Unusual comparison nets new sleep loss marker

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(Medical Xpress)—For years, Paul Shaw, PhD, a researcher at Washington University School of Medicine in St. Louis, has used what he learns in fruit flies to look for markers of sleep loss in humans.

Shaw reverses the process in a new paper, taking what he finds in humans back to the flies and gaining new insight into humans as a result: identification of a human gene that is more active after sleep deprivation.

"I'm calling the approach cross-translational research," says Shaw, associate professor of neurobiology. "Normally we go from model to human, but there's no reason why we can't take our studies from human to model and back again."

Shaw and his colleagues plan to use the information they are gaining to create a panel of tests for sleep loss. The tests may one day help assess a person's risk of falling asleep at the wheel of a car or in other dangerous contexts.

PLOS One published the results on April 24.

Scientists have known for years that sleep disorders and disruption raise blood serum levels of interleukin 6, an inflammatory immune compound. Shaw showed that this change is also detectable in saliva samples from sleep-deprived rats and humans.

Based on this link, Shaw tested the activity of other immune proteins in humans to see if any changed after sleep loss. The scientists took saliva samples from research participants after they had a normal night's sleep and after they stayed awake for 30 hours. They found two immune genes whose activity levels rose during sleep deprivation.

"Normally we would do additional human experiments to verify these links," Shaw says. "But those studies can be quite expensive, so we thought we'd test the connections in flies first."

The researchers identified genes in the fruit fly that were equivalent to the human genes, but their activity didn't increase when flies lost sleep. When they screened other, similar fruit fly genes, though, the scientists found one that did.

"We've seen this kind of switch happen before as we compared families of fly genes and families of human genes," Shaw says. "Sometimes the gene performing a particular role will change, but the task will still be handled by a gene in the same family."

When the scientists looked for the human version of the newly identified fly marker for sleep deprivation, they found ITGA5 and realized it hadn't been among the human immune genes they screened at the start of the study. Testing ITGA5 activity in the saliva samples revealed that its activity levels increased during sleep deprivation.

"We will need more time to figure out how useful this particular marker will be for detecting sleep deprivation in humans," Shaw says. "In the meantime, we're going to continue jumping between our flies and humans to maximize our insights."

More information: Thimgam, M. et al. Cross-translational studies in humans and Drosophila identify markers of sleep loss.*PLoS ONE* 8(4): e61016. doi:10.1371/journal.pone.0061016.

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