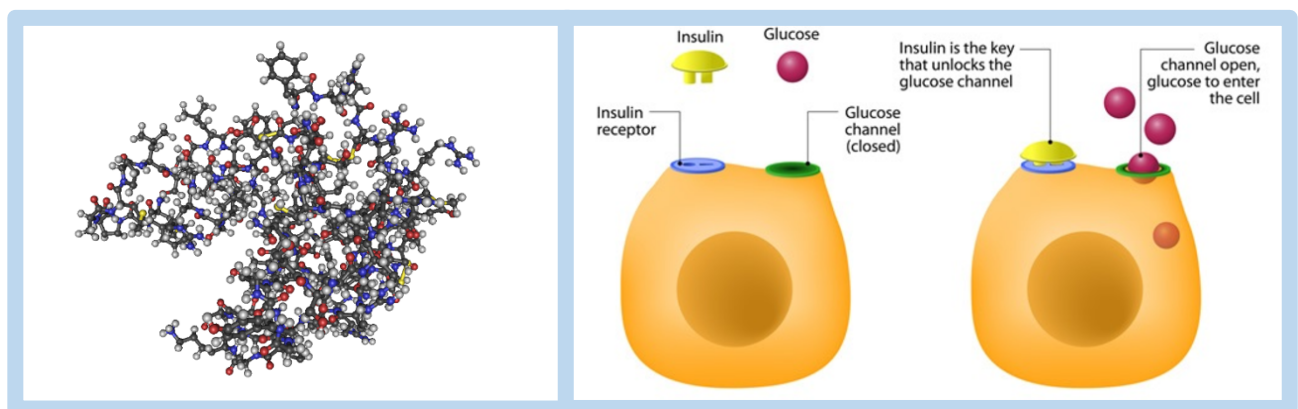


Insulin—the Hormone Hero

Q: If all nutrients exiting the gastrointestinal tract travel to the liver via the hepatic portal system before entering the general blood stream, and the liver is a glucose storage-system, how can high blood sugar occur?

A: It is true that the liver stores glucose. However, the liver does not work like a giant filtration system that keeps blood glucose levels *just* right. In fact, the majority of cells in the body* – **including liver cells** – are 100% unable to take in any glucose on their own. In order to use glucose from the blood, they need a hormone hero—and that hero is...INSULIN! Insulin ($C_{256}H_{387}N_{65}O_{79}S_6$) is a large peptide hormone produced by the pancreas. Of its many important functions, insulin's primary job is opening glucose channels (insulin is the "key"). The opening of these channels is what allows cells to take glucose, keeping the body alive.



But what does this have to do with high blood sugar? The answer is that high blood glucose is in fact the thing that triggers the pancreas to release insulin into the blood stream! Thus, the answer to the original question is: Blood glucose must become high before most body cells can begin taking in glucose, because high blood sugar triggers the pancreatic release of insulin into the blood stream; and insulin is the "key" which opens cells' glucose channels.

*The insulin-producing pancreatic beta cells can take in glucose without insulin when blood glucose levels are high, via facilitated diffusion. As you might have guessed, this fact is crucial to the entire process described above, because it is this absorption that eventually causes pancreatic insulin secretion.

Photo Credits

- Insulin molecular structure:
https://commons.wikimedia.org/wiki/File:3LRI_SolutionStructureAndBackboneDynamicsOfHumanLong_arg3_insulin-Like_Growth_Factor_1_02.png
- Insulin hormonal action schematic: <http://diabeteslibrary.org/?s=insulin>