

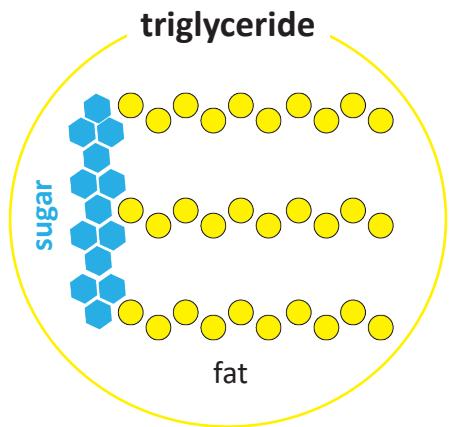


# Triglycerides

## and Lipodystrophy Syndromes

### What is a triglyceride?

- A triglyceride is a substance **made of both fat and sugar**.
- In the body, triglycerides can be used as **fuel for energy**.
- Triglycerides can **come from the fat in our food**.
- The **body also makes triglycerides out of sugar to store in body fat** as an energy supply.



### What is different for people with lipodystrophy?

- For people with lipodystrophy syndromes, **body fat does not develop, function, or distribute properly**. They are **unable to maintain body fat** in all or parts of the body.
  - Therefore, the **triglycerides are unable to be stored properly**.
  - The **fat stays in the blood** and can build up to **high triglyceride levels**, also known as **hypertriglyceridemia**.
  - The fat can also **build up on the liver, heart, pancreas, and other internal organs**.



### Why it matters

- High triglycerides increase the risk for a range of **cardiovascular complications**.
- High levels of fat in the blood can cause **insulin resistance**, a condition that can lead to diabetes. Insulin resistance further increases triglyceride levels.
- The fat can build up on the liver causing **metabolic dysfunction-associated fatty liver disease (MAFLD)**. Fatty buildup on the liver can also lead to insulin resistance and diabetes.
- Very high triglycerides can also lead to severe inflammation of the pancreas, a dangerous and painful condition called **pancreatitis**.



### Medication treatment

- **Medications are required** to treat lipodystrophy, high triglycerides, insulin resistance, and other related complications. Your **lipodystrophy specialist** will determine which medications are right for you.
- If you have diabetes, proper management of your blood sugar will also help manage triglycerides. If your blood sugar is high, some of the extra sugar will be converted into triglycerides.

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## How food affects triglycerides

- A triglyceride is made of both fat and sugar. Therefore, the more fat and/or sugar you eat, the higher your triglycerides can be.
- Fat or sugar can raise triglycerides individually or together. Therefore, a low fat *and* low sugar diet is essential in managing triglycerides.
  - “Refined” or “highly processed” carbohydrates can lead to high blood sugar. High blood sugar can increase triglyceride levels. Refined carbs include white breads, white rice, noodles made from white flour or rice, sweets, pastries, and other foods made with added sugar. Simple sugars like fruit juices, syrups, or honey can also spike blood sugar. See “The Plate Method” handout for guidance on proper portions, balance, food choices, and meal preparation tips to help manage blood sugar.



## Personalized nutrition is key

- Because there is a range of lipodystrophy syndromes, **nutrition must be personalized**.
- **Be cautious with general nutrition recommendations and popular diets.** Some people can tolerate a moderate amount of fat, while others may need to follow a very low fat diet. For this reason, common eating patterns may not be suitable for everybody. For example, the Mediterranean Diet includes a moderate amount of fat like olive oil or nuts. The Ketogenic Diet is a very high fat diet. Some high protein approaches can inadvertently lead to high fat intake depending on the type of protein included.
- **A registered dietitian nutritionist (RDN) who is specially trained in lipodystrophy** can help you develop a meal plan specific to your needs. Dietitians can also help clarify common misconceptions about nutrition and diet.



## What else affects triglycerides

- **Alcohol can increase triglycerides.** Alcohol can prevent the liver from breaking down triglycerides.
- **Low physical activity** reduces the breakdown of triglycerides, thus keeping triglycerides elevated.

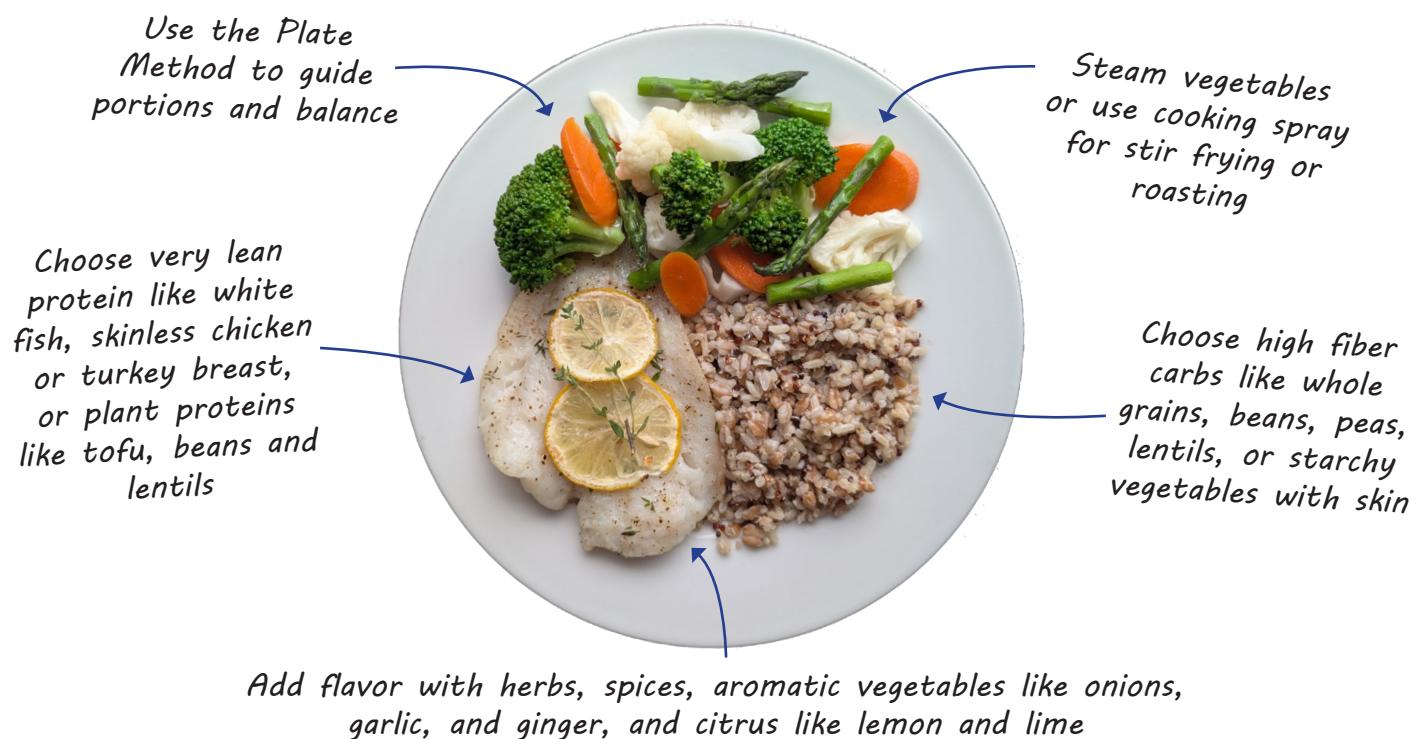
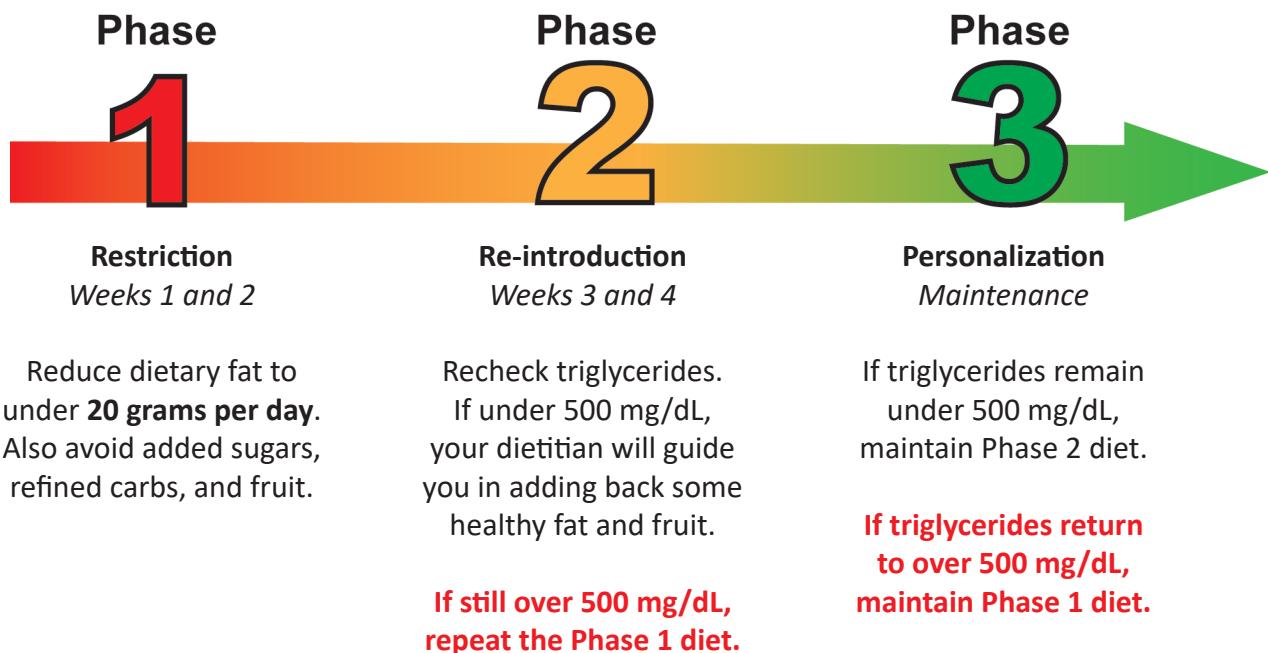
## For triglycerides over 1000 mg/dL

- A special diet is required for people with triglycerides over 1000 mg/dL, otherwise known as “**severe hypertriglyceridemia**.” This condition increases the risk of complications, especially pancreatitis.
- **Some people have chronic severe hypertriglyceridemia.** They will need to maintain a **very low fat diet (less than 20g per day)** under the supervision of their doctor and a registered dietitian nutritionist.
- Others may be able to lower and maintain their triglycerides below 500 with a **special 3-phase dietary approach**. Review the handout “**A Dietary Approach to Lower Severely High Triglycerides**” with a registered dietitian nutritionist for guidance on how to follow this diet safely.



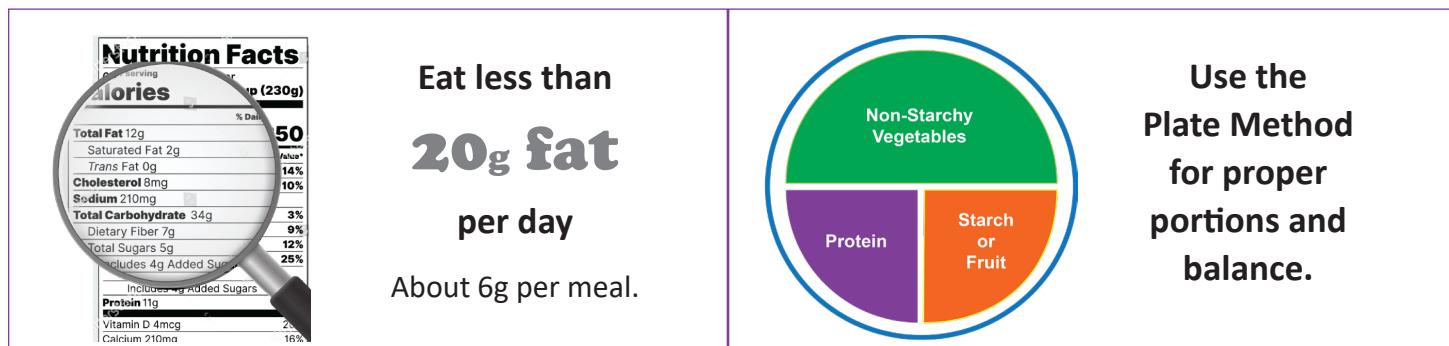
# Dietary Approach to Lower Severely High Triglycerides

If your triglycerides are **OVER 1000 mg/dL**, you will follow this 3-phase approach under the supervision of your doctor and a specially trained registered dietitian.



# Phase 1: Meal Planning Tips

For the first 2 to 4 weeks, you will follow a very low-fat, low-sugar diet.



Choose low fat protein.		
Protein	Portion	Fat grams
Chicken or turkey breast, boneless, skinless	3 ounces	1g
White fish like cod, flounder, tilapia, halibut	4 ounces	1 to 3g
Canned tuna in water, drained	5 ounce can	1g
Legumes like lentils, black beans, kidney beans, garbanzo beans and other beans	1/2 cup	0.5 to 2g
Tofu	1/5 of a package	5g
Low-fat cottage cheese	1/2 cup	1g
Non-fat Greek yogurt, plain	1 cup	0g

## Use low fat cooking methods.

- **Use cooking spray** for stir fries, sautes, and air frying.
- **Bake, broil, roast, grill, air fry or steam** without added oils or butter.
- **Poach or slow cook** in water.

## Avoid high fat foods, sweets, sugary drinks, and alcohol.

- **Deep fried foods** like fried chicken, battered fish, and french fries.
- **Red meat** like beef and pork.
- **Processed meat** like sausage, bacon, and deli meats like salami and bologna.
- **Fatty fish** like salmon, mackerel, sardines, and anchovies.
- **High fat dairy** like whole milk, cheese, butter, and cheese sauces.
- **Fast food** like pizza, burgers, and chicken nuggets.
- **Cooking oils, butter, salad dressings, and spreads** like mayo and peanut butter.
- **Nuts and seeds** like peanuts, walnuts, almonds, and sunflower seeds.
- **High fat snacks** like potato or corn chips.
- **Foods high in sugar** like cookies, candies, pastries, regular soda, juice, and sweetened tea or coffee.
- **Alcoholic drinks** like beer, wine, and liquor.

Your plan might include MCT oil.



Ask your dietitian if MCT oil is right for you.

## Resources

Brown RJ, Araujo-Vilar D, Cheung PT, Dunger D, Garg A, Jack M, Mungai L, Oral EA, Patni N, Rother KI, von Schnurbein J, Sorkina E, Stanley T, Vigouroux C, Wabitsch M, Williams R, Yorifuji T. The Diagnosis and Management of Lipodystrophy Syndromes: A Multi-Society Practice Guideline. *J Clin Endocrinol Metab*. 2016 Dec;101(12):4500-4511. doi: 10.1210/jc.2016-2466. Epub 2016 Oct 6. PMID: 27710244; PMCID: PMC5155679.

Rhodes KS, Weintraub M, Marchlewicz EH, Rubenfire M, Brook RD. Medical nutrition therapy is the essential cornerstone for effective treatment of “refractory” severe hypertriglyceridemia regardless of pharmaceutical treatment: Evidence from a Lipid Management Program. *J Clin Lipidol*. 2015 Jul-Aug;9(4):559-67. doi: 10.1016/j.jacl.2015.03.012. Epub 2015 Apr 9. PMID: 26228674.