All living organisms, including humans, show rhythmic changes in physiological, biochemical, and behavioral parameters. These changes can help optimize energy use, prioritizing certain body functions at certain times of the day and saving energy at other times. Circadian rhythm with about 24-hour cycle controls various functions of human beings. The central and peripheral circadian clocks regulate the circadian rhythm in response to environmental signals such as sunlight, food, and body activity.

Circadian variations have also been observed in many various diseases such as hypertension, coronary arterial diseases, bronchial asthma, epilepsy, mood disorders, and cancer [1]. Chronotherapeutic strategies to optimize the timing of therapeutic intervention is being developed in medical field and have been implemented in various circadian diseases. However, high cost of clinical trials incorporating chronopharmacological approaches and the absence of a reliable circadian biomarker to guide chronotherapeutics are important limitations in this area.

Serum/salivary levels of melatonin and cortisol and core body temperature (CBT) rhythms have been considered as circadian biomarkers controlled by the master circadian clock located in hypothalamic suprachiasmatic nuclei [2,3]. Circadian rhythm in human being is commonly assessed by repeatedly measuring the CBT, the circadian profile in serum/salivary cortisol concentration during the day, or by measuring the dim-light melatonin-onset (DLMO). However, these can be invasive or impractical due to the complexity of the process and because they cannot be easily measured in everyday life. Therefore, development of a simple and reliable method for measuring circadian rhythm is needed.

It is encouraging to see that recent studies are actively being carried out to measure endogenous circadian clocks with simple methods. Some researchers developed an endogenous circadian timing estimation based on the expressed patterns of multiple circadian genes from a single sample of epidermis [4] or hair follicle cells [5]. Other researchers developed a sweat-based platform for circadian biomarkers such as cortisol and dehydroepiandrosterone (DHEA), which measures and monitors the cortisol and DHEA concentrations secreted by sweat over multiple time points [6]. Jeong et al. [7] reported that the acrophase of the circadian rhythm of heart rate assessed using a wearable device tended to correlate with that of salivary cortisol concentration and suggested that the heart rate measured using a wearable device was a relatively reliable biomarker for endogenous circadian rhythm. However, it seems that these circadian biomarkers have more to be developed in terms of accuracy and reliability.

If circadian biomarkers, which can identify endogenous circadian clock and can be easily applied in real life, are successfully developed, this will be an opportunity to make a big leap in the development of medicine. The development of simple and effective circadian biomarker is expected to reveal the causes of many non-communicable diseases and make a landmark contribution to the development of effective treatments.

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Conflicts of Interest
The author has no potential conflicts of interest to disclose.

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