AMERICAN ASSOCIATION OF CLINICAL ENDOCRINOLOGISTS
AMERICAN COLLEGE OF ENDOCRINOLOGY

Guidelines for Management of Dyslipidemia and Prevention of Cardiovascular Disease

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ASCVD Risk Categories and LDL-C Treatment Goals

10-YEAR RISK (%)	Risk Category	Risk factors/10-year risk	Treatment Goals (mg/dL)		
			LDL-C	Non-HDL-C	Apo B
>30	Extreme risk	• Progressive ASCVD including unstable angina in individuals after achieving an LDL-C <70 mg/dL • Established clinical cardiovascular disease in individuals with DM, stage 3 or 4 CKD, or HeFH • History of premature ASCVD (<55 male, <65 female)	<55	<80	<70
>20	Very high risk	• Established or recent hospitalization for ACS, coronary, carotid or peripheral vascular disease, 10-year risk >20% • DM or stage 3 or 4 CKD with 1 or more risk factor(s) • HeFH	<70	<100	<80
10 – 20	High risk	• ≥2 risk factors and 10-year risk 10%-20% • DM or stage 3 or 4 CKD with no other risk factors	<100	<130	<90
<10	Moderate risk	• ≤2 risk factors and 10-year risk <10%	<100	<130	<90
<10	Low risk	• 0 risk factors	<130	<160	NR

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Treating LDL to Goal

Extreme Risk

Lifestyle + high intensity statin

6–8 weeks

If LDL-C > 55 mg/dL

Add ezetimibe or PCSK9i depending on required LDL-C lowering

6–8 weeks

If LDL-C > 55 mg/dL

Add ezetimibe or PCSK9i depending on required LDL-C lowering

Very High Risk

Lifestyle + high intensity statin

6–8 weeks

If LDL-C > 70 mg/dL

Add ezetimibe or PCSK9i depending on required LDL-C lowering

6–8 weeks

If LDL-C > 70 mg/dL

Add ezetimibe or PCSK9i depending on required LDL-C lowering

High-Moderate Risk

Lifestyle + moderate intensity statin

6–8 weeks

If LDL-C > 100 mg/dL

Increase to high intensity statin

6–8 weeks

If LDL-C > 100 mg/dL

Add ezetimibe

6–8 weeks

If LDL-C > 100 mg/dL

Add PCSK9i

Low Risk

Lifestyle

3 months

If LDL-C > 130 mg/dL

Add moderate intensity statin

6–8 weeks

If LDL-C > 130 mg/dL

Increase to high intensity statin

6–8 weeks

If LDL-C > 130 mg/dL

Add ezetimibe

WHEN LDL GOAL IS ACHIEVED, IF TG > 200 MG/DL, CONSIDER FIBRATE THERAPY

HIGH-INTENSITY STATIN THERAPY	MODERATE-INTENSITY STATIN THERAPY				EZETIMIBE	PCSK9 INHIBITORS (PCSK9I)
Atorvastatin 40–80 mg	Atorvastatin 10–20 mg	Fluvastatin XL 80 mg	Pitavastatin 2–4 mg	Rosuvastatin 5–10 mg	Ezetimibe 10 mg	Evolocumab 140 mg q 2wks, 420 mg q 4 wks
Rosuvastatin 20–40 mg	Fluvastatin 40 mg twice daily	Lovastatin 40 mg	Pravastatin 40–80 mg	Simvastatin 20–40 mg		Alirocumab 75mg-150 mg q 2 wks

Major Atherosclerotic Cardiovascular Disease Risk Factors

Major Risk Factors	Additional Risk Factors	Nontraditional Risk Factors
Advancing age	Obesity, abdominal obesity	▲ Lipoprotein (a)
▲ Total serum cholesterol level	Family history of hyperlipidemia	▲ Clotting factors
▲ Non–HDL-C	▲ Small, dense LDL-C	▲ Inflammation markers (hsCRP; Lp-PLA_2)
▲ LDL-C	▲ Apo B	▲ Homocysteine levels
Low HDL-C	▲ LDL particle concentration	Apo E4 isoform
Diabetes mellitus	Fasting / postprandial hypertriglyceridemia	▲ Uric acid
Hypertension	PCOS	▲ TG-rich remnants
Stage 3 or 4 chronic kidney disease	Dyslipidemic triad	
Cigarette smoking		
Family history of ASCVD		

AACE POSWC. *Endocr Pract*. 2005;11:126-134; ADA. *Diabetes Care*. 2017;40(Suppl 1):S1-S135; Brunzell JD, et al. *Diabetes Care*. 2008;31:811-822; Cromwell WC, et al. *J Clin Lipidol*. 2007; 1:583-592; Einhorn D, et al. *Endocr Pract*. 2003;9:237-252; Grundy SM, et al. *Circulation*. 1998;97:1876-1887; Jellinger P, Handelsman Y, Rosenblit P, et al. *Endocr Pract*. 2017;23(4): 479-497.; Kastelein JJ, et al. *Circulation*. 2008;117:3002-3009; *NCEP*. NIH Publication No. 02-5215. September 2002; Neaton JD, et al. *Arch Intern Med*. 1992;152: 1490-1500; NHLBI. NIH Publication No. 04-5230. August 2004; Stamler J, el al. *JAMA*. 1986;256:2823-2828; Weiner DE, et al. *J Am Soc Nephrol*. 2004;15(5):1307-1315; Yusuf S, et al. *Lancet*. 2004;364(9438):937-952.

How is Risk Assessed?

Recommendations associated with this question:

R4.	**The 10-year risk of a coronary event (high, intermediate, or low) should be determined by detailed assessment using one or more of the following tools:** • Framingham Risk Assessment Tool www.framinghamheartstudy.org/risk-functions/coronary-heart-disease/hard-10-year-risk.php • MESA 10-year ASCVD Risk with Coronary Artery Calcification Calculator www.mesa-nhlbi.org/MESACHDRisk/MesaRiskScore/RiskScore.aspx • Reynolds Risk Score, which includes hsCRP and family history of premature ASCVD www.reynoldsriskscore.org • UKPDS risk engine to calculate ASCVD risk in individuals with T2DM www.dtu.ox.ac.uk/riskengine
R7.	**When the HDL-C concentration is greater than 60 mg/dL, one risk factor should be subtracted from an individual's overall risk profile.**
R8.	**A classification of elevated TG should be incorporated into risk assessments to aid in treatment decisions.**

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Who Should be Screened for ASCVD Risk and When?

Screening Category	Recommendations Associated With This Question
Familial Hypercholesterolemia	R9. Individuals should be screened for FH when there is a family history of: • Premature ASCVD (definite MI or sudden death before age 55 years in father or other male first-degree relative or before age 65 years in mother or other female first-degree relative) or • Elevated cholesterol levels (total, non-HDL, and/or LDL) consistent with FH.
Adults With Diabetes	R10. Annually screen all adult individuals with T1DM or T2DM for dyslipidemia.
Young Adults (Men 20-45 Years, Women 20-55 Years)	R11. Evaluate all adults 20 years of age or older for dyslipidemia every 5 years as part of a global risk assessment.
Middle-Aged Adults (Men 45-65 Years, Women 55-65 Years)	R12. In the absence of ASCVD risk factors, screen middle-aged individuals for dyslipidemia at least once every 1 to 2 years. More frequent lipid testing is recommended when multiple global ASCVD risk factors are present. R13. The frequency of lipid testing should be based on individual clinical circumstances and the clinician's best judgment.
Older Adults (>65 Years)	R14. Annually screen older adults with 0 to 1 ASCVD risk factor for dyslipidemia. R15. Older adults should undergo lipid assessment if they have multiple ASCVD global risk factors (i.e., other than age). R16. Screening for this group is based on age and risk, but not gender; therefore, older women should be screened in the same way as older men.
Children and Adolescents	R17. 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. R18. Screen adolescents older than 16 years every 5 years or more frequently if they have ASCVD risk factors, have overweight or obesity, have other elements of insulin resistance syndrome, or have a family history of premature ASCVD.

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Which Screening Tests Should be Used?

Screening Test	Recommendations Associated With This Question
Fasting Lipid Profile	R19. Use a fasting lipid profile to ensure the most precise lipid assessment; this should include total cholesterol, LDL-C, TG, and non-HDL-C. R20. Lipids, including TG, can be measured in the non-fasting state if fasting determinations are impractical.
LDL-C	R21. LDL-C may be estimated using the Friedewald equation: LDL-C = (total cholesterol – HDL-C) – TG/5; however, this method is valid only for values obtained during the fasting state and becomes increasingly inaccurate when TG levels are greater than 200 mg/dL, and becomes invalid when TG levels are greater than 400 mg/dL. R22. LDL-C should be directly measured in certain high-risk individuals, such as those with fasting TG levels greater than 250 mg/dL or those with diabetes or known vascular disease.
HDL-C	R23. Measurement of HDL-C should be included in screening tests for dyslipidemia.
Non-HDL-C	R24. Non-HDL-C (total cholesterol minus HDL-C) should be calculated to assist risk stratification in individuals with moderately elevated TG (200 to 500 mg/dL), diabetes, and/or established ASCVD. R25. If insulin resistance is suspected, non-HDL-C should be evaluated to gain useful information regarding the individual's total atherogenic lipoprotein burden.
Triglycerides	R26. TG levels should be part of routine lipid screening: moderate elevations (≥150 mg/dL) may identify individuals at risk for insulin resistance syndrome and levels ≥200 mg/dL may identify individuals at substantially increased ASCVD risk.
Apolipoproteins	R27. Apo B and/or an apo B/apo A1 ratio calculation and evaluation may be useful in at-risk individuals (TG ≥150, HDL-C <40, prior ASCVD event, T2DM, and/or insulin resistance syndrome [even at target LDL-C levels]) to assess residual risk and guide decision-making. R28. Apo B measurements (reflecting the particle concentration of LDL and all other atherogenic lipoproteins) may be useful to assess the success of LDL-C–lowering therapy.

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What Treatments are Available for Dyslipidemia?

Recommendation Associated With This Question

R47. A comprehensive strategy to control lipid levels and address associated metabolic abnormalities and modifiable risk factors is recommended primarily using lifestyle changes and patient education with pharmacotherapy as needed to achieve evidence-based targets.

Treatment Categories for Dyslipidemia

Lifestyle Changes

- Physical activity
- Medical nutrition therapy
- Smoking cessation

Pharmacologic Therapy

- Statins
- Fibrates
- Omega-3 fish oil
- Niacin
- Bile acid sequestrants
- Cholesterol absorption inhibitors
- PCSK9 inhibitors
- MTP inhibitor
- Combination therapies

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