

THE ZONE DIET

Dissection of a Dietary Fad

Dr. Gutweiler
Connie S. Hayes
#9326
April 7, 2000

ABSTRACT

Scientific understanding of the chemical and physiological nature of muscular work in the early 20th century was followed by dietary aid use by athletes and rationalized as “scientific” justification. Athletes commonly use current products such as protein isolates and antioxidant nutrients, and many ergogenic aids available today differ little from those used long ago. The Zone Diet joins the ranks of other nutritional manipulative efforts for the elite athlete. This low carbohydrate, protein rich, calorie deficient diet boast of improving athletic performance. Much of the research suggests the contrary. The diet states that by focusing on protein intake, it can alter the body’s insulin to glucagon ratio. However, the idea that lower carbohydrate intake while increasing protein consumption can alter pancreatic hormone response in glucagon’s favor is unsubstantiated.

INTRODUCTION

The Zone diet is yet another fad in the long list of dietary regimens marketed towards improving athletic performance. According to Dr Barry Sears, author of 'The Zone', it is a physiological condition reached by consuming food in proportions of 40% carbohydrate, 30% protein, and 30% fat for 3 meals and 2 snacks a day. The ideal distribution and calorie requirement is determined on the basis of protein intake. In an over zealous desire to reach a higher performance level, people often fail to take an objective overview of claims made by dietary regimens. In this literature review, the Zone Diet and the efficacy of the 40/30/30 plan will be explained. In addition, the role of insulin/glucagon, as well as, eicosanoids, exercise and the Zone will be investigated. When studied alone, it is true that carbohydrates produce an increase in the release of insulin and a decrease in the level of circulating glucagon(4). It is also true that protein elicits just the opposite effect in the levels of insulin and glucagon when it is consumed in the absence of carbohydrates. Protein and carbohydrates are digested and the body is then resupplied with glucagons and insulin. Reduced carbohydrate consumption would produce lower insulin levels which result in more linolenic acid (GLA) production and less (DGLA) dihomo-linolenic acid, which is the precursor of arachidonic acid (AA). Glucagon and insulin do not remain in the plasma forever. They go through a steady decay process in the plasma, and therefore, without a constant resupply their effect is limited. According to Sears, it is this change in hormones that allows entry into the Zone (8). However, despite it's high protein influence, the Zone is still a mixed diet. Coulston et al (6) compared the insulin responses in both a 60% and 40% carbohydrate diet. They

found that the insulin rise was a lot less in the 40% carbohydrate diet, but that both diets maintained an insulin level too high to elicit glucagon mediated lipolysis.

“If insulin and glucagon are your portal to the Zone, eicosanoids are the Zone”(8).

Eicosanoids control all of the body’s hormonal systems such as prostaglandins, thromboxanes and leukotrienes which are all in the eicosanoid family. They are hormone-like derivatives of essential fatty acids. The Zone divides eicosanoids into ‘good’ and ‘bad’ categories. According to Sears, good eicosanoids are anti-inflammatory, promote vasodilation inhibit platelet aggregation and cellular proliferation, and stimulate immune response(8). Bad eicosanoids do just the opposite of the good ones. Formation of eicosanoids begins with the desaturation of linoleic acid to linolenic acid. These eicosanoids and their precursors serve dual puposes within the body. The basis for the Zone’s claim of improved physical performance originates from the idea of eating more linolenic acid(8). However, Sears fails to explain the mechanism by which the digestion of linolenic acid can selectively produce only good eicosanoids.

A comprehensive literature review will provide the reader with current debate on the efficacy of the Zone Diet. One significant component of this debate is the role of eicosanoids and how diet can control the insulin-glucagon ratio. Barry Sears states that his Zone diet (40,30,30) is based on “humanity’s genetic makeup”(8). He states that the human body requires a constant protein-to-carbohydrate ratio; with the carbohydrates being of low-density. In his book, The Zone: A Dietary Road Map, he states several

important points to his diet plan. According to Sears:

1. Eating fat does not make you fat as long as it is the consumption of monounsaturated fat.
2. Athletes perform better on a high-fat diet than on a high-carbohydrate diet. Sears is convinced that an athlete eating a high-carbohydrate diet will never reach their potential, due to the inflammatory state that such a diet would impose on one's body.
3. Exercise alone cannot counter-act the negative effects of a high-carbohydrate diet.
4. A high-carbohydrate diet might be hazardous to the health of a cardiovascular patient.
5. By following the Zone diet one can burn fat, fight diabetes, PMS, chronic fatigue, depression and cancer.

The anti-inflammatory environment accomplishes all the above as well as producing the glucagon-favored, insulin-to-glucagon ratio recommended by the Zone.

The premise of dietary aid use is based upon superstition and ritualistic behavior of athletes who perceive that past performances were predicted by unique dietary regimens or dietary manipulation. Accounts from ancient times recommended that athletes and soldiers preparing for battle consume specific animal parts to gain agility, speed or strength associated with that animal. Dietary aids such as alkaline salts, caffeine, carbohydrate and protein have been used with variable success. As nutritionists and exercise physiologist discovered and perfected the scientific understanding of metabolic reactions, athletes in turn experimented with the amount, form and timing of administration in the search of the optimal performance. Anabolic steroids and blood doping enhance athletic performance, but health risks, ethics and sportsmanship hindered

their use. Popularity of dietary aids often has preceded scientific substantiation of claims. People are always in search of the 'magic bullet' in every aspect of life. When it comes to athletic performance, this is no exception.

MATERIALS & METHODS

The research shown was a computer generated literature review using the PUBMED database (www.pubmed.com). The keywords used were 'diet fads', 'protein diets' and 'diet and athletes'. The database located a total of twenty (20) articles on the above headings, dating back to 1985. Of these twenty articles, eight did not pertain to the subject at hand. Of the remaining articles, all of the available abstracts were read, and the articles remaining were looked up or ruled out by the author. Included in the research was, The Zone Diet by Barry Sears; New York: Harper Collins, 1995. A web search using the keywords 'high protein diet' produced eight (8) websites, including www.zonedietdelivery.com.

LITERATURE REVIEW

In 1992, the United States Food and Drug Administration created the Food Pyramid(10). The USDA recommends six to eleven servings of carbohydrates daily, and suggests a caloric intake between 2000 – 3000 calories/day. The daily energy use is based upon

three major factors: How much muscle we have; how much total weight we carry around, and how far we move our weight in a day. The USDA suggests only 2-3 serving of protein daily. Doing the math on the average recommended 'Zone-favorable' diet, one discovers that it is a low-calorie diet (approximately 1500 calories/day). Dr. Klaper states in his article that such a low carbohydrate diet would put the body into a "constant state of ketosis"(7). Ketone bodies are acidic products derived from the breakdown of fatty acid oxidation. He further states that keeping the body in a constant state of ketosis causes a large load of metabolic acid on the kidneys to excrete large amounts of NH_4^+ to control blood pH. Increased requirement for carbohydrate synthesis cause the liver to produce greater amounts of urea. Dr. Klaper points out that a protein-rich diet can cause intestinal problems by promoting the growth of pathogenic organisms. This, he says, can lead to "leaky gut syndrome"- a condition of increased intestinal permeability, which allows pathogens to leak into the bloodstream(2). In essence, Dr. Klaper is stating that the Zone diet creates an acidic environment in the plasma, and hence an inflammatory environment in the body.

In Coleman's article, 'The biozone nutrition system', he states that a high protein diet has been highly correlated with colon cancer(1). He states that there is scientific, time-tested data to support the presence of a high carbohydrate diet for elite athletes. There is very little data to substantiate Sears' claims, especially with regard to eicosanoids.

Cheuvront states that the Zone's ability to alter the pancreatic hormone response is

unfounded. Chevront points out that Sears fails to mention the multiple roles played by protein consumption at the macronutrient level, and is therefore misleading. Sears states that by eating protein, the glucagon:insulin ratio will move in favor of glucagon, and increase the production of linolenic acid and eicosanoids to create an anti-inflammatory environment within the cells. Chevront states that the reaction proceeds through a series of fatty acids as follows to produce the eicosanoids in question:

Linoleic →Linolenic →Dihomo-linolenic →Arachidonic →Eicosanoids

Where the step from linoleic acid to linolenic acid is catalyzed by $\Delta 6$ Desaturase and the step from dihydro-linolenic acid to arachidonic acid is catalyzed by $\Delta 5$ desaturase.

He goes on to point out that protein, which is proposed to help boost the body's glucagon ratio, increases the activity of both $\Delta 6$ and $\Delta 5$ desaturase. This would produce more eicosanoids and place the body in a 'Zone State' in theory. Unfortunately, glucagon decreases the activity of both $\Delta 6$ and $\Delta 5$ desaturase (6). Sears does not offer an explanation as to how one reaches the Zone given these opposing reactions. Chevront goes on to say that even though the biochemistry of the Zone is on target, the connections made between nutrition, endocrinology, lipid metabolism, and exercise physiology are oversimplified(6).

It has been suggested that the power outputs of distance runners during a marathon race approach 20 kcal/min(5). This would imply that a 2-2.5 hour race could expend 2400 to 3000 kcal. This implication was confirmed by measuring the energy expenditures of 12

males performing a treadmill marathon(5). A 1989 nationwide survey of the nutritional habits of elite athletes suggests that endurance athletes, male and female, consume between 3100 and 5900 kcal/day, and 2100 and 3100 kcal/day respectively. A study by Costill et al.(6) showed that the cumulative effects of daily glycogen depletion could only be reversed by consuming 500-600g of carbohydrates daily. The Zone diet is credited for carrying Stanford's women swim team to a winning season. The regimen placed on the Stanford team followed a study using Ohio State swimmers to evaluate their performance and diet. The diets were of either 43% or 80% carbohydrates(8). The original findings of the study done on these 2 dietary protocols after 9 days were that there were no significant differences between athletic performances. The Zone misleadingly reports the results of this Ohio State study as evidence that the 40% carbohydrate diet is effective, but never states that both groups of swimmers consumed more than 500g of carbohydrates/day.

CONCLUSION

Manipulating diet to improve athletic performance is as old as the Olympics themselves. As the list of banned substances grows, our need to find a natural edge increases. Enter Dr. Barry Sears and his Zone Diet. Sears calls 'the zone' that "near euphoric state of maximum physical, mental, and psychological performance"(8). The Zone diet boast that through the 40/30/30 plan one can achieve a competitive edge. The diet is proposed to alter the pancreatic hormone response in favor of glucagon. This hormonal alteration

gives the athlete more energy and is also responsible for controlling the production of 'good' eicosanoids; which is the key to entering the Zone(8). This is a simple approach to such a complex process. The Zone fails to address the checks and balances that operate inside such intricate processes of the body. Dr. Sears' claim that vasodilation in muscle arterioles can be achieved by altering eicosanoid production is true in theory(5), however, there is little scientific evidence to support that this provides significant change in the insulin glucagons ratio. Through my research I found only one article that spoke favorably toward the Zone diet. Unfortunately, this article failed to address the scientific basis of the Zone and only mentioned the diets' popularity and ability to elevate Sears to millionaire status (9). I found plenty of journal article that opposed Dr. Sears' protein diet; article such as Coleman's "The Biozone Nutrition System: A Dietary Panacea?", in which he states there is no scientific data to support Sears' eicosanoid claims, and Chevront's "The Zone Diet and Athletic Performance", in which he states that there is not enough detailed explanation in the mechanism behind the Zone diet.

REFERENCES

1. Coleman EJ The biozone nutrition system:a dietary panacea? Int J Sport Nutr 1996;6:69-71
2. Sherman WM Leenders N Fat loading: the next magic bullet? Int J Sport Nutr 1995
3. Akermark C, Jacobs R, Rasmusson M. et al. Diet and muscle glycogen concentration in relation to physical performance in Swedish elite hockey players. Int J Sports Nutr 1996;6: 272-84
4. Lamber Ev Speechly DP Dennis SC et al. Enhanced endurance in trained cyclists during moderate intensity exercise following two weeks adaptation to a high fat diet. Eur J Appl Physiol 1994; 69: 287-93
5. Kiens B, Raben AB, Valeur AK. Et al. Benefit of dietary simple carbohydrates on the early post exercise muscle glycogen repletion in male athletes. Med Sci Sports Exerc 1990; 22(2 Suppl.);S88
6. Chevront SN The Zone Diet and athletic performance. Sports Med 1999;27 (4):213-228.
7. Applegate EA, Grivetti LE. Search for the competitive edge: a history of dietary fads and supplements. J Nutr 1997;127(5 Suppl.); 869S-873S
8. Sears, B. The Zone: a dietary road map. New York:Harper Collins, 1995
9. Ratnesar, R. Against the Grain: The Low-Carb Zone Diet Rises from Fad to Fixture. Time 1997;150:25
10. Garrison, R, Somer E. The Nutrition Desk Reference. New Canaan:Keats Publishing, 1995

