Macro Nutrients: Substance required in relatively large amounts by living organisms, in particular

* Carbohydrates: Polysaccharides, glycogen, fiber, starch.
* Protein, Fats, Water.
* \*Sugar can be addictive and changes brain chemistry & is a gateway drug.

Micro Nutrients: Chemical element or substance required in trace amounts for the normal growth and development of living organisms

* Vitamins: Organic (Carbon & Hydrogen)
* Minerals: Inorganic

Types of *Monosaccharide:*Any of class of sugars that cannot be hydrolyzed to give a simpler sugar

* **Galactose**: Sugar of the hexose class that is a constituent of lactose and many polysaccharides (never occurs naturally in nature)
* **Glucose**: Simple sugar, energy source in living organisms, composed of many carbohydrates
* **Fructose**: Hexose sugar found especially in honey and fruit

*Disaccharides*: Any of a class of sugars whose molecules contain 2 monosaccharide residues

* **Sucrose**: compound that is the chief component of cane or beet sugar (Fructose + Glucose)
* **Maltose**: Sugar produced by the breakdown of starch. (glucose + Glucose)
* **Lactose**: Sugar present in milk. (Glucose + Galactose)

*Polysaccharides*: Carbohydrate whose molecules consist of a number of sugar molecules bonded together

**Glycogen**: Glycogen is a polysaccharide composed of glucose manufactured in the body and stored in the liver and muscles. Used for energy.

* - Liver stores 1/3 & 2/3 in muscle.
* -You can store 12 hrs worth of glycogen, the rest of the glucose is stored as fat
* - Stored in cells then fat then bloodstream = diabetes.
* - Anaerobic exercise uses glucose then glycogen for energy.
* - Aerobic uses fat

**Starch**: Odorless tasteless white substance occurring widely in plant tissue and obtained chiefly from cereals and potatoes. It is a polysaccharide that functions as a carbohydrate store and is an important constituent of the human diet

**Cellulose**: Insoluble substance polysaccharide consisting of chains of glucose monomers

Various types of diets

|  |  |  |  |
| --- | --- | --- | --- |
|  | CARBS | FAT | PROTEIN |
| American diet now | 35% | 40% | 25% |
| Amer.Med.Assoc. | 55% | 30% | 15% |
| Mr. H. | 55%-60% | 20%-25% olive,fishoil | 20% |
| Bodybuilder | 65% | 15-20% | 20-25% |
| Mediterranean Diet | 45% | 40% | 15% |

Calorie Intake Percentages

* **55%-60% Carbohydrates**
* **20%-25% Proteins**
* **20% Fats**

**Basic Component of a Carbohydrate**

**GLUCOSE** – **FRUCTOSE** - **GALACTOSE** --C6 -H12 -O6

Monosaccharide- Galactose = it never occurs naturally in nature part of lactose.

Disaccharides - Lactose = glucose + galactose. Maltose = glucose + glucose.

Sucrose = Glucose + Fructose.

**What is glycogen? How is glycogen formed?**

**Glycogen** is a polysaccharide composed of glucose manufactured in the body and stored in the liver and muscles.

* The liver stores 1/3, muscles stores 2/3 because it will need it for energy.
* You can store about 12 hrs. worth of glycogen, the rest of the glucose will get stored as fat.
* Anaerobic exercise utilizes glucose then glycogen for energy. You will replace the glycogen storage before you make any fat.

**Glycogenesis** (formation of Glycogen) and **Lipogenesis** (formation of fat) when glycogen stores are full.

Q: **What is the Glycemic Effect?**

A: When you eat sugar, the less processed it is, it will raise blood sugar causing an over secretion of Insulin to lower sugar levels and take it below normal.

Q: **What's wrong with having a high Glycemic Index:** Low blood sugar makes you hungry

* High insulin increases inflammation
* Raises serotonin levels (makes you hungry)
* Makes you tired and sleepy
* Creates Advanced Glycation end products (AGE's) that accelerate aging.
* Pancreatic Cancer

**Glycemic Index Foods :** White bread, potatoes (shoots blood sugar)

* High fiber grains (Gradually increases B.S.L)
* High sugar diets with high GI has 2x fat around liver and 2x fat in blood stream.
* Monosaccharides shoots B.S.L while Polysaccharides reduce it.

**Ghrelin and Leptin:** They are enzymes, Ghrelin increases appetite and leptin decreases appetite.

**Simple Carbohydrates**: Sugar & anything bleached. Bad carbohydrates have no fiber.

**Fats**: *Saturated*: Lots of Hydrogen

*Monounsaturated*: One less hydrogen

*Polyunsaturated*: Two less hydrogen

\*\*\* 98% of our fats are triglycerides.

**Water**: Lubricates joints, helps mucus membranes, nutrient absorption. Maintains temperature and maintains electrolyte balance.

**Importance of Fiber:** Creates a feeling of fullness and you excrete all of it out

* Attracts water to digestive tract and soften fecal matter and prevents bacteria infection of the appendix and prevents diseases like hemorrhoids, Diverticulosis
* Fat + Bile + Natural Bacteria in the colon = secondary Bile Acids- Is a carcinogen. The more fats you eat the more secondary bile acids you create
* Fiber 1 absorbs some secondary bile acids, fiber 2 speeds fecal matter through the intestines Helps prevent carcinogen by speeding the fecal matter out and by absorbing some secondary bile acids on the way
* Improves body’s handling of glucose- eat fruit not fruit juice (fruit slows down absorption and digestion of sugar)
* Phytonutrients in high fiber foods- helps body release nitric oxide- relaxes blood vessels and make them more flexible
* You will find fiber with its phytonutrients prevent tumor growths, inhibits many cancerous tumors. Cancerous tumors come in 3 general stages
* 1st stage of cancer, is the initial stage, caused by an early genetic change by a virus, a chemical, x ray, environmental pollutants,
* 2nd stage, promotion stage, cancer will not grow unless it is in the presence of a promoting factor: Presence of carcinogens which are promoted by fat, takes 10-20 years of exposure to get the cancer. During this stage, if you remove the promoters and take the inhibitors- fruits and vegetables with phytonutrients-
* 3rd stage metastasis- When it goes to the lymph, first place is the brain and lungs. Death mostly, some survive
* Fiber improves body's handling of glucose. Slows down digestion and absorption of sugar so you do not get that glycemic effect.
* 2 types of fiber: Insoluble: Great at stool softening, pushing the bad stuff out: Soluble FIber:

**Examples of high fiber foods:** Raspberries, Pear with skin, apple with skin, spaghetti whole-wheat cooked, barley cooked, bran flakes, oat bran muffin, oatmeal, lentils. beans, artichoke, green peas cooked, broccoli boiled.

**How does cooking effect fiber?** Steaming or microwaving vegetables leads to less fiber loss than boiling. Keep cooking times as short as possible to preserve fiber and nutrients

**Benefits of a high fiber diet:** Maintain or lose weight, Helps avoid digestive problems, healthy for the heart,

Types of fiber

**Insoluble**: Fruits, vegetables, bran, whole grain, nuts, seeds, brown rice, popcorn,wheat, whole wheat. Can not be dissolved in water

* Most insoluble, have a combination
* Typical average fruit 2 g of fiber, medium size apple, pear, peach, banana, 2 prunes,
* Vegetable half cup a serving, 5 serving of vegetables 18 g

**Soluble**: Fruits, vegetables, seeds, **Legumes, oats**, barley, psyllium and rye. Can be dissolved in water: Good as it pulls bad cholesterol out of your blood.

High fiber food have high antioxidants

* Fruits, vegetables, seeds (2g each)
* Legumes, \*\*most fiber (8g)
* Oatmeal (5g)
* Rye bread, oat brand, psyllium, barley.

How much fiber do we need? 25-30g of fiber a day.From fruits, veggies, legumes, and grains

**How are fats useful:** Insulation & cushioning organs, Compact form of energy, Produces Hormones Makes vitamin D, Protective Sheath (mylein) around PNS

**High Fat Foods:** Bacon, chocolate, dressings, fast foods, popcorn, cheese, red meat, cream cheese

**Essential fatty acids: Linoleic Acid:** It is omega-6 (vegetable oil). It is inflammatory in large amounts. Without it, skin becomes red and flakes, increased infection, liver abnormalities, and stunts your growth.

**Linolenic Acid:** Omega-3, which is anti-inflammatory and prevents hypertension, lowers LDL cholesterol.

**Cholesterol**: A wax-like sterile found in animal products made by liver (1000 mg per day).

Other MAJOR types of fat?

**Saturated Fat:** Saturated Fat comes from animals, the less the legs the animal has the better

It is something that is fully saturated with hydrogen's. It comes from animal products (meat/dairy), coconut and palm oil (tropical oils). Increases LDL Cholesterol.

**Polyunsaturated Fat:** It is found in most vegetable oils. It increases HDL cholesterol and reduces heart disease but too much leads to inflammation and may cause cancer.

**Monounsaturated Fat**: (missing 1 hydrogen from carbon atoms) Olive and Canola oils. Decreases LDL cholesterol and inflammation which prevents CVD, cancer and many other inflammatory diseases. Liquid at room temperature.

Trans Fat- Unrecognizable by the body. Partially hydrogenized vegetable oil.

Interesterified (you should spell check that) fat- Fully hydrogenized vegetable oil.

**How much saturated fat should I have in my diet?** No more than 7% of your total calories

**Raise blood cholesterol:** Ground Turkey, Added sugars such as table sugar or HFCS, Mashed Potatoes, Pizza, whole- fat dairy products, coconut oil

**Calculating The Calories I Need**

1. Multiply your weight by 10(Females) or 11(Male)
2. Multiply that by 1.2-1.5 depending on the amount of physical activity
3. Multiply that by 1.1 to get the total amount of calories needed

**Calculating Daily Value**

1. Take the amount of calories you need
2. Divide that by the Daily Value (4g protein, 4g Carbs, 9g fats)
3. If you exercise, multiply by 20% before diving by the daily value

**Lower blood cholesterol:** Oatmeal, Oat bran and high fiber foods, Fish and omega- 3 fatty acids, walnuts, almonds and other nuts, olive oil,

High protein foods: Meat, Cheese, Fish, tofu, beans, lentils, yogurt, nuts and seeds.

**Function of protein in our bodies:** Rebuilds muscle, energy, creation of some hormones, transportation and storage of molecules

**Basic components of protein:** Amino acids, they have zinc, calcium, vitamin B-6 (increases plaque - Arteriosclerosis), B-12 (leads to wernicke korsakoff syndrome) **Nitrogen, Carbon, Hydrogen, Oxygen (NCHO)**

**How much protein do we need?**

Depends on the formula used – (1) 15% to 20 % of calories

(2) Wt. / 2.2 lbs/kg. =N age 4-10 use 1.1 g/kg

N x RDA quotient or .9 = X in grams age 11-14 use 1.0 g/kg

age 15 -18 use 0.9g/kg

age 19 –up use 0.8g/kg

(3) ages 11-14 .45 x ideal wt. = Ng/28.35 = Oz.

ages 15 -18 .39 x ideal wt. = Ng/ 28.35 = Oz.

1oz. = 28.35g 1000mcg. = 1mg. 1tsp. = 5g or 5ml.

1kg = 2.2lb 125ml = 1/2 cup = 125 mg 1tbsp. = 15g or 15ml

1lb. = 454g 1 cup = 250ml 1g alcohol = 7 Cal.

**Q: What are the incomplete proteins?**

**A:** Protein that doesn't have all 9 essential amino acids that your body needs to make other amino acids. Rice=incomplete protein rice+beans= complete protein. Grains and vegetables Soybeans are complete proteins, there are essential proteins that make the other 11 complete proteins. NCHO,

**Q: What happens when you eat too much protein?**

**A:** May fuel weight gain as the excess will be converted to calories to sugar and then at. Increased blood sugar levels can also feed pathogenic bacteria and yeast and fuel cancer cell growth . It increases blood acidity leading to Ketoacidosis.

Q: Long term protein excess may cause?

Kidney damage but that's your not drinking a lot of water.

**NPU – Net Protein Utilization:** Measure of protein retained after ingesting.

**HCFS**: It inhibits lepton, causes wrinkles

* Produces most AGE's damage ecologen (which makes skin firm and elastic)
* Causing aging usually at the age of 35.
* \*\* Methanol is a class A carcinogen
* \*\*Sugar increases triglyceride levels which increase LDL Cholesterol.

**Soda:** Empty calories that lead to obesity & type II diabetes, Benzing is a cancer causing substance in it, Diet soda leads to more obesity after 8 yrs, Increases blood pressure by 44%

* Phosphoric acid inhibits calcium which leads to Osteopenia -> Osteoporosis
  + Practically prevents the growth of new bone and deteriorates old bone.
* Diet soda has Aspertaine = Brain tumor disorders

Cells are made from lip- proteins

**Role Of Vitamins**

**Q: Fat soluble means:** Stored,dissolves and transported in fat. A,D,E, and K. (ADEK)

**Vitamin A: Beta-carotene Antioxidant**

Increase resistance to infection, helps prevent cancers of the lining of organs(lung, stomach), by maintenance of epithelial tissue: found in bones and transparent covering lens of the eye , strengthens tooth enamel, and helps light perception & a clear cornea. Prevents night blindness. Helps calcium and phosphorous absorption in bones. Too much is toxic and causes an orangish skin color.

**VITAMIN D:** Absorption of phosphorus & calcium essential for bones & teeth, prevents certain cancers (colon). Too much vitamin D can lead to headaches, diarrhea, kidney stones, and calcium deposits in soft tissue.

**VITAMIN E**: Tocopherol and Tocotrienols alpha, beta, delta, and gamma Use natural only d-tocopheryl not dl. Vitamin E generally helps the immune system, inhibits blood clots, as well as prevents the chances of getting cancer. Also prevents early red blood cell destruction.

ANTIOXIDANT – saves polyunsaturated fat and other fats from being oxidized.

**VITAMIN K:** Helps maintain bone mass preventing osteoporosis, aids in blood clotting. There must be a balance of both Vitamin E and K as one clots blood and one prevents the clotting of blood.

Found in turnip greens, broccoli, dark lettuce, seaweed, kelp

**Water Soluble : B & C:** Must ingest water every day

*Vitamin B:*

* **B1** - Thiamin is essential for proper carbohydrate metabolism. Also works to promote healthy nerves, improve mood, strengthen the heart, and improve heartburn.
* **B2** - Riboflavin is necessary for red blood cell formation, as well as for assisting with fat, protein and carbohydrate metabolism. Also works to improve skin blemishes, migraines and in preventing the onset of cataracts.
* **B3** - Niacin is an effective aid for lowering cholesterol, as well as to promote healthy skin. Can also be used to treat depression, insomnia and arthritis.
* **B6** - Pyridoxine is needed for almost every function in the body, working as a coenzyme for numerous enzymes. Plays a major role in forming red blood cells, proteins and neurotransmitters, as well as stabilizing homocysteine levels. Can be used to relieve PMS and asthma attacks. stabilizes homocysteine levels. Lowers homocysteine levels
* **B12** - Cyanocobalamin is essential to prevent pernicious anemia, which is caused by B12 deficiency stabilizes homocysteine levels. Lowers homocysteine levels
* **Biotin** is important to improve nail & hair health.
* **Folic acid/ Folacin** - Essential during pregnancy to protect against birth defects; stabilizes homocysteine levels.

**Vitamin C**

* Helps absorption of IRON.
* Reduces the chances of cataracts.
* Found in all berries, citrus fruits, kale, cantaloupe, papaya…
* prevents alzheimer disease
* 90 milligrams per day to prevent scurvy (deficiency of Vitamin C that connects tissues and keeps blood attached as well as the tendons to tissue).

**Role of Minerals in a Healthy Diet**

**Macrominerals**

* Found in concentrations greater than 100 ppm in an animal’s body
* Calcium (Ca), Phosphorus (P). Magnesium (Mg), Potassium (K), Sulfur (S)
* Salt most commonly fed mineral supplement

**Calcium**: Most abundant mineral in body, Helps contract muscles, An electrolyte, Found in dairy products & green leafy veg, Prevents certain cancers

Phosphorous: Found in animal products, Need Phosphorus for bone

Magnesium:

**Potassium**: Used to cut down sodium levels to cut down water retention, Takes sodium out of the body and lowers blood pressure, DASHED Diet: Dietary Approach to Stop Hypertension, Found in fruits and vegetables, also found in beans, cereal, and dairy products.  
Sulfur:

**Microminerals**

* Found in concentrations less than 100 ppm in an animal’s body
* Copper (Cu), Iron (Fe), Iodine (I). Manganese (Mn), Selenium (Se), Zinc (Zn), Cobalt (Co)

**Iodine**: Allows for healthy thyroid gland, Found in salt and seafood

**Iron**: Important for women, Used to make hemoglobin which leads to oxygen, Makes blood red. Heme-iron is found in animal sources & is more usable and easier to absorb, Non-Heme is found in plants, Found in enriches grains and whole grains.

**Zinc**: A mineral that helps formation of sperm cells.

**Selenium**: An Antioxidant, Prevents prostate cancer & gastric cancer, Found in seafood, lean meats, grains, eggs, and garlic.

**Sodium:** An electrolyte, Found in anything that is processed, canned, boxed, and ice cream.

**Fortified Means**: Adding something that a product never had

**Enriched:** taken out during processing and put back in but not as much

**ORAC**: Oxygen Radical Absorption Capacity; Neutralizes free radicals

**What types of food do we need based on a 2000 cal diet?**

Fruit, vegetables, grains, oils, milk, oils, meat, beans, sweets.

The most saturated fat is coconut oil then its lard (animal fat)

**Beat Cancer with these cancer fighting foods: Reduce - Red & Processed Meat**

**AIM:**  **HOW DOES FAT METABOLISM WORK?**

**Set Point Theory :** States that your metabolism naturally wants to stay the same weight by means of its own internal controls you were and will adjust itself to keep it. So if you overeat your metabolism speeds up.

**Fat Cell Theory:** People gain in number of fat cells three times in your life, infancy, puberty, and pregnancy. Other than those 3 times fat cells only gain in size. The more cell the more they want to be filled up, and the more they will be hungry to be filled up.

**Behavioral Causes:** External cues stimulate appetite, altered satiety cues (leptin – Ghrelin), learned or stress/emotional eating; Lollipop when crying or to increase serotonin levels.

**Lipogenesis** is the process of storing fat. Fat molecules combine so it doesn’t leave the cell.

**Lipolysis** is the process of breaking down fat molecules in cells with exercise (oxygen).

**Fasting:** You run out of glycogen which blocks lipolysis, lowers BMR (set point theory), increases Lipogenesis when you do eat.

**High Protein Diets**

* Low calorie diet means little sugar so energy comes from burning muscle
* Oxygen + Glucose = Lipolysis.
* Without Glucose, Oxygen + Protein = Ketosis = Acidity.

**How to plan an effective Diet**

* **Emphasize high nutrient dense foods**, **Don’t skip meals, EAT breakfast**.
* **Anticipate plateaus**
* **Control external cues to eat**
* **H.A.L.T.** Hunger, Anger, Loneliness/Boredom, Tired/Thirsty.
* **Behavior Modification**

Foods we need on a 2000 calorie diet: Fruits, vegetables, grains, oils, milk, meat, beans, sweets.

*Vocab*

**Potential dangers of bleaching (white flour)**: What gets lost: Half of the beneficial unsaturated fatty acids, almost all of the vitamin E, 50% of the calcium, 70% of the phosphorus, 80% of the iron, 98% of the magnesium, 50-80 %of the B vitamins.

Alloxan is a byproduct of the flour bleaching process, the process they use to make flour look so white. They are technically notadding alloxan to the flour,but, are doing chemical treatments to the grain that result in the formation of alloxan in the flour. Alloxan, or C4 H2O4N2, is a product of the decomposition of uric acid. It is a poison that is used to produce diabetes in healthy experimental animals (primarily rats and mice), so that researchers can then study diabetes “treatments” in the lab. Alloxan causes diabetes as it spins up enormous amounts of free radicals in pancreatic beta cells, thus destroying them.Beta cells are the primary cell type in areas of your pancreas called islets of Langerhans, and they produce insulin; so if those are destroyed, you get diabetes.There is no other commercial application for alloxan, it is used exclusively in the medical research industry because it is so highly toxic.

**Leptin:** Our starvation hormone. Leptin tells your brain that you have enough energy stored in your fat cells to engage in normal, relatively expensive metabolic processes. When people diet, they eat less and their fat cells lose some fat, which then decreases the amount of leptin produced.

**Ghrelin:** Originates in the stomach, declines soon after meals. Ghrelin levels in the blood are high before we eat our food. If you give ghrelin to someone, they will eat more.

**Inflammation & free radicals (how it relates to disease only):** Some types of arthritis are the result of misdirected inflammation. Arthritis is a general term that describes inflammation in the joints. Inflammation may also be associated with general flu like symptoms.

Free radicals are good in that they enable the body to fight inflammation, kill bacteria and control the tone of smooth muscles, which regulate the working of internal organs and blood vessels

**Anti-inflammatory foods:** Reduces inflammation, can make weight loss easier, slow down aging process and prevent diseases

**Heterocyclic Amines:** The biological functions vary, including vitamins and carcinogens. Carcinogenic heterocyclic amines are created by high temperature cooking of meat

**Glycotoxins/ Advanced Glycation End Products:** Cooking certain foods at a temperature high enough to provoke a burning n the surface, results in a chemical reaction between sugars and proteins. This gives food a appreciated flavor, but produces advanced glycation end products that can cause health problems. Associated with premature aging, diabetes, alzheimer’s stroke, reduced muscle function and cardiovascular disease

**Acrylamides:** Used in many industrial processes such as production of paper, dyes and plastics and in the treatment of drinking water and wastewater,including sewage. They are also found in consumer products such as food packaging, and trace amounts generally remain.

**Nitrosamines:** Used in the manufacture of some cosmetics, pesticides and in most rubber products, occurs in many foods and other consumables. Not expected to be of toxicological significance

**Cytokines**: Cytokines are proteins that are produced by cells. Cytokines interact with cells of the immune system in order to regulate the body's response to disease and infection. Cytokines also mediate normal cellular processes in the body.

**Homocysteine:**Naturally occurring amino acid found in blood plasma.High levels of homocysteine are believed to increase chance of heart disease, stroke, Alzheimer disease and osteoporosis.

**C Reactive Protein**: Blood test that measures the amount of protein called C reeactive protein in your blood, which measures general levels of inflammation in your body. High levels of CRP are caused by infections and many long term diseases, but CRP test cannot show where the inflammation is located or the cause of it

**Pro-inflammatory foods**: Contribute to unhealthy inflammation

**Excitotoxins**: A chemical that causes a brain cell to become overexcited and fire uncontrollably, leading to cell death

**Interesterified Fat:**Just as bad as trans fat. might increase heart disease risk by lowering HDL good cholesterol and raising LDL(bad) cholesterol, as trans fats do. They might increase the risk of type 2 diabetes by raising fasting blood glucose levels and decreasing insulin response.

**Trans fat:** Raises LDL , lowers HDL good cholesterol and you are more likely to get heart disease.

**High fructose corn syrup**: Significant risk of weight gain and obesity, increased risk of developing type 2 diabetes, hypertension and elevated bad LDL cholesterol levels, liver damage

**ORAC Scale:** Oxygen Radical Absorbance Capacity, method of measuring the antioxidant capacity of different foods and supplements.

**Phytonutrients/Phytochemicals:** Natural chemicals from plants that may help prevent disease and keep your body working properly