# Teenager Nutrition

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|  | Many Europeans consider the Average American diet with Hamburger , Hot Dogs, Frensh Fries, Ketchup , Coke and simular Fast Food Products which also found increasingly its way to Europe in the last couple of years.  In the 8 months I have been here in California so far my impression is that the Fast Food consume of my class mates is much higher then what I was used to in my hometown in North Germany. The majority of the Teenagers in my school eat Pizza, Frensh Fries, Hamburgers, Chicken Mc Nuggets or Candy for Lunch. On the other hand you can buy a great variety of foods which are low in Fat, Cholesterol, Sodium and Calories, which also seemed to be favored by people, in the supermarkets.  When I had to chose my Research Project for my AP Biology class I thought that it would be interesting to compare the diets of Teenagers in my hometown in Germany and my school here and to see if my impression was right. I as a vegetarian have also been very interested in Nutrition and was concerned that my classmates diets would even come near to their nutritional needs.  This Project has been very interesting for me even if the results didn' t meet what I expected them to be.  Nutrition  The movement of certain minerals and plant - made compounds into the body of the human is called Nutrition.  We differ between Macro- and Micronutrients  Macronutrients:  Macronutrients are so named, because they comprise the greatest portion of the human diet. They supply fuel for work and they help to regulate body heat.  The macronutrients are:  carbohydrates  lipids  proteins  Their consumption as a percentage of the average American diet is depicted in the following figure.  The fuel potential of the macronutrients is expressed in kilokalories. A calorie is the amount of energy needed to raise the temperature of one gram of water by one degree centigrade.  The ideal diet should be 60 - 70 percent Carbohydrate foods along with about 15- 25 percent fat and 15- 20 percent protein.  Carbohydrates  Carbohydrates are probably the most important of the three main classes of foods since they are our main source of energy and should constitute at least 50 - 60 percent of the diet.  Carbohydrates are composed of carbon (C), hydrogen (H), and oxygen (O) in a 1 : 2 : 1 ratio . Carbohydrates are quick source of energy for the body, being easily converted to glucose. Each gram of carbohydrate releases 4 calories for the body.  C. are produced by Photosynthesis in plants. They are the primary source of energy in fruits, vegetables, grains, legumes, and tubers which play a very important role in the functioning of the internal organs, the nervous system, and the muscles. Carbohydrates are also needed to regulate protein and fat metabolism.  With proteins and fats Carbohydrates help to fight infections, promote growth of body tissues such as bones and skin, and lubricate the joints.  Three principal Carbohydrates are present in foods:  Sugars - both simple sugars (monosaccharides) such as those found in honey and fruits and multiple sugars ( oligosaccharides) like table sugar.  Starches - complex carbohydrates found primarily in vegetables such as carrots and potatoes and in whole grains such as rice and corn.  Fiber - mainly cellulose and hemicellulose, the indigestible roughage found in most unprocrssed, carbohydrate- containing foods.  Proteins  Protein makes up about 20 % of our body weight and is a primarily component of our muscles, hair, nails, skin, eyes and internal organs. Our immune defense system requires protein, especially for the formation of antibodies that help fight infections.Hemoglobin and many hormones that regulate our metabolism like insulin are proteins. Biochemical deficiency can occur when there is a lack of enzymes (protein molecules that catalyze chemical reactions in the body) Protein is needed for growth and the maintenance of body tissues. It is especially important during childhood and pregnancy.  Protein molecules are composed of carbon, oxygen, hydrogen, and nitrogen.  Each food has a different mix of amino acids. "Therefor it is important to have an understanding of protein composition and to apply it on our diet.  Meat foods, dairy foods and eggs almost have sufficient Quantities of amino acids to substain life and are called complete Proteins."  But overconsumption of protein foods contributes to some major illnesses!  Deseases caused by protein deficiency are Kwashiorkor and Maramus.  Lipids  Lipids are Fats and oils which are primarily found in meats and dairy foods and in some richer vegetable sources as nuts,... They are an important component of our diet and at least a minimum intake is essential.  Fats are primarily a form of energy reserves and insulation in the body and can be burned to make energy when needed. They are also important for transporting the fat soluble vitamins.  Levels of fat intake are "highly correlated "with weight. High consumption of dietary fat is associated with both increased body fat and obesity .They are the "most concentrated source of food energy and provide 9 kalories per gram."  Micronutrients  Vitamin and minerals are the micronutrients. They have no caloric or energy value, but are absolutely necessary for good health. "With very few exceptions essential micronutrients are not manifactured within the human body and must be obtained from food or supplements."  Vitamins: These complex organic molecules are essential for biochemical transformations; they sometimes fulfill hormone- like functions and aid in the protection of cell membranes.  Vitamin A  Vitamin A is the general name for a group of substances that include retinol, retinal and the carotenoids.  Functions: Vitamin A plays an important role in the eyesight and is essential for the maintenance of epithelial tissue. It is also necessary for the proper function of the cornea, all muscuous membranes, the lining of the gastrointestinal tracts and the lungs.  Deficiency: An early symptom of vitamin A deficiency is follicular keratinosis ( creation of hardened pigmented goose bumps around the hair follicles)  A chronic lack of vitamin A in the diet can result in:  - Night blindness  - Inflammation of the eyes  - Blindness  - Hyperkeratosis  - Reduced resistance to infection  -Weight loss  - Anorexia, ...  RDA Requirements  Teenage Males - 1000 RE  Teenage Females - 800 RE  Sources:Good sources of Vitamin A include whole milk, yellow and green vegetables and orange fruits and liver.  Toxicity: Because Vitamin A is not excreted overdoses can produce toxic effects.  Vitamin D  Vitamin D is a crystalline white substance that is soluble in fat. It plays " a dual role as both a vitamin and a hormone."  Functions:Vitamin D promotes Calcium Absorption from the intestines, calcium resorption from the bone and calcium deposition into osseous tissue. It monitors renal excretion of calcium and maintains normal blood levels of this mineral.  Deficiency:A vitamin D deficiency is responsible for rickets in children and osteomalacia in adults. " Both conditions are a result of defective ossification leading to reduced rigidity in bones and causing them to become soft and pliable and to bend readily."  RDA Requirements:  Teenagers - 10 mcg = 400 IU  Sources: Vitamin D is found in cod liver oil, fish oils and the edible portion of oily fish. Egg yolk, butter and liver and fortified milk are good sources as well. Plants are a poor source. Only mushrooms and dark green leafy vegetables contain minute amounts.  Toxicity: Because Vitamin D is fat soluble it is not eliminated by the body. It can be stored in adipose tissue. Toxicity is likely to occur by more than 500 mcg/ kg body weight the day.  Vitamin E  "Vitamin E refers to a family of compounds known as tophocerols. It is light yellow oil that is predisposed to oxidation."  Functions: As an Antitoxidant Vitamin E functions:  -to stabilize membranes and to protect them against free radical damage  - to protect the lungs against oxidative damage from air pollutants  - to prevent tumor growth  -to protect tissues of the skin, eye, liver, breast and calf muscle  - to maintain the biological integrity of vitamin A and increase the body' s stores of this vitamin.  Deficiency: Vitamin E deficiency is difficult to diagnose. The major influence of the deficiency is on the reproductive system, the nervous system, muscle tissue and blood erythrocytes.  RDA Requirements:  Teenagers - 10 mg  Sources: Vitamin E is found in plant and animal foods, with greatest amounts in vegetables and seed oils. Animal products are medium to poor sources of vitamin E.  Vitamin C  Vitamin C ( l-absorbic acid) is a water- soluble vitamin found in the watery medium of fruits and vegetables.  Functions: Asorbic acid plays a major role in collagen formation and in the amino acid metabolism and hormon synthesis.It contributes to the formation of the amino acid tyrosine and is associated with the cholesterol metabolism and utilization of other nutrients such as folic acid and iron.  Deficiency: The major symptom of an asorbic acid deficiency is scuvy, petechial, hemorrhages, anemia, delayed wound healing and bone fragility.  RDA Requirements:  Teenagers - 60 mg  Sources: Vitamin C is found primarily in fruits and vegetables such as citrus fruits, tomatoes, green peppers, parsley, fresh dark green leavy vegetables, broccoli, cantaloupe, strawberries, cabbage, potatoes, fresh peas, lettuce and asparagus.  Toxicity: Vitamin C is not appreciably stored in the body. When tissues are saturated, additional intake is excreted in the urine.  Thiamin (Vitamin B1)  Thiamin is a water soluble white crystalline substance that has the odor and flavor of yeast.  Functions:TPP ( Thiamin pyrophosphate) is the coenzyme of thiamin . It is critical in several metabolic functions including  -the removal of CO2  - the transfer of 2 Carbon units  - the conversion of glyoxylate to carbon dioxide  - the conversion of carbohydrate to fat  Deficiency: When thiamin intake drops below 0.2 - 0.3 mg / 1000 kcalories, deficiency symptoms like Beribi ( Polyneuritis), cardiovascular problems, anorexia, nausea, fatigue and paralysis occur.  RDA Requirements:  Teenage Males - 1.5 mg  Teenage Females - 1.1 mg  Sources: Good sources of thiamin are found in pork, beef, organ meats, whole- wheat or enriched cereals, nuts and legumes. Moderate thiamin sources include milk, avocados, cauliflower, spinach and dried fruits.  Riboflavin ( Vitamin B2)  Riboflavin is an orange- yellow, crystalline substance that gives watery mediums a yellow- green fluorescent glow.  Functions: Riboflavin is a component of two enzymes - flavin mononucleotide (FMN) and flawin adenine dinucleotide (FAD). These Coenzymes play a role in the electron transfer system, cell respiration and the metabolism of carbohydrates.  Deficiency: Riboflavin deficiency can lead to cracks and sores at the corners of the mouth ( cheilosis), dermatitis, conjunctivitis, photophobia and glossitis. Deficiency Symptoms have been reported when daily intake falls below 0,6 mg.  RDA:  Teenage Males: 1,8 mg  Teenage Females: 1,3 mg  Sources: The best B2 Sources are milk, organ meats, animal protein, enriched grains and brewer' s yeast.  Toxicity: Large doses of riboflavin do not create adverse effects, because it can be excreted by the urine.  Niacin (Vitamin B3)  Niacin is a needlelike white crystalline substance .  Functions: It functions as a coenzyme of the electron transfer system; in dehydregenase reactions, oxidation to produce ATP ( NAD+); biosynthesis of fatty acids, steroids, etc  Deficiency: Niacin deficiency known as pellagra affects every cell but is most critical in tissues with rapid cell turnover like the skin.  The classic symptoms of pellagra are dermatitis, diarrhea and dementia.  Deficiency symptoms are seen in diets containing less than 7.5 mg/ day  RDA:  Teenage Males: 20 mg  Teenage Females: 15 mg  Sources: The best dietary sources are protein foods such as organ meats, peanuts, muscle meats, poultry, legumes, milk and eggs.  Toxicity: Large doses of nicotinic acid produce cutaneous rasodilation and resultant flushing and itching of the skin.  Vitamin B 6  Vitamin B 6 ( pyridoxine) is a family of compounds that includes pyridoxine, pyridoxal and pyridoxamine.  Functions: Pyridoxal performs the following functions:  -Builds amino acids (amination)  - Removes amino groups from amino acids ( deamination)  -Transfers amino groups from one amino acid to another ( transamination)  -Functions in dehydration and amine oxidation  -Participates with folic acid in the methylation of choline, methionine and serine.  - Metabolizes cysteine to pyruvic acid and oxalate to glycine.  - Plays a role in decarboxylation reaction.  Deficiency: No particular desease has been associated with a vitamin B6 deficiency but there are reports of glossitis, stomatis, ...  RDA:  Teenage Males 20 mg  Teenage Females 15 mg  Sources: The best B6 Sources are meat, whole grains, poultry and fish.  Toxicity: Incidents of Vitamin B6 Toxicity are very rare.  Vitamin B12 (Cobalamin)  Function: The coenzyme of Vitamin B 12 is a carrier of methyl groups and hydrogen and is necessary for carbohydrate, protein and fat metabolism. It is also important for the biosynthesis of purines, choline, methinine, etc and mutase reactions.  Deficiency: Pernicious or megaloblastic anemia are the charecteristic symptoms of a Vitamin B 12 deficiency. In addition to anemia, deficiency synmptoms include glossitis, degeneration of the spiral cord, loss of appetite, fatigue, ...  RDA:  Teenagers: 2,0 mg  Sources: " The only source of vitamin B12 in nature is microbial synthesis." The vitamin is not found in plants, but is produced by bacteria in the digestivew tract of animals, or by microbial fermentation of foods.  Toxicity: There are no signs of Toxicity.  Folate:  The B vitamin folacin or folic acid is a dull yellow substance which is sensitive to light.  Functions: Folate is important in the synthesis of DNA and acts together with B12 in the production of hemoglobin.  Deficiency: Folic acid deficiency is one of the most common vitamin deficiendies. The symptoms are simular to those of a vitamin B 12 deficiency: Macrodcytic and Megaloblastic amenias, sprue, malabsorption, leukopenia, thrombocutopenia,...  RDA:  Teenage Males : 200 mcg  Teenage Females : 180 mcg  Sources: Good sources of Folacin is liver, wheat bran, leafy green vegetables, beans and grains.  Minerals: These naturally occuring inorganic elements "perform structural and catalytic roles, including the activation of enzymes and hormones." Unlike vitamins minerals are not destroyed during cooking.  Calcium:  "Calcium is the most abundant mineral and the fifth most abundant substance in the body. Bone tissue comprises about 99 % of the Calcium contained in the body."  Functions: Calcium builds bones and teeth , maintaines bone density and strength, helps prevent osteoporosis in older population, plays a role iin regulating heartbeat, blood clotting and muscle contraction.  Deficiency: The major deficiency symptoms ae Rickets in Children, poor growth, osteoporosis in adults and muscle cramps.  RDA:  Teenagers - about 1200 mg  Sources: Excellent sources of Calcium are milk and milk products, sardines and salmon eaten with bones, dark green leafy vegetables, shellfish and " hard" water.  Iron:  Iron is found in two forms in the body: in functional forms ( hemoglobin + enzymes) and in transport and storage forms ( transferrin, ferritin and hemosiderin)  Functions: Iron is essential to formation of hemoglobin, the oxygen- carrying factor in the blood; part of several enzymes and proteins in the body.  Deficiency: The major deficiency symptom is Microsytichypochromic amenia.  RDA:  Teenager Males: 12 mg  Teenager Females; 15 mg  Sources: Excellent sources are Liver, kidneys, red meats, egg yolks, peas, beans, nuts, dried fruits, leafy green vegetables and enriched grain products.  Magnesium:  Functions: Magnesium aids in bone growth and in the Function of verves and muscles including the regulation of the normal heart rhythm.  The symptoms of a magnesium deficiency include weakness, confusion, personality changes, muscle tremor, Anorexia, Nausea, Lack of coordination and Gastrointestinal disorders.  Deficiency: Longterm deficiency may result in muscular tremor and rasidilatation.  RDA:  Teenage Males: 400 mg  Teenage Females: 300 mg  Sources: Good sources of Magnesium are wheat bran, whole grains, raw leafy green vegetables, nuts, soybeans, bananas, apricots, hard water and spices.  Zinc:  Functions: Zinc maintains normal taste and smell acuity , growth and sexual development and is important for fetal growth and wound healing.  Deficiency: The major deficiency symptoms are Amenia, stunted growth, hypogonadism in male; decreased protein synthesis and wound healing and the lack of taste.  RDA:  Teenage Males: 15 mg  Teenage Females: 12 mg  Sources: Oyster, crab meat, beef, liver, eggs, poultry. brewer' s yeast and whole wheat bread are excellent sources of Zinc  Toxicity: Zinc Toxicity is rare in humans.  Potassium:  Potassium is the primary cation in intracellular fluids.  Functions: Potassium promotes regular heartbeat, is active in muscle contraction, regulates transfer of nutrients to cells and controls water balance in body tissues and cells.  Deficiency: Acidosis, renal damage and cardiac arrest are the major symptoms of Potassium deficiency.  RDA:  Teenagers: 2000mg  Sources: Potassium is found in a wide variety of foods including meat, milk, fruits and vegetables.  Toxicity: High intakes of Potassium is dangerous. Hyperkalemia can develop from a sudden increase in dietary intake above 18 g for the average adult.  Sodium:  Functions: Sodium helps regulate water balance in the body and plays a role in maintaining blood pressure.  Deficiency: The major deficiency symptoms are Dehydration and acidosis.  RDA:  Teenagers: 500 mg  Sources: Table salt is the major source of sodium. It is also found in Baking soda, salty food and baking powder.  Toxicity: Evidence collerates high sodium intake with elevated blood pressure and edema. |

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