LIVSTEADY

An Ideal Fueling Strategy For
Improving Body Composition and Health

By Jeff S. Volek, PhD, RD

Introduction

LIVSTEADY is a revolutionary proprietary fuel source gaining popularity among sport enthusiasts from weekend warriors to top professional athletes. Because of its unique molecular weight, low osmolality, and slow absorption characteristics, LIVSTEADY has advantages over other commercially available sports drinks for use before, during and after workouts and competitions. In addition to its fueling applications highlighted in an earlier white paper, an added benefit associated with regular use of LIVSTEADY is improved body composition. This white paper specifically addresses the role of LIVSTEADY in helping athletes achieve a leaner, more powerful, and healthier body. Also included are compelling stories of professional athletes who transformed their physiques with the help of LIVSTEADY.

Losing Body Fat – Is this You?

There are many good reasons for losing body fat for general health and well-being and for excelling in sport – be quicker, more agile and improve performance, make a weight class, improve your health or just look and feel better. The question is how to best go about it? You may adopt a low calorie diet only to find yourself feeling hungry, drained and unable to complete your workouts. A diet too restrictive in calories will provide inadequate fuel for workouts, compromise training adaptations, and ultimately deliver suboptimal results. A better approach is to provide adequate energy to fuel exercise without putting your fat cells into storage mode. This is where LIVSTEADY can play a vital role in helping you achieve a leaner more athletic physique.

Why is Body Composition Important?

Very simply, body composition refers to the proportion of lean body mass (highly correlated with muscle mass) to fat mass in a person. Improving body composition involves decreasing body fat while maintaining or adding muscle. Why would decreasing body fat be advantageous? Beyond the obvious aesthetic and health reasons, decreasing body fat is relevant for athletes who need to maintain a specific body weight as a demand of their sport (e.g., wrestling, boxing, powerlifting, Olympic lifting, judo, mixed martial arts, etc.) or for sports where physical appearance is a component of success (e.g., bodybuilding, gymnastics, dancing, fitness model competitions, figure skating, platform diving, etc.).

From a functional perspective, body fat is not involved in force production and therefore decreasing body fat does not adversely affect strength or power production. In fact a loss in body fat, and therefore body weight, improves the power to weight ratio, a very important determinant of endurance performance. Think about 2 cyclists climbing a hill who have the same pedaling power, but one weighs 200 lbs and the other 175 lbs. Who gets to the top first? Clearly the lighter athlete since he/she has less total weight and therefore total work to perform. A higher power to weight ratio also translates into greater speed and quickness which is relevant for athletes who participate in sports demanding short high-intensity and explosive bursts.

Insulin and Body Fat Physiology

The majority of fat is contained with within adipocytes (fat cells) that make up adipose tissue. This component of body composition has a vast capacity for storage. Considering that 2 out of 3 adults in the U.S. are classified as overweight and 1 in 3 obese, in no time in history has the adipocyte been under such intense pressure to expand. Obesity is a disease of excess adipose tissue storage, and when viewed in this context the key to lowering body fat, even for athletes, is obvious – increase the stimulus for fat breakdown and decrease the stimulus for fat storage.

The key hormone that inhibits fat breakdown and oxidation and stimulates fat synthesis is insulin. The primary nutrient that stimulates insulin is dietary carbohydrate. Some carbohydrates stimulate insulin more than others. Thus, consumption of insulin-stimulating carbohydrates is a surefire way to block access to fat during and after exercise. Taking a closer look, the relationship between insulin levels and fat breakdown is curvilinear (***Fig 1***). Just small decreases in insulin translate into large increases in fat breakdown and fat oxidation[1]. The corollary is true as well. Small-to-moderate increases in insulin, such as those stimulated by most sports drinks, rapidly decrease release of fat from storage. Thus, focusing on keeping insulin low is associated with significant changes in fat metabolism favoring decreased storage and increased breakdown and oxidation of fat.

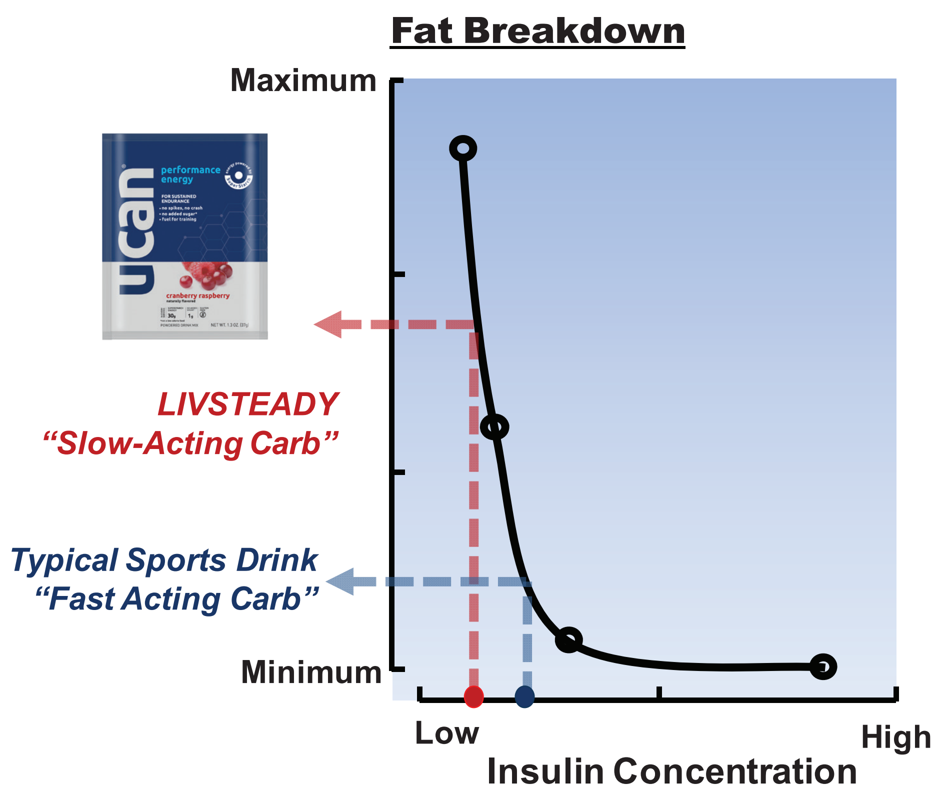

Fig 1. Lower levels of insulin that occur with the ingestion of LIVSTEADY do not block fat breakdown and oxidation as do other fast-acting commercial sports drinks.

Why Sports Drinks Post-Exercise Can Be Problematic

Carbohydrates are encouraged for the general public, and carbohydrate-rich diets are even more aggressively recommended for athletes. The increase in calories during the obesity epidemic was due largely to a marked increase in carbohydrate consumption, and there is increasing evidence implicating excess intake of simple sugars and processed carbohydrates in the development of obesity, metabolic syndrome and diabetes. Athletes are not immune to such effects. While exercise can provide some protection from the untoward effects of too much carbohydrate, regular physical activity does not provide a license to binge on carbohydrates. In the quest to achieve optimal performance and body composition, the question is why use sports drinks that rapidly elevate blood sugar and insulin? Even if you are looking for small changes in body composition, the most potent and healthiest way to reduce body fat is to keep insulin levels stable though modulation of the quantity and quality of carbohydrate.

In the post-exercise period, consumption of fast-acting carbs that spike blood sugar and insulin are not needed and may be counter-productive. Prior work clearly shows that providing even small amounts of carbohydrate after exercise rapidly decreases the release of fatty acids from fat stores and oxidation of fat in the muscle[2]. In some athletes, a surge in insulin may be followed by a low blood sugar eliciting a stress response characterized by a counter-regulatory hormonal response that can manifest as carbohydrate cravings, lethargy, poor physical/mental performance and suboptimal recovery.

Over stimulation of insulin by fast-acting carbs can have a more insidious effect of diverting glucose into fat storage, which is obviously not conducive to promoting favorable changes in body composition. Spiking insulin with fast acting carbs during recovery has also been shown to diminish the beneficial effects of exercise on insulin sensitivity and other cardio-metabolic risk markers[3, 4]. As highlighted in a recent review of the role of carbohydrate availability for athletes, there is a large amount of research supporting the concept that positive adaptations promoting enhanced fat burning and health are more robust when carbohydrates are not flooding the system during and after exercise[5].

The argument that high insulin is required for glycogen synthesis is not supported by recent studies. Glycogen synthesis after exercise does not require excessively high blood sugar or insulin levels to proceed at an accelerated pace. A spike followed by a subsequent fall in blood sugar is not an optimal metabolic milieu for promoting glycogen synthesis over a 24 hour period. Moreover, if you avoided using a fast acting carb before and during exercise, the greater use of fat for fuel would spare glycogen and thus there would be less need to re-synthesize during recovery.

There is also no good reason to spike insulin for purposes of stimulating muscle protein synthesis. In skeletal muscle, insulin has anabolic effects by increasing amino acid uptake and protein synthesis, but only a small amount of insulin is necessary to achieve a maximal effect [6]. Insulin is generally accepted as a stimulator of protein synthesis only when adequate amino acids are available[7], thus dietary carbohydrates alone are not a potent stimulus for increasing protein synthesis[8, 9]. Many dietary protein supplements include carbohydrate as a way to increase insulin and potentially augment protein synthesis. However, recent work has shown that when adequate protein is provided after exercise, including insulin-stimulating carbohydrates does not augment the response further [10, 11]. The primary driver of muscle protein synthesis is not insulin, but the availability of essential amino acids. Thus, the trivial positive effect of carbohydrate and insulin on protein balance should be weighed against the more potent effects of fast-acting carbs on inhibition of fat breakdown which is counter-productive for decreasing body fat.

The Problem with Fructose

Many energy drinks and sports beverages use sucrose (half glucose and fructose) or high fructose corn sweetener as their primary energy source. Daily fructose intakes have increased dramatically in the last decade, especially in adolescents, mainly attributed to increased use of sports drinks and other sugar-sweetened beverages, grains, and other foods with added sugars. An alarming one in four kids gets greater than 15% of their calories from fructose. Many health experts implicate increasing fructose intake with a host of health problems (e.g. fatty liver, obesity, dyslipidemia, oxidative stress, vascular dysfunction, metabolic syndrome, diabetes, increased uric acid, etc.)?

Although fructose is a simple 6 carbon sugar like glucose, they differ in many ways. Fructose ingestion does not raise blood glucose levels and thus has a minimal impact on insulin levels. On the surface this may appear beneficial since it does not spike blood sugar or insulin in the same manner as glucose consumption. But the effect of fructose is more sinister. Unlike glucose which is principally taken up by muscle and either converted to glycogen or oxidized, fructose is preferentially metabolized in the liver where it is cleaved into two 3-carbon fragments that contribute to fat production. It is also not under the same feedback as glucose and thus can uncontrollably support fat synthesis. Thus, fructose has a high propensity to be converted to fat, a process called de novo lipogenesis. A single meal of fructose has been shown to stimulate lipogenesis and synthesis of triglycerides[12].

Given these clearly unhealthy effects, why would manufacturers of sports drinks include fructose in their products? Or the more appropriate question should be why would you ingest products with fructose? Yes, fructose avoids the insulin spike, but rather than inhibiting fat synthesis it actually promotes it! If you want to lose body fat, it does not make a lot of sense to consume something that that will eventually end up mostly as fat.

LIVSTEADY Does Not Spike Insulin and Provides an Uninterrupted Sustained Flow of Energy

LIVSTEADY offers an ideal carbohydrate source for athletes concerned with their weight and health. In contrast to other sports drinks that block access to body fat, LIVSTEADY provides a better fuel balance between fat and carbohydrate because of its proprietary manufacturing process that slows digestion and absorption of the starch. LIVSTEADY provides a highly palatable carbohydrate source that delivers sustained energy while having a minimal impact on insulin levels. The net effect is more efficient maintenance of blood sugar[13-15] and greater access to fat stores and fat for fuel during and after exercise compared to competing sports beverages[16].

In a study conducted at the University of Oklahoma study[16], trained cyclists ingested LIVSTEADY or maltodextrin before and after cycling for 2.5 hr. LIVSTEADY blunted the initial spike in blood glucose and insulin and enhanced the breakdown and oxidation of fat during exercise. Subjects also consumed the supplements after exercise, and again the athletes showed greater use of fat during recovery (***Fig 2***). Keeping insulin low during recovery translates into less time in fat storage mode thereby promoting a more favorable metabolic state for decreasing body fat.

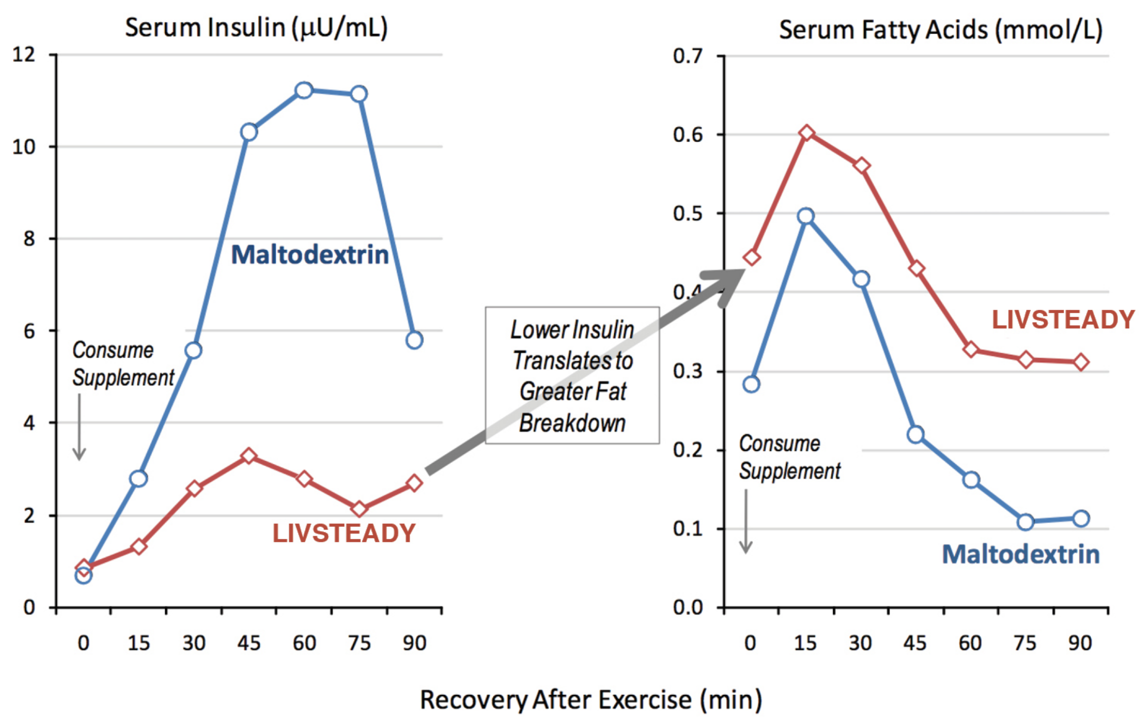

***Fig 2.** Serum insulin (left) and fatty acid (right) levels in high level cyclists who consumed either Maltodextrin or **LIVSTEADY** immediately after cycling for 2.5 hours. **LIVSTEADY** resulted in a significantly muted insulin response and a corresponding increase in fat breakdown and fat oxidation during recovery. Data from Roberts et al. Nutrition. 2010 Oct 13.*

Lower Insulin Translates into Improved Body Composition

Carbohydrate is the main stimulator of insulin. Using fewer or higher quality carbohydrates that do not cause a marked increase in insulin is a fully rational approach to improve body composition. A comprehensive review paper concluded that diets lower in insulin-stimulating carbohydrates were associated with greater fat loss[17], and the effects were independent of energy intake and exercise. Work in my laboratory has shown that diets that lower insulin translate into greater fat loss. For example we showed that normal-weight men who consumed a low carbohydrate diet for 6 weeks decreased fat mass (-3.4 kg) and increased lean body mass (1.1 kg). There was a significant decrease in serum insulin (-34%) and 70% of the variability in fat loss was accounted for by the decrease in serum insulin concentrations[18]. The effects are even more dramatic when you add exercise training to a diet that controls insulin. We performed an experiment in overweight/obese men who participated in resistance training and were either placed in a low fat or a low carbohydrate diet group. The results were compared to non-training diet only groups. The low carbohydrate diet group lost more fat which was associated with greater decreases in insulin. Resistance training, independent of diet, resulted in increased lean body mass without compromising fat loss in both diet groups. The most dramatic reduction in plasma insulin and percent body fat was in the low carbohydrate diet resistance training group. Similar to our earlier work, when we looked at the relation between the changes in insulin and the changes in body fat, there was a significant correlation. In the training groups, the subjects who showed the greatest reductions in plasma insulin also showed the greatest reductions in body fat (***Fig 3***). Thus, the combination of a diet that lowers insulin and resistance training is additive in the sense it maximizes fat loss while preserving/increasing lean body mass and therefore produces the largest reductions in percent body fat.

	Low Fat Diet	Low Carb Diet	Low Fat Diet + Training	Low Carb Diet + Training
Change in % Body Fat	**-2.0%**	**-3.4%**	**-3.5%**	**-5.3%**

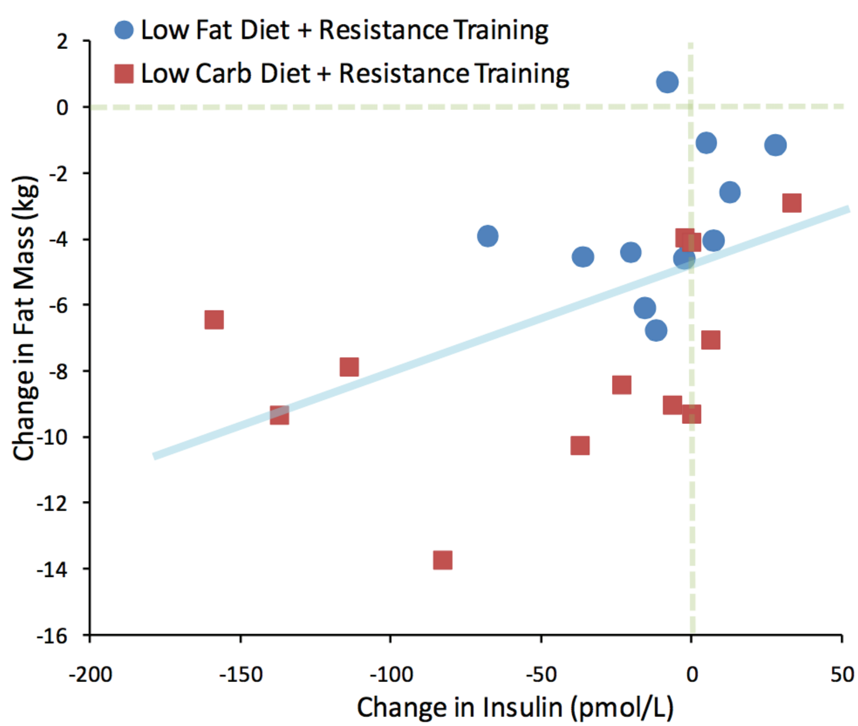

***Fig 3.** The relation between changes in plasma insulin and changes in body fat in men who participated in 12 weeks of progressive resistance training and either a low fat or low carbohydrate diet. Data from Volek et al. Strength and Conditioning Journal.* 32(1):42-47, 2010.

Summary

For most athletes the majority of energy intake comes from carbohydrates in the form of sugars and maltodextrins - refined and processed sources that are metabolized quickly. A high sugar and refined carbohydrate diet is fundamentally counter-productive to decreasing body fat. Commercially available sports and energy beverages are primarily sugar-based and emphasize rapid absorption. This is precisely the opposite effect you need to encourage loss in body fat. UCAN with LIVSTEADY offers an alternative to his problem by providing athletes with sustained energy to fuel intense workouts without shutting down access to fat stores. LIVSTEADY is a genuine innovation in sports drinks based on its unique chemical and metabolic characteristics and applications for athletes. Beyond simply providing a sustain energy source, repeated use of LIVSTEADY is also likely to help athletes achieve improved body composition, better health, and enhanced performance.

What would an ideal energy source in a sports drink look like?

Characteristic	LIVSTEADY
Sugar-Based	No
Complex Carbohydrate	Yes
Molecular Weight	Very High
Osmolality	Very Low
Osmotic Pressure in GI Tract	Low
Gastric Emptying	Fast
Intestinal Digestion	Slow
Intestinal Absorption	Slow
Completely Absorbed	Yes
Blood Glucose Impact	Low
Blood Insulin Impact	Low
Avoids Spike and Crash	Yes
Extends Maintenance Blood Glucose	Yes
Fat Breakdown During Exercise & Recovery	Increase
Fat Burning During Exercise & Recovery	Increase
Promote Improved Body Composition	Yes

As a pro defensive lineman, I was amazed at how UCAN allowed me to play leaner while maintaining the explosiveness and strength necessary to be effective on the line!"

~ Mike Wright, Pro Football Player - Defensive Lineman

"Simply stated, UCAN manufactures revolutionary game changing nutrition that has addressed all my needs – preventing gastric distress, preventing spikes and crashes in my blood sugar, minimize my insulin production, allow my body to burn more fat, and satiate hunger during and after rides."

~ Matthew Kutilek, Marine Maj. Special Forces and Distance Cyclist

"Countless individuals have been able to TRANSFORM THEIR PERFORMANCE by increasing energy levels, reducing body fat, increasing lean mass and speeding recovery time between intense training sessions."

~ Ben Herbert, Master Strength and Conditioning Coach and Head of Performance, University of Michigan Football

"Generation UCAN is a new paradigm in sports nutrition that puts an athlete in the ideal performance state."

~ Bob Seebohar, MS, RD, CSSD, CSCS, Former U.S. Olympic Sports Dietitian

"I believe this product, its team and the company's vision will change the face of sports nutrition."

~ Meb Keflezighi, Professional Runner, Olympic Medalist

"We give our athletes UCAN to keep their blood sugar stable, which helps them better utilize fat for fuel and sparing their glycogen for when they need it the most, which is late in the game or on the second night when we play back to back."

~ Brijesh Patel, Strength & Conditioning Head Coach, Quinnipiac University

UCAN Transformation #1

Professional Tennis Player

Age:	29
Height:	6’ 2”
Before:	203 pounds, 21% body fat (43 fat, 160 lean)
After:	172 pounds, 7% body fat (12 fat, 160 lean)

One of the more visually striking body transformations achieved with the help of UCAN is that of this pro tennis player. Carrying a little over 200 pounds on a 6’ 2” well-muscled frame, he would hardly be considered overweight. But darting back and forth on an 800 square foot court area for several hours with that frame can take its toll. Anytime you lose weight, especially more than 10% of body mass, there is a good chance absolute strength and energy levels may be compromised due to caloric restriction. In this case, the athlete used UCAN before training to fuel his grueling workouts and after to provide energy for recovery without surging insulin and inhibiting fat burning. Over an 8 month period he lost 31 pounds, ramping down from 203 to 172 pounds. Remarkably, 100% of the weight loss was from fat while his lean body mass stayed the same. Thus, he had the same muscle mass but was carrying 15% less total weight. He not only looked and felt better, but it translated on to the court as well. He then played the best tennis of his career in his slimmed-down physique, and he achieved his highest rankings of his career (10th in the world, #1 in the U.S.), and he was the talk of the ATP Tour with every announcer exclaiming how incredible he looked and played following his transformation.

UCAN Transformation #2

Female Super, Olympic Weightlifter

Age:	20
Height:	5’ 9”
Before:	239 pounds, 40% body fat (96 fat, 143 lean)
After:	239 pounds, 26% body fat (61 fat, 178 lean)

This female athlete desired to improve her body composition while maintaining the necessary body mass to be successful as a Super in Olympic weightlifting. Olympic weightlifting is a weight classified sport; however in the class of Super, athletes are allowed to be as heavy as they want. As a result, there is a fine balance between maintaining the highest competition weight possible, optimizing body composition and maintaining good health. As a weightlifter, the important components of her sport are power to weight ratio and agility in moving the bar. Carrying inefficient body weight can not only hurt the joints of a weight lifter but also limit the ease with which they manipulate the bar. In the case of this athlete, the goal was to improve body composition while minimizing weight loss. Improvements in body composition for an athlete trying to maintain weight can best be achieved by supplying the energy needed in the form of low glycemic foods (foods that don’t spike insulin and keep blood glucose stable). Low glycemic foods can make you feel full and energy intake can tend to decrease. In the case of this weightlifter we did not want this to happen; UCAN was strategically utilized to help supply all of her energy needs without also making her feel too full.
This athlete chose used UCAN to replace the sugar based carbohydrates that she was consuming before, during and after training. The energy taken in prior to training was doubled because she was able to tolerate higher levels of carbohydrate since the UCAN was easy for her to digest. The UCAN was also used to increase calories in snacks such as yogurt and smoothies, and again helped to ensure energy supply was consistent on a low glycemic nutrition plan. Over a 10 month period, this female athlete was able to lower her body fat levels by 13%, while only losing 6 pounds of body weight. All of the weight loss was from fat while her muscle mass stayed the same. During this time the total amount of weight that she could lift also significantly improved. This is a result of having more muscle mass and improving her power to weight ratio. A leaner physique gave this athlete an increased level of confidence which also helped to improve her performance.

UCAN Transformation #3

D-1 Collegiate Coach / Former Professional Football Player

Age:	36
Height:	6'2
Before:	243 pounds, 26% Body Fat (63 # fat , 180# lean)
After:	228 pounds, 18% Body Fat (41 # fat, 187# lean)

Like many athletes, our client found himself in unfamiliar territory following a decade long collegiate and professional football career. As he transitioned from player to coach, he fell into the common trap of consuming similar calories as his playing days without performing anywhere near the physical activity. Over the ensuing years this lead to significant fat gain to the tune of +25 pounds over his playing weight.

With increasing frequency, the coach found himself laboring through on-field coaching drills and he decided to rededicate himself to the weight room and focus on smart eating. Using UCAN as his primary source of carbohydrates at breakfast, and using the protein enhanced UCAN as his pre-work out fuel he started a steady regimen of strength training and running the stairs of the stadium.

UCAN allowed him to train "longer and harder than I ever did as a player". The sustained energy he felt allowed him to regain strength long lost since his playing days. Aside from fueling his workouts and allowing him to train at a high level, he also noted a decrease in his cravings throughout the day when he added a mid-afternoon shake consisting of UCAN and whey protein. This essentially cured his "sweet tooth" which had been a major contributor to his weight gain. His controlled, steady blood sugar and insulin allowed him to utilize fat as fuel and minimize intake of empty calories.

Upon reaching his goal of a 15# weight loss he retested his body composition. Initially focused only on his weight on the scale, the body fat numbers showed an even more impressive transformation. In just under 3 months he had decreased his body fat by 8%, lost 22 pound of fat and gained 7 pounds of lean mass. The ability to gain muscle in the presence of fat loss has long been the goal of many strength and power athletes, by using UCAN to fuel workouts the coach was able to do just that.

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Work Cited

1. Jensen, M.D., et al., *Insulin regulation of lipolysis in nondiabetic and IDDM subjects.* Diabetes, 1989. 38(12): p. 1595-601.
2. Long, W., 3rd, et al., *Does prior acute exercise affect postexercise substrate oxidation in response to a high carbohydrate meal?* Nutr Metab (Lond), 2008. 5: p. 2.
3. Holtz, K.A., et al., *The effect of carbohydrate availability following exercise on whole-body insulin action.* Appl Physiol Nutr Metab, 2008. 33(5): p. 946-56.
4. Stephens, B.R. and B. Braun, *Impact of nutrient intake timing on the metabolic response to exercise.* Nutr Rev, 2008. 66(8): p. 473-6.
5. Hawley, J.A. and L.M. Burke, *Carbohydrate availability and training adaptation: effects on cell metabolism.* Exerc Sport Sci Rev, 2010. 38(4): p. 152-60.
6. Rooyackers, O.E. and K.S. Nair, *Hormonal regulation of human muscle protein metabolism.* Annu Rev Nutr, 1997. 17: p. 457-85.
7. Kimball, S.R. and L.S. Jefferson, *Signaling pathways and molecular mechanisms through which branched-chain amino acids mediate translational control of protein synthesis.* J Nutr, 2006. 136(1 Suppl): p. 227S-31S.
8. Borsheim, E., et al., *Effect of carbohydrate intake on net muscle protein synthesis during recovery from resistance exercise.* J Appl Physiol, 2004. 96(2): p. 674-8.
9. Roy, B.D., et al., *Effect of glucose supplement timing on protein metabolism after resistance training.* J Appl Physiol, 1997. 82(6): p. 1882-8.
10. Koopman, R., et al., *Coingestion of carbohydrate with protein does not further augment postexercise muscle protein synthesis.* Am J Physiol Endocrinol Metab, 2007. 293(3): p. E833-42.
11. Staples, A.W., et al., *Carbohydrate Does Not Augment Exercise-Induced Protein Accretion versus Protein Alone.* Med Sci Sports Exerc, 2010.
12. Parks, E.J., et al., *Dietary sugars stimulate fatty acid synthesis in adults.* J Nutr, 2008. 138(6): p. 1039-46.
13. Bhattacharya, K., et al., *A novel starch for the treatment of glycogen storage diseases.* J Inherit Metab Dis, 2007. 30(3): p. 350-7.
14. Correia, C.E., et al., *Use of modified cornstarch therapy to extend fasting in glycogen storage disease types Ia and Ib.* Am J Clin Nutr, 2008. 88(5): p. 1272-6.
15. Qi, X., et al., *Use of slow release starch (SRS) to treat hypoglycaemia in type 1 diabetics.* Nutrition & Food Science, 2010. 40(2): p. 228-234.
16. Roberts, M.D., et al., *Ingestion of a high-molecular-weight hydrothermally modified waxy maize starch alters metabolic responses to prolonged exercise in trained cyclists.* Nutrition, 2010.
17. Krieger, J.W., et al., *Effects of variation in protein and carbohydrate intake on body mass and composition during energy restriction: a meta-regression* American Journal of Clinical Nutrition, 2006. 83(2): p. 260-274.
18. Volek, J.S., et al., *Body composition and hormonal responses to a carbohydrate-restricted diet.* Metabolism, 2002. 51(7): p. 864-70.