

New theory offers clues to vital 'repair and maintenance' role of sleep

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(Medical Xpress)—We spend about a third of our life asleep, but why we need to do so remains a mystery. In a recent publication, researchers at University of Surrey and University College London suggest a new hypothesis, that the biological function of sleep is to allow for vital 'repair and maintenance' of the cells in our brain, so called neurons. The research also proposes that these repair functions can only occur if the rest periods of individual neurons are aligned precisely at a time scale of seconds or less. The hypothesis is published today (20 May) in *Nature Reviews Neuroscience*.

Vladyslav Vyazovskiy, Lecturer in Sleep and Chronobiology at the University of Surrey, comments; "We have billions of [neurons](#) in our brain, and each of them is connected with thousands of other neurons that are constantly talking to each other and exchanging information. It appears that our neurons cannot rest and repair themselves independently; they have to all shut down at the same time so as not to disturb each other and allow each individual cell in our brain to obtain the rest it needs."

"If neurons attempt to obtain rest while we are awake, it is not only much less efficient, but also affects our performance negatively. On the other hand, under certain conditions some areas of our brain may be unable to "fall asleep" and remain in a "local wakefulness" state, resulting in us experiencing a very bad night's sleep."

Kenneth Harris of UCL, a co-author on the article, adds: "There are

intriguing parallels between the cellular repair processes that occur in brain cells after prolonged waking, and in muscle cells after exercise. This suggests that the repairs they are conducting may be similar. But while you can rest your muscles while being awake, to [rest](#) the brain during waking would be impossible."

"The same happens in many other circumstances outside of biology. The London Underground for example, can only function properly during the day because it has extensive maintenance every night. We suggest that sleep allows a similar period of maintenance for the [brain](#)."

Provided by University of Surrey

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