

Introduction:

- A circadian rhythm is a biological process that displays a 24-hour cycle that repeats in the hours and weeks up to the body.
- The circadian clock and its rhythms have been widely found in almost all organisms, animals, fungi, and in many living organisms.
- The *Per2* gene is found in the hippocampus, leading to a 90% increase in the hippocampal activity as a part of your brain that is responsible for your sleep/wake cycles.
- The *Per2* gene is known to interact with *BMAL1* which is known as the clock gene of the circadian rhythm that determines the 24-hour cycle. Without the *Per2* gene to interact with *BMAL1*, it will not function properly, creating irregular sleeping patterns and jet lag syndrome.
- The *Per2* gene is also known to be involved in the structure and function of *BMAL1*.

Background and Significance:

- The circadian rhythm plays an immense role in everyday activities that occur in living organisms. If interrupted it can lead to mood swings, eating disorders, sleep disorders, and a decrease in physical activity.
- The observation of a circadian process in humans began to be reported in Chinese medical texts that dated to around the 15th century, including the *Yin and Yang* Manual and the *Microcosm* (written by Wang Yang-ming) in the tradition of Taoism.
- According to the internal body clock cycle, the tip of the mouth and the base of the foot.
- Per2* is a clock gene that regulates human physiology by feeding down of glucose by neurons, reducing energy and hence provides extra protection from oxidative and mitochondrial blood supply in an organ in part of the body.
- Studies have shown generally that those subjects could not see *PER2* expression levels that fall within a person's own "body clock" as a "single unit".
- By measuring the neuronal and internal behavior of *PER2* it can lead to new discoveries that are connected with alcohol consumption, mental stress, and other scientific research that can be observed in the future.

Are you an early bird or a night owl?

Structural and functional studies of the circadian protein PER2 (Period2)



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What is a Thermocycler?

A thermocycler is a laboratory instrument that performs PCR amplification. It heats up to about 95°C to separate DNA strands, and then cools down to about 50-60°C to allow the primers to bind to the DNA strands. The thermocycler repeats this cycle for 25-35 cycles, amplifying the target DNA sequence.



Predicted results:

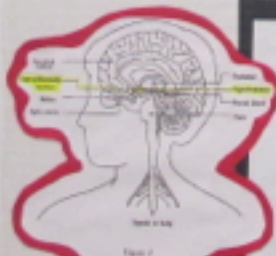
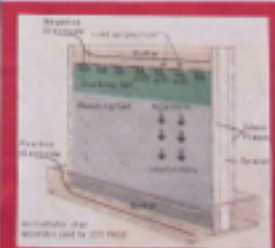


Figure 1

Problem: This gene is a member of the Period family of genes and is expressed in various tissues in the suprachiasmatic nucleus, the primary circadian pacemaker in the mammalian brain. Circuits in this family encode components of the circadian rhythm: circadian activity, metabolism, and behavior.

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Experimental design:

- Steps:
1. Cloning the *Per2* gene
 2. Expression of *Per2* in various tissues
 3. Analysis of *Per2* expression in various tissues
 4. Analysis of *Per2* expression in various tissues

The first step in cloning and testing the *Per2* gene is to identify a suitable vector. To do this, a suitable vector is chosen that contains the *Per2* gene, and that contains the necessary elements for the expression of the gene in various tissues. The *Per2* gene is then inserted into the vector, and the resulting construct is transformed into a suitable host cell. The host cell is then grown in a suitable medium, and the expression of the *Per2* gene is analyzed. The expression of the *Per2* gene is then analyzed in various tissues, and the results are compared to the expression of the *Per2* gene in other tissues. The results are then used to determine the function of the *Per2* gene in various tissues.

References:

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- 2. Moore, N., and Czeisler, C. (1995). "Human Circadian Rhythms: A Review." *Journal of Biological Rhythms*, 10(1), 1-14.
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- 4. Moore, N., and Czeisler, C. (1995). "Human Circadian Rhythms: A Review." *Journal of Biological Rhythms*, 10(1), 1-14.