

Circadian rhythm in human epidermis identified via biomarkers

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A team of researchers affiliated with several institutions in the U.S. has identified circadian rhythm patterns in human skin based on genetic biomarkers. In their paper published in *Proceedings of the National Academy of Sciences*, the group describes how they obtained skin samples from multiple volunteers over time, and what they discovered after conducting a genetic analysis.

Most people have heard of the circadian rhythm—the [internal clock](#) that regulates sleepiness and wakefulness. It generally oscillates over an approximate 24-hour period. Researchers have been studying the [circadian clock](#) because certain medicines work better or worse during different parts of the cycle. It has also been found that there are optimal times during the cycle for carrying out surgical procedures. In this new effort, the researchers have found a way to track the circadian rhythm in people by taking skin samples every few hours and looking at gene expression markers.

To find out if the skin could be used to map the

circadian rhythm of a given individual, the researchers collected skin samples every six hours from 19 volunteers over a 24-hour period. Each of the samples was tested for gene expression markers. They found 110 genes whose expression varied in rhythmic patterns throughout the day. They noted that the rhythm patterns followed a bimodal distribution where peaks occurred in the morning and the evening.

The researchers then collected skin samples from 219 volunteers just once at random points throughout a given day. They compared gene expressions in those samples to the ones they had studied earlier, and found a correlation between the two groups. Next, they used a tool called CYCLOPS to rebuild the temporal order of the new samples. They identified 188 [genes](#) that expressed rhythmically in the skin. The researchers conducted a similar experiment on mice and found similarities with human volunteers.

The researchers suggest their findings indicate that [skin](#) sampling could be used to develop biomarkers for mapping out the circadian clock in individuals—a much less cumbersome process than the current standard, the dim-light melatonin-onset assay.

More information: Gang Wu et al. Population-level rhythms in human skin with implications for circadian medicine, *Proceedings of the National Academy of Sciences* (2018). [DOI: 10.1073/pnas.1809442115](#) , www.biorxiv.org/content/early/2018/04/16/301820

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