

Chapter 2: Energy and Macronutrients

Energy Needs of Children

Energy needs are increased during childhood because of periods of rapid growth and muscle, blood, and bone formation. This is an extremely anabolic time for children. Due to the rapid changes and fluctuations among children, scientists have noted, however, that specific energy needs are difficult to specify. Physicians and other health care practitioners most commonly use the National Center for Health Statistics (NCHS) growth chart with the percentiles for each age group even though formulas have been derived to estimate a child's needs. Of course physical activity plays a large role in the energy requirements and needs of children too. Those who are sedentary are going to require significantly less than their more active counterparts who participate in many lifestyle activities, such as playing with friends, riding a bike, etc, in addition to playing organized sports. Therefore, the NCHS growth charts are a simple way of tracking general nutrition and energy adequacy by following growth patterns overtime. These tools are used more for pediatricians and dietitians than trainers; however, if working specifically with a pediatrician or registered dietitian, they can be utilized to ensure a child is obtaining the required nutrition, but not over nutrition, and engaging in an adequate amount physical activity.

Energy Needs of Adolescents

Like children, physical activity plays a major role in the energy requirements of adolescents. Estimating the energy needs of an adolescent is difficult due to the rapid physical changes occurring during these years. The most important consideration is to consume adequate energy and recommend eating until satisfied to fulfill the needs of adolescents. The Recommended Dietary Allowances suggest an intake of 2200 Kcals per day and 2500 Kcals per day, for 11 to 14 year old female and males, respectively. These numbers will fluctuate depending on the activity level of the individual. Keep in mind that as a trainer, it's not your job to prescribe diets, but rather when working with kids, suggest healthy foods and make eating enjoyable.

Macronutrients

Carbohydrates

Partly Modified from the Fitness Nutrition Coach

Carbohydrates play a number of roles in the body. Two of the primary functions of carbohydrates are to provide glucose for the brain and energy for working muscles. Carbohydrates are stored in the muscles and liver as glycogen. Glycogen allows individuals to perform exercise for a sustained period of time, ride a bike, go for a run, etc. This is crucial when working with children; they typically eat too many simple carbohydrates, in the form of soft drinks, sports drinks, candy, etc even though it is important that they consume carbohydrates for energy.

The key is to ensure that a majority (the FGP recommends at least 50%) come from whole grains. Of course needs differ for children, just like they do with adults, depending on physical activity, age, etc.

There are actually three major types of carbohydrate:

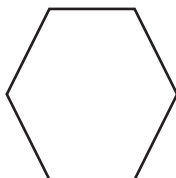
1. sugar
2. starch
3. fiber

Simple Carbohydrates

Simple carbohydrates should comprise very little of the overall diet because they offer very little to nothing in terms of nutrients. Unfortunately there is a shift in the intakes of simple and complex carbohydrates; children and adolescents are increasing their intake of simple carbohydrates and decreasing complex carbohydrates. This means they are receiving less nutrients, more calories, and putting themselves at greater risk for health problems. Simple carbohydrates are more technically known as monosaccharides (mono means one) and disaccharides (di means two), which are single and double sugar molecules, respectively.

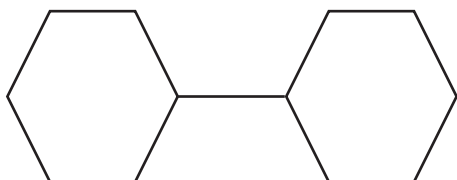
Monosaccharides are the simplest form of carbohydrate and include:
1. fructose
2. glucose
3. galactose

Monosaccharides are symbolized like this:



Disaccharides are made up of two monosaccharides and include:
1. Sucrose, which is a combination of glucose and fructose.
2. Lactose, which is milk sugar, a combination of glucose and galactose.
3. Maltose, which is glucose plus glucose.

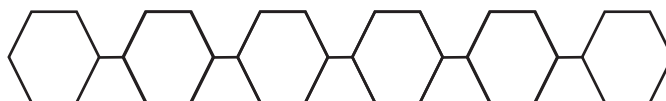
Disaccharides can be symbolized like this:



Common Names of Sugar found on Food Labels	
Brown Sugar	Turbinado
Sugar Honey	Maple syrup
Sucrose	Glucose
Corn syrup	Dextrin
Sugar	Lactose
Molasses	Fructose
Confectioner's Sugar	Honey
Date Sugar	Caramel
High fructose corn syrup	Fruit Sugar
Brown rice syrup	Maple sugar
Maltodextrin	Dextrose
Molasses powder	Chicory syrup

Complex Carbohydrates

Starches and dietary fiber constitute the complex carbohydrates. These are known as polysaccharides (poly, meaning “many”). Polysaccharides are many sugar molecules linked together to make a complex structure, as seen below.



Only plant foods that contain starch and dietary fiber (such as grains, fruits, vegetables, potatoes, dried beans) are considered complex carbohydrates. There is very little carbohydrate available in animal products. Complex carbohydrates should constitute the majority of the diet. They provide a large amount of vitamins and minerals, in addition to fiber. Aside from providing a more sustained source of energy, complex carbohydrates reduce the risk of heart disease and some cancers. These are not often thought about for children and adolescents, but unfortunately these diseases don't discriminate and can begin very silently at a very young age.

Like simple carbohydrates, complex carbohydrates are also broken down into glucose and ultimately used for energy. However, because they contain more sugar molecules linked together (as depicted above), this is a more laborious process for the body, and it requires more work to digest complex carbohydrates. Thus an individual will often feel

These are all forms of simple carbohydrates. Some real food examples of simple sugars include honey (glucose and fructose), table sugar (glucose and fructose), and soft drinks (fructose and glucose, often listed as high fructose corn syrup). All of the abovementioned simple carbohydrates rapidly convert to glucose, so the body can use them for fuel. This is appealing for many kids because they each provide a quick source of energy; however, with that quick “pick me up” there also comes a quick fall of energy levels.

It is important to note that sugar also goes incognito on food labels and often “hides” under the following disguises; don't be fooled, these are all essentially simple carbohydrates and can be found in seemingly very healthy products.