Objectives: Sleep-wake disturbances (SWD) are common following traumatic brain injury (TBI) and can have severe consequences by slowing processes of physical recovery and exacerbating cognitive and neurobehavioral impairments. SWD arise in the days following TBI and could point to circadian disturbances. Our objectives were to measure 24h melatonin secretion in acute moderate-severe TBI, and to evaluate the association between melatonin secretion and the rest-activity cycle.

Methods: During hospitalization in intensive care, when continuous sedation had been ceased and they were medically stable, patients underwent 24h actigraphy and urine was collected hourly from the urinary catheter during this same period. Concentration of 6-sulfatoxymelatonin (aMT6s), melatonin’s principal metabolite, was measured. Peak aMT6s concentration and mean daytime and nighttime excretion were calculated. Activity counts were summed for day (7:00-21:59) and night periods (22:00-6:59). Ratio of daytime activity to total 24h activity > 80% was used to denote the presence of rest-activity cycle consolidation. Student t-tests were used to compare daytime and nighttime aMT6s excretion. Pearson correlations were used to assess the association between melatonin and rest-activity cycle.

Results: Nine patients (6 men, 36.3±16.2 years old) admitted with a Glasgow Coma Scale score of 6.7±2.5 were included. Urine collection and actigraphy began 20.2±15.8 days post-injury. Daytime activity represented 70.8±11.4% of total 24h activity, and only 2 patients had a consolidated rest-activity cycle. Peak hourly aMT6s concentration was 25.9±21.3ng/ml. Overall, patients showed increased nighttime hourly aMT6s concentration (13.0±17.9 ng/ml) compared to daytime (3.0±5.2 ng/ml; t(16)=2.3, p<0.05). No association was found between melatonin and rest-activity cycle.

Conclusions: Nocturnal melatonin secretion is present in moderate-severe TBI patients. Our preliminary data suggest that lack of rest-activity cycle consolidation may not be a direct consequence of an abnormal circadian rhythm of melatonin. However, the sample size still needs to be expanded and results will be compared to those obtained from other patients hospitalized in a similar environment, without TBI.