Low-Carbohydrate Diets

What We Know

› Low-carbohydrate diets (LCDs) are diets in which the calorie contribution of carbohydrates, particularly simple sugars and starches, is restricted and substituted with calories derived from protein, fat, and/or fiber. Clinically, the rationale for LCDs is based on evidence that diets high in carbohydrates lead to increased insulin levels and that carbohydrate restriction is beneficial for diabetes management, weight loss, and seizure control.\(^{(13-17)}\) Because the term LCD varies in definition, what constitutes an LCD should be defined when used therapeutically.\(^{(1,8)}\)

• Diets identified by carbohydrate content frequently are categorized as very-low-carbohydrate diet (VLCD), low-carbohydrate diet (LCD), moderate-carbohydrate diet (MCD), or high-carbohydrate diet (HCD), and are defined by either the number of grams of carbohydrate consumed daily or the percentage of daily calories derived from carbohydrates. For example, a VLCD is usually considered to be >50 g carbohydrate/day or 4–23% of daily calories.\(^{(8,17)}\)

– Popular commercial diets such as the Atkins, Protein Power, South Beach, and Zone diets are LCDs that have varying degrees of scientific support. The Atkins and Protein Power diets are examples of VLCDs, while the South Beach and Zone diets are more consistent with an LCD to MCD.\(^{(2)}\)

• Feinman et al. (2015) proposed a definition of LCDs that considers a VLCD to be between 20 and 50 g carbohydrate/day, a LCD <130 g/day, a MCD at about 130–230 g/day, and a HCD at 230 g or more per day.\(^{(8)}\)

– Generally speaking, carbohydrate intake below 50 g/day leads to ketosis (i.e., the buildup of ketone bodies, or ketones, in the blood and urine) and is considered to be a ketogenic diet (KD).\(^{(8)}\) Although the process is not entirely understood, the increase in ketones is correlated with improved control of seizures. The KD is an extremely restrictive and structured diet that is mathematically calculated and should be initiated only with close medical supervision.\(^{(13)}\)

• Although short-term implementation of LCDs has been shown to improve glycemic control, weight loss, and cardiovascular risk for persons with type 2 diabetes (DM2), long-term use of LCDs has not consistently proven to be more effective than HCDs when measuring weight loss, glycemic control, lipid concentration, blood pressure, and compliance in persons with DM2.\(^{(7,11,15)}\)

– Research on the long-term use of LCDs is controversial.\(^{(8)}\) In a study comparing the effects of a VLCD (defined in this study as less than 50 g carbohydrate per day), that was high in unsaturated fat and low in saturated fat, with a high-carbohydrate, low-fat diet on DM2 and cardiovascular disease at 52 weeks, researchers found that both diets led to significant weight loss, and improved A1C and fasting glucose. Additionally, the VLCD produced greater positive improvements in lipids, blood glucose regularity, and reduction in diabetes medication needed. These researchers suggest that the use of a VLCD might be an effective strategy for managing DM2.\(^{(14)}\)

• According to two separate studies, adhering to LCDs may affect the risk of developing DM2 in some persons and this risk may be influenced by the dietary sources of proteins and fats consumed.\(^{(3,6,12)}\)
In a prospective study examining the relationship between LCDs and the long-term risk of developing DM2 in women with a history of gestational diabetes, researchers found that women who consumed an LCD in which the protein and fat were derived primarily from animal sources were at greater risk of developing DM2, while no association with DM2 risk was found in women who consumed an LCD that was high in plant-based protein and fat\(^{(3)}\).

Researchers examining the relationship between LCDs and DM2 risk in Japanese adults report that an LCD was related to a decreased risk of DM2 in Japanese women but not in men\(^{(12)}\).

Authors of the Health Professionals Follow-up Study report that an LCD high in animal protein and fat is associated in men with an increased risk of developing DM2\(^{(6)}\).

- LCDs are associated with greater weight loss during the first 6 months than traditional calorie-reduction diets in which carbohydrate, fat, and protein are balanced, but researchers report no difference in weight loss between the two methods after 1 year\(^{(5,10)}\).
- VLCDs might be useful for reducing fat mass in obese persons according to the results of a meta-analysis\(^{(10)}\).
- Following a diet that is higher in protein and dairy can reduce bone loss during weight loss; however, LCDs are linked to increased mortality, particularly when the fat and protein are derived primarily from animal sources\(^{(5,11)}\).
- Investigators who conducted a systematic review of the research on the efficacy of the Atkins, South Beach, Weight Watchers, and Zone diets found that there were insufficient data to identify one diet as more effective or beneficial than the others. All four diets resulted in modest weight loss in the short term but failed to show sustained weight loss at 12 months or longer\(^{(2)}\).

- According to results from the National Diet and Nutrition Survey in the United Kingdom, compared to consumers with average carbohydrate intakes individuals consuming LCDs tend to have higher intakes of red and processed meats and lower intakes of beans. Health benefits might improve for individuals adhering to LCDs if they replace red meats with white meats and plant-based proteins\(^{(9)}\).
- Impaired renal function, insufficient essential nutrients, ketoacidosis, ulcerative colitis, and increased cardiovascular risk have all been documented as unfavorable conditions associated with LCDs\(^{(4,7,16)}\).

**What We Can Do**

› Learn about/become knowledgeable about LCDs so we can accurately assess our patients’ personal characteristics and health education needs and effectively counsel them on the benefits and risks associated with an LCD; share this information with our colleagues.
References


