

The Fat Paradox

How does fat keep us skinnier?

Background

Anyone who has ever dieted knows how difficult it can be to lose weight. New research shows that it may not be your fault: humans are hardwired to store extra energy as fat. For our ancestors, who were often uncertain about when their next meal would come, storing fat was a beneficial adaptation that helped them survive famine. Today, most of us are fortunate enough to have an abundant food supply, and storing excess fat can cause problems.

Almost all of the food we consume in excess of what we need for energy—whether it comes as fat, protein, or carbohydrate—is converted to fat and stored. But since we can also store carbohydrates as glycogen, the body's other energy-storage molecule, why does the body go through the effort of converting most carbohydrates to fat?

Fat has about 9 calories per gram. Glycogen has just 4. This difference means that, using fat, our bodies can store more energy in less space.

What would happen if the body stored energy as glycogen instead of fat?

Assignment

Using the conversions and data provided, calculate how heavy a 145 pound person with a healthy percentage of body fat would be if all of their fat was replaced by glycogen.

Conversions and Data

Pound to Gram Conversion

Pound	Grams
1	454

Calorie Content

Nutrient	Calories/gram
Fat	9
Glycogen	4

Glycogen is like a sponge. It holds twice its weight in water. That means that every pound of glycogen stored in body tissue holds 2 pounds of water, for a total weight of 3 pounds.

Fat tissue holds very little water.

QUESTIONS

1. How much does the fat weigh?

If a 145 pound person has 24% body fat, how much does their fat weigh?

_____ pounds

_____ grams

2. How many calories are stored in the fat?

Based on your calculation above, how many calories is the person storing?

_____ calories

3. How much glycogen is needed to provide the same calorie content?

Based on your calculation in question 2, how much glycogen would be required to store the same number of calories?

_____ grams of glycogen

_____ pounds of glycogen

4. How much water would be stored with glycogen?

Stored in body tissue, glycogen holds twice its weight in water.

Based on your calculation in question 3, how much water would be stored with the glycogen?

_____ pounds of water

5. How much would the person weigh?

Based on your calculations above, what would be the total weight of the person if they stored the same number of calories, but stored them as glycogen rather than fat?

145 pounds - _____ pounds of fat + _____ pounds of glycogen + _____ pounds of water

= _____ pounds total