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# Going Against the Grain

## Flaws in the Zone Diet

Samuel N. Cheuvront, PhD, RD

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**The Zone Diet is an eating plan claiming to maintain an "ideal" hormone balance and improve health through the manipulation of dietary carbohydrate and protein. Although popular, the diet's health claims are based on dubious information and misinterpreted scientific facts, and it ultimately remains unsubstantiated.**

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The Zone Diet is an eating plan that claims to maintain "ideal" hormone balance and improve health through the manipulation of dietary carbohydrate and protein. Eaters are urged to consume a specific protein-to-carbohydrate ratio (P:C = .75) with each meal to reduce their insulin-to-glucagon hormone ratios and to trigger biologic events that ultimately produce permanent weight loss, reduce chronic disease risk, and enhance sports performance.<sup>1-3</sup> Total calories recommended on the Zone Diet are low, carbohydrate is approximately 100 g/day for sedentary people (40% of total energy intake),<sup>3</sup> and low glycemic index foods are emphasized.<sup>1,2</sup>

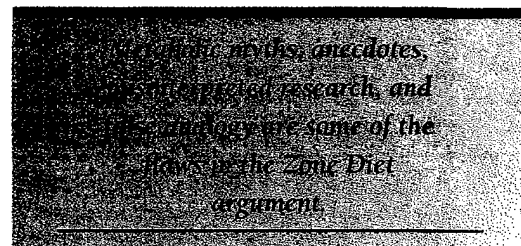
Nutrition quackery is the entrepreneurial promotion of any diet that restricts food choices, boasts of therapeutic benefits related to health and disease, and is unsubstantiated by modern science.<sup>4</sup> The Zone Diet's formulation qualifies as modern nutrition quackery under this definition. Its rationale has been addressed and refuted in great detail elsewhere,<sup>3,5</sup> but it continues to be popular.<sup>3</sup> Like other popular low-carbohydrate diets, the Zone Diet is mass marketed to the public using claims (Table 1) that sound "scientific" but go against contemporary evidence-based nutrition science. This article provides a summary of the arguments used by Zone Diet proponents and the scientific evidence that refutes them.

### Fundamental Flaws in the Zone Diet Argument

#### Zone Diet Proponents Endorse Metabolic Myths

Weight loss is not dependent on the composition of the diet as long as total energy intake is adequately reduced.<sup>6</sup>

Also, when energy intake exceeds energy output, weight is gained independent of the dietary macronutrient composition.<sup>7,8</sup> However, strategies aimed at reducing obesity in America often target the need to eat less fat<sup>9,10</sup> because it is more energy dense than carbohydrate. Spontaneous food consumption and total energy intake increases when the diet is high in fat and decreases when the diet is low in fat.<sup>7,11</sup> Proponents of the Zone Diet and other low-carbohydrate diets argue that because data



show Americans growing more overweight while consuming less fat than ever before,<sup>12</sup> the fattening of America must result from an overemphasis on dietary carbohydrates, especially those with a high glycemic index (GI), which they claim may overstimulate the release of insulin and hasten the storage of fat and other nutrients.

Obesity is a disease often characterized by hyperinsulinemia. It is argued that eating carbohydrates, especially those with a high GI, promotes excessive insulin release (hyperinsulinemia), fat storage, and obesity.<sup>1,2</sup> Many

Characteristics of the Zone Diet	YES	NO
Is false reasoning used (e.g. simple/slope reasoning)?	✓	
Is yes/no/pragmatic evidence presented as empirical scientific support for a theory?	✓	
Are the links between the scientific studies and the proposed mechanism of action?	✓	
Are the scientific theories or models governing the process criticized?	✓	
Is the use of analogy or metaphor faulty?	✓	

plausible relationships among these physiological factors exist, but they do not necessarily represent a causal chain. Reference to such a causal chain of events (ie, carbohydrates raise insulin levels, which results in obesity; therefore, carbohydrates cause obesity) is an example of "slippery-slope" reasoning. Although some studies show the potential for high GI carbohydrates to increase body weight,<sup>13</sup> many dietary factors influence and alter the GI, including the presence of protein, fat, fiber, and other common food components.<sup>11</sup> As a result, there has been a de-emphasis on the GI in the management of obesity and chronic disease.<sup>11,14</sup> The pathophysiology of obesity is multifaceted and complex, but there is a simpler explanation for weight gain observed when fat intake is reduced, the first law of thermodynamics!

Although overfeeding fat remains a more efficient means of weight gain than overfeeding carbohydrate,<sup>8</sup> the first law of thermodynamics cannot be circumvented. When energy intake exceeds energy expenditure, weight is gained regardless of the energy source.<sup>7,8</sup> According to a recent US Department of Agriculture (USDA) survey of more than 16,000 Americans,<sup>15</sup> fat intake (g/day) has not changed in the past 10 years. However, total energy intake has increased in concert with a decline in self-reported physical activity.<sup>15</sup> In fact, 30%–45% of men and women report little or no daily exercise, which coincides with more than 50% of adults being overweight.<sup>15</sup> The importance of physical activity to the energy balance equation is also underscored by the steep rise in obesity in Britain between 1980 and 1990, despite reductions in both fat intake and total energy intake during the same duration. Trends in obesity in Britain during that period were best tied to changes observed for number of cars per household and hours of television viewing.<sup>16</sup> An analysis of data from the National Weight Control Registry concluded that the most successful long-term weight maintenance

strategy, even for men and women with extensive histories of overweight, was to eat fewer calories and increase physical activity.<sup>17</sup>

### Zone Diet Proponents Rely on Anecdotes

Many of the Zone Diet's arguments are based solely on anecdotes. One example is the claim that adherence to the Zone Diet, rather than a more traditional diet high in carbohydrate, was responsible for propelling many collegiate swimmers to Olympic success.<sup>1</sup> Their path to the medal stand cannot be attributed to any single factor, nor can we even be certain that the Zone Diet played any role at all. Anecdotes are not science. At best, they are a mere springboard to scientific inquiry. The reliable evidence that does exist concerning nutrition and sports performance is diametrically opposed to the adoption of a Zone Diet.<sup>5,18,19</sup> Specifically, endurance athletes require daily intakes of carbohydrate far in excess of Zone Diet recommendations to replace glycogen losses that reduce the ability to train and compete optimally at moderate to high exercise intensities.<sup>5,19</sup>

### Zone Diet Proponents Misinterpret Research

Zone Diet advocates wrongly interpret many studies that dispute its theories.<sup>1,20</sup> The results of experiments showing equivalent effects of 40% and 80% carbohydrate diets on endurance performance,<sup>21,22</sup> on the surface, support the Zone Diet concept and are portrayed as such by Zone Diet advocates.<sup>1,20</sup> However, these studies provided considerably more energy (3500–4700 kcal/day) and carbohydrates (5–12 g/kg/day = 370–935 g/day) than even the highest Zone Diet recommendations for elite endurance athletes (Table 2). In another study,<sup>23</sup> Zone Diet proponents claim the diet<sup>20</sup> showed that a higher fat (38%) and lower carbohydrate (50%) diet enhanced oxygen uptake and improved endurance. This diet also provided 3500 kcal/day, 6.7g/kg/day carbohydrates (438g/day), and a P:C of .24. The experiment included more than double the carbohydrate content allotted in the Zone Diet (Table 2), was within the guidelines for optimal carbohydrate intake for endurance exercise (5–10 g/kg/day)<sup>24</sup>, and resulted in a P:C ratio well below that in Zone Diet recommendations (.75). These diets are nothing like Zone Diets. In fact, the only study to ever explicitly examine the impact of the Zone Diet on exercise performance, although limited in its methodology, reported a 10% decline in endurance after only 7 days on the diet.<sup>25</sup>

### Zone Diet Proponents Criticize Federal Nutrition Guidance

Low-carbohydrate diet enthusiasts often attack federal food and nutrition policies aimed at reducing fat and

Fat (% kcal)	Weight (kg)	Body Fat (%)	Fat-Free Mass (kg)	Protein (g)	Carbohydrate (g)	Fat (g)	Energy (kcal)
30	64	7.5	59	130	173	55	1730
40	64	7.5	59	130	173	60	2020
60	64	7.5	59	130	173	70	3030

Energy density of maintenance ration is 22.5 kJ/kg of dry matter.

increasing carbohydrate intake. Zone Diet proponents contend that the federally recommended “healthy diet” (55% carbohydrate, 15% protein, and 30% fat) is “hormonally dead wrong” and has never been tested or proved to be healthy.<sup>1,26</sup> Given the quantity and quality of research in support of contemporary diet recommendations but the difficulty with which the message is conveyed to the public, these remarks represent the epitome of public confusion and misinformation.

The Institute of Medicine (IOM) is one of the organizations operated by the distinguished National Academy of Sciences (NAS). Current dietary recommendations emerged primarily from reports published by its committees,<sup>9</sup> as well as those issued by the Surgeon General<sup>4</sup> and the USDA.<sup>10</sup> These publications represent landmark achievements of rigorous scientific inquiry into nutritional approaches that reduce chronic disease. Although the long-term efficacy of adopting the Dietary Guidelines for Americans has never been tested, the validity and efficacy of its component recommendations for health were reviewed in a large cooperative effort organized by the American Heart Association.<sup>27</sup> Based on an extensive review of research and research-based recommendations already in place from numerous independent professional organizations, these guidelines were upheld and unified with remarkable agreement.<sup>27</sup> The National Nutrition Monitoring and Related Research Act of 1990 requires that the research on which the Dietary Guidelines for Americans is based be reviewed every 5 years and that revision be based only on current scientific evidence and medical knowledge.<sup>10</sup> Therefore, even legitimate science-based recommendations are subject to change as our understanding of nutrient-health interactions improves. Although the public may view the dynamic nature of nutrition science as fickle or confusing, it is actually a fine example of the self-correcting nature of science at work. Knowing the difference between what is and what is *not* sound nutrition science is the key.

### Zone Diet Proponents Argue Using False Analogy

Zone Diet advocates claim that the cattle industry has known for years that the best way to fatten cattle is to feed them copious quantities of grain.<sup>2,26</sup> They conclude that the same fattening fate will befall people eating pasta and bagels because humans are similar to cattle.<sup>2,26</sup> In fact, the monogastric anatomy and physiology of human beings is different from their ruminant cattle counterparts. Unlike humans, cattle are herbivores capable of extracting a considerable amount of energy from fiber. Cattle subsist on a forage-based diet (grass) for most of their lives, yet there is little difference between the marbling of meat in grain-fed or grass-fed animals, as long as grains or grain concentrates are limited to the finishing phase of meat production.<sup>28,29</sup> In fact, the demand for leaner cuts of meat by health-conscious consumers has resulted in leaner cattle, even though carbohydrate remains the primary bovine dietary constituent. There are also unique differences in metabolism and the handling of macronutrients between ruminants and nonruminants<sup>30</sup> that make species comparisons inappropriate. The human-to-feedlot cattle analogy succeeds in grabbing consumer attention, but it fails as a scientific argument.

### Applications and Conclusions

Although adopting a Zone Diet is not harmful to health as are other more extreme low-carbohydrate diets,<sup>31</sup> the diet is a rigid and restrictive eating regimen (a more elaborate interpretation of the Zone Diet as it relates to nutritional adequacy can be found elsewhere).<sup>31</sup> More importantly, the diet’s overblown health claims are based on dubious information and misinterpreted scientific facts and ultimately remain unsubstantiated.<sup>3,5</sup> The burden of proof rests with the Zone Diet and other low-carbohydrate diet advocates in demonstrating through well-controlled

studies, rather than rhetoric, that a change in food and nutrition policy to restrict carbohydrates is truly warranted for improved health.

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