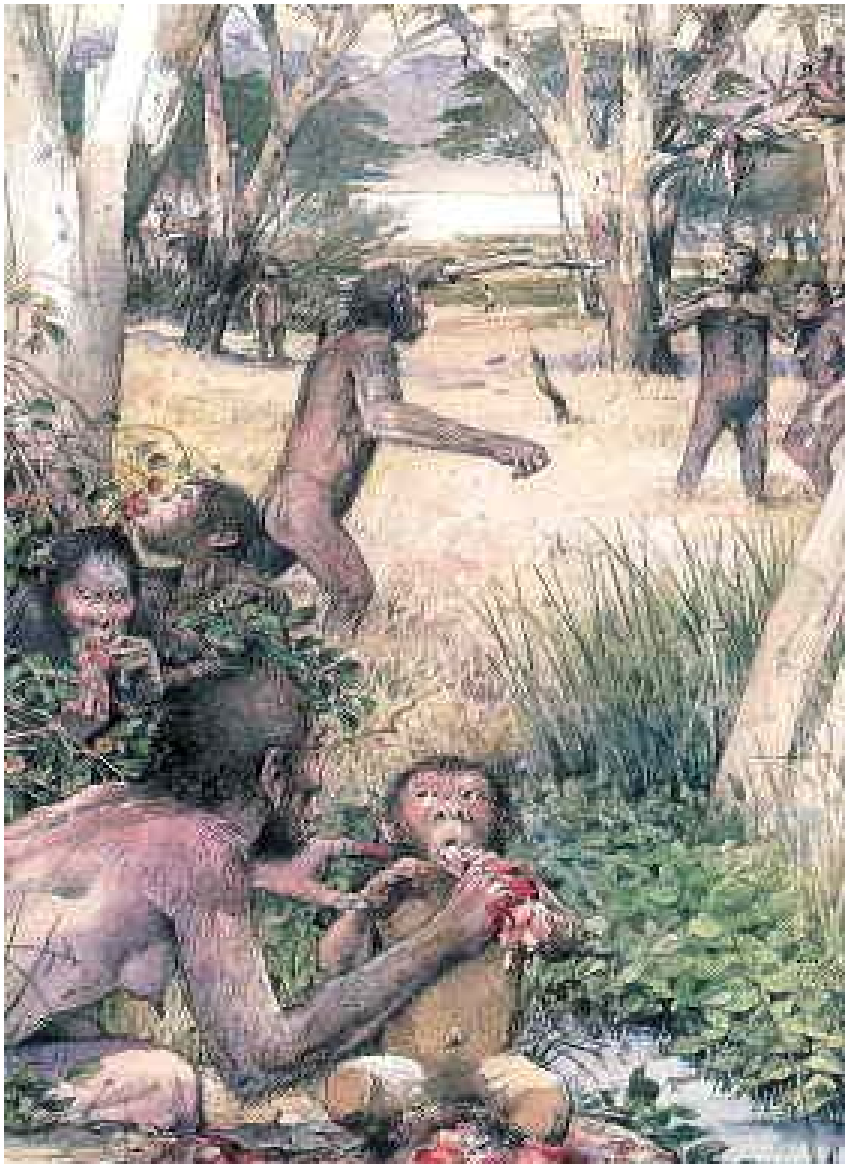
# Our ancestors ate too...

## Human Development and Diet

**A stable blood glucose (sugar) level is essential for normal physiological function of all animals regardless of their diet. The amazing thing here is that there is very little sugar in blood. Never the less, the blood sugar level is kept within narrow limits, either by release of sugar stored as hepatic glycogen, or synthesis of sugar from amino acids derived from the diet or one's own body proteins. This is essential for the brain's function. Blood sugar must lie over about 3 millimoles per liter for normal mental operation. Blood glucose usually varies between 3.5 and 5.5 mmol/l regardless of whether we eat carbohydrate rich food, a diet comprised mainly of either fat or protein or, in fact, when we do not eat at all.**



## How did it all begin?

**About 2-3 million years ago, our ancestors climbed down from the trees and began to hunt and eat their neighbors. Before this, they were most likely tree-dwellers who lived on fruit and berries. Most of the energy they consumed came from carbohydrates and unsaturated fat. Why did they begin to eat meat? Well, it would seem that the key to this lies in the development of the human anatomy.**

**When one compares our anatomy with that of now living apes one finds a striking difference. Our**

**brain is much larger than that of other primates, and our digestive system is quite a bit smaller. The brain is normally completely dependent upon blood glucose for its energy supply. Our large brains use about five grams of glucose per hour under all circumstances; sleeping, exercising or during an examination. Five grams of glucose corresponds to just about the total amount of glucose found in blood. Once more! The brain's normal activity over one hour requires so much glucose that its metabolism alone can quickly exhaust blood sugar. Amazingly, blood glucose concentration remains more or less constant. Therefore, there must be active and well-controlled mechanisms to replenish blood sugar. These are intake of digestible carbohydrates, intake of protein that is converted to glucose or breakdown of the body's own proteins and conversion of the released amino acids to glucose. In addition, lactate produced during muscle activity can also be converted to glucose.**

**Parallel to the increase in brain size and need for glucose, the body's sources of this material became smaller. Unlike other primates, our intestines cannot accommodate large quantities of undigested food, thus limiting the ability to absorb food from the gut to a few hours. We have also proportionally smaller livers than other primates. Hepatic glycogen is the major buffer of blood glucose on a short-time basis and the liver's gluconeogenesis takes over after 10-12 hours of fasting. Early humanoids had to cope with a reduced capacity to digest and absorb carbohydrates as well as a limited hepatic capacity to buffer blood glucose. They were forced to eat often, and their food had to be more concentrated than that used by other primates. They had to have a readily available source of glucose to support the brain and muscle activity. That source was meat; their neighbor's flesh!**


***Figures are taken from National Geographic February 1997.***

# Must we eat sugar?

**Most official sources of information about nutrition recommend a diet in which about 60% of the calories come from carbohydrates, 10% from protein and the rest from fat (not more than 10% from saturated fatty acids) (References 1, 2). All of that carbohydrate, be it starch or sugar, will be digested and adsorbed as sugar! A mixed diet with this composition gives all of the nutrients needed for normal bodily growth and repair.**

**However, there is no doubt that humans can and do live well on diets with little or no carbohydrates. A mixture of dried meat and fat known as pemmican has been used for centuries by native people in artic regions. You can find a very interesting discussion of this here. Pemmican supplemented with vitamin C (from the intestine contents of reindeer or spruce tea) can support an active life for long periods. However, the rapid increase in the world's population during the last 5000-10000 years was based on the development of agriculture. The ability to feed large numbers of people on relatively small land areas came about through cultivation of cereal crops. Starch became a common and relatively inexpensive part of the human diet and was the basis for the enormous increase in population which has followed the agricultural revolution.**

**We can summarize these speculations as follows:**

**1. Our development probably began with organisms whose major energy source was carbohydrate from fruit, roots and berries.**

**2. Thereafter followed a very long period in which much of the food came from hunting and gathering and where a high-protein meat-based diet was "normal".**

**3. We have now come to a point where carbohydrates again are or should be our major energy source.**