

Name: _____

Date: _____

Proteins

Proteins are the fundamental building blocks of the human body. They are essential for tissue building and repair, synthesis of enzymes and hormones, as well as being critical to our immunity response. Protein is a limited source of energy supply, except under extreme conditions.

Structure

Proteins are made of combinations of 20 amino acids. There are nine "essential amino acids" that must be supplied through food intake, and eleven "non-essential" amino acids which can be synthesized by the body.

Protein Needs

The RDA (recommended daily allowance) for adults is .8 - 1.0 grams of protein /kg of body weight per day. This value should represent 15% of the daily caloric intake. Although there are individual differences in protein metabolism the RDA value does try and take this into consideration. As a general guideline, athletes and individuals training for muscle hypertrophy will increase overall caloric intake producing a corresponding increase in protein intake as well.

Protein Suggestions for General and Special Populations

Total calories 10 - 15% of daily intake

RDA = .8 grams/kg/day

Vegetarians need to ensure that all essential amino acids needs are being met through food combination. Vitamin B₁₂ shortage is very common.

Athletes may have higher protein needs and most research supports between 1.2 - 1.7 grams/kg/day, with endurance athletes at the lower end of the scale, and resistance athletes at the higher end of the scale.

In situations where pre-exercise muscle glycogen content is low protein metabolism for energy production will be more significant and loss of lean body mass may increase.

Amino Acid Supplementation

Ingestion of large amounts of amino acids or protein in supplement form is a much disputed topic by researchers and fitness professionals. An individual with extremely high daily protein requirements may not be able to "eat enough" to fill the need, but supplementation should not be necessary if daily caloric intake is adequate. There are some risks of dehydration, kidney and liver stress, increase calcium loss and imbalance of amino acids (if isolated amino acid supplements are ingested). An active individual who increases calorie intake and keeps protein percentage constant (i.e. 15% of daily calories) will automatically increase the amount of protein ingested and should not require amino acid supplementation under most conditions.

PROTEIN

- **Role of protein in sports performance:**
 - Helps to build, maintain, and repair muscle tissue.
 - Provides a minimal source of energy during intense exercise or during starvation.
 - Keep in mind, building muscle tissue also requires strength training and adequate calorie intake.
- **Protein requirements are as follows:**
 - Endurance athletes: 0.55 to 0.6 grams per pound body weight
 - Strength athletes: 0.6 to 0.8 grams per pound body weight
 - *PRO Intake > 0.9 grams per pound is not beneficial and could be harmful*

| Weight (lb) | PRO (g) | Weight (lb) | PRO (g) | Weight (lb) | PRO (g) |
|-------------|---------|-------------|---------|-------------|---------|
| 100 | 68 | 155 | 105 | 220 | 165 |
| 105 | 71 | 160 | 109 | 230 | 173 |
| 110 | 75 | 165 | 112 | 240 | 180 |
| 115 | 78 | 170 | 116 | 250 | 188 |
| 120 | 82 | 175 | 119 | 260 | 195 |
| 125 | 85 | 180 | 123 | 270 | 203 |
| 130 | 89 | 185 | 126 | 280 | 210 |
| 135 | 92 | 190 | 129 | 290 | 218 |
| 140 | 95 | 195 | 134 | 300 | 225 |
| 145 | 100 | 200 | 150 | 310 | 233 |
| 150 | 102 | 210 | 158 | 320 | 240 |

- Best sources of protein include lean beef, chicken and turkey, fish, peanut butter, beans, or tofu. Examples of protein sources:

| <u>Food</u> | <u>Cal</u> | <u>Pro (g)</u> | <u>Food</u> | <u>Cal</u> | <u>Pro (g)</u> |
|--------------------------------------|------------|----------------|-----------------------------------|------------|----------------|
| Meat* | | | Yogurt, flavored | 200 | 10 |
| Hot dog | 180 | 6 | Cheese stick, 1 oz | 80 | 7 |
| Lunchmeat, 3 oz | 90 | 15 | Cottage cheese, 1/2 cup | 100 | 15 |
| Ham, 3 oz | 150 | 18 | Cream cheese, 2 Tbsp (non-fat) | 30 | 5 |
| Steak (sirloin), 3 oz | 200 | 25 | Egg (1) | 75 | 6 |
| Hamburger, 4 oz | 300 | 30 | Egg white (1) | 15 | 3 |
| Chicken breast, 3 oz | 150 | 25 | Egg substitute, 1/4 cup | 30 | 6 |
| Turkey breast, 3 oz | 150 | 25 | Skim milk, 1 cup | 85 | 8 |
| Salmon, 3 oz | 100 | 17 | Whole milk, 1 cup | 150 | 8 |
| Tuna, 3 oz (1/2 can) | 100 | 21 | Legumes | | |
| Dairy | | | Refried beans, 1/2 cup | 100 | 7 |
| Cheddar cheese, 1 oz | 114 | 7 | Peanut butter, 2 Tbsp | 190 | 8 |
| Cheddar cheese, 1/4 cup (non-fat) | 45 | 10 | Peanuts, 1 oz | 150 | 7 |
| Mozzarella cheese, 1 oz | 90 | 6 | Tofu (firm) 4 oz | 150 | 20 |
| Parmesan cheese, 2 Tbsp | 50 | 4 | | | |

* 3oz meat is about the size of a deck of cards

Too much protein can result in:

- Inadequate muscle fuel
- Dehydration
- Increased fat storage
- Calcium loss in the urine
- Increased muscle strength comes from training, *not* high protein intake

Too little protein can result in:

- Feelings of fatigue
- Increased susceptibility to colds and flu
- Increased risk of iron deficiency anemia
- Protein requirements should be increased when caloric intake is reduced or activity levels are drastically increased

Fats

Fats have a bad reputation due to their link to increasing obesity, cancer and heart disease. They are, however, a necessary nutrient for optimal health and performance. They are a source of vitamins A, D, E and K, in addition to being key in energy production, hormone synthesis and the maintenance of healthy cell membranes.

Saturated Fats

The fat (lipid) molecule is saturated with hydrogen i.e. all bonds within the fat molecule are single bonds. It is this variety that is linked to the health issues. Typically animal products (dairy, meat, eggs) and some vegetable oils (coconut and palm) are high in saturated fat. No more than 10% of daily fat intake should be saturated.

Unsaturated: Monounsaturated or Polyunsaturated

Unsaturated fats have 1 or more double bonds between the carbon molecules. This variety is considered "healthy" and should form the bulk of fats ingested each day.

Monounsaturated

Monounsaturated fats are found in vegetable sources (olive oil and peanut oil).

Polyunsaturated

Polyunsaturated fats are primarily from vegetable sources (i.e.: soybeans, sunflower, corn, and cold water fish such as tuna and salmon). This includes the often-talked about EFAs (essential fatty acids)

Transfatty Acids (hydrogenated fats)

In the push to leave saturated fats behind, many individuals are switching to foods (e.g. margarine) with "hydrogenated fats". Unfortunately these modified fats are also linked to increasing cholesterol levels in the blood.

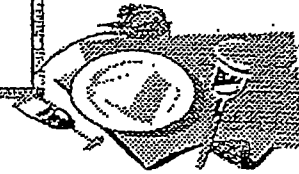
Guidelines for Fat Intake

The established recommended daily fat intake of no more than 30% of daily caloric intake (and no more than 10% from saturated fats) is being challenged by some nutritionists who suggest fat ingestion at 20 - 25% of daily caloric intake would be adequate to meet nutritional needs.

Dietary Suggestions

- substitute high-fat foods with lean meats, fish, chicken and low fat dairy products
- reduce the amounts of deep-fried foods, shellfish, high-fat dressings, etc
- use unsaturated oils and limit trans-fats
- include foods high in EFAs (essential fatty acids)

IS YOUR DIET FIT TO EAT???



| NUTRIENT | CARBOHYDRATE | PROTEIN | FAT |
|--------------------------|--|--|---|
| % OF DAILY INTAKE | 58% (55-70%) ⇒ 48% COMPLEX ⇒ 10% SIMPLE | 12% (10-15%) * DO NOT EXCEED 20 % | 30% (20-30 %) ⇒ 20% UNSATURATED ⇒ 10% SATURATED |
| CALS./GM. | 4 CALS./GM. | 4 CALS./GM. | 9 CALS./GM. |
| FUNCTIONS | <ul style="list-style-type: none"> ◆ PROVIDE BODY WITH IMMEDIATE ENERGY ◆ PREFERRED SOURCE OF ENERGY DURING INTENSE-EXERCISE ◆ MAJOR SOURCE OF B VITAMINS & FIBRE ◆ MINOR SOURCE OF IRON | <ul style="list-style-type: none"> ◆ GROWTH, REPAIR & MAINTENANCE OF BODY TISSUE (MUSCLE, SKIN, HAIR) ◆ ONLY USED AS ENERGY SOURCE DURING STARVATION | <ul style="list-style-type: none"> ◆ CONCENTRATED SOURCE OF ENERGY ◆ PREFERRED SOURCE OF ENERGY AT REST & LOW INTENSITY EXERCISE ◆ ONLY SOURCE OF FATTY ACIDS ◆ GROWTH ◆ INSULATION ◆ PROTECTION OF INTERNAL ORGANS ◆ ABSORPTION & TRANSPORT OF FAT SOLUBLE VITAMINS |
| DIETARY SOURCES | <ul style="list-style-type: none"> ◆ FRUITS / VEGGIES ◆ GRAINS / RICE / PASTA/ BREADS ◆ BEANS / LEGUMES | <ul style="list-style-type: none"> ◆ MEATS / FISH / EGGS / POULTRY / DAIRY ⇒ "COMPLETE PROTEIN" ◆ BEANS / LEGUMES / NUTS / VEGGIES ⇒ "INCOMPLETE PRO." | <ul style="list-style-type: none"> ◆ OILS / BUTTER / MARGARINE ◆ FISH OILS ◆ NUTS ◆ DAIRY PRODUCTS ◆ AVOCADOS |

EFFECTS OF DIFFERENT FATS ON CHOLESTEROL

| TYPES OF FATS | TYPES OF CHOLESTEROL | |
|--|--|--|
| | LDL "Bad Cholesterol" keeps cholesterol circulating>> Arterial Plaque | HDL "Good Cholesterol" transports LDL to the liver for excretion >> No Plaque |
| SATURATED solid at room temperature | INCREASES | NO CHANGE |
| POLYUNSATURATED liquid at room temperature | DECREASES | DECREASES |
| MONOUNSATURATED liquid at room temperature | DECREASES | NO CHANGE |