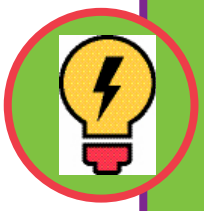
DO IT!

Get in Touch!

In this activity students will be investigating differences in how the skin's receptors are distributed in their skin, and how that affects how they sense touch.



You'll Need

1) Ruler
2) Paper Clips
3) Paper
4) Pens, Pencils, or Markers

Smart Start

Our skin has receptors that detect different stimuli, like temperature and pressure. These receptors are not distributed evenly across our body. In this activity students will be investigating differences in how these receptors are distributed in their skin, and how that affects how they sense touch.

For us to feel two separate touches, the touch needs to activate two separate receptors in our skin (with one 'un-touched' receptor in between). These activated receptors trigger a series of nerve impulses that make their way to the parietal lobe of the brain for interpretation. Areas of skin where touch receptors are spaced farther apart require larger spaces between tiny point sources of touch to feel that there are 2 touches: if the two points are too close together, it will feel like one touch point. Areas where touch receptors are closer together can 'feel' touch points that are closer together. Our fingertips and face have the highest density of receptors, while places like our arms, legs, and back have the lowest density.

1. **Discuss:** How does our brain know when something is touching your arm?
   There are receptors in your skin that can send a message to the parietal lobe of your brain.
   Is your arm as sensitive to touch as your fingertip? How could we measure that?
   Students should work in groups of 2 or 3. One student will be the neurologist, the other student is the patient. Third student can be the data recorder. Roles will be switched at the end of the activity

2. **Decide**. Groups/pairs decide how they want to make their 2-point discrimination tester.
   - Paperclips: students can bend paperclips, using their ruler to measure the distance between the two ends of the wire.
   - Toothpicks: students can tape toothpicks to a note card, using the ruler to measure the distance between the points of the toothpicks.

3. **Begin Experiment.** The patient will close their eyes while the neuroscientist gently but firmly touches both points to the skin, being careful that the points touch at the same time. The patient will say whether they felt one distinct point of contact or two. The recorder records their response. Conduct this exercise with spacing of 3mm, 10 mm, 15 mm, 20 mm, 30 mm

4. **Switch Roles.** Switch roles, so that each person has data about their own arm and fingertip.

5. **Collect and Organize Data.** Allow students to display their data in a way that they choose (example: table, bar graph, line graph, paragraph, sketch, etc). Make sure they use appropriate labels and titles. There are many ways to display this type of data.

6. **Share.** Have groups pair up with another group so they can all discuss, compare, and contrast their data.

7. **Closing Discussion.** What was most interesting? What did you learn? What were the differences between testing your fingertip and your arm? What does the data show? What can you infer about the number of receptors in your arm vs. your fingertip, based on the data you collected? (Fingertips have more receptors, and receptors are closer together.) or (Arm has fewer receptors, and receptors are farther apart.) What are ways that humans use the high-sensitivity of their fingertips? (Braille, other ideas?) The exercise we just did is called two point discrimination, and is something that neuroscientists sometimes do with patients that have injuries. Why do you think they do this? (Testing for nerve damage)