Vision Dysfunction in Myalgic Encephalomyelitis

A wide range of ocular signs and symptoms occur in Myalgic Encephalomyelitis. These include eye pain, photophobia, visual processing problems, floaters & spots, tearing, dry eyes, poor focus, double vision, blurred vision, tunnel vision, night blindness, depth-of-field loss, nystagmus (eyes move rapidly and uncontrollably), scotoma (aura or blind spot that obstructs part of your vision) and early cataracts.

Myalgic encephalomyelitis (ME) is a devastating disorder marked by Neuro dysfunction of the central nervous system. It not well understood and its diagnosis is controversial. It is very important therefore that significant clinical features are investigated. Visual symptoms in ME represent a group of distinct, quantifiable, clinical features that could significantly improve diagnosis and provide insights into underlying pathology.

The purpose of one study was to explore the effect of ME on spatial windows of visibility using the spatial contrast sensitivity function. Contrast sensitivity was determined for stationary luminance-defined sinusoidal gratings spanning a five-octave range of spatial frequencies (0.5 to 16 c/deg) in a group of 19 individuals with ME and a group of 19 matched (age, gender) controls. Compared to controls, the ME group exhibited a restricted spatial window of visibility for encoding stimulus contrast. This was characterized principally by a contrast sensitivity deficit at lower spatial frequencies and a narrower bandwidth. Our findings suggest that contrast sensitivity deficits may represent a visual marker of ME, and be indicative of abnormal visual processing at the level of the retina and in the cortical and subcortical visual pathways.

Visual symptoms in ME represent a group of distinct, quantifiable, clinical features that could significantly improve diagnosis, provide insights into underlying pathology and represent a candidate for treatment, thereby improving the everyday lives of patients. Commonly-reported visual symptoms include photosensitivity, difficulty focusing on images, blurring of images, halos around images, poor depth perception, pain in the eyes, impaired visual attention, increased susceptibility to pattern glare, and vision-related headaches.

A number of visual problems have also been identified objectively using experimental measures and include, reduced visual accommodation and poor binocular vision, increased susceptibility to pattern-glare, inaccurate eye movements, and impaired visual attention, particularly on tasks on which performance relies upon the ability to detect and/or identify an object whilst ignoring irrelevant visual distractors (selective attention.)

Visual symptoms are a pervasive part of the condition, exacerbate other symptoms, and affect the ability to carry out everyday tasks. Indeed, some studies report that up to 25% of those suffering from ME reduce the frequency of driving or stop driving completely due to the vision-related problems they experience.

In spite of reported problems related to the perception of even elementary spatial information, the effects of ME on spatial vision remain relatively unexplored and unquantified. The purpose of the present study was therefore to explore how ME affects spatial windows of visibility using the spatial contrast sensitivity function.

The human contrast sensitivity function provides a measure of the range of spatial detail that is visible (resolvable) to the visual system and the relative sensitivity to stimulus contrast within this range. Changes in contrast sensitivity are well documented in ageing and are evident in a range of retinal diseases. They are also present in neurodegenerative diseases such as Parkinson's disease and in inflammatory autoimmune diseases such as multiple sclerosis. Contrast sensitivity deficits can be present even when there is no detectable impairment in visual acuity. They provide a sensitive clinical measure of visual function and can indicate abnormal visual processing at the level of the retina and in the cortical and subcortical visual pathways.

Other studies have revealed abnormalities of the pre-ocular surface and vascular pathology in the eye. There is also evidence for a significantly higher distribution of exophoria, lower functional vergence (near and far), a further point of convergence, and lower tear secretion and break up time in ME patients, compared to healthy controls, reduced accommodation, impaired anti-saccadic and smooth pursuit eye movements deficits in visual attention (determined using visual cueing, visual search & selective visual attention tasks) and increased susceptibility to pattern-related visual stress.

There have been findings to add to a growing literature demonstrating that vision-related problems and their effects on everyday tasks that involve functional vision (e.g., reading, driving) represent a measurable class of symptoms that are commonly reported by patients with ME. In the context of the present study, they support the claims of people with ME that they experience difficulties related to reading, and that visual factors contribute to this phenomenon. ME patients exhibited slower maximum reading speeds than controls on standardized reading tests. Although reading acuity and acuity for isolated words and letters did not differ significantly between patients and controls, patients were more susceptible to visual crowding. Reading test performance was also correlated with crowded acuity in that patients who read more slowly were more susceptible to the effects of visual crowding. Increased susceptibility to visual crowing was also associated with poor acuity for isolated words.

Deficits in other aspects of binocular vision, such as accommodation or eye movement control may also contribute to reading difficulties in ME. There is evidence for problems with visual accommodation in ME, where reduced fusion amplitudes, reduced convergence capacity and a smaller accommodation range have been reported recently. In the context of reading, poor accommodation has been linked to headaches and visual discomfort in school-age children.

Studying eye movements while reading may shed light on the causes of reading-related visual discomfort but, to date, no studies have systematically examined eye movements during reading in this group. When we read, our eyes move along each line of text by making a rapid sequence of saccadic eye movements, separated by brief fixational pauses during which visual information is acquired. Studies of this behavior are remarkably informative about moment-to-moment processes in reading and have led to the development of sophisticated models of eye movement control. Studying eye-movements during reading may therefore provide a more coherent account of how reading behavior is affected by ME.

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