

# **CIRCADIAN RHYTHM AND ITS IMPORTANCE IN HUMAN LIFE**

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### **Abstract**

*Circadian rhythm is a biological clock that is built in our brain throughout the functionality of everyone's day and night processes within a 24-hour clock frame and it devises our body to function in a healthy way of daily routines. Thus, the circadian rhythm becomes a self-control system of human body to regulate our eating habits, activities and body functionality. In this context, our daily (24-hour) functionality should have concern over food, physical environment including lightings, exercises, work habits, sleeping and other activities concern. All in consideration and importantly, a mind clock should be set with routinised daily functionality for a healthy life.*

Keywords : circadian rhythm, mind clock, human, self-control, sleeping,

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# CIRCADIAN RHYTHM AND ITS IMPORTANCE IN HUMAN LIFE

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## 1. INTRODUCTION

Proper functions of mind and body of a person depends on how the person maintains a healthy circadian rhythm. Circadian Rhythm is basically a biological clock that is built in our brain throughout the functionality of everyone's day and night processes, as per the 24-hour clock. The circadian rhythm of human body is a self-control system to regulate our eating habits, activities and body functionality, like getting hungry and food digested, passing urine and maintaining blood pressure, sleeping and awakening process, and body temperature. Thus, our food, eating style and time, life disciplinary process, lights (day and night) we see and our body experience, and other day to day lifestyle components are the crucial factors that shape up everyone's circadian rhythm.

Brainard et al. (2015 and 2015) endorse that disruption of a circadian rhythm can much more directly lead to develop potential diseases and become a main source for the severity of possible diseases within human body. They also cite studies to clearly insist that disruption of circadian rhythm can cause with more troubles than its worth. It is therefore important for everyone to keep up and maintain a better circadian rhythm to overcome such irregularities in our day to day life.

In order to make the readers to understand further, the rest of this paper is organised as meaning of circadian rhythm, main aspects of maintaining consistent circadian rhythm, fixing a circadian rhythm, impacts on disrupted circadian rhythm and conclusion

## 2. MEANING OF CIRCADIAN RHYTHM AND IMPACT IN HUMAN HEALTH

The circadian rhythm is an internal process that naturally regulates our biological processes within a 24-hour time frame. The source of the word Circadian is from Latin "*Circa*" meant to "around" and "*diēm*" meant to "day", thus transforming "*Circa diēm*" into "*Circadian*" as a single word for "*around the day*".

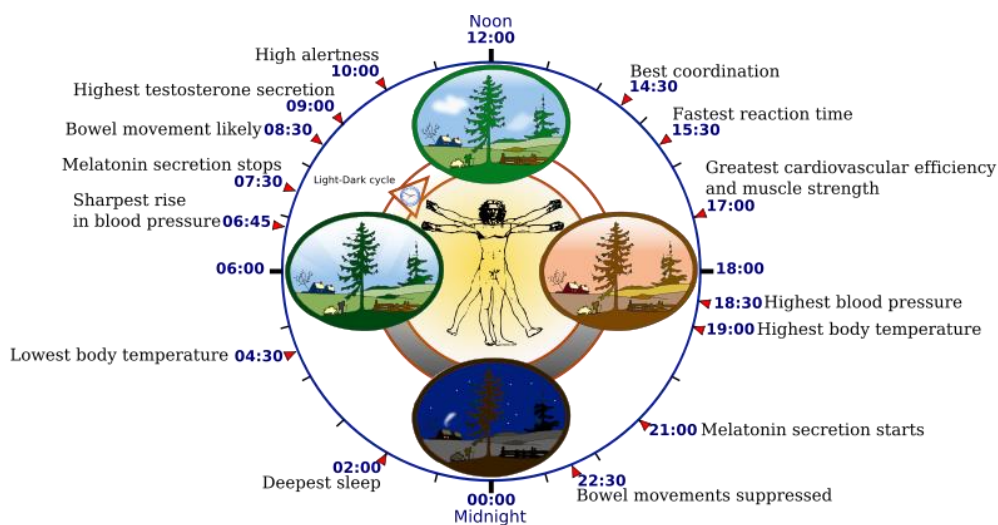
Human body becomes active from awakening at a time and goes through a frame of 24 hours in a day. During this period, our body experiences diverse emotional, behavioural and biological nature (like sleeping, resting, hungry, thirsty, urine passing, etc.). When a human body has a pattern of such experiences for a period of continuous duration, the body gets synchronised to the experience and that can possibly become transformed into our 24-hour routine. The

biological process that a human body follows as a routine within a 24-hour cycle is now known as the “Circadian Rhythm”. In a simple term, this implies that for an example, everyone’s routinised eating time has a great impact on the way our body process the food digestion. Similarly, sleeping pattern of a person also has a great impact on the way of functioning our brain as well as organs of human body.

As a human circadian rhythm is identical for everyone as unique as possible, it is a biological process of an individual that can be explained as a synchronised 24-hour internal clock that comes from back of a person’s brain. Circadian rhythm cycles become active every day with a regularity between sleepiness and alertness that is known as the sleep-wake cycle. The circadian rhythm is endogenous which means that it’s a cycle that is built-in to the body and should be self-sustained (Dominguez, 2019).

KrNel (2017) highlights “*The circadian rhythm is a biological clock that is linked to the day/night cycles. It regulates much in our bodies, as well other animals, plants, fungi and cyanobacteria*” and represents the circadian rhythm with a potential biological clock as in Figure 1.

Figure 1: Potential human biological clock



(Source: [https://en.wikipedia.org/wiki/File:Biological\\_clock\\_human.svg](https://en.wikipedia.org/wiki/File:Biological_clock_human.svg), 2009)

All in all, human circadian rhythm refers to how body, organs and mind of an individual do adapt into a synchronised process of our daily lifestyle that includes our environment (e.g., light, weather condition, etc.), practices (e.g., sleeping, food, food consumption time, etc.) and applications (e.g., mobile, laptop, etc.) of various elements. Frequent changes in the environment, practices and applications can severely affects our synchronised circadian rhythm, thus causing feeling of non-healthiness and stress sometimes.

Ballantyne (2014) indicates

*“The term circadian rhythm refers to the fact that a huge array of biological processes within the human body (and indeed all forms of life on Earth) cycle according to a 24-hour clock. Circadian rhythm allows your body to assign functions based on the time of day (and whether or not you are asleep); for example, prioritizing tissue repair while you are sleeping, and prioritizing the search for food, metabolism, and movement while you are awake.<sup>1</sup> Circadian rhythms are how your body knows what time it is (like when it’s time to get up in the morning)–and properly regulated circadian rhythms are critical for health”.*

According to Brainard et al. (2015 and 2015), disruption of circadian rhythm can cause with more troubles with unhealthy state of a human body and mind. This study therefore questions whether frequent change in the body and mind related synchronising process to have a better circadian rhythm causes increase in illness (like heart diseases, cancer, diabetes, psychological stress, etc.). This paper suggests this as an implication that future study can explore this further, since increase in number of such diseases can possibly correlate with frequent changes in environment (e.g., physically changes in natural environment, and advanced and rapid changes in technology). In this context, this paper underlines the importance of maintaining consistent experiences to form a circadian rhythm with respect to our environment, practices and applications.

### **3. MAINTAINING CIRCADIAN RHYTHM**

Many studies highlight importance of maintaining a circadian rhythm for a healthy lifestyle (e.g., Ballantyne, 2014; Brainard et al., 2015 & 2015; KrNel,2017; Dominguez, 2019). According to Ballantyne (2014), there are 10 basic aspects that one must follow to set a circadian clock which would help human to regulate the functionality of human organs: (a) during day time, get bright/blue light exposure, (b) during evening, avoid bright/blue light, (c) manage mental stress, (d) keep on time sleep to get enough sleep, (e) Sleep in a comfortable dark room with healthy temperature, (f) involve in regular physical activities, (g) manage the food, drinks and blood sugar level, (h) be Social during day time and keep intimacy during night, (i) healthy and timely eating and (j) embrace seasonal changes.

However, Ballantyne (2014) indicate simple ways of fixing a circadian rhythm that comprises adhere to routinising, light manipulation, regularise on-time meal and maintain sleeping patterns.

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<sup>1</sup> Metabolism: The process by which your body converts the food and water you consume into energy for immediate use or to be stored for later (source: <https://www.dummies.com/health/nutrition/what-is-metabolism/>).

- (a) **Routinising:** This is to set the activities as routine as possible in order to get your body at a regular pattern, till you get into sleep in bed.
- (b) **Light Manipulation:** This refers to expose white/blue light to familiarise to your body to reduce melatonin, during daytime; and setting lights in dim (avoid white/blue light) in the evening to adapt and make your body to feel sleeping on time.<sup>2</sup>
- (c) **Regularise On-time Meal:** Make a timetable to have your meal on time with a stipulated interval between the meals; and avoid meals that affect your circadian rhythm. According to Patrick et al. (2008), keeping 16 hours fasting between dinner (at 4.00 pm evening) and next day breakfast (at 8.00 am) can help human body to track in a healthy manner.
- (d) **Maintain Sleeping Pattern:** It is better to avoid daytime sleep more than 20 minutes, to keep track on night sleeping. Regularise on-time sleeping and awakening pattern as your lifestyle.

#### 4. BENEFITS OF HEALTHY CIRCADIAN RHYTHM

An individual with synchronised circadian rhythm inside body should enjoy a healthy life. This implies that the individual maintains a 24-hour cycle internal timekeeping mechanism that regulates the basic functions of sleep-wake and feeding patterns. Circadian rhythm help maintaining many physiological changes that includes heart beating rate, produce of red blood cells and hormone, maintaining body temperature and metabolism. Thus, it is important to keep circadian rhythm (internal body clock) by an individual to track on his/her day to day lifestyle, mind and behaviour.

Disruption of a synchronised circadian rhythm has correlation to various sleep disorders, like sleeplessness, and frequent changes in or violating existing circadian rhythm can possibly cause health problem of obesity, diabetes, depression, bipolar disorder and seasonal affective disorder (e.g., Charrier et al., 2017). According to Dr Michael Roizen, circadian rhythm very much appealing for maintaining younger skin, supper immunity, better blood sugar and more energy (see Appendix 1). Scholars explicitly accepts that circadian rhythm is a method of devising our day to day life in a healthy manner. Overall, circadian rhythm is mind-set clock to synchronise our daily lifestyle as routinised for our healthy life. However, there is much more possibility that our circadian rhythm can get violated/interrupted due to the frequent changes in physical, social, cultural, economic, technological and political environment of our workplace and living state.

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<sup>2</sup> Melatonin: a hormone in the body that produces changes in skin colour and is involved in controlling biorhythms such as our sleep pattern (source: <https://dictionary.cambridge.org/dictionary/english/melatonin>).

## 5. CONCLUDING REMARKS

As circadian rhythm is a biological clock built in our brain throughout the functionality of everyone's day and night processes within a 24-hour clock frame, it devises our body to function in a healthy way of daily routines. Thus, the circadian rhythm becomes a self-control system of human body to regulate our eating habits, activities and body functionality. In this context, our 24-hour daily functionality should have concern over food, physical environment including lightings, exercises, work habits, sleeping and other activities concern. All in consideration, a mind clock in performing even a simple task should be perfectly set with routinised daily functionality.

When we set our brain clock for 24-hour frame, it is important to pay attention on starting time, duration, size and type of an activity concerned. For example, consider food consumption for a day and relatively, it is important to routinise daily eating habit with when to eat, how long to eat, amount of food and type of food to take. This applies to every aspects and activities in our daily life that shape up everyone's circadian rhythm.

As circadian rhythm is unique and vary for every individual, the sociological, cultural, political, economic, technological and environmental aspects do also influence the biological function, mind, brain, thinking and feelings of human. It is therefore possible to argue whether a human can formulate a circadian clock in a synchronized manner. In practice, it will be a very difficult for a human, since the present world mostly explores with dynamic socializing (as a human nature) through the community, culture, religion, language, peers, education, family, law and order, politics, economy, etc., and this becomes subject to frequent changes in human behaviour. Thus, from a socio-cultural point of view, as an implication for further investigation, the paper addresses this as an issue of maintaining a circadian rhythm, because the functions of the human body, mind and knowledge are created through socio-cultural and other environmental aspects; and the human interactions with those changing environments frequently take place possibly.

Brainard et al. (2015 and 2015) endorse that disruption of a circadian rhythm can become a main source for the severity of possible diseases within human body. They also cite studies to clearly insist that circadian rhythm can cause a healthy life beyond irregular presence of our actions daily. It is therefore important for everyone to keep up and maintain a better circadian rhythm to overcome such irregularities in our day to day life. Here in a clinging description, circadian rhythm is a mind-set clock to synchronise our daily lifestyle as routinised for our healthy life.

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## Appendix 1: Why are circadian rhythms important?

(Source: <https://www.sharecare.com/health/sleep-disorders/why-circadian-rhythms-important>)



**Dr. Michael Roizen, MD**  
Internist



Keep your personal "Big Ben" circadian rhythms ticking at a steady tempo and you'll see immediate benefits. You'll keep your appetite in check, stay sharply focused and get a good night's sleep—but that's not all. Discoveries show that an in-sync body clock also has the following surprising benefits:

- **Younger skin:** Resetting your circadian rhythms helps skin stem cells keep perfect time, protecting against sun damage by day and replacing damaged skin cells as you sleep. An off-kilter body clock interferes with the ability of skin stem cells to repair damaged skin and protect against tumors, according to an Ohio State University study.
- **Super immunity:** There's evidence that daily circadian rhythms control a gene that determines how your immune system reacts to invading bacteria and viruses. Keeping your internal body clock running smoothly rewards you with stronger defenses. Consistently getting enough sleep is the key to avoiding everything from minor head colds to major cancers.
- **Better blood sugar:** Insulin (the body's blood-sugar controlling hormone) is normally higher during the day than at night, but messing with your body's clock by skimping on sleep can throw your insulin levels—and your blood sugar levels—out of whack. That puts you at risk for everything from obesity to diabetes and heart disease.
- **More energy:** Your muscle cells contain hundreds of tiny power stations, called mitochondria, which keep you energized. A body clock in your brain is the foreman of these energy mini-factories, telling them when to release energy. Go off the timetable and you might find yourself wide awake at 3 a.m. and weary at noon.