

“Carb” (not “Keto”) is a Four Letter Word

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Introduction

Hospital-based nutritional support has evolved from simple feeding to active therapy. Particularly in critical care, patients are consciously fed, not inadvertently fasted. Now the majority of current nutritional literature focuses not on whether to feed, but how much—total calories and protein intake. Typical enteral formulas are predominantly low fat/high carbohydrate. One exception to this are formulas with specific fatty acids (FA) meant to modulate inflammation and improve outcome in sepsis. This work addresses WHAT to feed and suggests that diet can have an effect on par with pharmaceuticals. That said, its broader application to other surgical and critical care patients has shown inconsistent results. The potential power of feeding and manipulating dietary fats may in fact be negated by the persistence of a high carbohydrate load in the standard formulas. Omega-6 linoleic acid-based oils (soy, canola, and other vegetable oils) and omega-3 FAs (especially EPA and DHA from fish) can potentially increase the production of anti-inflammatory chemicals, while arachidonic acid (also an omega-6 fat) promotes inflammation and pain. However, an omega-6 and -3 imbalance (now on average 15:1 versus a healthier 2:1) can exacerbate inflammation acutely, increasing pain, and lead to the development of chronic disease long term. In this instance, the presence of high amounts of omega-6 FA can instead promote inflammation. Carbohydrates can also contribute to inflammation by increased insulin production, which diverts more omega-6 FAs away from anti-inflammatory production into the inflammatory pathway. For this reason, a growing body of evidence advocates reduced intake of high-glycemic carbohydrates, and even a low- or very-low-carbohydrate (20-130gm CHO/day), high-fat (LCHF) diet to enhance health.

Methods

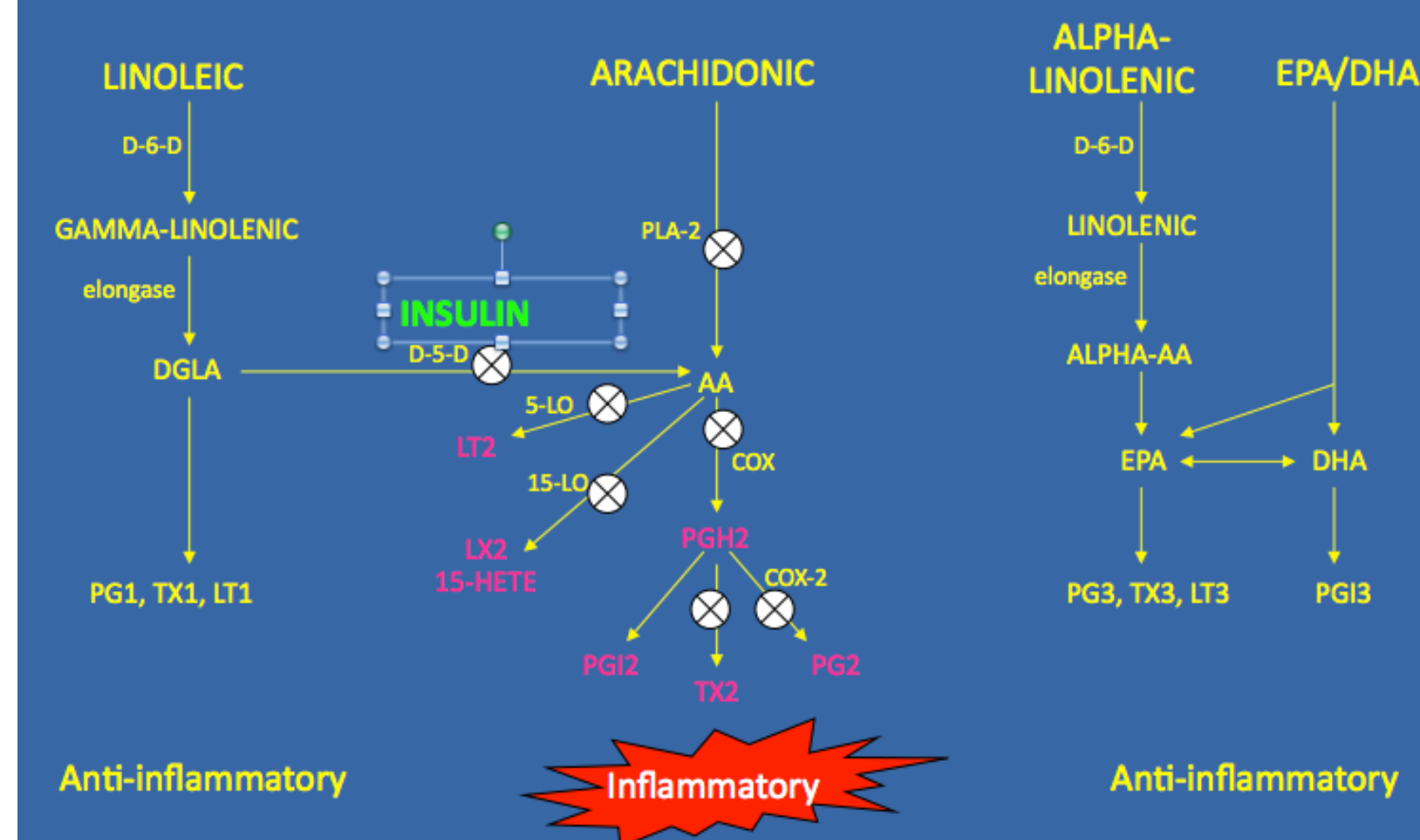
We reviewed the composition and sourcing of commonly used enteral feeds.

Results

Feeding the average 75kg male, all formulas contained a “moderate” or “high” carbohydrate levels (195-273 gm carbohydrate/day) as defined in the literature. Typical ingredients in formulas include, for carbohydrates, corn, maltodextrin, fructose and sucrose, and for fats canola and/or soy oil, high in linoleic acids.

Per 1800cc/day	GM CHO (%)	GM PRO (%)	GM FAT (%)	CHO SOURCE	FAT SOURCE
VITAL 1.2	195 (36)	133.5 (25)	96 (39)	Corn, Maltodextrin	Marine Oil, Canola, soy, MCT
PROMOTE	231 (52)	111 (25)	46.5 (23)	Corn, Maltodextrin, Sucrose	Soy, Safflower, MCT
GLUCERNA 1	172 (34.3)	75 (16.7)	98 (49)	Corn, Maltodextrin, Fructose	High Oleic Safflower, Canola, MCT
JEVITY 1	273 (54.3)	78 (16.7)	60 (29)	Corn, Maltodextrin, Carageenan	Canola, Corn, MCT
OXEPA	187.5 (28.1)	111 (16.7)	167 (55)	Corn, Maltodextrin, Sugar	Marine Oil, Borage, Canola, MCT

Balancing Inflammation



Conclusion

For most clinicians, ketosis is pathophysiology, but nutritional ketosis in fact, is not. LCHF diets are shown safe as an effective treatment of diabetes and obesity. They are also an excellent nutritional strategy for endurance athletes, who, following long, hard training and racing develop a very similar systemic inflammatory response as trauma patients. In the critical care arena, nutritional ketosis is used to control epileptic seizures and studies suggest an injured brain’s preference for and increased uptake of ketones. These considerations warrant a study on a LCHF diet with a balance of FAs in feeding the critically ill. Adopting these changes in the ICU may help better control inflammation and pain, reduce infection, and improve recovery time.

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