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BLUEPRINT: TRAINING FAT OXIDATION

For the past 80 years, the sports industry and has been literally fueled by supplementing energy deficits with carbohydrates. Metabolic response and maintaining energy has been primarily focused on minimizing caloric deficit by maintaining energy output through manipulating the ingestion of carbohydrates.

The focus has been on consuming carbohydrates to maintain blood sugar and in theory allow the athlete to stabilize and prolong exercise. When the athlete's energy wanes, the advice for carbohydrate fueling is too continually fuel up with primarily simple carbohydrates, namely mixes of glucose, sucrose, fructose, dextrose and maltodextrin. The historic premise of these traditional sugar-based fuels has been threefold, first, to provide a "loading of carbs " before exercise, second, to maintain blood sugar levels during exercise, and lastly, to enhance recovery post exercise.

> ***"Certainly, during exercise, the athlete has higher caloric demands. However, with the body having 15 times more non-carbohydrate fuel available than carbohydrate-based fuel, the ability to draw on these non-carbohydrate sources for flexible and simultaneous energy is key to maximizing endurance athletic performance - not simply being overly reliant on the highly limited carbohydrate source.***

CARBOHYDRATE FUELING

The major problems with reliance on carbohydrates and simple sugars is the dramatic glucose and insulin spike which shuts off fat oxidation processes. Let's take a look at the simple carbohydrate ingestion and the issues prior to and during exercise:

1. Firstly, there is an immediate spike in blood glucose then insulin, resulting in blunted fat oxidation, thereby creating the predominant dependency of carbohydrates for fuel. Additionally, the common inclusion of sucrose and fructose in fueling formulas, has shown to suppress glucose transporter proteins (in muscle cells) specifically Glut4, thereby limiting the channels for carbohydrate to flow from the blood and into muscle cells, most efficiently.
2. In longer-duration exercise, heat, and attempts to consume higher dose carbohydrates (>50gram/hour) has consistently shown to trigger chaotic GI distress, with symptoms of bloating, belching, diarrhea and vomiting. Again, fructose (and sucrose) has the additional negative side-effect of disrupting the GI/Gut membrane integrity, raising systemic inflammatory risk.
3. With the GI system under distress, the athletes' intensity and ability to prolong the activity is dramatically negated. Gut/GI distress continues as the #1 reason for not finishing endurance races.
4. Taking in simple carbohydrates creates a reliance for routine feedings of these fuels. The resultant yo-yo effect of blood-sugars and energy levels, raises bonking and performance risks.
5. The longer-term adoption of high-carbohydrate diet-lifestyles has consistently shown to be associated with more chronic inflammatory based diseases – including cardiovascular disease, diabetes, rheumatic diseases etc.

FLEXIBLE SIMULTANEOUS FUELING

Fat utilization and ongoing fat oxidation efficiency is the key tenant for stabilizing energy, sparing glycogen, mitigated Gut/GI distress, and reduced inflammation allowing endurance athletes to train, race and recovery optimally.

1. Day to day dietary (including during training) intake of quality fats, begins to shift and train, the internal metabolism and muscles to become less reliant on carbohydrates. Lipolytic and oxidative enzymes that breakdown fat can be trained (like muscles) through die and exercise, with lab results showing cases of 2-3 times improvement, in fat oxidation efficiency.
2. An athlete will develop this adaptive fat oxidation response by predominately burning free fatty acids or ketone bodies for fuel at higher and higher intensities. Training fat oxidation efficiency, is highly valuable to the endurance athlete in enabling the body to preserve precious glycogen stores, while enabling stable fuel-energy to muscles through flexible and simultaneous supply of fat and carbohydrate substrates.
3. Reduced dependency on carbohydrate, and lowered consumption of sugars dramatically reduces Gut/GI distress risks.
4. Athletes following a more balanced fat and carbohydrate approach to endurance training-racing fuel, consistently report lower inflammatory symptoms, including reduced delayed onset muscle soreness. While research continues to evaluate the mechanisms at work here, it is believed to be partly responsible by lower free-radical output from fat oxidation (vs. carbohydrate only), a sparing effect on branch chain amino-acid levels, and we suspect lower exposure to gut-generated inflammatory triggers, that would permeate the gut-membrane in the simple-sugar centered athlete.

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KEY TAKEAWAYS: TRAINING FAT OXIDATION

Fat oxidation efficiency enables stable, flexible (fat and carb) and simultaneous fuel oxidation for working muscles.

Fat oxidation when increased, reduces the dependency on carbohydrate intake, and Gut/GI risks in training and racing.

Fat oxidation has a lower inflammatory load than carbohydrate oxidation, supporting more consistent training and racing blocks.

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SFuels Technical Development Team

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BLUEPRINT: TRAINING FAT OXIDATION

Supplement Facts	
30 Servings Per Container	
Serving Size	**About 1 Scoop (10.8g)**
Amount Per Serving	
Calories	**50**
	% Daily Value*
Total Fat 4g	**5%**
Saturated Fat 4g	**20%**
Trans Fat 0g	**0%**
Sodium 240mg	**10%**
Total Carbohydrate 1g	**1%**
Dietary Fiber 0g	**0%**
Total Sugars 0g	†
Includes 0g Added Sugars	**0%**
Protein 3g	**6%**
Calcium 25mg	2%
Potassium (from Potassium Gluconate) 50mg	2%
L-Glutamine 500mg	†

*The % Daily Value (DV) tells you how much a nutrient in a serving of food contributes to a daily diet. 2,000 calories a day is used for general nutritional advice.
†Daily Value (DV) not established.

Other Ingredients: Coconut Oil, Collagen Peptides (Hydrolyzed Beef), Natural Flavors, Himalayan Rock Salt, Citric Acid, Malic Acid, Monk Fruit Extract.

TEXTURE
Water like. Thin and light.

MIX WITH
Cold water.

SWEETNESS
Mild to low.

FLAVORS
Coconut-Lime. Strawberry Lemonade
Pomegranate-Acai. Fruit-Punch

Fuel and Fat Oxidation Training

Coconut based MCT (medium chain triglycerides) bound to collagen (not maltodextrin) to provide caloric fuel, and to train and trigger lipolytic enzyme fat-oxidation efficiency.

The MCT form used is mostly the C8 form which follows similar digestion, assimilation and mitochondrial path as carbohydrate. MCT C8 form is also rapidly channeled into mitochondria for oxidation to fuel.

Electrolyte Balance

Higher dose sodium and potassium, are warranted as supplementation to offsetting electrolyte loss noted in lower-carbohydrate diets.

Additionally, repetitive long-duration training sessions and blocks places further strain on sodium, potassium reserves.

Simultaneous Fat/Carb Oxidation and Gut Distress Mitigation

No inclusion of sugar, sucrose, fructose, glucose, maltodextrins, syrups, or sugar alcohols.

Avoidance of all simple carbohydrates, mitigates the risk of triggering insulin, which would have an anti-lipolytic (anti fat oxidation) impact. This issue is most prominent in the first 30-60minutes of exercise where Glut-4 transporters are still moving to the muscle cell edge, to open glucose channels. Once these channels are opened, the muscle cell can receive and oxidize carbohydrate without insulin, and since without insulin, fat and carbohydrate can be simultaneously oxidized.

The avoidance of sugar-alcohols, and the lowered used of carbohydrate sources, dramatically reduces the risk of gut membrane and microbiome derangement and associated gut/GI distress symptoms, commonly seen in endurance racing/training.

SUGGESTED USAGE

Add 1 scoop of SFuels TRAIN Endurance Powder to 16oz of cold water and mix/shake thoroughly.
Consume 1 serving for every 30minutes of sustained activity. Test in training

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