The brain is a marvelous organ. And it's a hungry one, too. The major fuel for the brain is the carbohydrate glucose. The average adult brain represents about 2% of our body's weight, but uses 25% of the glucose in the body. Moreover, specific areas of the brain use glucose at different rates. If you are concentrating hard (taking a test, for example), certain parts of the brain need a lot of extra glucose while other parts of the brain only use their normal amount. Something to think about.

**Monosaccharides**

Some foods that are high in carbohydrates include bread, pasta, and potatoes. Because carbohydrates are easily digested, athletes often rely on carbohydrate rich foods to enable a high level of performance.

![Foods that serve as carbohydrate sources.](image)

The term carbohydrate comes from the fact that the majority contain carbon, hydrogen, and oxygen in a ratio of 1:2:1, making for an empirical formula of $\text{C}_n\text{H}_{2n}\text{O}_n$. This is somewhat misleading because the molecules are not actually hydrates of carbon at all. **Carbohydrates** are monomers and polymers of aldehydes and ketones that have multiple hydroxyl groups attached.

Carbohydrates are the most abundant source of energy found in most foods. The simplest carbohydrates, also called simple sugars, are plentiful in fruits. A **monosaccharide** is a carbohydrate consisting of one sugar unit. Common examples of simple sugars or monosaccharides are glucose and fructose. Both of these monosaccharides are referred to as hexoses since they have six carbons. Glucose is abundant in many plant sources and makes up sweeteners such as corn sugar or grape sugar. Fructose occurs in a great many fruits and is also found in honey. These sugars are structural isomers of one another, with the difference being that glucose contains an aldehyde functional group whereas fructose contains a ketone functional group.

![Glucose and fructose are monosaccharides, or simple sugars.](image)
Glucose and fructose are both very soluble in water. In aqueous solution, the predominant forms are not the straight-chain structure shown above. Rather, they adopt a cyclic structure (see figure below). Glucose is six membered ring, while fructose is a five-membered ring. Both rings contain an oxygen atom.

![Glucose and Fructose](image)

**glucose**  
**fructose**

Figure 26.1.3: The cyclic form of sugars is the favored form in aqueous solution.

Another important group of monosaccharides are the pentoses, containing five carbons in the chain. Ribose and deoxyribose are two pentoses that are components of the structures of DNA and RNA.

![Ribose and Deoxyribose](image)

**ribose**  
**deoxyribose**

Figure 26.1.4: Ribose and deoxyribose.

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