

Clinical study confirms biological (melanopic) effectiveness of light of the LUCTRA® desk lamps.

A clinical study conducted by INTELLUX GmbH in cooperation with the research group „Sleep Research and Clinical Chronobiology“ and supervised by Dr. Dieter Kunz at the St. Hedwig Hospital in Berlin confirmed the biological effectiveness of the light of LUCTRA® desk lamps. LUCTRA® is among the few lamps with such an evidence, and the first desk lamp ever with a systematic verification of its biological effect on melatonin suppression.

The study was conducted from July to August 2014 with 16 participants, between 21 and 27 years. Within the test period the participants were exposed to five different light settings, one per evening with a minimum of four days in between. Two settings – dim light and bright light – served as reference conditions, three settings were produced by LUCTRA® lamps: a cold-white at 6.000 Kelvin, a warm-white at 2.700 Kelvin and a mixed cold-warm white setting at 3.800 Kelvin. The biological impact of each light setting was verified by analyzing the time course of salivary melatonin concentrations in the evening. The ‘dark hormone’ melatonin is the most widely accepted circadian marker to determine light effects in humans. Light with a high blue-portion suppresses melatonin stronger than a light source with a lower blue-portion (i.e. warmer lighting conditions), with a greater portion of longer wavelengths of light (red light). In addition to the salivary melatonin analyses, participants assessed their visual comfort during the five different light settings by filling out a questionnaire. Before the study and in between study days, participants had to keep a regular sleep-wake cycle, which was controlled by means of an activity watch and sleep logs.

As expected the cold-white and the mixed light settings suppressed melatonin secretion, while the warm-white light showed hardly any differences on the time course of melatonin secretion compared to dim light. In their subjective assessment of the lighting conditions, the participants showed a significant greater preference for the warm-white and the mixed light compared to the cold-white light. The cold-white light was judged as too bright, while the participants would imagine to be able to work significantly longer with the warm-white light.

2.700 K ←—————→ 6.500 K



The researchers' conclusions:

„The results of this project have shown that the three LUCTRA test specimens of the LUCTRA LED desk lamp provided by DURABLE had varying biological effects on melatonin suppression in the evening. A significant melatonin suppression was measured for the mixed LED illumination, and (...) also for the cold white LED illumination, compared to the warm white illumination.

The subjective assessment of the desk lamp by the study participants showed that subjective preference was given in most cases to the warm white and to some extent also to the mixed LED illumination when compared

to the two reference illuminations (...) and they also preferred the warm white setting more than the cold white LED illumination.“

“Although a relatively low light intensity was chosen for the LUCTRA test specimens, we were able to measure significant melatonin suppression by the mixed light and as a trend with the cold white illumination, when compared to dim light. It can be assumed that these effects could be even stronger when using a different table surface, for example one with a higher reflection rate.”

„It was shown that the warm white LED illumination met with a very high rate of acceptance by the users. This lamp could certainly be recommended for rather relaxing tasks during the evening, without the normal melatonin secretion in the evening being disrupted, and so falling asleep should present no problems.“



About Dr. Dieter Kunz and INTELLUX GmbH

The research group „Sleep Research and Clinical Chronobiology“ has won both national and international recognition for outstanding achievements in the area of light & health. The project leader, Dr. Kunz, is a psychiatrist and has been active in clinical sleep research and clinical chronobiology for 20 years. He has published a number of original research findings relating to melatonin, the vital hormone for the effect of light. Evidence of his reputation in the area of light & health are: membership in DIN FNL 27 (Effect of Light on Humans); sole physician on the Scientific Committee of the German Lighting Society (TWA in LiTG), responsible for the area of melanopic effects of light; advisor to the European Commission in preparing the official report: Health Effects of Artificial Light.

Intellux GmbH was founded by Dr. Kunz in 2013 with the objective of carrying out research into the biological effects of light also commercially, and thus contributing to the development of intelligent, biologically optimised lighting systems. Since the autumn of 2014, Intellux has been a part of the BMBF (German Federal Ministry of Education and Research) sponsored joint project “OLIVE” for optimised lighting systems to improve performance and health, which addresses jointly with other industrial partners the optimisation of various lighting systems and their biological effects on human beings.

About the impact of light on humans

The earth’s rotation causes two of the most reliable, predictably recurring changes in nature which have an influence on human beings: the daily alternation of light and darkness and the 24-hour variation in ambient temperature. Every living organism on earth has adapted to these changes in the course of evolution, and humans have obviously done so extremely well. Light is the strongest “timer” of this synchronisation. The result is a system of inner clocks which controls and drives all daily variations within the body: organ activity, hormone production, response to medication and even genetic expression. These circadian rhythms are synchronised

with each other, so that they, similar to a mathematical chaos, ensure an extremely regular process and consequently the functionality of body and mind.

The circadian system consists of multiple clocks. Each individual body cell contains its own 24-hour information schedule. The cells must be synchronised with each other in order to do the right thing in a coordinated way at any given moment. The synchronisation of the peripheral clocks is effected via a master clock located in the nucleus suprachiasmaticus (SCN) of the hypothalamus. This master clock is synchronised with the external environment via timers every day. In this context, the timers of light and darkness are of paramount importance. Experimental studies on animals and humans have shown that the extent of the biological effects of light is substantial. These findings open up a completely new perspective, since it has become obvious that, in addition to performing the visual task, artificial light has an either positive or negative influence on human performance and health.