

Keto Diets for Athletes

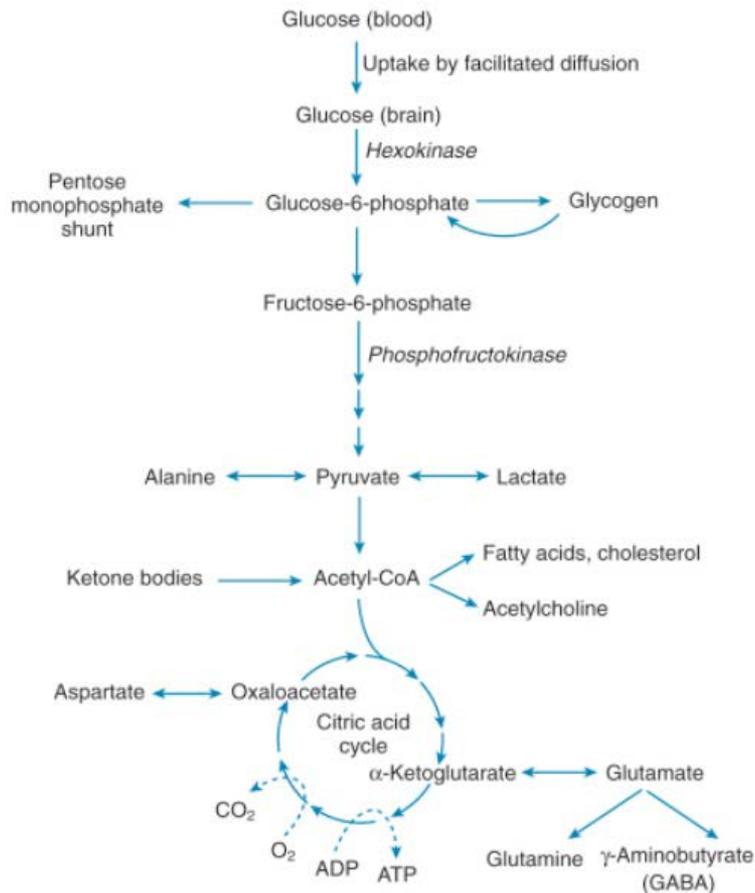
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Let's review...

- Image of Cooper eating a bar
- We fuel our muscles with carbohydrates.
- We need insulin to get glucose into cells for cell function.
- We break down long chains of glucose when we need more.
- We fuel and re-fuel to keep our bodies functioning.

If we don't fuel, we run out of energy

- Image of cooper on the grass



Traditional Sports Nutrition

- The Basics:
 - Fuel BEFORE, DURING and AFTER your activity with easy to absorb glucose containing products and variable fiber and protein.
 - Maltose is one of the easiest to digest.
 - Maximum absorption rate due to GI uptake is 80kcal/20 minutes (240kcal per hour) which is what has been advised for aerobic athletes.

NUTRITION FACTS	
Serv. Size:	packet (32g)
Amount Per Serving	
Calories	100
Calories From Fat	0
% Daily Value*	
Total Fat	0g 0%
Saturated Fat	0g 0%
Trans Fat	0g
Sodium	50mg 2%
Potassium	40mg 1%
Total Carb	25g 8%
Sugars	5g
Protein	0g
Vitamin C	100%
Vitamin E	100%
Calcium	2%

*Percent daily values (DV) are based on a 2000 calorie diet



Have you ever tried to eat this much DURING activity???

BEFORE: 1 to 4 grams PER kg body weight of CHO without fat or fiber (and LOW protein).

DURING: For events 1-2 hours in duration shoot for 30-60 g CHO/hour

- For events > 2.5 hours in duration shoot for 60-90 g CHO/hour and add in protein and fat too
- **AFTER**: 1-2 g/kg body weight CHO + protein:CHO RATIO
 - Medium = 1:2 OR High = 1:1 + Hydration + Metabolites

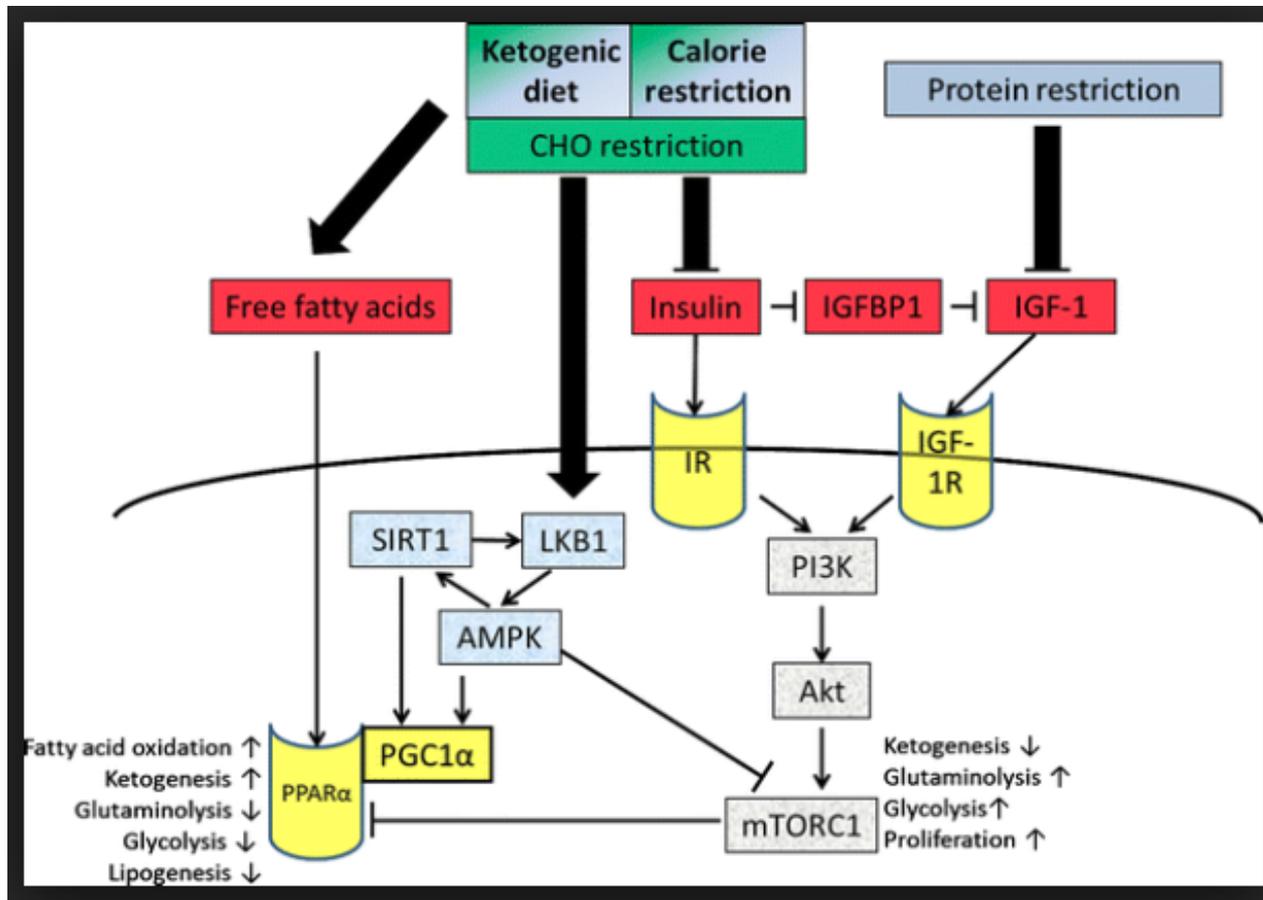
Sports Nutrition = Carbs !!!

- So why should we change now?
- What's wrong with glucose (carbs)?
- Is there a better way to fuel?



What is ketosis?

- Ketosis is a metabolic state characterized by raised levels of ketone bodies in the body due to the breakdown of non-carbohydrate sources. (diagram from selfhacked.com)



Ketosis gets energy from fat NOT CARBS!

- Diet directed ketosis (through carbohydrate restriction) can be used to allow your body to switch from carbohydrate use to fat as fuel.
- So should we try to have our body use fat as an energy source or glucose?

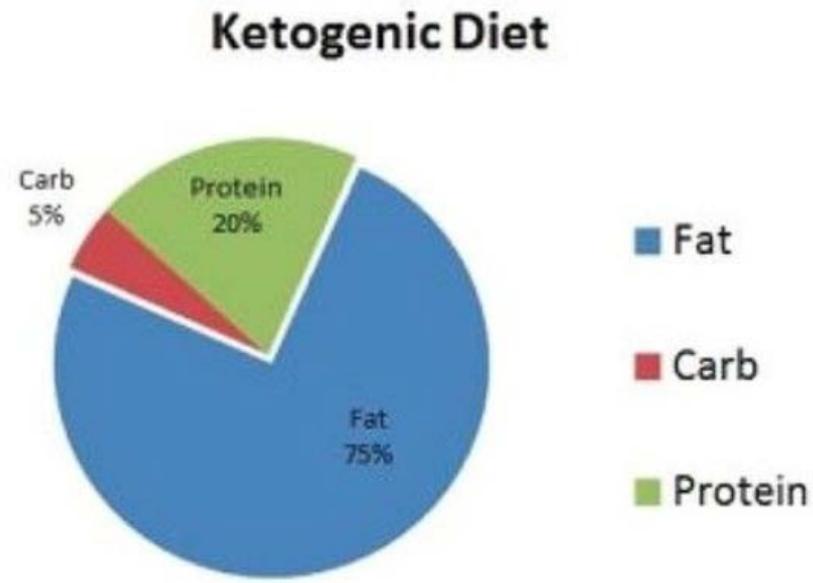
Wait! Isn't ketoacidosis bad???

- Traditionally ketosis has been thought of as a pathological condition - such as diabetes - in which insulin is too low to allow normal glucose uptake to cells.
- Ketosis happens to diabetics when not enough insulin is used resulting in dehydration and acidosis of the blood which can lead to coma or even death.

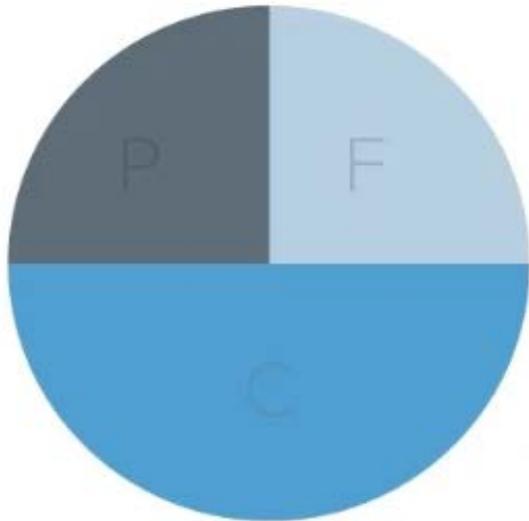


Diet controlled ketosis

- Limit carb intake, eat fat and protein and shift the equation to utilize fat stores for energy.

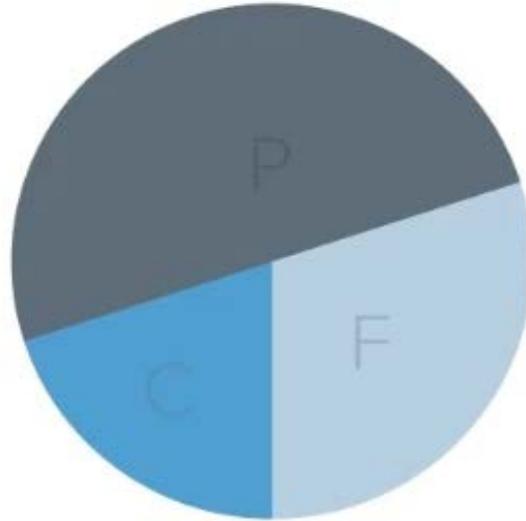


TRADITIONAL



PROTEIN: 15-25%
CARBS: 50-60%
FAT: 20-30%

LOW CARB



PROTEIN: 40-50%
CARBS: 20-30%
FAT: 20-30%

KETOGENIC



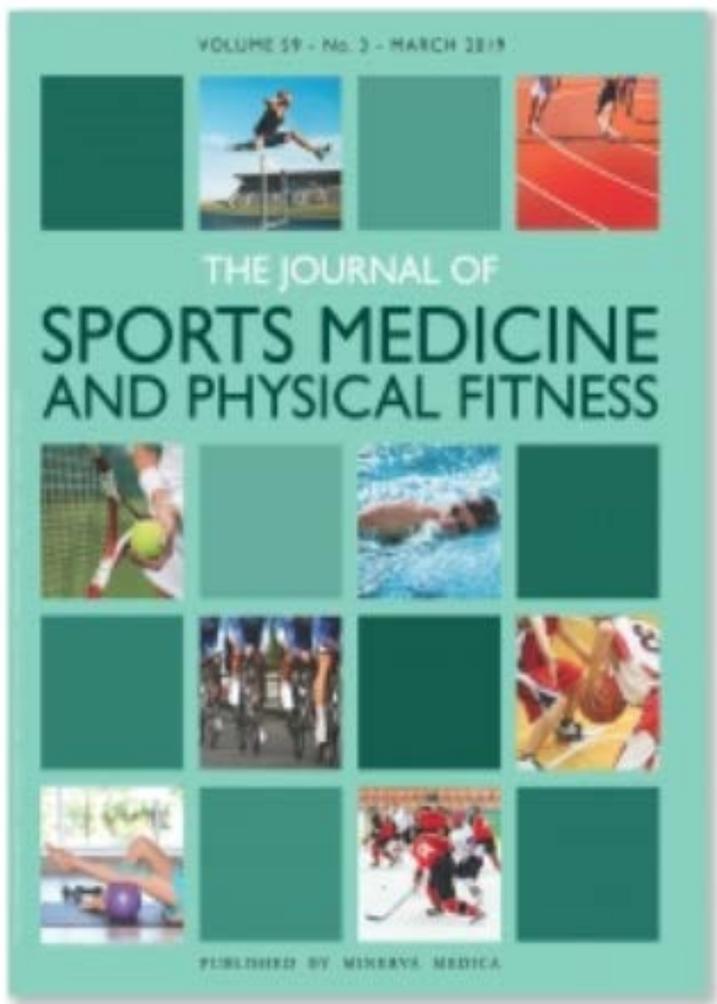
PROTEIN: 25%
CARBS: 5%
FAT: 70%

Ketosis is actually GOOD for endurance!!

- Ketosis seems to be better suited for endurance athletes than anaerobic athletes.



Ketosis and Anaerobic tests



- **RESULTS:** The diets were matched for total energy (LC: 2333 ± 158 kcal/d; HC: 2280 ± 160 kcal/d; $p=0.65$) but differed in carbohydrate content (9 ± 1 vs. $63 \pm 2\%$ of energy intake; $p < 0.001$). LC resulted in lower urine pH (5.9 ± 0.1 vs. 6.3 ± 0.2 , $p=0.004$) and the appearance of urine ketones in every participant. LC resulted in 7% lower peak power (801 ± 58 vs. 857 ± 61 watts, $p=0.008$) and 6% lower mean power (564 ± 50 vs. 598 ± 51 watts, $p=0.01$) during the Wingate test.
- **CONCLUSIONS:** Short-term low-carbohydrate, ketogenic diets reduce exercise performance in activities that are heavily dependent on anaerobic energy systems.

Ketosis and Endurance

- **“Keto-adaptation enhances exercise performance and body composition responses to training in endurance athletes.”** [McSwiney FT](#), [Wardrop B](#), [Hyde PN](#), [Lafountain RA](#), [Volek JS](#), [Doyle L](#). *Metabolism*. 2018 Apr;81:25-34. doi: 10.1016/j.metabol.2017.10.010. Epub 2017 Nov 3.
- Summary: 20 athletes self-selected either a **high or low carbohydrate diet for 12 weeks**. Both groups were trained with the same, endurance, strength and high intensity interval training and measures of body composition, 100km time trial (TT), six second (SS) sprint, and a critical power test (CPT) were measured. **The low carb/keto-adapted group had improved exercise training, lower body fat, improved fat oxidation during exercise, and better 100km time trial.**

Should we have all of our endurance athletes switch???

- Studies are still small in numbers and not long duration however some findings that are still being evaluated are:
- Increase in LDL's in athletes without abnormalities prior to initiation
- Loss of strength in legs over 12 weeks (possibly due to low protein?)

Is the Keto diet new?

- NOPE!
- First use was in the 1920's
- Has continued to be used for seizure control in children
- “Keto” is very similar to previous diets called, “Atkins”, “South Beach”, and “modified Atkins”



So if you want to do it how do you start?

- The diet starts with a period of fasting or VERY restricted carbohydrates .
- Measurements are taken to evaluate for urine ketones. This is documentation that ketosis is occurring.
- Calculate BMR and eat correct caloric intake to meet needs



Yes

- Meat
- Green Leafy Veggies
- Eggs & Dairy
- Cheese
- Oils (Coconut, Olive, Lard, etc.)
- Nuts & Seeds
- Avocados
- Cauliflower
- Berries
- Some Non Green Veggies
- Heavy Whipping Cream
- Diet Soda
- Tea/Coffee (Unsweetened)
- **Water (Very Important)**



No

- Bread
- Pasta
- Rice
- Starches (Potatoes, etc.)
- Sugar
- High Fructose Corn Syrup
- Corn
- Wheat
- Flour
- Legumes
- Beans
- Fruit (Except some berries)
- Soda
- Milk (including Skim)

Note: For better results, make sure to get plenty of magnesium through either food or supplements and also potassium from Lite Salt or food. This will prevent muscle cramps and other common symptoms.



How will you fuel?



Resources

- The ketogenic diet for the treatment of childhood epilepsy: a randomised controlled trial.
- Neal EG, Chaffe H, Schwartz RH, Lawson MS, Edwards N, Fitzsimmons G, Whitney A, Cross JH
- Lancet Neurol. 2008;7(6):500. Epub 2008 May 2.
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- 2. Optimal clinical management of children receiving the ketogenic diet: recommendations of the International Ketogenic Diet Study Group.
- Kossoff EH, et al. Charlie Foundation, Practice Committee of the Child Neurology Society, Practice Committee of the Child Neurology Society, International Ketogenic Diet Study Group Epilepsia. 2009;50(2):304.
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- 3. Low-carbohydrate, ketogenic diet impairs anaerobic exercise performance trained women and men: a randomized-sequence crossover trial.
- Wroble, K, Trott, M, Schweitzer, G, Rahman, R, Weiss, P., The Journal of Sports Medicine and Physical Fitness. 2018; DOI 10.23736/S0022-4707.18.08318-4
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- 4. Keto-adaptation enhances exercise performance and body composition responses to training in endurance athletes.
- [McSwiney FT](#), [Wardrop B](#), [Hyde PN](#), [Lafountain RA](#), [Volek JS](#), [Doyle L](#). Metabolism. 2018 Apr;81:25-34. doi: 10.1016/j.metabol.2017.10.010. Epub 2017 Nov 3.
- *Journal of the International Society of Sports Nutrition* 2017 14:33