Abstract for poster presentation—Clinical study (Binocular vision)

Title: Visual Evoked Potentials in dyslexics with visual perceptual deficiency – before and after perceptual training

Author
Leung Ka Yan, Daisy (The Hong Kong Polytechnic University, HKSAR)
Leung Mei Po, Mabel (The Hong Kong Polytechnic University, HKSAR)
Chan Ho Lung, Henry (The Hong Kong Polytechnic University, HKSAR)

Purpose
To investigate the characteristics of Visual Evoked Potentials (VEP) before and after perceptual training in dyslexics

Methods
Fourteen children, 7 dyslexics and 7 control, aged 7 to 8 years were recruited. All dyslexic subjects were diagnosed by clinical psychologist. All subjects are from mainstream primary schools in Hong Kong, using Chinese and Cantonese as their primary written and spoken language, having normal visual acuity and IQ. Children with reported emotional or behavioral problems or binocular vision problem were excluded.
Perceptual assessment including Southern California test of Right Left discrimination, Gardner Reversal Frequency: recognition subtest, Test of Visual-Perceptual Skill (non Motor) - Revised (TVPS-R) and Developmental eye movement test (DEM test), and pattern-reversal VEP were measured before and after 10-week perceptual training (Table 1&2). All the subjects participated in pattern-reversal VEP measurements binocularly with 1000msec recording time. Two conditions of stimulations (checkersize: 180 min of arc) were applied.
(1) 5-Hz at 15% contrast
(2) 15-Hz at 15% contrast
(Figure 1)

Results
In the Southern California test of Right Left discrimination, dyslexic subjects scored slightly higher after training that did not reach statistical significant (Figure 2). In Gardner Reversal Frequency Test, The subjects made significant less error after the training (Figure 3). In the TVPS-R results, subjects obtained higher score in all subtests with statistically significant improvement found in visual discrimination, visual memory, visual closure and the total score after training (Figure 4). In DEM, significantly improvement was again found. After training, subjects used significantly less time to complete both vertical test and horizontal test. Subjects also made significantly less error in DEM test after training (Figure 5 & 6). In the VEP response with 15% contrast stimuli, the amplitude was lower in the dyslexic group
at both frequencies compare with control, but statistically significant difference was found only at 15Hz stimuli. This showed that there were changes of the transient visual response which implies that there is an abnormality in magnocellular pathway (M-pathway) in dyslexics. The VEP amplitude in the dyslexics showed no significant change after training (Figure 7). Although significant improvement in perceptual performance was found after training, no obvious changes were observed in the VEP response. This implied that perceptual training influences behavioral activity but not in neurophysiological activity at the primary visual cortex.

Conclusion
There is abnormality in M-pathway in the dyslexics reflected from the significant difference of VEP responses towards 15-Hz at 15% contrast stimulus between dyslexics and control. Perceptual training can enhance perceptual performance but not the VEP response, which implied that perceptual training may not influence the neurophysiological activity at the primary visual cortex.