Mathematical modeling and machine learning approach for sleep disorders.

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ABSTRACT

In this talk, I will illustrate collaborative stories between our math group and medical researchers to treat disrupted circadian rhythms and sleep. In collaboration with Pfizer Inc. to help the development of a new drug modulating circadian phase, we have used a mathematical model. In this talk, I will illustrate how we identified the major source of a large inter and intra-species variations in the efficacy of the clock-modulating drug by using the combination of in silico, molecular and behavioral experiments. To circumvent the large inter-patient variations, I will propose the "adaptive" chronotherapy identifying personalized dosing regimens that restore normal circadian phase. Furthermore, in collaboration with Samsung medical center, we have analyzed complex sleep patterns of shift workers with a mathematical model to find optimal sleep patterns improving their sleep quality. This opens the chance for the development of an app providing personalized sleep schedule based on sleep patterns measured by wearable devices. If time is allowed, I will briefly introduce the phenotyping of Obstructive sleep apnea based on whole PSG data rather than a single canonical metric, AHI.

REFERENCES

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