A tendency for the U-shaped dynamic throughout the sleep cycles was seen at all derivations.

Conclusions: Our results show that the spectral exponent is a potent marker of the homeostatic process of sleep regulation which supports earlier findings about the associations between this exponent and sleep depth. Furthermore, the maximum spectral peak frequencies could reflect the circadian modulation of sleep. The latter index could be a useful measure in future studies, potentially substituting complicated protocols like melatonin or core body temperature measurements, with assumed applicability in retrospective investigations. Finally, the spectral exponent can serve as a link between sleep regulation and consciousness.

SLEEPING IT OFF? ARE HOSPITALS TOO NOISY TO ALLOW RECOVERY?

M. Reid [1], M. Buller [2]. [1] *London North West NHS Foundation Trust, London, United Kingdom;* [2] *University of Leeds, Leeds, United Kingdom*

Introduction: Increased overnight noise levels are known to stimulate the release of multiple stress hormones and negatively impact upon objective and subjective sleep quality. Increasing levels of noise impairs physical and psychological recovery, and has been shown to slow wound healing, increase post-operative complication rates, delay recovery, and lengthen hospital admissions. Noise levels are therefore an important factor to consider in hospital care and an important component of recovery. The purpose of this study is to document the actual noise levels experienced by patients on hospital wards overnight, document the sources of this noise and propose some solutions.

Materials and Methods: Firstly, five-minute recordings were made during four separate hours throughout the night on two wards - one paediatric and one adult. In both cases, recordings were made inside a six-bedded bay. Secondly, researchers described and categorised the sources of noise.

Results: The World Health Organisation (WHO) has recommended that average overnight noise levels in hospitals should not exceed 35 dB. The average recorded on the paediatric and elderly ward was 42.27 dB and 43.91 dB respectively, with peak noise levels of 93.65 dB and 97.01 dB respectively. In every five-minute recording, there was at least one sound louder than 67 dB. Researchers also noted the causes of noise and tallied the number of times they occurred. The sources were categorised as avoidable (or significantly modifiable) vs non-avoidable, constant vs impact, and within the hospital bay vs outside. These descriptions were not matched to the objective data. Examples of constant noises were generally unavoidable and included air-conditioning machines and oxygen delivery devices, though clearly avoidable sources such as a radio were also noted. Impact noises were subjectively thought to be more disruptive, common examples included staff talking, doors closing, patients moving, machine alarms inside the bay, telephones ringing and staff alert systems (e.g. bleeps).

Conclusions: The average noise level was significantly greater than the WHO recommendations. Every five-minute recording contained peak sounds of significance. Such noise levels have been linked to poor sleep, increased stress hormone release, delayed wound healing, and an increased recovery times. Staff members also experience higher levels of stress when working in noisy environments. Many avoidable causes of these sounds are identified, several of which could be easily improved by existing solutions (e.g. quietened or vibrating staff alarms overnight, machine alarms directly contacting the appropriate staff member rather than alarming everyone closeby, quiet-closing doors etc). There are also some overnight noises which are likely to be unavoidable overnight and other measures such as the use of ear plugs is likely to be necessary in addition. Addressing the issue of overnight noise is important for hospital wards and is likely to improve patient outcomes, as well as lowering stress levels of staff.

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THE CIRCADIAN EXPRESSIONS OF METABOLISM GENES IN HUMAN ADIPOCYTES: THE IMPACT OF MELATONIN

M. Gombert [1], R. Cousin [2], A. Carrasco García [1], J. Carrasco Luna [1,3], P. Codoñer Franch [4,3], I. Lanneluc [2], S. Bordenave-Juchereau [2]. [1] *Universitat de Valencia, Departamento de Pediatría, Obstetricia y Ginecología, Valencia, Spain;* [2] *La Rochelle Université, BCBS Group (Biotechnologies et Chimie des Bioressources pour la Santé), Laboratoire Littoral Environnement et Sociétés, UMR CNRS 7266, La Rochelle, France;* [3] *Universidad Católica de Valencia, Departamento de Biotecnologia, Valencia, Spain;* [4] *Hospital Universitario del Doctor Peset, Servicio de Pediatría, Valencia, Spain*

Introduction: Numerous key parameters of the metabolism homeostasis display circadian rhythms in their expression and activity. In adipose tissue, this is the case for clock genes, but also for adipokine genes, glucose transporters, and transcription factors. The condition of obesity is associated with a dysregulation of these same factors. In this context, the main circadian hormone and powerful antioxidant melatonin is also modified, and melatonin supplementation is presented as a strategy to limit metabolic damage in people with obesity. In the present work, we investigate if melatonin impacts the circadian expression of clock genes and metabolic genes of human adipocytes.

Materials and Methods: The experiments were performed on Primary Human White Preadipocytes isolated from adult subcutaneous adipose tissue. After twenty-four hours in a differentiation medium, supplemented or not with melatonin, mRNAs were extracted at four different times of the day and reverse transcribed. Quantitative PCRs were then performed for the genes Aryl hydrocarbon receptor nuclear translocator-like protein 1 (Bmal1), Cryptochrone (Cry), Period2 (Per2), Peroxisome proliferator-activated receptor gamma (PPARγ), CCAAT/enhancer-binding protein alpha (C/EBPα), Lipoprotein lipase (LPL), adipocyte protein2 (aP2), Angiotensin (AGT), Melatonin receptor 2 (MT2), Adiponectin (GBP-28) and Plasminogen activator inhibitor-1 (PAI-1). The β-actin gene was used as a reference. For statistical analysis and modeling, R was used, with the packages Cosinor, ggplot2 and dplyr.

Results: The circadian expression of the genes are modelized using a cosinor curve. The amplitude of circadian expression was twice as high for all genes compared to the control, but only significantly so for four genes: Cry (control = 15.78 ΔCT; melatonin = 51.11 ΔCT; p = 0.002), GBP-28 (control = 35.28 ΔCT; melatonin = 64.05 ΔCT; p < 0.001), LPL (control = 38.65 ΔCT; melatonin = 72.54 ΔCT; p < 0.001) and Per 2 (control = 34.68 ΔCT; melatonin = 56.67 ΔCT; p = 0.005). No clear effect of melatonin treatment was observed on acrophase and mesor of circadian expression of the tested genes.

Conclusions: The present results suggest that melatonin acts on the clock genes and on metabolic genes by intensifying the amplitude of the circadian expression. Further investigation is needed to characterize the role of melatonin in adipocytes physiology. If confirmed, this amplification of circadian gene expression could mediate the protective role of melatonin on the metabolic damage in obesity.

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THE INFLUENCE OF LIGHT EXPOSURE AND PHYSICAL ACTIVITY IN THE TIMING AND DURATION OF SLEEP: INSIGHTS FROM A TWO-SHIFT NATURAL MODEL OF DANCE STUDENTS

I. Estevan [1], N. Coirolo [2], B. Tassino [2], A. Silva [2]. [1] *Facultad de Psicología, Universidad de la República, Montevideo, Uruguay;* [2] *Facultad de Ciencias, Universidad de la República, Montevideo, Uruguay*

Introduction: Impaired sleep timing, duration, and quality have major consequences on health, as well as on mental and physical performance. It is recognized that sleep patterns are determined by social, environmental, and behavioral factors. Our first aim was to characterize how shifts shape the different sleep determinants. Our second goal was to provide evidence using this complex natural experiment about the influence of the amount and timing of light exposure and physical activity on sleep patterns.

Materials and Methods: In the present study, we continuously recorded the activity and light exposure of 31 dance students attending two extreme training shifts (morning: 08:30 to 12:30, night: 20:00 to 24:00), for 16 days using wrist devices. We estimated daily, morning, and night minutes of moderate to vigorous physical activity (MVPA) and mean light intensities. Besides, we estimated daily sleep patterns (onset, end and duration), and registered if an alarm clock was set to wake-up. Linear models were employed to study type-of-day (training vs free) and shift (morning vs night) differences in minutes of MVPA, light exposure and alarm usage.