Poster

Effects of Daylight and Artificial Light on Melatonin Suppression in Educational Environment

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Introduction

Daylight in indoor environments allows to achieve reductions of energy consumption [1], but it is even more important for its effects on human beings in terms of visual comfort and impact on circadian rhythm regulation [2]. Therefore it results necessary to evaluate the entrance of natural light in indoor environments both in qualitative and quantitative terms.

An analysis of the characteristics of daylight in an indoor environment is presented here, it was carried out by comparing SPDs and CCTs of the natural source (sky) during typical days with contemporaneous measurements of spectral irradiances and CCTs detected at the eyes level. Data obtained from these measurements together with those detected with artificial light, were used to evaluate the effects on melatonin suppression during the day according to the procedure proposed by Rea et al [2].

Description of measures

Measurements with different sky conditions (clear and overcast) during winter days were carried out in a representative classroom with western windows, located at the 6th floor of the Federico II University, Faculty of Architecture. Data were acquired from morning until twilight at one hour intervals. SPDs and CCTs of sky light, illuminances and spectral irradiances at eye's level were collected. Illuminances and spectral irradiances at eye were also acquired with the artificial light on. All spectral data were obtained by means of a Spectroradiometer Minolta CS-2000.

Results and discussion

Figures 1 and 2 show melatonin suppression in presence of daylight during typical clear and overcast winter days.

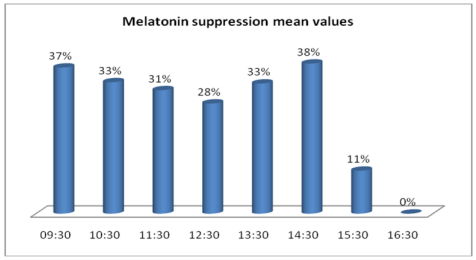

Fig. 1: Melatonin suppression during a clear day

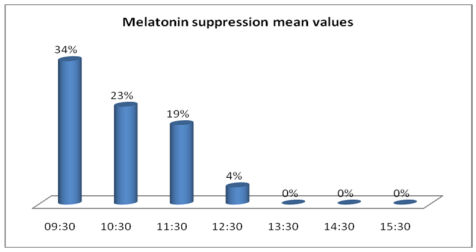

Fig. 2: Melatonin suppression during an overcast day

Although illuminances on desks under natural and artificial light corresponded to the EN 12464-1 Standard requirements, the irradiances detected at eye's level, which are essential for melatonin suppression, do not appear to always guarantee the necessary circadian stimulus. Hence much care should be devoted in designing lighting systems in educational environments in order to take into account their effects on the human circadian system regulation.

References

[1] J Mardaljevic, L Heschong and E Lee, Daylight metrics and energy savings, *Lighting Res. Technol.* 2009; 41: 269-283.

[2] M. S. Rea, M. G. Figueiro, A. Bierman, J. D. Bullough, Circadian Light, *Journal of Circadian Rhythms*, 2010; 8:2.