INFLUENCE OF COLOURED STIMULUS IN THE MESOPIC PUPILAR DIAMETER

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INTRODUCTION

The pupil light reflex (PLR) has attracted the attention of physiologists throughout history yet it was not until the advent of videopupillography and the infrared camera (Loewenstam, 1956) that real progress in this area of research started.

AID

In depth knowledge of the PLR has implications for the diagnosis of several disease states. For this purpose, the PLR first needs to be characterized in healthy subjects under mesopic illumination conditions and then in patients with a systemic or neurologic disorder (e.g., Alzheimer’s disease, diabetes mellitus).

METHODS

Sample:

In a study at the Clinica de Cirugía Ocular in Madrid, pupil size measurements and their variations in response to a light stimulus were recorded in 33 healthy volunteers. All participants signed an informed consent form. The time allowed for the subjects to adapt to darkness was 15 min.

Material:

The pupillometer used was a Plusoptix Power Refractor II. The pupillometer consists of an infrared camera and a signal adapter that sends the processed signal straight to the laptop. The camera is placed 1 meter from the volunteer’s face.

The flash light (Flash Netz Mecablitz 60 CT-I) was placed 1.22 meters from the camera that was in front of the subject examined. Its color temperature is 5600 K and its angle at 150°241° in the metric system is 60. Each volunteer viewed 5 flashes of light, one for each bandpass filter (450 nm, 510 nm, 600 nm) and neutral density filter (01 and 10).

RESULTS

The data were processed by the designed software. This application ignores blank spaces and eliminates signal noise to generate a smooth curve.

Fig. 1. Pupil light pathway.

The interface of the pupillometer software generates an independent logfile. A new javaswing user interface was developed (Cabanillas software) to transfer the data, analyze several parameters (latency, amplitude, speed, rebound, etc.) and construct the graphs.

Fig. 3. Infrared camera and flash.

The data were recorded in the following way:

- Latency
- Amplitude
- Dilation time
- Pupil size-Time

These parameters can be analyzed in the ND filter (0.1) vs each filter and in the interference filter 455 nm (Table 2).

Table 1. P-Values (ND Filter 0.1 vs each filter).

<table>
<thead>
<tr>
<th>Filter</th>
<th>01</th>
<th>02</th>
<th>03</th>
<th>04</th>
<th>05</th>
</tr>
</thead>
<tbody>
<tr>
<td>Latency</td>
<td>0.17</td>
<td>0.81</td>
<td>0.62</td>
<td>0.69</td>
<td>0.60</td>
</tr>
<tr>
<td>Amplitude</td>
<td>0.17</td>
<td>0.81</td>
<td>0.62</td>
<td>0.69</td>
<td>0.60</td>
</tr>
<tr>
<td>Dilation time</td>
<td>0.04</td>
<td>0.59</td>
<td>0.58</td>
<td>0.59</td>
<td>0.58</td>
</tr>
</tbody>
</table>

Table 2. P-Values (ND Filter 455 nm vs each filter).

<table>
<thead>
<tr>
<th>Filter</th>
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<th>03</th>
<th>04</th>
<th>05</th>
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VALUES AND P-Vs (FOR EACH RANGE OF AGE) ACCORDING TO THE FILTER USED:

Table 3. Age and filter latency and amplitude for 450 nm interference filter.

<table>
<thead>
<tr>
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</tr>
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<td>0.59</td>
<td>0.58</td>
<td>0.59</td>
<td>0.58</td>
</tr>
</tbody>
</table>

P-VALUES for MEN-WOMEN for each filter:

Table 4. P-values for each filter.

<table>
<thead>
<tr>
<th>Filter</th>
<th>Men</th>
<th>Women</th>
<th>01</th>
<th>02</th>
<th>03</th>
<th>04</th>
<th>05</th>
</tr>
</thead>
<tbody>
<tr>
<td>Latency</td>
<td>0.00</td>
<td>0.00</td>
<td>0.05</td>
<td>0.05</td>
<td>0.00</td>
<td>0.00</td>
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<tr>
<td>Amplitude</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
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CONCLUSIONS

1. No differences were detected between both eyes for any variable.
2. The stimulus wavelength gives rise to variations in latency, rediation, and amplitude of the pupil reflex.
3. Sex significantly affects starting and final mydriasis for stimuli of different intensity and colour.
4. Age significantly but differently affects latency, amplitude, starting and final mydriasis, speed and rebound, depending on the intensity and wavelength of the stimulus.

AKNOWLEDGEMENTS

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REFERENCES