**Physiology Assignment**

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1. Discuss the physiology of sleep

Sleep is often described as a reversible multidimensional state in which an individual has little or no response to environmental stimuli. The most pronounced physiological changes in sleep occur in the brain. The brain uses significantly less energy during sleep than it does when awake, especially during non-rapid eye movement sleep. In quiet waking, the brain is responsible for 20% of the body's energy use, thus this reduction has a noticeable effect on overall energy consumption. The different types of sleep can be thought of as different overall organizational states of the nervous system, some involving increased brain activity and some involving decreased brain activity. During slow-wave sleep, humans secrete bursts of growth hormone. All sleep, even during the day, is associated with secretion of prolactin. There are three basic mechanisms coordinating and governing sleep and wakefulness: (1) autonomic nervous system balance, (2) homeostatic sleep drive, and (3) circadian rhythms. These mechanisms maintain sleep and wakefulness in a dynamic balance.

There are 2 types of sleep and they are;

a.) NREM ( Non- Rapid eye movement) sleep:- Non-REM sleep occurs first and after a transitional period is called slow-wave sleep or deep sleep. During this phase, body temperature and heart rate fall, and the brain uses less energy. NREM sleep constitutes about 75 to 80 percent of total time spent in sleep. It is divided into 3 stages N1, N2, and N3, the last of which is also called delta sleep or slow-wave sleep.

b.) REM ( Rapid eye movement) sleep:- REM sleep, also known as paradoxical sleep, represents a smaller portion of total sleep time. It is the main occasion for dreams (or nightmares), and is associated with desynchronized and fast brain waves, eye movements, loss of muscle tone, and suspension of homeostasis. REM sleep constitutes the remaining 20 to 25 percent.

In normal adults, REM sleep increases as the night progresses and is longest in the last one-third of the sleep episode. As the sleep episode progresses, stage 2 begins to account for the majority of NREM sleep, and stages 3 and 4 may sometimes altogether disappear. The whole period normally proceeds in the order: N1 → N2 → N3 → N2 → REM. REM sleep occurs as a person returns to stage 2 or 1 from a deep sleep.

Awakening is the end of sleep or a moment to survey the environment and readjust body position before falling back asleep. Awakening involves heightened electrical activation in the brain, beginning with the thalamus and spreading throughout the cortex. Sleep timing depends greatly on hormonal signals from the circadian clock

2. Discuss the role of basal ganglia in coordinating movement

The basal ganglia are responsible for voluntary motor control, procedural learning and eye movement as well as cognitive and emotional functions. The Basal ganglia represents the accessory motor system. It also regulates attention and individual cognitive process. It also assists the cerebral cortex in making subconscious and learned movements. The direct pathway of movement is a neuronal circuit within the central nervous system (CNS) through the basal ganglia which facilitates the initiation and execution of voluntary movement. It works in conjunction with the indirect pathway of movement. The indirect pathway of movement is a neuronal circuit through the basal ganglia and several associated nuclei within the central nervous system (CNS) which helps to prevent unwanted muscle contractions from competing with voluntary movements. It operates in conjunction with the direct pathway of movement. The contributions of the basal ganglia to movement are complex and still not completely understood. In fact, the basal ganglia probably have multiple movement-related functions, ranging from choosing actions that are likely to lead to positive consequences to avoiding things that might be aversive. But the basal ganglia are most often linked to the initiation and execution of movements.