

## Activity: Diagramming Carbohydrate from Mouth to Muscle

### Introduction

The gastrointestinal (GI) tract is a continuous tube ~30 ft long that extends from the mouth to the anus. Ingested food is moved along the GI tract by strong contractions. As the food is moved through the GI tract it is mixed with secretions of fluid containing various enzymes which aid in the digestion and absorption of nutrients. This lab will focus on the digestion and absorption of carbohydrate, and the fate of the carbohydrate in the body once it is absorbed. You will not get into the small details of these processes, but rather outline an overview to enhance your understanding of the journey of ingested carbohydrate in the body.

**Supplemental reading:** [SSE #108: Multiple Transportable Carbohydrates and Their Benefits](#) [Jeukendrup, A. 2013].

### Part 1: Digestion and Absorption in the GI Tract

On a piece of paper (or using a digital drawing program), draw a long tube to represent the GI tract clearly marking the following components, drawn to approximate scale: Mouth (4 in), Esophagus (10 in), Stomach (12 in), Small Intestine (20 ft), Large Intestine (5 ft).

Answer the following questions:

1. In the mouth, what are the roles of chewing and saliva related to digestion?
2. In the stomach, how do you think the volume and energy density of food and fluids consumed affects how quickly it is emptied into the small intestine?
3. Indicate which portion of the GI tract is the main site for carbohydrate absorption. Draw the two carbohydrate transporters, using different shapes to indicate each. What are the two monosaccharides absorbed through the small intestine following digestion?

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## Part 2: The Fate of Glucose Post-Absorption

Draw a triangle to indicate the liver, oval to indicate the muscle, and a circle to indicate the brain. Connect them with a line to indicate the bloodstream.

Label with a number 1 the first organ to receive the absorbed sugars.

The sugars are stored in the liver as glycogen or sent into the bloodstream as blood glucose as needed. Indicate glycogen with squares and the export of blood glucose with an arrow.

Blood glucose is a primary fuel for the brain. Indicate this as a star on your shape for the brain.

Blood glucose is also taken up by the muscle and used for energy or stored as glycogen. Once stored as muscle glycogen, the glucose will not leave the muscle. Show this with an arrow indicating blood glucose uptake, a square for glycogen storage, and a star for fuel utilization to produce energy.

## Take Home Messages

Carbohydrates are digested along the GI tract, starting in the mouth.

The stomach acts as a “gate keeper” for the ingested food.

During exercise you want to ingest foods that are rapidly passed from the stomach to the intestine.

The body does not absorb nutrients (CHO and fluid) until they reach the small intestine.

Once in the body, carbohydrates (at this point, the sugar glucose) are stored in the liver and muscle as glycogen and provide energy for the brain.

Muscle glycogen is only used to supply the muscle fuel so that it has the energy to contract. Adequate muscle glycogen stores are important to support performance of most types of exercise.

Eating different types of carbohydrates, using the different transporters in the intestine, may increase the availability of carbohydrate to the working muscles during exercise.