Beer Carbohydrates – The Real Story

Many Popular Carb Diet Books Provide Incorrect Information About Beer

The popularity of recent carbohydrate diet books has focused Americans' attention on carbohydrates in their food as never before. Even those who are not on strict carb diets consider some carbs "good" or "bad" based on this advice and make their food choices accordingly.

Unfortunately, many of these books contain errors about beer, which are focused in three areas:

Error 1: Maltose in beer

Some recent, popular carbohydrate diet books incorrectly claim that beer has a high glycemic index. They base this on the incorrect belief that beer is high in sugar, or particularly maltose.[1, 2, 3, 4, 5, 6, 7]

Beer is made, in part, with malted barley. When the barley malt is first cooked in the brewing process, the resulting liquid contains maltose, which is a sugar. During fermentation, however, yeast consumes the maltose, converting it to alcohol and natural carbonation.

Popular beers in fact contain little or no maltose or any other simple sugars.[8, 9, 10, 11]

Error 2: Glycemic index of beer

The science of nutrition, and in particular carbohydrate metabolism, is complicated and dynamic. Many popular carbohydrate diet books attempt to simplify and popularize these difficult concepts by calling food "good" or "bad" based on its "glycemic index" alone.[1, 2, 5, 6]

The glycemic index is a way of measuring how fast and high a specific food increases blood sugar.[26, 27] Although there are two similar methods for measuring glycemic index, there is no consensus among doctors or nutritionists that glycemic index alone is a reliable way to choose foods for weight loss or any other diet.[12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22]

When it comes to beer, many diet book authors say beer's glycemic index is high.[1, 2, 3, 5, 6, 7] But this is based on the mistaken belief that beer contains high levels of sugar or maltose, which we know is incorrect.[8, 9, 10, 11]

So, what is the correct glycemic index of beer?

At this point, it is unclear. Some sources say beer contains too few carbs to be tested for glycemic index.[23, 24] Measuring the glycemic index of a food generally requires the food be consumed in about a 15-minute time period and in quantities that deliver 50 grams of carbohydrates. Then, the blood sugar is measured over time and the results are compared to the blood sugar response of a standard food, such as glucose or white bread.[13, 26, 27]

The problem with testing beer this way is that all beers are relatively low in carbs.[23, 24] It would require a person to drink, for example, 7.5 light beers within 15 minutes to consume the 50 grams necessary to measure the resulting blood sugar. That is not responsible consumption of beer by adults.

Beer's glycemic "value" is very low.

Many carb diet books focus on glycemic index. But several experts warn against using glycemic index alone when choosing foods because it does not account for serving size, the effect of eating different foods together in one meal, which is how most people eat, or other factors.[12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22]

For this reason, some experts suggest that a more important measure is the "glycemic load," which adjusts glycemic index for serving size. (Multiply glycemic index by the number of carbs per serving and divide by 100.) Glycemic load provides a better idea of how a single serving has an impact on blood sugar.[12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22]

If you select your food based on glycemic index (GI) alone, then you would have little guilt eating chocolate cake, while watermelon would be forbidden. But when you account for carbohydrates per serving, watermelon's glycemic load (GL) is much lower, and much preferred, than the chocolate cake.

	GI	Carbs	GL
Chocolate Cake	38	58	22
Watermelon	72	6	4

Source: Sydney University Glycemic Index Research Service (University of Sydney) Web site

Beer's glycemic index has not been published.[23, 24, 25] However, even if beer's glycemic index were determined to be 70, the glycemic load for Bud Light, for example, would be 4.6. Less than 10 is considered low.[23, 24]

Error 3: 'Beer belly'

There have long been humorous references to "beer bellies" on some people who carry extra weight around their midsection. Two carbohydrate diet books ("South Beach Diet" and "Suzanne Somers' Fast and Easy") also suggest beer specifically encourages fat deposit in this area.[1, 2]

The truth is, there is no such thing as a "beer" belly. Excess fat in any part of the body is caused by too many calories from any source and not enough exercise, according to published academic sources. If calories consumed exceed calories burned, fat will result.[28, 29, 30, 31]

Where fat is deposited on the body is mainly determined by gender and genetics, not by the type of food you eat.[29, 31, 32, 33, 34]

Beer, and especially light beer, is enjoyed responsibly by many adults who also happen to be on weight-loss diets of all kinds. Beer has zero fat.[10] Light beer is also low in carbs and low in calories.

No matter what kind of diet – low-carb, low-fat, low-calorie – is chosen, most doctors agree that the keys to weight loss are moderate food and beverage intake and regular exercise. Beer can be part of that kind of lifestyle for many adults.

We are not endorsing any particular diet or diet book, and we are certainly not saying that drinking beer will cause you to lose weight. Rather, we are providing accurate information for adults |to determine what products can fit within their food and beverage choices.

We want any consumption of our beers to be by adults and to be responsible.

Questions and Answers

1. What is a carbohydrate?

A carbohydrate is a fundamental nutritional building block that provides energy to the body, particularly the brain.[35]

2. Are there carbohydrates in beer?

Yes, there are low levels of carbohydrates in beer, but only trace amounts of simple sugars, including maltose, in beer.[8, 9, 10, 11]

All light beers are low in carbohydrates. Bud Light, for example, contains 6.6 grams of carbs per serving.

3. Does this mean the carb count for beer is incorrect in the diet books?

No. Beer does contain carbohydrates, but at relatively low levels.

The problem is that some diet books say beer has a high glycemic index, but this is based on incorrect information that beer is high in maltose or simple sugars.[1, 2, 3, 5, 6, 7]

4. Why is a food's glycemic index important?

Many recent, popular carbohydrate diet books use glycemic index as a simple guide to making food choices.[1, 2, 3, 4, 5, 7] Glycemic index is intended to measure how fast and high a specific food increases blood sugar.

Although there are two similar methods for measuring glycemic index, there is no consensus among doctors or nutritionists that glycemic index is a reliable way to choose foods for weight loss or other diets.[12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22]

Glycemic index does not account for serving size. Considering a food's purported glycemic index alone can distort the real glycemic response of a low-carbohydrate food, such as beer.

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5. What's a "good carb" vs. a "bad carb"?

There is no universally agreed upon definition for "good" or "bad" carbohydrates in the academic world.

Many carb diet books characterize carbs by glycemic index – low is good, high is bad.

Some recommend only "complex carbs" and unprocessed, high-fiber foods and discourage eating foods high in simple sugars, or those that are highly processed.[1, 2, 3, 4, 5, 7]

Many of these books mischaracterize beer in terms of its glycemic index or simple-sugar content, suggesting both are high. However, in fact, beer contains little or no simple sugars or maltose and light beer is low in carbohydrates.

Not all of these books label beer as "bad." Nonetheless, readers draw that conclusion because they have inaccurately been told beer has a high glycemic index, or high sugar content, or both. We know that conclusion is based on incorrect information, since beer contains no more than trace amounts of maltose or other simple sugars.[8, 9, 10, 11]

6. But is beer still appropriate on strict low-carb diets?

Many adults who also happen to be on weight-loss diets of all kinds enjoy beer, and especially light beer, responsibly.

Beer has no fat.[10] Light beers also are naturally low in carbs and low in calories. Even regular beers are so low in carbs that the glycemic index cannot be practically measured, according to University of Sydney researchers.[23, 24]

No matter what kind of diet – low-carb, low-fat, low-calorie – is chosen, most doctors agree that the keys to weight loss are moderate food and beverage intake and regular exercise. Beer can be part of that kind of lifestyle for many adults.

We are not saying that drinking beer will cause you to lose weight. Rather, we are providing accurate information so adults can determine what products can fit within their food and beverage choices.

7. Does this mean other foods are measured incorrectly in the books?

We know the books that assign a high glycemic index to beer based on high maltose and simple sugar content are wrong.

It is for other industries to comment on how their products are described in the books.

Footnotes

1. **The South Beach Diet, Arthur Agatston, Random House, 2003**
p. 10 "So my eating plan's first principle was to permit good carbohydrates (fruits, vegetables, and whole grains) and curtail the intake of bad carbohydrates (the highly processed ones, for the most part, where all the fiber had been stripped away during manufacturing)."
p. 12 "I went on the diet. I gave up bread, pasta, rice, and potatoes. No beer."
p. 50 "And the beer, of course, is nobody's idea of a diet drink. Maltose, the sugar in beer, has a higher glycemic index than white bread. The insulin response to it leads to the fat storage in the abdomen that we call, quite accurately, the beer belly."
p. 56 "At the other end of the spectrum is beer. As discussed, it has a high glycemic index thanks to its main component, maltose, which is even worse than table sugar."
p. 67 "The king of all sugars, the one that increases blood sugar faster than any other, is maltose, which exists in beer. Now you understand what's behind the beer belly: The rapid rise of blood sugar caused by guzzling this beverage stimulates a corresponding rise in insulin production, which encourages storage of fat around the midsection."
p. 88 (How to Eat in a Restaurant) "Avoid white wine, spirits, and worst of all, beer."

2. **Suzanne Somers' Fast and Easy, Suzanne Somers, Crown Publishers, 2002**
p. 81 "As for alcohol, everyone knows it makes you fat, especially beer and hard liquor. Now that you understand the connection between insulin and weight gain around the midsection, a "beer belly" makes perfect sense."
p. 86 "[Glycemic Index Chart] Beer = 110"
p. 123 "Beer has an extremely high sugar content. In fact, on the Glycemic Index, it rates higher than pure glucose."

3. **The New Sugar Busters! Cut Sugar to Trim Fat, H. Leighton Steward, et al., Ballantine Books, 2003**
p. 30 [Glycemic Index List, Miscellaneous, "High"]: "Maltose (as in beer) [=] 105"
p. 87 "As a word of caution, mixers for drinks usually contain a lot of sugar, as does beer (which contains maltose), so neither is considered appropriate for a healthy diet."

4. **Your Last Diet! A Sugar Addict's Weight-Loss Plan, Kathleen DesMaisons, Ph. D., The Ballantine Publishing Group, 2001**
p. 73 "In your detox, you will start by eliminating the known or big sugars. Don't forget that beer and wine are high in sugar. Technically because hard liquor is distilled, it is not a sugar."
p. 195 "Alcohol is listed here because even though pure alcohol has no carbohydrate in it, many alcoholic beverages, such as wine and beer, also contain a high percentage of sugars because the rest of the liquids that have not converted to alcohol. The sugars compound the beta-endorphin effect of the alcohol. I think of beer and wine as liquid sugar."

5. **Eat Yourself Slim, Michel Montignac, Michel-Ange Publishing, 1999**
p. 33 [Double sugars] "Maltose (glucose + glucose): beer and corn"
p. 38 [High GI Carbohydrates] "Maltose (beer) [=] 110"
p. 38 "BAD CARBOHYDRATES These are the carbohydrates whose assimilation causes a significant rise in glucose in the bloodstream (hyperglycemia)… GOOD CARBOHDYRATES Unlike bad carbohydrates, these are slowly absorbed by the body, resulting in less of a rise in blood sugar (glycemia)."
p. 55 [The American Dietary Model] "Americans are known for their high beer (110) consumption and eat a lot of pre-cooked, processed foods, which all contain corn syrup (100), maltodextrins (100) and modified starches (95). The high glycemic content, then, of the American diet can potentially lead to obesity, diabetes and cardiovascular diseases."

6. **Michel Montignac International Web site, NSV Nutrinautes Inc. 2003:**
http://www.montignac-intl.com/En/m7en.html
[Glycemic Index Table] "Beer [=] 110"

7. **The G. I. Diet – The Easy, Healthy Way to Permanent Weight Loss, Rick Gallop, Workman Publishing, 2002**
p. 100 "But remember, because of its high malt content, beer is a high-G. I. beverage, so moderation is particularly important."

8. **Malting and Brewing Science – Volume II Hopped Wort and Beer, Hough, Briggs, Stevens, and Young, 2nd Ed., Chapman & Hall, 1982, pp. 784-785**
Table shows a range of 15 beer styles and maltose content. 9 are either "trace" or "nil." Others are 0.17 - 0.25% w/v (Lagers) and 0.16 - 0.7% w/v (Ales).

9. **Rapid Analysis of Saccharides in Beer via Fluorescence-Assisted Carbohydrate Electrophoresis, Thomas et al., Journal of the American Society of Brewing Chemists, 58(3):124-127, 2000**
Range of maltose is 0.02 – 0.24 g/L in U.S. Beer

10. **USDA National Nutrient Database for Standard Reference Release 16, Nutrient Data Laboratory of the Agricultural Research Service:**
http://www.nal.usda.gov/fnic/foodcomp/Data/SR16/sr16.html
"Alcoholic beverage, beer, regular (per 100 g edible portion): Total lipid (fat) = 0.06 g; Sugars, total = 0.05 g"
"Alcoholic beverage, beer, light (per 100 g edible portion): Total lipid (fat) = 0.00 g; Sugars, total = 0.05 g"

11. **Analysis Report, NP Analytical Laboratories, 2/24/2004**
Carbohydrate spectrum of popular beers measured by HPLC: Budweiser, Bud Light, Michelob, Michelob ULTRA, Busch, Miller High Life, Miller Lite, Coors, Coors Light, Heineken, Amstel Light, Corona.
Maltose: All brands measured below the detection limit of 0.02 g/12 oz. (0.005%)
Isomaltose: Ranged from 0.06 to 0.15 g/12 oz.

12. **The New Glucose Revolution, Jennie Brand-Miller, Ph. D., et al., Marlowe & Company, 1999**
p. 47 "The Glycemic Index was never meant to be used in isolation! … A food's GI value was never meant to offer the only criterion by which it is judged as fit to eat."

13. **Carbohydrates in human nutrition. (FAO Food and Nutrition Paper - 66), Report of a Joint FAO/WHO Expert Consultation, Rome, 14-18 April 1997, Reprinted 1998 (http://www.fao.org/DOCREP/w8079e/w8079e00.htm)**
Ch. 4, "The glycemic index is defined as the incremental area under the blood glucose response curve of a 50 g carbohydrate portion of a test food expressed as a percent of the same amount of carbohydrate from a standard food taken by the same subject."
Ch. 4, "In choosing carbohydrate foods, both glycemic index and food composition must be considered."
"It is not necessary or desirable to exclude or avoid high GI foods."

14. **Glycemic index, glycemic load, and risk of type 2 diabetes, Walter Willett, JoAnn Manson, and Simin Liu, American Journal of Clinical Nutrition 2002; 76 (suppl): 274S-80S**
"For an individual food, it is intuitively obvious that the glycemic load will be more relevant than the glycemic index."

15. **The glycemic index at 20 y, David S Ludwig and Robert H Eckel, American Journal of Clinical Nutrition, 2002; 76 (suppl), 264S-5S**
"Because there is essentially no rate limitation in the digestion of polysaccharide into glucose, starchy foods (ie, so-called complex carbohydrates) do not necessarily have a lower GI than do simple sugars."
"However, there is by no means a consensus regarding the utility of the GI to human health and nutrition. Many clinicians and researchers, especially in the United States, have questioned the relevance and practicality of the GI."

16. **Dietary glycemic load assessed by food-frequency questionnaire in relation to plasma high-density-lipoprotein cholesterol and fasting plasma triacylglycerols in postmenopausal women, Liu et al., American Journal of Clinical Nutrition, 2001; 73: 560-6**
"Because both the amount and the quality of carbohydrates in a food are important determinants of fasting plasma triacylglycerol concentrations and the postprandial plasma glucose response, we proposed the glycemic load as a measure that incorporates both the quantity and the quality of the dietary carbohydrates consumed… The concept of glycemic load addresses the concern about rating foods as good or bad solely on the basis of their glycemic index."

17. **Dietary Fiber, Glycemic Load, and Risk of NIDDM in Men, Salmerón et al., Diabetes Care, Volume 20, Number 4, April 1997, 545-550**
"The glycemic index, as a relative measure of glycemic response to a given amount of carbohydrate, does describe the quality of carbohydrate but does not take into account the quantity. In contrast the total glycemic load represents the combination of quality as well as the quantity of carbohydrate."

18. **Glycemic index and disease, F Xavier Pi-Sunyer, American Journal of Clinical Nutrition, 2002; 76 (suppl): 290S-8S**
"Subsequently, the standard against which foods are compared was changed to white bread. This is unfortunate for 2 reasons: first, published GI values conflict; second, 50 g carbohydrate in white bread is more difficult to determine accurately than is 50 g glucose. A comparative standard should be simple, accurate, and reproducible, and the one used to calculate GI is not." "In the tables compiled by Foster-Powell and Miller, the variability in the GI of glucose, the carbohydrate that can most accurately be measured, was 85-111 (i.e., 25%)"

19. **Dietary Fiber, Glycemic Load, and Risk of NIDDM in Women, Salmerón et al., Journal of the American Medical Association, February 12, 1997, Vol. 277, No. 6, 472-477**
"The glycemic index, as a relative measure of glycemic response to a given amount of carbohydrate, does describe the quality of carbohydrate but does not take into account the quantity. In contrast the total glycemic load represents the combination of quality as well as the quantity of carbohydrate consumed and may be interpreted as a measure of dietary insulin demand."

20. **Glycemic index and heart disease, Anthony R. Leeds, American Journal of Clinical Nutrition, 2002; 76 (suppl): 286S-9S**
"Proof of the clinical value of low-GI diets awaits prospective trials, which should include short-term observations covering periods of metabolic stress induced by surgery as well as long-term trials with clinical endpoints."

21. **The Gycemic Index, Physiological Mechanisms Relating to Obesity, Diabetes, and Cardiovascular Disease, David S. Ludwig, Journal of the American Medical Association, 2002; 287:2414-2423**
"The glycemic index was proposed in 1981 as an alternative system for classifying carbohydrate-containing food. Since then, several hundred scientific articles and numerous popular diet books have been published on the topic. However, the clinical significance of the glycemic index remains the subject of debate."
"Other questions remain unresolved… Mechanistically oriented studies, multicenter clinical trials, and prospective epidemiological analyses are needed to address these issues."

22. **Glycemic index: overview of implications in health and disease, David JA Jenkins, et al., American Journal of Clinical Nutrition 2002; 76 (suppl): 266S-73S**
"The glycemic load, which assesses the total glycemic effect of the diet and has proved very useful in epidemiological studies, is the product of the dietary glycemic index and total dietary carbohydrate."
"It is said that the glycemic index lacks clinical utility because differences in glycemic index between foods are lost once these foods are consumed in a mixed meal… Appropriate calculation of the mixed-meal glycemic index is therefore required."
"Over time, the introduction of new foods will expand the range of food choices, providing foods to be selected not only for their glycemic index, but also for their range of health advantages. A certain amount of dietary understanding is certainly required, e.g., carrots with a high glycemic index are not taboo. It is realized that there are other considerations relevant to the consumption of carrots, and that the glycemic index is not significant."

23. **The New Glucose Revolution - The Complete Guide to Glycemic Index Values, Jennie Brand-Miller et al., Marlowe & Company, 2003**
[Beer] "has so little carbohydrate that the GI value cannot be tested. The GI, therefore, is 0" (p. 38)

24. **Sydney University Glycemic Index Research Service (University of Sydney)**
Web site http://www.calvin.biochem.usyd.edu.au/GIBD/mainV4a.htm
"Foods containing little or no carbohydrate (such as meat, fish, eggs, avocado, wine, beer, spirits, most vegetables) cannot have a GI value. No carbs = no GI."

25. **Foster-Powell K, Holt SH, Brand-Miller JC, International table of glycemic index and glycemic load values: 2002. American Journal of Clinical Nutrition, 2002; 76:5-56**
Beer is not among this most comprehensive list of published glycemic indices.

26. **Sydney University Glycemic Index Research Service (University of Sydney)**
Web site http://www.glycemicinde.com/gi-testing
"The GI value of a food is determined by feeding 10 or more healthy people a portion of the food containing 50 grams of digestible (available) carbohydrate and then measuring the effect on their blood glucose levels over the next two hours."

27. **Dietary Glycemic Index and Obesity, David S. Ludwig, Journal of Nutrition. 130: 280S-283S, 2000**
"The concept of glycemic index (GI) was proposed by Jenkins and colleagues in 1981 to characterize the rate of carbohydrate absorption after a meal (Jenkins, et.al. 1981). GI is defined as the area under the glucose response curve after consumption of 50 g carbohydrate from a test food divided by the area under the curve after consumption of 50 g carbohydrate from a control food, either white bread or glucose."

28. **Effect of alcohol on postmeal fat storage, BJ Sonko et al., American Journal of Clinical Nutrition, Volume 59, pp. 619-625, 1994**
"We conclude that alcohol has a fat-sparing effect similar to that of carbohydrate and will only cause fat gain when consumed in excess of normal energy needs."

29. **Regulation of Body Weight in Humans, Eric Jéquier and Luc Tappy, Physiological Reviews, Vol. 79, pp. 451-480, 1999**
"The mechanisms involved in body weight regulation in humans include genetic, physiological, and behavioral factors. Stability of body weight and body composition requires that energy intake matches energy expenditure and that nutrient balance is achieved."

30. **Methods for Voluntary Weight Loss and Control, National Institutes of Health, Office of Medical Applications of Research, Technology Assessment Conference Statement, March, 1992**
"The basic mechanism [for weight gain] is an imbalance between caloric intake and energy expenditure…"

31. **Centers for Disease Control and Prevention (Dept. of Health and Human Services), adapted from "U. S. Surgeon General's Call to Action to Prevent and Decrease Overweight and Obesity, 2001" http://www.cdc.gov/nccdphp/dnpa/obesity/contributing_factors.htm**
"Overweight and obesity result from an energy imbalance. This involves eating too many calories and not getting enough physical activity."
"Body weight is the result of genes, metabolism, behavior, environment, culture, and socioeconomic status."

32. **Encyclopedia of Sports Medicine and Science, Albright, A.L. and Stern, J.S. (1998). Adipose tissue. T.D. Fahey (Editor). Internet Society for Sport Science: http://sportsci.org, 30 May 1998**
"A primary factor [for fat distribution] is genetic background, which can often be seen by looking at the similarity in fat distribution within same-sex family members. As mentioned earlier, gender is also known to have an effect."

33. **Genetic Influences on the Response of Body Fat and Fat Distribution to Positive and Negative Energy Balances in Human Identical Twins, Claude Bouchard and Angelo Tremblay, The Journal of Nutrition, Vol. 127, No. 5, May 1997, pp. 943S-947S**
"[Response to energy imbalance] revealed that members of the same twin pair are significantly more alike than individuals who are not genetically related by descent. The intra-pair resemblance in response was particularly strong for the changes in body mass, body composition, subcutaneous fat distribution and abdominal visceral fat."

34. **The alpha 2-adrenergic receptor gene and body fat content and distribution: the HERITAGE Family Study, D. Garenc et al., Molecular Medicine, February 2002, 8 (2), pp.88-94**
"These results suggest a role for the ADRA2A gene in determining the propensity to store fat in the abdominal area, independently of total body fatness."

35. **Dietary Reference Intakes for Energy, Carbohydrate, Fiber, Fat, Fatty Acids, Cholesterol, Protein, and Amino Acids (Macronutrients) (2002), Food and Nutrition Board (FNB), Institute of Medicine (IOM)**
"The primary role of carbohydrates (sugars and starches) is to provide energy to the cells in the body, particularly the brain, which is the only carbohydrate-dependent organ in the body."