Sleep Improvement Study with Wearable LED Goggles Based on Citopic Effect

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Sleep is an essential factor in maintaining the physiological function of the human body, people who work day night reversed suffer from sleep problem, which is seriously harmful to health. Medicine dependence and safety issues are becoming increasingly prominent. From paper study, illumination is the main triggering factor of circadian rhythm. Eyes' non-visual citopic effect can positively affect the body's biological clock system. We designed a wearable LED goggle, by CCT 2200K LED lighting, through the physically dynamic setting in color temperature and lumen output, to simulate the natural sunset, in order to increases sleep melatonin secretion, then enhance sleep quality. The sleep quality was monitored by smart bracelets and sleeping monitor App. Deep sleep hours and sleep duration are recorded in several days with goggles and without goggles. We analyzed the data of people traveling across the time zones and night shift nurses. With deep sleep time as an indicator of observation, we found the jet lag recovery time was shortened from 7 days to 5 days. With total sleep time as an indicator, after night duty, the second night sleep time is extended 1.1 hour. The goggle is low power and rechargeable, intelligently controlled, comfortably wearable. The device can quickly lead to sleep, reduce the number of awakening time and increase the deep sleep time, has a significantly positive effect on sleep improvement.

Awards Won:
National Aeronautics and Space Administration: Honorable Mention