Visual Evoked Potential Detection of Amblyopia in the Clinic
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Abstract

Introduction: Preverbal children with amblyopia risk factors can be challenging to manage, as they may have a fixation preference but may or may not have amblyopia. We developed a user- and patient-friendly test using visual evoked potentials to aide in management of such children. 

Methods: We tested 33 normal children and 43 amblyopic children (age 3-12 years) using the Diopsys NOVA-TR system. A checkerboard pattern reversal visual evoked response was produced at 2 Hz for each of 5 spatial frequencies. Stimuli were presented for 10 seconds (20 reversals) and the entire test typically took less than five minutes. The relative diminution of P100 amplitude between the eyes, and the absolute prolongation of P100 latency were compared for each spatial frequency.

Results: A 9 millisecond difference in P100 latency for at least two spatial frequencies, or a 25% diminution in P100 amplitude between the eyes for at least three spatial frequencies correctly identified 94% of normal subjects as being normal, and 81% of amblyopic subjects as being amblyopic, including 72% of subjects with mild amblyopia (2-3 lines of inter-ocular difference), and 88% of subjects with moderate or severe amblyopia (>3 lines difference).

Discussion: A pattern reversal visual evoked response at five spatial frequencies can correctly identify children with amblyopia, without misclassifying too many normal individuals. This is important since fixation preference testing can be unreliable in preverbal children. The development of a clinically useful evoked potential test will help pediatric ophthalmologists manage amblyopia in preverbal children.

Conclusion: The development of a clinically useful evoked potential test will help pediatric ophthalmologists manage amblyopia in preverbal children.

Objective

Amblyopia is thought to affect around 2% of all children1. Preverbal children with risk factors for amblyopia can be challenging to manage, as they may have a fixation preference but not amblyopia. By measuring visual evoked potentials (VEPs) in response to predictable patterns, we may have an objective tool for diagnosing and managing amblyopia in these preverbal children.

Subjects

Age: 3-12 years old
33 normal subjects
• 20/40 vision or better and less than 2 lines of inter-ocular difference (IOD)
43 amblyopic subjects
• Amblyopia: 2 lines or more of IOD
• 18 have mild amblyopia (2-3 lines IOD)
• 25 have moderate/severe amblyopia (>3 lines IOD)
5 spatial frequencies at 10 seconds each (20 reversals)
Test took ~5 minutes, setup time was longer.

References


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Conflicts

Dr. Donahue is a consultant for Diopsys Inc. and has also served as a consultant to several other companies.