



Weighing in on calories



Calorie content in food

In a recent commercial, two beverages are placed next to each other on a countertop. The first crushes the counter and sinks an inch or two into its surface. The second one sits nicely on top of the counter. The difference? The first beverage contains way more calories! Although meant to be a tongue-and-cheek way to think about calorie content, the ad reinforces an unfortunate misconception about calories—that they literally turn into fat and make you gain weight. Let's get the facts straight!

A matter of energy

First off, we need to define matter and energy, and how they relate to each other. Matter is anything that has mass and occupies space. It is all the “stuff” that surrounds us. Energy—such as electrical or heat or solar—is defined as the ability to do work. **There is no mass associated with energy, and in chemical reactions, mass does not turn into energy.**

Now that we have that straight, let's talk about that misleading advertisement. Calories have no mass. So in the unlikely event when one beverage would sink through a countertop while another would rest on top, it wouldn't be because calories are weighing down the counter-crushing drink!

We all talk about consuming calories. But this is an imprecise way of talking about our diets



One kilocalorie, a.k.a. Calorie with a big “C,” is the amount of heat energy required to raise the temperature of one kilogram of water by one degree Celsius.

and energy. Calories are a measure of energy—heat energy to be precise. We don't eat calories; we eat food. Different foods have different amounts of chemical potential energy, which can be released as they are metabolized.

Calories and weight gain

So, what is the nature of this chemical potential energy in

food? It relates to how food is metabolized. Food metabolism is the series of chemical reactions in organisms that maintain life.

Chemical reactions involve the breaking of chemical bonds

(which takes energy) and the making of new bonds (which releases energy) as the reactants rearrange. While making and breaking bonds, if a reaction gives off more energy than it takes in, it releases energy. This energy can then be converted into different forms including heat energy, which can be measured in calories.

It is easy to see why calories are associated with weight gain. If we eat food that has a lot of chemical potential energy, more than our bodies require, our metabolism uses that excess energy to build up fat by manufacturing it from simpler starting molecules.

When we talk about food and diets, it's important to recognize facts versus misconceptions. *Let the discussion begin!*

