

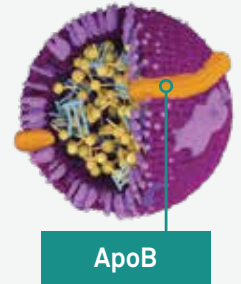
**Apolipoprotein B (apoB)**



**ApoB** identifies atherogenic particles and is a marker for cardiovascular risk stratification

**Test description**

Apolipoprotein B (apoB) is a major protein component of non-HDL lipoprotein particles. Each non-HDL lipoprotein particle has one apoB, therefore, apoB levels represent the total number of atherogenic particles in circulation.<sup>1,2</sup> ApoB differs from the concentration of cholesterol, represented in traditional lipid values such as LDL-C and non-HDL-C, as it quantifies the number of particles delivering cholesterol throughout the body. Many individuals with optimal values on a conventional lipid panel still experience cardiovascular disease (CVD) or disease progression.<sup>2,3</sup>



**Clinical significance**

- High apoB, alongside high triglycerides, is the most common atherogenic dyslipoproteinemia and is frequently found in patients with obesity, metabolic syndrome, and type 2 diabetes<sup>4</sup>
- ApoB is superior to LDL-C and non-HDL-C as a predictor of CVD events<sup>2,5</sup>
- ApoB is associated with residual risk of CVD events and all-cause mortality in patients receiving statin therapy<sup>5-7</sup>
- ApoB is used to diagnose certain lipid disorders, including familial dysbetalipoproteinemia and familial combined hyperlipidemia (FCHL)<sup>8</sup>
- ApoB levels can be driven by a variety of factors, including the amount of cholesterol, metabolic dysfunction, or genetic conditions. Its use has been suggested by multiple professional societies:

| Professional society       | Guideline recommendations                                                                                                                                                                                                                                             |
|----------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ESC & EAS <sup>9</sup>     | ApoB analysis can be used as an alternative to LDL-C as the primary measurement for screening, diagnosis, and management, and may be preferred over non-HDL-C in people with high triglycerides, type 2 diabetes mellitus, obesity, or very low LDL-C                 |
| AHA & ACC <sup>10,11</sup> | Elevated apoB (≥130 mg/dL) is a risk-enhancing factor for CVD and can help guide decisions on interventions in individuals with borderline-to-intermediate risk (10-year ASCVD risk ≥5% and <20%)                                                                     |
| AACE & ACE <sup>12</sup>   | Elevated apoB is an additional risk factor that may be useful to assess residual risk and guide decision-making for at-risk individuals, even when target LDL-C levels are achieved <sup>†</sup>                                                                      |
| NLA <sup>8,13</sup>        | ApoB measurement is reasonable for patients receiving lipid-lowering therapy and may be reasonable for initial evaluation of CVD risk or as an optional secondary treatment target. ApoB measurement can assist diagnosis of familial dysbetalipoproteinemia and FCHL |
| WHF Roadmap <sup>14</sup>  | Guideline recommendation: Where appropriate laboratory facilities exist, apoB should in time become the default measure of total atherogenic lipid burden, especially in conditions associated with insulin resistance                                                |

ESC, European Society of Cardiology; EAS, European Atherosclerosis Society; AHA, American Heart Association; ACC, American College of Cardiology; ASCVD, atherosclerotic cardiovascular disease; AACE, The American Association of Clinical Endocrinologists; ACE, American College of Endocrinology; NLA, National Lipid Association; WHF Roadmap, World Heart Federation Cholesterol Roadmap  
<sup>†</sup> At-risk individuals include those with triglyceride level ≥150 mg/dL, HDL-C <40 mg/dL, prior CVD event, type 2 diabetes mellitus, and/or insulin resistance syndrome.



**Elevated levels of apoB may indicate:**

- Risk for atherosclerotic CVD
- Residual cardiovascular risk in patients on lipid lowering therapies

# ApoB relative risk (mg/dL)<sup>15</sup>

|                         |                                 |                                   |                        |                          |
|-------------------------|---------------------------------|-----------------------------------|------------------------|--------------------------|
| <b>Desirable</b><br><90 | <b>Above Desirable</b><br>90-99 | <b>Borderline High</b><br>100-119 | <b>High</b><br>120-139 | <b>Very High</b><br>>139 |
|-------------------------|---------------------------------|-----------------------------------|------------------------|--------------------------|

## Individuals suitable for testing

- Those with 1 or more risk factors for the development of CVD
- Those with borderline risk (5% to <7.5% 10-year ASCVD risk) or intermediate risk (≥7.5% to <20% 10-year ASCVD risk)<sup>10</sup>
- Those receiving lipid-lowering therapy<sup>6</sup>


## Treatment considerations\*

| Potential risk factor     | Considerations                                                                                                                                                                                          |
|---------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Lifestyle</b>          | Diet, <sup>16</sup> exercise, <sup>17</sup> and smoking cessation <sup>18</sup>                                                                                                                         |
| <b>Lipids</b>             | Lipid-lowering therapies described in the AHA/ACC Guideline on the Management of Blood Cholesterol <sup>10</sup>                                                                                        |
| <b>Insulin resistance</b> | Insulin-sensitizing therapies described in the American Diabetes Association guidelines for the management of pre-diabetes/diabetes <sup>19</sup><br>Metabolic dysfunction increases apoB <sup>20</sup> |

\*Treatment considerations are provided for educational purposes only and are not intended as medical advice. A healthcare provider's test selection, interpretation, diagnosis, and patient management decisions should be based on their education, clinical expertise, and assessment of the patient. Specific treatment plans should be provided and reviewed by an appropriately credentialed provider.

| Test Name                                           | Test Code | CPT Code <sup>a</sup> | Specimen |
|-----------------------------------------------------|-----------|-----------------------|----------|
| Cardio IQ Apolipoprotein B                          | 906946    | 82172                 | Serum    |
| Cardio IQ Lipid Panel and Apolipoprotein B          | 804372    | 82172, 80061          | Serum    |
| Cardio IQ Lipid Panel w/ Reflex to Apolipoprotein B | 907403    | 82172, 80061          | Serum    |

<sup>a</sup>The CPT codes provided are based on AMA guidelines and are for informational purposes only. CPT coding is the sole responsibility of the billing party. Please direct any questions regarding coding to the payer being billed.



Assess apoB to identify atherogenic particles.

For more information, contact your Sonora Quest Account Manager.

## References

- Carr SS, Handelsman AJ, Sullivan DR, et al. Non-HDL-cholesterol and apolipoprotein B compared with LDL-cholesterol in atherosclerotic cardiovascular disease risk assessment. *Pathology*. 2019;51(2):148-154. doi:10.1016/j.pathol.2018.11.006 2. Sniderman AD, Williams K, Contois JH, et al. A meta-analysis of low-density lipoprotein cholesterol, non-high-density lipoprotein cholesterol, and apolipoprotein B as markers of cardiovascular risk. *Circ Cardiovasc Qual Outcomes*. 2011;4(3):337-345. doi:10.1161/CIRCOUTCOMES.110.959247 3. Sachdeva A et al. Lipid levels in patients hospitalized with coronary artery disease: An analysis of 136,905 hospitalizations in Get With The Guidelines. *Am Heart J*. 2009; 157: 111-117 doi:10.1016/j.ahj.2008.08.010 4. Sniderman A, Couture P, de Graaf J. Diagnosis and treatment of apolipoprotein B dyslipoproteinemias. *Nat Rev Endocrinol*. 2010;6(6):335-346. doi:10.1038/nrendo.2010.50 5. Marston NA, Giugliano RP, Melloni GEM, et al. Association of apolipoprotein B-containing lipoproteins and risk of myocardial infarction in individuals with and without atherosclerosis: distinguishing between particle concentration, type, and content. *JAMA Cardiol*. 2021:e215083. doi:10.1001/jamacardio.2021.5083 6. Johannesen CDL, Mortensen MB, Langsted A, et al. Apolipoprotein B and non-HDL cholesterol better reflect residual risk than LDL cholesterol in statin-treated patients. *J Am Coll Cardiol*. 2021;77(11):1439-1450. doi:10.1016/j.jacc.2021.01.027 7. Khan SU, Khan MU, Valavoor S, et al. Association of lowering apolipoprotein B with cardiovascular outcomes across various lipid-lowering therapies: systematic review and metaanalysis of trials. *Eur J Prev Cardiol*. 2020;27(12):1255-1268. doi:10.1177/2047487319871733 8. Wilson PWF, Jacobson TA, Martin SS, et al. Lipid measurements in the management of cardiovascular diseases: practical recommendations a scientific statement from the National Lipid Association writing group. *J Clin Lipidol*. 2021;15(5):629-648. doi:10.1016/j.jacl.2021.09.046 9. Mach F, Baigent C, Catapano AL, et al. 2019 ESC/ EAS Guidelines for the management of dyslipidaemias: lipid modification to reduce cardiovascular risk. *European Heart Journal*. 2019;41(1). doi:10.1093/eurheartj/ehz455 10. 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. *Circulation*. 2019; 140(11):e596-e646. doi:10.1161/CIR.0000000000000678 11. Grundy SM, Stone NJ, Bailey AL, et al. 2018 AHA/ACC/AACVPR/AAPA/ABC/ACPM/ADA/AGS/APHA/ASPC/NLA/PCNA guideline on the management of blood cholesterol: a report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines. *Circulation*. 2019;139(25):e1082-e1143. doi:10.1161/CIR.0000000000000625 12. Jellinger PS, Handelsman Y, Rosenblit PD, et al. American Association of Clinical Endocrinologists and American College of Endocrinology guidelines for management of dyslipidemia and prevention of cardiovascular disease. *Endocr Pract*. 2017;23(suppl 2):1-87. doi:10.4158/EP171764.APPGL 13. Jacobson TA, Ito MK, Maki KC, et al. National Lipid Association recommendations for patient-centered management of dyslipidemia: part 1--full report. *J Clin Lipidol*. 2015;9(2):129-169. doi:10.1016/j.jacl.2015.02.003 14. Ray KK, Ference BA, Séverin T, et al. World Heart Federation Cholesterol Roadmap 2022. *Glob Heart*. 2022;17(1):75. doi:10.5334/gh.1154 15. Contois JH, McConnell JP, Sethi AA, et al. Apolipoprotein B and cardiovascular disease risk: Position statement from the AACC Lipoproteins and Vascular Diseases Division Working Group on best practices. *Clin Chem*. 2009;55(3):407-419. 16. Solá R, Fitó M, Estruch R, et al. Effect of a traditional Mediterranean diet on apolipoproteins B, A-I, and their ratio: A randomized, controlled trial. *Atherosclerosis*. 2011;218(1):174-180. doi:10.1016/j.atherosclerosis.2011.04.026 17. Holme I, Hostmark AT, Andersen SA. ApoB but not LDL-cholesterol is reduced by exercise training in overweight healthy men. Results from the 1-year randomized Oslo Diet and Exercise Study. *J Intern Med*. 2007;262(2):235-243. doi:10.1111/j.1365-2796.2007.01806.x 18. Kausz AR, Antunes M, de La Bourdonnaye G, et al. Smoking and apolipoprotein levels: A meta-analysis of published data. *Toxicology Reports*. 2022;9:1150-1171. doi:10.1016/j.toxrep.2022.05.009 19. American Diabetes Association. Cardiovascular Disease and Risk Management: Standards of Medicare Care in Diabetes—2018. *Diabetes Care*. 2018;41(Supplement 1):S86-S104. doi:10.2337/dc18-S009 20. Haas ME, Attie AD, Biddinger SB. The regulation of ApoB metabolism by insulin. *Trends Endocrinol Metab*. 2013;24(8):391-397. doi:10.1016/j.tem.2013.04.001

SonoraQuest.com

Sonora Quest Laboratories, any associated logos, and all associated Sonora Quest Laboratories registered or unregistered trademarks are the property of Sonora Quest Laboratories. All third-party marks—® and ™—are the property of their respective owners.  
© 2024 Sonora Quest Laboratories. All rights reserved. 02/2024