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Poster Session B: Clinical Trials: Methodology

B96 Quantitative Comparison of the Capacities of Three Competing Actigraphy Systems to Record and Analyze Sleep, Activity and Ambient Light. Jovelyn Du-Quiton,1 Robert D. Levin,2 James F. Grutsch,2 MaryAnn Daehler,2 Digant Gupta,2 Christopher G. Lis,2 William J. Hrushesky.1 W. J. B. Dorn Veterans Affairs Medical Cen-ter,1 Columbia, Cancer Treatment Centers of America,2 Zion, IL.

Introduction: Actigraphy is a non-intrusive tool that measures an individuals circadian rhythm and quantity, timing and quality of daily sleep. Recently, data from clinical trials have found a link between patient well-being, response to therapy, survival and intact circadian function. These data suggest that distorted circadian activity and sleep rhythms may account for a significant fraction of cancer patients complaints of chronic fatigue, insomnia and poor quality of life. Consequently, actigraphy data may be a powerful tool in the management of patients with advanced cancer. The latest actigraphy units also measure ambient light, which may be important because of the emerging negative effects of light at night upon tumor growth. We evaluated actigraph instruments from three companies, Ambulatory Monitoring Inc. (AMI), Minimitter, and MTI Actigraph, in three volunteers, as potential tools to measure circadian function, sleep quality and exposure to nocturnal light in patients undergoing chemotherapy for cancer. Methods: The three wrist actigraphs were placed simultaneously on the non-dominant arm of three test subjects for 3-4 consecutive days. Each actigraph was set to capture activity and light intensity every minute. Activity data from these actigraphs were then transferred to a computer to produce actograms. Sleep and activity parameters were generated via their corresponding softwares. 24-hour auto-correlations were also generated to compare their ability to capture sleep/wake activity patterns. Results: All three instruments produce an actogram that graphically shows the circadian variation in an individuals high and low levels of activity over several days along with light exposure. AMI and Minimitter have analysis companion softwares that could manipulate activity to produce circadian sleep and wake parameters while MTI can only produce raw data and minimal statistics. AMI instrument was the only one that could simultaneously record activity at different modes such as Zero Crossing Mode, a measure of movement frequency, and Proportional Integrating Measure (PIM) mode, a measure of activity level or vigor of motion. Consequently, the AMI actograms are much more sensitive for both activity and rest phase of the daily activity cycle than the other two instruments. 24-hour autocorrelation analysis showed that AMI had higher autocorrelations ranging from 0.18 to 0.35, while Minimitter had 0.10 to 0.16 and MTI had 0.11 to 0.14. This clearly indicates the superiority of AMI to capture circadian rhythmicity over the other two actigraphs. Further, AMI output lends itself to various analyses to evaluate the extent and consistency of a patients exposure to nocturnal light. Conclusions: Overall, the AMI instrument has features that enable the oncologists to determine whether cancer patients have distorted circadian function, have disturbed sleep, and are consistently exposed to nocturnal light. It also provides concurrent information relevant to the quantification of daily activity in the PIM mode.

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