36 Points from Nutrition for Swimmers by Ernie Maglischo

1. Good nutrition supersedes training because it is essential for proper training to take place.
2. Athletes should never diet while they are training.
3. One way to estimate the caloric needs of athletes in training is that they should be taking in between 20 and 23 calories per pound of body weight.
4. A high **carbohydrate** diet, one where 60% to 70% of the calories come from carbohydrates (a daily diet containing 500 grams of carbohydrates or more), will permit the muscle and liver glycogen that was used during exercise to be replaced within 24 hours.
5. Since there are 4 calories in each gram of carbohydrate, a good estimate for carbohydrate intake in grams an athlete ingests daily is achieved by dividing the number of carbohydrate calories taken in each day by 4.
6. Most of the carbohydrates should come from starchy foods: breads, grains, pasta, and starchy vegetables such as potatoes and beets. High sugar foods such as baked goods, candy and carbonated beverages should be reduced considerably.

FATS

7. **Fats** are needed for building cell membranes, skin, nerve fibers and they are also involved in the synthesis of certain hormones. Fats provide almost 70% of the total energy we use at rest.
8. Cholesterol is a fat. Most cholesterol is produced in the liver. Most of us take in more cholesterol than we should. Most experts recommend an intake of no more than 300 milligrams of cholesterol daily.
9. Cholesterol is the chief ingredient in saturated fats that adhere to the linings of blood vessels forming plaque. Red meats, shellfish, dairy products and eggs contain large amounts of cholesterol.
10. Unsaturated fats are found in the oils of plants such as canola, olive, safflower, peanut and corn oil. They remain liquid at body temperature, can be transported easily throughout the body without adhering to the walls of blood vessels and tend to lower blood cholesterol.
11. However, coconut and palm oil are two plant oils that will raise blood cholesterol.
12. Trans-fatty acids have been implicated as a risk factor for heart disease. They cause an increase in concentration of low-density lipoproteins (LDL's, "bad cholesterol") and lower the concentration of high-density lipoproteins (HDL's "good cholesterol").
13. If hydrogenated or hydrogenated oils are listed first, the product will contain a large quantity of trans-fatty acids.
14. **Triglycerides** are the primary storage form for saturated fats. More than 95% of our fat consists of triglycerides. They can be stored or under the skin as adipose tissue. 90% of fat is stored as adipose tissue. Excess fats in our diet are easily converted to adipose tissue while it is a longer and less efficient process to convert excess carbohydrates to adipose tissue.
15. Fat contains 9 calories per gram while carbohydrates contain only 4 calories per gram.
16. Athletes need about 50 to 100 grams or 450 to 950 calories of fat per day depending upon their age, size and time spent training. That translates to 15% to 20% of calories each day from fat.

17. Examples of highly saturated sources of fat to reduce or avoid and their substitutes.

Foods to avoid	**Fat grams**	**Substitutes**	**Fat grams**
Cheese, 1 oz	10	Cottage cheese, 1 oz	5
Beef, 3 oz	15	Chicken, 3 oz (not fried)	3
Doughnuts, pastries, 1	15	Bread, bagels, 1	2
Pie, cake, 1 slice	25	Apple, orange, 1	0
Candy, 1 bar	10	Pretzels, 1	1
French fries, 1 large pkg	22	Baked potato, 1 no butter	0
Potato Chips, 10 chips	10	Corn on the cob, no butter	0

PROTEIN

18. **Proteins**, like carbohydrates and fats are constructed of carbon, hydrogen and oxygen atoms. Unlike the other two nutrients, they also contain nitrogen, sulfur, phosphorus and iron. These combine to form the structural units of proteins which are amino acids. Amino acids, in turn, are combined in a variety of ways to form the thousands of different proteins used in our bodies. Twelve are non-essential because they can be synthesized in our bodies. Eight are essential because they can only be supplied through the foods we eat.
19. **Essential amino acids** are found in both plant and animal foods. However, meat, fish, poultry, eggs, and milk are better sources than plants because they contain all 8 essential amino acids. Plant foods are usually lacking in one or more of the 8 essential amino acids and thus are considered to be incomplete sources of protein.
20. Proteins are the building block for our body tissue. Muscle tissue is composed of protein. So are the mitochondria and myoglobin in muscle cells. The oxygen-carrying substance in the blood, hemoglobin, is also composed of protein. All of the more than 2000 different enzymes that catalyze chemical reactions and many of the hormones that regulate body functions are made up of proteins. In addition, proteins are also one of the most important buffers in the body. Finally, proteins can also donate small amounts of energy for recycling ATP during exercise. All of these functions impact aerobic and anaerobic exercise.

USES FOR PROTEINS
1. MUSCLE GROWTH AND REPAIR. 2. CONSTUTUENT OF TENDOS, LIGAMENTS, HAIR AND SKIN. 3. CONSTITUENT OF HEMOGLOBIN IN BLOOD AND MYOGLOBIN IN MUSCLES. 4. CONSTITUENT OF MITOCHONDRIA IN MUSCLES. 5. CONSTITUENT OF ENZYMES AND HORMONES. 6. SERVES AS ABUFFER IN BLOOD AND MUSCLES. 7. SOURCE OF ENERGY FOR MUSCULAR CONTRACTION.

21. The Recommended Dietary Allowance (RDA) for adult protein intake has been set at 0.80 grams of protein per kilogram of body weight. 1.0 g/kg for teenagers because they are growing rapidly.
22. To determine the number of grams of protein divide the calories from protein listed by 4. Protein contains 4 calories per gram.

23. There is no disagreement that training increases protein use in the body. However, most experts condemn the use of protein supplements. Most athletes take in the additional protein needed through the additional calories consumed. Small to normal size athletes protein intake while training should range between 90 and 165 grams daily or 1.5 to 2.0 grams per kilogram of body weight.
24. On the other hand for athletes where protein intake from food is below daily needs (this is prevalent among female athletes attempting to control weight through reduced calorie intake) protein supplements may be needed to increase muscle size and performance.
25. In addition to muscle size and performance, both endurance and anaerobic power can increase when the correct amount of protein is consumed. The addition of 100 grams of protein daily (400 calories) from additional food or supplementation can produce those results.
26. Excess protein will be converted into fat.
27. The type of protein is just as important as the amount. It is suggested that protein foods should contain substantial amounts of glutamate and branched chain amino acids.
28. Athletes can estimate their daily need for protein by converting their body weight in pounds into kilograms. **(divide weight by 2.2). Then multiply weight in kilograms by 2** for a fairly accurate estimate of the number grams of protein needed in their diet each day.
29. Protein intake should be increased by consuming more fish, poultry, peas, beans or amino acid supplements, not by eating more red meat to avoid consuming too much saturated fats.

WATER

30. Water constitutes 70% of the weight of a muscle cell.

USES FOR WATER IN THE BODY
1. Maintain chemicals and other elements in solution so they do not become too concentrated.
2. Transports substances throughout the body.
3. Cools the body.
4. Lubricates joints.

31. In general swimmers should drink 6 to 10 glasses of water or other liquids to replace water lost in training.

Nutrient	% calories	Grams/kg	Grams/lb	45kg/100lb	55kg/121lb	70kg/154lb	80kg/176lb
Carbs	60%-70%	8-10	4-5	450	550	700	800
Fats	15%-20% (10% sat.)	1-1.5	.5-.7	45	55	70	80
Protein	10% -15%	1.5-2.5	.7-1.25	100	120	150	170
Water	6 to 7	Glasses	Of Fluid	Daily	For	Everyone	

32. The eating habits of most swimmers should be different from those of the general population.
    800 to 1200 fewer fat calories (90 to 130 grams less) per day.
    100 to 200 more protein calories (25 to 50 additional grams) per day.
    600 to 1000 more starch form carbohydrate calories (100 to 250 additional grams) per day.
    Drink 6 to 10 glasses of water or some nutritious liquid daily.

VITAMINS

33. Thirteen different vitamins have been discovered to date.
34. Vitamins are either water-soluble or fat-soluble organic compounds that serve as catalysts for the metabolic processes that furnish energy and build tissue. Although needed in very small amounts they are extremely important to our health and physical performance.
35. Water-soluble vitamins (generally functioning as coenzymes) include all B-complex, C, niacin, panothenic acid, folacin vitamin M), biotin (vitamin H), and choline and are not stored in the body.
36. Fat-soluble vitamins are A,D,E, and K. Major storage sites are the liver for A, D, and K, and fat tissue throughout the body for E. Excess amounts are stored in fat tissue. A and E are also antioxidents.