

The complexity of sleep

Compiled and edited by Thomas Wennekers, Peter Achermann and Ekehard Olbrich

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Brains fall asleep through a sequence of stages that can be coarsely defined by specific neural activation patterns in different frequency bands observable, for example, in the Electroencephalogram (EEG). Interactions between brain areas are more 'complex' in consciously awake states than during relaxed drowsiness or sleep.

This Theme Issue addresses the 'complexity of sleep', using experimental, theoretical, and modelling approaches. It provides reviews about large-scale functional brain networks during human sleep and theoretical methods to define and measure the complexity of interacting brain networks in strict terms.

It describes state-of-the-art methods to analyse EEG and brain imaging data, and how to predict them using large-scale brain models on computers. It also reports modelling work on the circuits and physiological mechanisms underlying sleep-related neural activity like sleep oscillations or the daily sleep-wake cycle, and finally discusses how a better understanding of the sleeping brain and its complex activity on several spatial and temporal scales can open up our minds to what it physiologically means to be awake.



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