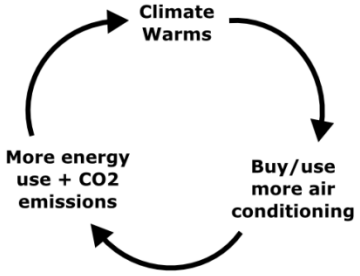
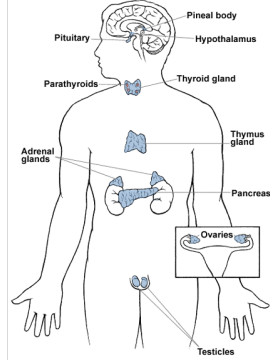
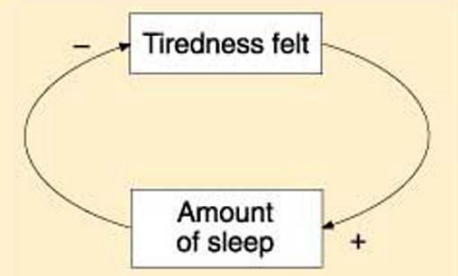


3.4 The Diabetes Connection Study Guide by Hisrich

3.4.a. What is a **feedback** mechanism?

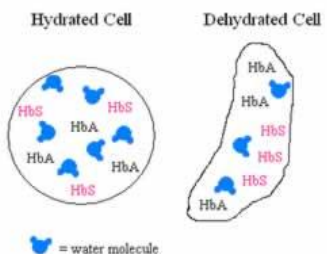
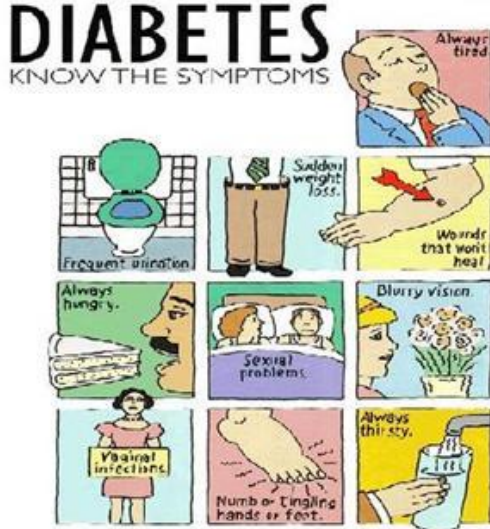
A **feedback** mechanism is just when one thing happens in response to another thing—sort of like a chain reaction.

3.4.b. In what ways do **negative feedback** and **positive feedback** differ?

Positive Feedback	Similarities	Negative Feedback
<p>create a larger & larger response until something major occurs to stop the process (represented by single loop)</p> 	<p>involve hormones, controlled by Endocrine system</p> <p>one thing happens in response to another</p> <p>necessary for health (both GOOD!!)</p> <p>happen inside the body, but also outside (society, environment, etc)</p> 	<p>maintain homeostasis (keep things same)—trigger results in a “correction” in order to keep BALANCE</p> 
<p>Labor→until child is born</p> <p>Growth→until maturity</p> <p>Blood clotting→until clot form</p> <p>Menstrual cycle→until menstration</p>		<p>Temperature, blood pressure, blood sugar levels, erythropoiesis (creation of new red blood cells), hunger, sleep—MOST LOOPS IN BODY ARE NEGATIVE</p>

3.4.c. Why is having too much sugar in blood bad?

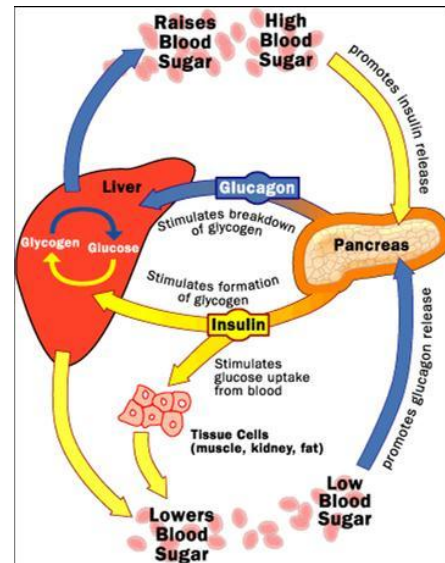
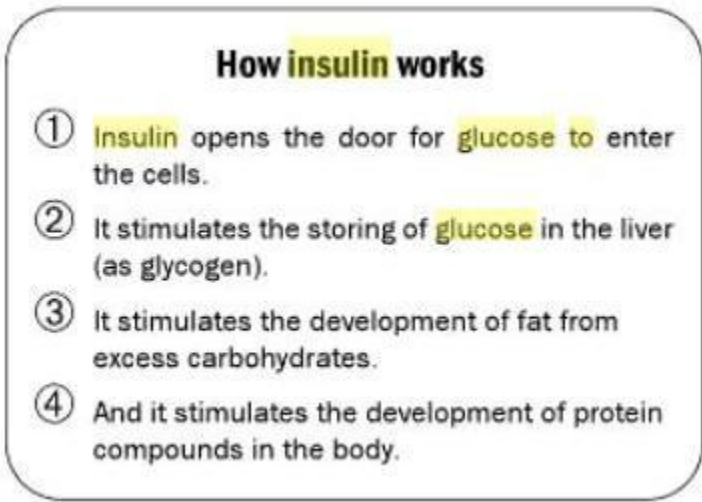
3.4. d. What might happen to cells that are exposed to high concentrations of sugar?

Effects on cells	Blood effects
<p>Too much sugar in blood means not enough is reaching cells. Cells use sugar (glucose) to make energy (ATP). If the sugar can't get in, the person lacks energy and will experience fatigue. For homeostasis, the solutions that make up blood and cells should be isotonic (same concentration in the solutions) In a diabetic, a concentration gradient develops because the blood becomes hypertonic (greater concentration of solute) & the cells hypotonic (less concentration of solute) & osmosis draws the solvent (water) out of cells and into the bloodstream, dehydrating cells☹. That leads to constant hunger & thirst that isn't properly satiated with food/water intake</p> 	<p>The sugar thickens the blood, causing less flow. That stresses the cardiovascular system & causes high blood pressure, blood clots, poor circulation (often resulting in blindness and/or need for amputation of toes or even limbs).</p> 

3.4.e. What is the role of **insulin** in our body? 3.4. f. How does **insulin** accomplish its job?

Insulin is a **hormone** (particular kind of protein) produced by the pancreas. It's job is to let sugar into cells. In a non-diabetic, **insulin** maintains **homeostasis** of blood sugar levels, but in a diabetic, **homeostasis** is not maintained, causing lots of problems!


Cells are all "locked" in a way and only let certain materials in. **Insulin** acts like a key, "unlocking" cells to let in glucose whenever levels in the blood get high. It works via a **negative feedback** loop (see below).



3.4.g. What is diabetes? 3.4.h. How do Type I and Type II diabetes differ?

Type 1 Diabetes	Both	Type 2 Diabetes
<p>Usually occurs in children (used to be called "Juvenile Diabetes")</p> <p>An autoimmune disorder, in which the immune system attacks the insulin-producing cells of the pancreas</p> <p>Sugar can't get into cells because the pancreas has stopped producing insulin</p>	<p>Sugar cannot get into cells</p> <p>Result in hyperglycemia (high blood sugar) & dehydration of cells</p> <p>Can lead to cardiovascular problems (high blood pressure, heart attacks)</p> <p>Can lead to blindness</p> <p>Can cause need for amputation of toes or even limbs, due to poor circulation.</p>	<p>Usually occurs in adults (used to be called "Adult Onset"), especially those who are overweight</p> <p>An endocrine disorder—caused by a person's lifestyle habits making cells reject insulin</p> <p>Sugar can't get into cells because they've become "insulin-resistant" & no longer recognize it as the "key"</p> <p>Reversible IF lifestyle changes are made.</p>

3.4.i. What are the current treatments for Type I and Type II diabetes?

Type 1 Diabetes	Type 2 Diabetes
<p>Only treatment is insulin—without it there is certain death. Patients have option of injections or an insulin pump.</p> 	<p>Not typically treated with insulin—usually treated with lifestyle changes (exercise, limiting carbohydrates, etc) & oral medications. Insulin may become necessary over time if condition worsens (by then it's considered irreversible because of long-term damage to the pancreas).</p>