Answer on Question #49761 – Biology – Other

1.What is the difference between everyday movement (ex. raise your hand) and a reflex (ex.touching a hot object)?

2. By accident, Jacques has touched a hot stove. His arm is removed immediately, and a moment later he felt pain. Why he withdrew his arm before feeling pain?

3.Normally, the pupils of your eyes contract when your eyes are exposed to intense light. Is it a reflex? Explains.

Solution:

1. Almost all of behavior involves motor function, from talking to gesturing to walking. But even a ***simple movement*** like reaching out to pick up a glass of water can be a complex motor task to study. Not only does your brain have to figure out which muscles to contract and in which order to steer your hand to the glass, it also has to estimate the force needed to pick up the glass. Other factors, like how much water is in the glass and what material the glass is made from, also influence the brains calculations. Not surprisingly, there are many anatomical regions which are involved in motor function.

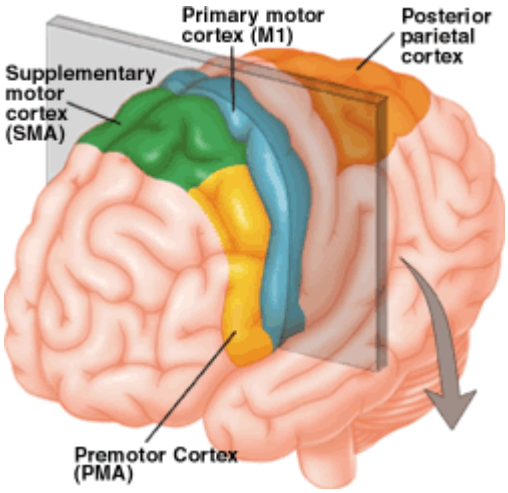

Figure 1: Principal cortical domains of the motor system.

Reflexes are, by definition, actions that occur before the brain is aware of what is happening. Reaction to a stimulus is processed in the spinal cord, bypassing brain control. Naturally, if movement results, the brain will become aware of such movement and can regulate it somewhat, but the brain cannot control it. All these 'reflex' reactions occur when muscles contract in response to an obvious external stimulus.

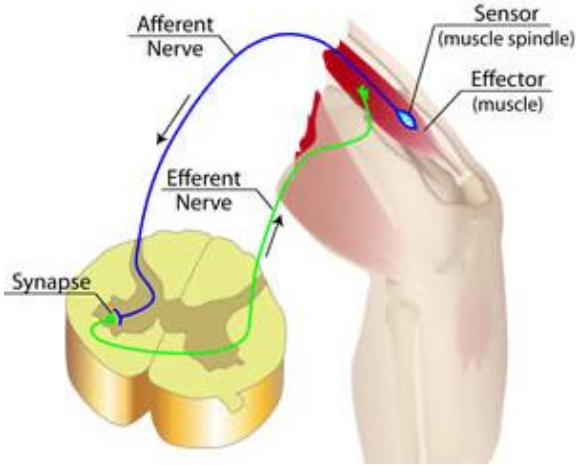

Figure 2: Muscle reflex

2. Believe it or not, under normal circumstances, pain is a good thing. It alerts you to the location of objects in your environment that pose a threat to the health of your body. Pain provides an

invaluable service by informing you that you are, for example, treading on a drawing pin or touching a scalding hot pan, thus giving you a chance to avoid damaging yourself. In fact, pain-sensing neurons are wired straight into motoneurons of the spinal cord to produce an automatic withdrawal reflex. This means that you can find yourself recoiling from the painful stimulus i.e. pulling your foot up away from the sharp object, or moving your hand away from the heat, before you are even aware of the pain. This reduces the time that the body part is in contact with the sharp or hot object to minimise the damage caused. Reflex arc operates before the pain signal reaches the brain (*step 3*).

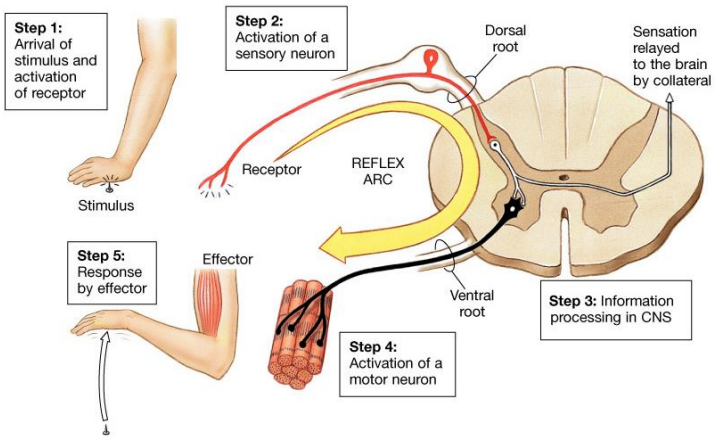

Figure 3: Hand withdrawal reflex

3. Yes, this process called *pupil reflex*.
A muscle that is responsible for the expansion of (m. *Dilatators papillae*) or pupil dilator muscle - is located on the pigment layer of the pupil. Innervation is provided by sympathetic fibers located in the upper cervical node. In dim light conditions relay neurons stimulate the *sympathetic* nervous system, causing radial muscles to contract and the pupil to dilate, in bright light conditions relay neurons stimulate the *parasympathetic* nervous system, causing circular muscles to contract and the pupil to constrict.

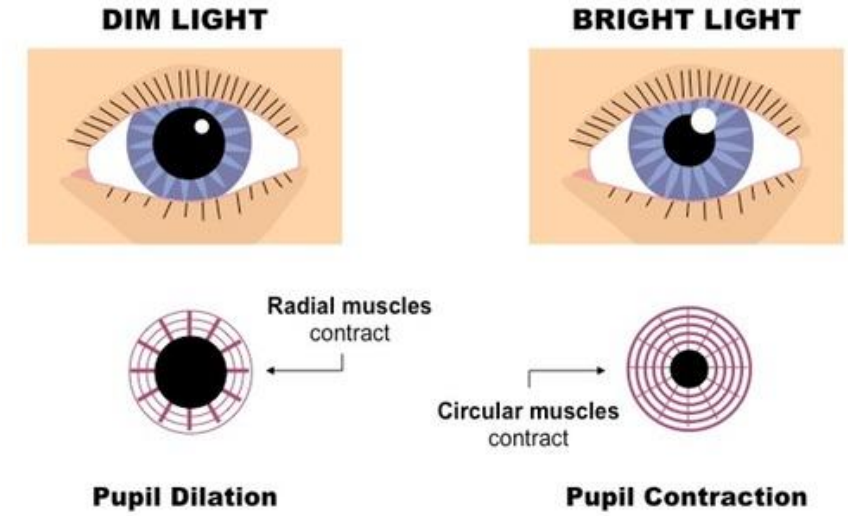

Figure 4: Pupil reflex