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## Objective

The aim of this study is to compare the percentages of photopic, high mesopic and dark illumination conditions in progressive myopic children. Ultimately, this can help to prevent the behaviour that may lead to progression in patients with myopia.

## Methods

The Visual Behaviour Monitor (VBM) is a wearable sensor system which helps doctors and patients to understand reasons for myopic progression in an objective and non-obtrusive way. Patients with myopic progression of more than one diopter per year were included in the study. Participants underwent VBM training by research personnel. After training, participants used the VBM during their daily routine for 3-5 days (e.g. at home, in school, hobbies). Doctors accessed the data reports via a web-based interface. In the study, photopic illuminance was defined above 50 lux, high mesopic illuminance was between 10-50 lux and dark illuminance was below 10 lux. Factors that may be effective in progression in myopia patients and possible solutions were investigated.

## Patients Data

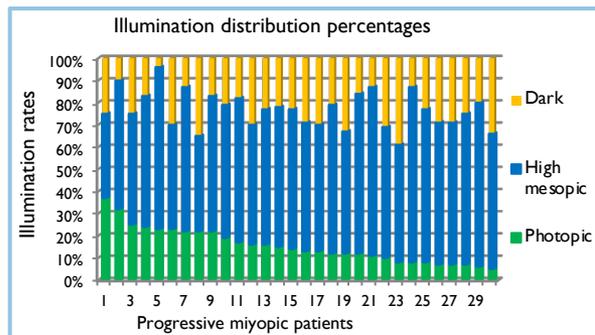


Figure 1: Illumination distribution percentages of patients

The Visual Behavior Monitor (VBM) consists of sensors measuring key parameters:



It is clipped on to prescription or plain lens spectacles and records the patient's daily activity data for 3-5 days. Data is uploaded to the Vivior cloud.



Figure 2: Visual Behaviour Monitor (VBM)

| Statistics         |           | Illumination Statistics  |            |
|--------------------|-----------|--------------------------|------------|
| Number of points:  | 130738    | Zone                     | Occurrence |
| First measurement: | 09:56:52  | Bright (photopic):       | 4 %        |
| Last measurement:  | 21:54:21  | Moderate (high mesopic): | 60 %       |
| Valid duration:    | 11 h 44 m | Dark (low mesopic):      | 36 %       |

Figure 3: Statistics of a patient's daily data

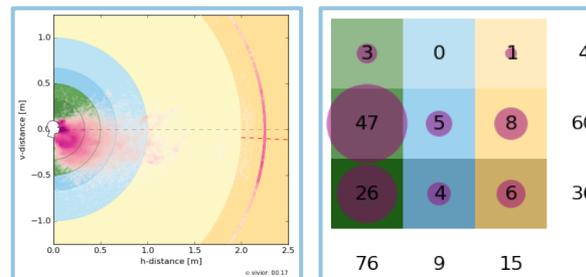


Figure 4: Visual distance and illumination distribution graphics

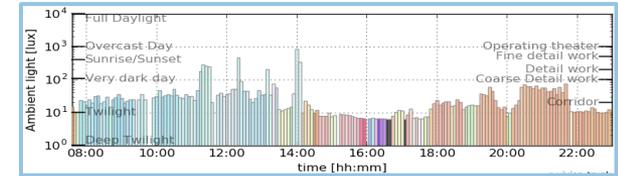


Figure 5: Hourly records of illumination distribution

## Results

A total of 30 patients completed the study according to the study criteria. Mean age of myopic children was  $11.4 \pm 2.7$  years. Mean percentage of photopic illuminance (outdoor activities and high light) of total patients was 15.5%, mean percentage high mesopic illuminance (indoor activities) was 61.3% and mean percentage of dark illuminance was 23.2%. Twenty seven of 30 patients (90%) had mean percentage less than 25% of photopic illuminance in their daily activities.

## Conclusion

Outdoor high light intensity may protect progression of myopia. Our study showed that photopic illumination rate is very low in progressive myopic children. Environmental factors can be modified to protect progression of myopia. The VBM device helped us to better analyze the progression of myopia in children objectively. This study is based on initial data. More objective results will be achieved in the future with increasing participation.

## References

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- Ostrin LA. Objectively Measured Light Exposure in Emmetropic and Myopic Adults. *Optom Vis Sci.* 2017 Feb; 94(2): 229-238.