# *Chapter I*

# *Guidelines for Immediate Results*

**The fastest effective sports nutrition guidelines possible**

Eat a piece of fruit 30 min before exercise, a nut butter sandwich within ten minutes after exercise, salad with lunch and dinner, consistent protein through the day, at least 2 Liters of water each day, and a small amount of salt after significant perspiration (to retain normal fluid level).

**In a bit more detail**

- If you have not eaten a carbohydrate within a meal in the last 3 hours, eat a piece of fruit 30-60 minutes before exercise. Fruit manages your hormonal response much better than starch.

- Eat a nut butter sandwich on whole-grain bread within 10 minutes after exercise with an optional piece of fruit and a small glass of milk or soy milk. If your stomach cannot handle solid food immediately after exercise, replace this with 1/4 cup (4 Tbsp) of glucose (such as maltodextrin) and 1 Tbsp protein powder within 10 minutes after exercise. It is the glucose that is most essential, not the fruit or the protein, immediately after exercise. You could simply eat a small yam, some crackers, a muffin, a granola bar, bread or malto without anything else besides water.

- Have a salad or a lot of veggies with every lunch / dinner to slow the carbohydrate digestion rate.

- Add 1 or 2 snacks to your day if you find yourself going longer than 5 hours without eating.

- Don't skip meals, particularly in the start of your day.

- Don't eat large meals or snack excessively, particularly in the last 5 hours of your day.

- Drink 8 cups (2 Liters, 64 oz) of water each day with 2 of those cups being consumed immediately upon waking first thing in the morning.

- Drink additional water during and soon after any exercise: 2-4 cups for each hour of training, with at least some of this during the training itself (the rest can be afterwards).

- If you don't have added salt in your diet, add a few salt shakes for each hour of training to the meal after your exercise. Do not add salt to your fluids during exercise if you are drinking (replacing) less than half of your perspiration losses i.e. if you are not drinking much water.

**Taking it to the next level: What to eat and why (recipes later)**

**CARBOHYDRATE**

**"Carbs" are sugar, whether they taste sweet on the tongue or not**

There are two different types of carbs that an athlete needs to be aware of: the type that fuel muscle directly, and the type that do not.

**Glucose fuels muscle (and other lean tissues) directly**

The foods whose calories are primarily glucose are what we typically think of as starches, meaning tubers (yams, potatoes) and cereals (rice, corn, wheat, oats, quinoa).

**To supplement with glucose during or right after exercise, use maltodextrin or "malto"**

Malto is a white powder with no taste, usually derived from corn, that provides ~125 Calories per 1/4 cup. Many sports syrups (e.g. Gu or Powergel) are malto in some water plus bells and whistles. The glucose in baking flour or corn flour is in chains too long to easily dissolve in water, but when the shorter chains made of a dozen glucoses are sifted out, these are able to dissolve and can therefore be added to water and drank, as opposed to eaten as solid food like bread. Consuming even shorter glucose chains (maltose is two glucoses linked together) or simply consuming glucose itself added to water increases the risk of stomach upset during hard exercise because, for the same caloric intake, you have more molecules (they are not linked together!).

**Malto supplements for during and immediately following training**

- Liquids: Ensure or similar spin offs (Safeway brand & others)
- Syrups: E-gel, Carboom, Gu, Powergel, Hammer gel
- Powders: Sustained Energy, Accelerade, Powerbar Endurance (dextrose is glucose)
- Pure powders: Carbo hit, Carbo gain, Complex Carbs
- You can also buy pure malto from any home brew supply shop (people use it to make beer at home), typically for about $2 per lb.
- A decade ago I purchased a 50 lb bag of malto for super cheap, which was a 1-year supply for serious athletics, or a 1-2 month supply for a dozen athletes. The person I picked it up from at the warehouse told me I was getting the same stuff the company "Gu" purchased from them. I don't remember what warehouse and found it with a simple internet search.

**Half of sucrose (cane and fruit sugar) directly fuels muscle**

Sucrose is table sugar, made of equal parts glucose and fructose. The liver converts fructose to glucose, stores it as glycogen, and releases it into the bloodstream as needed. Unfortunately, the conversion is relatively slow, so when the liver is flooded by fructose from eating sweets or fruit juice, the overload is converted into fats instead, raising blood cholesterol and triglyceride levels. Therefore, slow-digesting sucrose sources (legumes and vegetables) provide half their sugar content to muscle directly, and the other half later on as the liver converts it to glucose. Medium-fast digesting sucrose sources (fruit) only lose a little of their fructose to liver fat production. Fast-digesting sucrose sources (sweets and processed fruit e.g. jelly or fruit juice) lend themselves to liver fat production, which can accumulate in the blood over time with associated disease risk.

**Half of lactose (dairy sugar) directly fuels muscle**

Dairy sugar is lactose and is made of equal parts glucose and galactose. As with fructose, galactose is primarily converted into glucose by the liver. Dairy sugar is medium-fast digesting like fruit.

**Liver-fueling carbs: Legumes are the ultimate long-term muscle fueling source**

The liver stores 500 Calories of sugar that is available to the rest of your body when you need fuel. These liver calories are very important for endurance and recovery since it is impossible to consume enough calories during hard training or while sleeping (a critical recovery period). The liver only effectively fuels up when you eat non-glucose sugars.

**Carbs that fuel the liver well:** Legumes, fruit, dairy, and vegetables

**Rapid-liver fueling that in excess causes fat production, not liver fueling:** Table sugar, sucrose, fructose, honey, evaporated cane juice, corn syrup, high fructose corn syrup, processed fruit (jelly, fruit juice), smoothies (pass through the stomach and intestine faster than the original fruit)

**How to get the vast majority of your carbs into the tissues where you want them**

- Use glucose carb sources (tubers, cereals, or supplement) during and right after exercise
- Glucose foods (tubers, cereals) should have their digestion slowed by vegetables at other times unless the body is significantly starved, meaning some cereal without veggies at breakfast is fine
- For a longer-term glucose supply use legumes, particularly at dinner for night-time recovery
- Veggies don't supply enough usable calories; legumes and fruit are the best baseline carb sources

**DIETARY FATS**

Many diets for the past half century have been based on reducing fats in the diet. A diet low in unsaturated fats reduces metabolism, exercise recovery, the muscle's ability to absorb carbohydrate, and can very easily lead to an athlete becoming over-trained in a short period of time. About 1/3 or more of the calories in each regular meal of your day should be fats, with at most 1/3 of those being saturated fats, the rest being unsaturated fats. This corresponds to about 150-300 Calories of fats per meal. Most fats in America are highly oxidized from processing, and animal fats mainly come from corn-fed animals with as much as twice the fat as their healthier kin, making the topic of saturated fats complex. The evidence tells us that saturated fats are not fundamentally unhealthy. To the contrary, other than eating sufficient calories, saturated fats are the most effective way to recover steroid hormone levels (estrogen, testosterone) during periods of hard exercise.

**Sources of saturated fats (limit to 1/3 of total dietary fat intake):** Tropical plants (coconut, cocoa) and-animal sources i.e. meats, dairy and egg yolks.
**Sources of unsaturated fats (should be the majority of your fat intake):** Avocado, nuts (or nut butter), seeds, extra virgin vegetable oils, olives, soy products and low-mercury fish.

**Omega-3 fats**

There are two types of fats the body cannot make and must be eaten in the diet. These are omega-3 and omega-6 fats. [Ironically, it is omega-9 fats i.e. monounsaturated fats, that research on the traditional Mediterranean diet shows lengthens life the most.] Omega-6 fats are in all unsaturated fat sources, and are therefore easy to obtain in large amounts in a normal diet. But this is not the case with omega-3 fats, which are in very few foods. Their benefits are as powerful as medicine, but meta-analysis shows supplementing does not provide the benefit of getting omega-3 from food, probably because of the processing involved to make supplements. More than any other nutrient that you can put into your body, omega-3 fats increases muscle fueling, nerve recovery, brain function, and metabolism. However, consuming them in large amounts can contribute to heart disease because excess un-used omega-3 fats are easily oxidized and stimulate your immune system to attack the LDL particles they are in. For this reason, I recommend using minimally processed unsaturated fat sources, meaning natural food. For omega-9 use avocado, olives, or extra virgin olive oil. For omega-6 use nuts and seeds. For omega-3 use salmon, sardine, chia or flax.

**The basis of how much omega-3 you need**

Consume the amount of omega-3 recommended by the Institute of Medicine as described in their Dietary Reference Intakes (DRI). This is roughly one dozen Calories of omega-3 fats per day. During hard training I recommend 2-3 times these levels, but there is no need to consume more than 3-4 times these levels even during your hardest training. Omega-3 fats break down faster in the body than other fats in response to free-radical production so highly active people need a bit more.

**How to get the ~12 Cal i.e. ~1000 mg DRI recommended levels of omega-3 fats**

- 12 walnuts (24 walnut halves)
- 3 oz of salmon or sardines
- 1 Tbsp chia or flax seeds, 1.5 Tbsp ground flax meal, or 1 teaspoon flax oil (you can mix these into oats after the cooking is complete, or into yogurt, etc.)
- To supplement do not use capsules, and instead get the highest quality liquid you can find since processing is the likely reason for the reduced cardiovascular disease benefits from supplements

**PROTEIN**

Proteins are the molecules in your body that do work, such as motor proteins that contract muscle during exercise. As much as 5-10% of energy production during exercise comes from burning functional body protein (eating protein during exercise does not eliminate this because it is a natural stress hormone response). Endurance athletes burn more functional body protein for fuel due to their longer training sessions, whereas strength athletes damage more functional body protein due to higher loads. Ironically, this leads to endurance and strength athletes needing similarly higher than baseline amounts of protein on a pound-per-pound basis. Protein needs rise from the standard DRI of 0.8 g / kg body weight to more than twice that amount, meaning they increase from 1 g per kg to 1 g per pound. But water, carb, dietary fat, and nutrient needs all go up as well. As a result, the percentage of the calories in the diet that need to come from protein does not change significantly compared to the other food groups.

**Consistent protein availability in the bloodstream is critical**

Maximum body protein recovery occurs only after the damaged protein being replaced has been removed, and this removal process peaks 1-3 days after exercise occurs, when Delayed Onset Muscle Soreness (DOMS) is at its greatest. Consistent protein availability in all meals every day is

therefore much more important than consuming protein right after training. No damage has been removed to clear a path for new protein production right after that damage has occurred. The benefit of protein after exercise is therefore NOT to initiate the recovery process, but rather to increase blood amino acid levels to 1) reduce the release of cortisol so as to stop the loss of functional body protein, 2) activate gene expression to increase protein production rate and 3) to increase insulin sensitivity. Without consuming glucose, cortisol will stay at high levels in the blood, and gene expression is blunted, so protein by itself does not achieve the intended result by itself.

**Sources of protein**

- Contractile tissue from animals: fish, poultry, beef, pork…if it moves, its protein
- Products from animals: dairy and eggs (yolks are almost entirely fat, the whites entirely protein)
- Soy: Within 10% the quality of protein as animal protein
- Lentils and beans are lower in bio-availability so you need 50% more than you would expect based on the protein content shown on the label i.e. a full cup or more in a single meal.

**NOT effective sources of protein**

- Nuts (or nut butter) are so high in fat that they are very poor protein sources. You would need almost 2000 Calories of these per day to get enough protein. Nut butters are outstanding sources of unsaturated fats. Cheese is a saturated fat source and only 25% protein.
- Fruit and grains are too high in carbohydrate and low in bioavailability and are therefore poor protein sources; it would take over 30 bananas or 1-2 loafs of bread per day.
- Vegetables are the healthiest foods over-all but they are very low in protein.

**BOTTOM LINE: NUTRIENT TIMING**

You need more protein, carbs, fats, water and nutrients when you are training or exercising harder. Eat more of everything with the same balance you are used to, and focus on your timing so that each type of food groups is represented in the bloodstream at all times. This focus will dramatically shift how you manage the timing of your nutrient intake. You will consume more glucose right after and in the hours after hard exercise, then reduce your carb intake afterwards, whereas your protein intake will be moderately higher at all times because you are always recovering.