

Letter to the Editor

OTOACOUSTIC EMISSIONS

To the Editor:

We read with interest the recent article “Similarities and Differences in Distortion-Product Otoacoustic Emissions Among Four FDA-Approved Devices” by Parthasarathy and Klostermann (*Journal of the American Academy of Audiology* 12:397–405, 2001). To our surprise, this article failed to cite one of our papers that is in our opinion relevant and pertinent: “Outcome of Newborn Hearing Screening by ABR Compared with Four Different DPOAE Pass Criteria” by Barker, Lesperance, and Kileny, *American Journal of Audiology* 9:142–148, 2000, published nearly 1 year prior.

In our study, we manipulated pass-fail criteria of the SonaMed “Clarity,” a commercially available, FDA-approved distortion-product otoacoustic emission (DPOAE) (and automated auditory brainstem response) device. Four different pass-fail DPOAE criteria were used, and the results were compared with the results of an automated ABR on 596 neonates (1184 ears). None of the infants had risk indicators for hearing loss, and all ears passed the ABR screening. We defined the presence of a distortion-product (DP) response for any one frequency using the novel criterion of a signal-to-noise ratio of at least 6 dB (the usual range cited in the published literature is +3 to +5 dB) and a DP response magnitude exceeding –5 dB. The four different pass criteria were (1) the presence of DPOAEs per the above-mentioned criteria at two of the three F2 frequencies tested including 2000 Hz, (2) DPOAEs present at any two F2 frequencies tested, and (3) the above two conditions with or (4) without a replicated response. Replication was defined as a second response obtained within 6 dB of the original response, with both replications meeting the criterion for presence. We found that although all ears passed the ABR screen, between 35 percent for the most stringent DPOAE criterion and 11 percent for the least stringent DPOAE criterion of ears were “refers.”

The Parthasarathy and Klostermann paper had a similar objective, studying the effects of DPOAE pass-fail criteria on hearing screening results using several commercially available,

FDA-approved devices. Furthermore, we find it remarkable that Parthasarathy and Klostermann used the identical stringent criterion for DP signal-to-noise ratio and magnitude as defined by our work. It should be noted that our population was substantially larger and was confined to newborns, who are the obvious target population for hearing screening using commercial devices. Thus, although it is certainly a novel contribution to ask the same research question in an analogous population of adults, it should be reported in the context of current, pertinent literature.

It is our opinion that our study is relevant to this field and that citing it would not have detracted from the value and relevance of the Parthasarathy and Klostermann study. We appreciate the opportunity to bring this matter to your attention for consideration by the readers of *JAAA*.

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The Authors Reply

We appreciate the opportunity to comment on the letter from Marci Lesperance and Paul Kileny. Although we were fully aware of the Barker et al (2000) article and could have cited it, we believed that this was unnecessary because it differed significantly from our article, precluding any meaningful comparison.

The Barker et al (2000) article contains data obtained in a sample of neonates using a single distortion-product otoacoustic emission (DPOAE) device. Data were analyzed with one signal-to-noise ratio (6 dB) and pass criteria that were arbitrary and not frequency specific (–5 dB SPL at all frequencies). The status of the conductive mechanism was not determined. Actual hearing sensitivity was not measured with a frequency-specific threshold assessment but was estimated based only on a suprathreshold criterion, the presence of auditory brainstem response (ABR) wave V for broad-band clicks at 35 dB nHL.

Conversely, our study contains data obtained in a sample of adults using several other DPOAE devices. Data were analyzed with two signal-to-noise ratios (5 and 6 dB)

and pass criteria that differed by test frequency and are fully characterized in the published literature. Additional measures (tympanometry, bone-conduction thresholds) verified that the status of the conductive mechanism was normal. Actual hearing sensitivity was measured precisely with frequency-specific threshold assessment.

Even ignoring the difference between populations (neonates vs adults), other differences prevent comparison. The OAE results cannot be compared because of the differences in pass criteria. Protocol effects cannot be compared because the Barker et al (2000) study included effects of unknown conductive mechanism conditions. Note that a 10-dB change in hearing level caused by a transient conductive condition (e.g., presence of amniotic fluid) will reduce stimulus levels at the cochlea that will cause DPOAE levels in many subjects to fall below either DPOAE pass criteria, yet will still leave the ABR stimuli at the cochlea 25 dB above actual threshold and produce a clear ABR wave V. The only way to allow direct comparison of the results would be for us to have measured neonates or

for Barker et al (2000) to have determined hearing status with a frequency-specific threshold assessment and conductive mechanism status with other measures.

We view the two studies as different but complementary. The Barker et al (2000) article provides information concerning overall screening results in a well-baby neonate population when using a single device with four protocol variations, and their research data include unknown transient conductive conditions. In addition, there were substantial differences in OAE pass criteria and in pass criteria that differ substantially between OAE and ABR measures. Our article provides detailed information concerning the specific effects of several protocol changes that are independent of individual devices and uncontaminated by unknown conductive mechanism conditions or differences in criteria between OAE and actual hearing sensitivity.

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