Sports Nutrition Engineering

Fuel lean tissue instead of body fat for greater performance and quality of life

Dr. Clyde Wilson

Introduction

Like all things in life, sports nutrition can be profound both in its simplicity and complexity. The simple version is to eat healthy foods in balance, and more *of* it as you exercise harder, based on the concept of calories-in-calories-out and our common sense of what it means to eat balanced healthy meals. Unfortunately, this simple approach does not apply when an athletic person wants to reduce body fat because they might be cutting calories and therefore eating less, not more, as they work out harder. This can hurt the athletic person's energy and recovery (reducing their short term performance) and can hurt their health (reducing their long-term performance). A better approach would be getting more *out* of your nutrition, sending more of what you are eating to your lean tissues that do the actual work, and less to body fat. Even those not interested in losing body fat would want to apply these principles so they could push their bodies harder while reducing the risk of feeling over-trained. By under-supplying the body, the concept of calories-in-calories-out by itself can end up doing more harm than good. Engineering your nutrition means strategically composing and timing your food to optimize your health and performance beyond just calories.

Your cells have no idea what you eat. They only know what is in your blood stream, and they want their needed nutrients continuously 24 hours per day. Your meals should therefore process slowly to provide for your cells as many hours as possible with the full spectrum of things needed. It all comes down to steady and continuous blood chemistry, meaning both nutrients and the hormones that regulate their use. If your bloodstream has everything but not more than your lean tissue needs from minute to minute as you go through your day, then your lean tissue will maximize their function and body fat will get very little. Even just one hour falling short hurts your recovery and performance for that hour. Just one hour with excess in your blood over-flows nutrients to waste and/or body fat, losing those nutrients or forcing you to use those calories as fat later. Fat burning is a lower power production rate than sugar burning, dropping high-intensity performance and recovery. It is easy to fall short when combining low-carb consumption together with intensive training, not even realizing that the combination is hurting you more than helping. Here are a few common examples:

Example 1: Squeezing in a few hard workouts each week

You squeeze in some hard workouts during the week and only eat protein right after exercising, leaving your blood sugar low and blood cortisol high. The fitter you get, the harder you work out, making the problem worse over time, to the point that muscle break-down from poor blood chemistry can exceeds the exercise gains. You end up in the crazy situation that although exercise at first dropped your body fat, it eventually actually increases it.

Example 2: Exercising right after waking up in the morning

You exercise right after waking up, dropping your blood sugar even lower than it already is from not having eaten since dinner the night before. You assume that not feeling hunger means you do not need calories, but the drastic blood sugar drop during exercise spikes your cravings later in the day. So the first half of your day low blood sugar and high cortisol eats away at your muscle mass, and the second half of the day you search for constant snacks, increasing body fat.

Example 3: Alternating between carb meals and vegetable meals

Although technically vegetables are carbs, they are much lower in calories than fruits and starches. It is common for us to eat meals that are high in vegetables (e.g. salad) and at other times high in carb calories (e.g. pizza, a burrito, or a sandwich). Salad often does not contain enough calories to maintain blood sugar more than a couple hours. Carb heavy meals generate an insulin response that can clear out blood sugar out in an hour. Either way, blood sugar ends up low, and cortisol high.

<u>Fixing the problem</u>

Don't change how or when you exercise: Just fix your blood chemistry

There is nothing wrong with squeezing in hard workouts, exercising first thing in the morning, or eating pizza. But you could have a low blood sugar from exercising without eating anything afterwards, and then later in the day a low blood sugar from the insulin response to pizza or some other high-carb meal. This would leave you with a low blood sugar all day long. Managing your other nutrients is just as important as blood sugar, but carbohydrate increases body fat the fastest and eating too much of it can actually lower how much of it is in your blood because of the insulin response. No other food group is therefore as touchy or tough to get right.

If you get fatter when you exercise harder, your timing is off

Many people trying to lose weight with diet and exercise find that weight loss is short lived, eventually turning into weight gain, all the while feeling somewhat miserable. "Dieting" leaves many feeling deprived or starved, low in energy, with accumulating injuries, a low sleep quality, eventually deranging the immune system with increasing food allergies, and low hormone production (e.g. testosterone, estrogen, growth hormone and thyroid hormone). These changes reduce recovery, triggering the thought to perhaps eat more, but body fat is going up so that by itself cannot be the answer. Instead, shift *where* the calories go to get more out of what you are eating.

The importance of blood chemistry applies to both strength and endurance athletes

Two athletes I have worked with that fall in opposite ends of the spectrum (strength versus endurance) are Will Svitek (ten years NFL, 340 pounds) and Ryan Hall (marathoner, 130 pounds). When they came to me their nutrition was already very good. The only key change for each of them was adding coarse vegetables to their highest-calorie carbohydrate meals in the day in order to slow the digestion of those meals. That way, the carb calories enter the bloodstream slower, giving lean tissue more hours to absorb and use the calories being eaten. When carbs digest faster, they easily overload the absorption capacity of muscle and other lean tissue, therefore over-stimulating insulin release, increasing body fat. You can burn off that fat in your workouts, but not always all of it, and with less power than if you were burning the original food in its original carbohydrate form, meaning your workouts cannot achieve the same intensity. Will opted to add leafy greens to his dinner, and Ryan ate celery with his pancakes. As long as the vegetable is crunchy, it will slow digestion rate. If you want nutrients, eat dark vegetables, but if you want to slow digestion for a time-releasing effect, it matters little whether they are dark or not. Celery has essentially no nutrients but is easy to eat in the early morning when the healthier more bitter veggies are a turn off.

<u>Abbreviations and conversion factors used in this book</u>

Calories are units of energy. A typical slice of bread contains 100,000 calories, or 100 Calories written with a capitol 'C' to mean kilocalories. Fat contains 9 Cal per gram whereas carbs and protein are only 4. When I write "calories" not capitalized I am just referring to energy content.

tsp = teaspoon	**Tbsp = tablespoon**
3 tsp = 1 Tbsp	8 fluid oz = 1 cup
4 Tbsp = 1/4 cup	32 fluid oz = 4 cups = 1 Qt ~ 1 L

About Dr. Clyde Wilson

- Founded the Health Facts Initiative to increase public awareness of scientific research findings.
- Teaching: Nutrition and exercise theory (human movement) courses for over a decade at Stanford University (Medicine, Athletics, and Continuing Studies) and at the University of California, San Francisco (UCSF) School of Medicine.
- Research: With Professor Roger Cooke in the Department of Biochemistry and Biophysics at UCSF on the super relaxed state of skeletal muscle and its implications for human metabolism. Post-doctoral research was in the same lab; investigated the mechanism of muscle contraction.
- Director of the Center for Nutrition, the Sports Medicine Institute (a nonprofit in Palo Alto, CA)
- Ph.D. in Chemistry from Stanford with Professor Richard Zare; investigated ultra-small volume (vesicle) biochemistry, particularly during vesicle fusion e.g. as occurs in nerve signaling.
- Undergraduate research at Northern Arizona University with Professor Michael Eastman; molecular encapsulation (host-guest complexation), such as in biochemical chelation in the body.
- Previous to this worked in nuclear engineering on an aircraft carrier (USS Carl Vinson) in the US Navy as the supervisor of Reactor Laboratories, responsible for the chemistry and radiation control on the ship.