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Daylight savings time disrupts humans' natural circadian rhythm

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When people living in many parts of the world move their clocks forward one hour in the spring in observance of daylight saving time (DST), their bodies' internal, daily rhythms don't adjust with them, reports a new study appearing online on October 25th in *Current Biology*.

The finding suggests that this regular time change—practiced by a quarter of the human population—represents a significant seasonal disruption, raising the possibility that DST may have unintended effects on other aspects of human physiology, according to the researchers.

"When we implement small changes into a biological system which by themselves seem trivial, their effects, when viewed in a broader context, may have a much larger impact than we had thought," said Till Roenneberg of Ludwig-Maximilian-University in Munich, Germany. "It is much too early to say whether DST has a serious long-term impact on health, but our results indicate that we should consider this seriously and do a lot more research on the phenomenon."

As in other animals, the human circadian clock uses daylight to stay in synchrony with its environment as the seasons change. In fact, Roenneberg said, this "entrainment" is so exact that human behavior adjusts to the east-west progression of dawn within a given time zone.

Despite the fact that approximately 1.6 billion people experience DST, he continued, few studies have investigated its impact on human physiology and behavior. The results of the few, relatively small studies

that have addressed the question have generally suggested that sleeping patterns adjust within days.

In a large survey, which examined the sleep patterns of 55,000 people in Central Europe, Roenneberg's group now shows that the timing of sleep on free days follows the seasonal progression of dawn under standard time, but not under DST.

In a second study, they analyzed the timing of sleep and activity for eight weeks around each of the two DST transitions in 50 people, taking into account each individual's natural clock preferences, or "chronotypes," ranging from morning larks to night owls. They found that the timing of both sleep and peak activity levels readily adjust to the release from DST in autumn, but that the timing of activity does not adjust to the start of DST in spring, especially in those who like to stay up late and sleep in.

"While we generally think that the time changes enforced by the DST transitions are 'only an hour,' they have far more drastic effects if viewed in the context of the circadian clock's seasonal changes," Roenneberg said. "This seemingly small hour translates to a repeat of 10 weeks in the annual progression of the relationship between our sleep-wake cycle and dawn—four weeks in spring and six weeks in autumn. In effect, it's as if the entire population of Germany, for example, is transported to Morocco in spring and back again in autumn."

Indeed, "after taking the seasonal adjustment into account, our results show that the human circadian clock does not adjust to the DST transition," Roenneberg said. "This is especially obvious in the late chronotypes in spring when one looks at their daily activity patterns. Essentially, their biological timing stays on standard, winter time, while they have to adjust their social schedules to the advanced clock time throughout the summer."

Source: Cell Press