



# American Diabetes Association Standards of Care 2025: Role of Low-Carbohydrate Diets (LCD) in Individualized Care

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## Abstract

The American Diabetes Association (ADA) recently released the "Standards of Care in Diabetes-2025 (SoC-25)". Recommendations for medical nutrition therapy (MNT) are based on personalizing diets. The Keto-Med Study was a newly added article that provides evidence for improvement in A1c and many other important metrics in diabetes management in both the well-formulated ketogenic diet (WFKD) and the Mediterranean diet (Med-Plus) arms. The WFKD arm outperforms the Med-Plus arm in this study, but the superiority is awarded to the Med-Plus arm based on the priority given to LDL-C over all other metrics. On the one hand, the ADA appears to be moving toward a more holistic approach while simultaneously clinging to population-based approaches on the other.

**Keywords:** American Diabetes Association (ADA); Standards of Care in Diabetes-2025 (SoC-25); Mediterranean Ketogenic; Diet; Diabetes; Prediabetes

## Commentary Article

The American Diabetes Association (ADA) suggests tailoring medical nutrition therapy (MNT) to treat patients with diabetes because there is no single best dietary strategy [1]. This is a reasonable approach to gaining trust and building relationships with patients, and possibly true given the variation among individuals. It is certainly a step back from population-based and a step toward more holistic approaches. It would theoretically increase compliance and overall health if some control is left up to each individual.

The ADA mentions several times the dangers of processed foods. One common denominator of successful eating plans seems to be the avoidance of processed foods. Although it is unclear whether processing the foods is harmful, if the typical ingredients in processed foods are harmful, or if there is some combination of those two factors. Nonetheless, authors of the SoC-25 encourage to "limit processed foods and foods high in added salt, sugars, and fats and, when possible, choose whole foods" and to lose weight loss of 3-7% in those who are overweight or obese [1].

The Keto-Med trial [2] was added as a reference to the SoC-25 as evidence that a Mediterranean diet (Med-Plus) is comparable to a well-formulated ketogenic diet (WFKD) in lowering A1c but without the downside of increasing low-density lipoprotein (LDL)-cholesterol (LDL-C). The implication is that by decreasing LDL-C through dietary modification, cardiovascular disease (CVD) risk will also decrease. A meta-analysis shows improvement in the CVD risk factors weight, triglycerides, and high-density lipoprotein (HDL) but warns that increases in LDL-C may negate those benefits [3]. This is the position that the ADA and the authors of the Keto-Med trial are taking, and likely the rationale for following the ADA's position on diet for decades. Nevertheless, some issues arise from inserting this one study into the SoC-25:

- It is unclear if prioritizing LDL-C over all other available metrics is the best method to assess CVD risk in the general population, diabetic population, or those following an LCD. The issue is contentious, though there is growing data to support LCD as a safe and effective MNT for diabetes therapy [4-6].

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- The authors of the Keto-Med Study mention that while LDL-C increased in the WFKD arm when compared to the Keto-Plus arm, diets lower in carbohydrates tend to result in larger, more buoyant LDL particles and that no lipid subfractionation studies had been performed. This was mentioned in the Keto-Med Study as a limitation but not in the SoC-25.
- The authors of the Keto-Med Study acknowledge that there are other factors that improved more on the WFKD that may contribute more to lowering CVD risk than LDL-C does. There was a statistically significant lowering of triglycerides and CGM average glucose and an insignificant improvement in fasting insulin, HDL, and weight in the WFKD arm when compared to the Med-Plus arm, which was not mentioned anywhere in the SoC-25.
- A1c decreased in both arms, however the difference between arms was statistically insignificant. This contrasts with changes in CGM average glucose, which had a difference of -8 mg/dL in the WFKD arm and -2 mg/dL in the Med-Plus arm. This mismatch between A1c other metrics such as CGM needs to be further studied as A1c may be artificially high in individuals that consume lower amounts of carbohydrates.
- “We are moving away from emphasizing macronutrients, which include carbohydrates, proteins, and fats, and micronutrients, which include vitamins and minerals, and instead focusing on foods.” Micronutrients are a different story. Sodium intake of <2.3 g/day is recommended in the SoC-25. This is consistent with the DASH diet but would be inadequate in other eating plans. Keto-Med participants in the WFKD arm were given 3-5 g/day sodium and 3-4 g/day potassium.

Given the above improvement in more CVD risk factors overall and the lack of need to restrict sodium intake, it appears that the WFKD arm outperformed the Med-Plus arm. However, the bias created by fear of LDL-C is tremendous. That idea took root after cholestyramine for primary prevention in a 1984 NHLBI study simultaneously lowered LDL-C and decreased CVD-related death by 0.4% (NNT=250) over 7.4 years [7]. Since then, it has been assumed that diets that lower LDL-C would provide the same benefit.

Never mind the data from large randomized controlled trials (RCTs) that refute the diet-heart hypothesis. The Minnesota Coronary Survey was a huge RCT that could have been published in the 1970s but was not published until 1989 after the principal researchers retired because “we didn’t like the way it turned out” [8-10]. The Women’s Health Initiative showed that more harm may be done than good by lowering fat intake and that metrics associated with insulin resistance are most predictive of CVD risk in certain groups of women [11,12].

While the American Heart Association (AHA) has engaged in a war on saturated fat intake to lower LDL-C and hopefully lower CVD risk, the ADA has dutifully followed. There is variability between individuals that gets ignored by population medicine and may be causing more harm. A holistic approach may benefit the individual. More recent data suggest that in those starting an LCD, elevations in serum LDL-C may be related to weight rather than to saturated fat intake and that LDL-C either stays stable or decreases in obese individuals [13]. The Lipid Energy Model has been used to explain the observation [14]. LDL-C has been noted to increase after starting a VLCD even in the context of lower saturated fat intake in some individuals [15]. Increasing saturated fat and carbohydrate intake could lower LDL-C [15]. More research is needed to understand this relationship between carbohydrate restriction and lean mass individuals to the other conventional markers of CVD risk that tend to improve.

**Table 1:** Comparing Carbohydrate Content between the Keto-Med Study and the JLCDPA.

| Keto-Med | Carb   | JLCDPA       |
|----------|--------|--------------|
| Med-Plus | 38-40% | Petit LCD    |
|          | 26%    | Standard LCD |
| WFKD     | 12%    | Super LCD    |

While the ADA appears to be shifting toward treating the individual in a more holistic approach rather than population-based treatment plans, there is a curious revision. Recommendation 5.29 was added to the SoC-25 to encourage increasing plant-based proteins at the expense of animal-based proteins. The ADA admits there is little evidence to support limiting animal protein, but that less consumption of saturated fat might lower LDL-C and somehow save the planet. The rationale behind the latter is not explained as the planet, presumably, is not afflicted with diabetes. The former should be discussed with each individual. If eating cookies lowers LDL-C [15], joint decision-making should include discussing whether or not eating more of them is in the best interest of the patient. Likewise, lipid-lowering medication can be prescribed depending on the whole clinical picture and the wishes of the patient.

In a 2019 consensus report the ADA began recognizing LCD eating patterns as a viable MNT for diabetes. They are among the most studied eating patterns for type 2 diabetes [16]. Since then the ADA has been consistent that MNT should be individualized. The authors agree with this sentiment and have an interest in treating the patient rather than the illness. We also recognize the benefits of multiple different types of eating patterns including the Mediterranean diet [17]. Fortunately, there are multiple methods to measure glycemic control, and it allows us to give



more control to the individual. The Japan LCD Promotion Association (JLCDPA) and Takao Hospital recommend various degrees of LCD for this reason [18] to allow for flexibility based on the needs of each individual. When considering the carbohydrate composition, the Med-Plus diet (38% carbohydrate) is close to our petit LCD (40% carbohydrate) and the WFKD (12%) matches our super LCD (12%) [2,18]. Nuance based on the whole clinical picture as well as patient preferences should be considered. It is exciting to see the progression of more patient-centric thinking in healthcare.

### Conflict of Interest

The authors declare no conflict of interest.

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