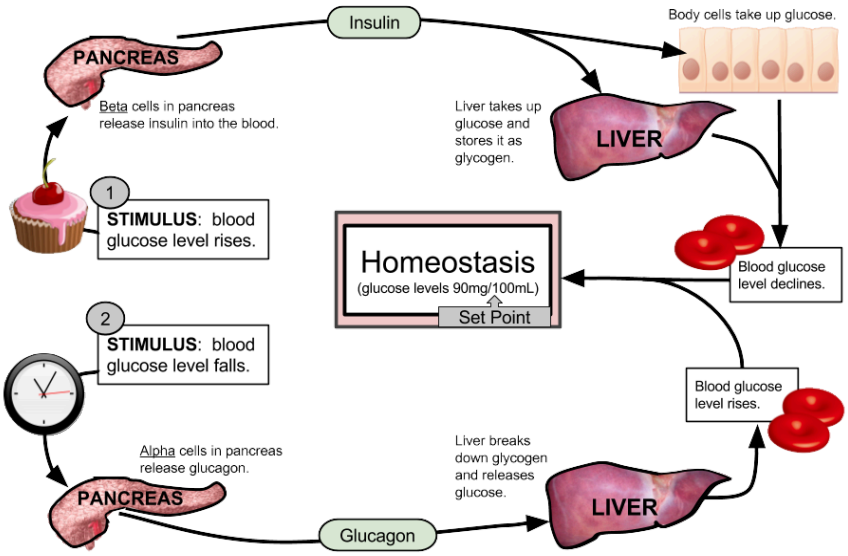
Feedback Loops: Glucose and Glucagon

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The control of blood sugar (glucose) by insulin is a good example of a negative feedback mechanism. When blood sugar rises, receptors in the body sense a change. In turn, the control center (pancreas) secretes insulin into the blood effectively lowering blood sugar levels. Once blood sugar levels reach homeostasis, the pancreas stops releasing insulin. Examine the graphic below to understand how this feedback loop works.



Direction: Use the model to the right to answer the questions below. You do not need to answer in complete sentences BUT I need to be able to understand your answer!

1. The image shows two different types of stimuli (1 and 2), but doesn't explain what the stimuli are that cause blood sugar to raise or lower. Based on clues in the graphic, what are the two stimuli?

Stimulus 1: mechanical Stimulus 2: chemical

2. What happens when your blood sugar rises? Use your own words.

It can cause health problems and also damage some organs like the ones that store sugar. I think it can cause diabetes.

3. What is the effect of glucagon? What cells release glucagon?

Effect	Cells
In maintaining normal concentrations of glucose in blood.	Alpha cells of the pancreas

4. What is the effect of insulin? What cells release insulin?

Effect	Cells
Helps your muscles and fat cells store extra glucose so it doesn't overwhelm your bloodstream. It signals your muscle and fat tissues cells to stop breaking down sugar level.	Islets Langerhans Pancreas

5. What is the normal level of glucose in the blood? Why is this called a "set point." Normal Level: 140mg
Define “set point”: The desired target of value for an essential variable.

6. What would you expect to happen if your blood sugar was 120 mg/100 mL? Be specific.
I would expect to get weaker throughout the day and maybe having 120mg of blood sugar could be a sign of diabetes

7. A person with diabetes cannot regulate their blood sugar, mainly because the pancreas does not release enough insulin. To treat the disease, a person must monitor their blood sugar, if their blood sugar is high, they must take an injection of insulin. How do you think they would need to treat low blood sugar?
To treat low blood sugar i think they should remove some insulin or take a shot of glucagon.

8. In a single sentence, explain the relationship between the pancreas and homeostasis.
Homeostasis can't live without the pancreas because the pancreas kinda does all the work.

9. Where does the glucose that is released into the blood ultimately end up (2 places)?
It can be broken down in order to produce ATP or formed into glucagon

Read the article "Johnson & Johnson to Prevent Type 1 Diabetes" and answer the questions below:
10. Type 1 diabetes is an autoimmune disease. Define autoimmune disease and use type 1 diabetes as an example. Autoimmune system is when the immune system attacks the pancreas cells. Which makes the insulin make no or little insulin causing diabetes.

11. Explain the stimulus that causes diabetes. What is the response? How is insulin used to trigger a negative feedback loop? Model the feedback loop below. Glucose is the main reason that causes diabetes too much glucose means too much sugar. Insulin is used to trigger a negative feedback loop by controlling the glucose the body will see that a change is occurring it a negative feedback loop is made,
Insulin->control->receptors->negative feedback loop.

12. What are antigens, based on the reading? They are special cells that can help cure diabetes

13. The diabetic body recognizes one of its own proteins as an “invader” and the immune cells would kill the beta cells. What is the only way the patient can survive? How can we theoretically stop Type 1 diabetes?
The patient could survive by taking a daily dose of insulin. We could theoretically stop Type 1 diabetes by giving insulin and antigens.

14. How are computer microchips used in the research for preventative medicine? Janssen Biotech unit will use computer microchips designed to simulate functions of human organs to predict which experimental drugs are most likely to be effective and safe in people. The chips simulate the responses of cells to medicines or chemicals, from beneficial results to toxic reactions.