

## The Fine Art of Demonstrating the Efficacy of a Noise-Reduction Program

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In my two [previous blog posts](#), I discussed various ways of clearly showing patients the benefits of hearing aids. I explained how to conduct demonstrations using test words and pulsed warbled test tones.

Today I want to talk about demonstrating a hearing aid's ability to handle "background noise." But be warned, this topic is fraught with danger. Not all patients will benefit noticeably from noise-reduction programming, and it is difficult, or even impossible, to design impressive noise-reduction demonstrations for some categories of patients. People who benefit the most from noise-reduction programming have hearing levels in the middle of the audiogram—neither near the top nor the bottom of the scale. I will explain.

If patients who have nearly normal hearing in the lower frequencies are fitted with open-canal hearing instruments, they will notice little or no difference when you switch back and forth between the normal listening program and the noise-reduction program. For these people, the perceived difference between the two programs is not enough to create any excitement. So I avoid using noise-reduction demonstrations if the patient's low-frequency hearing is pretty good.

When you do conduct a demonstration, you want it to make the patient react emotionally. Done properly, a demonstration generates excited responses like, "Wow! That's really impressive!" or "I can't believe these new hearing aids can do that!"

When patients have poor hearing with thresholds near or below the bottom of the audiogram, they will probably need a lot of amplification. As a result, using directional microphones may reduce the level of amplification to an undesired point where everything sounds too soft. So I usually avoid noise-reduction demonstrations with these patients.

### Reaching People with Moderate-to-Severe Loss

For this discussion of how to demonstrate noise reduction to patients, we have eliminated people with good hearing (thresholds near the top of the audiogram) and people with poor hearing (thresholds near the bottom of the audiogram). This leaves patients with moderate to severe hearing loss, i.e., with hearing thresholds somewhere in the middle of the audiogram. For example: flat hearing loss, 40-70 dB in the lower frequencies, and 60-80 dB in the higher.

Now think about this category of hearing aid patients for a moment. When their amplification is set properly, they have highly functional aided hearing. That means they are going to be able to hear and understand the words well in the demonstration we give them. Also, these patients are fitted with an occluding earmold that works as a noise plug when the hearing aid is switched to Program 2, the noise-reduction setting.

Here are the specifics of my noise-reduction demonstration:

I make sure there is a significant difference between the default program (P-1) and the noise-reduction program (P-2). This difference can be as much as 20 dB at 250 Hz (the lower frequencies).

I seat the patient in front of the speaker for my real-ear system and turn on a 70-dB composite noise. At this point in the demonstration, the patient is using P-1, which has a wide band response.

I ask the patient, “Can you hear the noise?”

He replies, “Yes. It is loud.”

I have the patient push the program button on the remote control (or hearing aid), and I ask, “How loud does the noise sound now?”

If I have adjusted the programming code properly, the patient often says, “I can’t hear the noise at all anymore?”

When this happens the patient’s family goes crazy, saying things like, “What do you mean you can’t hear that noise? Really?”

## **Why this Demo Works**

Now, let’s study this “demo” so we understand why the hearing aid seems to be doing the impossible—eliminating all background noise.

In P-1, patients receive wide band amplification so they hear the noise “loudly.”

When they switch the hearing aid to P-2, three different factors are activated: First, the hearing aid switches into the directional-microphone mode, which substantially reduces the level of sounds coming from the area behind the patient where my “noise” speaker is located.

Second, I have markedly reduced low-frequency amplification in the noise-reduction program, so no low-frequency sound is amplified. Also, the patient has a significant hearing impairment in the lower frequencies, e.g., 40 dB, and is fitted with an occluding earmold that works as a noise plug when the aid is switched to P-2.

The first few times I did this demonstration and the patient said, “I cannot hear the noise at all,” I thought she was exaggerating. But she was not. Set properly, hearing aids can remove huge amounts of low-frequency noise coming from behind the wearer. In many cases, it seems like a miracle.

## **Time to Celebrate**

After I do this demonstration and everyone is happy, I explain that I used a bit of “trickery.” I placed the noise source behind the patient and used a “behind-the-back, directional-microphone system.” If you do this demonstration using a noise from the front, the result is not impressive.

Nonetheless, even after I explain what I have done, patients love this demonstration. They don’t care about the specifics. From their point of view, something in the hearing aid gets rid of lots of background noise, allowing them to hear well without huge amounts of perceived noise.

Bingo! It is time to celebrate!