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Characterization and Structural Analysis of Glucose

Sonika Rathi [1] and Preeti [2]
[1]Gateway Institute of Engineering & Technology, Sonipat
[1]GVM College ,Sonipat

Abstract:
In present research paper investigation is carried out on characterization and structural analysis of glucose. Glucose, which is a basic carbohydrate and main ingredients of sugar having most important role in human metabolism, the reaction and breakdown of chemicals to maintain our living state. And within the brain itself, it is also the primary source of energy (along with glycogen) used to good functioning of nerves system. The brain needs glucose in order to perform its basic functions, as well as higher order executive functions, such as making decisions, focusing, or doing mental calculations. Although the brain weighs just a few pounds, it accounts for about 20 percent of the calories burned in the human body. Brain cells (or neurons) need twice as much energy than any other cells in the human body. This is because neurons in the brain are always active, thereby always expending energy. Even during sleep, the brain is still active, regulating the cycle and other vital functions necessary for the body to survive. So this field having wide scope of research and development to make human life healthier.

Key Words: Glucose, Brain cells, Glactose, Glycogen etc.

1.Introduction:

Glucose is the most common monosaccharide. It is optically active dextrorotatory isomer so it is called Dextrose. Its general formula is C6H12O6 which means that it is a molecule that is made of six carbon atoms, twelve hydrogen atoms, and six oxygen atoms. Glucose circulates in the blood of animals as blood sugar. It is made during photosynthesis from water and carbon dioxide, using energy from sunlight. It is the most important source of energy for cellular respiration. Glucose is stored as a polymer, in plants as starch and in animals as glycogen. Naturally glucose found in sweet fruits especially grapes (20-30%) and honey. It is the most essential constituent of the human blood. The blood normally contains 65 to 110 mg of glucose per 100ml. In diabetic person level of the glucose is much higher. In the combined form glucose occurs in abundance in cane sugar and polysaccharides such as starch and cellulose. Glucose is white crystalline solid. Its melting point is 146. When Glucose is crystallized with the help of cold water then it convert in the Glucose monohydrate ($C_6H_{12}O_6.H_2O$) which have the melting point 86. It is extremely soluble in water but insoluble in ether. Glucose is an energy source of the cell by aerobic respiration, anaerobic respiration, or fermentation. All of these processes follow from an earlier metabolic pathway known as glycolysis. The first step of glycolysis is the phosphorylation of glucose by a hexokinase to form glucose 6-phosphate. The main reason for the immediate phosphorylation of glucose is to prevent its diffusion out of the cell as the charged phosphate group prevents glucose 6-phosphate from easily crossing cell membrane. Further more, addition of the high-energy phosphate group activates glucose for subsequent breakdown in later steps of glycolysis. At physiological conditions, this initial reaction is irreversible. In anaerobic respiration, one glucose molecule produces a net gain of two ATP molecules. In aerobic respiration, a molecule of glucose is much more profitable in that a maximum net production of 30 or 32 ATP molecules (depending on the organism) through oxidative phosphorylation is generated.

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(+)-Glucose: An Aldohexose

Because it is the unit of which starch, cellulose and glycogen are made up and because of its special role in biological processes,(+)-glucose is by far the most abundant monosaccharide they are probably more(+)-glucose units in nature than any other organic group and by far the most important monosaccharide. (+)-glucose is a six carbon, straight-chain, pentahydroxy aldehyde that (+)-glucose is an aldohexose. But this is only the starting. There are 16 possible (+)-glucose. Beyond this, there is the fact that (+)- glucose exist in alpha and beta forms, indicating still further stereo-chemical possibilities that are not accommodated by the simple picture of pentahydroxy aldehyde.

2. Theoretical Analysis

A lot has already been said about the importance of carbohydrates during periods of strenuous physical activity. But not many know of the importance of glucose during strenuous mental activity. You may remember a time in which you felt mentally and physically drained after long day mentally. This is because glucose levels drain in the brain rapidly, especially parts of the brain responsible for higher order executive functions. Previously, scientists thought that the brain always had an excess amount of glucose. But recent research tells a different story. One such research discovered that glucose levels in the hippocampus portion of the brain fell 30 percent when mental tasks use that portion of the brain, such as acquisition of new memory or spatial navigation. Generally, the more developed portions of the brain will use more glucose whereas areas of the brain regulating our vitals can do with much less. Another experiment was conducted in which radiologists measured glucose level of participants during a verbal fluency task, which required participants to list as many words as possible beginning with a certain letter in a short space of time. The radiologists found that people performing this simple task used 23 percent more glucose than when at rest. Although too little glucose causes mental fatigue, too much glucose can also be bad. The brain sees excess glucose as a pathogen and thus can cause the mental deficits as well. Too much glucose in the system has also been shown to be responsible for mental impairment. Too much glucose in the bloodstream has been known to diminish the body's ability to respond to insulin, thereby leading to diabetes type II. Diabetes type II can cause gradual damage to the brain as people with diabetes have been shown to show cognitive decline at a much younger age than those without diabetes. To Give human brain the Fuel it Needs to ensure that we give our brain the proper nutrients it needs to function optimally? Here are several tips to ensure that you are getting enough glucose in your system (but not too much) in order for your brain to function optimally.

a) Eat foods on the low end of the glycemic index (GI)

The glycemic index (GI) ranks foods according to how they affect blood glucose levels. Those who have diabetes may be familiar with the index as they suggest those with diabetes also eat foods on the lower end of the glycemic index. Foods that are on the low end of the glycemic index include various vegetables (including carrots), oatmeal, pasta, rice, barley, fruits, corn, potato, whole wheat, etc. In addition to eating foods on the lower end of the glycemic index, make sure that you are taking in a lot of fruits, vegetables, and grains as they are the most plentiful source of glucose. Here is a more comprehensive list of foods and their corresponding GI rating.

b) Eat in moderation

Fitness experts suggest eating in moderation, about 5 times a day. The same thing is suggested for the brain. According to Michael Green of Aston University, one great method for optimizing the power of the brain is to eat more frequently, but take in less every time. Don't eat too much, but don't eat too little. About 300-500 calories per meal is perfect depending on your weight, metabolism, and activity level. This ensures that your brain doesn't have too much glucose in the system at once and your body isn't going into overdrive to digest foods.

c) Eat good fats

Statistics show people who consume a diet high in trans fat are more susceptible to cognitive impairment, as shown by the prevalence of strokes, dementia, and depression in those who eat a diet high in trans fat. But eating a diet with a fair amount of unsaturated fats appears to be good for cognition. A regular dose of omega-3 fatty acids has been shown by some studies to prevent cognitive decline (along with improved cardiovascular health). Omega-3 fatty acids are found in fish and many plant oils. Avocados are also great source of "good fats" as there is plenty of monounsaturated fats (MUFA) in them.

d) Cut out processed foods and soft drinks

To prevent premature mental decline, be sure to cut processed foods and sugary drinks out of your diet. There has been numerous studies that have linked processed foods, junk foods, and sugary drinks to earlier mental decline and increase incidence of mental disease. .

e) Keep track of your activity and diet

Although there are a several rules outlined above for optimal brain health, we are all different. The way you respond to certain foods is unique to you. So keep track of what you eat, how often you eat it, and how you feel after eating it. Something that can give someone brain fog can be what gives you an extra boost of cognitive functionality.

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