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Comparison of wristband-based and ECG-based sleep analysesYan Ma¹, Yulin Wei² and Chung-Kang Peng¹¹Center for Dynamical Biomarkers, Beth Israel Deaconess Medical Center, Harvard Medical School, MA 02215, USA²China-Japan Friendship Hospital, Beijing, 100029, China

Nowadays, the concept of sleep health management is well accepted, and consumer sleep technologies are commonly utilized in mobile devices including high-end wristbands and smartwatches. However, most wearable devices on the market are entertainment-oriented, and cannot generate reliable sleep assessments; their accuracy of sleep evaluation has not been studied systematically. The objective of this study is to compare the result of sleep analysis obtained by a wristband with the result from a well-accepted ECG-based sleep analysis, known as Cardiopulmonary Coupling (CPC). Huawei Metis Wristband, which implemented an algorithm based on heart rate variability developed by Nanjing Fengsheng Yongkang Software Technology Co., Ltd. (NFYST), was used. In the study, 200 subjects (98 males, 49%) were recruited, from three Chinese cities (Dongguan, Suzhou and Nanjing), with an age range of 18~45years (median age 26yr). All subjects made records for the test night, including time for bed, time to fall asleep and wake-up time in the morning. The subjects reported total sleep time (TST) ranged from 230 to 511 minutes (median TST = 410min). The data from wristband and ECG recordings were extracted and analyzed by the NFYST algorithm and CPC analysis, respectively. To investigate the accuracy of the classification obtained by wristband, six measures were calculated, and the median of six measures are stable sleep detection (83.07%); unstable sleep detection (73.14%); REM sleep detection (80.05%); stable sleep duration (87.46%); unstable sleep duration (90.02%); REM sleep duration (82.29%). The results show that the classifications obtained by wristband and CPC analysis are consistent.

Biography

Chung-Kang Peng is the director of Center for Dynamical Biomarkers (DBIOM) at Beth Israel Deaconess Medical Center, a major teaching hospital of Harvard Medical School. Prof. Peng focuses on fundamental theory and novel computational algorithms for characterizing physiological states in terms of their dynamical properties. These Dynamical Biomarkers may provide more sensitive and accurate assessments of physiological states than conventional biomarkers. He has published many papers in reputed journals and has over 33 thousand citations.

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