

## Physiology in Action: Explore Feedback Mechanisms and Homeostasis

# Heart Rate Elevation

## Procedure

1. The test subject sits quietly in a chair with the palm of 1 hand facing upward on a table. The observer locates the test subject's radial pulse, which is on the thumb side of his/her wrist.
2. The observer counts the number of heart beats felt in 15 seconds. Record this number in the data table below for Subject 1, HR (heart rate), Resting.
3. The test subject then does jumping jacks or jogs in place next to the observer for 30 seconds.
4. After 30 seconds, the test subject sits in a chair and the observer immediately locates the radial pulse again.
5. The observer again counts the number of heart beats in 15 seconds and records the results in the data table for Subject 1, HR, 0 minutes.
6. The test subject then sits quietly for 1 minute.
7. After 1 minute, the observer takes the test subject's pulse again for 15 seconds and records the results in the data table for Subject 1, HR, 1 minute.
8. The observer continues to record the test subject's heart rate at 1-minute intervals, up to a total of 5 minutes, recording the results in the data table.
9. Switch roles and repeat steps 1 through 8 until all group members have been tested.

## Materials

Stopwatch

## Data Table

	HR (heart rate)						
	Resting	0 min	1 min	2 min	3 min	4 min	5 min
Subject 1							
Subject 2							



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# Cutaneous Sensation

## Procedure

1. Test subject 1 sits with eyes closed and 1 hand palm upward and motionless on the table. The experimenter begins by testing the subject's fingertip.
2. Start with the 2 points on the Carolina™ Two-Point Discriminator touching each other. In increments of 1 to 2 mm, gradually increase the distance between the 2 points. Test the subject's skin after each adjustment. Each time the 2 points are touched to the skin, ask the test subject whether he/she feels 1 point or 2 distinct points.
3. Repeat this procedure until the test subject reports feeling 2 distinct contact points. The measurement at which 2 distinct points are felt is called the two-point threshold. This value is obtained by reading the number found between the 2 arrows in the middle of the sliding scale on the two-point discriminator. Record the test subject's two-point threshold in the "Trial 1" column of the data table below.
4. Repeat steps 2 and 3, obtaining a two-point threshold measurement for the following areas of the test subject's body: palm of hand, forearm. Record each of these results in the "Trial 1" column of the data table.
5. Conduct an additional trial for each of these locations, following the procedure above. Record the results in the "Trial 2" column of the data table.
6. Switch roles, with the experimenter as test subject and the test subject as experimenter, and repeat steps 1 through 5. Record the results under "Subject 2" in the data table below.

## Materials

Carolina™ Two-Point Discriminator

## Data Table

Location of Test	Subject 1		Subject 2	
	Trial 1	Trial 2	Trial 1	Trial 2
Fingertip				
Palm of Hand				
Forearm				



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# Temperature Sensation

## Procedure

1. Place the aluminum temperature probe in cold water for a few minutes and allow it to cool. While the probe is reaching the appropriate temperature, use the grid stamp and stamp pad to place a grid stamp on the back of each test subject's hand. When the probe has cooled, remove it from the cold water and wipe it dry with a paper towel.
2. Subject 1 sits with eyes closed and with the stamped hand palm downward and motionless on the desk. The experimenter begins with the grid labeled "Subject 1: Back of Hand."
3. The experimenter begins in 1 quadrant of the dot grid and gently touches each grid area with the temperature probe. The probe should remain on each grid area for about 2 seconds. The test subject reports whether he/she feels a cool stimulus. **Note:** *Remind test subjects (and students) that they are testing for temperature sensation, not for pressure sensitivity. Test subjects and students should report a positive response only if they perceive a temperature sensation.*
4. Repeat this activity with Subject 1, touching the other areas on the grid, having the test subject report the sensation, and recording responses in the data table below for Subject 1. Make a mark on the data table grid that corresponds to the grid on the back of the hand, using a blue color pencil to indicate a cool sensation. Continue until all grid areas have been recorded.
5. Allow the experimenter to be tested, repeating steps 1 through 4 and recording the responses on the data table for Subject 2.

## Materials

### Per pair:

Aluminum Probe  
Blue Color Pencil  
Paper Towel

### Per table:

2 Cups Cold Water  
2 Black Stamp Pads  
2 Grid Stamps

Subject 1: Back of Hand									

Subject 2: Back of Hand									



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# Reflexes and Reactions

## Procedure

### Activity 1: Patellar reflex

1. The subject sits in a chair, with the right leg crossed over the left, and both legs relaxed.
2. The observer locates the kneecap (patella) on the subject's right leg.
3. The observer finds the patellar tendon just below the middle of the patella. (It will feel soft in comparison to the patella.)
4. The observer uses the pointed end of the Taylor reflex hammer to tap gently on the subject's patellar tendon and observes the reflex.
5. Record the observed result in the data table below, Subject 1, Right Leg Observations.
6. The subject reverses leg positions. The observer repeats the procedure, tapping gently on the patellar tendon of the left leg.
7. Record the observed result in the data table below, Subject 1, Left Leg Observations.
8. Repeat this process until all group members have been tested.

### Materials

Taylor Reflex Hammer  
Reaction Time Ruler

## Data Table 1

	Right Leg Observations	Left Leg Observations
Subject 1		
Subject 2		

### Activity 2: Reaction time ruler

1. The subject sits in a chair, facing the observer.
2. The observer holds the reaction time ruler between the thumb and first (index) finger, and on the end marked "release."
3. The observer positions the reaction time ruler at the subject's eye level or higher.

*(continued on back)*

# Carolina Workshop Resource

4. The subject places his/her thumb and first finger over the “thumb line,” but leaving about 1” of space between the thumb and first finger. The subject’s fingers should not touch the ruler at this point.
5. When the subject is ready, the observer releases the ruler. As quickly as possible, the subject tries to catch the falling ruler between the thumb and first finger.
6. The lines under the subject’s fingers represent the reaction time in milliseconds. Each line on the ruler represents 10 milliseconds. Estimate the subject’s reaction time to the nearest whole number.
7. Record the observed result in the data table below, Subject 1, Trial 1.
8. Perform this test 10 times.
9. Switch roles and repeat the procedure until all group members have been tested.

## Data Table 2

	Trial 1	Trial 2	Trial 3	Trial 4	Trial 5	Trial 6	Trial 7	Trial 8	Trial 9	Trial 10
Subject 1										
Subject 2										