UC San Diego
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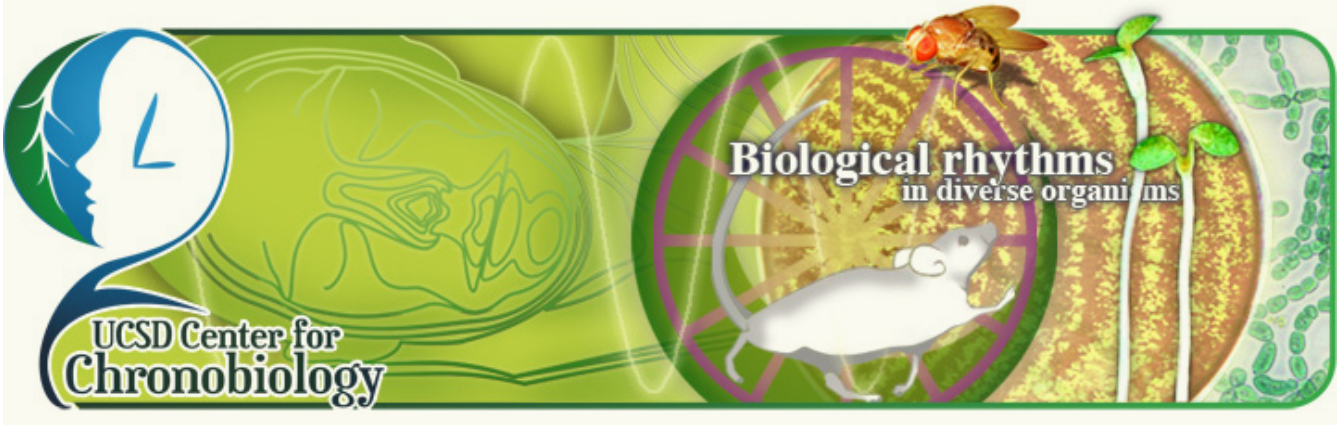
By Kim McDonald Mar 07, 2013

Biology of Time Change

Switch to Daylight Savings Time can wreak havoc on your body

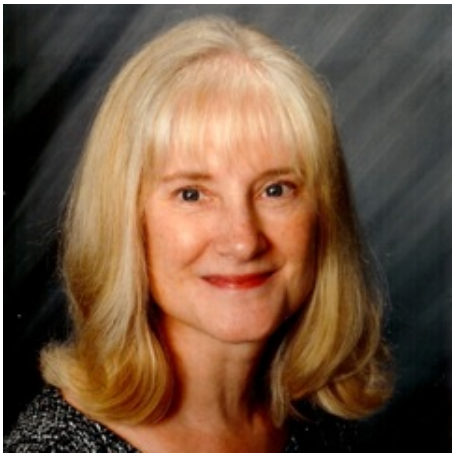


On March 10, clocks across the United States will be moved forward one hour, shifting an hour of daylight from the morning to the evening. It's a time when many of us feel fatigued and listless. And it's not just because of that lost hour of sleep.

Our biological systems, like those of plants, are intimately tied to the day-night cycle that sets our circadian rhythms. In fact, much of what biologists at UC San Diego are now learning from plants, animals, bacteria and even fungi about the basic biology of circadian rhythms, or chronobiology, is vital to our daily lives. Half of the U.S. population suffers from some problem in their daily sleep cycle, and shifts caused by Daylight Savings Time, medications, artificial lighting, shift-work, airline travel and 24/7 internet access represent chronobiological—or biological timing—changes that affect our productivity and physical and mental well-being.

Susan Golden, a professor of biology, is co-director of the Center for Chronobiology here, which is combining what scientists across campus are learning about the biological clocks of diverse groups of organisms, from bacteria to fungi to plants to humans, to better understand the basic biology of circadian rhythms. We asked Golden a few questions about the center, which last month brought experts from around the world for a symposium on chronobiology:

Q: What's so important about the human biological clock and, besides jet lag or the sleepiness associated with Daylight Savings Time changes, what sorts of long-term health problems can result from disturbances in our circadian rhythms?



Susan Golden

A: The biological clock in humans plays a central role in whether we gain or lose weight, when we fall asleep and wake up, how likely we are to have accidents and how we respond to disease. There is no single function in human biology that is affected by the clock; rather, essentially all physiological process are timed, and when the timing of one process is off relative to the others with which it should be coordinated, our health suffers.

Q: What have biologists here discovered recently about the biological clocks of other organisms that could be applied to humans?

A: One area of news in chronobiology is the discovery of how intimately food intake and the circadian clock are intertwined. Although the sleep/wake centers in the brain are set to local time by light and darkness, the clocks in the liver and some other body organs are sensitive to the time of food intake. The [Satchin] Panda lab (in UC San Diego's Division of Biological Sciences and the Salk Institute) has shown dramatically that mice will become obese when they eat around the clock but not when they ingest exactly the same food and number of calories during an 8-hour period when the mice are active. It has also found that people in our modern society are eating almost around the clock, and propose that this timing issue may be as important as the availability of high-calorie food for promoting obesity and diabetes.

More information on the center can be found at: http://ccb.ucsd.edu/