



**McCANCE CENTER
FOR BRAIN HEALTH**



Massachusetts General Hospital
Founding Member, Mass General Brigham

Detecting Signs of Neurodegenerative Disease from Sleep: A way to assess your risk of dementia

A recent McCance Center study to be published in an upcoming issue of *Sleep** detects signs of neurodegenerative disease from brain activity measured during sleep.

McCance Center Director of Data Science and Principal Investigator for the Human Sleep Project Dr. M. Brandon Westover and colleagues Drs. Robert Thomas and Alice Lam are co-senior authors, along with researcher Elissa Ye and McCance faculty Dr. Haoqi Sun.

The significance of this research, combined with the McCance Brain Data Science Project which is dramatically increasing the pace of evaluating detailed sleep data using artificial intelligence (AI), is that it will enable doctors to reliably use sleep data to understand a patient's current condition in a scalable way that can be applied to many more patients, faster and more affordably.



Dementia Detection from Brain Activity of Sleep



10,784
Sleep Studies



8,044
Participants

339 with Dementia
514 with MCI
7263 Cognitively Normal

Features based on:

Sleep Architecture
Frequency Band powers
Spindles
Slow oscillation
Coherence

Accuracy ranges from
73% to 78% (measured
by AUROC).

Conclusion

8,044 Sleep Studies Participants
*Our algorithms show promise for incorporating
dementia screening techniques into sleep studies.*

The new study used a clinical dataset of 10,784 polysomnography from 8,044 participants. Sleep macro-and micro-structural features were extracted from the electroencephalogram (EEG). Micro-structural features were engineered from spectral band powers, EEG coherence, spindle, and slow oscillations. Participants were classified as dementia (DEM), mild cognitive impairment (MCI), or cognitively normal (CN) based on clinical diagnosis, Montreal Cognitive Assessment (MoCA), Mini-Mental State Exam (MMSE) scores, Clinical Dementia Rating (CDR), and prescribed medications. The authors trained logistic regression, support vector machine, and random forest models to classify patients into DEM, MCI, and CN groups. The accuracy ranges from 73% to 78% measured by the area under the curve.

While results are pending publication, we can report the team's dementia classification show promise for incorporating dementia screening techniques using the EEG in routine sleep studies. The findings strengthen the concept of sleep as a window into neurodegenerative diseases.

*Ye, E., Sun, H., Krishnamurthy, P., Adra, N., Ganglberger, W., Thomas, R.J., Lam, A.D., and Westover, M.B., 2022. Dementia Detection from Brain Activity During Sleep. *Sleep*.