State College of Florida HUN 2201 Fundamentals of Nutrition

Class 3 Chapters 5 & 6

**Lipids**

**Lipids** are fats and oils. Generally, fats are **solid** at room temperature and oils are not. Oils are **liquid** at room temperature, which is 70degrees.

Lipids have a structure that contains many atoms of Carbon. Most look like and are called long chain. See the diagrams on textbook pages 131 and 132.

 A **Fatty acid,** by definition, is a chemistry term that is used to describe fats or oils as they are being digested and metabolized (made useful) in the body.

**Oils** are called either:

**Oleic, Linoleic, Linolenic**  The last one, can be alpha or gamma linolenic.

These names indicate different chemical structures and functions or uses in the body. They all fill up **cell membranes**, (the outside edge of cells in the body), **lubricate joints,** help transmit **nerves** in the brain and elsewhere and they provide **energy**: both calories and to work or play.

If the oil has it’s first double bond at the 3rd molecule from the left end, it is called an **Omega 3**  oil. If the first double bond is at the 6th molecule from the left end, it is called an **Omega 6** oil.

**Fats and Oils** also have **qualities** or things about them that make them function differently from the others. These are that Omega 3 oils contain a DHA Docosahexanoic quality. Omega 3 and Omega 6 oils contain an EPA Eicosapentanoic quality.

The three main categories of lipids in the body are:

Triglycerides, Phospholipids and Sterols

**Triglycerides**  – are, chemically speaking, a combination of three molecules of fat or oil and one molecule of glycerol, a variation of glucose sugar. (Whitney p 133)

Having a blood test result that contains high triglycerides indicates a diet of foods that contain high saturated fats plus high sugar. This kind of fat is inflammatory and the source of many health problems. Foods that contain both saturated fats & sugars are some cakes, pies and ice cream.

 Nurses and dietitians may be aware of medium chain triglycerides, MCT, an oil that has a shorter structure. It is an ingredient seen in parenteral nutrition and tube feeding formulas used in hospitals and nursing homes. It is absorbed more easily than other triglycerides.

 **Fats and Oils** have other Properties or things about them that make one different from the other. One of these is Saturation. If they are solid at room temperature (70 degrees), they are **Saturated**. If they melt at room temperature, they are **Unsaturated.**

 Tropical oils melt at body temperature (98.6 degrees) and are **Partially saturated.**  Many people of the world use them without problems, especially cocoanut oil. If they have at least one Carbon to Carbon double bond in their structure they are **unsaturated**.

 If they have one double bond they are **Monounsaturated.**  If they have more than one double bond they are **Polyunsaturated.**  (Whitney p 134)

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**Chemical changes** to oil occur in two ways.

One is **Oxidation**  This occurs when the oil turns sour or rancid unless there is some oxygen in the product. Manufacturers add vitamin E or a chemical. This happens in the body too. \*We need sufficient anti-oxidants in our diet to prevent fats and oils from causing inflammation.

 Another chemical change that occurs intentionally is **Hydrogenation.**  A diagram is on the textbook. (Whitney 139 Manufacturers add hydrogen to the oil to make it more spreadable. This causes it to be highly saturated. Oils that are not hydrogenated oils are chemically in a “cis” formation. Hydrogenation changes the structure of the oil to a “trans” formation.

 **Cis** formation = if turned upside down, it looks like a boat

 **Trans** formation – looks slightly like a chair.

Hydrogenation changes the oil to be more like saturated fats like in milk, butter and meat. This makes commercial bakery products more solid with an oil that costs less. Balance is the key. Try not to eat too many saturated fats or trans oils. Since 2006, the amount of “trans” fats needs to be listed on labels because they act like a saturated fat and clog arteries. Some restaurants and cities have tried to be Trans fat free in all public places where food is served. ( NYCity San Francisco)

**Food Sources of Fats and Oils are:**

 **Structure**  **Kind** **Food Source**

Mostly Saturated stearic acid beef fat, chicken fat, lard

 milk butter cocoa butter

Partially Saturated omega 6 coconut oil, palm oil, peanut oil

1 double bond monounsaturated  **Omega 9 Oil** olive, canola

**Omega 6 Oils**

2 double bonds polyunsaturated oleic high oleic sunflower, soybean

2 double bonds polyunsaturated linoleic sunflower, safflower, corn

3 double bonds polyunsaturated gamma linolenic borage, evening primrose

 alpha linolenic flaxseed, walnut, almond

**Omega 3 Oils (W**hitney p 132)

1st double bond in the third molecule from the left in the chemical structure

 Docosahexanoic & Eicosapentanoic } fish oil

 DHA EPA mother’s milk

 some: canola, walnut

**Linoleic oils** cause inflammation in the body. \*\* **Alpha linolenic oils** need protein in the diet, to make the body produce Delta 4, 5, & 6 desaturase, certain enzymes for lipids, to metabolize them into DHA.(Budwig) **Trans fats** are often found in: margarine, some peanut butter, cookies & chips and partially hydrogenated oils.

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**Phospholipids**

Another category of lipids are Phospholipids. They are in foods and are made in the body. \*They are a combination of lipids and phosphorus, which is a mineral. They are important for **brain function,** help to fill cell membranes to be strong, and if they are substituted for saturated fats, they can **lower cholesterol** levels. The most common phospholipid is \***lecithin**. **Food sources** are: egg whites, soy oil, wheat germ and peanuts. They help to move fats around in the brain and in the body elsewhere. The food industry uses them to emulsify or mix oils and water. (Whitney p 136)

 Supplements have been made into phosphatydil serine, which helps to establish new brain receptors. Other supplements contain phosphatydil choline and acetyl choline that lubricates the nerves and according to some new research and may help to prevent dementia.

**Sterols**

Another category of lipids are Sterols. They are in both plant oils and animal fats. **Cholesterol**  is the most well known and useful sterol, found in meats, eggs, fish, poultry and dairy fat. **Vitamin D,** that works within fats is also a sterol. They are important in **forming** digestive **bile, cholesterol,** and sexual and adrenal **hormones**. (Whitney p 137)

**Cholesterol function** is a liver process. Receptor sites on the liver draw it in from the blood. If there are not enough receptor sites on the liver, or there is too much cholesterol eaten in the diet, it stays in the blood. This results in a high cholesterol test result. The receptor sites are established before birth. Otherwise the liver takes it in and processes it out. If cholesterol joins with calcium, it becomes deposited on the inside of the blood artery walls and narrows the opening. This is called **atherosclerosis**, which decreases blood flow from the heart to the rest of the body.

 **Other sterols** are: Beta Sitosterol, found in shrimp and lobster. \*Because betasitosterol is so similar in structure to cholesterol, it will show up on a blood test as cholesterol. Squalene, is found in shark oil. Brassica sterol, is found in cruciferous vegetables. These last two are being researched as therapies against cancer.

 \*Eating **plant sterols** from legume beans, decreases the absorption of animal sterols and lowers cholesterol. Plant sterols added to margarine may help to lower cholesterol.

**Digestion, Absorption and Transport of Lipids** (Whitney p 139-140) illustrations

Lipids are **Digested** down into smaller particles by Bile from the Liver, Lipase Enzyme from the Pancreas and Lipase Enzyme in the Intestine.

Lipids are **Absorbed** into the bloodstream. Large particles first go through the lymph system. (Whitney p 141)

Lipids are **Transported to** the liver accompanied by proteins. (Whitney p 142)

They are known as: VLDL, **Very Low Density Lipoproteins**

 and LDL(Less healthy) **Low Density Lipoproteins**

 and HDL(Healthy) and **High Density Lipoproteins**

These are all fats or oils that are transported accompanied by proteins. (Whitney p 143)

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**Lipids in the Body**

Fats, Oils and Sterols all **provide** calories for **energy** inside the cells, to motivate internal processes and so we can work and play. \*They provide twice the amount of calories than protein or carbohydrates. (Whitney p 148) Carbohydrates are used first, then Lipids and then protein.

**Functions of Lipids and Essential Fatty Acids**

Generally, our bodies do not make fats, we **must nourish** our body with them. In general, saturated fats can clog our arteries although the Conjugated Linolenic Acid, **CLA** inside them is nurturing to the heart. Think of the juice that comes out of hamburger fat when it is cooked or the juices in beef. Trans Fats act like saturated fats and are not needed.

 Essential Fatty Acid **Deficiencies,** can occur without some Omega 6 oils. This can cause health problems in the same areas where the lipids function to promote health. (Whitney p 146) Without Fatty acids, we have problems in **skin** texture, **brain** and **eye** problems as well as liver, intestinal problems and growth and reproductive problems. Essential fatty acids are very important for many body processes including making our skin soft and hair shiny and forming and maturing sexual hormones. Some solid Fat is necessary inside the body to **support** inner **organs** like the heart, uterus, kidneys and bladder.

Omega 9 oils also nurture the skin and make it soft and our hair shiny.

 Omega 3 oils, because of their DHA quality, nurture the brain, lubricate **joints**, coat and calm **nerves**. \*Omega 3 oil deficiency causes brain and **emotional** problems like difficulty learning, concentrating, \*figuring out what is appropriate in life and depression. \*Omega 3 oils help all brain processing from the preborn to the elderly.

Because omega 3 oils fill up the outer edge of cells, **cell membranes**, they make them strong. There is some research to show that this helps to prevent the spread of cancer cells to other cells.

\*Fats and oils also **transport vitamins** A, D, E and K to body parts that need them. \*Omega 3 and 6 oils, because of their EPA quality, **thin** the **blood t**o reduce clotting.

\*We need some **Omega 6 oils** in small amounts to **lubricate joints**  and **promote growth** of new tissue. In large amounts, Omega 6 oils produce arachidonic acid and cause \***inflammation,** which is a factor in heart attack and cancer and they \*clog skin pores to cause acne.\***Corn oil,** an omega 6 oil, has been implicated in **grow**ing cancerous **tumors**. \* Vegetable oil, as used in some restaurants, is a combination of several omega 6 oils.

 \* Interestingly, some omega 6 oils with an **Alpha linolenic** shape, like **flax seed oil**, if consumed **with protein** in the diet, like cottage cheese or peanut butter, the body will produce delta 4, 5 and then 6 desaturase, **enzymes**. \*This allows the **conversion** of an omega 6 oil into **DHA**, which naturally only comes in omega 3 fish oil and mothers’ milk.(Budwig) So, this is beneficial to vegetarians and those who want to increase their brain power without fish. So, pour off the peanut oil and add some flax seed oil and you have brain power. A commercial example is Smart Balance peanut butter and Eggland’s Best eggs. Flax seeds are fed to the chickens, which join with the protein in the yolk to make “omega 3 eggs!

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**Lipid Metabolism**

In digesting fats, the enzyme **Lipase** and fiber get fats and cholesterol out of the intestines and the body. If the stool is soft, it **communicates** through the blood to the liver that the liver does not need to produce any more **cholesterol** . Then, less cholesterol is produced by the liver. Adequate **fluids**, to soften the stool, also promotes low cholesterol. This would be important if one needs to reduce blood cholesterol.

**Health Effects**

 **Fatty acids** also provide **insulation** to warm the body in cold weather. They also coat nerves to protect and to promote transmission of **nerves to eyes, joints and spine** . **Excessive fats** are **stored** in fat cells and contribute to **obesity.**

High cholesterol or high trans fats often result in increased risk for heart disease.

A 1% decrease in saturated fats in the diet, results in a 2 % decrease in cholesterol and a 2% decrease in heart disease risk. \*Most people benefit from using monounsaturated **olive oil** to decrease the effects of saturated fats. \*Sources of Omega 3 oils are **fish**, especially tuna and salmon.

**Recommended Intakes of Lipids**

Fats provide more than twice the energy of carbohydrates or protein. This is why, when you are figuring out your diet analysis, you will **multiply fat grams by 9** to equal the calories for a product or food that you are eating. **One tablespoon** of oil =**14 grams**

14 grams times 9 = **126 calories**. Labels may estimate 120 calories per tablespoon of oil.

**Benefits**

Fats provide more than twice the **energy or calories** of carbohydrates or protein.

Extra fat, carbohydrates and protein that are eaten – those not used for energy by work or exercise – will also be **stored** as fat.

**Personal Daily Values**

On **labels**, You can see that the recommended daily amount of lipids for a 2000 calorie diet is 65 grams from foods and supplements. And the average sized adult should take in 20 - 30% of calories.

20 % of calories would be 400 calories from lipids (divided by 9) or 44 grams of lipids per day

To calculate your own personal daily values for lipids, see the chart on page 159 of the textbook according to other recommended daily calorie amounts in the How To section of Chapter 5. (Whitney p 155)

SCF HUN # 2201 Nutrition Class 3 Highlights (2)

**Healthier choices**  – **olive oil**  & **fish oil**. Fish oils also have Trace minerals from the ocean like selenium and iodine. You might want to try **Low fat dairy**. **Flax oil**  should be eaten **with protein**. It will then be able to help brain processing, similar to fish oil.

Cut off visible meat fats. Choose **lean** cuts of **beef** like top round or lean steak. Choose **poultry** more often as it has less saturated fat than beef. Choose **low fat cheese**s including mozzarella which is naturally lower in fat than other cheeses. Consider using **soy cheese** slices. Choose low fat milk for coffee instead of ½ and ½ . As the cholesterol is in the egg yolk, choose **egg whites** some times. In recipes, for one egg yolk, **substitute**  2 egg whites. Use olive oil instead of melted butter. **Nuts** and **nut oils**, such as almond or walnut are also better choices. Walnut oil has some omega 3 possibilities. Remember that most candy contains significant saturated or trans fats. Artificial fat replacers like olestra are chemicals that need to be processed through the liver. The traditional **Mediterranean diet**  of fish, olive oil and many vegetables and wine only with meals is known to significantly lower risk for heart disease.(Whitney 162) Wine moves fats along in blood vessels toward the liver. The antioxidants in red wine keep fats and oils fresh and flowing. See the textbook(Whitney 152) for other suggestions to increase heart health. Choose less Saturated fats and less Hydrogenated foods. See [www.omegacookie.com](http://www.omegacookie.com) for information about cookies made with omega-3 oil in Venice, FL. See the Make Heart Healthy Choices by Food Group table in the textbook. (Whitney 152)

**Lipid Cautions**

**Low omega 6 oils. \***Very little Corn oil should be consumed. It is used in animal cancer experiments to grow tumors. High amounts of lipids is becoming known to increase the risk of prostate cancer. (Blasky)

**Steam meats and fish** to prevent the excessive heat of the oils from meats to become cancer causing chemicals. If you do grill or barbeque, turn the heat down and cook meats slowly and not burned. Fish should be quickly steamed or lightly broiled. Baking fish makes the oil come out into the pan.

**Wild salmon** vs farm raised – Farm raised salmon and other fish are fed oils that are sometimes polluted with PCB’s that contain chlorine and that are estrogenic and growth promoting. They contribute to making people overweight and increase cancer. Genetically engineered, to grow larger faster, salmon ??

Shrimp and lobster – have **beta-sitosterol**  – that is close, biochemically, to cholesterol although will show up as cholesterol on blood tests.

**Milk fat** – is **necessary** for **pregnant and nursing mothers** and **children between one and two** years of age. Other people should gradually decrease to low-fat and skim dairy.

Fat is more nutrient dense than sugar. Balance the amount of fats in the diet with anti-oxidant fruits and vegetables for adequate oxygen and to prevent the oxidation of lipids.

 A note about **overheating** (boiled or frying in) oils Excessive heat **changes** the oils chemically and they are then known to be toxic. Fats that are **burned**  produce aromatic hydrocarbons, which are chemicals that are toxic and carcinogenic. Cut off burned fats. Ask for “lightly grilled” foods. Try not to eat any burned foods. **No burned food.**

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**Proteins, Amino Acids**

 **Vegetarian Diets**

The **Chemistry View of Proteins**

**Proteins** and their Amino Acids, like carbohydrates and lipids, have hydrogen, oxygen and carbon in their structure, but they also have \***Nitrogen.** Nitrogen promotes new growth. (Whitney 168) Nitrogen is #7 on the Table of Elements, which are listed in Appendix B page2 of the textbook.

**Amino Acids** Protein in foods is broken down into amino acids by digestion. This is a liver process. Then the amino acids are used to form new tissue, usually muscle or skin. This is a **catabolic**  or break-down process from the protein foods and then an **anabolic** or building-up process to make new tissue. The whole process is called **protein turnover**. (Whitney 178)

 There are nine **essential amino acids** that we need to get from our foods. The table on (Whitney page168) of the textbook lists these. The body makes the other eleven amino acids by combining some of the essential ones.Each amino acid has it’s own **unique structure** and function or work to do. Sometimes two amino acids join to form a new dipeptide. Some dipeptides join together in long chains to form 3 D arrangements to make it strong enough to hold on to iron. (Whitney 169)

To be digested, those tight protein structures need to break apart or break down. This is called **denaturation.** This happens when heat, agitation, or chemicals interact with proteins and they break down. This is something like the changes we see when we mix eggs, cook meat or eggs or marinate meat. (Whitney 170)

 During **protein synthesis** the body rearranges the amino acids and creates new tissue.We have many large and small muscles inside the body. Some can be seen on the outside of the body. Muscles hold on to nutrients longer than fat tissue. When the body is growing, repairing or replacing tissue, protein and amino acids are involved & needed.(Whitney 175)

**Digestion & Absorption** of Proteins,

Proteins need saliva in mouth **enzymes** and **stomach acids** to dissolve them and intestinal acids to process them. So the body produces them. Stimulate you own digestive juices, by anticipating the food to come, before the meal and the body will have less need to produce acid later. Decrease these acid producing foods with some vegetables which are alkaline for balance.

**DNA**

Amino acids are used in the process of DNA being made and also being absorbed into various tissues in the body. Amino acids are arranged in a specific sequence for this process. There is a diagram on page 200 showing some of this process. Messenger RNA is a part of the process in transporting amino acids to form DNA. RNA is also being added to baby formula to try to form new brain cells to form the chemical DHA to make smarter babies.

**Sickle cell anemia** is a genetic tendency that has an altered arrangement of amino acids. It creates an altered shape to blood cells. That results in difficulty holding on to iron. People with this illness have trouble breathingand dehydrate easily. Nutritional answers are unknown although it may be a vitamin and or this mineral deficiency. (Whitney 174-175)

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**Other functions of amino acids** (Whitney 178)

Cells can use amino acids to make other things, like **neurotransmitters** in the brain. \*These help to form our emotions. For example, a protein food like turkey, initially gives us the amino acid Tryptophan. This helps to form the neurotransmitter **Serotonin,** which helps us relax. At Thanksgiving, when we also eat many carbohydrates, together they promote sleep. Secondarily, turkey gives us the amino acid **Tyrosine.** This helps us to form the neurotransmitter **Dopamine**, which helps us want to achieve. Tyrosine also helps to make **Thyroxin,** the thyroid stimulating hormoneand some people believe tyrosine helps to form **Testosterone.**

 **Roles of Protein: \***Protein builds muscle, bone, collagen in blood vessels and cartilage in joints. (Whitney 180) It also is part of regulating fluids, and in maintaining acid/base balance, in forming antibodies in our immune system and moving many of our internal processes.

**Protein Quality**

**Food sources** of \*complete protein are meats, poultry, fish, milk, dairy, cheese.

**Plant sources** of protein, legume beans and nuts, generally have less protein quality than animal sources. **Legume beans** and **nuts** are wonderful for certain reasons, although they lack certain amino acids to make muscle. \*Legumes lack the amino acids methionine, tryptophan and nuts lack lysine. These are essential amino acids to be obtained from other foods. (Whitney 181)

Methionine is important for joint health, heart health, and uplifting mood. Lysine is important in preventing and controlling herpes virus outbreaks.

\*Grains have the opposite strengths, making them the perfect match for legumes and nuts. They complement each other. (Whitney 182)

Food sources of legume beans are kidney beans, chick peas, green peas, black eyed peas, lima beans, black and white beans, navy beans and lentils. \*All need to be eaten **with grains** to complete the muscle building process. Thus, when you eat a vegetarian chili, add corn or a whole wheat fajita for a complete protein. \*Nuts and butters plus grains for example on bread equals a more complete protein.

**Health Effects of protein**

A major problem in other countries of the world is **Inadequate protein** in their diet. **Nitrogen balance** is sufficient intake of protein to make the muscles needed that a person’s activity level requires. This is \***Positive nitrogen.** (Whitney 182)

**Marasmus –** is when a person is so thin that the ribs show

**Kwashiorkor**  is malnourishment due to inadequate calories when the stomach is very enlarged, Lack of growth or failure to thrive in infants is referred to as negative nitrogen. These are all \***Negative nitrogen.**

 **Adequate protein** is important in the \*growth of new tissue especially for babies and young children. Adults after 18 years old, or when one stops growing, people still need\* adequate protein to repair injured or damaged tissue. We do not need a lot of protein but we do need some each day. Consuming \*excess saturated fats along with the protein, will clog the arteries and veins and increase the risk of heart disease. \*High intake of meats has been implicated in increased risk of colon cancer. (Whitney p 183)

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**Recommended Intakes**

**The RDA for protein**  is the average female is 50 grams per day for a 2000 calorie diet. . For an adult male with a 2500 calorie diet, it would be 65 grams. These two different calorie categories are on some labels. As stated on page Y in the back of the textbook, the **RDV**of the US government, for the average adult to keep healthy, is now se at 50 grams per day or 10% of the calories. More or 20% might be appropriate for athletes or people needing to repair tissue. the recommended amounts are sometimes a range of 10 to 35 % (Whitney p 20) People with kidney disease or decreased kidney function should take in the lower protein percentage of calories and they should be from vegetable sources. (Whitney p 184)

 \* The How To section on page 193 explains a short cut to determine grams of protein per day. Divide your weight in pounds by 2.2 to calculate weight in kilograms. Then multiply your weight in kilograms by 0.8 to get the grams of protein per day for the average person. For active teens 14-18 years of age multiply by 0.85. For Athletes, multiply by 1.2 to 1.7 depending on level of activity.

 To balance nutrients in the diet, people should have some protein at each meal. That way, you will be less hungry before the next meal. Most people in the US like to eat most of their protein at the supper or evening meal. People in other countries often eat most of their protein at the noon meal.
 **Vitamin Interactions** Increased protein in the diet, increases the need to have **vitamin B6** in it’s active form. This vitamin is necessary for the body to metabolize protein. Insecticides decrease this vitamin in the insect. Parkinson’s disease patients may have a deficiency of this vitamin or be unable to metabolize the active form.

\*Increased protein also increases the need for **Vitamin A.** Vitamin A is added to low fat and skim milk because the lack of fats increases the amount of protein in the milk.

**Supplements of amino acids** Usually, these are taken to build muscle. They can be a help if there is a \*need to repair injured tissue. They should have all or most of the essential amino acids.(Whitney 186-187) There should also be adequate vitamins B6 and Vitamin A in the product or the diet. However, taken too long or too often, they will \*stress the kidneys, which would have difficulty excreting protein, or the \*nitrogen in the amino acids, into the urine. A therapeutic amount of amino acids or whey protein could be taken for about Three months, then a period of rest. Not continuously. They should be used with the above cautions.

**Vegetarian Diets** Highlight after Chapter 2

**Vegetarian diets,** especially **vegan diets,** that is not eating any animal or animal based foods, may have difficulty obtaining enough protein. If a person will eat dairy products it is called being a **Lacto vegetarian** . It the person will eat eggs, it is called being an **Ovo vegetarian.** A vegetarian diet is known to \*decrease risk of heart disease and cancer. Sometimes, a vegetarian diet does not include adequate protein. Unless one eats dairy or a lot of legume beans, one can be **underweight**. Sometimes people substitute for the animal foods by eating many sugary foods or pasta and rice that can create obesity and health problems.

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Vegetarian diets - continued

Without adequate animal protein intake, a person can go without **Vitamin B12** for about 4 years before deficiencies start. Animal protein foods also contain the highest amount of iron. Without adequate iron, as the blood is passing through the lungs, it is unable to pick up oxygen to produce strong amounts of **hemoglobin** in the blood cells. The person then may have trouble breathing, a symptom of iron deficiency and may become **Anemic.**

To help absorb more iron from vegetable protein, one can consume some \*acid with that meal. Suggestions are for \*tomato products, \*orange juice or another \*vitamin C food or supplement. A vegetarian diet that includes some dairy would provide some vitamin B12 and some protein. \*Fish or walnuts, almonds or flaxseed plus grains in the diet would provide some **Omega 3 oil,** which is also often lacking in a vegetarian diet.

 Table H2-1 (Whitney p 64) gives information about types of vegetable protein for several calorie levels. Table H2-2 (Whitney p65) gives information about good food sources of all the nutrients needed during a vegan or possibly a type of vegetarian diet.

**Challenges**

**AIDS** This virus spreads faster in malnourished people with poor muscle development. Protein in the diet, complemented by vitamin A, would help build the muscle. \*Fish oil helps if there is wasting, unintentional weight loss. However, this is a very strong virus and most people have difficulty counteracting this virus if they are exposed to it. Hopefully, we will continue to have more research for Nutrition and AIDS. Vegetable sources of protein plus grains can help to\* build muscle that is known to help patients resist the virus. \*Antibacterial herbs can also help patients resist the bacteria that occur as a result of a lowered immune system. Some patients retain fluids from the medicines and may need to reduce sodium.

**Other Challenges** Many of the food sources of protein also contain saturated fats and estrogenic chemicals used in the animals’ feed. Maverick Ranch and Greenwise beef and naturally raised poultry are available in some supermarkets. In the past cattle were given feed that contained bone from sheep to strengthen their leg bones to hold them up from the extra weight from the hormones. When the sheep were sick it produced mad cow disease in the cows. It is no longer allowed in the US to allow animal feed to contain other animal parts. Very high animal protein with saturated fats contributes to heart disease and cancer. Naturally raised meats and poultry are more expensive. High phosphorus in meats, excretes calcium from the body.

**Protein Bars**

Look at the labels of bars that you or others buy. If there is soy as an ingredient, is there also a grain? Or, is there **whey protein?** This is from dairy and would be a complete protein. Is there a lot of sugar? Is there a lot of fat? Good taste?

Sugar is a tumor promoter and joined with soy, a mild estrogen promoter that goes to the sexual receptor sites, may cause cancer problems at those areas. So, decrease soy and sugar together, especially in a liquid, which also has only a small amount of fiber which increases absorption.

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Prepare for Test 1 Review Classes 1-3 in ANGEL and textbook Chapters 1-6

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