LABupdate

Apolipoprotein B: a Risk-enhancing Factor in the Primary Prevention of Cardiovascular Disease

The American College of Cardiologists and the American Heart Association recently issued an updated guideline to help address the primary prevention of cardiovascular disease at population and individual patient levels. This 2019 guideline combines existing scientific statements, expert consensus, and clinical practice guidelines and adds new recommendations for physical activity, aspirin use, and tobacco use. Suggestions for team-based care, shared decision making, and assessment of social determinants of health round out a comprehensive but focused approach to primary prevention.[1]

To enhance clinician-patient discussions and help inform prevention strategies, the guideline advocates, among other things, estimating an individual's 10-year risk for atherosclerotic cardiovascular disease (ASCVD) to[1]:

- match the intensity of interventions with patient's risk,
- maximize the expected benefit, and
- minimize possible harm from overtreatment.

However, due to the inherent limitations of risk estimation tools in individual patients, the guideline also advocates consideration of risk-enhancing factors to inform prevention strategies for adults with borderline- (5% to < 7.5%) or intermediate- (≥ 7.5% to < 20%) risk.[1] Risk-enhancing factors include:

- Family history of premature ASCVD (males, < 55 years; females, < 65 years)[1];
- Primary hypercholesterolemia (LDL-C, 160-189 mg/dL; non-HDL-C, 190-219 mg/dL)[1]*;
- Metabolic syndrome (a total of 3 of the following is diagnostic)[1]:
  - increased waist circumference (by ethnically appropriate cut-points)[1];
  - elevated triglycerides (> 150 mg/dL, non-fasting)[1];
  - low HDL-C (males, < 40 mg/dL, females < 50 mg/dL)[1];
  - elevated glucose (fasting plasma glucose, 100 mg/dL-125 mg/dL; oral glucose tolerance, 2 hr., 140 mg/dL-199 mg/dL; or hemoglobin A1c, 5.7%-6.4%)[1,2];
  - elevated blood pressure.[1]
- Chronic kidney disease (eGFR 15-59 mL/min/1.73 m^2 with or without albuminuria; not treated with dialysis or kidney transplantation)[1];
- Chronic Inflammatory conditions (e.g. psoriasis, rheumatoid arthritis, lupus, HIV/AIDS)[1];
- History of premature menopause (< 40 years), pregnancy-associated conditions that increase later ASCVD risk (e.g., pre-eclampsia)[1];
- High risk race or ethnicity[1]
- Lipids and biomarkers[1]:
  - persistently elevated hypertriglyceridemia (≥ 175 mg/dL, non-fasting)*;
  - elevated high-sensitivity C-reactive Protein (≥ 2.0 mg/L);
  - elevated Lipoprotein(a) – ≥ 50 mg/dL constitutes risk-enhancing factor; relative indication for measurement is family history of premature ASCVD;
  - elevated Apolipoprotein B (≥ 130 mg/dL constitutes risk-enhancing factor; relative indication for measurement is triglyceride ≥ 200 mg/dL (≥ 130 mg/dL corresponds to LDL-C > 160 mg/dL).

The role of low-density lipoprotein (LDL) particles has been documented to elevate patient risk for ASCVD and is well known in the development and progression of ASCVD.[3] As stated in the Journal of Family Medicine, LDL particles move into the arterial wall via a gradient-driven process. Once inside the intima, LDL particles that bind to the arterial wall are oxidized and subsequently taken up by macrophages to form foam cells.[3] The greater the circulating levels of LDL over time, the greater the acceleration of this process and the higher the risk for ASCVD events.[3]

"LDL-C (the measurement of cholesterol carried in LDL particles) has been used for decades to estimate circulating LDL quantity. However, the cholesterol content of LDL varies widely among individuals and is often dependent on existing metabolic conditions (e.g., insulin resistance, metabolic syndrome, type 2 diabetes mellitus) as well as the presence of lipid-altering medications."[3] Apo B is a major protein component of LDL particles; as such, Apo B serves as an alternative particle measure of one's LDL status, and more than 90% of total plasma Apo B is associated with LDL particles.[4]

LabCorp offers the following to assist clinicians in evaluating Apo B as a risk-enhancing factor in the primary prevention of ASCVD:

Test Name	Test Number
Apolipoprotein B **Reference Interval (mg/dL):** Desirable < 90 Borderline High 90 - 99 High 100 - 130 Very High > 130	**167015**
Lipid Cascade With Reflex to Apolipoprotein B	**363676**

For the most current information regarding test options, including specimen requirements and CPT codes, please consult the online Test Menu at **www.LabCorp.com.**

* 3 determinations

References
1. Arnett DK, Blumenthal RS, Albert MA, et al. 2019 ACC/AHA Guideline on the Primary Prevention of Cardiovascular Disease. A Report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines. *J Am Col Cardiol.* 2019 Mar 17. Pii: S0735-1097(19)33877-X.
2. 2. Classification and Diagnosis of Diabetes: Standards of Medical Care in Diabetes – 2019. American Diabetes Association. *Diabetes Care.* 2019 Jan;42(Suppl 1):S13-S28.
3. Cromwell WC, Triffon DW. Clinical utility of LDL particle number to optimize management of LDL-related cardiovascular risk. *J Fam Pract.* 2016 Jul;65(7):1-8.
4. Cromwell WC, Berringer TA. Low-density lipoprotein and apolipoprotein B: clinical use in patients with coronary heart disease. *Curr Cardiol Rep.* 2009 Nov;11(6):468-475.

LabCorp

www.LabCorp.com