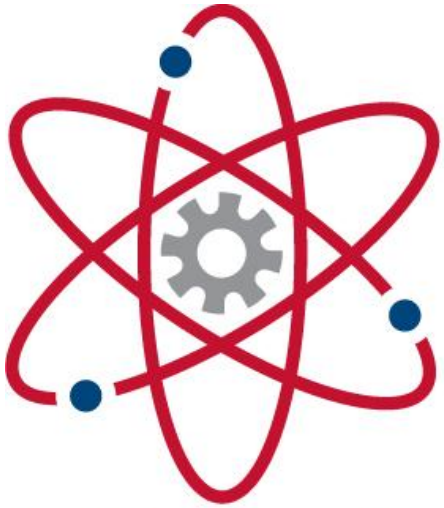


PROJECT LEAD THE WAY

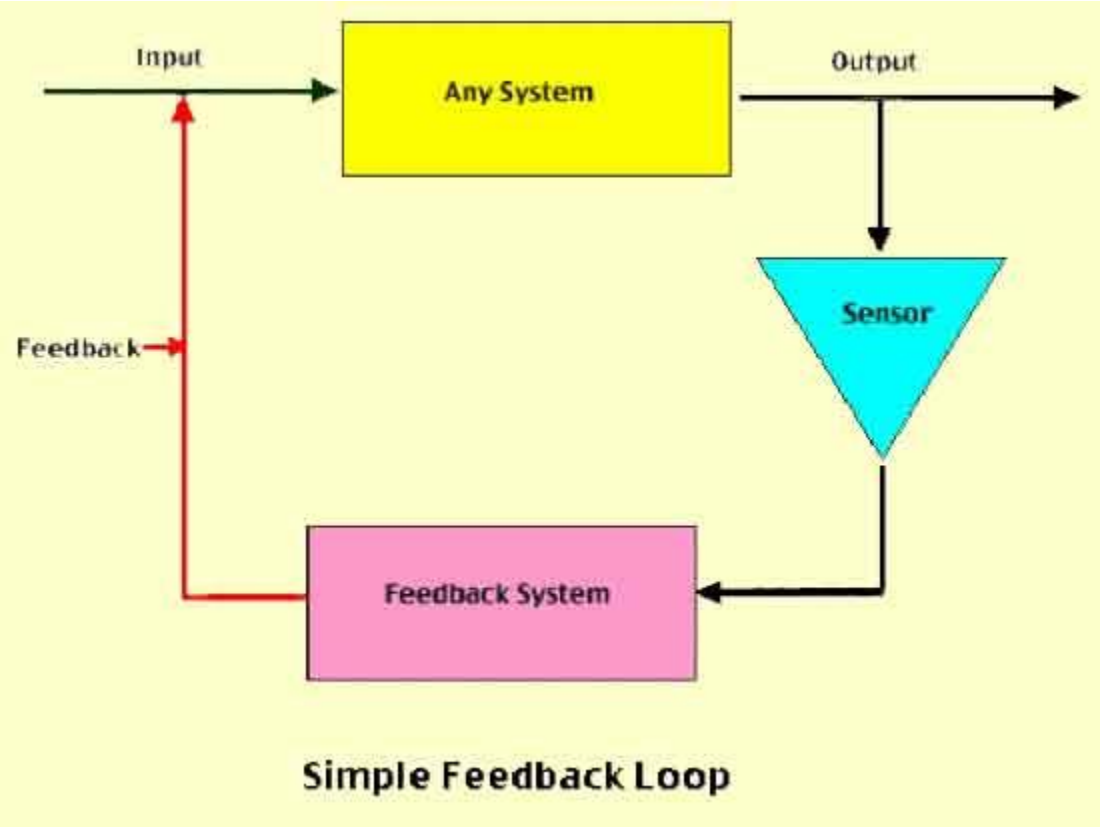
PLTW

Igniting imagination and innovation through learning.

3.4 The Diabetes Connection

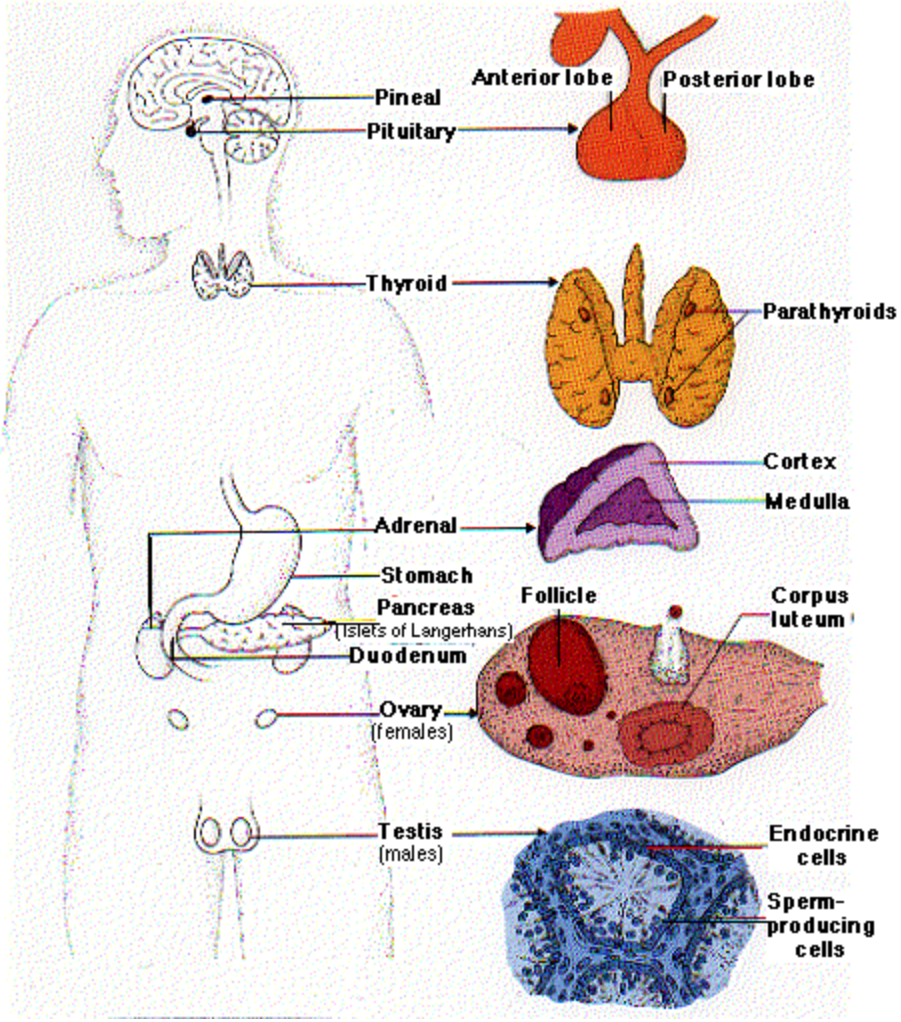
1) What is a feedback mechanism?

- A situation in which parts of a system respond to other parts to make something happen



In the body, the feedback loops are controlled by what?

- HORMONES!!!

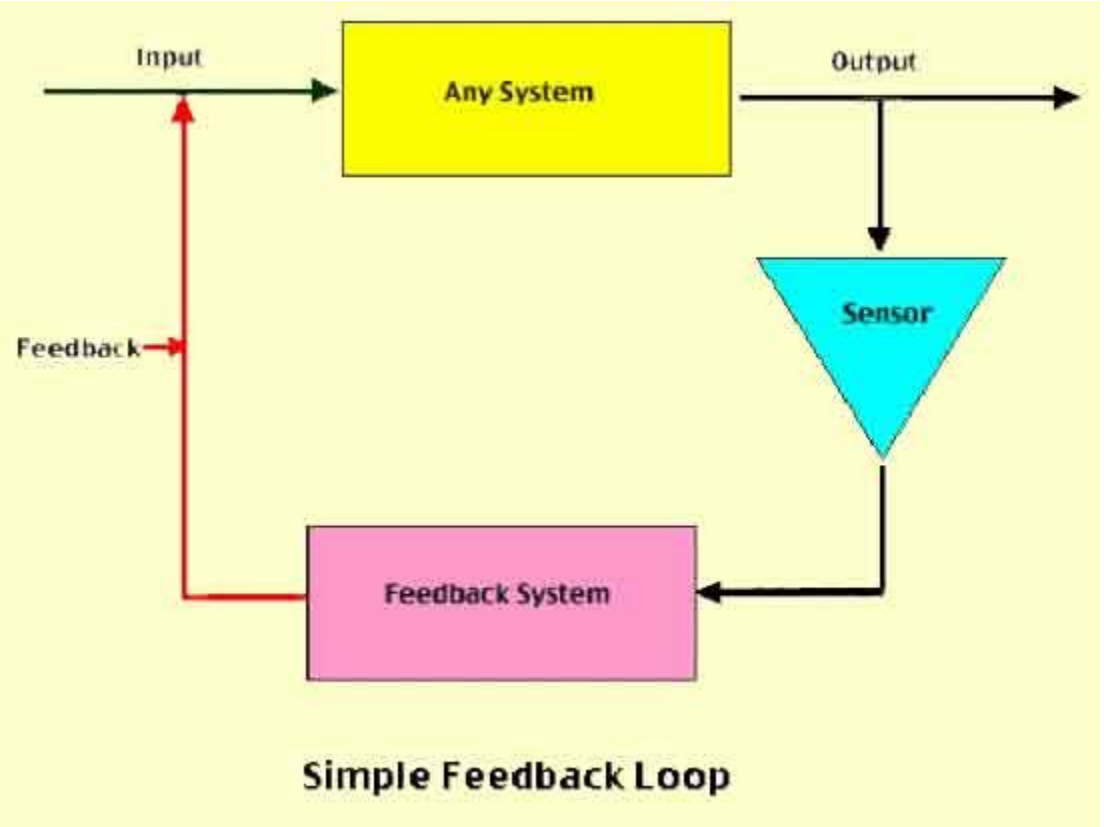


examples

- Childbirth
- Blood clotting
- Erythrocyte (red blood cell) production
- Blood pressure maintenance
- Blood glucose maintenance
- Menstrual cycles
- Growth

2) How do positive and negative feedback differ?

- A situation in which parts of a system respond to other parts to make something happen



2) How do positive and negative feedback differ?

Negative

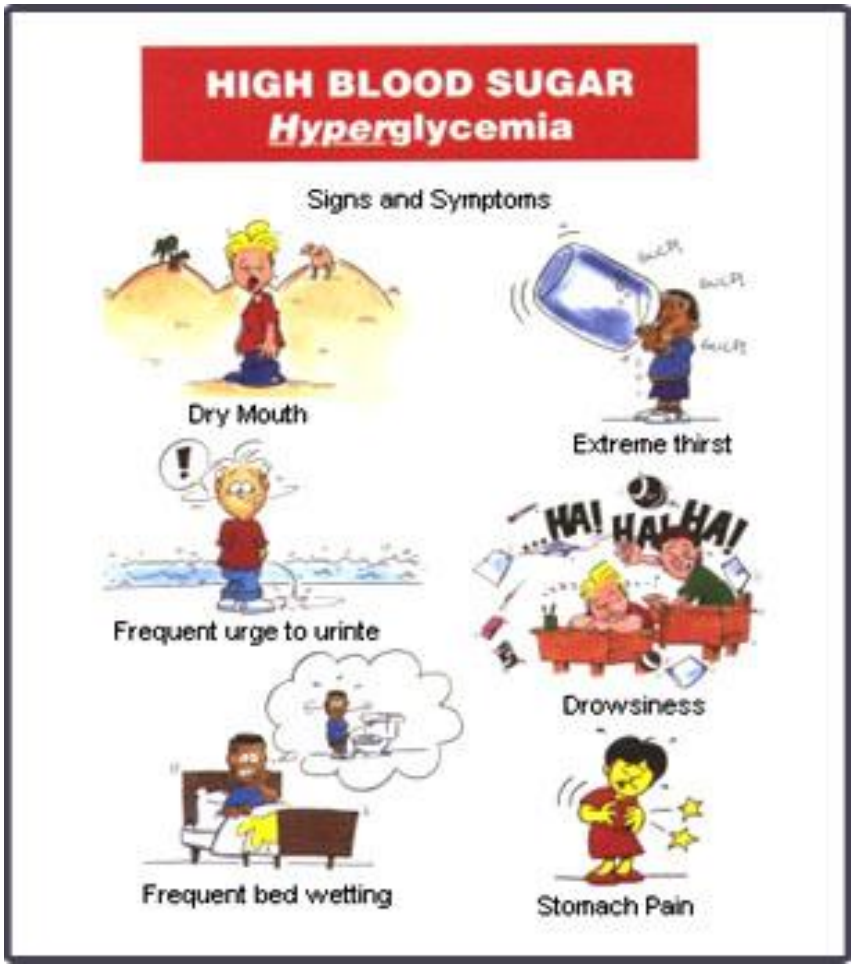
- Work to maintain homeostasis
- The response acts AGAINST the stimulus
  - if blood pressure is high, the response is to LOWER it…

Positive

- Work to amplify a result
- The response acts to ENHANCE the stimulus
  - Pressure on the pelvis makes a woman contract more, creating more pressure on the pelvis, causing more contractions…

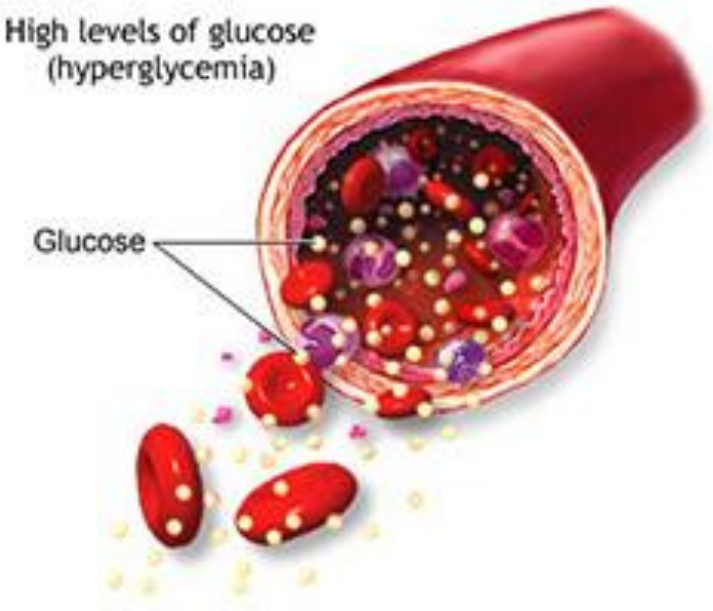
3) Why is having too much sugar in the blood bad?

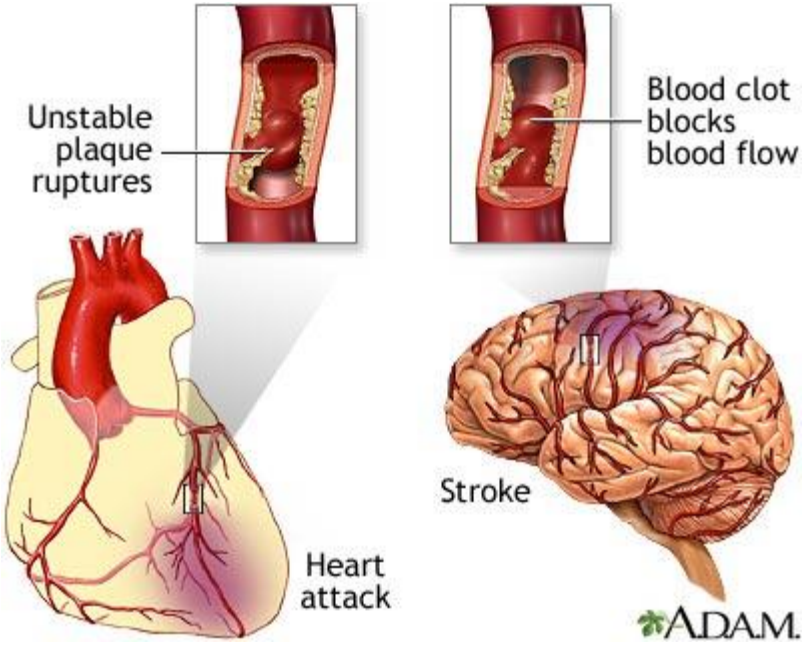
- It causes these problems →



It also causes

- **50% of diabetics to have heart disease (thicker blood is harder to pump☹)**





It also causes

- 12% of diabetics to suffer serious vision loss early on (thicker blood can't get through the capillaries and lack of oxygen and nutrients starves the cells in the eye☹)

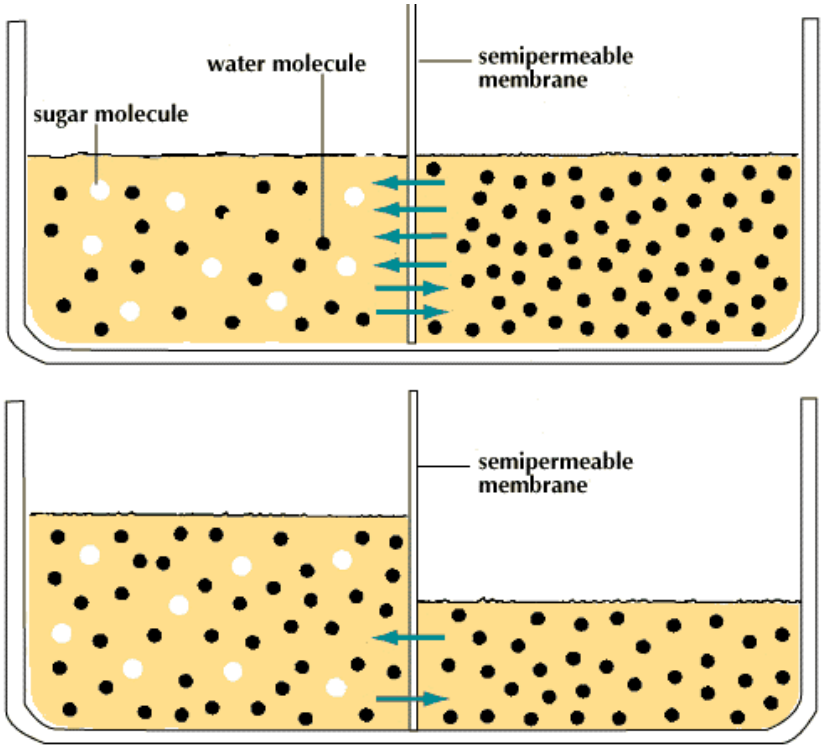
It also causes

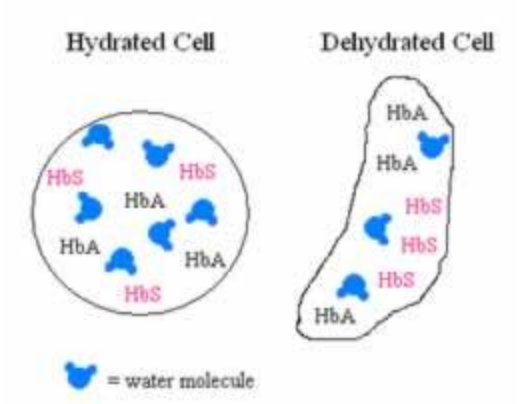
- **75% of diabetics to suffer serious vision loss after 15 years**

http://www.cdc.gov/diabetes/statistics

4) What happens to cells exposed to high levels of sugar?

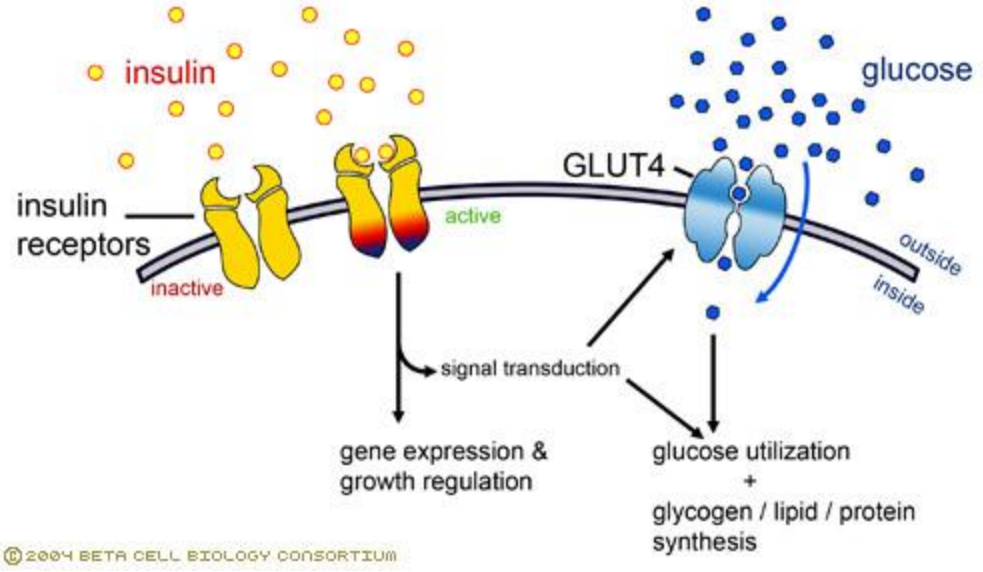
- Sugar SUCKS!!!
  - It will suck the water right out of the cells, leaving them DEHYDRATED☹





5) What is the role of insulin in our bodies?

- It lets the sugar into our cells and gets it OUT of the bloodstream.
- It's like the KEY that opens the LOCK into the cell!

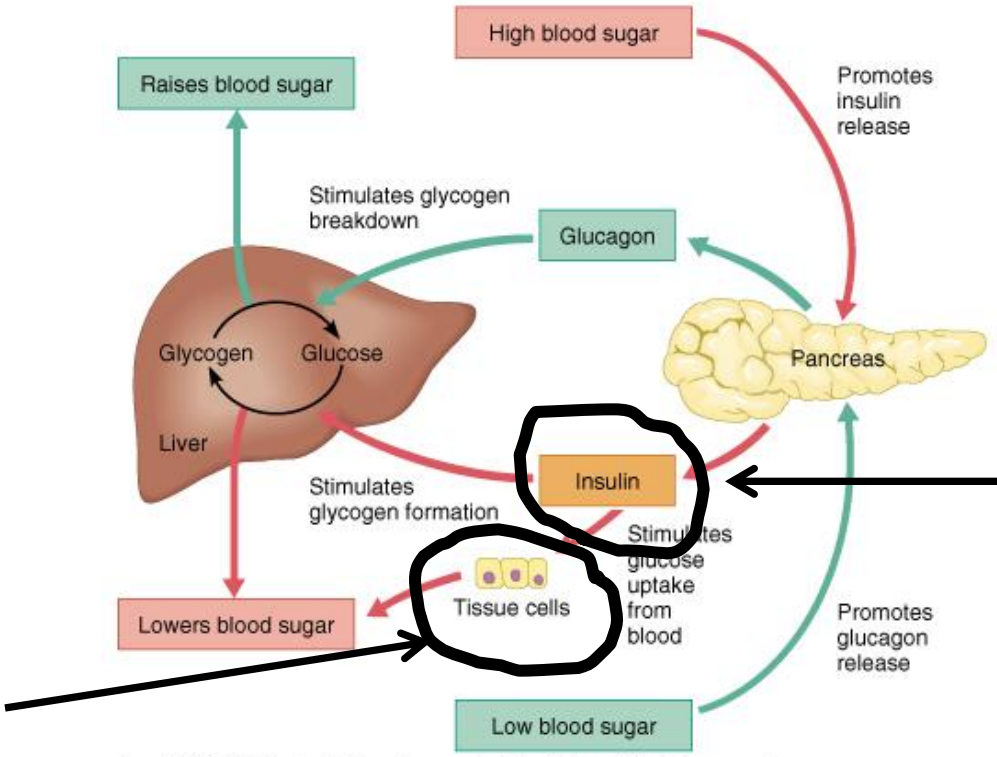


6) How does insulin accomplish its job?

- Open the “All About Insulin” PowerPoint or go to http://www.youtube.com/watch?v=CuQMpN7rM-4

7) What is the diabetes connection?

- Diabetes is a malfunction in the blood sugar feedback loop—KNOW THIS LOOP!



Type 1: no insulin is made

Type 2: cells ignore insulin

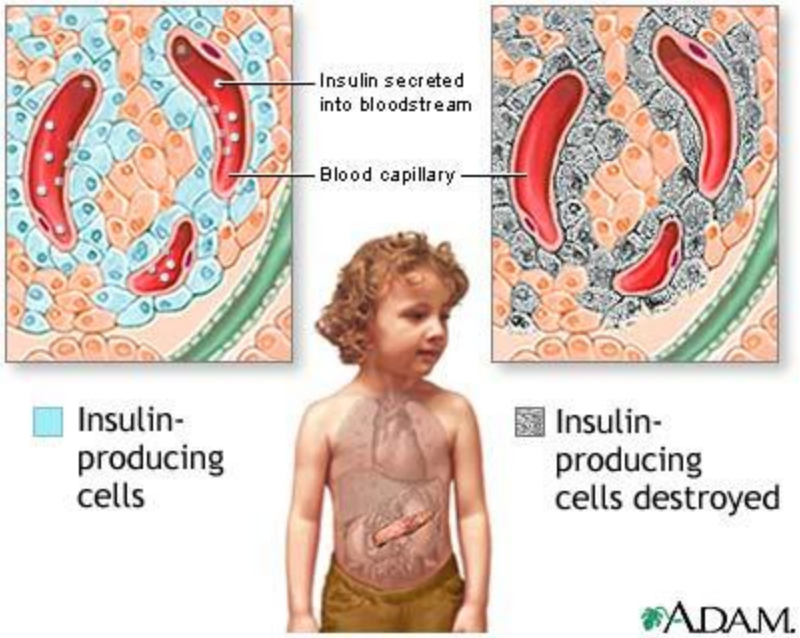
Watch this video to hear the loop explained

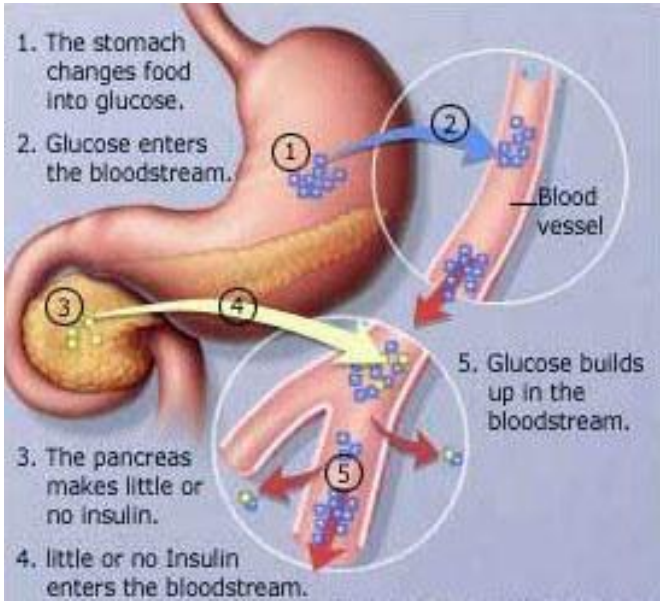
- http://www.youtube.com/watch?v=NnIWDxuZKUo (the substitute can play it off of my computer)

Type 1 Diabetes

Insulin-Deficient Diabetes

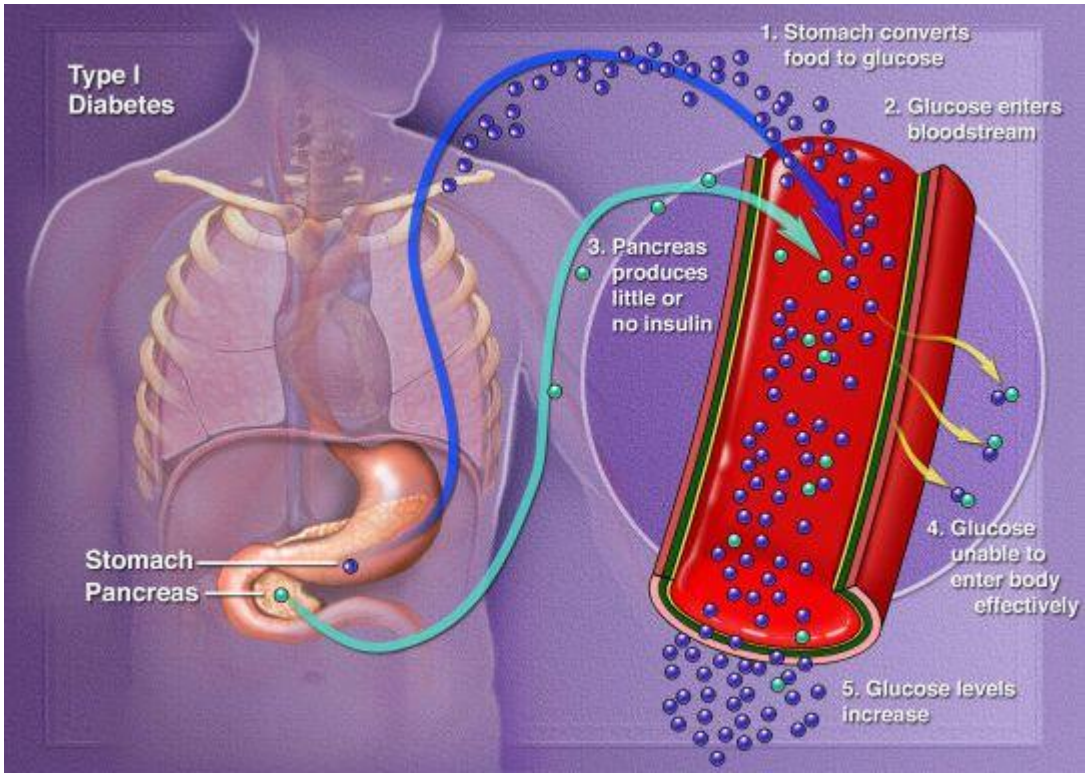
- **Pancreas does not make insulin**





Type 1 Diabetes

- **Mostly in children**
- **(*old name: Juvenile Diabetes)***



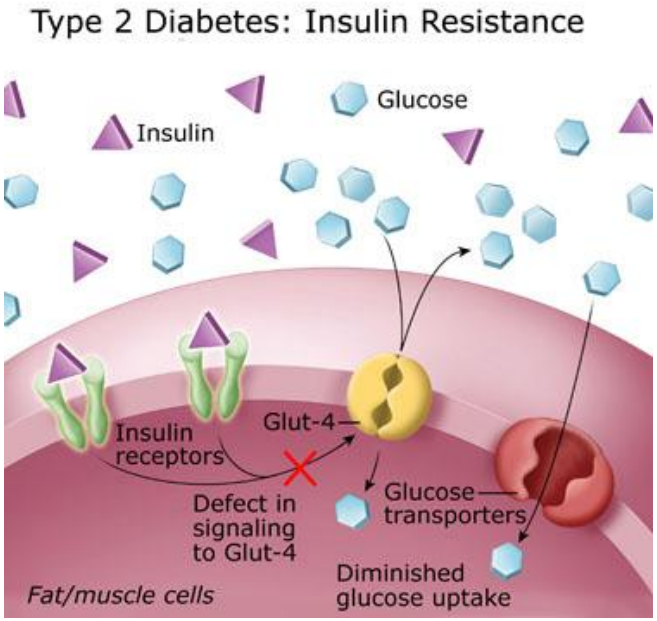
Type 1 Diabetes

- **Treatment: Insulin** (shots or pump) and **controlled diet** (limit of carbs)

Type 2 Diabetes

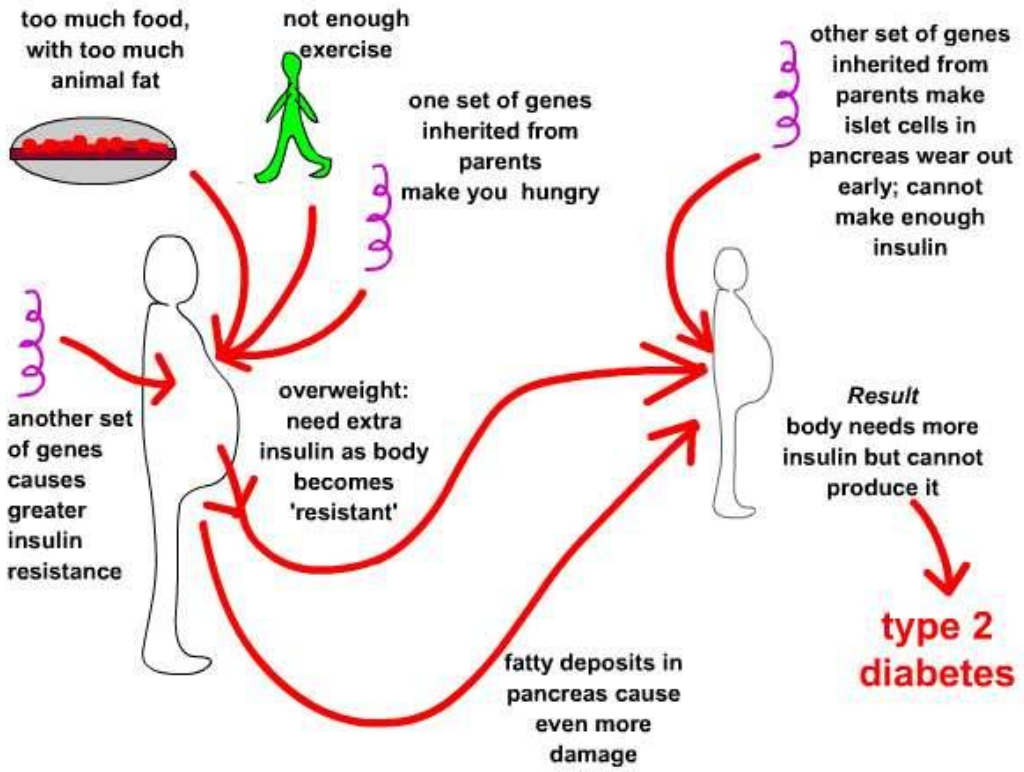
Insulin-Resistant Diabetes

- **Cells become resistant to insulin (it doesn't work anymore)**



Type 2 Diabetes

- **Mostly in adults**
- *(old name: Adult Onset Diabetes)*



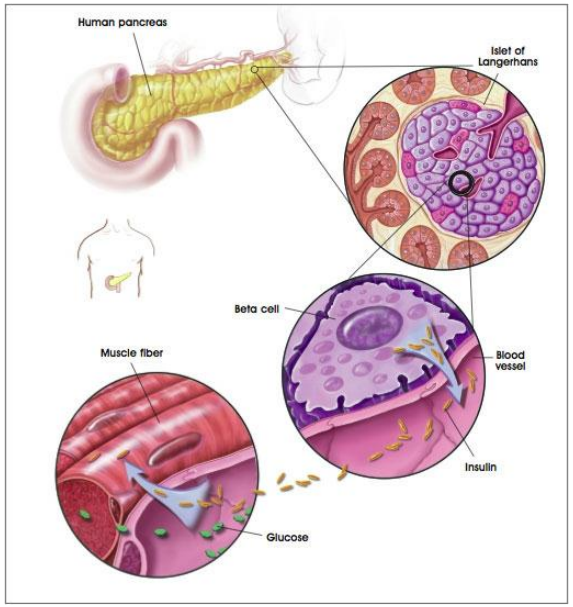
Type 2 Diabetes

- **Treatment: Controlled diet (limiting carbs) and exercise**
- **Type 2 is REVERSIBLE with lifestyle changes!!!** (at least for a time)

"What fits your busy schedule better, exercising one hour a day or being dead 24 hours a day?"

Type 2 Diabetes

- **Long-term damage to the pancreas (from overworking it) can cause the need for insulin shots**



So What?

- If the cell becomes resistant to insulin (type 2 diabetes) it has the same effect as if there was not insulin present
- **BOTH: Cells can't take in glucose, resulting in too much sugar in blood**

8) How do types 1 and 2 differ?

- Your assignment
- Make a chart comparing and contrasting type 1 and type 2 diabetes. Be as thorough as you can. You may work with a partner if you'd like. You may create a Venn diagram or simply do a comparison chart. Put your names on it and put it in the tray.