GMM component was calculated to find the final population of OFF periods.
Results: The majority of OFF periods were detected in NREM sleep (88.59%, CI=84.18 - 92.97) and REM sleep (6.87%, CI=3.46 - 10.29) with a small proportion detected in wake (1.15%, CI=0.39 - 1.91). Mean OFF period length across all animals and states was 114ms. The average LFP profile of all detected OFF periods shows a strong positive deflection that peaks ~45ms after OFF period initiation. There was a positive correlation between OFF period LFP amplitude and OFF period length with the regression of these variables significant (linear model, R^2=0.85, t=9.46, p<0.001). There was a significant fixed effect of prior experience on OFF period occupancy (linear mixed model, t=7.36,p<0.001), frequency (linear mixed model , t=7.39,p<0.001) and length (linear mixed model , t=13.42,p<0.001) during the second half of the dark phase (ZT6 - T12) with all three metrics higher for the sleep deprivation treatment. The temporal coincidence of OFF periods increased as laminar probe channel distance decreased.
Conclusions: OFF periods detected by our pipeline show similar properties to those previous described. OFF periods occur predominantly in NREM sleep and are associated with slow-wave like LFP profiles that increases in amplitude as a function of OFF period length. OFF periods show strong in homeostatic dynamics, increasing in frequency, length and overall occupancy time after sleep deprivation. Finally, OFF periods are shown to be both a global and a local phenomenon across layers of motor cortex.
Acknowledgements: EPSRC, NPIF

DISRUPTION OF SLEEP ARCHITECTURE AND RETICULAR THALAMIC (RT) NEURONAL FIRING ACTIVITY IN NEUROPATHIC PAIN

M.G. Lopez- Canul [1], A. Oviesi [1], Q. He [1], M.-L. Vigano [1], S. Comai [2], G. Gobbi [1]. [1] *McGill University, Psychiatry, Montreal, Canada;* [2] *Vita Salute San Raffaele University, Department of Neuroscience, Milan, Italy*

Introduction: Neuropathic pain (NP) is an important public health problem with no effective treatments. It has been demonstrated that chronic pain condition produces changes in sleep pattern in about 80% of the patients (Finan et al., 2013). Indeed, poor sleep occurred in patients with a widely variety of pain disorders including musculoskeletal (Yu-Lin Wu et al 2017), post-herpetic trigeminal neuropathy (Roth et al. 2010), post-surgery neuropathic pain, HIV, multiple sclerosis, trigeminal neuralgia, cancer, trauma/accident and diabetes (Wafik Said Bahnasy et al, 2018). To date, the brain mechanisms linking pain and insomnia are yet to be clarified. In this work, we thus examined the effect of NP in the L5-L6 ligature rat model in sleep architecture and in the electrical activity of the neurons of the reticular thalamus (RT), which is an area related to both pain and sleep.
Material and Methods: We induced NP in Wistar rats. 14 days later, rats were evaluated for allodynia using von-Frey filament. Animals with NP were then separated in 2 groups: one group was implanted with six stainless-steel wire electrodes in the skull for the EEG/EMG 24h recording, while the second group underwent in vivo electrophysiological recordings in the reticular thalamus (RT) (for details in methods see Ochoa-Sanchez et al., 2011). Sham operated animals were used as a control for both groups.
Results: EEG/EMG analysis showed that NP animals displayed a reduced time in non-rapid eyes movement (NREM) sleep (-20%, $t_{(14)}$=3.94, p<0.001) and an increase in wakefulness (+19.13%, $t_{(14)}$=3.47, p<0.05). In addition, NP animals displayed a fragmented sleep architecture ($t_{(14)}$=4.3, p<0.0001) represented by transient EEG arousals. No changes in the latency to NREM sleep ($t_{(14)}$=4.3, p=0.15) were detected. Baseline firing rate as well as burst-firing activity of RT neurons in NP animals were significantly higher than in control rats (firing rate: +344 %, $t_{(10.3)}$=3.12, p<0.01; burst-firing activity:+843.1%, $t_{(8.6)}$=3.86, p<0.004).
Conclusions: These findings indicate that NP is associated with significant changes in the sleep-wake cycle, particularly a reduced duration of NREM sleep, and in the activity of the RT neurons.
Acknowledgments: This work was supported by the Ministry of Economy, Science and Innovation (MESI) of Québec and the Merit scholarship program for foreign post-doc students, PBEEE, Faculty of Medicine, McGill.

EFFECT OF HIV INFECTION ON SLEEP AND CHRONOTYPE IN AN AGEING RURAL SOUTH AFRICAN COHORT

K. O'Brien [1], K. Redman [2], F.X. Gómez-Olivé [3,4], D. Rae [5], K. Scheuermaier [2], M. von Schantz [1,3,6]. [1] *University of Surrey, Faculty of Health and Medical Sciences, Guildford, United Kingdom;* [2] *University of the Witwatersrand, Faculty of Health Sciences, Johannesburg, South Africa;* [3] *MRC/Wits Rural Public Health and Health Transitions Research Unit, Agincourt, South Africa;* [4] *University of the Witwatersrand, School of Public Health, Johannesburg, South Africa;* [5] *University of Cape Town, Faculty of Health Sciences, Cape Town, South Africa;* [6] *Northumbria University, Northumbria Centre for Sleep Research, Department of Psychology, Newcastle, United Kingdom*

Introduction: Sleep disturbances are a well-established consequence of HIV infection. The pathophysiology of these disturbances have yet to be experimentally defined, but theories suggest that HIV infection may both impact the homeostatic and circadian systems of sleep-wake regulation. Studies to date have primarily explored sleep quality using the Pittsburgh Sleep Quality Index (PSQI), with limited objective data available to probe specific sleep characteristics in people living with HIV (PLWH). Those that have employed objective measures have utilised PSG, which describes aspects of sleep architecture, but does not allow for longer term monitoring of sleep habits in the home environment unlike actigraphy. Crucially, much of the research on HIV and sleep has been conducted in industrialised societies with greater access to HIV education and healthcare. Therefore, the aims of this study are to utilise actigraphy to explore sleep parameters in PLWH, and assess whether HIV infection impacts chronotype in a rural dwelling South African population.
Materials and Methods: Participants (N = 688; aged 45-100y, mean 66.4 ± 12.07y; 426 women, 166 HIV+) from the Agincourt Socio-demographic and Health Surveillance System (Mpumalanga, South Africa) were selected randomly for inclusion in this study. Participants were required to complete the Munich Chronotype Questionnaire (MCTQ), and a subset of these participants (N = 172; aged 45-93y, mean 67.06 ± 11.6y; 99 women, 31 HIV+) wore an accelerometer for a minimum of 5 nights of actigraphy (ActTrust, Condor Instruments). MCTQ data were processed in Rstudio using the 'mctq' package. ANOVA and subsequent multiple linear regressions were performed in RStudio to determine the relationship between HIV status and both actigraphy and MCTQ parameters, controlled for age and sex.
Results: Actigraphy analyses showed no significant relationship between HIV status and measures of sleep efficiency. However, there was a significant relationship between HIV status and total sleep time, with HIV+ individuals sleeping significantly less ($F_{(3,168)}$ = 2.69; P=.0482). Analysis of the MCTQ showed that the effects of HIV infection were most prominent on working days, with HIV+ individuals going to bed earlier ($F_{(3,599)}$ = 15.17; P≤.001) and spending more time in bed $F_{(3,599)}$ = 18.79; P≤.001). This effect was most pronounced in HIV+ men, and was not observed on free days. Analyses also revealed that HIV status had an interesting interaction with age on MCTQ derived chronotype (P=.002). In HIV+ individuals, chronotype was significantly later before the age of 60, but shifted earlier with age, whereas the opposite relationship was observed in HIV- individuals ($F_{(4,264)}$ = 3.24; P=.012).
Conclusions: Together, these data suggest that PLWH are more fatigued by work than HIV- individuals, and their earlier bedtimes may reflect an effort to combat . However, the reduced actigraphically derived total sleep time suggests that sleep needs may not be met, resulting in a cycle of sleep restriction and fatigue. Moreover, HIV may impact phase of the internal biological clock producing a shift in chronotype. Analysis of circadian phase markers will complement these data.
Acknowledgements: Supported by Academy of Medical Sciences

EFFECTS OF AUDITORY SLEEP MODULATION APPROACHES ON SLOW WAVES AND AUTONOMIC RECOVERY FUNCTIONS

S. Huwiler [1], S. Huwyler [1], L. Kiener [1], R. Sala [1], C. Schmied [2], R. Huber [3,4,5,6], N. Wenderoth [1,4,7], C. Lustenberger [1,3,4]. [1] *ETH Zurich, Department of Health Sciences and Technology, Zurich, Switzerland;* [2] *University Heart Center Zurich, University of Zurich, Department of Cardiology, Zurich, Switzerland;* [3] *Center of Competence Sleep & Health*