

Name: _____

Date: _____

Period: _____

Weekly Reading HW

HW Wk _____

Directions: Read and annotate the passage below. Then answer the questions.

Shivering as a Form of Exercise

This winter's frigid temperatures could be having one desirable side effect – they may be boosting your metabolism. Shivering alters fat cells and increases metabolism, much like exercise does. The findings intimate that exercise and shivering are related in ways not previously suspected.

For the study, N.I.H. researchers drew blood and obtained samples of muscle and fat cells from 10 healthy men and women. During one lab visit, the volunteers completed a short but intense session of stationary bicycling, riding as hard as they could until they were exhausted. On another day, they rode the bike at a gentle, easy pace for an hour. On their final visit, each volunteer laid in bed for 30 minutes as the temperature dropped from about 75 to a chilly 53 degrees. By the end of the session, the volunteers were shivering. The scientists analyzed changes in the volunteers' white and brown fat.

Until a few years ago, it was widely believed that adult humans do not have brown fat, which unlike white fat, burns calories and generates heat. Infants carry plenty of brown fat, which helps to keep them warm, since they are not good at shivering. But scientists had thought that after childhood, humans lost their brown fat and substituted shivering to stay warm. Newer studies, however, have found varying amounts of brown fat in humans of all ages. Scientists were unclear why as we continue to shiver if we have brown fat.

In a recent study, animals that produced more of the hormone, irisin, had more brown fat than other animals. But muscle contractions from exercise caused an increase in irisin levels, which caused white fat to turn into brown fat. This left many scientists wondering why exercise causes an increase in irisin, when both exercise and irisin increase heat. The N.I.H. researchers, however, reasoned that irisin was initially created by the muscular contractions of shivering in order to stay warm. They explained that the volunteers' levels of irisin increased both after shivering in the cold room and after exercising because exercising is an exaggerated form of shivering.

- (RST.9-10.2) The main idea of the passage is that:
 - Shivering is a good replacement for exercise and is necessary to stay healthy.
 - Shivering, like exercise, can increase brown fat, which burns calories and generates heat.
 - Shivering is something that is learned, which is why babies cannot do it.
 - Brown fat is healthier, so people should be trying to increase their brown fat levels.
- (RST.9-10.4) As it is used in the passage, the word *intimate* means:

a. Private	c. Detailed
b. Personal	d. Imply
- (RST.9-10.1) Which of the following is NOT one of the parts of the experiment by N.I.H. researchers?

a. One hour of easily sustained exercise	c. Lying in a room that gets colder
b. Short period of intense exercise	d. Lying in a room that gets warmer

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4. (RST.9-10.1) Why was it widely believed that adult humans do not have brown fat?
- a. Adult humans exercise more than babies, which remove most of the fat in their bodies.
 - b. Adult humans have the ability to shiver so they do not need brown fat to stay warm.
 - c. Adult humans have slower metabolisms so their brown fat turns to white fat.
 - d. Brown fat is more difficult to see on a scan than white fat.

5. (RST.9-10.2) What was the purpose of the study conducted by the N.I.H. researchers?

6. (RST.9-10.1) Based on the results of the second study, what happens when a person exercises?

Adapted from the article, "Shivering as a Form of Exercise" by Gretchen Reynolds for The New York Times, on February 5, 2014.

