

Applications of Actigraphy

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About Actigraphy

Actigraphy is the measurement of motion, usually with miniature accelerometers, to monitor daily activity and sleep patterns. The devices are typically worn for several days or weeks on the wrist or the hip. The motion patterns can be displayed as actograms that show the daily activity and rest periods. The motion data can be analyzed to provide a variety of objective endpoints about the circadian patterns, the level of activity and the nighttime movements. Actigraphy has been used in many studies on various disease states.

Value of actigraphy data in studies of Depressive Disorders (depression, bipolar disorder)

Actigraphy has been used to measure the effects of various depressive disorders on sleep³, circadian patterns and daytime activity patterns^{4,5,7}. Although the association of circadian disorders with bipolar disorder has been well documented², more recent literature has discussed the use of sophisticated signal processing tools to show alterations in motion patterns with depression. For example, Zeitzer used functional principal component analysis of 24-hr activity patterns to differentiate among patients with Alzheimer's disease who were apathetic versus those who were not⁷. Ding used similar techniques to discriminate among subjects who were healthy, mildly depressed and severely depressed¹. Krane-Gartiser used signal processing endpoints on 65 min activity samples to show that actigraphy can be used to quantify depressive moods⁵. A recent review article concludes that new analytical methods for analyzing motion data will aid in application to neurological or psychopathic disorders⁶.

Published actigraphy endpoints

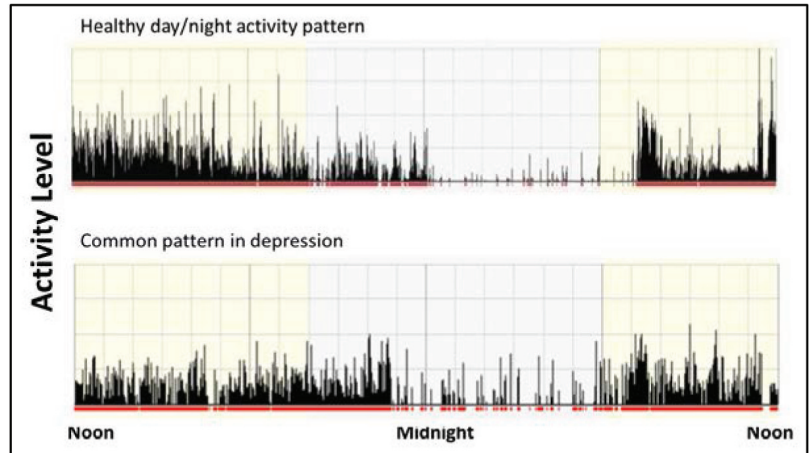
Total Sleep Time, Sleep Onset Latency, Wake After Sleep Onset, Sleep Fragmentation³

Circadian endpoints (intraday variability, stability, amplitude, acrophase time)²

Total activity counts every 6 hrs²

Functional Principal Component Analysis^{1,4,7}

Std dev. of activity, RMS successive differences, autocorrelation, entropy⁵



References

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- 6 Pan W, Song Y, Kwak S, Yoshida S, Yamamoto Y. Review article: Quantitative evaluation of the use of actigraphy for neurological and psychiatric disorders. *Behavioural Neurology*, Volume 2014, Article ID 897282, <http://dx.doi.org/10.1155/2014/897282>.
- 7 Zeitzer JM, David R, Friedman L, Mulin E, Garcia R, Wang J, Yesavage JA, Robert PH, Shannon W. Phenotyping apathy in individuals with Alzheimer disease using functional principal component analysis. *Am. J. Geriatr Psychiatry* 2013; 21: 391-397 (6/25).

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