

Moving light-dark exposure could reduce disruption faced by night shift workers

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New research published in *The Journal of Physiology* shows that our brain clock can be shifted by light exposure, potentially to align it with night shift patterns. It highlights that a 'one size fits all' approach to managing sleep disruption in shift workers may not be appropriate. A personalised approach, with light-dark exposure scheduled and taking into account whether someone is a 'morning' or 'evening' person, could reduce the increased risk of health problems in shift workers.

Our [sleep-wake cycle](#), in part controlled by our brain [clock](#), encompasses physical, mental and behavioural changes that follow a daily cycle. Light is the dominant environmental time cue which results in, for example, sleeping at [night](#) and being awake during the day.

Night time shift work disrupts the normal sleep-wake cycle and our internal circadian (24-hour) rhythms, and has been associated with significant health problems, such as a higher risk of heart disease and cancer. Alertness levels are often markedly impaired while working night shifts.

While it has been known that there are considerable differences in how the brain clock of different individuals responds to changing shift cycles, we have known very little about the mechanisms that underlie these differences between people. If someone was able to realign their brain clock to their shift pattern, then it would improve sleep and could lead to health benefits. While such realignment is rare, in some circumstances such as on offshore oil rig platforms, complete adaption has been

observed.

This new research aims to understand the relationship between [light exposure](#) and how an individual's circadian rhythm is affected across a transition from day to night shift schedules. The researchers found that timing of light exposure is the primary factor in determining how the brain clock responds to night shift work, accounting for 71% of the variability in timing of the clock observed in the study. It also found that the extent to which an individual is a 'morning' or 'evening' type affects how the body responds, which shows that a personalised approach is important.

This study was led by the CRC for Alertness, Safety and Productivity and saw nursing and medical staff recruited from an Intensive Care Unit at a major hospital in Melbourne, Australia. Staff members were enrolled into the study when working a schedule of day or evening shifts, or days off, followed by at least 3 or 4 consecutive night shifts.

To examine how the sleep-wake cycle responds to the shift schedule, the timing of the brain clock was measured on the day schedule, and at the end of the [night shifts](#). It was measured by monitoring urinary concentration of the major metabolite of melatonin, which is a hormone produced in the pineal gland known to be involved in the regulation of sleep cycles. Individual light exposure was measured using wrist actigraphs, worn for the duration of the study.

Prof Shantha Rajaratnam, from Monash University and the CRC for Alertness, Safety and Productivity, corresponding author for the study, said:

"We know that night time [shift workers](#) are more likely to suffer [health problems](#) due to disruption of their circadian clock, and the mismatch between the timing of the clock and their sleep-wake cycle. This

research is important because if we can realign a person's clock to fit their shift pattern, then they will sleep better and this may result in improved health, safety and productivity.

"These results will drive development of personalised approaches to improve sleep-wake cycles of shift workers and other vulnerable people, and could potentially reduce the increased risk of disease due to circadian disruption."

More information: *Journal of Physiology* (2018). [DOI: 10.1113/JP275589](https://doi.org/10.1113/JP275589)

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