. cuttlefish	
92. nautilus		92. nautilus	
93. squid		93. squid	
94. cuttlefish		94. cuttlefish	
95. nautilus		95. nautilus	
96. squid		96. squid	
97. cuttlefish		97. cuttlefish	
98. nautilus		98. nautilus	
99. squid		99. squid	
100. cuttlefish		100. cuttlefish	

Average S-Test Results



Wireless Connectivity and Streaming



Dual Radio

2.4 GHz + NFMI

Ear-to-Ear data and audio communication

Reliable direct connectivity to phones and accessories

Dual-Radio Wireless Technology

The Best of Both Wireless Worlds

NFMI

Near Field Magnetic Induction

- Highly reliable over short distances (approx. 20 cm)
- Ear-to-ear DATA and AUDIO communication
  - Ear-to-ear User Controls
  - Binaural detection and coordination of Wind, Noise, Music, and Directionality features
- Ear-to-ear phone streaming
- Spatial Speech Enhancement
- CROS System functionality

NFMI radio is available in all Livio AI and Livio products EXCEPT for the micro RIC 312.

2.4 GHz

- Range of 10+ meters with best performance within line of sight
- Global frequency band
- Direct connectivity to phones and Starkey Hearing Technologies accessories
  - Micro RIC 312 only
- Ear-to-ear DATA communication
  - Ear-to-ear User Controls
  - Binaural detection and coordination of Wind, Noise, Music, and Directionality features



Direct Streaming Protocols

Low Energy Audio (LEA)

- Apple's proprietary streaming protocol
- Allows direct streaming between Livio AI and Livio devices
- Works in conjunction with Bluetooth Low Energy for pairing and data sharing



Building on the Best  
Wireless Technology

With a new Android Streaming for Hearing Aids (ASHA) wireless protocol, we are able to STREAM DIRECTLY from select Android phones\*.

Android Streaming

Stream phone calls, music and more, directly from Android\* smartphones

NEW



\*Currently compatible with Google Pixel 3 and 4 smartphones with Android 10 operating system.



Patient-Focused Accessories

Livio AI Offers Amazon Echo Connectivity



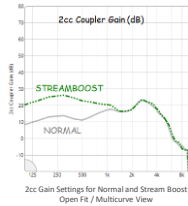
Stream Boost

- Activates hearing aid settings optimized for high-quality streamed audio
- Stream Boost settings are automatically applied whenever streaming starts with no interaction required by the patient
- When streaming stops, the hearing aids revert to previous settings



Stream Boost Memory

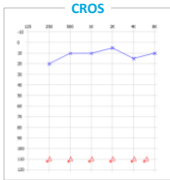
To compensate for vent loss with streamed audio, low- and mid-frequency gain is automatically increased for vented and open canal fittings when the Stream Boost is active.



CROS System

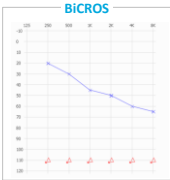


CROS/BiCROS



Contralateral Routing of Signal

- One unaidable ear
- One normal hearing ear

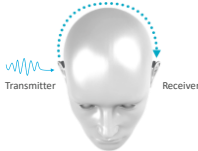


Binaural Contralateral Routing of Signal

- One unaidable ear
- One better/aidable ear



Wireless CROS System



Consists of:

Transmitter

- Worn on the unaidable ear
- Microphone enabled for CROS and/or BiCROS

Receiver

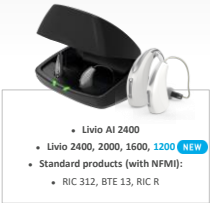
- Worn on the normal or better ear
- Microphone enabled for BiCROS or Hearing Aid Only mode

**CROS Stream**  
Audio streamed from the Transmitter to the Receiver

**Starkey's First Wireless CROS System**  
introduced on the Synergy platform in Muse standard products



Livio CROS System



- Livio AI 2400
- Livio 2400, 2000, 1600, 1200 **NEW**
- Standard products (with NFMi):
  - RIC 312, BTE 13, RIC R



**CROS System**  
Receiver and Transmitter — must be the same style

**NFMi**  
Utilizes NFMi of the Thrive Dual Radio technology



**Expected Battery Life\***

- RIC 312: 3-5 days
- BTE 13: 4-6 days
- RIC R: 14 hours

\*All RIC battery life estimates based on 50 gain receivers



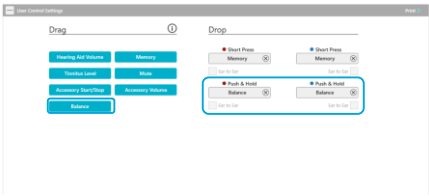
CROS Fitting Considerations

**Memories:**  
CROS modes can still be set on a per-memory basis in compatible memories.

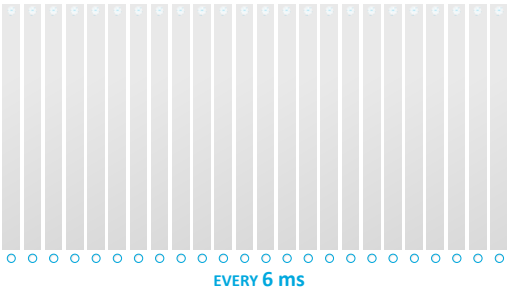
**CROS Streaming:**  
The CROS stream is active in any CROS or BiCROS memory during the fitting session.



CROS User Balance Control



- Transients**  
4 settings  
Up to 15 dB adaptation  
Fast acting
- Auto Music**  
Feature and gain adaptation
- Wind**  
4 settings  
Up to 30 dB adaptation
- Speech In Noise**  
4 settings available  
Up to 20 dB adaptation  
Fast-acting
- Speech In Loud Noise**  
On/Off  
NFMi Audio Streaming  
Up to 20 dB adaptation
- Machine**  
4 settings  
Up to 20 dB adaptation
- Quiet**  
4 settings available  
Fast-acting





100+  
SOUND QUALITY  
Patents

livio + livio<sup>AI</sup>



RIC 312



Micro RIC 312



RIC R



BTE 13

livio<sup>AI</sup>

2400 | with Healthable Technology

livio

2400, 2000, 1600, 1200

●●●●● Snap Fit Smart Receiver Matrix Options: 107/40, 115/50, 120/60, 130/70





livio<sup>AI</sup>

Microelectromechanical System (MEMS)  
Embedded Sensor Technology



**Accelerometer**  
Detects axis  
orientation



**Gyroscope**  
Detects angular  
orientation

**Artificial Intelligence  
and Machine Learning**

To perform tasks that typically  
require human intelligence

To automatically learn and adapt  
based on the acoustic environment





livio<sup>AI</sup>





### Learn More

Back to the Basics  
Tuesday 18 February 2020

Mastering Advanced Features  
Tuesday 10 March 2020

Bringing it all Together with Inspire 2019.1 Software  
Tuesday 7 April 2020

All courses 1:00pm to 2:00pm Sydney Time

Endorsed for Live and Recorded sessions



Register Now

The next generation in sound.

## Launch Event

Sunday 3 May 2020  
6:00pm - 9:00pm  
(Welcome drinks and canapés from 5:30pm)  
Crown Hotel Perth, Crystal Club, Level 15

Starkey's Chief Innovation Officer  
Dave Fabry PhD introduces the  
next generation in sound



Your Starkey team



Dawn Rollings  
• **Managing Director**  
• 0407 095 529  
• [dawn\\_rollings@starkey.com.au](mailto:dawn_rollings@starkey.com.au)



Vincent Santana  
• Senior Product Specialist & Sales  
Support (NSW, SA, ACT)  
• 0413 834 718  
• [vincent\\_santana@starkey.com.au](mailto:vincent_santana@starkey.com.au)



Joanne Sahdeo  
• Product Specialist & Sales  
Support (QLD, WA, NT)  
• 0407 603 292  
• [joanne\\_sahdeo@starkey.com.au](mailto:joanne_sahdeo@starkey.com.au)



Nicholas Bajan  
• Product Specialist & Sales  
Support (VIC, TAS)  
• 0448 664 11  
• [nicholas\\_bajan@starkey.com.au](mailto:nicholas_bajan@starkey.com.au)



Your Starkey team – training & support



Judy Grobstein  
• Manager of Education and  
Audiology  
• 0439 802 020  
• [judy\\_grobstein@starkey.com](mailto:judy_grobstein@starkey.com)



Vija Heath  
• Customer Relations Team  
Leader / Audiologist  
• 1800 024 985  
• [vija\\_heath@starkey.com.au](mailto:vija_heath@starkey.com.au)

Customer Service

1800 024 985 / [australia@starkey.com.au](mailto:australia@starkey.com.au)



## Questions?

## Endorsement Points

ACAud Endorsed: 202005 (2 CEP points)

AudA Endorsed: CPD1920 048 (Category 1.2) (1 CPD point)

HAASA Endorsed: CPED2018-2020 (2020-004) (1.5 CPED points)



Thank You!



Judy Grobstein, AuD-FAAA, MACAud  
*Judy\_Grobstein@Starkey.com*