

Physiological Aspects

Level: 3

Subject: What is Type I diabetes?

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Some people's pancreas becomes damaged and stops producing insulin; this condition is known as **diabetes**.

Though it may not sound critical, what actually happens is as follows:

After you've eaten, and once your body has digested the food, your bloodstream fills with a multitude of glucose particles. Without insulin to help glucose particles access your body-cells, the cells can never receive the energy they need to survive.

While science has not, yet, discovered how to fix a damaged pancreas, it has found a way of manufacturing insulin in laboratories. Unfortunately, the only method science has found for delivering insulin to people with diabetes is by injection.

So, anyone whose pancreas stops working has no choice but to buy insulin and inject it, several times a day.

Logically, people can't just go around guessing how much to inject, or having shots whenever they feel like it. Too much or too little insulin and/or a shot at the wrong time can harm the body.

Let's see how the system works in a person who doesn't have diabetes:

1. After eating, the glucose from the food you've eaten reaches your bloodstream.
2. The pancreas **measures** exactly how much glucose there is in your blood.
3. The pancreas **calculates** how much insulin it needs to produce, based on the level of glucose present in the blood.
4. It, then, **produces** as much insulin as it'll take for glucose particles to access the body-cells, while maintaining a regular level of blood-glucose, at all times.
5. Once inside your body-cells, the glucose is converted into energy.

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A person with diabetes has to try to emulate what the pancreas would do. Unfortunately, the body is an almost perfect machine, which makes emulating it a very difficult task.

1. After eating, the glucose from the food Carol has eaten reaches her bloodstream.
2. Several times a day, she puts a small drop of blood – which she draws from her fingertips – into a device which **measures** exactly how much glucose there is in her blood.
3. Carol **calculates** how much insulin she needs, based on the level of glucose present in her blood.
4. Carol **injects** as much insulin into her body as it'll take for glucose particles to access her body-cells, while attempting to maintain a regular level of blood-glucose, at all times.
5. Once inside her body-cells, the glucose is converted into energy.

The better Carol's calculations, the lesser the problems her diabetes will give her.

Still, it isn't always that easy! Bear in mind the following differences:

- If we compare both **STEP 2s**:

Pancreas measurements are always perfect; Carol's machine measurements are not so perfect.

The pancreas measures body glucose levels every second of the day; Carol can only be expected to measure her body's glucose levels 5 to 10 times a day.

- If we compare both **STEP 3s**:

Pancreas decisions, regarding how much insulin to produce, are always exact; Carol's decisions, regarding how much insulin to inject, are never likely to be exact.

The pancreas never makes mistakes; Carol does... Every now and then!

- If we compare both **STEP 4s**:

The pancreas produces the exact amount of insulin the body needs, down to the last drop. It is highly unlikely Carol will be able to calculate the exact amount of insulin she needs to inject!

The pancreas produces insulin, every second of the day; Carol can only inject her body with insulin, a few times a day.

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TAKE A LOOK AT THIS SUMMARY TABLE

THE PANCREAS	A PERSON WITH A DAMAGED PANCREAS...	WHAT'S AWKWARD ABOUT IT
...MEASURES exactly how much glucose there is in the blood.	...measures glucose levels with a special device.	You have to draw a drop of blood from your fingertip. You can't keep doing it: at most, you do 5 to 10 times a day. The measuring device is not as precise as the pancreas.
...DECIDES when and how much insulin to produce.	...has to decide when and how much insulin to inject.	The pancreas is never wrong; a person can make a mistake. A pancreas is an expert at deciding exactly how much insulin it needs; a person is not.
...PRODUCES all the insulin it needs, every second of the day.	...can only inject insulin, a few times a day.	People can't keep injecting themselves: at most, they can do it 5 to 10 times a day. A pancreas can stop producing insulin, or produce more or less of it, at any given time. When a person takes insulin shots, they last a few hours, at most. The pancreas produces and delivers as many minute droplets of insulin as the body needs. The device that administers insulin is not as precise as the pancreas.