

Extra sleep fixes memory problems in flies with Alzheimer's-like condition

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Paul Shaw, PhD, who studies sleep in fruit flies at Washington University School of Medicine in St. Louis, checks the nursery where he breeds flies. His research shows that artificially inducing extra sleep in the flies allows them to overcome major memory impairments. Credit: Clark Bowen

Many studies have linked more sleep to better memory, but new research in fruit flies demonstrates that extra sleep helps the brain overcome catastrophic neurological defects that otherwise would block memory formation, report scientists at Washington University School of Medicine in St. Louis.

Studying three groups of [flies](#), the scientists interfered with their ability to remember by disabling a different critical memory gene in each group.

In one group, the disabled gene led the flies to develop a condition with similarities to Alzheimer's disease. In another group, the disabled gene made it difficult for fly [brain cells](#) to reinforce new connections that encode memories. In the third group, the disrupted gene left the flies with too many of these connections.

"Our data showed that extra [sleep](#) can handle any of these problems," said senior author Paul Shaw, PhD, associate professor of neurobiology. "It has to be the right kind of sleep, and we're not sure how to induce this kind of slumber in the [human brain](#) yet, but our research suggests that if we can learn how, it could have significant therapeutic potential."

The study appears online Thursday, April 23, in *Current Biology*.

Shaw works with [fruit flies](#) to explore the brain mechanisms that control sleep, which he and others have shown to be similar to those seen in people.

As part of the new study, the scientists restored memory in each group of flies by using one of three techniques to increase sleep. They stimulated a cluster of key brain cells, boosted the production of a protein linked to sleep or gave the flies a drug that mimicked the activity of an important chemical messenger.

Regardless of the technique used to increase sleep, the added slumber—an extra three to four hours of sleep daily over as little as two days—restored the flies' ability to make memories.

"In all of these flies, the lost or disabled gene still does not work

properly," noted lead author Stephane Dissel, PhD, a senior scientist in Shaw's lab. "Sleep can't bring that missing gene back, but it finds ways to work around the physiological problem."

Shaw and others believe sleep helps the brain reinforce connections between brain cells that encode important memories and cut back connections that encode useless information.

More information: Dissel S, Angadi V, Kirszenblat L, Suzuki Y, Donlea J, Klose M, Koch Z, English D, Winsky-Sommerer R, van Swinderen B, Shaw PJ. Sleep restores behavioral plasticity to drosophila mutants. *Current Biology*, online April 23, 2015.

Provided by Washington University School of Medicine

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