



FOCUS ON RESEARCH

Perceptual Learning in Enhanced Amblyopia Treatment (PLEAT): an exploratory randomised control trial in the treatment of amblyopia.

Researchers

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Aim

This study was designed to evaluate the effectiveness and feasibility of implementing new interventions which embed visual training in videogame type tasks in restoring visual function in residual amblyopia.

Project Outline/Methodology

The most common natural cause of visual deprivation in childhood is amblyopia or 'lazy eye'; it affects approximately 3-4% of the total population. For over 260 years, the primary treatment for amblyopia has been occlusion (patching) of the non-amblyopic eye but long treatment periods are difficult and distressing for the patient and parent. Recently, the success of perceptual learning (via videogame playing) has raised the question of whether it should become a standard part of the armamentarium for the clinical treatment of amblyopia.

The primary study design was an exploratory, single-blinded, intra-patient controlled RCT. Each patient randomised into the study received 60 minutes of vision therapy per day with the study specific visual training program for 10 days. It is vital to determine the optimal viewing conditions for training; therefore the amblyopic patients were randomly assigned with equal probability to one of the following study arms (treatment modalities):

- Binocular (active comparator/control)
(both eyes view the same stimulus – little advantage if suppression is present patient is likely to use fellow eye only)
- Monocular (experimental)
(only the amblyopic eye views the stimulus – acuity may improve in amblyopic eye but unlikely to promote 'binocularity' between the eyes)
- Dichoptic (experimental)
(contrast of the images adjusted between eyes to take account of differences in visibility – optimised to improve both monocular acuity and the cooperation between the eyes i.e. binocular vision).

Key Results

- Of the 17 subjects recruited 12 showed an improvement in visual function after training.

- After 6 months the mean improvement in visual acuity maintained was 0.150 logMAR (greater than one line on a vision chart) these 7 participants were considered treatment responders.
- Similar improvements in visual function were gained regardless of the viewing modality of the game monocular v's dichoptic v's binocular.

Conclusions

These results partially verify the feasibility of a perceptual learning approach (video game play) in the treatment of juvenile amblyopia for improvements in visual acuity. Of particular note;

- Even binocular viewing through a head mounted display with no contrast penalisation has the potential to produce a change in visual acuity
- Office-based perceptual learning paradigms can generate significant issues with take-up, thus the current direction of home-based treatments is the right one but depending on the equipment used, may require careful clinical supervision to minimise intractable diplopia risk in older children.

What does this study add to the field?

30% of all subjects experienced at least one adverse event (headache, sore eyes, double vision) therefore the current study emphasizes the need for caution when employing VR head mounted displays in the treatment of amblyopia and binocular vision disorders

Implications for Practice or Policy

The treatment of amblyopia continues to generate sustained interest however, few studies have been subjected to rigorous scrutiny, there is therefore still a clear need for careful controlled clinical trials to provide the requisite data to establish clinical practice guidelines for the treatment of amblyopia with PL techniques.

Where to next?

The development of a more viable 'take home device' where compliance could be logged remotely.

Further details from:

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