SoundBites Podcast Transcript
Episode: Finding the Right Fit with Fitting Formulas

Dr. Dave Fabry:

Welcome to Starkey Sound Bites. I'm your host, Dave Fabry, Starkey's Chief Hearing Health Officer, and today we're diving into the world of fitting and fitting formulas to be exact. And I can think of no one better to talk on this topic than Dr. Andrea Hannan Dawkes, who I've known more than I care to admit. I know you've been with Starkey just a little bit shorter time than I have. You came in 2010, if I'm not mistaken, and I joined in 2009, but we've known each other prior to that from various endeavors. So we'll just say a few years, Andrea. But you have, and I'm going to come to you in a minute to describe a little bit about your background and what brought you to audiology, what brought you to Starkey, but you have lectured extensively on this topic, you've taught on this topic. And today we're going to discuss all things related to fitting formulas.

So Andrea, it's a pleasure to have you on the podcast finally, and I'm delighted that you're with us. And we were just talking before we started that she's getting ready to be a grandmother. I just became a grandfather within the last 10 months and so new phases and so it's fun to be able to share that journey with you.

Dr. Andrea Hannan Dawkes:

Well thanks Dave, and thanks for having me today.

Dr. Dave Fabry:

You bet. So let's begin with you and talk about, we said 2010, you came to Starkey, but you have a journey in audiology that started before that you got your bachelor's in master's from the University of Maryland and then your AuD from A.T. Stills. But talk a little bit about what was the catalyst, what drew you to audiology to begin with and talk a little bit about your journey.

Dr. Andrea Hannan Dawkes:

Yeah, thanks for the question. So as an undergraduate student, I was really struggling with what to major in because I liked so many different things. And when I got to that junior senior year of college, finally got to a point where I needed to really set my mind to something. And I loved my health classes, my communication classes. I was taking a few languages as well, Spanish and German, and I loved children. So I put all of that together and thought, well, for sure speech, language, pathology. And then when I got to the University of Maryland, I was taking audiology classes and there you have, it fell in love.

Dr. Dave Fabry:

Wonderful program. I know a lot of the folks that were at Maryland or are still at Maryland, I just saw Dr. Gordon-Salant at Auditory Society meeting earlier this year in February. And Pete Fitzgibbons is somebody I've known for a long time now, he's retired. But what a wonderful education and really that ability to learn from some of the greats in our discipline, but then to apply it. So once you became an audiologist, you did, and you are still licensed in South Carolina. And so you do come from a background where you've used technology and you've fitted hearing aids on patients and now your transition. Talk a little bit about your role within Starkey now.

Dr. Andrea Hannan Dawkes:

Yeah, happy to do so. After my education, I kind of set out to grow myself clinically. So spent some time in Los Angeles and then Houston and then New York City and did some teaching and some research and was part of the research team at another company. And Starkey reached out to invite me to consider a research position. And as things developed and I learned about the education and training role that was really very much suited to my interests and my skills. And so just absolutely love serving on that team. Love working with the engineers and the researchers, developing the technology to create the teachable materials to go out and share with professionals. So always keeps me on my toes with all that's up and coming as well.

Dr. Dave Fabry:

Does indeed. And I've had the great privilege and pleasure to collaborate with you on a number of things. And we've co-presented on a number of projects as it relates to hearing aid dispensing and to audiology. I love how prepared you always come for whatever task in front of you. And so let's on that note, dive in a little bit. So we've lived through professionally, we've lived through the transition from analog devices that had trim pots to digitally programmable devices and now digital devices that enable the hearing care professional to have tremendous tools and flexibility to those tools to achieve their fitting outcomes. And with that in mind, why are prescriptive fitting formulae necessary? Talk a little bit about why you think it is that they're sort of the basis, the building basis upon what the professional, after we deliver the product to them that has these features, how is it that prescriptive targets are important for achieving that outcome?

Dr. Andrea Hannan Dawkes:

Well, they really lay the foundation for success with amplification. And as you talk about the history of hearing aid technology, once the hearing aid styles and even the signal processing capabilities expanded, even when we got probe mic measurements on the table, those prescriptive techniques really took on new importance because it was really important to be able to account for various signals, various responses in the ear, and incorporating various types of signals as well as different input levels. When the technology became more complex, we really needed a tool to be able to set the patient or start the patient on the right foundation.

Dr. Dave Fabry:

I think that's a really good summary of the situation when you think about not only did we have this transition from analog to digital technology, but as it relates to prescriptive formulas even more importantly, was the transition from linear hearing aids that applied gain as a function of frequency across that fitting range into compression devices where instead of a linear device that had the same amount of gain in a channel until it reached the maximum output. At the time that these were developed, and I think of Sam Lybarger as sort of the original prescriptive fitting person who had the half-gain fitting rule back in the early 1940s. Also, there was early work done in UCLA on this topic, but you could use a half-gain fitting rule. And talk about what half-gain fitting rule means, if you don't mind.

Dr. Andrea Hannan Dawkes:

Yeah, sure. Essentially applying half the gain that equates to half the hearing loss. So taking that threshold and applying half-gain to compensate for that loss.

Dr. Dave Fabry:

And in analog devices that were around when dinosaurs roamed the earth, and I was a young practitioner, you could use behavioral measures unaided and aided thresholds measured in the booth to verify whether you were bringing up someone who had a threshold at let's say 70 dB at 1000 hertz and measure unaided and then aided. And you would expect that you would achieve the desired outcome if you reached a threshold, measured threshold in the booth aided at around 35, half of the gain would be applied. That was sort of the basic building block of that. That worked fine until early nineties, I would say when we first started to see devices like the [inaudible 00:07:33] and some other manufactured devices that started to use nonlinear amplification. So gain varied as a function of the input. And no longer could you simply measure unaided and aided thresholds because it was dependent on the input level, how much gain was applied. Talk about some of the transition then and formulae that began to consider linear versus nonlinear amplification for prescriptive formulas.

Dr. Andrea Hannan Dawkes:

As over time, as again, the technology became more sophisticated and really the signal processing as well. The use of compression certainly is very important for individuals who have a reduced dynamic range, very important that we keep signals within the residual dynamic range. And so compression, when that came on the scene really did a wonderful job of ensuring that variable amounts of amplification could be provided based on the input level. So it did a wonderful thing for individuals with especially sensory neural hearing loss and again, reduced dynamic range.

Dr. Dave Fabry:

And while still people sometimes will use an aided and unaided threshold to sort of target where they're wanting to get those aided thresholds, the reality is as well, I think that with the introduction of compression devices, we saw a transition for verification move from the audiogram measuring aided and unaided thresholds into an SPLogram format, where now we started to see formulae that had different targets for soft, moderate and loud inputs.

Dr. Andrea Hannan Dawkes:

That's right, yes. So a greater degree of precision for assisting individuals with hearing loss.

Dr. Dave Fabry:

And to that end, as you said, considering the residual auditory area for a given patient was one of the factors that now could be used. And I consider prescriptive formulae and real-ear measurements, which we'll come to in a little bit as sort of being inextricably intertwined. I mean, you can have sort of a prescribed gain target, but then you could measure back in the days, or if we're using devices that are primarily linear, applying the same gain throughout the range until maximum output, you can measure unaided and aided and then you just look at the gain. But with nonlinear hearing aids, really that transition to SPLogram was necessary. And I'd begin by saying how many prescriptive formulae are available and in use today? It is hard to put an exact number on that, but how many would you say are out there roaming around?

Dr. Andrea Hannan Dawkes:

Yeah, yeah, I love that question. So goodness, it's got to be upwards of 20, perhaps maybe even a bit more, a few more different fitting formulas that have kind of spanned the landscape over the last 10 or 20 years or so. And as you mentioned before, they really go back to approximately 1940 where they

were really prescribing hearing aid parameters based on the audiometric testing that was being done. And it's interesting because the different formulas created over the years have had different goals in mind. They've had different rationales underlying them, the type of signal processing that we were even just talking about. And so today, I think the primary ones in use are those that are created by the hearing aid manufacturers like our e-STAT 2.0. And then there's a handful of generic formulas that are sometimes called independent formulas, and the primary ones in use, there are some in the NAL family, so NL2, NLR or even RP, and then DSL version five as well. Those are the primary ones in use.

Dr. Dave Fabry:

Almost probably numbering 20 as you said. If you include the proprietary manufacturer developed formula and those that are quote unquote "independently validated", why do manufacturers need or develop proprietary formulae versus using those that are in existence like the NAL family, as you said, and the whole host of them that you listed off? Why is it necessary or relevant to have a proprietary formula from a given manufacturer?

Dr. Andrea Hannan Dawkes:

They're very important. They are created to account for unique signal processing, including compression architecture, and they also take into account important things like the hearing aid style, microphone location effects, and even the acoustic coupling as well. All of those variables impact the hearing aid response and all are important elements or considerations for patients.

Dr. Dave Fabry:

It's a great summary, and I wholeheartedly agree. One of the challenges has been, and we'll come to this in a little bit, is that if the proprietary formula aren't available for someone who is using real-ear measurements, then you're kind of in a quandary because then well, how do you verify to a target that you don't necessarily know and can easily measure by frequency, how much gain is the target? And then especially when you start talking with nonlinear devices that vary targets for soft, moderate, and loud. That's always been the challenge. And we'll come to I think some more recent developments that make that exciting to enable practitioners to use proprietary formulae which have been developed specific to a manufacturer and considering, and they continue to evolve based on the technology and the number of channels and bands, but then to actually be able to match in the individual patient taking into consideration all of the unique acoustic elements and location of the microphone, venting size, all of that for the individual patient in a way that wasn't previously possible.

From a high level, can you talk about what some of the different formulae, you talk about the 20 formulae at a general level, are they considering loudness, intelligibility? What sorts of factors come into play when developing these specific target formulae?

Dr. Andrea Hannan Dawkes:

Yeah, there are a number of variables that differentiate the different formulas. So it depends on a variety of different considerations I guess, if you will. So the type of signal processing that we were talking about, also the differences occur in how the underlying theoretical rationale, is there a loudness, the perspective loudness equalization or maybe loudness normalization if you will, how much audiometric information is available in order to calculate responses. The other thing that's important is the fitting formulas as a whole. There are different goals upon which they were developed. So the goal of optimizing speech intelligibility, minimizing rejection of amplification, and then maximizing things too, not just speech intelligibility, but comfort and sound quality and patient satisfaction. So there are a

number of goals behind the different fitting formulas, the principles which they're based, and again, the type of signal processing that they were created for.

Dr. Dave Fabry:

Makes sense. And not all hearing aids are built the same. And so as you said, being able to optimize those for the individual number of compression bands or channels that are used, the noise management systems that are used is why these proprietary formulae exist. So when we talk about, you mentioned loudness equalization and loudness normalization, can you expand on that just a little bit more for people that maybe aren't as familiar with that nomenclature?

Dr. Andrea Hannan Dawkes:

Yes, I'm happy to do that. Loudness equalization aims to equalize loudness across frequency bands. So that all sounds are equally loud. The goal really is for the patient to perceive speech like someone with normal hearing. And an example of a rationale or formulas based on this would be NAL, for example. So that's loudness equalization, equalizing across frequency bands. Loudness normalization on the other hand, that is designed to have patients perceive or judge soft, normal and loud signals like someone with normal hearing. And so the goal there is to maintain normal relative loudness across frequency bands. And a formula example there would be DSL version five.

Dr. Dave Fabry:

Yes, perfect. And Richard Seewald, who's known to both of us, he's sort of the godfather of the SPLogram and David Pascoe probably deserves credit coming out of the Central Institute of the Deaf, but Richard picked up that and really the DSL I/O and DSL five formulae are used for pediatric and also in considering those individuals specifically with narrowed residual auditory areas. So I have a lot of appreciation for the work that went into the development of that, but now let's turn our attention to e-STAT. You mentioned that we have recently updated to now e-STAT 2.0, and can you talk about e-STAT 2.0 and then some of the latest developments, latest advancements that we've developed for this most recent version and update?

Dr. Andrea Hannan Dawkes:

Sure, you bet. So e-STAT stands for evidence-based statistic, and with our latest iteration that we introduced last year with Genesis AI, e-STAT was enhanced to provide more gain for soft sounds, which equates to better speech intelligibility also provides more gain at higher frequencies for a broader, more well-rounded response, which lends itself to improved sound quality. So it's not peakier just broader. And then it also incorporates some improvement modeling, which is also an important consideration for patients.

Dr. Dave Fabry:

Yeah, I think Dr. Michelle Hicks and her team, the clinical research team have demonstrated that more audibility for soft sounds was critical to this advancement. And we've seen that in comparison to previous products and previous formula targets. We've got improved audibility for soft speech and also for those high frequency components. And you mentioned earlier about compression. By using this fast and slow compression really operating seamlessly, depending on whether it's transient or continuous signals including both speech and noise, we were able to deliver more high-frequency audibility, translating into better consonant intelligibility without that harshness, as you said, that some others with some other products people complain of. And so that ability to deliver more audibility for soft

speech, higher frequency audibility to translate into consonant intelligibility is why that e-STAT 2.0 Really is such an incredible advancement.

Dr. Andrea Hannan Dawkes:

Yes, and having the additive compression that we are using, having both slow and fast acting compression in each and every channel of the instrument really does a remarkable job of compensating for both outer hair cell and inner hair cell damage. And we know that both can exist with hearing loss. So a wonderful step forward.

Dr. Dave Fabry:

Absolutely. And we've talked about a number of even the proprietary formulae and some practitioners are loyal to one proprietary formulae or another. Are there differences that you've seen in your experience in some of the work you've done in research in clinical practice that some people favor one formula or another for specific patient populations?

Dr. Andrea Hannan Dawkes:

I don't know that there is necessarily one set recommendation. I would say that largely professionals are embracing the proprietary rationales as the best fit in match for the technology and the signal processing. NAL-NL2 is also very popular with sensory neural hearing loss DSL version five certainly. And you mentioned that before with children, a very important tool also for those with conductive hearing loss, going with a more linear strategy, those individuals tend to prefer a bit more gain. They don't have the challenge of a reduced dynamic range usually. And so the NAL-R, for example, or RP can be good choices there with conductive or mixed hearing loss.

Dr. Dave Fabry:

It does all boil down to what's going to provide the best sound quality and the best speech intelligibility for every range of hearing loss. And that's where I think with the proprietary formulae, regardless of whether it's someone with a mild loss, moderate, severe, profound loss, the targets in our proprietary formulae that have been developed for e-STAT 2.0 work across the entire spectrum because of all of the noise management, but especially the compression and the gain and the MECO characteristics that define the targets that we're looking for.

Dr. Andrea Hannan Dawkes:

Yeah, I became myself on a personal level, very much a fan of the proprietary formulas long before I became part of the Starkey team, and I do see them being well embraced in the clinical settings. Yeah.

Dr. Dave Fabry:

Well, so now I'll be the devil's advocate. So given that they're, both of us have been on the other side of the manufacturer for a while, and I will tell you that there have been times in the past where I've said, "Well, yeah, it's great that you have a proprietary formula, but as somebody who has throughout my entire career used real-ear measurements as an initial tool." I want to be very clear on this. real-ear measurements are not the end all be all, but they are the best tool that enable you to verify in the individual patient whether you're achieving your prescriptive target goals. And in the past, at least when a manufacturer says, "Well, the prescriptive proprietary formula that we use is the best one to use." I had no means of verifying that I was ensuring within an individual patient that I would meet their targets

because the real-ear measurement systems that I use required that I use one of the NAL targets or DSL or one of the other independent formulae.

How would you respond now that you're wearing a manufacturer hat with someone who says, "Well, I use real-ear and therefore I'm not going to use the proprietary formula no matter how good you tell me it is."

Dr. Andrea Hannan Dawkes:

I definitely agree that the very best tool we have for verifying audibility and comfort are indeed real-ear measures regardless of the fitting formula. They definitely play an important role. There are several reasons why, as we've already discussed, why proprietary formulas like e-STAT are so important and so helpful. I think the ability to match target is one consideration and I think the ability to confirm audibility and then also benefit are important considerations in the whole verification and validation side of the equation.

Dr. Dave Fabry:

And although best practice likely includes real-ear for many people, we all know that the majority of clinicians still don't use real-ear on a regular basis, at least for the initial setting. They'll often, I talk to many professionals to say, "Well, I use it if there's a problem." But for me, I've often said that it's a bit like practicing by astrology rather than astronomy. That being able to measure it means that at least from where you're starting, so that then you can still optimize and personalize it to individual patient need. But talk a little bit about some of the improvements that we've seen not only with e-STAT 2.0, but then as it relates to Pro Fit for ensuring that we can use the proprietary formula and enable professionals to verify according to the targets that we know work best with our technology.

Dr. Andrea Hannan Dawkes:

Yes, absolutely. So we do have a wonderful tool in our Pro Fit software called the REM Target Match, and it is a wonderful tool for being able to conduct real-ear measures simultaneously, quickly, accurately, and to count for the various fitting formulas that are in use.

Dr. Dave Fabry:

Yeah, I can tell you I use it with the Inventis system that I have. I use Auto REM with every patient that I fit to ensure that I'm taking those acoustic parameters for the patient depending upon wearing their custom device or a RIC device venting or non-venting. And it enables me to optimize and just ensure where I'm starting to get that audibility to match to my e-STAT 2.0 target out of the gate, and then still fine tune based on patient preference. But it gives me confidence that if the patient has had a surgical ear or even if they just have an ear, the issue that I think a lot of clinicians sometimes forget is we can make predictions, but we have to do so on the basis of KEMAR or standard ears. But it's rare that you see someone that has the resonant properties that exactly mimic an acoustic mannequin like KEMAR. And so being able to fine tune for that individual acoustic characteristic is important.

And I'll get off my soapbox now, but the Auto REM enables the initial target match to be done automatically. You don't have to fine tune and it optimizes and it takes half the time that it would take me to go and use the standalone software. And importantly, it enables the prescriptive target, the proprietary target to be matched in the manner that we would intend if we as the manufacturer had the patient the luxury of having the patient in front of us. And that's why I'm such a big fan and especially because it creates clinical efficiencies and ensures that I know where I'm starting from.

Dr. Andrea Hannan Dawkes:

Oh, I couldn't agree more. It's a big deal and such a valuable tool.

Dr. Dave Fabry:

Yeah. Now you mentioned earlier, let's say it's for practitioners, says, "I don't want to invest in real-ear or I don't have it. I trust that you are doing a great job with acoustic targeting based on average measurements of where the microphone location effects are, what the venting size is, the average insertion depth for our RIC receivers or a custom devices and small custom devices. I'm going to trust that you're getting as close as possible." Can you talk about other things that we've done with the latest Genesis products in combination with prescriptive targets to better match to the individual ear characteristics like running the feedback initialization test for example?

Dr. Andrea Hannan Dawkes:

Absolutely. That's an important consideration. So feedback cancellation, very important feature. When the sequence that is part of our feedback, canceler feature actually does double duty. It will measure leakage from the ear that amplified sound being redirected into the hearing aid. That creates feedback and it will calculate a strong feedback cancellation algorithm based on the hearing loss and the amount of leakage. But it also does something else. We're actually measuring how much leakage is occurring that might offset the target response. And so we all try our best at, for example, picking the right dome size for a RIC hearing aid. But we know that even in the same individual there can be differences between the two ears. So for example, if there's a significant amount of leakage identified, there's a pop-up in the Pro Fit software that will tell the professional basically, "Hey, we've got an offset from Target here. We're off of target. Would you like me to fix this?"

And so there's a nice opportunity to do that very easily with the click of a button. And I think a clinical example of that to make it more relevant, if my goal with a patient is to deliver 15 dB of gain at 500 Hertz and maybe I've got a lot of leakage coming out of the ear, maybe I'm only giving the patient five of the intended 15. So in that kind of a situation, I would get that nice optimized acoustic model that would say, "Hey, there's a mismatch here. Would you like me to correct this?" So that's a wonderful tool in the Pro Fit software.

Dr. Dave Fabry:

So all the clinician needs to do is first select the receiver size, length power that they're going to use if it's a rick or put the custom device in with the venting characteristics that came through. But as it inserts in the ear for the patient, it might be different as you said, than the acoustic the leakage that's coming back. We can actually, and we're using the feedback stimulus, the initialization stimulus to output and then measure what's bleeding back out. And then in those cases where we're not achieving what the prescribed target would be in e-STAT 2.0, in this case it'll say, "Hey, I'm offering you an update on the basis of this measurement." But they've chosen the dome tip, the receiver and put it in the ear. It's very important. Seems common sense, but it's very important that the feedback initialization stimulus be measured in the ear, not on the table, but all they need to do is measure that. And then if they get the pop-up that says, "Hey, we measured a difference from what is expected, do you want to do this optimization?" They say yes.

And then that is applied to ensure that even if they're not using real-ear measurements, we're getting closer on the basis of that measurement to our prescribed target.

Dr. Andrea Hannan Dawkes:

Absolutely. So important. Prior to Genesis AI, we were using population averages, which are good with Genesis AI. We've got that personalization, that extra degree of precision by using the measurement on ear, which is very important.

Dr. Dave Fabry:

And I do know that there are some professionals that say, "Well, I don't want to expose my patient to loud sounds because... ", now we've even improved the feedback initialization stimulus. It used to come on rather abruptly. And if you had a patient who started it wasn't putting them at risk of noise exposure, but it sometimes startled people because it came on rather abruptly, we've now used a slower ramp for that so it doesn't startle people. In the clinical environment, people say, "Well, I don't want to expose my patient to loud sounds." That's the one environment you can control as part of applying your target gains and then ensuring behaviorally that the patient isn't reacting to a loud sound, that's when you should be concerned with it.

So my clinic tends to be a noisy place because I want to see how they're reacting to those loud sounds. And if I'm using real-ear, I can measure it, but more importantly, I'm watching for nuance in the patient and not using all the tools in the tool belt seems silly. So I would just put an exclamation point on this and say that you need to measure the feedback initialization in the ear, not on the desk.

Dr. Andrea Hannan Dawkes:

Absolutely. And I would just add one more thing. I think it's important for everyone to know that Starkey is one of, I think two companies that does not limit the clinician and the ability to manage the response after having run the initialization sequence. I think that's very important. There are some companies that discourage use of that tool, but we don't, we advocate the use of it.

Dr. Dave Fabry:

Yeah. Thank you for making that final point. I think it's great. And I'm looking at the time and I see that we could, I know you and I could nerd out on this all day, but we're nearing the end of the allotted time that we have. So I do want to just get your comments on, I made a comment about at least my particular perspective on real-ear measurements is it's a tool to help us verify the prescribed targets that we're using in this case, as we're still talking about e-STAT 2.0. What other measures are essential in the tool belt beyond real-ear and beyond these optimization tools like the feedback initialization process to ensuring that we're meeting the goals of our prescriptive formulae?

Dr. Andrea Hannan Dawkes:

Yeah, thanks for that question. I think it's an important one. So we know of course, that real air measures are going to measure the sound pressure level in the ear canal and account for that, which is great. But I do think that validation tools also have an important place. They're going to measure the real world benefit of our fittings. And so there are several variables that feed into that. Certainly we can use real-ear to match targets, but there are times when we need to adjust away from target maybe to address sound quality or accommodate the preferences that patients have. And sometimes even if we run new curves, if you will, after making fine-tuning adjustments, sometimes those new measurements make clinicians feel uneasy. And they certainly don't tell the whole story about benefits. So I'm a big fan of validation measures. I think that it's so important to validate the benefit that the hearing aids are providing, making sure that they are delivering what's important and meaningful to each individual.

And of course, as you know, we've got a variety of objective and subjective tools that can be used. And in fact, there are three at last check that are available directly through the NOAH database that's used by many clinicians. So the COSI, the APHAB, and the IOI-HA, they're all under the NOAH questionnaire module. So easy access there. So a nice compliment to real-ear measures.

Dr. Dave Fabry:

Absolutely. And you can use prescriptive targets and everyone does independent of whether you're a believer in real-ear measurements, but ultimately the proof is in the patient and the patient's response is really that balance, especially for new users between audibility and loudness and sound quality and really in many cases. A final question I guess is what's your opinion on the automated adaptation? Are you somebody that would match to prescriptive target or start with the full on target and then throttle back on the basis of the patient's previous experience with devices? Or do you just like to put them on full gain and have them hunker down and deal with it from the start?

Dr. Andrea Hannan Dawkes:

No, I'm definitely a fan of target matching. I think that's a great starting point, but within that realm of target matching, I think the most important element there is audibility and ensuring audibility for soft, average and loud signals more so even than a direct target match, if you will. So audibility is a primary consideration for me. And then also as you said, and as we said, accommodating the patient and what their needs are and their preferences, I guess. And we've got great tools. So not every patient, especially a new hearing aid user can walk out the door fit to target. Sometimes individuals need to acclimate to amplification. And so there's a great tool that we have, for example, in the Pro Fit software that is our experience manager. So we can line up with target or as closely as possible and then use that tool to help the patient adjust. So kind of ease them into, if you will, the amplification experience.

Dr. Dave Fabry:

And this is why the role of the professional is so important to the outcome, no matter which tools that they're using. As you've said, prescriptive formulae are the building block upon which they begin, but this is patient-driven technology, and it's really that engagement between the patient and the professional that is so critical to success. But I think you've really highlighted not only the importance of prescriptive formulae, the importance of using the tools in the software, in the Pro Fit software to optimize the acoustics, whether you use real-ear measurements or not up to you. But also very importantly, ensuring the outcome measures and validation of the patient's benefit and satisfaction with the technology and the service that they're receiving is why I think a lot of people are afraid of OTC hearing aids or this or that and all sorts of other disruptors, but the role of the professional we provide, and I think the best outcomes are achieved with our technology in the professional's hands to deliver the patient outcomes that they desire, which is to hear better in all situations.

And I really appreciate this discussion on this topic with you today. Thank you for being with us.

Dr. Andrea Hannan Dawkes:

Well, thanks Dave. Thanks for having me.

Dr. Dave Fabry:

Of course. And we've got more to talk about, so I think we're going to have to have you back again, and I'll look forward to that. So for our listeners, thank you for listening to or watching this version, an episode rather of Starkey Sound Bites. We're interested in, if you like this, share it with your friends,

your networks, your colleagues, and if you have ideas for future topics, send us an email to soundbites@starkey.com. We thank you for listening and we look forward to seeing and hearing you again very soon. And thank you once more, Andrea.

Dr. Andrea Hannan Dawkes:

Thank you.