

# Diabetes Mellitus




When glucose is being absorbed, increased blood levels of insulin are beneficial. This insulin facilitates glucose uptake by the tissues and helps to replenish the glycogen stores of liver and skeletal muscle.

In diabetes mellitus, the beta cells of the pancreas do not secrete adequate amounts of insulin when it is needed. Need is most evident following a carbohydrate-rich meal.


In this exercise, we'll first stop insulin production and then view the consequences of eating a meal in a repeat of the eating exercise presented in another lab.

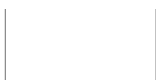
## The Diabetes Mellitus Protocol

Begin by clicking Restart to reset the model's variables to their initial values. Record control data. Go to  Pancreas - Beta Cells. Set insulin synthesis basic rate and insulin secretion basic fraction to 0.

Go to  Diet and change the food and water schedule from continuous to at mealtime.

Keep an eye on the contents of the gut, plasma glucagon concentration, liver metabolic activity and fuel use by the brain and skeletal muscle. Plasma insulin should be 0 throughout.

Go to  GI Tract - Lumen to monitor changes in the contents of the gut. The first meal is



breakfast, scheduled for 7:00 AM. Advance the solution for 7 (6 + 1) hours. The guy's been sleeping. The clock should display 7:00 AM. Record fasting data. It's time for breakfast. Advance the solution to the times shown below and record data.



G.I. Tract Glucose Mass (G)

G.I. Tract Fat Mass (G)

G.I. Tract Protein Mass (G)



Plasma [Glucose] (mG/dL)

Brain Glucose Use (mG/Min)

Fat Glucose Use (mG/Min)

Muscle Glucose Use (mG/Min)

Plasma [FFA] (mG/dL)

Tissue FFA Use (mG/Min)

Muscle FFA Use (mG/Min)

Plasma [Triglycerides] (mG/dL)

Fat Triglyceride Uptake (mG/Min)

Liver Glycogen Mass (G)



Plasma [Insulin] (uU/mL)

Plasma [Glucagon] (pG/mL)



Time	12:00	7:00	7:10	7:20	7:30	8:00	9:00
<b>Glucose Mass</b>							
<b>Fat Mass</b>							
<b>Protein Mass</b>							
<b>Plasma [Glu]</b>							
<b>Tissue Glu Use</b>							
<b>Brain Glu Use</b>							
<b>Fat Glucose Use</b>							
<b>Muscle Glu Use</b>							
<b>Plasma [FFA}</b>							



<b>Tissue FFA Use</b>							
<b>Muscle FFA Use</b>							
Plasma [Trig.]							
Fat Trig. Uptake							
<b>Liver Glycogen</b>							
<b>Plasma [Insulin]</b>							
Plasma [Gluca'n]							

