STUDY GUIDE FOR THE NUTRITION EXAM

1. By weight, water makes up about 60% of a man's body and 50% of a woman's body. About 55% of the body's water is founds in the cells, about 39% in the interstitial fluid, and about 6% in the plasma and lymph. Water is the most plentiful component of the human body. Terms to know: intracellular water and extracellular water.
   - Essentials of Strength Training and Conditioning.
   - See also – Reference #20 – Herbert, W.G. Water and electrolytes. In: *Ergogenic Aids in Sport*, M.H. Williams, ed. Champaign, IL: Human Kinetics. 1983. pp. 56-98.
2. Both liver and muscle glycogen act as stores of carbohydrates. Glycogen contains only glucose units, arranged in a highly branched structure. Understand the storage form of glucose and what glucose and glycogen are. Understand the carbohydrate digestion and absorption. Terms to know: glucose, glycogen.
   - Essentials of Strength Training and Conditioning.
   - See also – Reference #7 – Banks, E.A., J.T. Brozinick, B.B. Yespelkis, H.Y. Kang, and J.L. Ivy. Muscle glucose transport, GLUT-4 content and degree of exercise training in obese Zuucker rats. *Amer. J. Physiol*. 263(5, part1):E1015. 1992.
3. Carbohydrates can be classified into three groups: monosaccharides, oligosaccharides, and polysaccharides. Carbohydrates are the preferred metabolic fuel and are important in anaerobic activities. Of the total caloric intake in the American diet, 45%-55% consists of carbohydrates. Be able to understand the process of carbohydrate digestion and absorption, and also the process of carbohydrate loading. Terms to know: carbohydrate.

- Essentials of Strength Training and Conditioning.
- See also – Reference # 58 – Hargreaves, M., D.L. Costill, W.J. Fink, D.S. King, and R.A. Feilding. Effects of pre-exercise carbohydrate feeding on endurance cycling performance. *Med. Sci. Sports Exerc*. 19:33-36. 1987.

4. Lipids are important for many metabolic processes and also associated with several diseases including cardiovascular disease and cancer. Lipids are classified into three groups: simple lipids, compound lipids, and derived lipids. The American diet consists of approximately 42% fat. Understand the functions and roles that lipids (fats) play. Terms to know: lipoproteins, triglycerides, and the different types of essential fatty acids and their key role.
   - Essentials of Strength Training and Conditioning.
   - Understanding Nutrition, 7th Edition. pp 161-163.
5. Approximately 9% to 15% of the total caloric intake of most people in the United States consists of protein. The basic units of protein structure are amino acids. Synthesis of proteins in humans requires approximately 22 distinct amino acids, 9 of these are essential amino acids. Terms to know: protein.
   - Essentials of Strength Training and Conditioning.
   - See also – Reference #94 – National Academy of Sciences. *Recommended Dietary Allowances,* 10th ed. 1989.
6. Glycolysis is the breakdown of carbohydrates-either glycogen stored in the muscle or glucose in the blood-to produce ATP. Glycolysis does not require oxygen. Understand the anaerobic glycolysis pathway. Terms to know: fast and slow glycolysis.
   - Essentials of Strength Training and Conditioning.

- Understanding Nutrition, 7th Edition. pp 245.

7. Proteins, carbohydrates, and fats are all different in molecular structure. The number of kilocalories are also different for the same weight of the food. Understand the meaning of physiological fuel value for protein, carbohydrate, and fat.
   - Essentials of Strength Training and Conditioning.
   - Understanding Nutrition 7th Edition. pp 278
8. An easy way to recognize a food label is to look for the words "Nutrition Facts". The nutrition label shows the amount of calories, fat, and other nutrients contained with in the can of box of food. Understand the Daily Values (DV) – the RDA and also the DRI and the differences between them. The percentage of daily values provides an estimate of how individual foods contribute to the total diet. Know the average amount of calories that is based on the average American diet.
   - Understanding Nutrition 7th Edition. 63-64.
   - See also – Reference # 94 – National Academy of Sciences. *Recommended Dietary Allowances,* 10th ed. 1989.
9. BMR stands for Basil Metabolic Rate. Some factors that affect BMR are age, height, growth, stress, malnutrition, smoking, caffeine, and sleep. Voluntary and involuntary activities have a role in BMR. Voluntary activities include walking, lifting, or climbing. Involuntary activities include heart beating, breathing, and GI muscles contracting. BMI stands for Body Mass Index and is a way to measure a person's weight. Terms to know: BMI and BMR, and understand the major factor that influences BMR.
   - Understanding Nutrition 7th Edition. pp 282-285, 290-291.
   - Essentials of Strength Training and Conditioning.

10. Vitamins are organic substances that are essential in minute amounts that must be ingested in the diet. There are two types of vitamins: water-soluble (act as coenzymes which are organic molecules) and fat-soluble (which has antioxidant or hormone activity). Understand the absorption of fat-soluble vitamins.
    - Nutrition: Chemistry and Biology 2nd Edition. pp 58.
    - Understanding Nutrition 7th Edition. pp 346-347.
11. The chemical composition of nutrients includes carbohydrate, fat, protein, minerals, vitamins, and water. Water and minerals are made up of hydrogen and oxygen, while the remaining four are made from hydrogen, oxygen, and carbon. Terms to know: inorganic nutrients and organic nutrients.
    - Understanding Nutrition 7th Edition. pp 5.
    - Essentials of Strength Training and Conditioning.
12. It is important to understand where to get carbohydrates, protein, fat and dairy products from a variety of foods. It is also important to understand that the first three are referred to as *macronutrients* (the energy nutrients). Know some examples of some foods that come from each of these groups.
    - Understanding Nutrition 7th Edition. pp 44.
    - Fitness: The Complete Guide. pp 152-155.
13. Digestion requires many steps once food is placed in the mouth, being the starter point. After swallowing your food, you are unaware of all the activity that follows. The muscle of the digestive tract meet internal needs without you having to exert any conscious effort. Also understand how digestion of food is foremost a chemical process under what control? Terms to know: Peristalsis, sphincters, stomach actions.

- Understanding Nutrition 7th Edition. pp 86-88.
- Nutrition: Chemistry and Biology. pp 173-183.

14. Bile acids are formed by the liver and stored in the gallbladder. The major human bile is cholic acid. Understand the main role that bile plays.
    - Understanding Nutrition 7th Edition. pp 170.
    - Nutrition: Chemistry and Biology. pp 177.
15. When more energy is consumed than is spent for whatever reason, much of the excess energy is stored in fat cells. The amount of fat on a person's body reflects both the number and the size of the fat cells. When fat cells reach their maximum size, they may also divide. Understand what happens to the cells with weight loss. During fasting, all paths are lead to energy, and must be lead to every cell. Understand the knowledge of fasting and the role it plays in your body.
    - Understanding Nutrition 7th Edition. pp 307-308, 260-261
    - See also – Reference #71 – Jones, N.L., J.F. Heigenhauser, and A. Kuksis. Fat metabolism in heavy exercise. *Clin. Sci*. 59469-59478. 1980.
16. RDA stands for Recommended Dietary Allowances. Each person's food energy intake must equal the energy expended, if the person is to maintain body weight. The more physical activity a person engages in, the more fit the person becomes and the more food the person can eat without gaining excess weight. Understand what an RDA is and how much more an athletes RDA increases for protein, carbohydrates, and fat.
    - Understanding Nutrition 7th Edition. pp 15-16, 526-528.
    - Essentials of Strength Training and Conditioning.

17. PER stands for Protein Efficiency Ratio. PER measures the weight gain of a growing animal and compares it to the animal's protein intake. One of the most complete and digestible proteins is egg protein. It was assigned a value of 100 and the quality of other protein foods were determined based on how they compared with eggs. Understand how some foods compare to other and their protein content, which one is the highest and lowest.
    - Understanding Nutrition 7th Edition. pp 214-215.
    - Essentials of Strength Training and Conditioning.
18. Minerals are elements. In animals and humans, minerals constitute about 4% of our adult body weight. Our bodies contain and require several minerals. Understand the roles of calcium, phosphorus, and magnesium.
    - Nutrition: Chemistry and Biology. pp 125-131.
    - Understanding Nutrition 7th Edition. pp 447-456.
19. Athletes, like other people, sometimes consume alcoholic beverages. Some athletes think they can replace fluids and load up on carbohydrates by drinking beer. Energy from alcohol breakdown generates heat, but does not fuel muscle work, because alcohol is metabolized in the liver. Understand how many calories per gram alcohol has and how many grams of carbohydrates it has in one can of beer.
    - Understanding Nutrition 7th Edition. pp 8, 535.
    - Fitness: The Complete Guide. pp 214.
20. An antioxidant is a variety of molecules and macromolecules whose purpose is to prevent lipid peroxidation by either breaking free-radical chain reactions or preventing the

cellular accumulation of the toxic molecular species of oxygen. Understand the function and role that antioxidants play in the body, and the function of vitamin A,C, and E.

- Nutrition: Chemistry and Biology 2nd Edition. pp 270-274.
- Understanding Nutrition 7th Edition. pp 421-426.

21. Fluid replacement drinks that contain a low glycemic index are a positive thing in athletes. Understand what foods and drinks are low or high in glycemic levels, and also the definition of a glycemic index. Insulin is also a key in maintaining proper blood glucose levels. In a diabetic, the pancreas loses the ability to synthesize the hormone insulin. Understand how insulin works in a person with high blood sugar levels.
    - Fitness: The Complete Guide. pp 204-205.
    - Understanding Nutrition 7th Edition. pp 130-131, 664-665.
22. Ephedrine is classified as an ergogenic aid. Substances such as this are banned / illegal to athletic performances. Some pose a health risk that most dietary supplements do not. This is not worth an athlete's reputation and health. This kind of stuff jeopardizes all the hard work that has gone into an athlete's performance.
    - Essentials of Strength Training and Conditioning.
23. The post event meal should contain a high carbohydrate content to help replenish glycogen stores. Glucose may more readily increase muscle glycogen, and fructose may more adequately restore liver glycogen. Understand when an athlete needs to consume a post event meal (time duration), and how much to consume.
    - Essentials of Strength Training and Conditioning.
    - See also – Reference # 73 – Karlsson, J., and B. Saltin. Diet, muscle glycogen, and endurance performance. *J. Appl. Physiol*. 31:203-206. 1971.

24. Understand what guarana means. Guarana is a is a reddish berry found in Brazil's Amazon valley that is used as an ingredient in carbonated sodas and taken in powder or tablet form. It is marketed as an ergogenic aid to enhance speed and endurance, "cardiac tone". Know what guarana releases in the blood stream.
    - Understanding Nutrition 7th Edition. pp 544.
25. Coenzyme Q10 is a lipid found in cells shown to improve exercise performance in heart disease patients. What other role does coenzyme Q10 play in the body?
    - Understanding Nutrition 7th Edition. pp 370, 544.
26. The percentage of calories and fat in protein foods can make a difference in dietary fat intake. Trimming off excess fat is a great example of this. Boiling instead of frying foods is also another example. In poultry, understand the differences between light and dark meat.
    - Understanding Nutrition 7th Edition. pp 59, 181.
    - See also – Reference # 94 – National Academy of Sciences. *Recommended Dietary Allowances*, 10th ed. 1989.

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