DPC SUMMIT

Utilization of Coronary Artery Calcium (CAC) Scores to Predict Cardiovascular Disease (CVD) risk

Travis Allen, MD, Senior AME, FACP
Internal Medicine
Adjunct Faculty Creighton University School of Medicine - Phoenix

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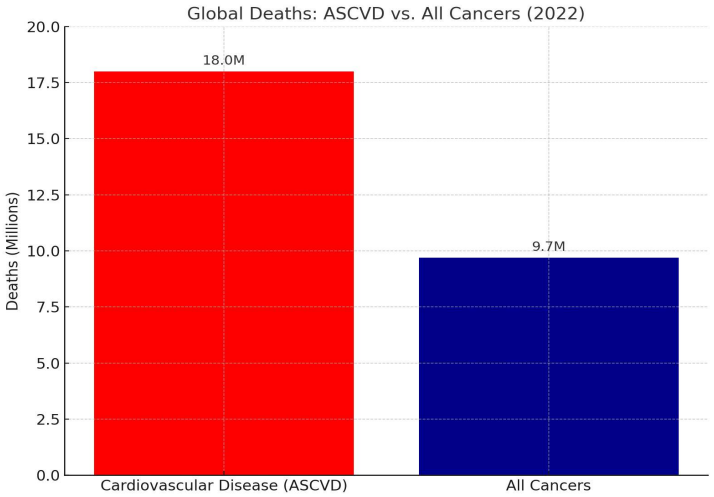
Learning Objectives

1. Discover advanced lipid management strategies and their role in optimizing patient outcomes.
2. Review ASCVD guidelines and apply them to guide treatment decisions for patients at varying cardiovascular risk levels.
3. Utilize Apolipoprotein B, Lipoprotein(a), and risk enhancers to refine management for patients in borderline ASCVD risk groups, including the use of Coronary Artery Calcium (CAC) scoring as a tiebreaker for statin initiation.

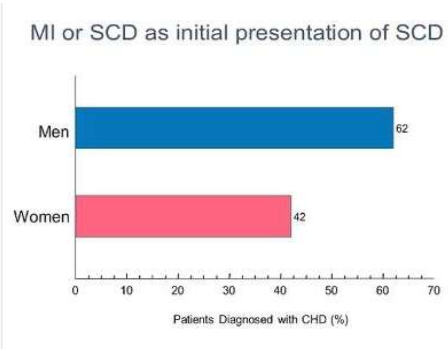
Why ASCVD matters.



ASCVD accounted for approximately 18 million deaths worldwide, nearly double the 9.7 million deaths caused by all cancers combined.
World Health Organization

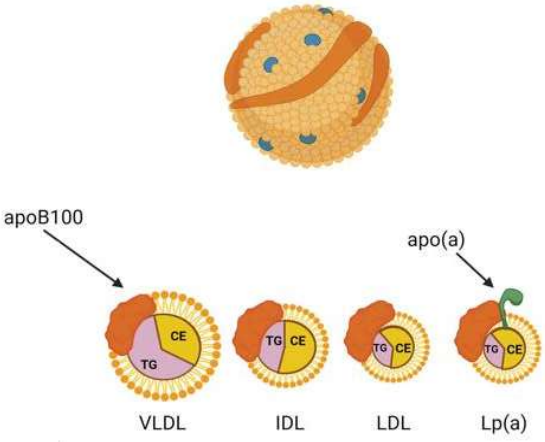
“Looking for trouble before trouble finds you”

Harry Potter



Advanced Lipid Management

- LDL-C
- Apolipoprotein B-100
- Lipoprotein(a)



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Poll: I regularly order Apolipoprotein B to assess cardiovascular risk in my patients?

Apolipoprotein B

Superior risk predictor to LDL-C

- ApoB provides a more accurate count of atherogenic lipoprotein particles (LDL, VLDL, IDL); each particle carries one ApoB molecule. This makes it a stronger predictor of cardiovascular disease compared to LDL-C alone
- Discordance between LDL–C and ApoB is common, especially in patients with metabolic syndrome, obesity, or diabetes. ApoB levels better align with ASCVD risk in such cases .

Apolipoprotein B

Professional consensus and guidelines

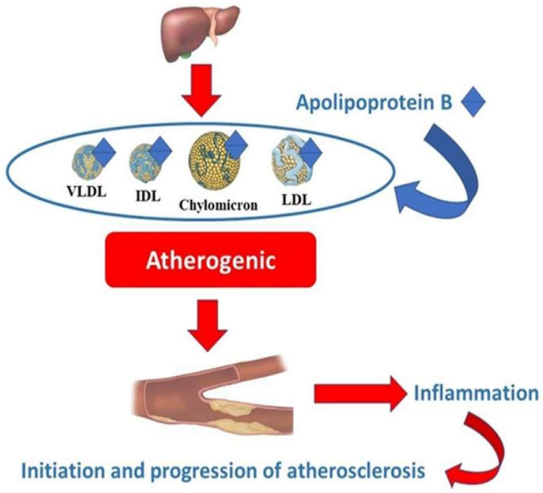
- The National Lipid Association (NLA)'s Expert Consensus endorses ApoB measurement for risk assessment and guiding lipid-lowering therapy, highlighting its superiority to LDL-C in risk stratification.
- ApoB has achieved adequate standardization across labs, supporting clinical use.
- Clinical targets: High-risk patients (e.g., on statins aged 40–75) aim for ApoB <65–80 mg/dL; ≥130 mg/dL indicates elevated risk

Apolipoprotein B

3. Practical advantages

- Can be measured without fasting, and is relatively cost-effective ($15–20 per test)
  - LabCorp Client Bill Price: $6.89
- It uncovers elevated atherogenic particles missed by standard lipid panels, especially in people with normal LDL but metabolic risk

Apolipoprotein B Summary



Apolipoprotein B Clinical Case

A 58-year-old male with obesity, hypertension, and type 2 diabetes presents for a cardiovascular risk assessment. His lipid panel shows:

- Total cholesterol: 175 mg/dL
- LDL-C: 95 mg/dL
- HDL-C: 43 mg/dL
- Triglycerides: 210 mg/dL
- His ApoB level is 115 mg/dL.

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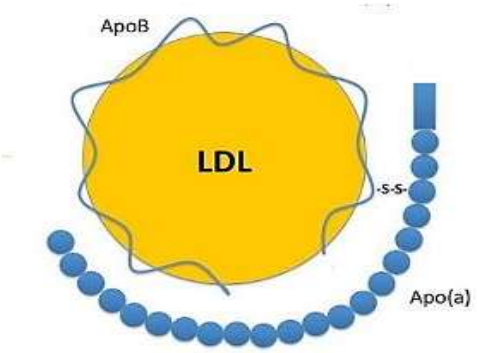
Poll: Which of the following best explains the clinical significance of his ApoB level?

Lipoprotein(a)

- Lp(a) is similar in structure to LDL, but it also contains a protein called apolipoprotein(a) (Apo(a).
- High Lp(a) is an independent risk factor for cardiovascular disease. (It can increase risk even with normal LDL-C).
- Lp(a) is an inherited genetic risk factor for ASCVD.



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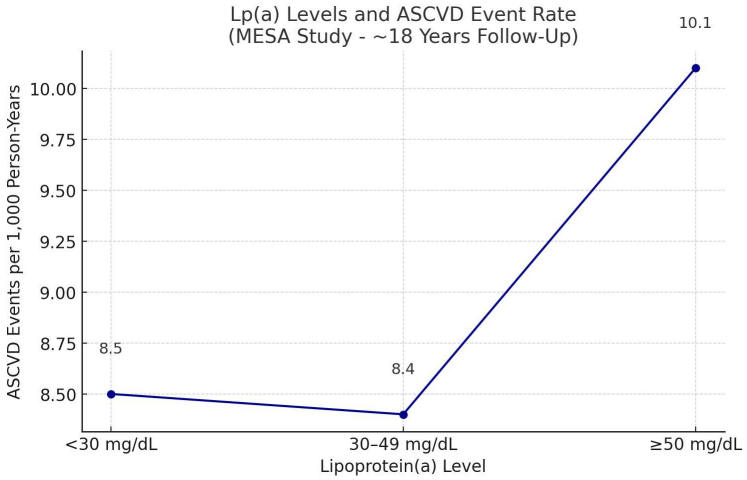
Poll: I regularly order Lipoprotein(a) to assess cardiovascular risk in my patients?

Lp(a) & Future ASCVD Events (MESA Study)



Lp(a) Level	ASCVD Events (per 1,000 PY)
<30 mg/dL	8.5
30–49 mg/dL	8.4
≥50 mg/dL	10.1

Participants with Lp(a) ≥ 50 mg/dL experienced a ~20% higher ASCVD event rate (10.1 vs. 8.5 per 1,000 person-years) compared to those with low Lp(a).

Lipoprotein(a)

Causal and independent ASCVD risk factor

- Lp(a) is strongly genetically determined and has causal links to atherosclerosis, CAD, stroke, thrombosis, and aortic stenosis.
- Large-scale epidemiologic and genetic studies confirm a continuous relationship between Lp(a) and ASCVD risk across all populations.

Lipoprotein(a)

Screening recommendations

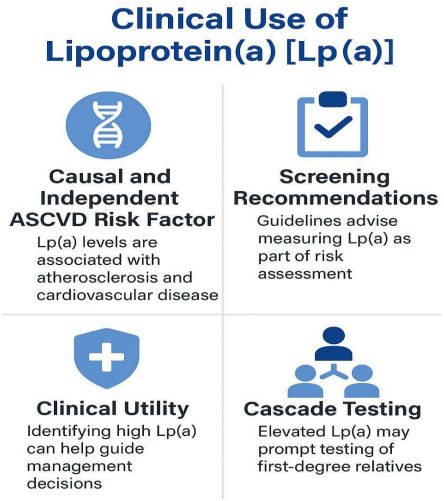
- **European (ESC/EAS 2019):** test Lp(a) at least once in every adult.
- **Canadian Cardiovascular Society (2021):** include Lp(a) in initial lipid screening.
- **National Lipid Association (2024 update):** measure once per adult; define <30 mg/dL as low, 30–50 mg/dL intermediate, ≥50 mg/dL high risk.

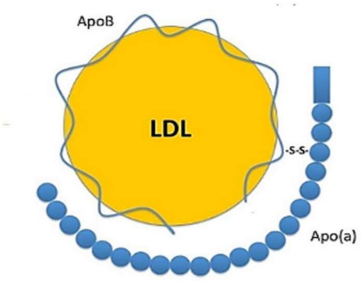
Lipoprotein(a)

3. Clinical Utility

- Lp(a) levels are stable throughout life; identifying elevated Lp(a) helps guide risk-benefit discussions and may prompt more aggressive LDL- or blood pressure-lowering.
- While no Lp(a)-specific drugs are currently FDA-approved, PCSK9 inhibitors modestly reduce Lp(a), and lipoprotein apheresis is FDA-approved for selected high-risk patients.
- Emerging therapies (e.g., pelacarsen in Lp(a) HORIZON trial ends estimated late 2025; olpasiran in OCEAN(a) ends December 2026) may soon offer targeted treatment. (5 total)
- High Lp(a) identifies individuals and families who may require cascade testing, especially in familial hypercholesterolemia or premature ASCVD.

Lipoprotein(a) Summary





Lipoprotein(a) Clinical Case

A 45-year-old woman with no significant medical history is referred after her father died of a myocardial infarction at age 49. Her lipid panel is unremarkable. Her Lipoprotein(a) level returns at 105 mg/dL.

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Poll: What is the most appropriate next step in this patientâ€™s risk assessment or management?

Why Providers Should Order These Tests

Benefit	ApoB	Lp(a)
Enhanced risk assessment	Counts actual atherogenic particles; reveals risk missed by LDL-C levels	Independent genetic risk marker; refines risk stratification
Guideline endorsement	Recommended by NLA to guide therapy	Strong consensus to screen adults once
Actionable results	Targets inform statin/therapy intensity	High levels prompt LDL/BP intensification, cascade testing, use of PCSK9 or apheresis
Clinical convenience	Non-fasting, standardized assay	Stable life-long measure, one-time test
Future therapy relevance	Helps select candidates for intensive treatment	Sets baseline for upcoming Lp(a)-lowering therapies

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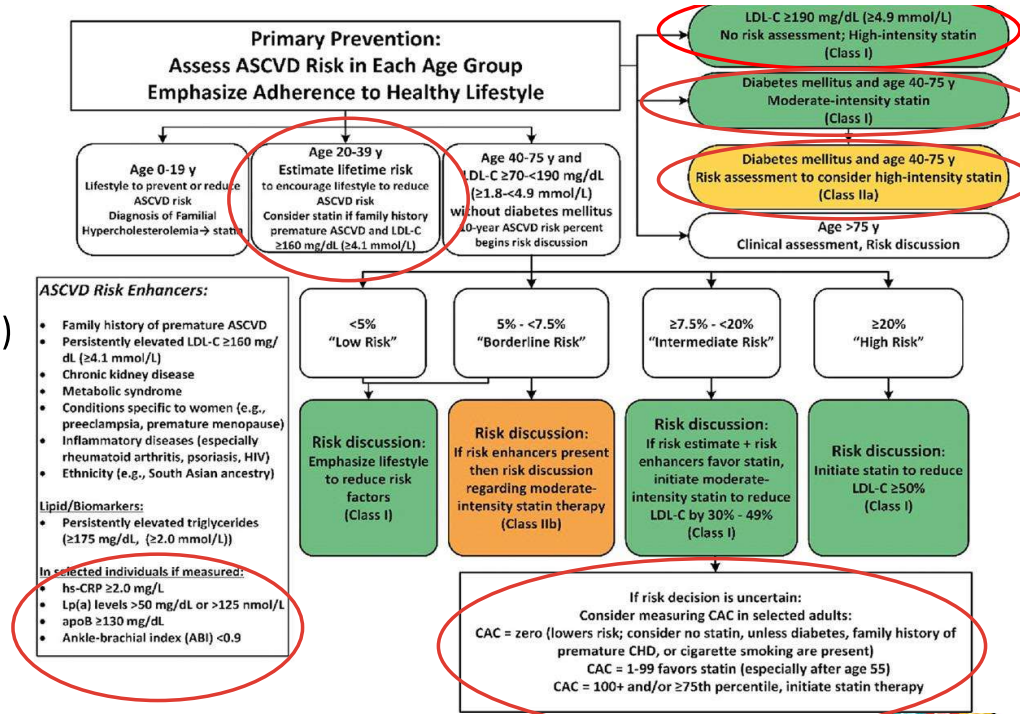
2019 ACC/AHA Cholesterol Management in patients without ASCVD (Primary Prevention)

JACC



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Risk Enhancers

- Family history of premature ASCVD
  - Male < 55
  - Female < 65
- Chronic Kidney Disease (CKD)
- Metabolic Syndrome
- Inflammatory Disease (RA, Psoriasis, HIV)
- Conditions specific to women (Preeclampsia, premature menopause)
- Ethnicity (South Asian ancestry)

- hs-CRP > 2.0 mg/L
- Lp(a) levels > 50 mg/dL or 125 nmol/L
- apoB > 130 mg/dL
- Ankle-brachial Index (ABI) <0.9

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Poll: I order Cardiac Calcium Scores to assess cardiovascular risk in my patients?

Guidelines Supporting CAC Scoring

1. **ACC/AHA 2018 Cholesterol Management Guidelines** (Class IIa/IIb recommendation):
   • Endorse CAC testing in **asymptomatic adults (age 40–75)** with intermediate (5-20%) 10-year ASCVD risk, when treatment decisions (e.g., statin therapy) are **uncertain.**
   • **CAC = 0** may **de-escalate risk**, delaying statin initiation; scores >1–99 favor treatment, and >100 strongly recommend it.

2. **AHA/ACCF 2010 Asymptomatic Risk Assessment Guidelines**:
   • Recommend CAC scoring as a risk-enhancing test to guide therapy intensity and lifestyle decisions, especially when traditional risk factors leave risk assessment **ambiguous .**
   • CAC >100–300 confers a **4–8× higher CHD risk** over 3–5 years compared to CAC = 0.

3. **Clinical Expert Opinion**:
   • CAC scoring is most useful when **statin decisions are unclear**, or in younger, intermediate-risk adults, or those with premature ASCVD family history.

Ideal Patient Candidates

- **Asymptomatic adults, ages 40–75**, with **intermediate (5–20%)** 10-year ASCVD risk (e.g., borderline risk like 5–7.4%).
- Individuals with **uncertain statin benefit**—neither clearly indicated nor contraindicated by guidelines.
- Patients with **family history** of premature ASCVD, **borderline risk**, or who are reluctant to start statins.
- **Not recommended for**: Patients <40 years or >75 years with high risk, known ASCVD, diabetes, or those already on statins.

The Power of CAC = 0

- The finding of **zero coronary calcium** ("power of zero") carries strong prognostic value across multiple settings:

Asymptomatic populations

- **Taylor et al**: CAC 0 predicted very low risk (<1% 10-year mortality) in ~44,000 asymptomatic individuals
- **PUBMED pooled analysis (≥35,000 individuals)**: Negative predictive value of **99.9%**, with annual event rates of **0.027%** in asymptomatic persons

CAC Summary

Element	CAC = 0	CAC >100
10-yr mortality Risk	~1% or less (asymptomatic)	4–8× higher event rate
MACE risk (annual)	0.5–0.8% in chest pain patients	Significantly elevated vs. CAC 0
NPV for Obstructive CAD	>97–99% in symptomatics	—
Guideline impact	Allows risk de-escalation and statin deferment	Triggers statin and lifestyle intensification

CAC Key Takeaways

1. CAC scoring is a proven, noninvasive tool to refine ASCVD risk, especially when risk is intermediate or unclear.
2. A CAC = 0 provides powerful reassurance—death/event risk is exceptionally low across diverse populations.
3. For CAC >100, guidelines clearly endorse intensified preventive therapy (statins, lifestyle).
4. Best used in asymptomatic adults aged 40–75 with intermediate risk; sparing use in symptomatic high-risk patients.

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Poll: Which of the following patients is the most appropriate candidate for Coronary Artery Calcium (CAC) scoring based on current guidelines?

MESA
The Multi-Ethnic Study Of Atherosclerosis

- Calculator Incorporates CAC Score.
- Does not include Lipoprotein(a), LDL-C, or Apolipoprotein B.

MESA 10-Year CHD Risk with Coronary Artery Calcification

1. Gender	Male ◉	Female ○			
2. Age (45-85 years)	46	Years			
3. Coronary Artery Calcification	0	Agatston			
4. Race/Ethnicity	Caucasian				
5. Diabetes	Yes ○	No ◉			
6. Currently Smoke	Yes ○	No ◉			
7. Family History of Heart Attack (History in parents, siblings, or children)	Yes ○	No ◉			
8. Total Cholesterol	167	mg/dL	or	4.3	mmol/L
9. HDL Cholesterol	53	mg/dL	or	1.4	mmol/L
10. Systolic Blood Pressure	128	mmHg	or	17.1	kPa
11. Lipid Lowering Medication	Yes ○	No ◉			
12. Hypertension Medication	Yes ○	No ◉			

Calculate 10-year CHD risk

Using the Coronary Artery Calcium Score

10 Year risk of a CHD Event	Coronary Age	Difference from Chronologic Age
1.4%	28	-18

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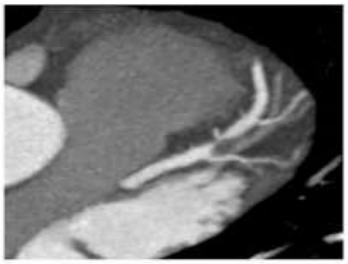
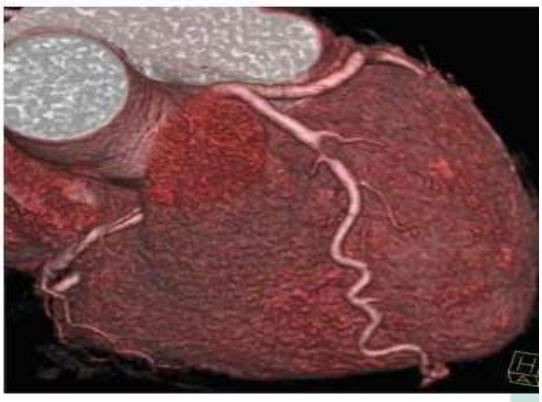
Not all ASCVD is calcified.



Case

52 year old male presents with strong history of premature CAD

Brother recently died of acute MI



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Social Q&A for Utilization of Coronary Artery Calcium (CAC) Scores to Predict CVD Risk

QUESTIONS?

Contact Information

Travis Allen, MD, Senior AME, FACP

Travis.Allen@thepilotclinic.com

"Looking for trouble before trouble finds you"

Harry Potter