Apolipoprotein B and Cardiovascular Disease Risk

The key role of low-density lipoprotein (LDL) in the development of atherosclerosis and cardiovascular disease (CVD) is well known. Following entry into the artery wall, LDL particles promote the development of atherosclerosis, which increases an individual’s risk for heart attack and stroke.1 Because of the difficulty in directly “counting” LDL particles, measurement of cholesterol carried by LDL particles (ie, LDL cholesterol or LDL-C) has been used for many decades as a surrogate to estimate LDL quantity for the purpose of risk assessment and as a principal target of therapy. The establishment of LDL-C treatment goals by the National Cholesterol Education Program Adult Treatment Panel guidelines and the success of lipid-lowering therapies in achieving those goals have reduced CVD morbidity and mortality2 and, in so doing, further entrenched LDL-C into medical decision making.

In recent years, numerous studies have evaluated the association of apolipoprotein B (apo B) levels as a predictor of heart disease in patients.3 At the same time, a deeper understanding has also emerged regarding the relationship of LDL particle measurement along the continuum of CVD risk assessment. These two developments, along with the facts presented below, may shift the CVD risk paradigm from exclusive reliance on LDL-C.

- The cholesterol content of lipoproteins varies widely in a single individual as well as between individuals.3,4
- Although lipid-lowering therapies are effective in reducing CV events, many individuals with cardiometabolic (CMR) factors (such as age, abdominal obesity, insulin resistance, elevated blood pressure, low HDL-C levels, elevated triglycerides, and increased numbers of small dense LDL particles) harbor residual risk.2 In many individuals, this combination of factors is characterized by a discordance between “normal” LDL-C and increased numbers of LDL particles (LDL-P).1,2,5
- When LDL particle number is elevated, risk of coronary heart disease events has been shown to increase.1 If LDL-C and LDL particle number measures are discordant, CHD risk has been found to track with LDL particle number, and LDL-C may be less predictive.2,4,5
- The dramatic increase in the prevalence of obesity has contributed to a shift in the overall CVD risk profile toward individuals with CMR factors.2

Apo B is the main protein component of LDL particles, and each particle contains a single apo B molecule (as does each intermediate-density lipoprotein [IDL] and each very low density lipoprotein [VLDL]). Since more than 90% of total plasma apo B is associated with LDL particles1 and automated, routine immunochemical methods are commercially available for apo B measurement, apo B may be a good surrogate for LDL-P.3

There is a linear relationship between LDL-P and apo B values such that the higher the values, the higher the level of risk assigned to the patient. If a clinical judgement places a patient in the high-risk category, it has been suggested that the target level of therapy be more aggressively lowered, regardless of the measurement method used.2

Expert panels have established suggested treatment goals, including LDL-P targets (either NMR LDL-P or apo B), in addition to LDL-C and non-HDL-C goals to optimize the management of moderate- and high-risk individuals.1,2,3,6,7,8 For high-risk individuals, optimal particle levels have been expressed as follows:

<table>
<thead>
<tr>
<th>Method</th>
<th>Test</th>
<th>Units</th>
<th>Optimal Goal</th>
</tr>
</thead>
<tbody>
<tr>
<td>NMR</td>
<td>LDL particle</td>
<td>nmol/L</td>
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</tr>
<tr>
<td>Immunochemical</td>
<td>Apo B</td>
<td>mg/dL</td>
<td>&lt; 80</td>
</tr>
</tbody>
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In addition to providing Lipid Cascade With Reflex to Lipoprotein Particle Assessment by NMR (361946), LabCorp now offers Lipid Cascade With Reflex to Apolipoprotein B (363676) as another option for lipoprotein measurement.

Visit the online Test Menu at www.LabCorp.com for full test information, including CPT codes and specimen collection requirements.

References