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Advanced ABR Technology: Eliminating the need to sedate children

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Clinical evidence confirms that with recent technological advancements, ABR without sedation is a viable and practical alternative to conventional ABR practices. While ABR measurement often requires sedation and/or anaesthesia to minimise the muscular activity of infants and young children¹, interest in a safe and effective alternative is increasing.

An ABR assessment is valuable for estimating hearing thresholds of infants and young children, and for assessing suspected retrocochlear auditory dysfunction. A considerable disadvantage, however, is the use of sedation and/or anaesthesia to obtain clear ABR recordings. Sedation and anaesthesia are associated with medical risks to patients^{2,3}, parental concern, scheduling delays, increased time and costs and specialised resource demands.

Clinical Implications

Recent experiences with non-sedated ABR indicate that clinical effectiveness and efficiency can be significantly improved by this approach.

Hall and Sauter (2010)⁴ state that ABR testing without sedation is *clinically feasible and valuable*. In their recent study, ABR testing without sedation was performed on 103 children in a resting state using the Vivosonic Integrity™ system with a con-

ventional test protocol. The availability of the non-sedation option led to the following findings: enabled timely management decisions for more than 90% of the cases; reduced the need for ABR assessment with sedation or anaesthesia by 66%; reduced the cost of performing an ABR by at least 85%; and significantly reduced the wait time for an ABR assessment from more than 2 months to less than 3 weeks.

According to Sebzda (2010)⁵, the introduction of non-sedated ABR has significantly reduced wait times for an ABR assessment from 5 or 6 months to 1 week. Of 124 ABR tests performed with the Vivosonic Integrity™ system, 110 were completed successfully without sedation. In general, the clinic identified improved patient safety, parent satisfaction and scheduling (including releasing time for other appointments) as major benefits. One unexpected benefit was the impact on newborn hearing screening. The ability to test awake newborns who had failed their screening eliminated the need for follow-up appointments and provided parents with same-day results.

About the Technology

The combination of new signal processing technologies, improved amplifier design and wireless capabilities of the Vivosonic Integrity™ system make it possible to conduct ABR testing without sedation.

Signal processing. Whereas a conventional ABR system rejects responses contaminated by artifact, Integrity combines a proprietary method of adaptively estimating the noise in each response with the method of Leski⁶ to weight *each and every* response, resulting in an ABR with minimum probability of error. This technique is known as Linear Minimum Mean-Square Error Filter, or Kalman-weighted averaging.^{7,8}

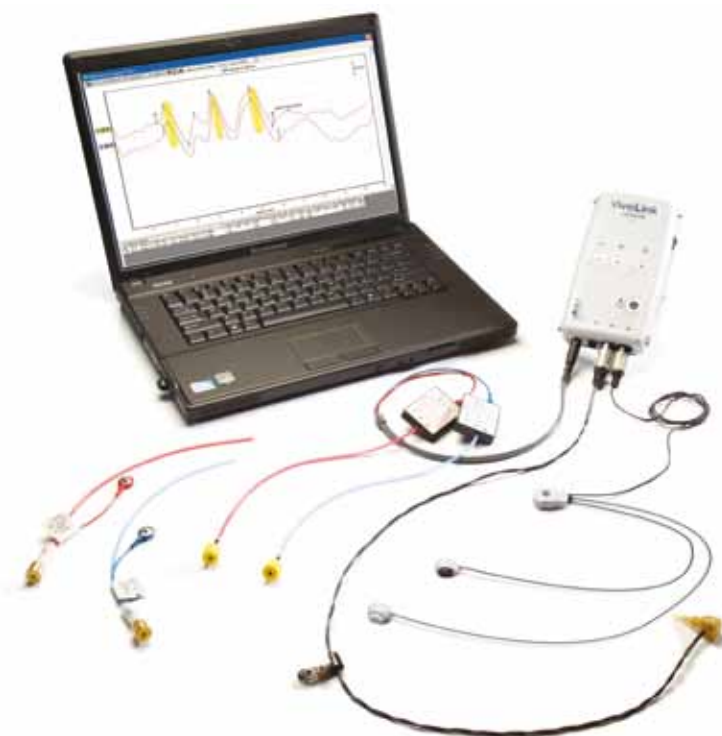
In situ amplification. The patented Amplitrode® design amplifies the ABR signal at the recording electrode site with no intervening wire. In addition to minimising the electromagnetic interference picked up by lead wires in conventional amplifiers, in situ amplification minimises the effects of motion artifacts that contaminate ABRs when wires move about freely.

Wireless recording. Wireless communication between the VivoLink™ and the computer allows a baby to be held or strolled during testing. In addition, it provides convenience and flexibility by allowing active young patients the freedom to play quietly or roam about while testing is in progress.

New Frontiers

Teleaudiology. Without the need for an OR and specialised personnel, ABR without sedation enables essential hearing diagnostics in rural communities. A natural progression, and a current trend, is to deliver these services via tele-audiology.

Adult and difficult-to-test patients. The advantages of non-sedated ABR technology are most often associated with paediatric assessments. However, the technology is considered a valuable tool to assess retrocochlear auditory dysfunction in adults⁹, and the hearing of persons who cannot provide reliable behavioural responses.





Newborn hearing screening. Integrity's core technology has been integrated into the Aurix™ Newborn Hearing Screening System. Clinical data reveals that Aurix performs better than similar equipment when screening awake babies.¹⁰

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