



Dietary Approaches for Managing Hyperlipidemia

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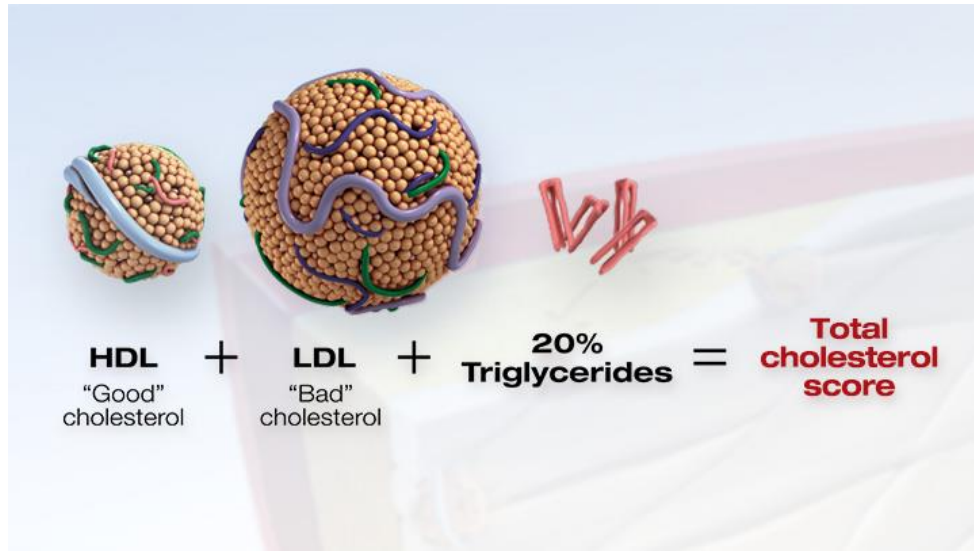
December 7, 2018

Objectives

By the end of this session, participants will be able to:

- Identify sources of heart-healthy fats versus saturated fats
- Describe how soluble fiber may be beneficial for lowering cholesterol

Hyperlipidemia



https://watchlearnlive.heart.org/CVML_Player.php?moduleSelect=chlsr

Total Cholesterol Level

Less than 200 mg/dL

200-239 mg/dL

240 mg/dL and above

Category

Desirable

Borderline high

High

LDL Cholesterol Level

Less than 100 mg/dL

100-129 mg/dL

130-159 mg/dL

160-189 mg/dL

190 mg/dL and above

LDL Cholesterol Category

Optimal

Near optimal/above optimal

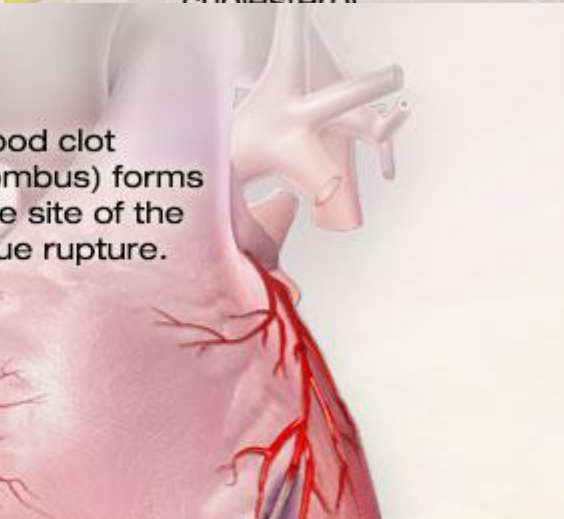
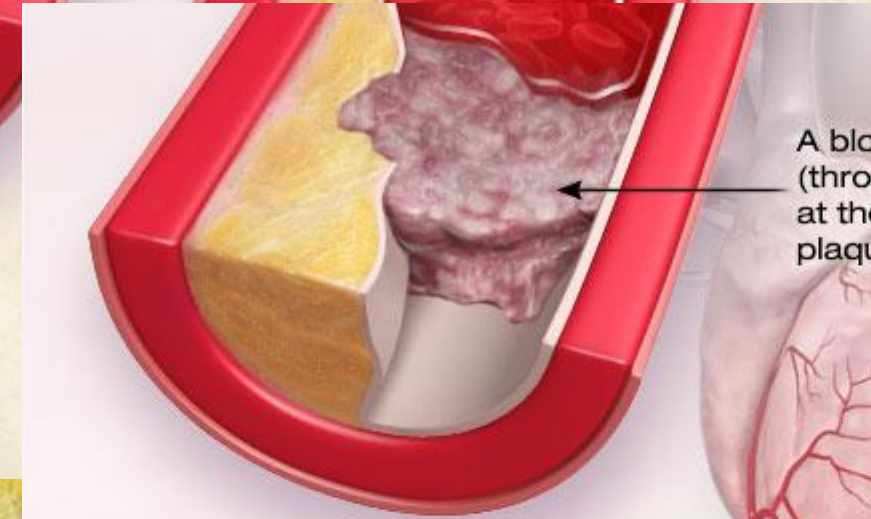
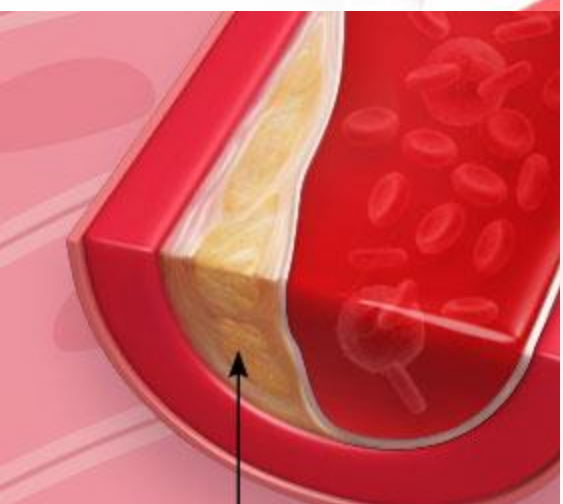
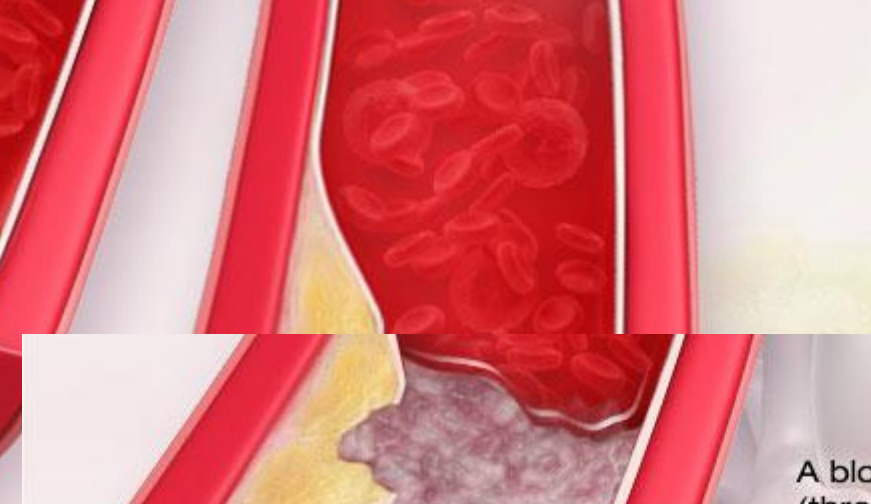
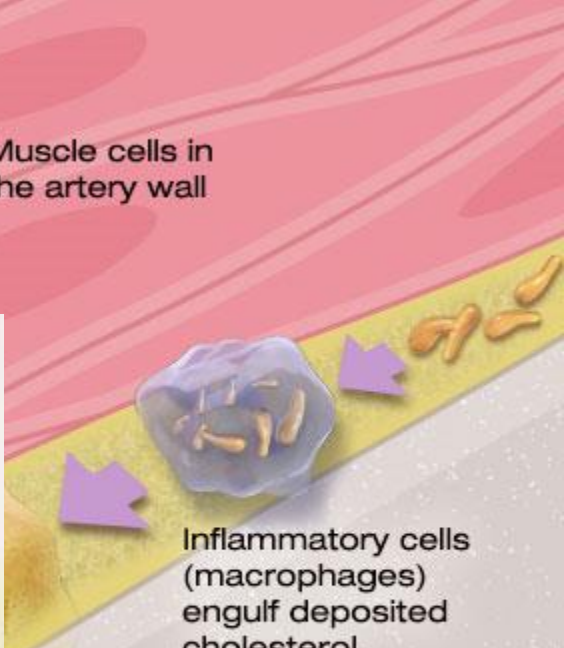
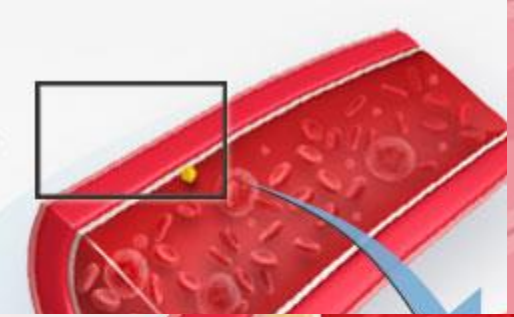
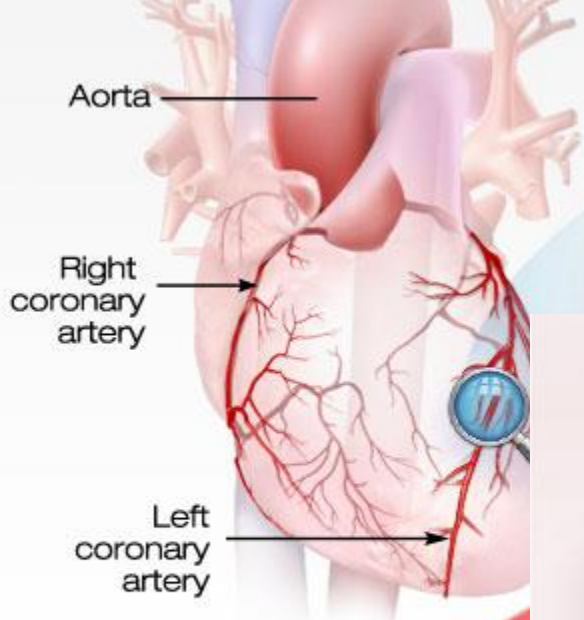
Borderline high

High

Very high

**Cholesterol levels are measured in milligrams (mg) of cholesterol per deciliter (dL) of blood.*

US Dept of Health and Human Services, National Institutes of Health. (2005). *High blood cholesterol: What you need to know*. Bethesda, MD: National Heart, Lung, and Blood Institute.



Medical Nutrition Therapy for Hyperlipidemia

- Dietary recommendations currently from:
 - 2013 AHA/ACC Guideline of Lifestyle Management to Reduce Cardiovascular Risk (Eckel et al. 2013)
 - National Lipid Association Recommendations for Patient-Centered Management of Dyslipidemia -- Parts 1 & 2 (Jacobson et al. 2015a and b)
- Dietary recommendations include:
 - **Choose unsaturated fats over saturated and *trans* fats**
 - Use non-tropical oils (canola, olive, avocado)
 - Eat plenty of fruits, vegetables, and whole grains
 - Include low-fat dairy, poultry, fish, legumes, unsalted nuts
 - Limit red meat, sodium, sugar-sweetened beverages (SSB), and sweets



THE FACTS ON FAT

The American Heart Association recommends replacing bad (saturated) fats with good (unsaturated) fats as part of a healthy eating pattern.

LOVE IT

UNSATURATED
(POLY & MONO)



- Lowers rates of cardiovascular and all-cause mortality
- Lowers bad cholesterol & triglyceride levels
- Provides essential fats your body needs but can't produce itself

LIMIT IT

SATURATED



- Increases risk of cardiovascular disease
- Raises bad cholesterol levels

LOSE IT

ARTIFICIAL TRANS FAT,
HYDROGENATED OILS
& TROPICAL OILS



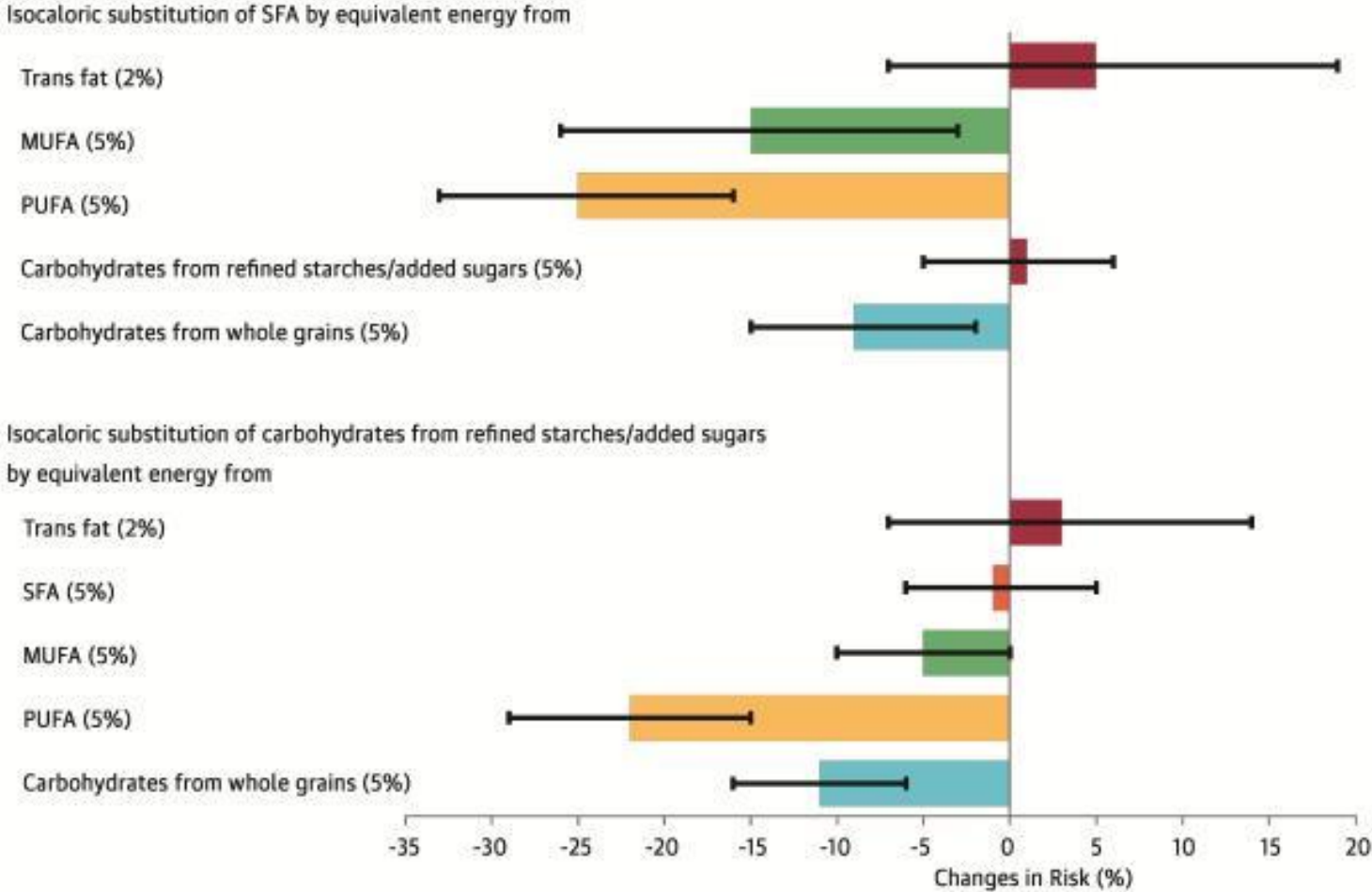
- Increases risk of heart disease
- Raises bad cholesterol levels

Saturated Fats (SFAs)

- Increase LDL-cholesterol
- NLA: SFA <7% of total energy intake
 - AHA/ACC: 5 – 6% intake
- 2000 calorie/day diet:
 - 5 – 7% intake of saturated fats
= **11 – 15 g/day**



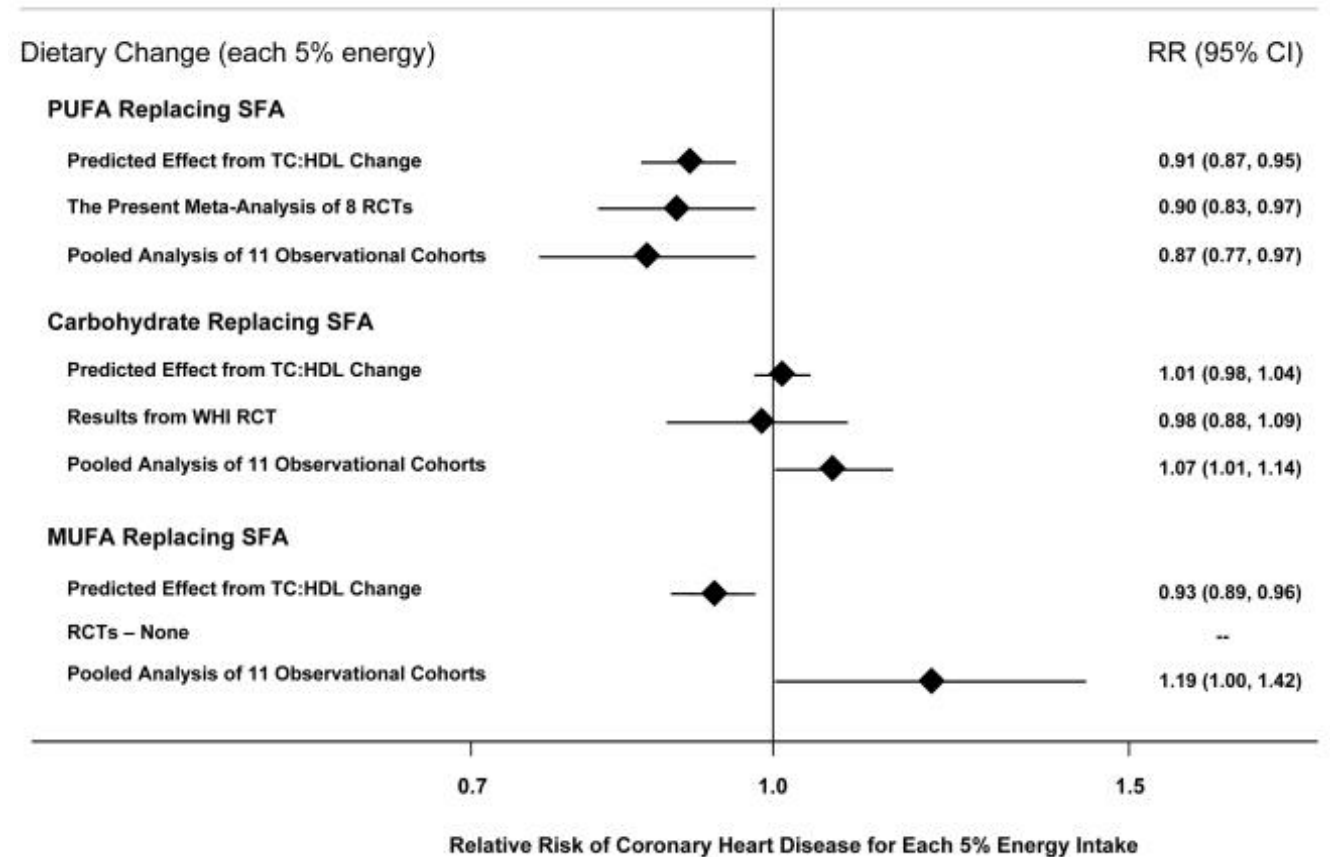
Replacing SFAs



Li, Y., et al. 2015

Replacing SFAs

- Replacing SFA with PUFA reduces the occurrence of CHD events by 19%
- Each 5% greater intake of PUFA:
 - reduced CHD risk by 10%
 - decreased LCL-C by 10 mg/dL



Replacing SFAs

Table 4 Predicted effects of macronutrient replacement of dietary saturated fatty acids with PUFA, MUFA, and carbohydrate on lipoprotein lipids based on results from controlled feeding trials*

Dietary component	Predicted effects* on lipoprotein lipids of replacing 5% of energy from saturated fatty acids with 5% of energy from the specified dietary component, mg/dL		
	LDL-C	TG	HDL-C
PUFA	-9.0	-2.0	-1.0
MUFA	-6.5	+1.0	-6.0
Carbohydrate	-6.0	+9.5	-2.0

HDL-C, high-density lipoprotein cholesterol; LDL-C, low-density lipoprotein cholesterol; MUFA, monounsaturated fatty acid; PUFA, polyunsaturated fatty acid; TG, triglyceride.

*Results are summarized from controlled feeding trials of subjects with average-to-mildly dyslipidemic baseline levels of lipoprotein lipids. Effects may be more pronounced in those with higher baseline values.

Source: Adapted from Eckel RH, et al. *J Am Coll Cardiol*. 2014;63(25 Pt B):2960–2984.²⁴

Finding SFAs on a Nutrition Label

- Total fat is the combined amount of all fats (SFA, MUFA, PUFA, and *trans*)
- Only *trans* and saturated fats are required on the label

Nutrition Facts	
Serving Size 2/3 cup (55g) Servings Per Container About 8	
Amount Per Serving	
Calories 230	Calories from Fat 72
% Daily Value*	
Total Fat 8g	12%
Saturated Fat 1g	5%
<i>Trans</i> Fat 0g	
Cholesterol 0mg	0%
Sodium 160mg	7%
Total Carbohydrate 37g	12%
Dietary Fiber 4g	16%
Sugars 12g	
Protein 3g	
Vitamin A	10%
Vitamin C	8%
Calcium	20%
Iron	45%
* Percent Daily Values are based on a 2,000 calorie diet. Your daily value may be higher or lower depending on your calorie needs.	
	Calories: 2,000 2,500
Total Fat	Less than 65g 80g
Sat Fat	Less than 20g 25g
Cholesterol	Less than 300mg 300mg
Sodium	Less than 2,400mg 2,400mg
Total Carbohydrate	300g 375g
Dietary Fiber	25g 30g

Nutrition Facts	
8 servings per container	
Serving size	2/3 cup (55g)
Amount per serving	
Calories	230
% Daily Value*	
Total Fat 8g	10%
Saturated Fat 1g	5%
<i>Trans</i> Fat 0g	
Cholesterol 0mg	0%
Sodium 160mg	7%
Total Carbohydrate 37g	13%
Dietary Fiber 4g	14%
Total Sugars 12g	
Includes 10g Added Sugars	20%
Protein 3g	
Vitamin D 2mcg	10%
Calcium 260mg	20%
Iron 8mg	45%
Potassium 235mg	6%
* The % Daily Value (DV) tells you how much a nutrient in a serving of food contributes to a daily diet. 2,000 calories a day is used for general nutrition advice.	



SFAs in Food & Drink



Food/Beverage	Saturated fat (g)
Ground beef (3 oz)	6.0
Regular cheddar cheese (1 oz)	6.0
Chicken thigh with skin	5.6
Whole milk (1 cup)	5.1
Coconut oil (1 tsp)	3.7
Cream (1 tbsp)	2.9
Butter (1 tsp)	2.4
Mayonnaise (1 tbsp)	1.6
Egg yolk (from 1 large egg)	1.6
Bacon (1 slice)	1.1

Food/Beverage	Saturated fat (g)
1 serving Meat lasagna	22.6
Crispy Chicken Tender Salad (with Grilled Chicken)	18
Panera Bear Claw	15
Starbucks Snowman cookie	14
Subway Italian 6 in. (with cheese and mayo)	13
Biggby Mocha Mocha Latte 16 oz	7.6
9 Hershey's Candy Cane Kisses	7

Coconut Oil – A Healthy Alternative?

- Studies cited suggesting health benefits
 - small in size
 - used animal models
 - used virgin coconut oil → differs from refined coconut oil that is available to the public
- At 92% SFA, coconut oil contains more SFAs than butter
- Diets high in coconut oil can raise LDL-C
- Coconut oil is **not recommended** as a healthy oil alternative to improve lipid levels



Food	Saturated fat (g)
Coconut oil (1 tsp)	3.7
Butter (1 tsp)	2.4

Trans Fats

- AHA/ACC and NLA: reduce *trans* fats/minimal *trans* fats
- Each 1% of energy coming from *trans* fats increases LDL-C by ~1.5 mg/dL
 - compared with carbohydrates, MUFAs, or PUFAs
- Found in stick margarine, commercially prepared fried foods, sweets such as pastries and cakes, and microwave popcorn
- Products labeled as *trans* fat free may have up to 0.5 g of *trans* fat per serving.
- FDA extended compliance date to Jan 1, 2020

Nutrition Facts		Amount/Serving	%DV*	Amount/Serving	%DV*		
Serv. Size 4 cookies (32g) Servings 9 Calories 150 Calories from fat 60		Total Fat	7g	11%	Total Carb.	20g	7%
		Sat. Fat	4.5g	23%	Dietary Fiber	1g	4%
		Trans Fat	0g		Sugars	10g	
		Cholest.	0mg	0%	Protein	2g	
		Sodium	115mg	5%			
		Vitamin A 0% • Vitamin C 0% • Calcium 0% • Iron 4%					
INGREDIENTS: Enriched flour, riboflavin, sugar, partially hydrogenated vegetable oil, cocoa, cornstarch, hydrogenated oils, soy lecithin, salt, caramel color, artificial flavors.							

Nutrition Facts		Amount/serving	%DV*	Amount/serving	%DV*		
Serv. Size 1 croissant (57g) Serv. Per Cont. 144 Calories 190 Fat Cal. 70		Total Fat	8g	12%	Total Carb.	24g	8%
		Sat. Fat	3g	16%	Fiber	1g	3%
		Trans Fat	1.5g		Sugars	3g	
		Cholest.	10mg	4%	Protein	4g	
		Sodium	290mg	12%			
		Vitamin A 4% • Vitamin C 2% • Calcium 6% • Iron 8%					

INGREDIENTS: Enriched Wheat Flour(Unbleached Wheat Flour, Malted Barley Flour, Niacin, Reduced Iron, Potassium Bromate, Thiamine Mononitrate, Riboflavin, Folic Acid), Water, Vegetable Shortening (Partially Hydrogenated Soybean and Cottonseed Oils, Soybean Oil, Soybean Lecithin with Mono- and Diglycerides, Vitamin A Palmitate), Butter, Sugar, Contains 2% or less of: Leavening(Yeast, Baking Powder [Sodium Bicarbonate, Cornstarch, Sodium Aluminum Phosphate, Calcium Sulfate, Monocalcium Phosphate]), Non-Fat Dry Milk, Salt, Dough Conditioner (Wheat Flour, DATEM, Dextrose, Soybean Oil, Ascorbic Acid, L-Cysteine, Azodicarbonamide(ADA), Calcium Stearoyl-2 Lactylate, Enzymes), Eggs, Artificial Flavor, Preservatives(Calcium Propionate, Potassium Sorbate, Citric Acid).

Sources of Healthy Fats

POLYUNSATURATED FATS (PUFAS)

- Oils – soybean, corn, sunflower
- Tofu / Soybeans
- Fish – salmon, albacore tuna, trout, mackerel, herring
- Some nuts and seeds (walnut, sunflower, flaxseed)

MONOUNSATURATED FATS (MUFAS)

- Oils – olive, canola, peanut, sesame
- Avocado
- Peanut butter
- Most nuts and seeds

<https://www.heart.org/en/healthy-living/healthy-eating/eat-smart/fats/4-ways-to-get-good-fats-infographic>

FOUR WAYS TO GET GOOD FATS

Replace saturated fats with unsaturated fats as part of a healthy eating pattern. Unsaturated fats can help lower bad cholesterol and triglyceride levels, and they provide essential nutrients your body needs. Here are four easy and delicious ways to get more of the good fats.

GO FISH
Eat fish at least twice a week. Choose fatty or oily fish like albacore tuna, herring, lake trout, mackerel, sardines and salmon to get essential omega-3 fatty acids.

BE NUTTY
Munch on a small handful (about 1 oz.) of unsalted nuts and seeds for good fats, energy, protein and fiber. Good choices include almonds, hazelnuts, peanuts, pistachios, pumpkin seeds, sunflower seeds and walnuts.

ADD AVOCADO
Snack, cook and bake with avocado to add healthy fats, fiber and essential vitamins and minerals.

CHECK THE OILS
Use cooking and dressing oils that are lower in saturated fat. Good choices include avocado, canola, corn, grapeseed, olive, peanut, safflower, sesame, soybean and sunflower oils.

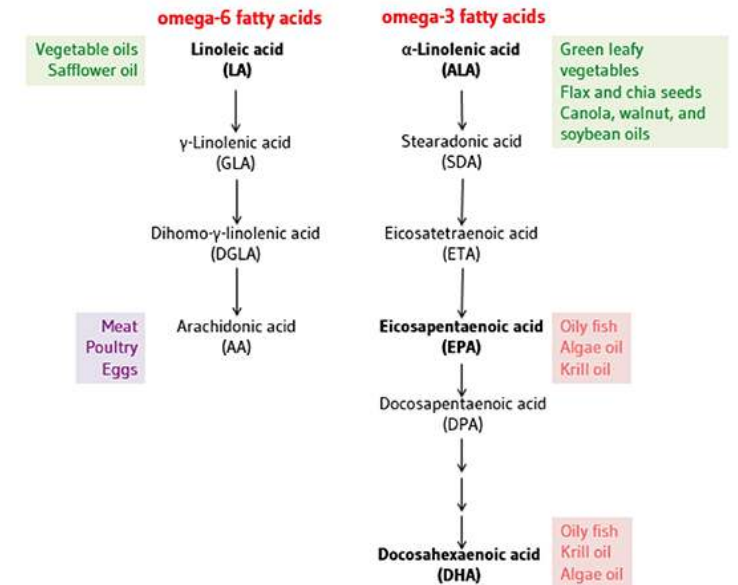
LEARN MORE AT HEART.ORG/HEALTHYFORGOOD

EAT SMART ADD COLOR MOVE MORE BE WELL

Omega-3 Fatty Acids

- High intake of omega-3 FAs is associated with lower rates of heart disease
- Omega-3 fatty acids include
 - alpha-linolenic acid (ALA)
 - eicosapentaenoic acid (EPA)
 - docosahexaenoic acid (DHA)
- NLA recommends: ALA intake of 0.6 – 1.2% of energy
- NLA recommends: **two 3.5 – 4 oz servings of oily fish per week**
 - equivalent to 250 – 500 mg of EPA and DHA

Figure 2. Classes of Essential Fatty Acids



Omega-6 (n-6) and omega-3 (n-3) fatty acids comprise the two classes of essential fatty acids (EFA). The parent compounds of each class, linoleic acid (LA) and α -linolenic acid (ALA) (bold font), give rise to longer chain derivatives inside the body. Due to low efficiency of conversion of ALA to the long-chain omega-3 PUFA, eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA), it is recommended to obtain EPA and DHA from additional sources. Dietary sources of the different LC-PUFA are listed in the colored boxes (23).

<https://lpi.oregonstate.edu/mic/other-nutrients/essential-fatty-acids>

Adding Omega-3 Fatty Acids to the Diet

- Eat 3.5 – 4 oz of grilled, baked, broiled, or sautéed fish at least 2x/week
 - Fish/seafood high in omega-3 FA: salmon, pacific oysters, tuna, trout, mackerel (not king), herring, sardines, anchovies
 - Limit fish that is high in mercury – shark, swordfish, king mackerel, tilefish, orange roughy, and big-eye tuna
- Use canola or soybean oil (ALA)
- Use ground flaxseed or flaxseed oil (ALA)
- Add walnuts to salads or trail mix and walnut oil in salad dressing (ALA)
- Choose eggs that are labeled as high in omega-3 FA (DHA)
- NLA recommendation: Some individuals who avoid seafood may benefit from a fish oil supplement, if recommended by a clinician
 - Daily supplements can provide 1 – 4 g of EPA/DHA

Dietary Cholesterol

(are eggs good for you now?)

- AHA/ACC and NLA recommendation: < **200mg/day**
 - Hyper-responders should limit to near 0 mg/day
- Foods high in cholesterol:
 - Egg yolks (limit to 2 – 4/week)
 - Shellfish – shrimp, crab, clams
 - Organ meats – heart, kidney, liver
 - Fried foods
 - Processed meats

Foods High in Cholesterol



Beef brain



Chicken liver



Egg yolk



Shrimps



Cheeseburger



Chicken legs

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<http://www.nutrientsreview.com/lipids/cholesterol.html>

Medical Nutrition Therapy for Hyperlipidemia

- Choose unsaturated fats over saturated and trans fats
 - Use non-tropical oils (canola, olive, avocado)
- **Eat plenty of fruits, vegetables, and whole grains**
- Include low-fat dairy, poultry, fish, legumes, unsalted nuts
- Limit red meat, sodium, sugar-sweetened beverages (SSB), and sweets



Fiber

- Insoluble Fiber (Non-viscous)
 - Adds bulk to the stool to help you pass food easier through the digestive tract
- Soluble Fiber (Viscous)
 - Attracts water in the digestive tract to form a gel-like mass
 - Slows digestion--keeping you fuller for longer
 - **NLA recommends 5 – 10 g/day (or more)**
- For each 1 g increase in soluble fiber →
1.1 mg/dL decrease in LDL-C



Sources of Fiber

INSOLUBLE

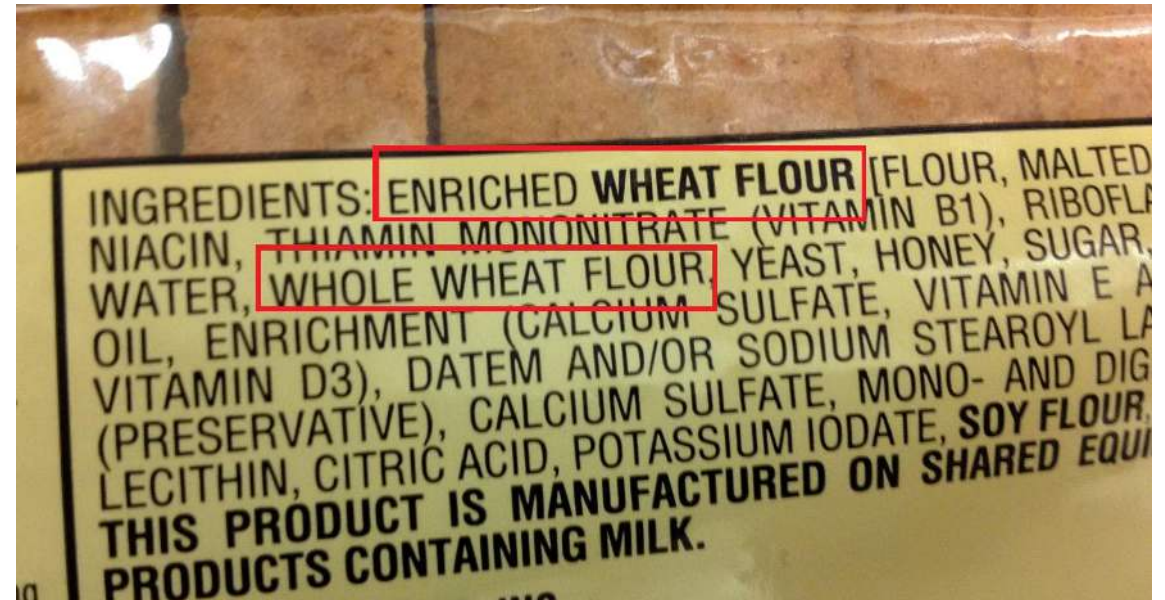
- Vegetables – green beans, dark green leafy vegetables
- Fruit skins and root vegetable skins
- Berries
- Whole-wheat products
- Wheat bran
- Seeds and nuts

SOLUBLE

- Vegetables – asparagus, Brussels sprouts, sweet potatoes, turnips, carrots
- Fruits – apricots, mangoes, oranges, apples, pears
- **Legumes – black beans, navy beans, kidney beans, peas**
- Wheat – barley, oats, oat bran
- Ground flax seed

Finding Whole Grains on a Nutrition Label

- First ingredient: **100% whole grain or whole grain**
- **Whole grain can be any kind of grain** or a mixture of grains (wheat, oats, barley, buckwheat, etc.)
- **Multi grain** → contains multiple types of grains, but not necessarily all whole
- Enriched grains have been refined
 - with nutrients added back in



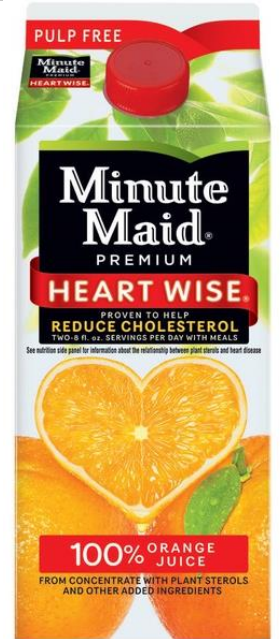
Tips for Increasing Fiber

- To prevent uncomfortable side effects, increase fiber intake slowly.
- Stay hydrated to prevent constipation and gas.
- Choose whole fruit instead of juice.
- Eat the skin on fruits and vegetables if possible.
- Choose whole grain cereals and bread.
- Increase intake of beans by adding to soups or salads.
- If it is difficult to get the recommended daily amount from food alone, fiber supplements such as Benefiber, Metamucil, or fiber gummies may be considered.
 - “Start low and go slow”



Plant Sterols and Stanols

- NLA recommendation: Consumption of **2g/day** of plant sterols and stanols can decrease LDL-C by 4 – 10%
- Occur naturally in foods, but in small amounts.
 - vegetable oils, nuts, seeds, whole grains
 - The average American consumes 200 – 400 mg/day
 - X2 for vegans
- Fortified sources – margarine spreads, orange juice, cereal, breakfast bars, dietary supplements
 - 1 tbsp Benecol buttery spread = 70 calories, 0.5 g of plant stanols
 - 4 tbsp/day of Benecol = **280 calories**, 2 g of plant stanols



Medical Nutrition Therapy for Hyperlipidemia

- Choose unsaturated fats over saturated and trans fats
 - Use non-tropical oils (canola, olive, avocado)
- Eat plenty of fruits, vegetables, and whole grains
- Include low-fat dairy, poultry, fish, legumes, unsalted nuts
- Limit red meat, sodium, sugar-sweetened beverages (SSB), and sweets



Role of the Registered Dietitian

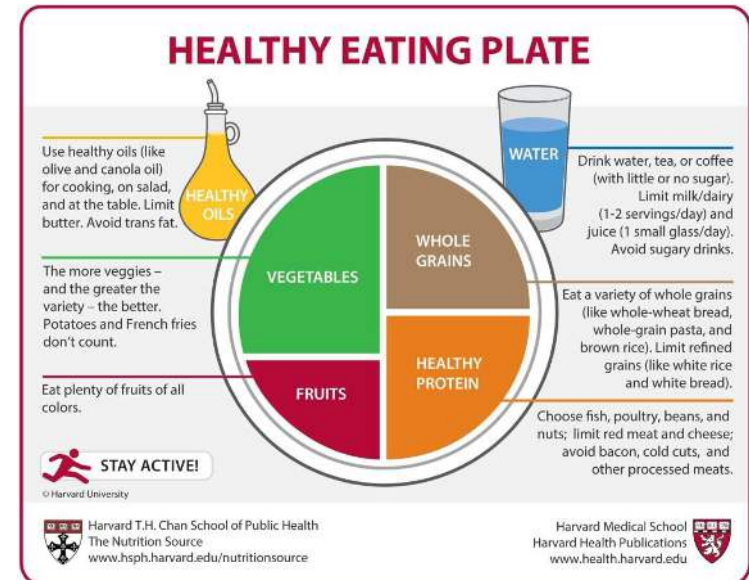
- ***“Nutritional counseling and follow-up/monitoring by a registered dietitian nutritionist are recommended whenever possible to individualize patients’ cardioprotective dietary patterns and to promote long-term dietary adherence.” – NLA, 2015***

Chart 15 Recommendations for team-based collaborative care

Recommendations	Strength	Quality
Health care teams for optimal lipid and ASCVD risk management may include, where available: the patient; the patient’s primary health care provider; nurses; nurse practitioners; pharmacists; physician assistants; registered dietitian nutritionists, including certified diabetes educators in some practices; exercise specialists; social workers; community health workers; and licensed professional counselors, psychologists, and health educators.	A	High
Health care team members should coordinate care support among various team members, use evidence-based guidelines/recommendations for dyslipidemia management, establish a structured plan for monitoring patient progress, and provide patients with a variety of tools and resources to improve their own care.	A	High
Team-based collaborative care may be incorporated into the Patient Centered Medical Home as a strategy to address shortfalls in patient health care quality, access, continuity, and cost.	E	Low

Heart-Healthy Dietary Patterns

- **Dietary Approaches to Stop Hypertension (DASH)** (*AHA/ACC and NLA*)
 - **USDA – Healthy U.S.-style** (*AHA/ACC and NLA*)
 - **American Heart Association** (*AHA/ACC and NLA*)
 - **Mediterranean style** (*NLA*)
 - **Vegetarian/vegan** (*NLA*)
- The specific diet recommendation should be individualized and depend on the patient's lifestyle, cultural beliefs, other health factors, and preferences.*

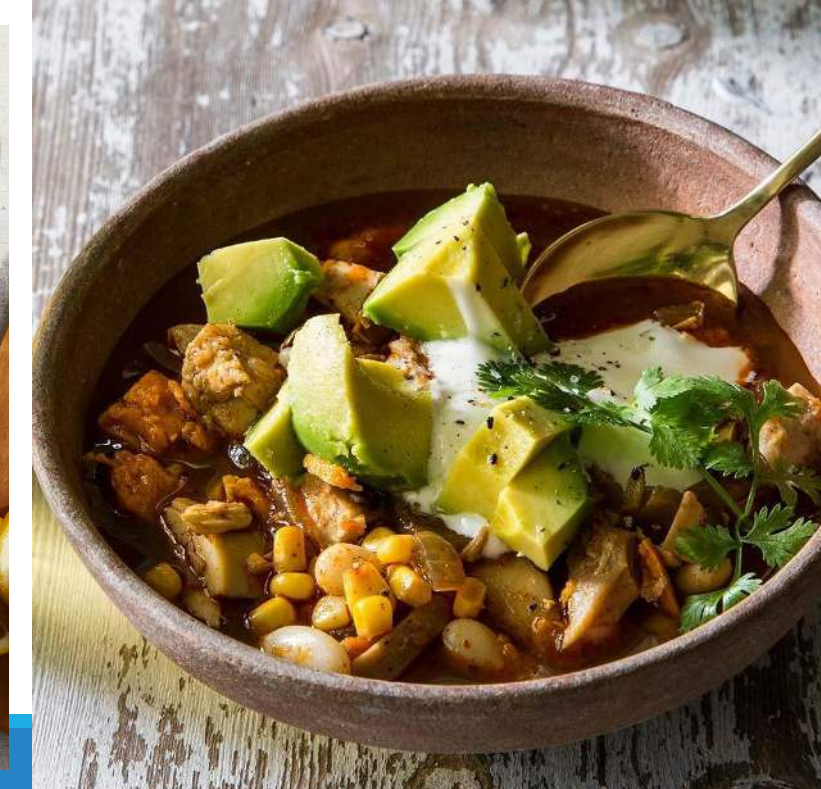


DASH Diet

Food Group	Recommended servings
Grains and grain products	4 – 8 / day
Vegetables	3 – 5 / day
Fruits	3 – 5 / day
Low-fat or fat-free dairy	2 – 3 / day
Lean meat, poultry, fish	3 – 6 oz / day
Nuts, seeds, and dry beans	3 – 5 / week
Fats and oils	1 – 3 / day
Sweets	3 – 5 or less / week

Additional Recommendations

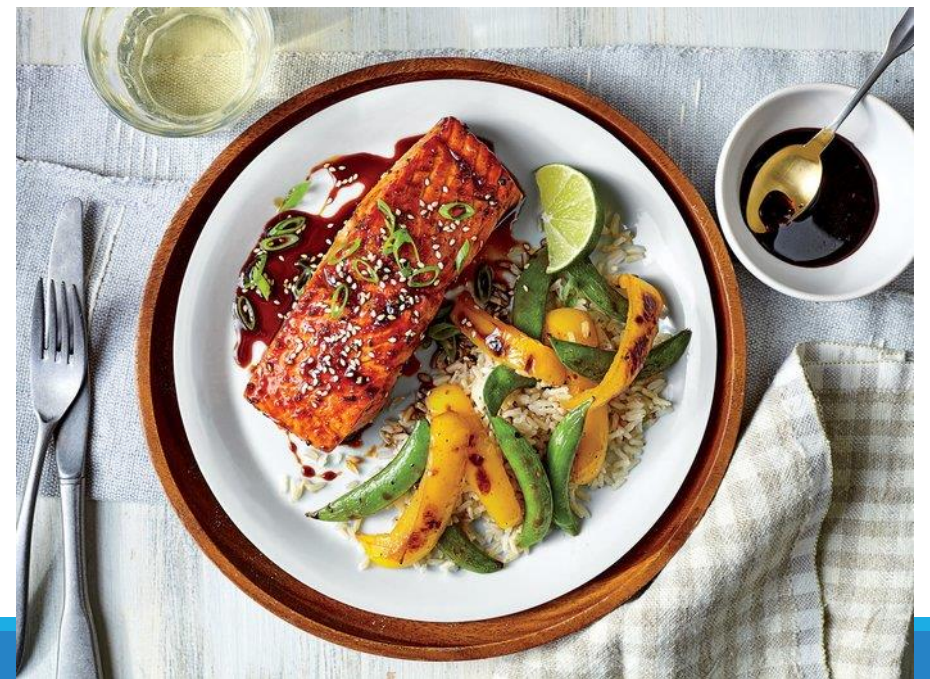
- < 2300 mg of sodium/day
- Adequate calcium intake
- Adequate magnesium intake from food sources
- High potassium → 4700 mg/day
- 30 – 45 minutes of physical activity on most days
- Moderate alcohol



Mediterranean Diet

- No one definition of a Mediterranean diet
- Most interpretations have similar characteristics:
 - Daily use of fruits, vegetables, bread, cereals, potatoes, beans, nuts, and seeds
 - Olive oil
 - Low to moderate amounts of dairy, fish, and poultry
 - Very low amounts of red meat
 - Eggs consumed 0-4x/week
 - Wine is consumed in low to moderate amounts
- Moderate in fat (32-35% of total calories)
 - Higher in SFA than is recommended for many (9-10% of total calories)
- Found to improve cholesterol, triglycerides, blood pressure, and fasting blood glucose levels





Vegetarian / Vegan Diets

Semi-vegetarian *Pescatarian* *Lacto-ovo vegetarian*

Lacto-vegetarian *Ovo-vegetarian* *Vegan*

- Adopting a vegetarian or vegan diet can help improve hyperlipidemia
 - Generally low in saturated fat and high in fiber from whole grains, fruits, and vegetables
 - Cheese??
- **Semi-vegetarianism, or only occasionally consuming meat, is associated with improved cholesterol levels and can be a good alternative for individuals who do not want to eliminate meat.**



Lifestyle Recommendations

- Work towards a healthy weight (5 – 10% weight loss can be helpful)
- Aim for 30 minutes of physical activity on most days
 - 200 – 300 minutes of moderate-intensity physical activity per week can help decrease weight and lower LDL-C
- Limit alcohol consumption to 1 drink/day for women and 2 drinks/day for men
 - **If you do not drink, it is not recommended to add red wine or any other form of alcohol**
- Do not smoke
- Get the recommended amount of sleep each night (7 – 9 hours)
- Manage stress



Clinical algorithm for screening and management of elevated TG

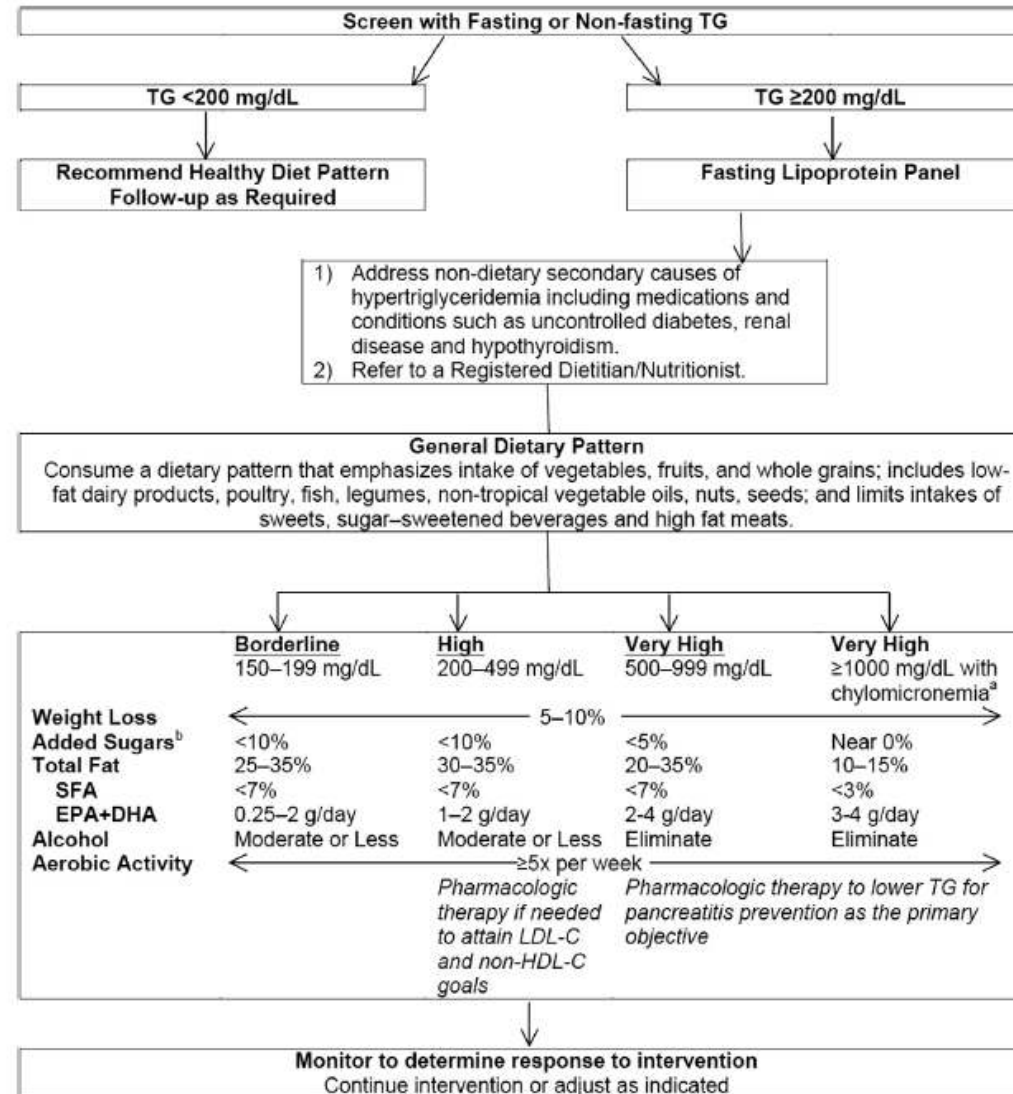


Figure 1 Clinical algorithm for screening and management of elevated TG. Adapted from Miller M, et al. *Circulation*. 2011;123:2292–2333.¹⁵² ^aSpecial consideration for patients with initial TG ≥1000 mg/dL and chylomicronemia: recheck lipids in 2 weeks. When TG <500 mg/dL, diet may gradually be liberalized with monitoring. ^bIn addition to added sugars, some foods and beverages that are high in naturally occurring sugars, for example, honey and fruit juices, should be limited. EPA, eicosapentaenoic acid; DHA, docosahexaenoic acid; HDL-C, high-density lipoprotein cholesterol; LDL-C, low-density lipoprotein cholesterol; non-HDL-C, non-high-density lipoprotein cholesterol; SFA, saturated fatty acids; TG, triglyceride.

Patient Resources

- American Heart Association (AHA)
 - www.heart.org
 - Articles, infographics, healthy recipes
- Academy of Nutrition and Dietetics (AND)
 - www.eatright.org
 - Articles, tips, healthy recipes
- MHealthy
 - <https://hr.umich.edu/benefits-wellness/health-well-being/mhealthy>
 - Recipes, University-wide events and resources
- Mediterranean Diet:
 - <https://oldwayspt.org/traditional-diets/mediterranean-diet>
 - Tips sheets, grocery list
- DASH Diet:
 - <https://www.nhlbi.nih.gov/health-topics/dash-eating-plan>
 - General description of diet, calorie levels/food groups, links to recipes
- Vegetarian/Vegan:
 - <https://vegetriannutrition.net/>
 - Recipes and informational articles

Special Thanks to

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