

LIPID TOPICS

by Mark Deeg, MD, PhD

Who, What, and When to Test Patients for Dyslipidemias

Who to test?

The National Cholesterol Education Program Adult Treatment Panel III (ATPIII) recommends that all adults without coronary artery disease who are over the age of 20 should have a fasting lipoprotein profile (total cholesterol, triglycerides, LDL cholesterol, and HDL cholesterol) done at least every 5 years (1).

Patients with a higher risk for cardiovascular events should have a lipid profile examined at least annually. These patients include those with diabetes (2, 3), obesity, smokers, men over the age of 45 and women over the age of 55. Patients already on lipid lowering medication should have fasting lipid profiles checked within 6 to 12 weeks after initiating or altering the lipid lowering medication. Once the patient's lipid goals are achieved, the fasting lipid profile should be examined at least on an annual basis.

What if the patient is non-fasting?

The requirement for fasting derives from the use of the Friedewald equation to calculate LDL ($\text{LDL cholesterol} = \text{total cholesterol} - \text{HDL cholesterol} - \text{triglycerides}/5$). Postprandial triglycerides typically increase within an hour of eating and peak as much as 2-fold within 4 to 6 hours after a meal. The total variability in day-to-day fasting triglycerides is 20 to 30%. With this variability, it is important to utilize two separate fasting triglycerides at least 2 weeks apart to identify a disorder using a calculated LDL.

Triglycerides begin to affect the Friedewald equation when the triglycerides exceed 250 mg/dL. In this situation, a direct LDL can be performed to measure LDL regardless of triglyceride level or fasting state.

For screening purposes, if the patient is non-fasting ATPIII suggests that a total cholesterol and HDL cholesterol can be obtained. However, if the total cholesterol exceeds 200 mg/dL or HDL is less than 40 mg/dL for men and less than 50 mg/dL for premenopausal women, it is important to get an accurate determination of LDL. In these cases the patient should either have a direct LDL test or a fasting lipid profile performed.

There now exist newer technologies to measure lipids from a finger stick sample at point of care. This method offers a fast and easy means of screening patients for potential dyslipidemia or monitoring the progress of those on lipid-lowering therapy. The advantage of a fingerstick test is that intervention can be taken during the office visit without waiting for lab results. Fingerstick tests exist for lipid profiles (with calculated LDL) and for direct LDL.

Although LDL cannot be accurately calculated from postprandial samples, very valuable clinical information can be obtained from the postprandial triglycerides. Therefore the "ideal" diagnostic may be a non-fasting lipid profile with postprandial triglycerides and a separate, direct LDL test.

Interpreting the results

LDL - The total variability (analytical plus biological) in day-to-day LDL is approximately 7%. An LDL over 200 mg/dL is likely to represent a significant genetic disorder, the most common of which is familial hypercholesterolemia. If the LDL exceeds 400 mg/dL, it is very likely the patient is homozygous for familial hypercholesterolemia and should be referred to a lipid specialist. The LDL goal is determined by the risk for cardiovascular events. Level of risk can be assigned using either classical risk factors (age and gender, hypertension, smoking) or the Framingham risk engine. Go to www.nhlbi.nih.gov and search for Framingham Risk.

- *Low risk* patients (0 to 1 risk factors or a Framingham 10-year risk of <10%): The ATPIII recommended LDL goal is less than 160 mg/dL.
- *Intermediate risk* patients (2 risk factors and a 10 year risk of <10%): The recommended LDL goal is less than 130 mg/dL.
- *Moderately high risk* patients (2 risk factors and/or a 10 year risk of 10 to 20%): The recommended LDL goal is <130 mg/dL. However, it should be noted that recent clinical data has suggested that an LDL goal of <100 mg/dL may be more appropriate for these patients (7).
- *High risk* patients (evidence of atherosclerosis or diabetes or a 10 year risk of >20%): The recommended LDL is <100 mg/dL. However, recently published guidelines suggest an LDL goal of <70 mg/dL may be more appropriate in this highest risk group (7).

HDL - The total variability in day-to-day HDL is approximately 7%. HDL less than 40 mg/dL in men and less than 50 mg/dL in women is considered a risk factor for coronary artery disease. HDL less than 10 mg/dL is usually indicative of a severe genetic defect and these patients should be referred to a lipid specialist.

Triglycerides - Fasting triglycerides less than 150 mg/dL are considered normal. Triglycerides above 250 mg/dL affect the accuracy of calculating LDL cholesterol. Fasting triglycerides greater than 500 mg/dL increases the risk of pancreatitis. In this situation, triglyceride reduction takes precedence over LDL reduction.

Postprandial triglycerides are a better predictor than fasting triglycerides of the risk for coronary artery disease (4-6). The most common causes of high postprandial triglycerides (i.e. >300 mg/dL) are the metabolic syndrome and diabetes. Other causes include excess caloric intake, particularly a high carbohydrate diet (regular sodas are a common source of excess simple sugars). If you identify a patient with high postprandial triglycerides, a detailed dietary history for fat and simple sugar intake is needed as well as evaluation for metabolic syndrome and diabetes.

Summary

- *All patients should have their lipids checked at least every 5 years. Those on lipid lowering therapy or high risk should be checked at least annually or 6 to 12 weeks after altering therapy.*
- *Total day-to-day variability for cholesterol, LDL cholesterol, and HDL cholesterol is 5 to 7% day-to-day) while variability for triglycerides is 20 to 30%.*
- *Triglycerides above 250 mg/dl affect calculated LDL.*
- *LDL should be determined by direct LDL in non-fasting situations or when triglycerides are above 250 mg/dL.*

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