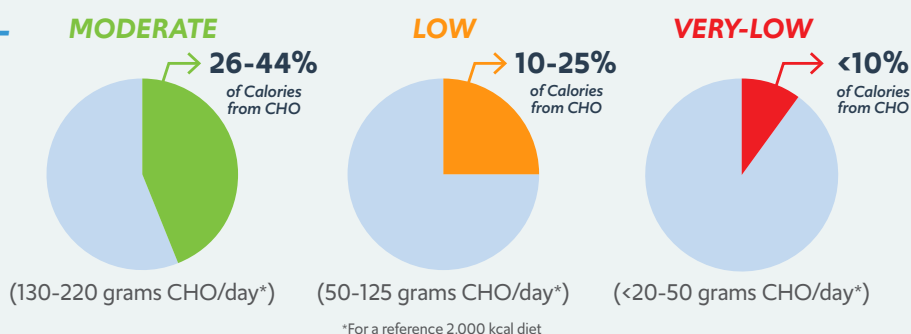


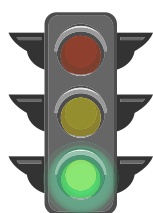
# Effects of Low-Carbohydrate and Very-Low-Carbohydrate Diets (Including Ketogenic) - Cardiometabolic Impact

## What are Moderate, Low- and Very-Low Carbohydrate (CHO) Diets?

A CHO-restricted diet is defined as CHO intake below the lower boundary of the acceptable macronutrient distribution range for healthy adults (45- 65% total daily calories). The various definitions used for CHO-restricted diets are typically based on the proportion of total daily calories from CHO and/or absolute CHO intake.

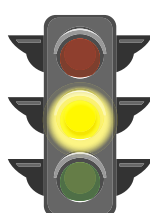


## Potential Benefits of Low- & Very-Low-CHO Diets



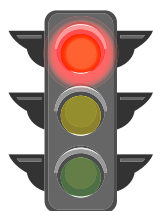
- **Lowers triglyceride levels**
- **Decreases use and/or dose of type 2 diabetes medications**
- Facilitates short-term (<6 months) weight loss
- Possibly helps with appetite control
- Appears to increase energy expenditure
- Reduces non-high-density lipoprotein cholesterol
- Results in short-term (<1 year) HbA1c reduction

## Potential Concerns with Very-Low-CHO & Ketogenic Diets



- **Difficult to maintain longer-term (>6 months) and not clearly superior for weight loss**
- **May increase low-density lipoprotein cholesterol, markedly in some individuals**
- May result in loss of lean body mass if protein content is not adequate
- Not aligned with nutrition recommendations from various professional organizations
- May restrict foods associated with cardioprotective benefits
- May encourage high intake of foods known to increase atherosclerotic cardiovascular disease (ASCVD)
- May not be nutritionally adequate

## Contraindications for Very-Low-CHO & Ketogenic Diets



- **Patients using SGLT2 inhibitors due to an increased risk of SGLT2 inhibitor-associated ketoacidosis**
- Patients with a history of hypertriglyceridemia-associated acute pancreatitis, severe hypertriglyceridemia, or inherited severe hypercholesterolemia

**Close Medical Supervision with Low- or Very-Low-CHO Diets Recommended for:**

- Individuals with ASCVD, history of atrial fibrillation, or the presence or history of heart failure, kidney disease, or liver disease due to unknown effects of these diets in patients with chronic illnesses
- Individuals taking diabetes, hypertension, and vitamin K-dependent anticoagulation medications due to the potential need for adjustments

## Points to Consider for Patients on a Low- and Very-Low-CHO Diet

- A clinician-patient discussion regarding risks and benefits of the diet and the need for medical oversight should occur before initiation
- Personal preference should be considered when selecting a weight loss diet
- Limit the use of a very-low-CHO diet to 2-6 months to induce weight loss
- Conduct baseline and follow-up lipid and lipoprotein assessments
- Monitor glycemic control and adjust diabetes medication(s) as needed
- Monitor vitamin K-dependent anticoagulation therapy

## When Counseling Patients on Weight Loss, Weight Maintenance, and Cardiovascular Health:



- Recommend a more moderate CHO intake to promote long-term (>6 months) adherence
- Emphasize consumption of foods associated with improved cardiometabolic health, including vegetables, fruits, whole grains, and legumes, whole plant-based and lean animal protein foods, and foods rich in unsaturated fatty acids
- Promote physical activity, including both aerobic and strength-training exercise
- Refer patients to a comprehensive lifestyle intervention program with a multidisciplinary team (physician, advanced practice nurse, and/or physical assistant, and registered dietitian nutritionist, exercise specialist, and behavioral specialist) whenever practical
- Address behavioral, family, cultural, and social dynamics that shape individual food preferences and physical activity habits