**Physiology**

**Nervous System-Nerve Distance Lab**

**Background**

We hardly think about our **sense of touch** until something goes wrong—trying to find a small object with gloves on or waiting for dental anesthetic to wear off so our faces don’t feel “dead” are a few things that make our awareness of touch noticeable. What a relief when things are back to normal! Just how does the skin let the brain know what it is touching? You’ve noticed that when you want to find out whether something is smooth or rough, you run your fingertips over it, rather than the palm of your hand or your elbow. And you may have noticed that you can feel a tiny fragment of a bone in your mouth, but you wouldn’t have noticed it at all if you had stepped on it with your bare foot. What does it mean when part of your body is “better” at getting touch information?

In this activity you will measure the distance you are able to detect “touch” on the forehead, cheek, forearm, palm of hand, tip of thumb, tip of index finger and back of lower leg. The closer together you can determine a pin prick, the more concentrated the neurons in that region of the body are.

**Focus Questions**

* What regions of your body are more sensitive to touch?
* When a region of your body is more sensitive than another what does this tell us about the neurons in those regions?
* What is the distance between nerves in your **forehead, cheek, forearm, palm of hand, tip of thumb, tip of index finger and back of lower leg?**

**Procedure**

1. Prepare a data table to collect your findings.
2. Hold 2 toothpicks 5 cm apart (Use a ruler to measure 5 cm). Have the subject turn the other way.
3. Lightly touch the subject’s forehead with the 2 toothpicks 5 cm apart.
4. Ask the subject if she/he can feel two points or one point.
5. If the subject can feel two points, move the toothpicks 4 cm apart.
6. Lightly touch the subject in the same spot on the forehead again.
7. Ask the subject if they can feel two points or one point.
8. If the subject can feel two points, move the toothpicks 3 cm apart.
9. Repeat the process until the subject feels only one point. In your data table indicate the distance between the toothpicks that the subject feels only one point.
10. Repeat all steps for each part of the body listed in the focus questions above. Repeat each step for each subject in your group.
11. When you are done collecting data, make a bar graph with your results and answer the following questions.

**Data Table** *Include the 7 locations you will test as well as a place to put the measurements. In your data table only record your own data*

**Post Lab Questions**

1. How do your personal results compare with those of your lab partner?

2. Which parts of the body are best at distinguishing two points are touching them even when the points are very close together? Explain why you think this is the case.

3. Which skin areas do you think have more receptors, areas that have small two point distances or large two-point distances? Explain your reasoning.

4. Which brain area do you think is larger, one receiving information from skin with lots of receptors, or from skin with a few receptors? Explain your reasoning.

5. How does information from sensory receptors in the skin get to the brain? Explain the path the information takes.

6. What type of sensory receptors detect the pricks of the toothpicks? Explain what division of the nervous system these receptors are part of.



7. The following is a diagram of a sensory homunculus. Observe the diagram and explain what you can conclude from the diagram.

**Conclusion-Write a conclusion and include the following in your summary.**

1. List three findings you think are important from today’s experiment. Were you surprised by anything you found?
2. How could you improve this experiment?
3. What did you learn from doing the experiment?
4. What types of neurons are involved in the process of detecting the touch of the toothpicks and processing the information in the brain? What components of the nervous system are involved in the process? (CNS, PNS, afferent, efferent etc.)