

S228

Light effect on sleep homeostasis, cognitive performance and mood

A. VIOLA¹, V. GABEL¹, M. MAIRE¹, C. F. REICHERT¹, C. SCHMIDT¹, V. HOMMES² and C. CAJOCHEN¹

¹Universita" re Psychiatrische Kliniken, Basel, CH, ²IT VitaLight I&D PC Drachten Philips Consumer Lifestyle, Netherlands, NL

Introduction: Light exposure elicits numerous effects on human physiology and behaviour. However, it remains inconclusive whether morning light exposure has beneficial effects on cognitive performance, mood and circadian physiology following sleep restriction (SR). Here we investigated the role of morning light exposure as a countermeasure for impaired cognitive performance and mood during SR.

Methods: Seventeen participants were studied during 42 h in the laboratory in a balanced cross-over design where three different light settings were administered each morning after SR (6 h): blue light (BL) (20 min exposure 2 h after wake-up; 200 lux of light at 470 nm), dawn simulating light (DsL) (blue-enriched polychromatic light gradually increasing from 0 to 250 lux during 30 min before wake-up time, with light around 250 lux for 20 min after wake-up time) and Dim light (DL) (<8 lux). Cognitive tests were performed every 2 h during the wake episode and questionnaires were hourly completed to assess subjective mood and well-being. Salivary melatonin and cortisol were collected during wake episode in regular intervals. **Results:** Analysis of cognitive performance yielded a significant main effect of *_light condition_* ($P < 0.01$), such that during the first day following SR, performance was significantly deteriorated during DL, while it maintained stable during BL and significantly improved with DsL. After the second SR night, these differences on cognitive performance did not further reveal significances between DsL and DL. Analysis of well-being revealed a significant main effect of *_light condition_*, such that morning DsL improves levels of well-being, and even more after the second SR night, as compared to DL and BL ($P < 0.001$). Exposure to morning DsL did not significantly affect circadian melatonin phase, while, after morning BL, melatonin onset was significantly earlier as compared to DsL and DL. Furthermore, after DsL, salivary cortisol levels were significantly higher at waketime as compared to BL and DL. **Conclusion:** Our data indicate that exposure to morning light after the first and second day of SR alleviate decrements in cognitive performance under conditions of mild SR. This effect was more pronounced after dawn simulation, since the DsL was able to maintain higher well-being levels and did not affect circadian melatonin phase, whereas morning blue-light induced a phase advance of melatonin, and therefore impacted on the circadian system.