Treatment for Auditory-Based Learning Impairments: Evidence Supports Efficacy

By Nina Kraus, PhD, & Samira Anderson, AuD, PhD

In our September column, we discussed the impact of impaired auditory processing on reading development, which suggests that auditory training might be a viable management strategy for children who have dyslexia or are at risk of developing reading problems. But is there any evidence to support treatment efficacy for this kind of disorder?

Let's first look at evidence supporting remediation efforts. Even a short, three-hour training session on phonological awareness can improve reading-related skills and neural discrimination of speech sounds (mismatch negativity; MMN) in preschool children (*Brain Res* 2012; 1448:42-55).

Several studies have shown benefits over longer time periods typical of commercial training programs.

For example, children with dyslexia who participated in 35 to 40 sessions of Earobics, a popular auditory training program, had better auditory processing following training, as demonstrated by better speech-evoked auditory brainstem responses (ABRs) in noise and better performance on reading-related tests of cognitive ability (*Behav Brain Res* 2005; 156[1]:95-103).

In these children, ABR latencies prior to training predicted improvement in syllable discrimination, suggesting that the speech-evoked ABR can be useful in determining who is most likely to benefit from training.

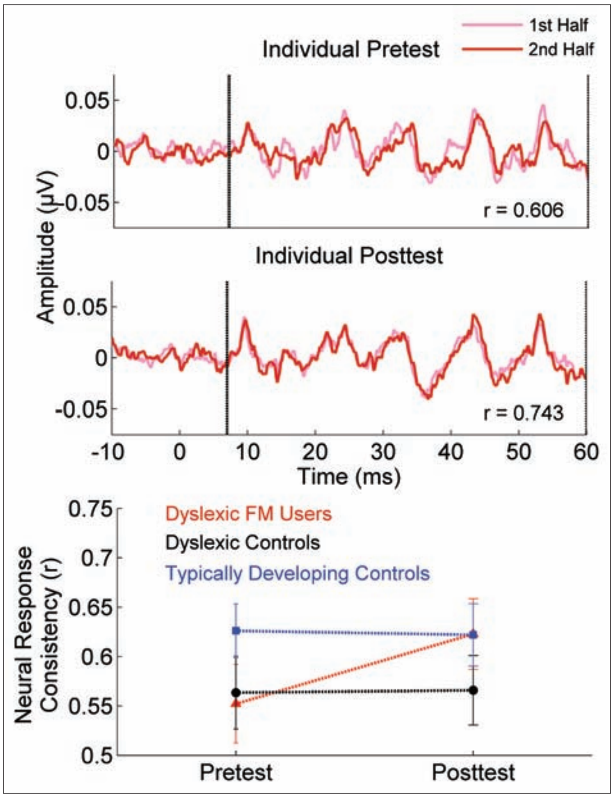
One example of an environmental modification used to enhance access to the acoustic signal is a frequency modulation (FM) system. There is now evidence for the benefits of using FM systems for improving both reading performance and neural response consistency (*Proc Natl Acad Sci U S A* 2012;109[41]:16731-16736).

In the FM study, children with dyslexia (age 8 to 14) wore Phonak EduLink systems during lecture-based classes, approximately four hours per day, for the nine-month academic year. Another group of children with dyslexia attending the same classes did not use the assistive listening devices and served as the matched control group.

In the summers before and after the school year, both groups, along with a group of typically developing children, were tested with ABRs.

After one year, the children using FM systems had improved neural response consistency and greater gains in reading compared with the matched control or typically developing groups.

Importantly, response consistency in the FM group increased to levels equivalent to those of typically developing children.



Neural response consistency improves after one year of FM use in children with dyslexia, with the average r-value increasing from 0.606 to 0.743. (Adapted from Proc Natl Acad Sci U S A *2012;109[41]:16731-16736.)*

Notably, the children with dyslexia with good phonological skills prior to using the FM systems did not show improvements in either phonological skills or response consistency, suggesting that it is important to identify which children are going to benefit from FM use based on pretest measures.

Electrophysiologic measures have demonstrated that both auditory training programs and FM use can improve auditory processing and reading outcomes. Furthermore, it may be possible to identify the children who are most likely to benefit from one or both of these treatment strategies.

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