

# Cooling and Heating

**Overview:** In this experiment, we will continue to explore Ruffini's endings in your skin. We also look at your body's ability to detect temperature and regulate its own temperature. You will study how the body cools and warms itself to achieve temperature equilibrium, a state of constant balance.

## Materials

- rubbing alcohol
- cotton ball
- liquid crystal thermometer strip
- glove

## Experiment

1. Position the liquid crystal sheet on the back of your hand. Give it a moment to register the temperature of your body. Record the color (or temperature reading if using a thermometer) as the base reading for your data.
2. Put some rubbing alcohol on a cotton ball. Now use the cotton ball to wipe the alcohol on the surface where you took the reading, right on the back of your hand. Quickly put the thermometer strip right back on the spot where you have put the alcohol and take another reading. Note the color and/or temperature in your records.
3. Now put the glove on your hand and run around in the yard, do some jumping jacks, or find another way to be physically active for 3-5 minutes.
4. When you have worked up a sweat, come back to the experiment area. With your hand still in the glove, put the liquid crystal thermometer on the back of your hand where you took the first reading. Record the color and/or temperature information in your data records.
5. Finally, take off the glove and observe your hand. Can you tell that your sweat glands have been working? If so, have they been very active or just a little active?

## Cooling Data Table

	Color/Temperature	Notes
room temperature		
alcohol		
exercise		

### Reading

Your body likes to keep your temperature in equilibrium, which is a state of balance. It works hard to regulate your temperature and avoid any sudden changes that could be harmful. Constant and predictable is your body's goal, and it uses your skin to help.

When you are cold, blood flow to the skin is reduced in order to help stem the loss of heat. Your hair also stands on end in an effort to trap air next to the body and help insulate it...although this doesn't work very well for most of us! This is a more effective tool against heat loss with much furrier mammals.

In order to cool you down, skin can use some of your three million sweat glands. Sweat absorbs and displaces extra heat and can also close openings to cells on the surface to avoid excess gains in heat.

Your data in the lab should have simulated the effects of body temperature in three different conditions: equilibrium, excess cold and excess heat.

### Exercises

1. What is equilibrium?
2. How does equilibrium relate to body temperature?
3. How does our body help to cool us down?

**Answers to Exercises: Cooling and Heating**

1. What is equilibrium? (a state of constant balance)
2. How does equilibrium relate to body temperature? (Equilibrium is our body's goal – it uses skin to help regulate temperature and achieve equilibrium.)
3. How does our body help to cool us down? (Sweat is released through pores, which evaporates to help cool us.)