



CLINICAL BRIEF

Use of the Vivosonic Integrity™ V500 System to Identify False Indications of Noise Induced Hearing Loss

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Noise induced hearing loss indicates a negatively affected Cochlea and/or auditory nerve. The preferred method of testing for noise induced hearing loss is a behavioural test. In certain circumstances a patient may inadvertently or purposely not respond to a behavioural test and hence falsely indicate a hearing loss – malingering. Dr. Yehuda Holdstein, an expert and an ENT physician in Israel has evaluated over 10,000 cases of claimed occupational hearing loss and in his estimation 25% to 30% of these claims involve some degree of malingering.

His standard first-tier battery of tests for verifying noise induced hearing loss include behavioural, OAE and impedance testing. However in cases where it is suspected that hearing loss may have been falsely identified, he has successfully used the Vivosonic Integrity™ V500 System in a second tier battery of tests to verify the hearing loss claim.

The impedance test is used to verify that there is no middle ear pathology or blockage that could explain the hearing loss (unrelated to occupational noise) or prevent OAE detection. An indication of hearing loss on the behavioural test and high OAEs suggest a possible likelihood of malingering.

To validate and cross-check the results of DPOAE testing, Dr. Holdstein strongly recommends a second tier of tests, including another OAE test and a first ABR test. The purpose of this second tier is to cross-check the OAE and behavioral results and to verify the function of the auditory pathway from the cochlea to the auditory nerve and brainstem. Dr. Holdstein recommends using the Integrity™ V500 System for the ABR tests to determine thresholds using 1kHz, 2kHz and Click stimuli. A successful ABR test with Integrity™ will show a threshold with an applicable offset that is consistent with behavioural results.

The advantage of the Vivosonic Integrity™ V500 System compared to other commercially available ABR systems is the myogenic and electromagnetic noise filtering inherent in Integrity™ technology.

Typical methods that patients use to prevent a successful ABR involve generating excessive myogenic noise – grinding teeth, movements etc. These standard methods of preventing a successful ABR cannot effectively “fool” the Integrity system although it will delay the generation of a suitable response.

In addition, the Vivosonic Integrity™ V500 System allows the patient to be situated in a waiting room where the test can run untethered to the computer and the patient can relax and be free to read or watch a quiet video; hence promoting a successful ABR test.

Dr. Holdstein’s experience has been that patients who are malingering are able to delay a response on other ABR systems indefinitely. Dr. Holdstein uses the Vivosonic Integrity™ V500 System to confidently separate subjects with true noise induced hearing loss from those who are malingering, whether inadvertently or purposely.



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Supporting research indicating the effectiveness of the Vivosonic Integrity™ V500 System in active patients includes:

Meyer et al. (2011)¹ compared the Vivosonic Integrity™ V500 System to the Bio-logic NavPRO, a conventional ABR system, under “Quiet” and “Active” conditions with normal hearing adults. In the “Quiet” condition, subjects were relaxed and supine with eyes closed. In the “Active” condition, subjects were seated upright with eyes open, and were engaged in a gentle activity. Data indicates “both the overall and modified means for the Active thresholds were markedly better with the Vivosonic machine than with the Biologic.” Furthermore, results show “statistical significance and notable clinical trends favoring the Vivosonic performance when subjects were engaged in an activity.”

In a similar study, Gerhart, Hall & Black (2010)² evaluated the ABRs of normal hearing adult subjects with the Vivosonic Integrity™ V500 System and a conventional AEP system, the GSI Audera. “Results showed a significant enhancement of the ABR recordings using the Vivosonic Integrity in situations involving myogenic noise.” Specifically, “With a conventional system, clinically useful data were obtained for all adult subjects in the quiet condition, but only 2 out of 10 subjects in the noisy condition. With the Vivosonic Integrity device, ABR thresholds in the noisy condition were within 10 dB nHL of thresholds in the quiet condition for all subjects tested. Thus, threshold estimation in noisy condition with Vivosonic Integrity permitted accurate description of hearing status.”

Cone et al. (2013)³ reports in a soon-to-be published study comparing the Vivosonic Integrity™ V500 System to the Intelligent Hearing Systems Smart-EP system that, when testing 40 adults with normal hearing, “30-45% more subjects had responses present at levels of 40-60 dB ppeSPL during steady state and intermittent (motor) noise” conditions with the Vivosonic Integrity™ V500 System. In the same study, 50 infants and young children at risk for hearing loss were evaluated with click-evoked ABR under awake and non-sedated conditions. According to the investigators: “Results indicate a 30-40% advantage over conventional methods for ABR technologies that employ adaptive filtering and in-situ physiological amplifiers.”

A study by Hall & Sauter (2010)⁴ which recorded ABR from 103 children and 100 adults found that that the Vivosonic Integrity™ V500 System provided significant evidence and support for the value of un-sedated ABR in infants and young children, and proved to be useful in the objective assessment of adult patients suspected of non-organic or retrocochlear auditory dysfunction.

¹ Meyer D, Moskop J, Winston A, Schupback J (2011). ABR Results in Quiet and Active Subjects. Poster presentation at AudiologyNOW! 2011, Chicago, IL, April 6-9, 2011.

² Gerhart MJ, Hall JW III, Black AL (2010). Evaluation of the Vivosonic Integrity Device for Auditory Brainstem Response Measurement. Poster presentation at AudiologyNOW! 2010, San Diego, CA, April 14-17, 2010.

³ Cone B, Norrix L, Velenovsky D, Dean, J (2013). Innovations in the Electrophysiologic Evaluation of Infants Part I: Technology. Research Podium at AudiologyNOW!, Anaheim, CA, April 3-6, 2013.

⁴ Hall JW III, Sauter T (2010). Clinical Experience with New Technology For Recording Un-Sedated ABRs. Poster presentation at AudiologyNOW! 2010, San Diego, CA, April 14-17, 2010.