HOLISTIC HEALTH AND FITNESS
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PREVENT - PREPARE - EDUCATE
ARMY NATIONAL GUARD

NUTRITION BASICS GUIDE

Nutrition Study: Basics

- Basics of nutrition

Nutrition: The process by which a living organism assimilates food and uses it for growth and repair of tissues. A proper nutrition can help enhance athletic performance, an active lifestyle and exercise routine. A solid fitness plan along with eating clean, is the best way to stay healthy and achieve your goals.

Eating a proper diet will help provide the energy you need to finish a race, or enjoy a casual sport or activity. You are more likely to be tired and perform poorly during sporting activities when you do not get enough; Carbohydrates, Fats, Proteins, Vitamins and Water.

Macro and Micronutrients

Macros:
- Fats
- Carbohydrates
- Proteins

Micros:
* Vitamins and other Minerals

Nutrition Study: Macronutrients

Macronutrients make up most of a person's diet and provide energy, as well as essential nutrient intake. Macronutrients include carbohydrates, proteins, and fats. However, too many macronutrients without associated physical activity cause excess caloric intake which can lead to things like obesity, cardiovascular disease, diabetes, kidney disease, and other chronic illnesses. Conversely, too few macronutrients contribute to nutrient deficiencies and malnourishment.

Carbohydrates: are sugars and starches and are an important energy source. Each gram of carbohydrates provides four calories. Carbohydrates break down into glucose and raise blood sugar levels. Diabetics should limit carbohydrate intake to maintain blood sugar levels in a healthy range.

Proteins: are peptides and amino acids that provide four calories per gram. Proteins are necessary for tissue repair and function, growth, energy, fluid balance, clotting, and the production of white blood cells.

Fats: consist of fatty acids and glycerol and are essential for tissue growth, insulation, energy, energy storage, and hormone production. Each gram of fat provides nine calories. While some fat intake is necessary for energy and the absorption of fat-soluble vitamins, excess fat intake contributes to heart disease and obesity. Due to its high-calorie content, a little fat goes a long way.

Nutrition Study: Micronutrients

The prime benefit of a balanced amount of micronutrients in the body is to effectively support functions within.

Micronutrients: Types and Functions
As micronutrients, vitamins and minerals are broadly classified into four categories that include - water soluble vitamins, fat soluble vitamins, macrominerals, and trace minerals. All of these are absorbed by the body in similar ways and tend to interact amidst the digestion processes.

Water-soluble vitamins: Water-soluble vitamins are known to dissolve easily, and do not remain stored in the body if consumed in excess, as they get flushed out through urination. They include - vitamin C, vitamin B complex: (B1), (B2), (B3), (B5), (B6), (B7), (B9),(B12), and vitamin A (in its Beta-Carotene form). While each of them has an individual part to play, their functions are all interrelated.

1.Fat-soluble vitamins: Conversely, fat-soluble vitamins do not dissolve in water and are known to get absorbed when consumed along with a source of fat, after which they are stored in one's liver and fatty tissues, to contribute to functions in the future.
2.Microminerals: With respect to essential minerals, micro minerals are required in huge amounts in order to perform their respective roles in the body. They include - calcium, phosphorus, magnesium, sodium, potassium, chloride and sulphur.
3.Trace minerals: Trace minerals, on the other hand, include - iron, manganese, copper, iodine, zinc, cobalt, fluoride and selenium, and are required in small amounts to efficiently perform functions in the body.

Nutrition Study: Fats

Fats are classified as saturated, unsaturated, and trans fatty acids. Saturated fats come from animal products, such as butter and red meat (e.g., steak). Saturated fats are solid at room temperature. Recommended intake of saturated fats is less than 10% of daily calories because saturated fat raises cholesterol and contributes to heart disease.

Unsaturated fats come from oils and plants, although chicken and fish also contain some unsaturated fats. Unsaturated fats are healthier than saturated fats. Examples of unsaturated fats include olive oil, canola oil, avocados, almonds, and pumpkin seeds. Fats containing omega-3 fatty acids are considered polyunsaturated fats and help lower cholesterol levels. Fish and other seafood are excellent sources of omega-3 fatty acids

Trans fats are fats that have been altered through a hydrogenation process, so they are not in their natural state. During the hydrogenation process, fat is changed to make it harder at room temperature and have a longer shelf life. Trans fats are found in processed foods, such as chips, crackers, and cookies, as well as in some margarines and salad dressings. Minimal trans-fat intake is recommended because it increases cholesterol and contributes to heart disease.

Nutrition Study: Carbohydrates (sugars and starches)

What are carbohydrates, and what roll do they play in my nutrition? To put it simply, a carbohydrate is a macronutrient that serves as the body's preferred source of energy. One gram of carbohydrate provides approximately 4 calories of energy. The simplest forms of carbs are known as monosaccharides which include glucose, galactose, and fructose. Glucose is a structural component of most carbohydrates and is the only form of carbohydrate the body can use as a fuel source. Therefore, all carbohydrates must be converted into glucose in order to produce ATP via anaerobic or aerobic glycolysis. Any glucose not immediately used is stored in the skeletal muscle and liver in the form of glycogen. If carbohydrates are ingested at a level grater, then the body can utilize, it is stored in the form of glycogen. The excess will then be converted to fatty acids and stored in adipose (fat) tissue.

The basic concept of thermodynamics is that energy can neither be created nor destroyed, but it can be changed from one form to another. The carbs you take in are converted to useable fuel stored in your muscles and liver. Any unused carbs (glycogen) is stored as fat. Carbohydrates are also important as an energy source to digest more difficult nutrients in our body such as proteins, which are used to rebuild muscle.

Nutrition Study: Fruits and Vegetables

A diet rich in vegetables and fruits can lower blood pressure, reduce the risk of heart disease and stroke, prevent some types of cancer, lower risk of eye and digestive problems, and have a positive effect upon blood sugar, which can help keep appetite in check. Eating non-starchy vegetables and fruits like apples, pears, and green leafy vegetables may even promote weight loss. Their low glycemic loads prevent blood sugar spikes that can increase hunger.

Vitamins and minerals in fruit and vegetables
Fruits and vegetables contain many vitamins and minerals that are good for your health. Many of these are antioxidants, and may reduce the risk of many diseases:

- vitamin A (beta-carotene)
- vitamin C
- vitamin E
- magnesium
- zinc
- phosphorous
- folic acid.

Nutrition Study: Fruits and Vegetables

Folic acid may reduce blood levels of homocysteine, a substance that may be a risk factor for coronary heart disease.
Research has shown that consuming these nutrients as food, within fruits and vegetables, is more beneficial for health than consuming them as supplements.

Fruit and vegetables for good health

Fruits and vegetables are low in fat, salt and sugar. They are a good source of dietary fibre, which can make you feel fuller for longer and prevent overconsumption of food. As part of a well-balanced, healthy diet and an active lifestyle, a high intake of fruit and vegetables can help you to:

- reduce obesity and maintain a healthy weight
- lower your cholesterol
- lower your blood pressure.

Nutrition Study: Proteins

This is probably going to be one of the most important sections on nutrition. Read in full.

Proteins are biopolymeric structures composed of amino acids, participating in nearly all cellular activities.

There are 7 different types of proteins in the human body: antibodies, contractile proteins, enzymes, hormonal proteins, structural proteins, storage proteins, and transport proteins.

Is a vital part of the human diet and is present in various foods like eggs, meats, dairy, seafood, legumes, nuts and seeds. Regardless of the source of the protein consumed, it gets broken down and reformed into new proteins in our bodies.
Most animal proteins are referred to as complete proteins as they contain all 9 essential amino acids. Whereas most plant proteins are considered to be incomplete proteins as they are missing at least 1 of the essential amino acids. Soy products, Quinoa, and the seed of a leafy green called Amaranth are a few of the plant-based proteins that contain all 9 essential amino acids.
Human beings aren't able to store proteins for the most part. The human body can break down Its own muscle tissues to get certain amino acids, "or the building blocks of protein," but has no specialized cells to store protein efficiently like fats and carbohydrates do. For this reason, eating protein on a regular basis is paramount to dietary success.

Nutrition Study: Proteins Continued

- The amount of protein we require changes through out our lifetime. Elderly people will require more protein than younger individuals will.

- Protein rich foods tend to make people feel fuller longer as compared to fats or carbs. Proteins do this by increasing thermogenesis and through the direct effect of is associated amino acids on the brain.

So, in short, protein is often under utilized, and misunderstood nutrient that is important to the over all cellular development, repair, and function of the human body. Chances are that most people reading this are unaware of the amount of protein that they have consumed today. Or even fewer still, the amount of protein that you are supposed to consume on an average day.

According to the National Academy of Sports Medicine, "Recommended protein intake for endurance exercise ranges from of 1.0 g/kg to 1.6 g/kg per pound of lean body mass per day. This depends on the intensity, and duration of the endurance exercise, as well as the training status of the individual. (i.e. whether they are in a building, performance or recovery phase of a training cycle.) Recommendations for strength/power exercise typically range from 1.6 to 2.0 g/kg/day. For athletes involved in exercise activities that are intermittent in nature (e.g., soccer, basketball etc.) the recommended protein intake is 1.4–1.7 g/kg."

Nutrition Study: Proteins Continued

The amount of protein includes many factors like age, sex, body weight, health status, activity level, frequency and types of workouts. But with out seeing a Registered Dietitian, it is difficult to come up with those exact numbers. So, to get a general idea, try one of these methods:

Steps to Calculate Protein Needs:

•1. Calculated your weight in kilograms: body weight in pounds x .45 = body weight in kilograms

•2. Multiply weight in kilograms by either (0.8 to 1.0 on days of rest, *or* 1.0 to 1.6 on days of intense physical exertion). The result is the grams of protein you should consume per day.

OR

If you happen to know your BMI (Body Mass Index), this number will give you your Lean Body Mass number. At that point you simply multiply by grams of protein needed for that day of activity level.

Example: Ben weighs 200lbs. He maintains a steady 20% BMI. His lean body mass is 160 lbs. Meaning he needs to consume 160 grams to 240 grams of protein on days of high activity, and 128 grams to 160 grams of protein on days of rest.

Formula: Body Weight (BW) X (BMI% to decimal. {20% = .20}) So, BW x (.BMI) = pounds of fat.
BW – Fat = Lean Body Mass. Finally, LBM x (protein) = Daily Protein Consumption.

Nutrition Study: Proteins Continued

Now that we know how much, we need to know how to consume that nutritionally. There are guides all over the internet about what food have what amount of protein.

First, what are the sources we can get protein from?

- Meat Proteins: are from sources like salmon, turkey, pork, lamb, steak and chicken etc. are nutrient packed and are a complete protein. Depending on the source they also contain an assortment of micronutrients.
- Whey Protein: A fast-absorbing milk-based protein that boosts muscle growth and recovery.
- Casein Protein: Found in milk that gradually builds muscle mass and aids fat loss.
- Egg Protein: provides all 9 essential amino acids.
- Pea protein: high fiber protein made from yellow split peas that promotes fullness.
- Brown Rice Protein: A protein made from brown rice that benefits body composition.
- Mixed Plant Proteins: Plant-based proteins blended to increase positive effects on muscle health.
- *Hemp Protein*: A plant-based protein rich in healthy fats and several amino acids. (*Take note however that if you are still under the employ of the military, this particular option is off limits!*)

Given all of these sources it is difficult, at best, to consume the daily required amount of protein with out the assistance of supplementation. Something to be aware of however is that the human body only absorbs 30-50 grams of protein at a time. Knowing this will help you to meal plan more appropriately.

Nutrition Study: Proteins Continued

BCAAs refer to three essential amino acids: leucine, isoleucine, and valine. They are different from other essential amino acids since they possess a branched side chain and play a large role in the regulation of muscle mass. They are present in high amounts in muscle tissue in comparison to other essential amino acids. BCAAs cannot be synthesized in the body, so they are important to ingest daily. Daily protein sources, such as eggs and meat, typically provide an adequate amount.

BCAA's have 4 major benefits:

1) Increase muscle growth, stimulates muscle protein synthesis
2) Decrease muscle soreness, which may help reduce the length and severity of delayed onset muscle soreness or DOMS.
3) Reduce exercise fatigue. When you exercise your body produces tryptophan. Your brain then turns this into serotonin which contributes to fatigue during exercise. BCAA's reduce this reaction.
4) Prevent muscle wasting. Muscle wasting is a sign of malnutrition. Muscle proteins are constantly broken down and rebuilt. The balance between muscle protein breakdown and synthesis determines the amount of protein in muscle. BCAAs account for 35% of the essential amino acids found in muscle proteins. They account for 40% to 45% of the total amino acids required by your body.

Nutrition Study: Proteins Continued

There are some cons to BCAA's as well.

- Depletes B-vitamins.
- May lower Serotonin and cause mood disorders.
- May cause sleep disturbances because of the low serotonin.
- May have a negative effect on blood sugar metabolism.
- May hamper other protein metabolism.
- They are expensive.
- They are not suitable for pregnant or lactating mothers.

Having said that, supplements like this should only be considered for minimal use during high amounts of exercise stress. It is highly recommended use is only under the guidance of a physician or nutritionist consultation.

The last point to be made about protein supplementation, do not use mass gainers!!! It is advertised as a way to help get people who are "Hard Gainers" to make progress. The truth is that you will gain weight but minimal muscle. These products contain high amounts or sugar and calories that give you the impression gaining muscle. The truth of the matter is that it is just as important for someone who is trying to gain weight to eat a balanced diet as it is for someone trying to lose weight. The lack of growth may be due to a lack of other macro or micronutrients. Again, consult a nutritionist if you're having in a difficult time gaining or losing weight.

Nutrition Study: ATP and the energy systems

Adenosine triphosphate (ATP) is an organic compound that provides energy to drive many processes in living cells, such as muscle contraction, nerve impulse propagation, condensate dissolution, and chemical synthesis. (This is the chemical responsible for making your muscles move.)

The phosphagen system– This system provides ATP primarily for short-term, high-intensity activities such as sprinting and resistance training.

The glycolysis system– This system is also anaerobic and is the breakdown of carbohydrates (the only micronutrient that can be broken-down without oxygen) into glycogen or glucose to resynthesize ATP. This system will start up at around 6 seconds and 30 seconds for fast glycolysis or all the way to 2 minutes if the exercise is lower in intensity.

The Oxidative system– This system is the primary source of ATP at rest and during low-intensity activities. The body uses mainly carbohydrates and fats during this system. At rest you are mainly using fats compared to the carbohydrates until the intensity increases.

Energy system	Intensity	Duration	Type of Activity	Rate of ATP
Phosphagen System	Very high to maximal	1-10 seconds	Power & Speed	Fast
Anaerobic Glycolysis	High	Up to 2-3 minutes	Speed & Strength	Intermediate
Anaerobic / Oxidative	Moderate to low	> 3 minutes	Endurance	Slow

Nutrition Study: Hydration

Hydration is one of the most important nutritional concerns for an athlete. Approximately 60 percent of body weight is water. As an athlete trains or competes, fluid is lost through the skin through sweat and through the lungs while breathing. If this fluid is not replaced at regular intervals during practice or competition, it can lead to dehydration. A dehydrated athlete has a decreased volume of blood circulating through the body, and consequently:

- The amount of blood pumped with each heartbeat decreases
- Exercising muscles do not receive enough oxygen
- Exhaustion sets in and the athlete's performance suffers
- By-products of exercise are not flushed out of the body as regularly as they should be

Research has shown that losing as little as 2% of total body weight can negatively affect athletic performance. For example, if a 150-pound athlete loses three pounds during a workout or competition, their ability to perform at peak performance due to dehydration is reduced. Proper fluid replenishment is the key to preventing dehydration and reducing the risk of heat injury in athletes engaged in training and competition.

Nutrition Study: Preventing Dehydration

The best way to prevent dehydration is to maintain body fluid levels by consuming plenty of fluids before, during, and after a workout or competition. Often, athletes do not realize that they are losing body fluids or that they are impacting their performance through dehydration. Athletes who are not sure how much fluid to drink can monitor hydration using two helpful techniques:

•Weighing themselves before and after practice. For every kilogram (pound) lost during the workout, drink ~1.5 liters (~three cups) of fluid in order to rehydrate the body.
•Checking urine color. Urine that is dark gold in color indicates dehydration. Urine similar in color to pale lemonade is a sign of a hydrated athlete.

Many times, athletes wait to drink until they are thirsty. Thirst is not an accurate indicator of how much fluid an athlete has lost. Athletes who wait to replenish body fluids until feeling thirsty are already dehydrated. As a matter of fact, most individuals do not become thirsty until more than 2 percent of body weight is lost. Waiting until you are thirsty can affect your performance. When athletes only drink enough to quench their thirst, they may still be dehydrated.
For best results, keep a bottle of fluid available when working out and drink as often as desired, ideally every 15-20 minutes. Table 12 lists guidelines for fluid replacement from the National Athletic Trainers Association, the Academy of Nutrition and Dietetics, and the American College of Sports Medicine.

Nutrition Study: Hydration Self Check

URINE COLOR CHART

•*Overhydrated:* Almost clear yellow

•*Hydrated:* Pale shades of yellow

•*Dehydrated:* Bright yellow to darker yellow

•*Extremely Dehydrated:* Orange to brown (if brown, consult a doctor)

GUIDELINES FOR PROPER HYDRATION

•**Monitor Fluid Losses:** Weigh-in before and after training, especially during hot weather and conditioning phases of the season

•**For Each Kilogram (Pound)** lost during exercise, drink ~.5 liters (~2 cups) of fluid

•**Do Not Restrict** fluids before, during, or after the event

•**Do Not Rely On** thirst as an indicator

Conclusion of Nutrition Course

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