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Jettison Your Jet Lag

How light exposure and the gene Id2 play a role in jet lag.

By Michele Solis for MSN Health & Fitness

The headaches, sleepiness, and all around out-of-it feeling of jet lag is a punishing side effect of long-distance travel by plane. But relief may be in sight in the form of a gene called Id2, suggests a study published in *Current Biology* in February.

Once we land at our far-flung destination, we feel groggy during the day, yet perk up as night approaches. Although we've reset our watches to the new time, our bodies take longer to adapt, somewhere between one or two days per time zone crossed.

Though a temporary nuisance to travelers, being out of synch with the local time is a constant challenge for many people, like night-shift workers and airline personnel, and eventually it may adversely affect their health. (Some research suggests it may raise the risk of breast and colon cancersand perhaps others.)

Adapting to new time zones is difficult because our daily cycle of sleeping and waking is somewhat engrained in our bodies: genes are turned on and off; brain cells buzz with electricity then go quiet; and hormones rise and fall in a 24-hour cycle. Together these so-called circadian rhythms create the internal timing that dictates when we feel sleepy and when we feel alert. These rhythms are such an integral part of our physiology that they continue even in complete darkness.

But they can be shifted by outside forces like light, which is what happens when we adapt to a new time zone.

The new study takes a closer look at how our circadian rhythms are pushed around by light by simulating jet lag in mice. While not particularly known for their frequent flyer miles, the mice revealed a gene called Id2 that seems to decrease the sensitivity of their rhythms to light. This means that finding ways to subdue Id2 might eventually hasten our recovery from jet lag.

Clocks in the brain

A master clock in the brain controls these circadian rhythms, in a place called the suprachiasmatic nucleus, or SCN. Smaller than a pea, the SCN contains genes and proteins that work together like the cogs of a clock to produce signals that fluctuate in a 24-hour cycle.

The SCN also receives light signals during the day from our eyes. When the light comes at the wrong time, as when we are displaced by several time zones, this de-synchronizes the cogs within the SCN, and we then feel seriously out of whack.

The scientists began by looking for genes that turned on and off once in a 24-hour period—good candidates for machinery that creates circadian rhythms. When they found one, Id2, that resided within cells of the SCN, "we knew were onto something interesting," says Giles Duffield, Ph.D., first author of the study and assistant professor at the University of Notre Dame in South Bend, Ind.

To understand what Id2 was up to, Duffield and his colleagues engineered mice without it. The idea behind this type of "knockout" experiment is that by removing a mouse's gene completely, you can then figure out that gene's job by seeing what physical and behavioral differences are then noted.

Knocking out Id2 didn't break the clock, though. The scientists exposed mice both with and without Id2 to artificial jet lag by delaying the time that lights went on and off in their cages by 10 hours. This time difference is the same experienced by travelers from Athens, Greece, who fly to Los Angeles.

The difference was dramatic. All the mice shifted to this new schedule, but the ones without Id2 did it much faster, taking only two and a half days to do what normal mice needed five days to do. "It's like we removed the handbrake on their molecular machinery," Duffield says.

Mind the light

This finding suggests that Id2 normally makes the clock in the SCN somewhat resistant to resetting. Without the gene, the clock is more amenable to outside influences like light, and it shifts readily.

Duffield says it's too soon to translate these results into practical advice for travelers, but finding ways to tweak Id2 downward could eventually help.

In the meantime, this research underlines the importance of increasing one's exposure to light when getting over jet lag. The study also found that only giving the mice isolated 30-minute episodes of light did not shift them; instead they needed *prolonged* light exposure. This aligns with recommendations for travelers to get lots of light during the day once they've arrived at their destination, and to sleep in a very dark room. The idea is to make the light and dark signals as distinct as possible for the benefit of your brain's clock.

And this weird marriage of genes and jets shows that while the brain can do its own thing, it needs to remain open to outside influences.

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After spending 15 years in the lab doing her own neuroscience research, Michele Solis is now putting her Ph.D. to work as a science writer. Her work covers a variety of topics including autism, linguistics, and animal communication. She contributes regularly to the Autism Speaks, Simons Foundation, and Crosscut Web sites.

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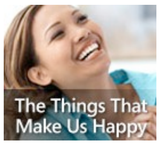

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