

اسدالکریم

# راهنماهای تغذیه ای برای پیشگیری و مدیریت اختلالات چربی خون

سمیه حسین پور نیازی

مرکز تحقیقات تغذیه در بیماری های غدد درون ریز

پژوهشکده علوم غدد درون ریز و متابولیسم

دانشگاه علوم پزشکی شهید بهشتی

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# Definition of dyslipidemia

❖ LDL-c  $\geq 150$  mg/dL **and/or**

❖ HDL-c  $< 40$  mg/dL **and/or**

❖ TG  $\geq 150$  mg/dL **and/or**

❖ Lipid lowering medications

# Lifestyle recommendation in **dyslipidemia**

**First-line approach** (prior to lipid-lowering drugs therapy): **lifestyle intervention**

**lifestyle intervention + lipid lowering therapy:**

- **high CVD risk** such as those with FH: baseline LDL-c levels of  $\geq 100$  mg/dl )
- **very high CVD risk** (with baseline LDL-c levels of  $\geq 70$  mg/dl)

# Lifestyle recommendation in **dyslipidemia** *(cont'd)*

a. Medical nutrition therapy

b. Weight loss

c. Physical activity

d. Smoking cessation

# Lifestyle recommendation in **dyslipidemia** *(cont'd)*

## a. Medical Nutrition Therapy in dyslipidemia

1. Reduced-energy intake
2. Consuming **fruits and vegetables** ( $\geq 5$  servings/day)
  - 1 of these servings/day of **dark green or orange vegetables**
3. Consuming grains (primarily **whole grains**)
4. Consuming **Legumes, unsalted nuts** and **seeds**  $\geq 4$  serving/week

# Food groups and intermediate disease markers: a systematic review and network meta-analysis of randomized trials

Lukas Schwingshackl,<sup>1,2</sup> Georg Hoffmann,<sup>3</sup> Khalid Iqbal,<sup>1</sup> Carolina Schwedhelm,<sup>1,2</sup> and Heiner Boeing<sup>1,2</sup>

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**Results:** A total of 66 randomized trials (86 reports) comparing 10 food groups and enrolling 3595 participants was identified. Nuts were ranked as the best food group at reducing LDL cholesterol (SUCRA: 93%), followed by legumes (85%) and whole grains (70%). For reducing TG, fish (97%) was ranked best, followed by nuts (78%) and red meat (72%). However, these findings are limited by the low quality of the evidence. When combining all 10 outcomes, the highest SUCRA values were found for nuts (66%), legumes (62%), and whole grains (62%), whereas SSBs performed worst (29%).

**Conclusion:** The present NMA provides evidence that increased intake of nuts, legumes, and whole grains is more effective at improving metabolic health than other food groups. For the credibility of diet-disease relations, high-quality randomized trials focusing on well-established intermediate-disease markers could play an important role. This systematic review was registered at PROSPERO ([www.crd.york.ac.uk/PROSPERO](http://www.crd.york.ac.uk/PROSPERO)) as CRD42018086753. *Am J Clin Nutr* 2018;108:576–586.



REVIEW



OPEN ACCESS



## Benefits of pulse consumption on metabolism and health: A systematic review of randomized controlled trials

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### ABSTRACT

Pulses are nutrient-dense foods that have for a long time been empirically known to have beneficial effects in human health. In the last decade, several studies have gathered evidence of the metabolic benefits of pulse intake. However, it remains unclear at what amounts these effects may be attained. This study aimed to systematically review the scientific outputs of the last two decades regarding health benefits of pulse consumption and the amounts necessary for positive outcomes to be achieved. A PubMed search including keywords [{"dietary pulses", "pulses", "legumes", "grain legumes", "bean", "chickpea", "pea", "lentil", "cowpea", "faba bean", "lupin"}] and [{"inflammation", "inflammatory markers", "C-reactive protein", "blood lipids", "cholesterol", "cardiometabolic health", "cardiovascular disease", "diabetes", "glycaemia", "insulin", "HOMA-IR", "body weight", "body fat", "obesity", "overweight", "metabolome", "metabolic profile", "metabolomics", "biomarkers", "microbiome", "microbiota", "gut"}] was performed. Only English written papers referring to human dietary interventions, longer than one day, focusing on whole pulses intake, were included. Most of the twenty eligible publications reported improvements in blood lipid profile, blood pressure, inflammation biomarkers, as well as, in body composition, resulting from pulse daily amounts of 150 g (minimum-maximum: 54-360 g/day; cooked). Concerns regarding methodological approaches are evident and the biochemical mechanisms underlying such effects require further investigation.

### KEYWORDS

Biomarkers; cardiovascular risk factors; ingestion; legume grains; well-being

# Assessment *cont'*

جدول تلفیق واحدهای توصیه شده دریافتی (serving size) با واحدهای سیاهه جانشینی (exchange)

	تعداد واحد توصیه شده به علی	CHO (g)	Pro (g)	Fat (g)	Energy (Kcal)
Low fat dairy	3	$3 \times 12 = 36$	$3 \times 8 = 24$	$3 \times 5 = 15$	$3 \times 120 = 360$
Vegetables	5	$5 \times 5 = 25$	$5 \times 2 = 10$	-	$5 \times 25 = 125$
Fruits	4	$4 \times 15 = 60$	-	-	$4 \times 60 = 120$
Simple sugar	5	$5 \times 5 = 25$	-	-	$5 \times 20 = 100$
<b>Legumes</b>	<b>1</b>	<b><math>1 \times 15 = 15</math></b>	<b><math>1 \times 10 = 10</math></b>	<b><math>1 \times 2 = 2</math></b>	<b><math>1 \times 125 = 125</math></b>
Grains	6.5	$350 - 161 =$ $189 \div 15 = 12.5$	$12.5 \times 3 = 37.5$	-	$12.5 \times 80 = 1000$
Meat	3	2 - 1	$105 - 81.5 =$ $23.5 \div 7 = 3$	$2 \times 3 = 6$ $1 \times 5 = 10$	$2 \times 45 = 90$ $1 \times 75 = 75$
<b>Nuts</b>	<b>2</b>	-	-	<b><math>2 \times 5 = 10</math></b>	<b><math>2 \times 45 = 90</math></b>
Fat and oil	13	-	-	$108 - 43 =$ $75 \div 5 = 13$	$13 \times 45 = 585$
<b>Total</b>		<b>350</b>	<b>105</b>	<b>108</b>	<b>2670</b>

# Lifestyle recommendation in **dyslipidemia** *(cont'd)*

## a. Medical Nutrition Therapy in dyslipidemia *(cont'd)*

5. Consuming **low-fat dairy products**

6. Consuming **fish**, and **lean meats**, **skinless poultry**

7. Reduction **salt** intake (**<2400** mg/d or **<6** g/d)

8. Reduce the **sugar and sugar sweetened beverages**

9. Intake of source of **probiotics**

# Lifestyle recommendation in **dyslipidemia** *(cont'd)*



✓ Supporting the **gut ecology** helps to keep the digestive tract healthy and balance the immune system, which may reduce inflammation

✓ Fermented and cultured foods are an excellent source of probiotic bacteria.

✓ Sources include miso, sauerkraut, yogurt, kefir, and kimchi, tempeh and kombucha (a fermented beverage).

## FERMENTED FOODS...an overview



# Dietary Inflammatory Index (DII) and obesity

## 5. GET ADEQUATE SOURCES OF PROBIOTICS

✓ Getting sufficient **pre-biotics** to feed the good bacteria is also important.

✓ Inulin and fructooligosaccharides are examples of prebiotics:

bananas, asparagus, onions, garlic, chicory, artichoke



# Lifestyle recommendation in **dyslipidemia** *(cont'd)*

## a. Medical Nutrition Therapy in dyslipidemia *(cont'd)*

### 10. Soluble fiber (10-25 g/ day)

- ↓ TC: 5 to 19%
- ↓ LDL-C: 8 to 24%
- Foods high in soluble fiber:  
Oat bran, oatmeal, beans, peas, rice bran, barley, citrus fruits, strawberries, and apple

### 11. Added sugar (<10% Kcal)

# Lifestyle recommendation in **dyslipidemia** *(cont'd)*

## a. Medical Nutrition Therapy in dyslipidemia *(cont'd)*

12. **dietary fat** : **25 - 35%** of calorie intake

13. **PUFA**: **up to 10%** caloric intake

- Vegetable oils are higher in PUFA: safflower and canola oils

14. **MUFA**: **up to 20%** of caloric intake

- vegetable oils higher in MUFA: canola, and olive oils

# Lifestyle recommendation in **dyslipidemia** *(cont'd)*

## a. Medical Nutrition Therapy in dyslipidemia *(cont'd)*

Limit consumption of:

15. **saturated fats** (<**7%** of total calories)

16. **cholesterol** (<**200** mg/day)

17. **trans-fats** (**0%** of total calories)

❖ each **1%** of energy from **TFAs** raising **LDL-C** by **1.5** mg/ dL compared with carbohydrate and, to a somewhat greater extent, compared with MUFA and PUFA

- Jellinger PS et al. Endocr Prac 2017 Apr;23(Suppl 2):1-87
- Jacobson TA et al. J Clin Lipidol. 2015 Nov-Dec;9(6 Suppl):S1-122.
- Dieter et al. Trends Cardiovasc Med. 2017 Jul;27(5):295-313.



# Lifestyle recommendation in **dyslipidemia** *(cont'd)*

a. Medical nutrition therapy

b. Weight loss

c. Physical activity

d. Smoking cessation

# Lifestyle recommendation in **dyslipidemia** *(cont'd)*

## **b. Weight loss**

❖  $\geq 5\%$  of body weight

• ↓ LDL-C : **5** mg/dl

• ↑ HDL-C : **2 -3** mg/dl

# Lifestyle recommendation in **dyslipidemia** *(cont'd)*

a. Medical nutrition therapy

b. Weight loss

c. Physical activity

d. Smoking cessation

# Lifestyle recommendation in **dyslipidemia** *(cont'd)*

## **c. Physical activity**

- At least **30** minutes of *moderate-intensity aerobic activity*, **4 to 6** times weekly
  - brisk walking, riding a stationary bike, water aerobics, cleaning/ scrubbing, mowing the lawn, and sporting activities
- *Muscle-strengthening activity* is recommended **at least 2** days a week

# Lifestyle recommendation in **dyslipidemia** *(cont'd)*

a. Medical nutrition therapy

b. Weight loss

c. Physical activity

d. Smoking cessation

Lifestyle recommendation according  
to **the type of dyslipidemia**

# Lifestyle recommendations according to **the type of dyslipidemia**

## **a. Hypertriglyceridaemia:**

- Borderlines TG (150-199 mg/dl)
- High TG (200-499 mg/dl)
- Very high TG (>500 mg/dl)

## **b. Hypercholesterolaemia**

- TC >200 mg/dl
- LDL-c >150 mg/dl

## **c. Low HDL-c**

- In men: HDL-c < 40 mg/dl
- In women: HDL-c <50 mg/dl

# Lifestyle recommendation in hypertriglyceridemia

1. loss of weight
2. Dietary carbohydrate
3. Dietary fat
4. Dietary protein
5. Increase physical activity
6. Reduction of alcohol consumption
7. Mediterranean diet





# Lifestyle recommendations for hypertriglyceridemia

## 1. Loss of excessive body weight (5–10%)

❖ *Borderline TG (150–199 mg/dl)*: weight loss of up to **5%**

3-kg loss of body weight: ~ **↓ 15** mg/dl in TG

❖ *High TG (200–499 mg/dl) or very high TG (>500 mg/d)*: weight loss of **5–10%**

weight loss of 5–10% **→** **↓ 20%** in TG

# Lifestyle recommendations for hypertriglyceridemia

- Beyond weight loss, the type and amount of carbohydrates consumed influences TG.
- Restriction of carbohydrates as well as added sugars and alcohol is recommended

TGs are lowered in a dose-response manner with reductions in carbohydrates

# Lifestyle recommendations for hypertriglyceridemia *(cont'd)*

## 2. Dietary carbohydrate

- **Limit carbohydrates** in diet (<**60**% of total energy)

Recommended rang (**45-55** %)

**Limit Refined starches and simple carbohydrates**

Carbohydrates from *less refined sources*, such as brown rice and whole-grain bread, *can also raise the TG concentration*

**added sugars: up to 5–10%**

- Jellinger PS et al. Endocr Prac 2017 Apr;23(Suppl 2):1-87
- Jacobson TA et al. J Clin Lipidol. 2015;9(6 Suppl):S1-122.e1.
- Anagnostis et al. Maturitas 2018; 108: 45–52

# Lifestyle recommendations for hypertriglyceridemia *(cont'd)*

## 2. Dietary carbohydrate *(cont'd)*

Low GI diets + 45–50% of energy intake from carbohydrate

*efficacious on lowering Tg*

**compared with** conventional diets (55–60% of energy from carbohydrates and energy restriction to 250–500 kcal/d)

- Jellinger PS et al. Endocr Prac 2017 Apr;23(Suppl 2):1-87
- Jacobson TA et al. J Clin Lipidol. 2015;9(6 Suppl):S1-122.e1.
- Anagnostis et al. Maturitas 2018; 108: 45–52

# Lifestyle recommendations for hypertriglyceridemia *(cont'd)*

## 2. Dietary carbohydrate in high and very high TG

### ❖ *High TG (200-499 mg/dl)*

- Dietary **carbohydrate**: **50-55** % of daily energy intake

### ❖ *Very High TG (>500 mg/dl)*

- Dietary **carbohydrate**: **45-50** % of daily energy intake

- Jellinger PS et al. Endocr Prac 2017 Apr;23(Suppl 2):1-87
- Jacobson TA et al. J Clin Lipidol. 2015;9(6 Suppl):S1-122.e1.
- Anagnostis et al. Maturitas 2018; 108: 45–52

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## EXPERT CONSENSUS DECISION PATHWAY

# 2021 ACC Expert Consensus Decision Pathway on the Management of ASCVD Risk Reduction in Patients With Persistent Hypertriglyceridemia



A Report of the American College of Cardiology Solution Set Oversight Committee

Endorsed by the National Lipid Association

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**TABLE 4** Summary of Nutrition Recommendations for Patients with Hypertriglyceridemia

	TG <500 mg/dL	TG 500-999 mg/dL	TG ≥1,000 mg/dL*	Patient Messages
<b>Alcohol</b>	Restrict Do not exceed limits: 2 drinks/d for men, 1 drink/d for women	Abstain completely	Abstain completely	For patients with TG <500 mg/dL, if alcohol is consumed, wine or beer with lower alcohol content is recommended over beverages with higher alcohol content. Alcohol content is listed on packaging and patients are encouraged to select beverages with lower alcohol content should they chose to consume alcohol.
<b>Sugar-sweetened beverages</b>	Restrict	Abstain completely	Abstain completely	Recommend plain or sparkling water, unsweetened tea, or coffee
<b>Fruits†</b>	Okay to include but individualize— 3-4 servings/d	Limit to 3 or 4 servings/d and individualize. Avoid fruits with a high glycemic index (ie, pineapples, mangoes, watermelon, ripe bananas)	Limit to 1 serving/d. Recommend individualized medical nutrition therapy with a registered dietitian nutritionist	Consume whole fruit and avoid fruit juices when possible. Emphasize fresh fruits without added sugar or salt.
<b>Vegetables</b>	Emphasize vegetables	Emphasize vegetables, but avoid vegetables with a high glycemic index (ie, carrots, potatoes, sweet potatoes, yams, parsnips)	Emphasize vegetables, but avoid vegetables with a high glycemic index (ie, carrots, potatoes, sweet potatoes, yams, parsnips)	Avoid canned vegetables with salt and vegetables frozen with sauces. Avoid vegetable juices. Recommend 2.5 cups/d (77)‡
<b>Legumes (beans, lentils, chickpeas, tofu, and so on)</b>	Emphasize	Emphasize	Emphasize	Avoid added salt. Emphasize plant-based proteins instead of red meat. Avoid ultraprocessed meat alternatives.
<b>Fish/seafood</b>	Emphasize fatty fish Recommend at least 2 servings/wk	Emphasize either fatty or lean fish Recommend 2 (or more) servings/wk	Emphasize lean fish Recommend 2 (or more) servings/wk	Examples of fatty fish include salmon, farmed rainbow trout, and tuna. Examples of lean fish or seafood include cod, tilapia, haddock, flounder, and shrimp. Prioritize fresh, frozen, or packaged without sodium.

<b>Poultry/lean meats</b>	Encourage	Encourage	Limit to the very leanest meats	Substitute poultry and lean meats in place of red meat. Avoid processed meats.
<b>Dairy products</b>	Limit full-fat dairy products. Avoid sugar-sweetened dairy products.	Limit full-fat dairy products. Avoid sugar-sweetened dairy products.	Eliminate full-fat dairy products and sugar-sweetened dairy products	Consume fat-free dairy products. Avoid any dairy products with added sugars.
<b>Fiber-rich whole grains</b>	Emphasize 6 servings/d unless a lower-carbohydrate diet is indicated§	Emphasize 4-6 servings/d unless a lower-carbohydrate diet is indicated§	Emphasize individualized medical nutrition therapy with a registered dietician nutritionist	Replace refined grains (white bread, white rice, pasta) with fiber-rich whole-grain cereals, bread, brown rice
<b>Nuts and peanuts</b>	Emphasize	Consume in moderation	Limit	Preferably plain without added sugars or sodium
<b>Total fat Type of fat</b>	Moderate fat (30%-35% of calories) ■ Limit SFA and emphasize unsaturated fat	Low fat (20%-25% of calories)   ■ Limit SFA and emphasize unsaturated fat	Very-low fat (10%-15% of calories or less) ■ Limit fats to 20-30 g/d or less ■ Meet essential fatty acid requirements ■ For patients who need extra calories, add MCT oil gradually	Emphasize liquid oils (soybean, canola, corn, olive) instead of solid fats, butter, lard, and tropical oils (coconut, palm, and palm kernel)
<b>Cholesterol</b>	Choosing healthy protein foods, dairy products, and fats will limit cholesterol	Choosing healthy protein foods, dairy products, and fats will limit cholesterol	Choosing healthy protein foods, dairy products, and fats will limit cholesterol	
<b>Desserts (sweets, cookies, cakes, pies, other pastries, ice cream, candy)</b>	Occasional indulgence	Occasional indulgence	Abstain completely	
<b>Added sugars (table sugar, jams/jellies, honey)</b>	Occasional indulgence (<6% of calories)	Occasional indulgence (<5% of calories)	Abstain completely/eliminate	



# Lifestyle recommendations for hypertriglyceridemia *(cont'd)*

## 3. Dietary fat for:

### ❖ **Borderline TG** (*150-199 mg/dl*)

- **Total fat:** **25-35** % of daily energy intake
  - SFA < **7**%
  - MUFA and PUFA : **10–20**% of daily energy intake

### ❖ **High and very high TG** (*>200 mg/dl*)

- **Total fat :** **30–35**% of daily energy intake
  - SFA < **5**%
  - MUFA and PUFA : **10–20**% of daily energy intake

# Lifestyle recommendations for hypertriglyceridemia *(cont'd)*

## 3. Dietary fat *(cont'd)*

consuming the **omega-3 fatty acids** (**3-4** g/d):

- **2** servings (120 g) of **fatty fish per week**:
  - **↓** **TG** by **25%** or more (depending on baseline concentration)
  - **↑** *slight* in LDL-C levels
  - **↑** HDL-C levels
- **Unsalted nuts** (1 serving/day)

# Letters to the Editor

## Clinical Considerations for the Management of Hypertriglyceridemia

**Original Article:** Management of Hypertriglyceridemia: Common Questions and Answers

**Issue Date:** September 15, 2020

**See additional reader comments at:** <https://www.aafp.org/aafp/2020/0915/p347.html>

**To the Editor:** We commend Drs. Oh, Trivette, and West-

these therapies also carry substantial risks and expense. As mentioned by Dr. Oh and colleagues, expert consultation is required in these cases.

The statement that icosapent (purified eicosapentaenoic acid; Vascepa) may not be cost-effective should be updated because a recent cost-effectiveness analysis from the REDUCE-IT (Reduction of Cardiovascular Events with Icosapent Ethyl-Intervention Trial) U.S. cohort demonstrated that icosapent was dominant (lower cost with a bet-

to pharmacokinetic interactions. we discourage clinicians from prescribing the 80-mg dose of simvastatin (Zocor) because it has been shown to significantly increase muscle-related adverse events without benefit (the U.S. Food and Drug Administration rescinded its approval for initiating this dose).<sup>1</sup>

A low-carbohydrate diet is also a good strategy for managing hypertriglyceridemia. However, it should not be a universal recommendation in patients with triglyceride levels greater than 500 mg per dL (5.65 mmol per L) because some of these patients may have familial chylomicronemia syndrome, a rare genetic disorder where loss-of-function mutations limit the ability to effectively break down triglycerides. Instead of a low-carbohydrate diet, patients with familial chylomicronemia syndrome should be placed on a very low-fat diet. This diagnosis should be considered in patients with triglyceride levels greater than 1,000 mg per dL (11.30 mmol per L) without an obvious secondary cause; occurrence at a young age; and debilitating physical, emotional, and cognitive symptoms.<sup>2</sup>

Intensive therapies such as insulin infusions, plasmapheresis, or parenteral heparin are not standard care or sufficiently supported by the literature to recommend their use;

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**Author disclosure:** Dr. Elkhal has no relevant financial affiliations. Dr. Warden reports receiving research support from an institutional grant to Oregon Health and Science University from Akcea Therapeutics.

## References

1. U.S. Food and Drug Administration. FDA drug safety communication: new restrictions, contraindications, and dose limitations for Zocor (simvastatin) to reduce the risk of muscle injury. December 15, 2011. Accessed October 2, 2020. <https://www.fda.gov/drugs/drug-safety-and-availability/fda-drug-safety-communication-new-restrictions-contraindications-and-dose-limitations-zocor>
2. Falko JM. Familial chylomicronemia syndrome: a clinical guide for endocrinologists. *Endocr Pract.* 2018;24(8):756-763.
3. Weintraub WS, Bhatt D, Zhang Z, et al. Cost-effectiveness of icosapent ethyl in US REDUCE-IT patients. *J Am Coll Cardiol.* 2020;75(11\_Suppl\_1):1914.
4. Saely CH, Rein P, Drexel H. Combination lipid therapy in type 2 diabetes. *N Engl J Med.* 2010;363(7):692-694-695.
5. Nordestgaard BG, Varbo A. Triglycerides and cardiovascular disease. *Lancet.* 2014;384(9943):626-635.
6. Marston NA, Giugliano RP, Im K, et al. Association between triglyceride lowering and reduction of cardiovascular risk across multiple lipid-lowering therapeutic classes: a systematic review and meta-regression analysis of randomized controlled trials. *Circulation.* 2019;140(16):1308-1317.

**Email letter submissions** to [afplet@aafp.org](mailto:afplet@aafp.org). Letters should be fewer than 400 words and limited to six references, one table or figure, and three authors. Letters submitted

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JID: JACL

Journal of Clinical Lipidology (2023) 000, 1-24

[mNS;June 2, 2023;16:4]

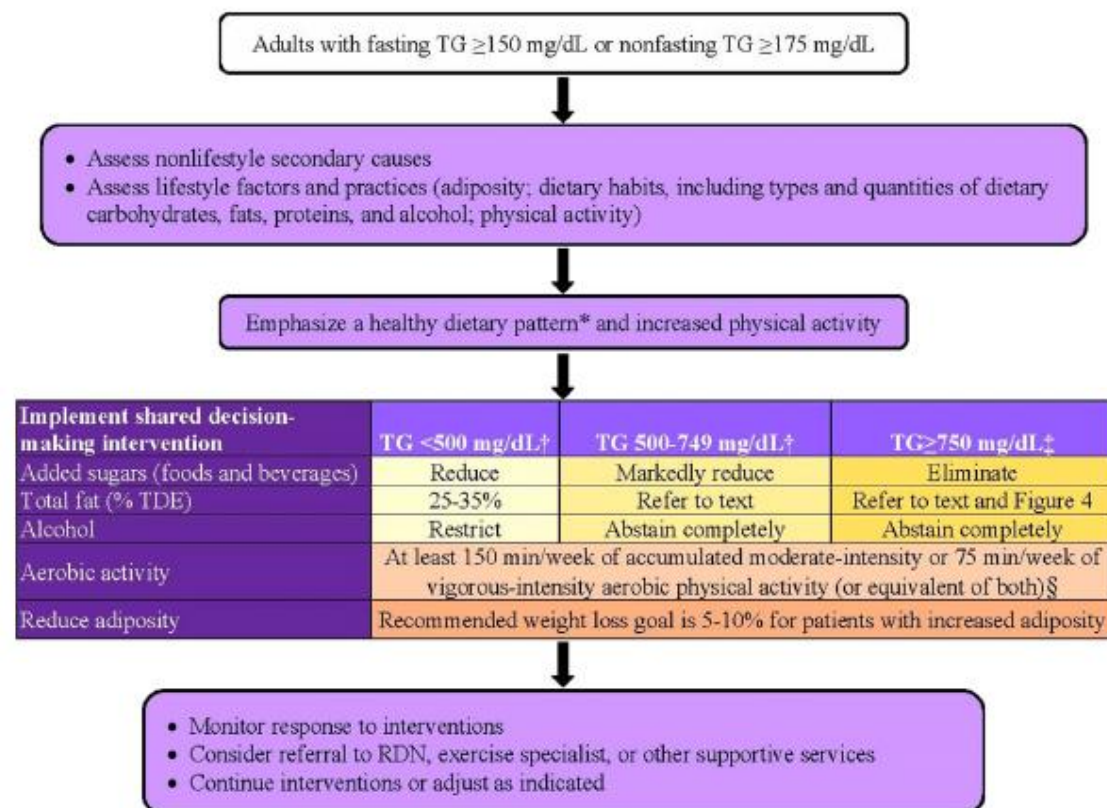
Journal of  
Clinical  
Lipidology

Clinical Perspective

# Nutrition interventions for adults with dyslipidemia: A Clinical Perspective from the National Lipid Association<sup>☆</sup>

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**Fig. 3 Recommendations for lifestyle interventions in patients with increasing levels of triglycerides (Adapted from 53)**

\*Recommendations for a healthy dietary pattern emphasize vegetables, fruits, legumes (pulses), nuts and seeds, whole grains, fish/seafood (and other healthy proteins, such as low-fat dairy, low-fat poultry), non-tropical, liquid plant-based oils, and replacing SFAs with MUFAs and PUFAs. Recommendations also emphasize limiting red and processed meats, refined carbohydrates, foods and beverages with added sugars (sweets and sugar-sweetened beverages), sodium, dietary cholesterol, and avoiding TFAs.

<sup>†</sup>RDN referral advised.

<sup>‡</sup>RDN referral necessary.

<sup>§</sup>Although healthcare professionals should encourage patients to meet the guideline-recommended goals for physical activity, any amount of physical activity is likely beneficial in sedentary individuals and, therefore, should be encouraged to reduce cardiometabolic risk.

**Abbreviations:** MUFAs=monounsaturated fatty acids; PUFAs=polyunsaturated fatty acids; RDN=registered dietitian nutritionist; SFAs=saturated fatty acids; TDE=total daily energy; TFAs=*trans* fatty acids; TG=triglyceride

## ARTICLE IN PRESS

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[mNS;June 2, 2023;16:4]

Kirkpatrick et al

15

**Table 8 Features of healthy dietary patterns that meet nutrition recommendations for hypertriglyceridemia based on triglyceride elevation and presence of chylomicronemia<sup>\*53,161</sup>**

Food Groups	Mild-to-Moderate TG Elevation ( $\geq 150$ to $< 500$ mg/dL) <sup>**†</sup>	Severe TG Elevation ( $\geq 500$ to $749$ mg/dL) <sup>**†</sup>	Severe TG Elevation ( $\geq 750$ mg/dL) – presumed MCS <sup>**‡</sup>	Severe TG Elevation ( $\geq 750$ mg/dL) – FCS <sup>**‡</sup>
Calories	Meet daily needs with minimally processed nutrient-dense foods	Meet daily needs with minimally processed nutrient-dense foods	Meet daily needs with minimally processed nutrient-dense foods	Meet daily needs with minimally processed nutrient-dense foods; gradually add MCT oil, as needed
Alcohol	Restrict; if choosing to drink: Men $\leq 2$ drinks/day <sup>**</sup> Women $\leq 1$ drink/day <sup>**</sup>	Abstain completely	Abstain completely	Abstain completely
Sugar-sweetened beverages	Restrict	Abstain completely	Abstain completely	Abstain completely
Fruits <sup>#</sup>	Mostly whole fruits, 2 servings/day <sup>a</sup>	Mostly whole fruits, 2 servings/day <sup>a</sup>	Mostly whole fruits, 2 servings/day <sup>a</sup>	Mostly whole fruits, limit to 1 serving/day <sup>a</sup>
Vegetables <sup>#</sup>	2 ½ cups/day <sup>b</sup>	2 ½ cups/day <sup>b</sup>	2 ½ cups/day <sup>b</sup>	2 ½ cups/day <sup>b</sup>
Grains <sup>#</sup>	Mostly fiber-rich whole grains, 4-6 servings/day <sup>c</sup>	Mostly fiber-rich whole grains, 4-6 servings/day <sup>c</sup>	Mostly fiber-rich whole grains, 4-6 servings/day <sup>c</sup>	Individualize <sup>c</sup>
Dairy <sup>#</sup>	Limit full-fat dairy	Limit full-fat dairy	Limit full-fat dairy	Eliminate full-fat dairy

	servings/day	servings/day	servings/day	
Dairy <sup>#</sup>	Limit full-fat dairy and/or sugar-sweetened dairy; choose low-fat or fat-free unsweetened dairy or unsweetened dairy alternatives, 3 servings/day <sup>d</sup>	Limit full-fat dairy and/or sugar-sweetened dairy; choose low-fat or fat-free unsweetened dairy or unsweetened dairy alternatives, 3 servings/day <sup>d</sup>	Limit full-fat dairy and/or sugar-sweetened dairy; choose low-fat or fat-free unsweetened dairy or unsweetened dairy alternatives, 3 servings/day <sup>d</sup>	Eliminate full-fat dairy and/or sugar-sweetened dairy; choose fat-free unsweetened dairy or unsweetened dairy alternatives, 3 servings/day <sup>d</sup>
Protein sources <sup>#</sup>	5 ½ oz equivalents/day <sup>e</sup>	5 ½ oz equivalents/day <sup>e</sup>	5 ½ oz equivalents/day <sup>e</sup>	Individualize servings/day
Legumes (beans, soy), nuts, and seeds	Choose mostly plant protein sources	Choose mostly plant protein sources	Choose mostly plant protein sources; cautiously include nuts and seeds	Choose mostly plant protein sources; eliminate nuts and seeds due to fat content
Fish and seafood	Emphasize fatty fish, ≥2 servings/week (8 oz/week)	Emphasize fatty or lean fish, ≥2 servings/week (8 oz/week)	Emphasize fatty or lean fish, ≥2 servings/week (8 oz/week)	Emphasize lean fish, ≥2 servings/week (8 oz/week)
Poultry/meats	Choose lean cuts and avoid processed meats	Choose lean cuts and avoid processed meats	Choose lean cuts and avoid processed meats	Choose very lean cuts without skin and avoid processed meats

\*Individualize the nutrition recommendations, including macronutrient distribution, calories, and number of servings from each food group based on patient needs, TG elevation, and TG response.

\*\*Any individual with an elevated TG level has some degree of LPL impairment, which can range from minimal to severe. Most individuals with TGs ≥500-749 mg/dL do not have severe LPL impairment. Individuals with TGs persistently ≥750 mg/dL are more likely to have severe LPL impairment.

<sup>†</sup>RDN referral advised.

<sup>‡</sup>RDN referral necessary.

\*\*\*If an individual chooses to drink, moderate consumption of alcohol should be emphasized. However, some individuals are more sensitive to the TG-raising effects of alcohol intake and may require restriction or abstinence. Additionally, alcohol reduction may facilitate weight loss in persons with overweight or obesity and will help reduce hepatic steatosis that commonly occurs in the context of hypertriglyceridemia.

<sup>#</sup>Number of servings per day is based on 2,000 calories/day and should be individualized.<sup>19</sup>

<sup>a</sup>1 fruit serving = 1 medium fruit; 1 cup raw, cooked, canned in natural juice, or frozen with no added sugar; 1 cup 100% fruit juice; ½ cup dried



500-749 mg/dL, thus implementing the appropriate nutrition interventions involves monitoring the TG response and assessing the individual's tolerance to the amount of total fat consumption.

It is a widely held belief that all patients with severe hypertriglyceridemia require a very-low-fat diet; however, there is a paucity of evidence to support this view. Limited evidence is available from RCTs of nutrition interventions in severe hypertriglyceridemia. The studies that have been completed generally have had small numbers of participants and have not always fully controlled possible confounding issues, such as negative energy balance and weight loss.<sup>42,151-153</sup> The results of nutrition intervention studies that included participants with hypertriglyceridemia suggest that there is substantial variability in the TG response and that the optimal dietary approach likely varies according to the balance of the underlying metabolic drivers, which include rates of entry of TG into the circulation from intestinally-derived chylomicron particles and hepatically-derived VLDL particles, rates of TG hydrolysis by LPL, and the rate of hepatic uptake of TG-rich lipoproteins.

For patients with FCS, a very low-fat (5-15% TDE) diet is needed long term (discussed further below) to minimize the production of chylomicron particles because LPL activity is severely impaired (<25% of normal).<sup>144,154</sup> However, FCS is rare (~1 in 1,000,000)<sup>51,66</sup> thus, most patients with severe hypertriglyceridemia will have less severe impairment of LPL activity and excessive VLDL-TG output and/or impaired clearance of TG-rich lipoprotein particles will also be

and is a substantial component of some other commonly used sweeteners, such as honey, agave nectar, molasses, and raw sugar.<sup>52</sup>

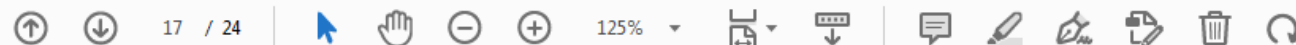
In summary, nutrition intervention for severe hypertriglyceridemia (500-749 mg/dL) should emphasize a healthy dietary pattern with greater emphasis on consumption of foods that are rich in healthy proteins, dietary fibers, and unsaturated fatty acids (including long-chain omega-3 fatty acids), such as nuts, seeds, legumes, fish/seafood, and non-tropical, liquid plant oils and should minimize or eliminate intakes of sweets, desserts, and dried fruits, fruit juices, sugar-sweetened beverages, and alcohol.<sup>32,52,53</sup> As is the case for nutrition interventions for less severe elevations in TG levels, considerable interindividual variability should be expected and monitoring and readjustments may be necessary to determine what dietary approach will provide the best balance of patient preferences, adherence, and TG response.

### **Nutrition interventions for severe hypertriglyceridemia ( $\geq 750$ mg/dL)**

For patients with TG  $\geq 750$  mg/dL who may be presumed to have a significant degree of chylomicronemia in the fast-ing state, a very-low-fat ( $\leq 5\%$  TDE) diet, ideally at least mildly hypocaloric, for 1-4 weeks is helpful initially, which may be combined with pharmacotherapy, to reduce TGs below 750 mg/dL.<sup>51,144,152</sup> Restriction of dietary fat will reduce the production of new chylomicron particles.<sup>51,144,152</sup> Negative energy balance will lower the circulating insulin







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Kirkpatrick et al

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level and increase hepatic fat oxidation, and thus reduce hepatic VLDL-TG output.<sup>125,159,160</sup> With less new TG entering the circulation from both the intestines as chylomicron-TGs and liver as VLDL-TGs, chylomicronemia will typically resolve.

The optimal maintenance diet will depend on the underlying metabolic disturbances. When TGs have decreased to <750 mg/dL, for those without known FCS, dietary fat intake may be cautiously liberalized with monitoring of the TG response.<sup>153</sup>

### Nutrition interventions for FCS and other types of severe LPL deficiency

Nutrition therapy for FCS, which also applies to other conditions that produce severe LPL deficiency, differs from other types of hypertriglyceridemia because of the need for marked dietary fat restriction long term to reduce chylomicronemia and prevent potentially life-threatening pancreatitis. Dietary guidance for FCS has been described by Williams et al.<sup>161</sup> and includes:

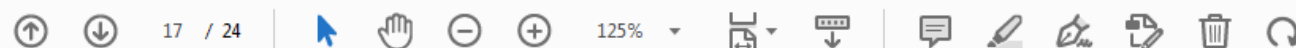
- 1) Limit fat to <15-20 g/day (<10-15% TDE) with dietary fat spread across the day.
- 2) Meet recommendations for essential fatty acids, i.e.,  $\alpha$ -linolenic acid and linoleic acid.
- 3) Choose complex carbohydrate foods while limiting refined starches. Patients with FCS must avoid alcohol and foods and beverages with added sugars.

tain lauric acid. Lauric acid is largely metabolized via a chylomicron-dependent pathway. Medical-grade MCT oil should be initiated in small amounts and gradually increased to tolerance. Guidance for the practical aspects of using MCT oil is available from the FCS Focus website (<https://fcsfocus.com/nutrition/nutrition-lifestyle-facts/>).

Additional nutrition recommendations and foods that can be emphasized for patients with and without FCS are summarized in Table 8. The dietary restrictions, while meeting energy needs and nutrient requirements, are challenging for FCS patients to follow. Consequently, it is essential that patients with FCS be referred to an RDN for medical nutrition therapy.<sup>53,161</sup>

### Nutrition interventions for elevated LDL-C and TG (mixed dyslipidemia)

Patients with elevations in both LDL-C and TGs will typically have reduced clearance of LDL particles concurrent with elevated VLDL-TG output and some degree of impairment in TG clearance.<sup>69</sup> A majority of such patients will have mild-to-moderate TG elevation, although some patients with more severe TG elevation initially may experience an increase in LDL-C as the TG concentration is lowered, resulting in mixed dyslipidemia<sup>56</sup> (Table 3). Nutrition interventions for such patients will consist of combining the strategies employed for lowering LDL-C and for reducing TGs



- and foods and beverages with added sugars.
- 4) Supplement with fat-soluble vitamins and minerals, as needed.
  - 5) Adjust calorie intake and physical activity for weight management.
  - 6) If additional calories are needed, the diet may be supplemented with small amounts of medium-chain triglyceride (MCT) oil. Medical-grade MCT oil contains only the medium-chain fatty acids capric and caprylic acids and is not the same as coconut oil or some coconut oil-based MCT oils, which con-

gies employed for lowering LDL-C and for reducing TGs discussed previously within the context of a healthy dietary pattern. A summary of these dietary strategies is shown in [Table 9](#).

### Conclusion/Summary

This Clinical Perspective describes recommended nutrition interventions for the management of elevations in LDL-C and TGs individually, and in combination. Various genetic determinants and other (acquired) factors contribute to the

**Table 9 Summary of nutrition and lifestyle interventions to lower circulating levels of LDL-C and TG\***

Interventions for Lowering LDL-C	Intervention for Lowering TG**
↓ SFAs, TFAs, and dietary cholesterol	↓ Added sugars and refined starches
↑ UFAs intake (5% TDE replacement for SFAs)	↓ Alcohol
↓ Body weight (5-10%), if overweight/obese	↓ Body weight (5-10%), if overweight/obese
↑ Protein, especially plant protein (3-5% TDE)	↑ Protein, especially plant protein (3-5% TDE)
↑ Viscous fiber intake (5-10 g/day)	↑ EPA+DHA intake (2-4 g/day)
↑ Plant stanols/sterols (2 g/day)	↑ Physical activity (≥150 minutes/week) <sup>†</sup>

\*The dietary strategies summarized are within the context of an overall healthy lifestyle that includes a recommended dietary pattern, adequate physical activity, avoidance of tobacco products, adequate sleep quantity and quality, and psychosocial stress management.

\*\*In addition to the interventions listed, individualize the macronutrient composition of the dietary pattern. Many patients will achieve TG reduction with dietary fat intake in the range of 20-40% TDE, whereas a lower fat diet (<20% TDE) may be needed in a small number of patients to maintain TG <750 mg/dL.

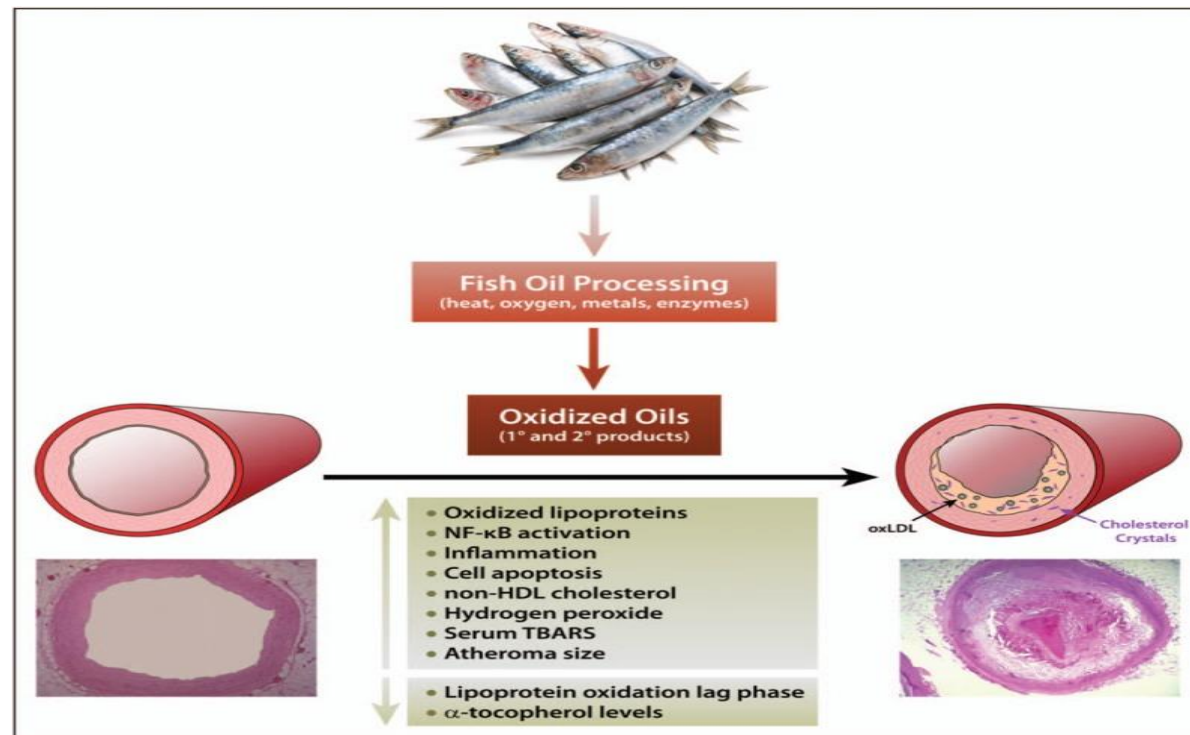
<sup>†</sup>≥150 min/week of moderate-intensity activity (e.g., brisk walking), ≥75 min/week of vigorous-intensity activity (e.g., jogging or running), or the equivalent combination, plus 2-3 days/week of muscle strengthening exercises.<sup>4,5,7,8,143</sup>

**Abbreviations:** DHA=docosahexaenoic acid; EPA=eicosapentaenoic acid; LDL-C=low-density lipoprotein cholesterol; SFAs=saturated fatty acids; TDE=total daily energy; TG=triglyceride; TFAs=*trans* fatty acids; UFAs=unsaturated fatty acids.

# Lifestyle recommendations for hypertriglyceridemia *(cont'd)*

A significant cardiovascular benefit with a highly purified and quality-controlled prescription preparation of **EPA** (4g/day).

Thus, dietary *fish oil supplements should not be considered* an effective substitute for appropriate dosage of prescription O3FA products, which are supported by strict testing and ongoing oversight by FDA.



# Lifestyle recommendations for hypertriglyceridemia *(cont'd)*

## 4. Dietary protein:

❖ **High TG** (200-499 mg/dl)

15-20 % of daily energy intake

❖ **Very high TG** (>500 mg/dl)

20 % of daily energy intake

- Jellinger PS et al. Endocr Prac 2017 Apr;23(Suppl 2):1-87
- Jacobson TA et al. J Clin Lipidol. 2015;9(6 Suppl):S1-122.e1.
- Anagnostis et al. Maturitas 2018; 108: 45–52

# Lifestyle recommendations for hypertriglyceridemia *(cont'd)*

## 5 . Dietary fructose (sugar sweetener beverages, cookies and cakes)

### ❖ **Borderline TG** (200-499 mg/dl)

- **<100** g/d

### ❖ **High TG** (200–499 mg/dl)

- **50-100** g/d

### ❖ **Very high TG** (>500 mg/dl)

- **<50** g/d

Figs, dried; Mango; Grapes, seedless (green or red); Raisins; Pear; Watermelon; Persimmon; Apple

Fructose in each serving of Fruits: **6-18** g

# Lifestyle recommendations for hypertriglyceridemia *(cont'd)*

6. Increased *physical activity* (at least **30 min**,  $\geq$ **5** days/week)
7. Reduction of alcohol consumption
8. **Mediterranean style diet**

# Lifestyle recommendations according to **the type of dyslipidemia**

## **a. Hypertriglyceridaemia:**

- Borderlines TG (150-199 mg/dl)
- High TG (200-499 mg/dl)
- Very high TG (>500 mg/dl)

## **b. Hypercholesterolaemia**

- TC >200 mg/dl
- LDL-c >150 mg/dl

## **c. Low HDL-c**

- In men: HDL-c < 40 mg/dl
- In women: HDL-c <50 mg/dl

# Lifestyle recommendation in hypercholesterolemia

1. Low SFA and TFAs
2. Weight loss
3. Dietary fiber
4. Physical activity
5. Dietary pattern:
  - NCEP Step I Therapeutic lifestyle change diet
  - NCEP Step II Therapeutic lifestyle change diet

• NCEP: National Cholesterol Education Program



# Lifestyle recommendations for hypercholesterolemia *(cont'd)*

1. **SFA** (< **7%**) & **TFA**s (**0%**)

2. **Weight loss** (**5–10%**)

**10** kg weight loss: ↓ **8.9** mg/dl LDL-c

3. Increase of dietary **fiber** (**14** g/1000 kcal)

4. Increase of **physical activity** (at least **30** min,  $\geq$  **5** days/week)

## Dietary pattern for hypercholesterolemia *(cont'd)*

- ❖ **NCEP Step I therapeutic lifestyle change diet**
- ❖ **NCEP Step II therapeutic lifestyle change diet**

- NCEP: National Cholesterol Education Program

- Jellinger PS et al. Endocr Prac 2017 Apr;23(Suppl 2):1-87
- Anagnostis et al. Maturitas 2018; 108: 45–52

# Dietary pattern for hypercholesterolemia *(cont'd)*

## NCEP Step I Therapeutic life style change diet.

- **Saturated fat:** < 7%
- **PUFA:** Up to 10%
- **MUFA:** Up to 20%
- **Carbohydrate:** 50% to 60%
- **Soluble fiber:** At least 5 to 10 grams a day
- **Protein:** 15% of total calories
- **Cholesterol:** <200 mg a day
- **Total calories:** Balance calories and stay at a healthy weight




# Dietary pattern for hypercholesterolemia *(cont'd)*

## NCEP Step II Therapeutic life style change diet.

- **Saturated fat: 5-6 %**
- **PUFA:** Up to 10%
- **MUFA:** Up to 20%
- **Carbohydrate:** 50% to 60%
- **Soluble fiber:** At least 5 to 10 grams a day
- **Protein:** 15% of total calories
- **Cholesterol:** <200 mg a day
- **Total calories:** Balance calories and stay at a healthy weight.

## Dietary pattern for hypercholesterolemia *(cont'd)*

Replacing **5%** of energy from **SFA** with:

- PUFA  lower LDL-C by **9.0**
- MUFA  lower LDL-C by **6.6**
- Carbohydrates  lower LDL-C by **6.0**

# Dietary pattern for hypercholesterolemia (cont'd)

## NCEP Step II therapeutic life style change recommendation (2)

### Food group:

### Number of servings

### Serving size

- Lean meat, poultry, fish

< 5 ounces a day

- 5 ounces maximum a day of lean meat, poultry, or fish
- Substitute ¼ cup dry beans or peas for 1 ounce of meat.

- Eggs

< 2 yolks a week

- 1 whole egg. Egg whites or substitutes are not limited.

- Low-fat milk and milk products

2–3 a day

- 1 cup fat-free or 1% milk
- 1 cup nonfat or low-fat yogurt
- 1 ounce nonfat or low-fat cheese (3 grams of fat or less per ounce)

- Fruits

2–4 a day

- 1 piece fruit, such as apple, orange, or ½ a banana
- ½ cup canned fruit
- 1 cup berries or melon
- ¾ cup fruit juice

# Dietary pattern for hypercholesterolemia *(cont'd)*

NCEP Step II therapeutic life style change recommendation

## Food group:

## Number of servings

## Serving size

- Vegetables

3–5 a day

- 1 cup raw leafy greens
- ½ cup cooked or raw vegetables
- ¾ cup vegetable juice

- Bread, cereals, pasta, rice, and other grains

At least 6 a day

- 1 slice of bread
- ½ hot dog or hamburger bun, bagel, or English muffin
- 1 ounce cold cereal
- ½ cup cooked pasta, rice, noodles, or other grains

- Sweets and snacks

Within calorie limit

- Choose snacks that are low in fat or are made with unsaturated fat.

# Dietary pattern for hypercholesterolemia *(cont'd)*

NCEP Step II therapeutic lifestyle change recommendation

## *Duration of Nutrition Therapy:*

- In *primary prevention*: at least **3-6 weeks** *before* initiating lipid-lowering drug therapy
- **Re-assess** individuals' lipid status for every **6 week intervals** until the treatment goals is achieved



# Lifestyle recommendations according to **the type of dyslipidemia**

## **a. Hypertriglyceridaemia:**

- Borderlines TG (150-199 mg/dl)
- High TG (200-499 mg/dl)
- Very high TG (>500 mg/dl)

## **b. Hypercholesterolaemia**

- TC >200 mg/dl
- LDL-c >150 mg/dl

## **c. Low HDL-c**

- In men: HDL-c < 40 mg/dl
- In women: HDL-c <50 mg/dl

# Lifestyle recommendations for low HDL-C *(cont'd)*

1. Increase of *physical activity* (at least **30** min,  $\geq$ **5** days/week)
2. Reduction of **TFA**s (**0%**)
3. **Weight loss (5–10%)**
  - A 5–8 kg weight loss may increase HDL-c by 2–3 mg/dl
  - weight loss of 5–10% is adequate to cause an 8% to 10% increase in HDL-c
4. **Reduction of dietary carbohydrate** intake and their **substitution with**  
***MUFA and PUFA***

# Lifestyle recommendations for low HDL-C *(cont'd)*

5. **Smoking cessation**
6. Reduction of **simple sugar**
7. Consumption of **low glycemic index** carbohydrates (high fiber, whole grain foods)



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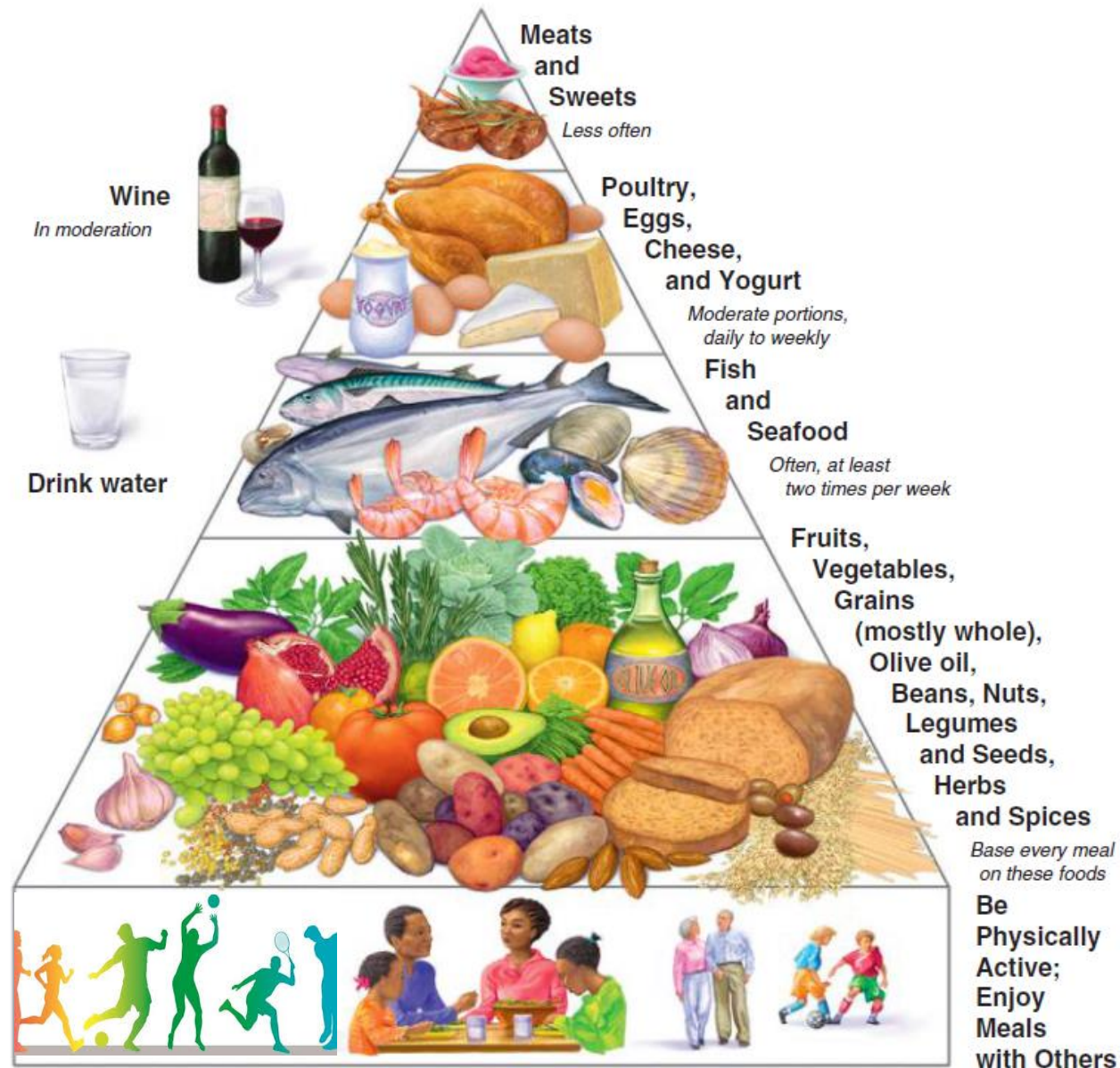
# Lifestyle recommendation in **dyslipidemia** *(cont'd)*

## Dietary pattern recommended to **dyslipidemia**:

- **Mediterranean diet:** as being low in saturated fat and high in vegetable oils, observed in Greece and Southern Italy during the 1960s
- **DASH dietary pattern:** a lifelong approach to healthy eating that's designed to help treat or prevent high blood pressure

# Mediterranean Diet Pyramid

*A contemporary approach to delicious, healthy eating*



**Mediterranean Diet Pyramid**  
*A contemporary approach to delicious, healthy eating*

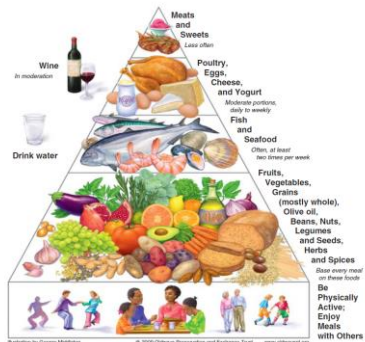


Illustration by George Middleton

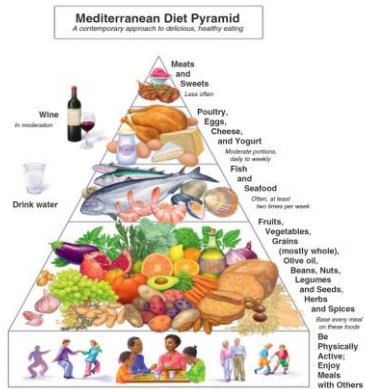
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# Mediterranean diet and dyslipidemia

## Feature of Mediterranean diet:

- Enjoying **meals with family** and **friends**
- Getting **plenty of exercise**



Be Physically Active; Enjoy Meals with Others

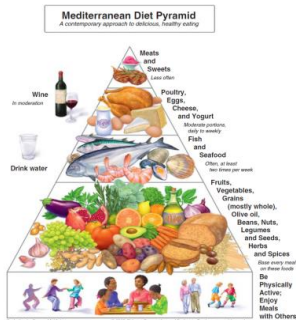
# Mediterranean diet and dyslipidemia *(cont'd)*

## Feature of Mediterranean diet *(cont'd)*:

### a. Fruit and vegetables



- An **abundance and variety** of plant foods should make up the majority of your meals
- Strive for **7 to 10 servings** a day of veggies and fruits
- Greater number of servings of fruits and vegetables (mostly fresh) with an emphasis on **root vegetables and greens vegetables**



Krause's food & nutrition care process, 14<sup>th</sup> edition; 2017, p 657-9



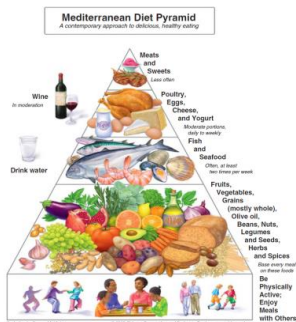


# Mediterranean diet and dyslipidemia

Feature of Mediterranean diet (cont'd) (cont'd)

## b. Grains :

- Are typically whole grain
- Bread is an important part of the diet
  - (Usually contain very few unhealthy trans fats)



Krause's food & nutrition care process, 14<sup>th</sup> edition; 2017, p 657-9

# Mediterranean diet and dyslipidemia

Features of the diet (cont'd):

## c. FAT and OILS

➔ Moderate in **total fat (32% to 35%)**

➔ High in **PUFA** (especially **omega-3**)

➔ High levels of **MUFA** such as **olive oil**

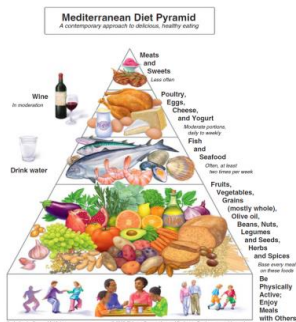
➔ Use of **canola oil, olive oil, nut oil**

➔ Relatively low in saturated fat (9% to 10%)



Fruits,  
Vegetables,  
Grains  
(mostly whole),  
**Olive oil,**  
Beans, Nuts,  
Legumes  
and Seeds,  
Herbs  
and Spices

*Base every meal  
on these foods*

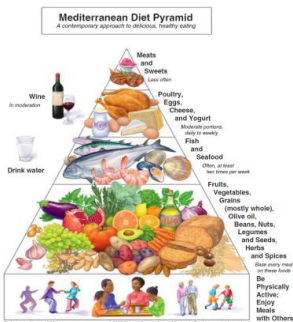


# Mediterranean diet and

## Features of the diet (cont'd) **dyslipidemia** (cont'd)

### c. FAT and OILS (cont'd)

- **Olive** or **canola oil** as a healthy replacement for butter or margarine
- Try **tahini** as a dip or spread
- The **type of fats consumed** is more important than total amount of fat (looking at metabolic goals and CVD risk)
- Mediterranean-style diet: effective alternative to **total fat and high in carbohydrates**



# Mediterranean diet and dyslipidemia

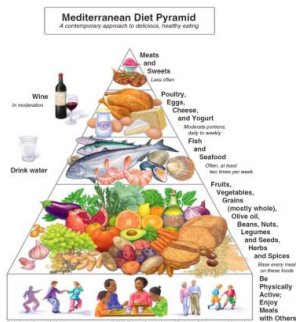
## Features of the diet (cont'd):

### d. Nuts and seed:

- high in fat: 80% from fat
- high in calories: should not be eaten in large amounts
- **Avoid** candied or honey-roasted and salted nuts

Fruits,  
Vegetables,  
Grains  
(mostly whole),  
Olive oil,  
Beans, Nuts,  
Legumes  
and Seeds,  
Herbs  
and Spices

Base every meal  
on these foods



Krause's food & nutrition care process, 14<sup>th</sup> edition; 2017, p 657-9



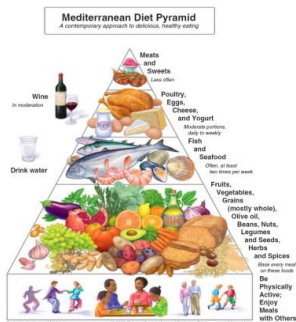
# Mediterranean diet and dyslipidemia

Features of the diet *(cont'd)*:

## d. Beans and legumes:

➤ high in soluble fiber and low GI

➤ 1 serving/ day



Krause's food & nutrition care process, 14<sup>th</sup> edition; 2017, p 657-9

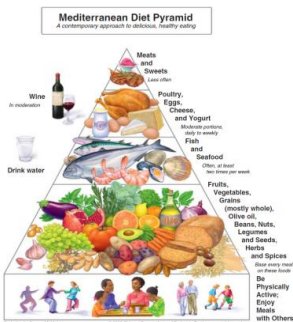
# Mediterranean diet and dyslipidemia (cont'd)

## Features of the diet (cont'd):

### e. Herbs and spices:

- Using **herbs and spices** instead of **salt** to flavor foods and meals
- Herbs and spices make **food tasty** and are also rich in **health-promoting substances**.

Fruits,  
Vegetables,  
Grains  
(mostly whole),  
Olive oil,  
Beans, Nuts,  
Legumes  
and Seeds,  
Herbs  
and Spices  
Base every meal  
on these foods



# Mediterranean diet and dyslipidemia *(cont'd)*

## Features of the diet *(cont'd)*:

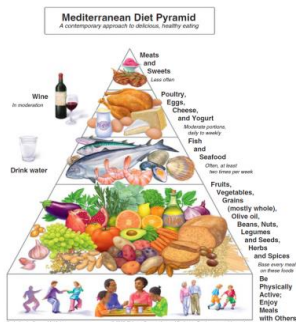
### e. Fish and seafood:

➤ Fatty fish- such as salmon

➤ Rich sources of omega-3 fatty acids

➤ Fish is eaten on a regular basis (once or twice a week)

➤ Avoid fried fish

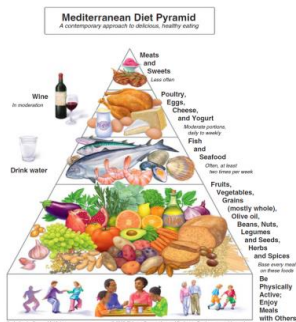


# Mediterranean diet and dyslipidemia

## Features of the diet *(cont'd)*:

### f. Dairy products:

- Limit **higher fat dairy products** (whole or 2 percent milk, cheese and ice cream)
- Switch to **skim milk, fat-free yogurt and low-fat cheese**



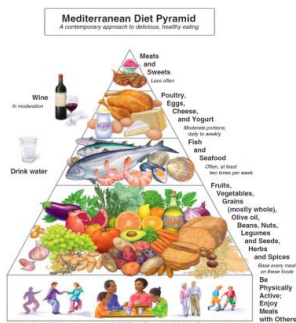


# Mediterranean diet and dyslipidemia *(cont'd)*

## Features of the diet *(cont'd)*:

### g. MEAT:

- Substitute **fish and poultry** for **red meat**
- When eaten, make sure it's **lean** and keep portions small
- Also avoid **sausage**, and other **high-fat meats**



# Lifestyle recommendation in **dyslipidemia** *(cont'd)*

## Dietary pattern recommended to **dyslipidemia**:

- **Mediterranean diet:** as being low in saturated fat and high in vegetable oils, observed in Greece and Southern Italy during the 1960s
- **DASH dietary pattern:** a lifelong approach to healthy eating that's designed to help treat or prevent high blood pressure

# هرم راهنمای غذایی DASH

