

## NUTRITION NOTES

**NUTRITION:** The process of digestion and absorption of foods and the body's use of it for growth and replacement of cells.

1. You will consume about 50 tons of food in your lifetime. Each day's intake of nutrients may affect your body only slightly, but a lifetime of poor food choices can have a devastating affect on total health.
2. Many of the top killers in this country are directly related to poor eating habits over a period of time. Can you name a few of the top killers linked to poor nutrition?

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### **SIX BASIC NUTRIENTS**

- |                  |             |
|------------------|-------------|
| 1. Carbohydrates | 4. Vitamins |
| 2. Proteins      | 5. Minerals |
| 3. Fats          | 6. Water    |

1. **CARBOHYDRATES:** 45% of the American diet comes from carbohydrates. Most nutritionists agree that **55 to 65%** of our diet should be carbohydrates.
  - A. Primary source of energy – **easiest food to break down and use for energy.**
  - B. Produced by all plant life – **fruits, vegetables, grains (6-11 servings a day).**
    1. **Photosynthesis** – the energy from the sun plus chlorophyll causes the carbon dioxide that the leaf takes from the air and the water that the roots bring up from the soil to produce glucose.
  - C. **Fiber:** some of the glucose units are linked together to form fiber. Fiber is the tough, stringy part of vegetables, fruits, and grains which humans cannot digest. You need about 25 grams of fiber each day – each meal choose one or two servings of food high in fiber.
    1. **Insoluble fiber** – is found in the cell walls of most grains, vegetables, and fruits. It helps to move waste through your digestive system by making your stools soft and bulky.
      - a. Lack of insoluble fiber can cause:
        1. **Constipation** - hard sluggish stools
        2. **Hemorrhoids** – swollen painful veins in the rectum that bulge out from straining to pass hard stools
        3. Fiber can also bind with some cancer – causing agents to help **prevent certain types of cancer** of the digestive system. (colon cancer)
    2. **Soluble fiber** – is present in certain grains, fruits, and in most vegetables and legumes, such as beans and peas.
      - a. Soluble fiber binds with cholesterol and carries it out of the body in the stools to help prevent heart disease.

3. Fiber also helps to balance **blood glucose** and helps to control **diabetes**.
4. Fiber can also help to prevent the accumulation of too much **body fat**.
  - a. The person who eats fiber-rich foods, **chews longer** and fills up sooner on fewer calories.
  - b. It is hard to eat a diet high in fiber and also **gain** weight.
5. Fiber can be destroyed when foods are **refined** or **cooked**.
  - a. Apples have more fiber than applesauce – apple juice has none.
  - b. Baked potatoes with their skins have more fiber than mashed potatoes. Potato chips have almost none.

**D. Types of carbohydrates:**

1. **Simple sugars** – monosaccharide-single sugar unit.
    - a. Glucose – blood sugar
    - b. Fructose – mostly fruits, berries and honey
    - c. Galactose – does not occur free in nature, it is always bonded to something else
  2. **Compound sugars** – disaccharide – two sugar units
    - a. Sucrose – sugar cane and sugar beets
    - b. Maltose – germinating seeds
    - c. Lactose – milk sugar
  3. **Complex carbohydrate (starch)** – polysaccharide – many sugar units
    - a. Whole grains
    - b. Fruits
    - c. Vegetables
- Concentrated forms of simple and compound sugars are a poor source of energy. They get into the blood to fast and cause an insulin over reaction.
- Best type of carbohydrate to eat for energy. It takes longer to break down the long chains of starch. Sugar is released into the blood stream slower.

**E. Carbohydrates as energy:**

1. Glucose is the **blood sugar**.
2. Excess glucose is stored in the body as **glycogen**.
  - a. Glycogen is stored in the liver and muscles.
  - b. The body can store about ½ day supply of glycogen for energy.
3. When the glycogen stores for glucose are full, the body stores the rest as fat.
4. The body can store an unlimited amount of fat.
5. When work is being done the glucose in the cell is used first → then the blood sugar → then the glycogen → then stored fat or protein.

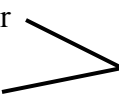
**F. Carbohydrates also have an important role in the efficient use of fats for energy.**

1. In order to use fat for energy you need glucose – a breakdown product of glucose is needed to combine with fat fragments so they can be used for energy.
2. Glucose is the only food the brain and nervous system can use for energy.
  - a. When glucose is not available the body breaks down protein to be used as glucose to feed the brain.
  - b. This is why body protein, such as liver and muscle cells, always break down to some extent during fasting.

3. The body goes into **ketois** – using fat without the help of glucose.
    - a. Characterized by the appearance of incomplete fat – breakdown products in the blood (ketones).
    - b. In the first few days of a fast, body protein provides about 90% of the needed glucose.
      1. If body protein loss were to continue at this rate, death would occur within 3 weeks.
    - c. The brain adapts and becomes able to use the ketones as fuel – (about half of the brain’s energy needs can be met this way).
    - d. Still many areas of the brain rely exclusively on glucose.
  4. **Starvation** – all the muscles are wasted, including the heart.
  5. When work is being done the glucose in the cell is used first → then the blood sugar → then the glycogen → then stored fat or protein.
- G. **Processed Sugar** – is not a nutrient but sometimes it is confused as a carbohydrate. All nutrients are removed from sugar through the refinery process.
1. Contains **empty calories** – it has not nutritional value, but it fills you up.
    - a. Burned as energy or turned into fat.
  2. Processed sugar robs the body of vitamins and minerals. Vitamins and minerals are used up when we digest food – usually we are repaid by the nutrients in the food – but there are no nutrients in sugar.
  3. Sugar is hidden in many labels under a variety of different names. Add all the sugars together and they equal the number one ingredient.
    - a. Brown sugar, dextrose, beet sugar, maltose, glucose, corn syrup, fructose, molasses, galactose.
  4. Processed sugars affect on behavior.
    - a. **FIRST** – hyperactiveness – due to speed that sugar gets into the blood.
    - b. **NEXT** – drops glucose level – due to an insulin over-reaction.
    - c. **THEN** – low sugar levels in the blood shuts off the “cerebral brain” which controls learning, attention span, moral values, etc.
      1. Now the animal (hypothalamus) brain is left to run the body which controls survival instincts and self gratification.
- H. **Hypoglycemia** – **low** blood sugar due to an over secretion of **insulin**.
1. **Symptoms** begin 2-5 hours after a meal.
    - a. Symptoms – rapid heartbeat, sweating, lack of energy, dizziness, shaking, faintness, and headaches.
  2. **Treatment** involves a diet that limits simple or refined sugars and substitutes complex and high fiber carbohydrates such as fruits, vegetables, and whole grains. Eating small and frequent meals also helps keep blood sugar levels consistent.
- I. **Diabetes**. A chronic disease that affects the way body cells convert food into energy. Diabetes develops either because no insulin or insufficient insulin is produced or because the insulin produce is not used efficiently.
1. **Facts** - 7<sup>th</sup> leading cause of death in the United States
    - affects 12 million people and number is increasing
    - 700,000 new cases each year
    - Diabetic more prone to heart disease, stroke, blindness, and kidney disease

2. **Type I diabetes** – Pancreas produces little or no insulin. Patient must take daily injections of insulin to stay alive. Occurs most often before the age of 15 and accounts for about 10% of all cases of diabetes. Symptoms usually appear abruptly and progress rapidly.
    - a. **Symptoms** – frequent urination, abnormal thirst, unusual hunger, weight loss, irritability, weakness, fatigue, nausea, and vomiting.
  3. **Type II diabetes** – The pancreas produces some insulin; but because of a cell receptor defect, the cells cannot use the insulin effectively. Can usually be controlled by diet and exercise. Accounts for about 90% of all cases of diabetes and usually occurs in adults over 40 years of age.
    - a. **Symptoms** – excess weight, drowsiness, blurred vision, tingling or numbness in hands and feet, skin infections, and itching and slow healing cuts.
    - b. **Linked to** – heredity, obesity and inactivity.
2. **PROTEIN:** Most people in the U.S. consume twice as much protein as they need. It is recommended that **15** to **20%** of the diet come from protein. Proteins contain **4** calories per gram.
- A. **Function:** vital part of every body cell – muscle, bone, blood, and organs.
    1. Build
    2. Repair and maintain body tissue
    3. Regulate body processes – enzymes, hormones, and antibodies
  - B. The building blocks of proteins are **amino acids**
    1. The body needs **22** amino acids in order to grow and develop properly.
    2. The body can produce most of these amino acids itself.
    3. The other **9** amino acids must be received through the food you eat and are called **essential amino acids**.
    4. Foods that contain all **9** essential amino acids are **complete proteins**.
      - a. All animal products are complete proteins
 

meat	milk
poultry	cheese
fish	eggs
    5. Not all protein foods have all 9 essential amino acids – these foods are called **incomplete proteins** (plants may be rich in protein – but are incomplete).
    6. It is possible to **combine** 2 incomplete proteins to make a complete protein.
      - a. Wheat bread and peanut butter
      - b. Legumes and seeds
      - c. Legumes and grains



A **vegetarian** can combine 2 plant sources of incomplete proteins to make a complete protein.
  - C. Excess **protein cannot be stored** in the body.
    1. The body will only use as much protein as it needs.
    2. The excess is converted into glucose and burned as energy or stored as fat.
    3. The body needs a daily supply of protein.
    4. Small amounts of protein at each meal is better than one large serving.
  - D. Excess protein causes:
    1. Dehydration, because more water is needed to flush protein out of the system.
    2. Strain on liver and kidneys.
    3. A need for more calcium – which results in a calcium deficiency.

E. Small amounts of extra protein is only needed by:

1. Pregnant mothers.
2. Teens.
3. Seriously ill/injured.
4. Athletes on a strenuous training program.

3. **FATS** – 34% of the American diet comes from fats (down from **40%** in 1957). Most nutritionist agree that we should reduce fat intake to under **30%** of our diet. Fats contain about **9** calories per gram twice as many carbohydrates or protein.

A. **Function:** (add flavor and help satisfy hunger).

1. Body's storage form for food energy eaten in excess of need.
2. Insulates the body.
3. Cushions vital body organs.
4. Transports fat soluble vitamins (A, D, E, K).

B. Types of fats

1. **Saturated fats – solid or semisolid** at room temperature.

- a. A fatty acid carrying the maximum possible number of hydrogen atoms.
- b. Source – mostly from **animal products** – meats, poultry, fish, milk, cheese and eggs.

1. Vegetable oils high in saturated fats

- a. Palm oil – 50% saturated
  - b. Palm kernel oil
  - c. Coconut oil – 92% saturated
- > exception to the rule

2. Beware of terms like

- a. All vegetable oil.
- b. 100% vegetable oil.
- c. made from one or more of the following.

- c. **Raise** cholesterol levels in the blood as well as LDL (bad cholesterol).
- d. They add texture and are more chemically stable to heat.

2. **Polyunsaturated fats – liquid** at room temperature.

- a. A fatty acid that has two or more hydrogen bonds missing.
- b. Source – mostly from **plants**.
- c. **Lowers** cholesterol, but also slightly lowers HDL (good cholesterol).
- d. They supply essential fatty acids.

3. **Monounsaturated fats – liquid** at room temperature

- a. A fatty acid that has **one** hydrogen bond missing.
- b. Source – mostly from **plants (olive oil & peanut oil)**
- c. Slightly lowers **LDL** cholesterol, but some studies show that it may slightly raise **HDL** - other studies show its effect on HDL is **neutral**.
- d. **Canola oil** had both polyunsaturated and monounsaturated fats.

4. **Fish Oils – Omega-3** polyunsaturated fatty acids that come from fish.

- a. They don't have much effect on cholesterol.
- b. They lower the total amount of fat in the blood (reduce triglycerides).
- c. They help prevent blood clots.
- d. Smart to eat fish 2 or 3 times a week.

5. **Trans fatty acids** – the process of **adding hydrogen to unsaturated fats** to make it more solid and resistant to chemical change.

a. Causes it to **lose** its polyunsaturated character and **health benefits**.

b. Example: Butter – Margarine (partially hydrogenated vegetable oil).

C. **CHOLESTEROL:** A fat related substance found in all animal fats and some vegetable fats

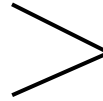
that may form fat deposits on the wall of the arteries. A condition called **atherosclerosis**.

1. Function in the body

a. Essential for cell wall construction

b. Needed to make hormones and bile

c. Transmission of nerve impulses



no problem when in correct amount

2. Where does it come from?

a. Some cholesterol is produced in the body.

1. If a person ate no cholesterol the body would manufacture enough for its needs.

b. Some cholesterol comes from the food we eat.

1. Saturated fats

a. Meat, fish, poultry, milk products, eggs

3. Fats do not mix with watery liquids.

a. In order to carry fat in the bloodstream the body coats it with a water – soluble protein called a **lipoprotein**.

4. Two types of cholesterol

a. Low – Density Lipoproteins – **LDL – bad cholesterol**

1. Fat in the blood stream that is on its way to cell for storage. (including the cells that line the artery walls)

2. Saturated fat causes the body to produce LDL.

b. High – Density Lipoproteins – **HDL – good cholesterol**

1. Fat in the bloodstream that is in route to the liver where it is processed and excreted from the body.

2. HDL works to minimize the harmful effects of LDL by causing it to be removed from the bloodstream and excreted.

3. **Cannot get HDL from the food you eat.**

a. The trick is to get your body to make it

\* **losing weight**

\* **not smoking**

\* **aerobic exercise**

5. **How to lower cholesterol levels**

a. Choose more vegetables, fruits, cereal grains and starches.

b. Choose fish and poultry instead of red meat.

c. Trim fat from meat and skin from chicken before cooking.

d. Eat less or avoid organ meats such as liver, brain or kidney.

e. Eat less commercial baked goods made with lard, coconut oil, palm oil or shortening.

f. Eat less sausage, bacon and processed luncheon meats.

g. Use skim or low fat milk.

- h. Choose low fat cheeses.
  - i. Eat less cream, ice cream, and butter.
  - j. Use low fat yogurt.
  - k. Eat less food fried in animal fats or shortening.
  - l. Eat fewer eggs, or fewer egg yolks.
4. **VITAMINS** – they do not supply calories
- A. **Function** – They work with enzymes by triggering specific chemical reactions that allow the digestion, absorption, metabolism, and use of other nutrients.
    - 1. They act like catalyst or co-enzymes to help a reaction take place, but are neither changed nor incorporated into the products of the reaction.
  - B. **Types**
    - 1. **Water soluble – (C and B complex).**
      - a. Are not stored to any extent in the body so you need an adequate supply of water soluble vitamins every day.
      - b. Any excess is excreted in the urine.
      - c. Found in fruits and vegetables.
      - d. Foods need to be cooked carefully so that water – soluble vitamins are not destroyed by heat or lost through steam or in cooking water.
        - \* Cook fruits and vegetables quickly
        - \* Steam them, or use only small amounts of cooking water
        - \* Cover food during cooking
        - \* Use leftover liquid in soups and stews
    - 2. **Fat Soluble – (A – D – E – K)**
      - a. They are absorbed and transported by fat.
      - b. The body stores fat-soluble vitamins in fatty tissue.
      - c. Any excess buildup of these vitamins can have a dangerous toxic effect.
      - d. People who take nutrient supplements with very large doses of fat soluble vitamins are especially vulnerable to the toxic effects.
  - C. **Vitamin Deficiency Diseases**
    - 1. **Pellagra – lack of niacin** (B group vitamin)
      - a. Can produce dermatitis – a painful skin rash, diarrhea, and mental disturbances.
      - b. Not common in the U.S. today, because commercially made bread and flour is enriched with niacin.
    - 2. **Rickets – lack of vitamin D**
      - a. Without this vitamin bones become weak and are unable to support the weight of the body. This causes the skeleton to become deformed. Teeth may fail to develop.
      - b. Today milk is fortified with vitamin D.
    - 3. **Scurvy – lack of vitamin C**
      - a. Without this vitamin you develop swollen, bleeding gums, and loss of teeth.
5. **MINERALS** – inorganic substances that the body cannot manufacture.
- A. Used for building new cells and chemical reactions within the body.
  - B. Some of the functions: muscular contraction, nerve irritability, water balance, acid base equilibrium, metabolism.

- C. **Osteoporosis** – a condition that results from a lack of calcium in the bones.
    - 1. The bones become weak and can break easily.
    - 2. Weight bearing exercise and a diet high in calcium help to prevent this disease.
    - 3. Most commonly found in older females.
  - D. **Sodium** (Salt): Some people have a natural sensitivity to sodium, which elevates blood pressure. (Keep sodium intake under 2400 mg)
6. **WATER** – human body is about two thirds water (6 to 8 cups of water a day)
- A. Regulator – vital to every body function (digestion, excretory, circulatory)
    - 1. **Dehydration** causes malfunction of all systems – death
      - a. Decrease urine – increase of toxins
      - b. Decrease sweating – increase body temperature
      - c. Decrease blood volume – increase of fatigue – decrease oxygen and nutrients

## CANCER AND FOOD

Most of us are concerned, curious and sometimes confused over reports associating nutrition with cancer. This relationship is a complex issue and easy to misunderstand. What should you and your family eat? What foods should you avoid? The best recipe for health is a simple one: everything in moderation. If you eat a well-balanced diet, there is usually no need to use vitamin or mineral supplements.

Extensive research is under way to evaluate and clarify the role diet plays in the development of cancer. So far no direct cause - effect relationship has been proved. Though we do know that some things you eat may increase or decrease your risks for certain types of cancer. Based on evidence at hand, you might lessen your chances of getting cancer by following these simple guidelines.

### 1. Avoid obesity

Sensible eating habits and regular exercise will help you avoid excessive weight gain. Your physician can work with you to determine your best body weight since it depends on your medical condition

and body build and an appropriate diet to maintain this weight. If you are 40 percent overweight, your risk increases for colon, breast and uterine cancers.

### 2. Cut down on total fat intake

A diet high in fat may be a factor in the development of certain cancers like breast, colon and prostate. If you avoid fatty foods, you will be able to control your body weight more easily.

### 3. Eat more high fiber foods

Regular consumption of cereals, fresh fruits and vegetables is recommended. Studies suggest that diets high in fiber may help to reduce the risk of colon cancer. And even if not, high fiber-containing foods are a wholesome substitute for foods high in fat.

### 4. Include foods rich in vitamins A and C in your daily diet

Choose dark green and deep yellow fresh vegetables and fruits as sources of vitamin A, such



as carrots, spinach, yams, peaches, apricots and oranges, grapefruit, strawberries, green and red peppers for vitamin C. These foods may help lower risk for cancers of the larynx, esophagus and the lung.

## **5. Include cruciferous vegetables in your diet**

Certain vegetables in this family – cabbage, broccoli, brussel sprouts, kohlrabi and cauliflower – may help prevent certain cancers from developing. Research is in progress to determine what is in these foods that may protect against cancer.

## **6. Eat moderately of salt-cured, smoked and nitrite-cured foods**

In areas of the world where salt-cured and smoked foods are eaten frequently, there is more incidence of cancer of the esophagus and stomach. The American food industry is developing new processes to avoid possible cancer-causing by-products.

## **7. Keep alcohol consumption moderate, if you do drink**

The heavy use of alcohol, especially when accompanied by cigarette smoking or chewing tobacco, increases risk of cancers of the mouth, larynx, throat, esophagus and stomach.