

# Time of day crucial to accurately test for diseases, new research finds

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A new study published today in the journal *PNAS (Proceedings of the National Academy of Sciences)*, has found that time of day and sleep deprivation have a significant effect on our metabolism. The finding could be crucial when looking at the best time of day to test for diseases such as cancer and heart disease, and for administering medicines effectively.

Researchers from the University of Surrey and The Institute of Cancer Research, London, investigated the links between sleep deprivation, body clock disruption and metabolism, and discovered a clear variation in metabolism according to the time of day.

Healthy male volunteers were put in an environment where light, sleep, meals and posture were controlled. Researchers collected [blood samples](#) every two hours to show how metabolic biomarkers change during the day. For the first 24 hours, the participants experienced a normal wake/sleep cycle. This was followed by 24 hours of wakefulness, to investigate the effect of sleep deprivation on metabolic rhythms. The results showed that metabolic processes are significantly increased during sleep deprivation. 27 metabolites, including serotonin, were found at higher levels in periods of [sleep deprivation](#) compared to levels during sleep.

Lead author Professor Debra Skene from the University of Surrey, said: "Our results show that if we want to develop a diagnostic test for a disease, it is imperative to take the time of day when taking blood

samples into account, since this has a significant effect on metabolism. This is also key for administering medicines and determining when they will be at their most effective. Of course, this will have to be considered on a case-by-case basis, since many people such as shift workers will have a different sleep/wake cycle and timings will need to be adapted to their body clocks."

Co-Senior author, Dr Florence Raynaud, a group leader at The Institute of Cancer Research, London, said: "The study made accurate measurements of a large number of metabolites as they varied by time of day and under different sleep patterns. Our findings are likely to be important in interpreting the results of blood tests, and in understanding why some individuals respond differently to medication. They also set reference points for future studies looking at the connection between [metabolic processes](#) and diseases such as cancer."

The research was funded by a grant from the BBSRC awarded to a large team of researchers, and was conducted at the University of Surrey's Faculty of Health and Medical Sciences and at The Institute of Cancer Research, London.

**More information:** Effect of sleep deprivation on the human metabolome , *PNAS*, [www.pnas.org/cgi/doi/10.1073/pnas.1402663111](http://www.pnas.org/cgi/doi/10.1073/pnas.1402663111)

Provided by University of Surrey

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