

Lactase Investigation

Name: _____

Introduction

Lactose is a type of sugar in milk. Other than milk and some dairy products made from milk, lactose is not found naturally in foods humans eat. Lactose is a type of carbohydrate made up of two simple sugars: glucose and galactose. The body digests lactose by breaking it into those simple sugars. The reaction is catalyzed by an enzyme called **lactase**. A summary of the reaction follows:



If lactase is made by the cells lining the small intestine, lactose gets broken down. The simple sugars are then absorbed into the bloodstream. Individuals who make the lactase enzyme throughout their lives (in other words, it persists) are called **lactase persistent**. People who make lactase are generally **lactose tolerant**.

If someone's small intestine does not make lactase, lactose is not broken down. Then what happens? The lactose passes into the large intestine, or colon. There, two things can happen that can cause problems. First, bacteria in the colon break down the lactose and use the galactose and glucose. In the process, they release hydrogen gas. As this gas builds up, it can cause a bloated feeling. It can also cause increased flatulence. Lactose that is not broken down by bacteria can also change the water balance in the colon. Too much lactose means that more water is drawn into the colon by osmosis, causing diarrhea. People who experience these symptoms when ingesting lactose are called **lactose intolerant**. Because these individuals have usually stopped making the enzyme lactase, they are also sometimes called **lactase nonpersistent**.

In this investigation, you will examine simulated samples from individuals in Europe, Asia, Africa, and the Middle East. You will gather evidence from your samples to determine whether or not the individuals are lactase persistent.

Procedure

1. Record the final color of the glucose test strip after your teacher placed it in the milk.
2. Your teacher will assign you a sample or two and show you information to help you determine the region and country your sample(s) came from. Record all this information in Table 1 (page 2 of this master).
3. Add 2 milliliters of milk to your sample. Hold your sample in your hand for three minutes to keep it near human body temperature.
4. Measure the amount of glucose in the sample using a glucose test strip. Record the result in Table 1.
5. Make a claim about whether or not the individual is lactase persistent. Describe how you used evidence to make that claim.

Table 1. Lactase Investigation Data

| Sample number | Region | Country | Color of glucose test strip when placed in sample <i>before</i> the reaction | Color of glucose test strip when placed in sample <i>after</i> the reaction | Make a claim about whether or not the individual is lactase persistent. Describe how you used evidence to make this claim. | Were your results confirmed by other researchers? |
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Source: http://www.medicinenet.com/lactose_intolerance/article.htm