

Cells, tissues, movement of molecules and action potential physiology



**ASSIGN
BUSTER**

1. You consume a Kit-Kat, strawberry sundae and a coke while watching "Lost" one night. Describe the effects this would have on your immediate blood glucose levels and the osmotic movement of water between water compartments within the body. What hormonal mechanisms would be initiated to restore homeostasis? The next morning, you go for a 10km run before your university class. How would the "fuel" you consumed last night be utilized to sustain the skeletal muscle contraction required for you to undertake this exercise?

Even by consuming high sugar concentrated foods, the blood sugar levels of a person who is non diabetic should still be in its normal levels. There is a hormonal link between the rise of blood sugar levels before and after meals. These hormones that regulate the blood sugar levels interact with other hormones within the human body such as the liver, pancreas and skeletal muscles in order to convert these sugars as fuel for the human body (Sinacore & Gulve, 1993).

Exercise or activity speeds up glucose absorption by the body by burning these sugars into muscle. This is why exercise or activity is recommended for non-insulin diabetic patients. With physical activity the hormones that produce and absorb insulin in the liver are more active (Yamanouchi, et al., 1995).

Two hormones mainly regulate blood sugar levels in the body. These are insulin and glucagon which if not utilized and processed may result in abnormal sugar levels resulting in obesity and diabetes. In the homeostatic regulation of blood sugar levels, these peptide hormones become synthesized by the pancreas and are released into the bloodstream. Upon the release of these synthesized hormones into other organs such as the <https://assignbuster.com/cells-tissues-movement-of-molecules-action-potential-physiology/>

liver and adipose tissues, there will be another reaction that can be triggered by the activity or inactivity of a human being (Lee & Park, 2004)

2. You are exercising at maximal capacity (i. e. maximum heart rate and therefore oxygen carrying capacity has been reached) and the workload you are subjected to continues to increase. Which metabolic pathway would supplement the production of ATP in this setting? What metabolites (i. e. products of metabolism) would you expect to see increased in both skeletal muscle and blood, when using this metabolic pathway?

There is a correlation between the increase of hormones from blood sugar metabolism and skeletal utilization of blood glucose as a fuel for energy. Glucose homeostasis is greatly affected by insulin dependent skeletal muscle glucose transport (Sinacore & Gulve, 1993).

This increase in glucose metabolism through strenuous activities also improves insulin sensitivity. Insulin is the hormone that converts sugar into fuel for the muscles. This hormone also triggers a series of metabolic events in the absorption of glucose into the body among them are to either convert insulin into skeletal muscle or into fat or adipose tissues (Yamanouchi, et al., 1995).

The increase of metabolites or hormones related to physical activity and blood sugar levels depends on the type of activity. For single bout strenuous activity, studies have shown that there is no significant increase in the levels of metabolites or insulin. While for regular strenuous activities such as training exercises, there is a significant increase of insulin. Among the glucose transporters in skeletal muscles, GLUT4 proteins become more concentrated. This hormone acts as a transporter of glucose among cell membranes which then utilize them according to the cell's needs and <https://assignbuster.com/cells-tissues-movement-of-molecules-action-potential-physiology/>

function (Sinacore & Gulve, 1993)

References

Sinacore, D., & Gulve, E. (1993, December). The role of skeletal muscle in glucose transport, glucose homeostasis, and insulin resistance: implications for physical therapy. *Physical Therapy*, 73(12), 878-891.

Yamanouchi, K., Shinozaki, T., Chikada, K., Nishikawa, K., Ito, T., & Shimizu, S. (1995, June). Daily walking combined with diet therapy is useful means for obese NIDDM patients not only to reduce body weight but also to improve insulin sensitivity. *Diabetes Care*, 18(6), 775-778.

Lee, G., & Park, J. (2004, May). Hemolymph sugar homeostasis and starvation-induced hyperactivity affected by genetic manipulations of adipokinetic hormone-encoding gene in *Drosophila melanogaster*. *Genetics*, 167, 311-323.