بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

وبینار تازه های اختلالات چربی خون

دارای امتیاز
آموزش مداوم

چهارشنبه ۱۳۹۹/۰۶/۲۶ ساعت ۱۰–۸ صبح

Toba Kazemi
Professor of Cardiology
Department of Cardiology, School of Medicine
Cardiovascular Diseases Research Center
Birjand University of Medical Sciences

Shima Jafari
Assistant professor of clinical pharmacy
Department of clinical pharmacy
faculty of pharmacy
Birjand University of Medical Sciences

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گروه هدف :

متخصصین داخلی(بیماری های داخلی- بیماری های قلب و عروق- بیماری های مغز و اعصاب)

پزشکان عمومی –پزشکان عمومی شاغل در طرح پزشک خانواده- متخصصین داروسازی بالینی

برگزار کننده :
گروه قلب و عروق با همکاری گروه داروسازی بالینی دانشگاه علوم پزشکی بیرجند

معاونت تحقیقات و فناوری
دانشگاه علوم پزشکی و خدمات بهداشتی درمانی بیرجند

مرکز تحقیقات بیماریهای قلب و عروق بیرجند
C.V.D.R.C
Birjand CardioVascular Diseases Research Center

Dr tooba Kazemi

MD ,General Cardiologist

Birjand Cardiovascular Diseases Research Center

Birjand Univerdity of medical sciences

Birjand ,Iran

“Dyslipidemia : Diagnosis & Treatment ”

1- 2018 AHA/... Guideline on the Management of Blood Cholesterol

2- 2019 ESC/EAS Guidelines for management of DLP

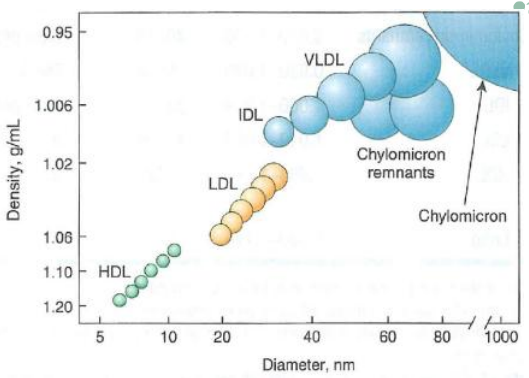
3- DLP : UpTo Date Aug 2020

Outline

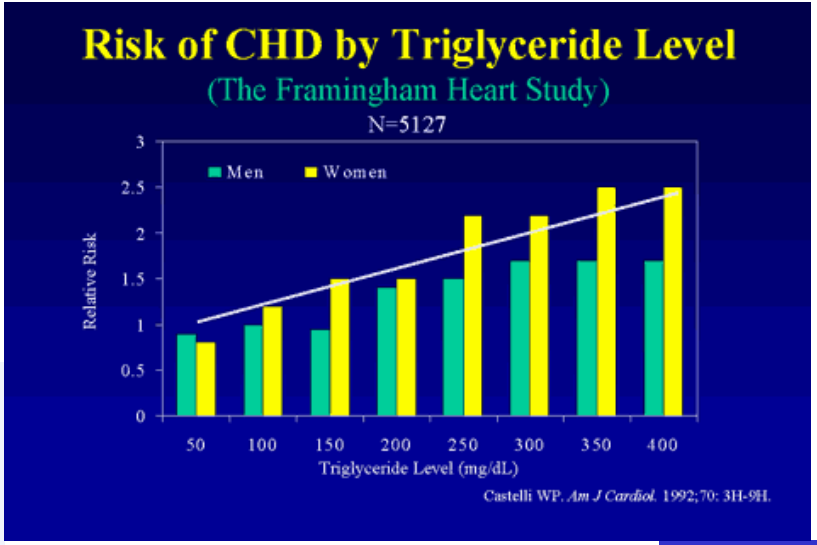
- Dyslipidemia: Definition, Significant ,Symptom & Sign ,Etiology
- Screening for DLP
- Life Style Modification
- Treatment of LDL according to AHA ,ESC
- Hyper TG
- Low HDL

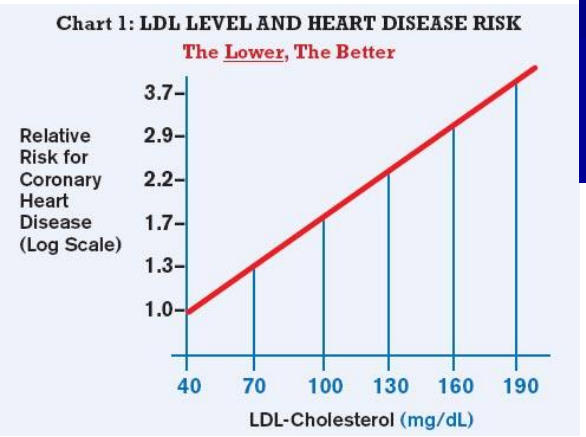
Dyslipidemia Definition

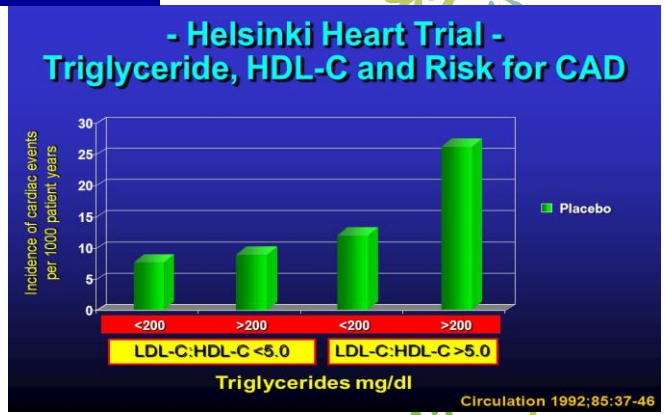
- DLP : Dyslipidemia is a disorder in lipoprotein metabolism, defined as elevated total cholesterol , LDL, TG or Low levels of HDL.
- HLP / DLP ?
- DLP is an important risk factor for coronary heart disease (CAD) and stroke.



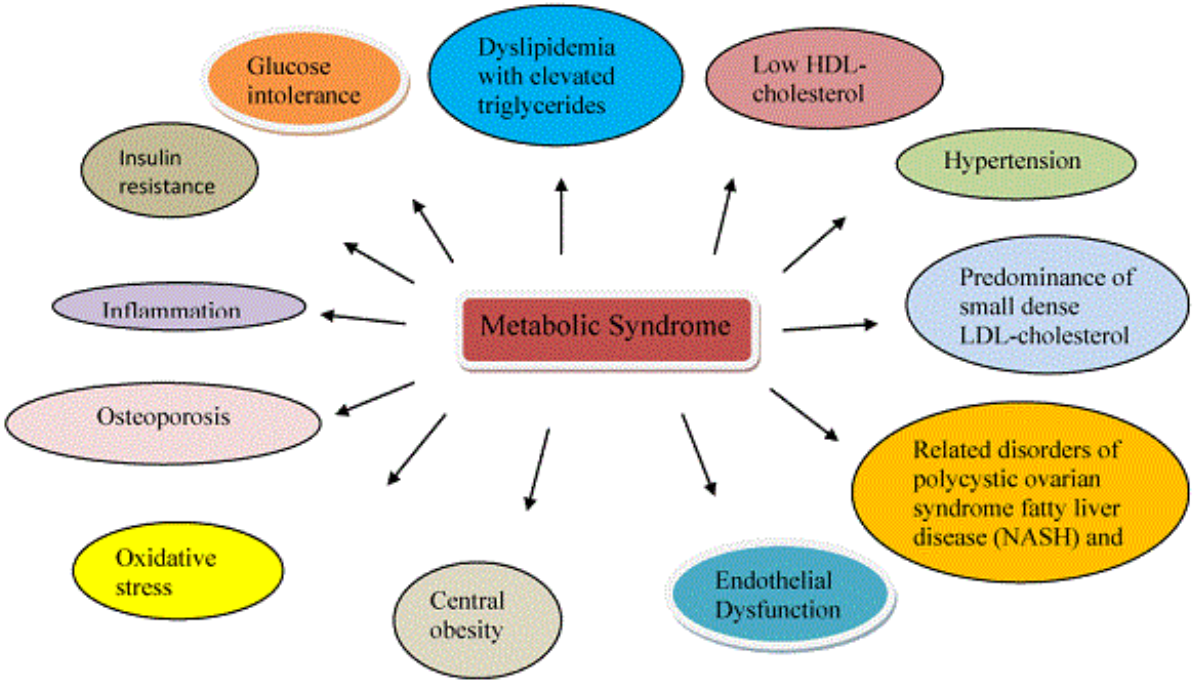
Importance of Dyslipidemia







+ Combination of **low HDL** + **High TG**



Lipid level	CAD risk
Each **1% increase** in LDL	**1% increase** in the risk of CHD in women and men
Each **1% increase** in Non-HDL-C	**1% increase** in the risk of CHD in women and men
Each 1 mmol/L (**89 mg/dL**) **increase** in TG	**37% increase** in the risk of CVD in women and **14% increased** risk in men
Each **1 mg/dL increase** in HDL-C	**2% decrease** in CVD death in men and **3% decrease** in CVD death in women

Prevalence of DLp in Our Studies

Table 1: Comparison of cardiac risk factors in 3 groups in Southern Khorassan-East of Iran

Population	Year	Hypertension (%)	Diabetes (%)	Obesity (%)	Smoking (%)	High LDL (%)	Low HDL (%)	Dyslipidemia (%)
Low socioeconomic population	2008	13.1	6.3	10.7	9.8	43.2	42.3	72.0
Nurses	2011	9.0	3.0	11.5	3.1	35.5	44.3	70.4
General population	2014-2015	13.3	6.1	18.8	9.0	44.5	72.0	74.6

Cardiovascular Risk-Factors in the Eastern Iranian Population: Are We Approaching 25×25 Target?

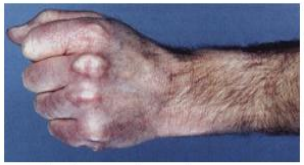
Citation: Siadat M, Kazemi T, Hajihosseni M. Cardiovascular Risk-Factors in the Eastern Iranian Population: Are We Approaching 25×25 Target? J Res Health Sci. 2016; 16(1): 51-52.

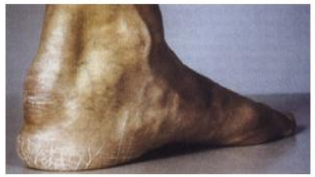
http://jrhs.umsha.ac.ir/index.php/JRHS/article/view/2513/

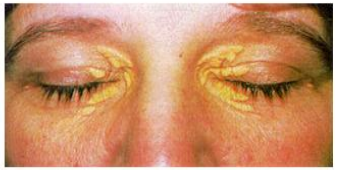
DLP **Symptom** and **Sign**

- ✓ **no symptoms :usually**
- ✓ **Symptomatic vascular disease: CAD, Stroke, PAD**
- ✓ **Acute pancreatitis**

- ✓ **No sign :usually**
- ✓ **may be Xanthoma**


Tendon xanthomata


Achilles tendon xanthoma


Xanthelasma

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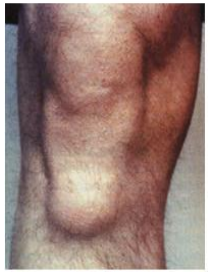
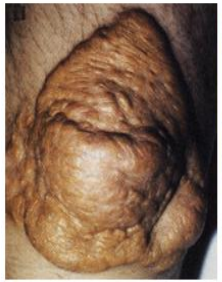
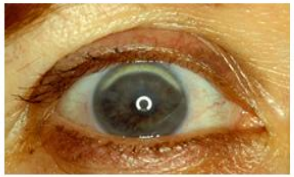
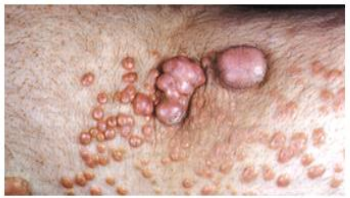
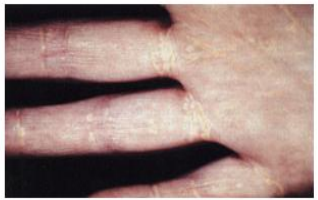

Subperiosteal xanthomata


Planar xanthoma


Early corneal arcus


Mature corneal arcus


Tuberoeruptive xanthomata


Palmar xanthomata

DLp etiology

- PRIMARY
  - Genetic
  - Hypercholesterolemia
  - Hypertriglyceridemia
  - combination of Hypercholesterolemia and Hypertriglyceridemia

- **SECONDARY**
  - **Life style :**
    - **D**iet
    - **L**ack of exercise
    - **S**moking
    - **S**tress
    - **E**xcessive alcohol intake
  - **Diseases**
  - **Drugs**

- **Obesity**

- **SECONDARY**
  - **Diseases**
    - **D**iabetes mellitus
    - **N**ephrotic syndrome
    - **R**enal failure
    - **H**ypothyroidism
    - **C**holestasis
  - **Drugs**
    - **T**hiazide diuretics
    - **β**-adrenergic blockers
    - **O**ral contraceptives
    - **C**orticosteroids
    - **I**sotretinoin (vitamin **A** derivative)

secondary causes of DLP

Exogenous
Alcohol
Drug therapy
Corticosteroids
Isotretinoin
Some oral contraceptives
Select chemotherapeutic agents
Select antiretroviral agents
Endocrine/Metabolic
Hypothyroidism/hypopituitarism
Diabetes mellitus types 1 and 2
Pregnancy
Polycystic ovary syndrome
Lipodystrophy
Acute intermittent porphyria
Renal
Chronic renal disease
Hemolytic uremic syndrome
Nephrotic syndrome
Infectious
Acute viral/bacterial infection*
HIV infection
Hepatitis
Hepatic
Obstructive liver disease/cholestatic conditions
Biliary cirrhosis
Alagille syndrome
Inflammatory disease
Systemic lupus erythematosus
Juvenile rheumatoid arthritis
Storage disease
Glycogen storage disease
Gaucher disease
Cystine storage disease
Juvenile Tay-Sachs disease
Niemann-Pick disease
Other
Kawasaki disease
Anorexia nervosa
Solid organ transplantation
Childhood cancer survivor
Progeria
Idiopathic hypercalcemia
Klinefelter syndrome
Werner syndrome

* Delay measurement until ≥3 weeks postinfection.

Adapted from: Daniels SR, Benuck I, Christakis DA, et al. Expert panel on integrated guidelines for cardiovascular health and risk reduction in children and adolescents: Full report, 2011. National Heart Lung and Blood Institute. Available at: http://www.nhlbi.nih.gov/guidelines/cvd_ped/peds_guidelines_full.pdf.

DLp etiology : Primary

Dyslipidaemia	Abnormal lipids	Prevalence
Familial combined hyperlipidaemia (FCH)	↑ LDL cholesterol, triglycerides (VLDL) or both	1:100
Heterozygous familial hypercholesterolaemia (HeFH)*	↑ LDL cholesterol (typical range 5–10 mmol/L in FH) ↑ apo B	1:500
Polygenic hypercholesterolaemia		1:50
Familial hypertriglyceridaemia	↑ triglycerides (VLDL)	1:100

* Note homozygous familial hypercholesterolaemia is very rare (~one in one million births)

Key: apoB = apolipoprotein B; LDL = low-density lipoprotein; VLDL = very-low-density lipoprotein

DLp Diagnosis & mangement

DLP Diagnosis

- **Standard** serum lipid profile measurement: CHOL, **HDL** ,TG
- ✓ LDl estimate by of LDL Friedewald equation.
- ✓ LDL=Chol –(VLDL + HDL)
- ✓ VLDL=$\frac{TG}{5}$
- ✓ LDL=Chol –($\frac{TG}{5}$ + HDL)

- **Error in Friedewald formula**

1. Nonvalid in TG≥400mg/dl
2. Error is in LDL <70mg/dl

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- **Fasting** or **non Fastig** :
- ✓ Small, clinically insignificant differences **in Chol ,HDL** in fasting or non-fasting
- ✓ TG levels may vary after a recent meal.
- ✓ **Thus, we (Uptodate) generally advise that the lipid profile be measured in the fasting state.**
- ✓ 8 to 12 hours without food, early in the morning (before breakfast)

Indication for Lipid measurement

1-Evaluate all adults 20 years (20-44 in male , 20-54 in female):
every 5 years as part of a global risk assessment.

2 : Adults With Diabetes :
Annually screen all adult individuals with T1DM or T2DM for dyslipidemia .

3 : Screen for Familial Hypercholesterolemia :
Family history of Premature ASCVD (definite MI or SCD < 55 years in father or other male first-degree relative, or <65 years in mother or other female first-degree relative) or Elevated cholesterol levels (total, non-HDL and/ or LDL) consistent with FH .(Chol >290 / LDL > 190)

4 :Middle-Aged Adults (Men Aged 45-65 Years, Women Aged 55-65 Years) :
at least once every **1 to 2** years.

5 :Older Adults (Older Than 65 Years)
At least **annually** .may be more according to risk factor ,no sex

6: Children and Adolescents
In children at risk for FH (e.g., family history of premature cardiovascular disease or elevated cholesterol), screening should be at **3** years of age, again between ages **9 and 11**, and again at **age 18**

7**: All patients with following condition** regardless to sex and age:
Clinical ASCVD ,abdominal aortic aneurysm ,Hypertension ,FH of DLP , CKD , Obesity (BMI ≥ 30),Inflammatory Disease, HIV infection, COPD , Hypertensive disease of pregnancy ,**acute pancreatitis**

Other Test in Dyslipidemic patients

- FBS
- TSH
- LFT
- Urea , Cr
- Urinalysis

Recommendations for lipid analyses for cardiovascular disease risk estimation

Recommendations	Class[a]	Level[b]
TC is to be used for the estimation of total CV risk by means of the SCORE system.	I	C
HDL-C analysis is recommended to further refine risk estimation using the online SCORE system.	I	C
LDL-C analysis is recommended as the primary lipid analysis method for screening, diagnosis, and management.	I	C
TG analysis is recommended as part of the routine lipid analysis process.	I	C
Non-HDL-C evaluation is recommended for risk assessment, particularly in people with high TG levels, DM, obesity, or very low LDL-C levels.	I	C
ApoB analysis is recommended for risk assessment, particularly in people with high TG levels, DM, obesity, metabolic syndrome, or very low LDL-C levels. It can be used as an alternative to LDL-C, if available, as the primary measurement for screening, diagnosis, and management, and may be preferred over non-HDL-C in people with high TG levels, DM, obesity, or very low LDL-C levels.	I	C
Lp(a) measurement should be considered at least once in each adult person's lifetime to identify those with very high inherited Lp(a) levels >180 mg/dL (>430 nmol/L) who may have a lifetime risk of ASCVD equivalent to the risk associated with heterozygous familial hypercholesterolaemia.	IIa	C
Lp(a) should be considered in selected patients with a family history of premature CVD, and for reclassification in people who are borderline between moderate and high-risk.	IIa	C

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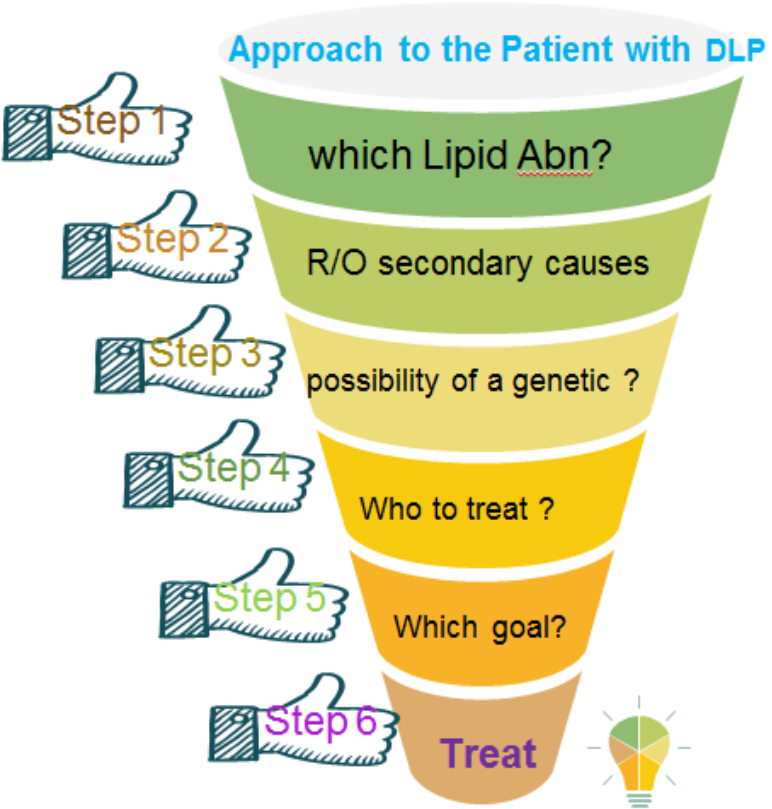
Apo = apolipoprotein; ASCVD = atherosclerotic cardiovascular disease; CV = cardiovascular; CVD = cardiovascular disease; DM = diabetes mellitus; HDL-C = high-density lipoprotein cholesterol; LDL-C = low-density lipoprotein cholesterol; Lp(a) = lipoprotein(a); SCORE = Systematic Coronary Risk Estimation; TC = total cholesterol; TG = triglyceride.

DLp Diagnosis & mangement



Approach to the Patient with DLP

Step 1 :**which Lipid abnormalities**? High LDL / High TG / Low HDL

Step 2 :**R/O secondary causes** :improve or even disappear by treatment of secondary cause .
For examplee; treatment of hypothyroidism result in a large decrease in LDL-C, often to normal levels
Good control of FBS in a patient with uncontrolled DM may result in a large decrease in serum TG.

Step 3 :**Possibility of a genetic** ?
The recognition of a genetic disorder will lead to screening family members and early treatment may prevent the adverse consequences of hyperlipidemia.

Step 4 :**Who to treat** ? the decision to treat should be based on the risk of the hyperlipidemia leading to those medical problems

Step 5 :**Which goal** ? According to new guidelines. AHA 2018 , ESC 2019

Serum Lipids Levels

	Normal	High Normal	High	Very High
Chol (mg/dl)	<200	200-239	≥ 240	
TG(mg/dl)	<150	150-174	175-499 Moderate	≥500 Severe
LDL(mg/dl)				≥190
HDL(mg/dl)				

According To patients comorbidity

Low : in M<40 , F<50

>60:cardioprotective

TABLE 7 Checklist for Clinician–Patient Shared Decision-Making for Initiating Therapy

Checklist Item	Recommendation
ASCVD risk assessment	■ Assign to statin treatment group; use ASCVD Risk Estimator Plus.* ■ In lower-risk primary-prevention adults 40-75 y of age with LDL-C ≥70 mg/dL (≥1.8 mmol/L). ■ Not needed in secondary prevention, in those with LDL-C ≥190 mg/dL (≥4.9 mmol/L), or in those 40-75 y of age with diabetes mellitus. ■ Assess other patient characteristics that influence risk. See Risk-Enhancing Factors (Section 4.4.1.3. and **Table 6**) ■ Assess CAC (Section 4.4.1.4.) if risk decision is uncertain and additional information is needed to clarify ASCVD risk. ■ Use decision tools to explain risk (e.g., ASCVD Risk Estimator Plus,* Mayo Clinic Statin Choice Decision Aid†).
Lifestyle modifications	■ Review lifestyle habits (e.g., diet, physical activity, weight or body mass index, and tobacco use). ■ Endorse a healthy lifestyle and provide relevant advice, materials, or referrals. (e.g., CardioSmart‡, AHA Life's Simple 7§, NLA Patient Tear Sheets‖, PCNA Heart Healthy Toolbox¶, cardiac rehabilitation, dietitian, smoking cessation program).
Potential net clinical benefit of pharmacotherapy	■ Recommend statins as first-line therapy. ■ Consider the combination of statin and nonstatin therapy in selected patients. ■ Discuss potential risk reduction from lipid-lowering therapy. ■ Discuss the potential for adverse effects or drug-drug interactions.
Cost considerations	■ Discuss potential out-of-pocket cost of therapy to the patient (e.g., insurance plan coverage, tier level, copayment).
Shared decision-making	■ Encourage the patient to verbalize what was heard (e.g., patient's personal ASCVD risk, available options, and risks/benefits). ■ Invite the patient to ask questions, express values and preferences, and state ability to adhere to lifestyle changes and medications. ■ Refer patients to trustworthy materials to aid in their understanding of issues regarding risk decisions. ■ Collaborate with the patient to determine therapy and follow-up plan.

*ASCVD Risk Predictor Plus is available at: http://tools.acc.org/ASCVD-Risk-Estimator-Plus/#!/calculate/estimate/ and http://static.heart.org/riskcalc/app/index.html#!/baseline-risk. Accessed September 1, 2018.
†Mayo Clinic Statin Decision Aid information is available at: https://statindecisionaid.mayoclinic.org.
‡CardioSmart health information is available at: https://www.cardiosmart.org/About
§AHA Life's Simple 7 information is available at: https://www.heart.org/en/healthy-living/healthy-lifestyle/my-life-check-lifes-simple-7
‖NLA Patient Tear Sheets information is available at: https://www.lipid.org/practicetools/tools/tearsheets
¶PCNA Heart Healthy Toolbox information is available at: http://pcna.net/clinical-tools/tools-for-healthcare-providers/heart-healthy-toolbox

AHA indicates American Heart Association; ASCVD, atherosclerotic cardiovascular disease; CAC, coronary artery calcium; CKD, chronic kidney disease; HIV, human immunodeficiency virus; LDL-C, low-density lipoprotein cholesterol; PCNA, Preventive Cardiology Nurses Association and NLA, National Lipid Association.

Life Style Modification

- Diet :

✓ vegetables, fruits, whole grains, legumes, healthy protein sources (low-fat dairy products, low-fat poultry (without the skin), fish/seafood, and nuts), nontropical vegetable oils

✓ limits intake of sweets, sugar-sweetened beverages, red meats

✓ dietary supplements: omega-3 fatty acids, red yeast rice, berberine, and green tea extracts. (adjunctive therapy not a pillar of treatment).

✓ We(Uptodate) do not advise the use of selenium, calcium, garlic, policosanol, coconut oil or water, bergamot, resveratrol, or soy isoflavone supplements for lipid management due to the lack of high-quality evidence supporting their efficacy.

- Weight Loss
- Good Physical Activity:

✓ Aaerobic physical activity 3-4 sessions per week, 40 minutes per session, moderate-to vigorous-intensity physical activity.

- Stop Cigarette Smoking

TABLE 2 Applying Class of Recommendation and Level of Evidence to Clinical Strategies, Interventions, Treatments, or Diagnostic Testing in Patient Care* (Updated August 2015)

CLASS (STRENGTH) OF RECOMMENDATION	LEVEL (QUALITY) OF EVIDENCE‡
CLASS I (STRONG) — Benefit >>> Risk Suggested phrases for writing recommendations: ▪ Is recommended ▪ Is indicated/useful/effective/beneficial ▪ Should be performed/administered/other ▪ Comparative-Effectiveness Phrases†: ○ Treatment/strategy A is recommended/indicated in preference to treatment B ○ Treatment A should be chosen over treatment B	**LEVEL A** ▪ High-quality evidence‡ from more than 1 RCT ▪ Meta-analyses of high-quality RCTs ▪ One or more RCTs corroborated by high-quality registry studies
CLASS IIa (MODERATE) — Benefit >> Risk Suggested phrases for writing recommendations: ▪ Is reasonable ▪ Can be useful/effective/beneficial ▪ Comparative-Effectiveness Phrases†: ○ Treatment/strategy A is probably recommended/indicated in preference to treatment B ○ It is reasonable to choose treatment A over treatment B	**LEVEL B-R** (Randomized) ▪ Moderate-quality evidence‡ from 1 or more RCTs ▪ Meta-analyses of moderate-quality RCTs
CLASS IIb (WEAK) — Benefit ≥ Risk Suggested phrases for writing recommendations: ▪ May/might be reasonable ▪ May/might be considered ▪ Usefulness/effectiveness is unknown/unclear/uncertain or not well established	**LEVEL B-NR** (Nonrandomized) ▪ Moderate-quality evidence‡ from 1 or more well-designed, well-executed nonrandomized studies, observational studies, or registry studies ▪ Meta-analyses of such studies
CLASS III: No Benefit (MODERATE) — Benefit = Risk (Generally, LOE A or B use only) Suggested phrases for writing recommendations: ▪ Is not recommended ▪ Is not indicated/useful/effective/beneficial ▪ Should not be performed/administered/other	**LEVEL C-LD** (Limited Data) ▪ Randomized or nonrandomized observational or registry studies with limitations of design or execution ▪ Meta-analyses of such studies ▪ Physiological or mechanistic studies in human subjects
CLASS III: Harm (STRONG) — Risk > Benefit Suggested phrases for writing recommendations: ▪ Potentially harmful ▪ Causes harm ▪ Associated with excess morbidity/mortality ▪ Should not be performed/administered/other	**LEVEL C-EO** (Expert Opinion) Consensus of expert opinion based on clinical experience

COR and LOE are determined independently (any COR may be paired with any LOE).

A recommendation with LOE C does not imply that the recommendation is weak. Many important clinical questions addressed in guidelines do not lend themselves to clinical trials. Although RCTs are unavailable, there may be a very clear clinical consensus that a particular test or therapy is useful or effective.

* The outcome or result of the intervention should be specified (an improved clinical outcome or increased diagnostic accuracy or incremental prognostic information).

† For comparative-effectiveness recommendations (COR I and IIa; LOE A and B only), studies that support the use of comparator verbs should involve direct comparisons of the treatments or strategies being evaluated.

‡ The method of assessing quality is evolving, including the application of standardized, widely used, and preferably validated evidence grading tools; and for systematic reviews, the incorporation of an Evidence Review Committee.

COR indicates Class of Recommendation; EO, expert opinion; LD, limited data; LOE, Level of Evidence; NR, nonrandomized; R, randomized; and RCT, randomized controlled trial.

Table 1 Classes of recommendations

Classes of recommendations	Definition	Wording to use
Class I	Evidence and/or general agreement that a given treatment or procedure is beneficial, useful, effective.	Is recommended or is indicated
Class II	Conflicting evidence and/or a divergence of opinion about the usefulness/efficacy of the given treatment or procedure.	
Class IIa	Weight of evidence/opinion is in favour of usefulness/efficacy.	Should be considered
Class IIb	Usefulness/efficacy is less well established by evidence/opinion.	May be considered
Class III	Evidence or general agreement that the given treatment or procedure is not useful/effective, and in some cases may be harmful.	Is not recommended

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Table 2 Levels of evidence

Level of evidence A	Data derived from multiple randomized clinical trials or meta-analyses.
Level of evidence B	Data derived from a single randomized clinical trial or large non-randomized studies.
Level of evidence C	Consensus of opinion of the experts and/or small studies, retrospective studies, registries.

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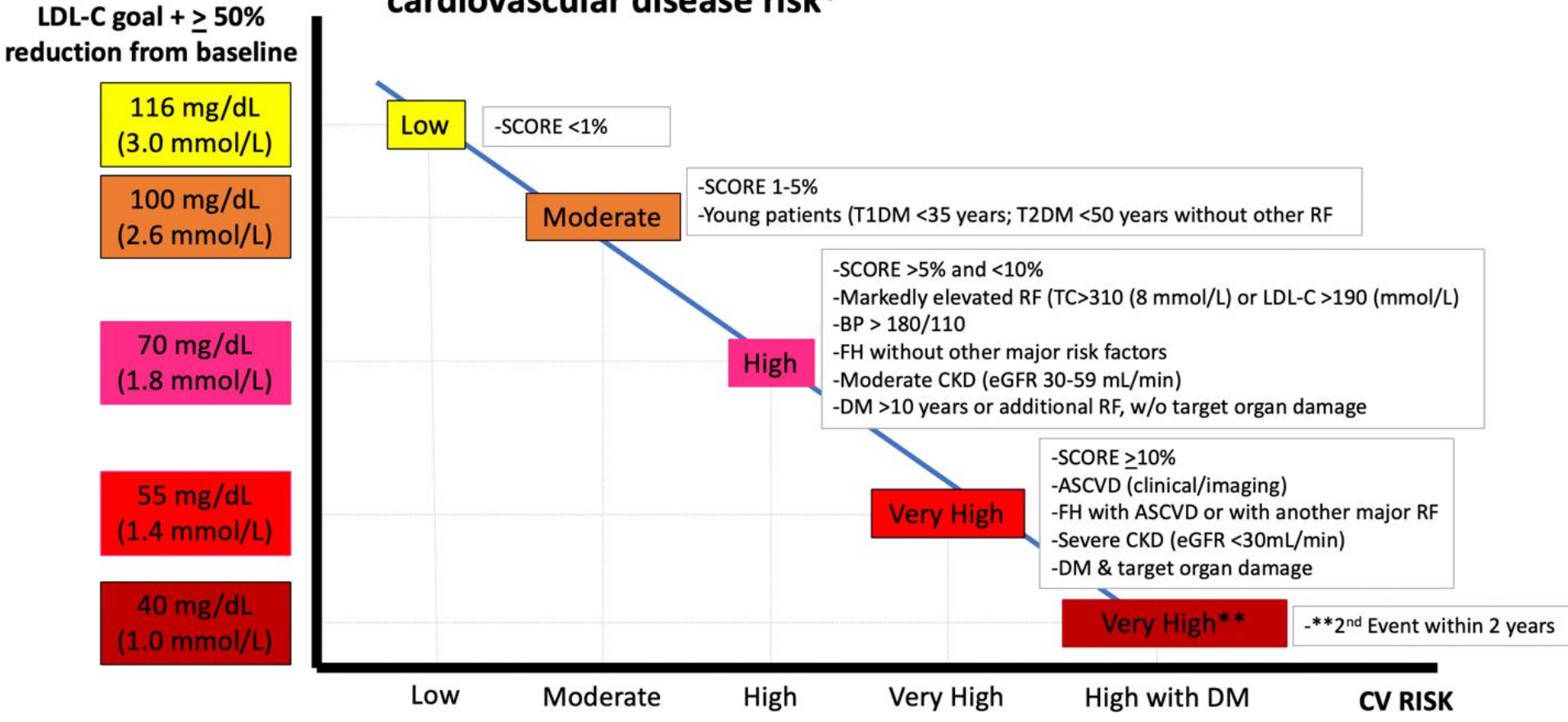
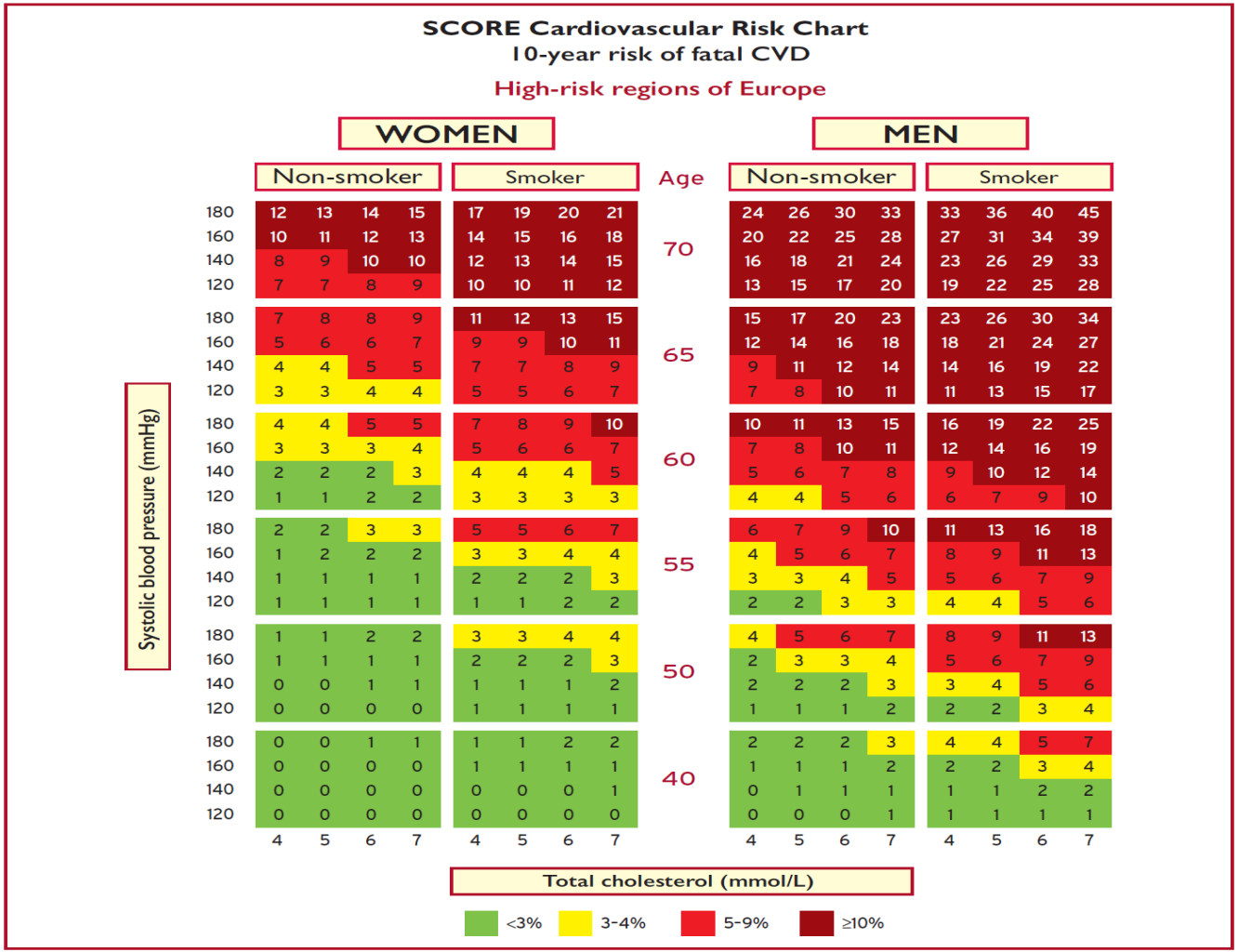
European Treatment goals for LDL-C across categories of total cardiovascular disease risk*



*Adapted from slideset available on www.escardio.org/guidelines which is from 2019 ESC/EAS Guidelines for the management of dyslipidaemias: lipid modification to reduce cardiovascular risk


SCORE Cardiovascular Risk Chart
10-year risk of fatal CVD
High-risk regions of Europe
WOMEN
MEN
Non-smoker
Smoker
Age
Systolic blood pressure (mmHg)
180 160 140 120
12 13 14 15 | 17 19 20 21 | 70 | 24 26 30 33 | 33 36 40 45
10 11 12 13 | 14 15 16 18 | | 20 22 25 28 | 27 31 34 39
8 9 10 10 | 12 13 14 15 | | 16 18 21 24 | 23 26 29 33
7 7 8 9 | 10 10 11 12 | | 13 15 17 20 | 19 22 25 28
7 8 8 9 | 11 12 13 15 | 65 | 15 17 20 23 | 23 26 30 34
5 6 6 7 | 9 9 10 11 | | 12 14 16 18 | 18 21 24 27
4 4 5 5 | 7 7 8 9 | | 9 11 12 14 | 14 16 19 22
3 3 4 4 | 5 5 6 7 | | 7 8 10 11 | 11 13 15 17
4 4 5 5 | 7 8 9 10 | 60 | 10 11 13 15 | 16 19 22 25
3 3 3 4 | 5 6 6 7 | | 7 8 10 11 | 12 14 16 19
2 2 2 3 | 4 4 4 5 | | 5 6 7 8 | 9 10 12 14
1 1 2 2 | 3 3 3 3 | | 4 4 5 6 | 6 7 9 10
2 2 3 3 | 5 5 6 7 | 55 | 6 7 9 10 | 11 13 16 18
1 2 2 2 | 3 3 4 4 | | 4 5 6 7 | 8 9 11 13
1 1 1 1 | 2 2 2 3 | | 3 3 4 5 | 5 6 7 9
1 1 1 1 | 1 1 2 2 | | 2 2 3 3 | 4 4 5 6
1 1 2 2 | 3 3 4 4 | 50 | 4 5 6 7 | 8 9 11 13
1 1 1 1 | 2 2 2 3 | | 2 3 3 4 | 5 6 7 9
0 0 1 1 | 1 1 1 2 | | 2 2 2 3 | 3 4 5 6
0 0 0 0 | 1 1 1 1 | | 1 1 1 2 | 2 2 3 4
0 0 1 1 | 1 1 2 2 | 40 | 2 2 2 3 | 4 4 5 7
0 0 0 0 | 1 1 1 1 | | 1 1 1 2 | 2 2 3 4
0 0 0 0 | 0 0 0 1 | | 0 1 1 1 | 1 1 2 2
0 0 0 0 | 0 0 0 0 | | 0 0 0 1 | 1 1 1 1
4 5 6 7 | 4 5 6 7 | | 4 5 6 7 | 4 5 6 7
Total cholesterol (mmol/L)
<3%
3-4%
5-9%
≥10%

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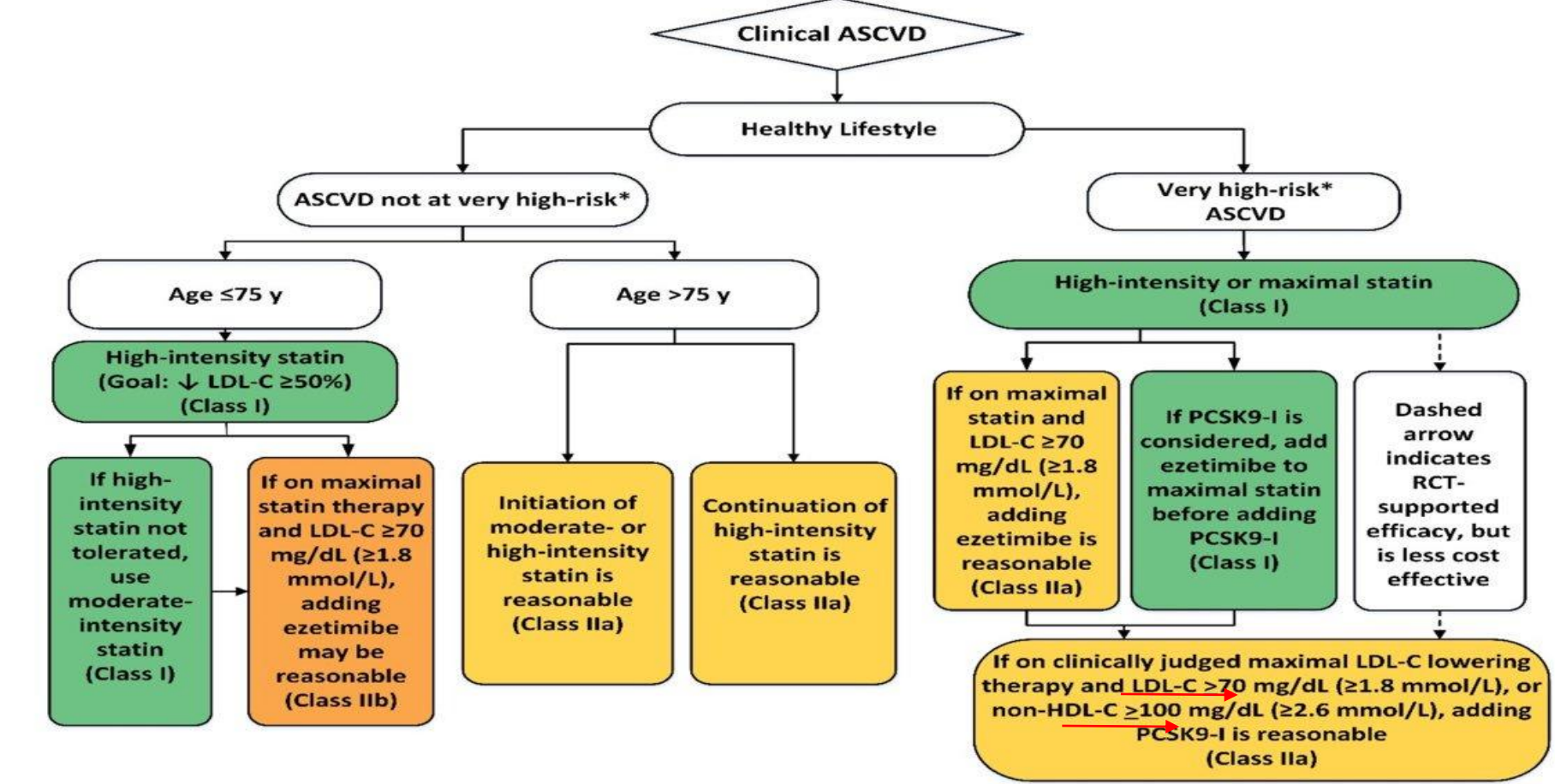
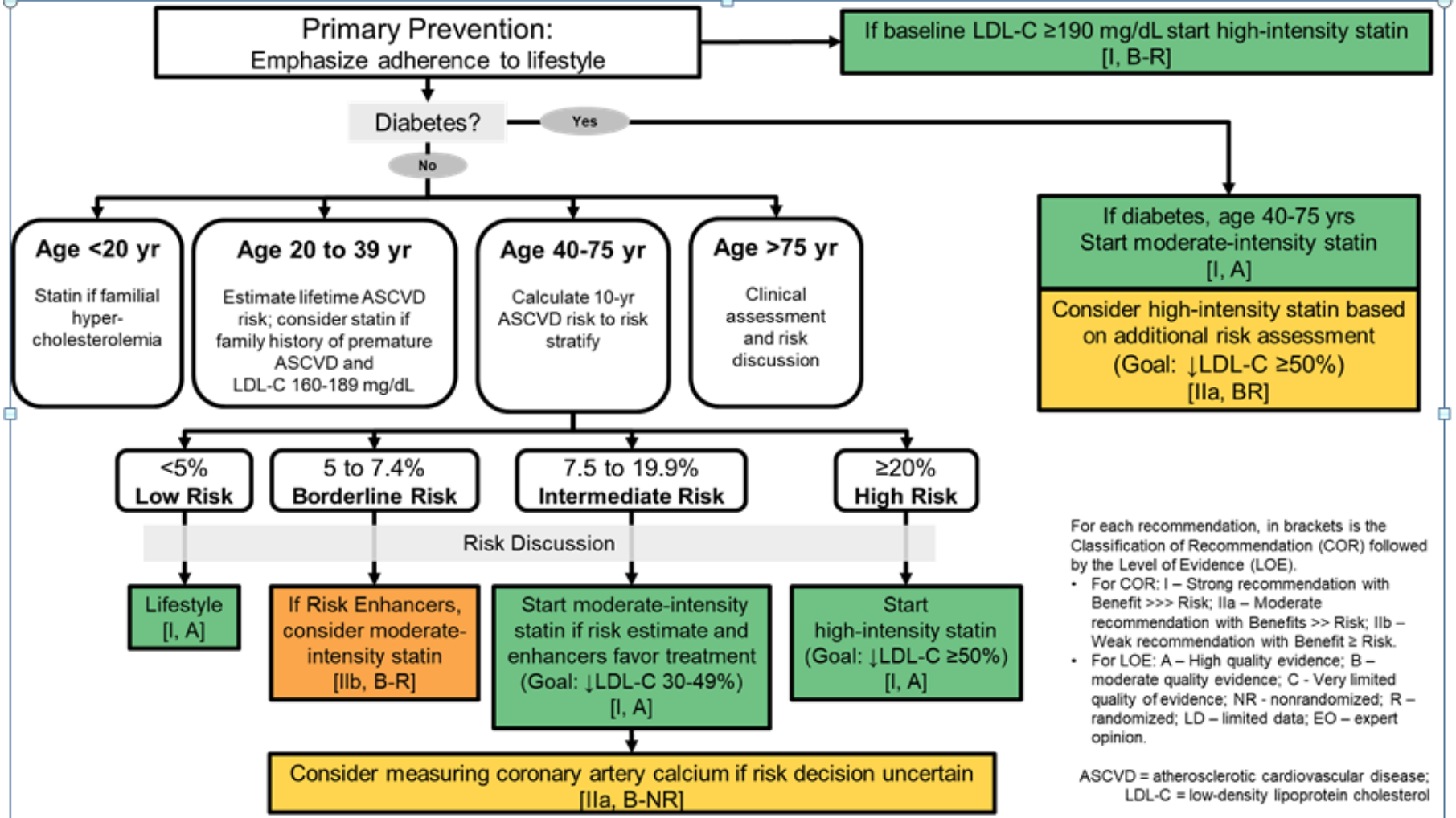


AMERICAN COLLEGE of CARDIOLOGY

American Heart Association.


Primary Prevention:
Emphasize adherence to lifestyle
If baseline LDL-C ≥190 mg/dL start high-intensity statin
[I, B-R]
Diabetes?
Yes
No
If diabetes, age 40-75 yrs
Start moderate-intensity statin
[I, A]
Consider high-intensity statin based on additional risk assessment
(Goal: ↓LDL-C ≥50%)
[IIa, BR]
Age <20 yr
Statin if familial hyper-cholesterolemia
Age 20 to 39 yr
Estimate lifetime ASCVD risk; consider statin if family history of premature ASCVD and LDL-C 160-189 mg/dL
Age 40-75 yr
Calculate 10-yr ASCVD risk to risk stratify
Age >75 yr
Clinical assessment and risk discussion
<5%
Low Risk
5 to 7.4%
Borderline Risk
7.5 to 19.9%
Intermediate Risk
≥20%
High Risk
Risk Discussion
Lifestyle
[I, A]
If Risk Enhancers, consider moderate-intensity statin
[IIb, B-R]
Start moderate-intensity statin if risk estimate and enhancers favor treatment
(Goal: ↓LDL-C 30-49%)
[I, A]
Start high-intensity statin
(Goal: ↓LDL-C ≥50%)
[I, A]
Consider measuring coronary artery calcium if risk decision uncertain
[IIa, B-NR]
For each recommendation, in brackets is the Classification of Recommendation (COR) followed by the Level of Evidence (LOE).
• For COR: I – Strong recommendation with Benefit >>> Risk; IIa – Moderate recommendation with Benefits >> Risk; IIb – Weak recommendation with Benefit ≥ Risk.
• For LOE: A – High quality evidence; B – moderate quality evidence; C - Very limited quality of evidence; NR - nonrandomized; R – randomized; LD – limited data; EO – expert opinion.
ASCVD = atherosclerotic cardiovascular disease; LDL-C = low-density lipoprotein cholesterol

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Which are the main LDL-C-lowering medications

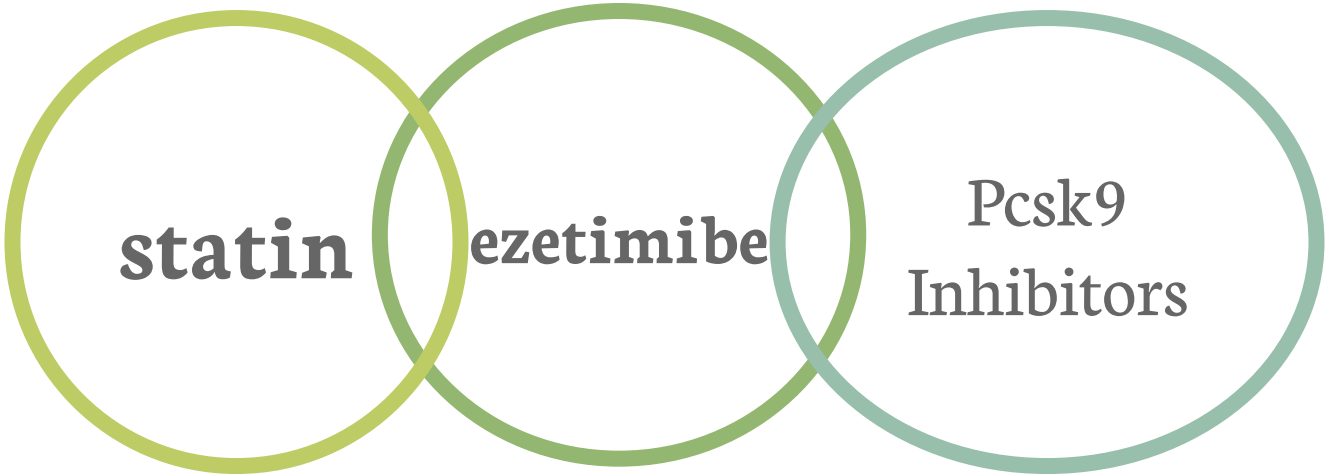

Table 5 Intervention strategies as a function of total cardiovascular risk and untreated low-density lipoprotein cholesterol levels

	Total CV risk (SCORE) %	Untreated LDL-C levels					
		<1.4 mmol/L (55 mg/dL)	1.4 to <1.8 mmol/L (55 to <70 mg/dL)	1.8 to <2.6 mmol/L (70 to <100 mg/dL)	2.6 to <3.0 mmol/L (100 to <116 mg/dL)	3.0 to <4.9 mmol/L (116 to <190 mg/dL)	≥4.9 mmol/L (≥190 mg/dL)
Primary prevention	<1, low-risk	Lifestyle advice	Lifestyle advice	Lifestyle advice	Lifestyle advice	Lifestyle intervention, consider adding drug if uncontrolled	Lifestyle intervention and concomitant drug intervention
	Class[a]/Level[b]	I/C	I/C	I/C	I/C	IIa/A	IIa/A
	≥1 to <5, or moderate risk (see *Table 4*)	Lifestyle advice	Lifestyle advice	Lifestyle advice	Lifestyle intervention, consider adding drug if uncontrolled	Lifestyle intervention, consider adding drug if uncontrolled	Lifestyle intervention and concomitant drug intervention
	Class[a]/Level[b]	I/C	I/C	IIa/A	IIa/A	IIa/A	IIa/A
	≥5 to <10, or high-risk (see *Table 4*)	Lifestyle advice	Lifestyle advice	Lifestyle intervention, consider adding drug if uncontrolled	Lifestyle intervention and concomitant drug intervention	Lifestyle intervention and concomitant drug intervention	Lifestyle intervention and concomitant drug intervention
	Class[a]/Level[b]	IIa/A	IIa/A	IIa/A	I/A	I/A	I/A
	≥10, or at very-high risk due to a risk condition (see *Table 4*)	Lifestyle advice	Lifestyle intervention, consider adding drug if uncontrolled	Lifestyle intervention and concomitant drug intervention	Lifestyle intervention and concomitant drug intervention	Lifestyle intervention and concomitant drug intervention	Lifestyle intervention and concomitant drug intervention
	Class[a]/Level[b]	IIa/B	IIa/A	I/A	I/A	I/A	I/A
Secondary prevention	Very-high-risk	Lifestyle intervention, consider adding drug if uncontrolled	Lifestyle intervention and concomitant drug intervention	Lifestyle intervention and concomitant drug intervention	Lifestyle intervention and concomitant drug intervention	Lifestyle intervention and concomitant drug intervention	Lifestyle intervention and concomitant drug intervention
	Class[a]/Level[b]	IIa/A	I/A	I/A	I/A	I/A	I/A

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CV = cardiovascular; LDL-C = low-density lipoprotein cholesterol; SCORE = Systematic Coronary Risk Estimation.
[a]Class of recommendation.
[b]Level of evidence.

hypertriglyceridemia

	Normal	High Normal	High	Very High
Chol (mg/dl)	<200	200-239	≥ 240	
TG(mg/dl)	<150	150-174	175-499 Moderate	≥500 Severe
LDL(mg/dl)	According To patients comorbidity			≥190
HDL(mg/dl)				

DEFINITION

In this topic, we categorize patients into three groups based on their fasting trigl
recommendations as to when or how a patient's triglyceride level should be mar

- **Normal**: <150 mg/dL (1.7 mmol/L)
- **Moderate hypertriglyceridemia**: 150 to 885 mg/dL (1.7 to 10 mmol/L)
- **Severe hypertriglyceridemia**: >885 mg/dL (≥10 mmol/L)

Recommendations for drug treatment of patients with hypertriglyceridaemia

Recommendations	Class[a]	Level[b]
Statin treatment is recommended as the first drug of choice to reduce CVD risk in high-risk individuals with hypertriglyceridaemia [TG levels >2.3 mmol/L (>200 mg/dL)].[355]	I	B
In high-risk (or above) patients with TG levels between 1.5–5.6 mmol/L (135–499 mg/dL) despite statin treatment, n-3 PUFAs (icosapent ethyl 2×2 g/day) should be considered in combination with a statin.[194]	IIa	B
In primary prevention patients who are at LDL-C goal with TG levels >2.3 mmol/L (>200 mg/dL), fenofibrate or bezafibrate may be considered in combination with statins.[305–307,356]	IIb	B
In high-risk patients who are at LDL-C goal with TG levels >2.3 mmol/L (>200 mg/dL), fenofibrate or bezafibrate may be considered in combination with statins.[305–307,356]	IIb	C

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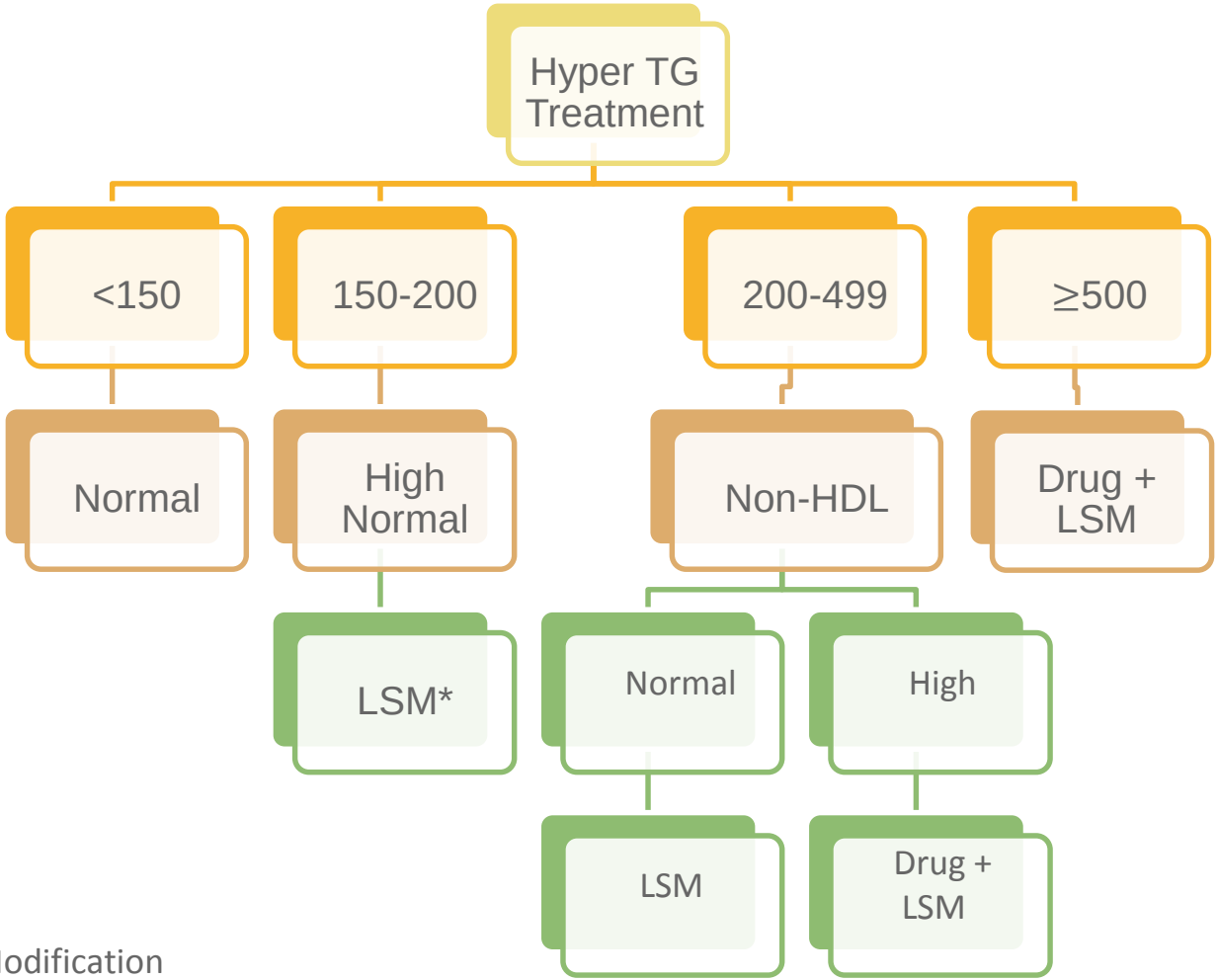
CVD = cardiovascular disease; LDL-C = low-density lipoprotein cholesterol; PUFA = polyunsaturated fatty acids; TG = triglyceride.
[a]Class of recommendation.
[b]Level of evidence.

4.5.2. Hypertriglyceridemia

Recommendations for Hypertriglyceridemia
Referenced studies that support recommendations are summarized in Online Data Supplements 31 and 32.

COR	LOE	RECOMMENDATIONS
I	B-NR	1. In adults 20 years of age or older with moderate hypertriglyceridemia (fasting or nonfasting triglycerides 175 to 499 mg/dL [2.0 to 5.6 mmol/L]), clinicians should address and treat lifestyle factors (obesity and metabolic syndrome), secondary factors (diabetes mellitus, chronic liver or kidney disease and/or nephrotic syndrome, hypothyroidism), and medications that increase triglycerides (S4.5.2-1).
IIa	B-R	2. In adults 40 to 75 years of age with moderate or severe hypertriglyceridemia and ASCVD risk of 7.5% or higher, it is reasonable to reevaluate ASCVD risk after lifestyle and secondary factors are addressed and to consider a persistently elevated triglyceride level as a factor favoring initiation or intensification of statin therapy (see Section 4.4.2.) (S4.5.2-2–S4.5.2-6).
IIa	B-R	3. In adults 40 to 75 years of age with severe hypertriglyceridemia (fasting triglycerides ≥500 mg/dL [≥5.6 mmol/L]) and ASCVD risk of 7.5% or higher, it is reasonable to address reversible causes of high triglyceride and to initiate statin therapy (S4.5.2-3–S4.5.2-5, S4.5.2-7, S4.5.2-8).
IIa	B-NR	4. In adults with severe hypertriglyceridemia (fasting triglycerides ≥500 mg/dL [≥5.7 mmol/L]), and especially fasting triglycerides ≥1,000 mg/dL (11.3 mmol/L)), it is reasonable to identify and address other causes of hypertriglyceridemia), and if triglycerides are persistently elevated or increasing, to further reduce triglycerides by implementation of a very low-fat diet, avoidance of refined carbohydrates and alcohol, consumption of omega-3 fatty acids, and, if necessary to prevent acute pancreatitis, fibrate therapy (S4.5.2-7, S4.5.2-9).



*LSM: Life Style Modification

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Follow Up

- ✓ Reassess Lipid Status **6 week** after initiation therapy .
- ✓ Reassess again at **6- week** intervals until goal achieved.
- ✓ Asses patient
- ✓ On stable lipid levels, lipid should be tested 6-12 mo intervals

LOW HDL

Heart.bums.ac.ir