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Research suggests a significant circadian rhythm in swim performance lasting 2-4 minutes

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A new study investigating the potential of a circadian rhythm in athletic performance adds further confirmation that it exists. The finding is being published in the Journal of Applied Physiology, one of 11 peer reviewed scientific publications issued monthly by the American Physiological Society.

The authors of "Circadian Variation in Swim Performance," are Christopher E. Kline, J. Larry Durstine, J. Mark Davis, Teresa A. Moore, Tina M. Devlin, Mark R. Zielinski, and Shawn D. Youngstedt, all from the Department of Exercise Science, Arnold School of Public Health, University of South Carolina, Columbia, SC.

Circadian rhythms are generated within the body, and are "re-set" almost every 24 hours. Human circadian rhythms originate from the tiny hypothalamus residing in the back of the brain. The hypothalamus, working with the endocrine system, drives many of our behavioral and physiological rhythms.

Researchers have speculated that there may be a circadian rhythm inherent in athletic performance and point to research showing that athletic performance varies based on time-of-day. Other studies have shown that peak performance occurs in early evening, at approximately the peak of the body temperature rhythm. Additional studies have found that morning is the worst time for athletic performance.

These findings, however, have limitations. For example, the studies failed to identify the other factors that could cause time-of-day differences that are independent of circadian rhythm. For example, worse performance in the morning could be attributed to nutritional status, joint stiffness following bed-rest, sleep inertia upon arising, lower ambient temperature, and a lack of "warm up" in the muscles.

To better understand the potential existence of a circadian rhythm in swimming performance, researchers assessed 25 highly trained swimmers over 50-55 consecutive hours while who were adhering to a 180-minute ultra-short sleep/wake schedule, specifically one hour of sleep in darkness and two hours of wakefulness in dim light, repeated throughout the length of observation. This study design distributed multiple masking factors equally across the 24-hour day and allowed multiple performance assessments to be conducted over a short period of time with relatively little sleep loss.

Each swimmer performed six scheduled maximal-effort 200-meter swim trials that were distributed equally across eight times of day, with nine hours between each trial. Data from the sleep/wake schedules, swim performances, states of sleepiness, physical/mental energy, and physical/mental fatigue and body temperature measurements were collected. The statistical comparisons were performed using SPSS software. All results were presented as mean plus or minus standard error; with significance set at P