Comparison of change in accommodative lag and accommodative microfluctuations with visual fatigue

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Sample
12 emmetropes (≤ 0.75 DS, < 0.75 DC astigmatism) and 2 myopes (-2.00 DS & -4.00 DS; corrected by soft contact lenses); age range 23-39 years (non-presbyopes)

Apparatus

Introduction
Various factors especially different components of accommodation have been used to assess visual fatigue. Studies¹,² have demonstrated positive correlation between accommodative lag and visual fatigue. Also, it is shown that accommodative microfluctuations, particularly the low frequency component increases with visual fatigue³,⁴,⁵. Therefore, this study aims to identify the most reliable indicator for visual fatigue among accommodative lag and accommodative microfluctuations, when measured simultaneously.

Materials and Methods

Sample
12 emmetropes (≤ 0.75 DS, < 0.75 DC astigmatism) and 2 myopes (-2.00 DS & -4.00 DS; corrected by soft contact lenses); age range 23-39 years (non-presbyopes)

Apparatus

Procedure
• Subjects performed 60 minutes of task displayed on the monitor
• During task performance, a fixation target for 20 seconds was displayed after every 5 presentations of the visual search task

Data Analysis & Results

Power spectrum of accommodative microfluctuations for fixation targets at 0 min, 30 min and 60 min was analyzed by Fast Fourier Transformation using MATLAB®

Accommodative Microfluctuations Vs Accommodative lag

A

B

Duration of task

0 min 30 min 60 min

Lag of accommodation (D)

Power (D² / Hz)

-0.012 -0.010 -0.008 -0.006 -0.004 -0.002 -0.000

0.0000 0.0005 0.0010 0.0015 0.0020 0.0025 0.0030

LFC (< 1Hz) OD OS

OD OS

n.s. n.s.

MFC (1.0Hz - 1.6Hz)

0.0001 0.0015 0.0030

0.0040 0.0055

OD OS

n.s. *

HFC (1.7Hz - 2.5Hz)

0.0005 0.0010 0.0015

0.0020 0.0025

OD OS

n.s. *

Monitor

11.1 1.2 1.3 1.4 1.5 1.6 1.7

OD OS n.s. n.s. 60 min 30 min 0 min

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Conclusion

• Visual search task successfully induced visual fatigue
• No change in accommodative lag but significant increase in accommodative microfluctuations after 60 minutes of performing task
• Accommodative microfluctuations appear more sensitive to visual fatigue than accommodative lag and therefore, a reliable indicator

References


Commercial Relationships: Nisha Singh, Essilor Int. (E), Bjorn Drobe, Essilor Int. (E); Konogan Baranton, Essilor Int. (E)