



CPT Code **83520***

Order Code **C561**

Sample Type **EDTA Plasma or Serum**

Tube Type **Lavender Top or Tiger Top**

Oxidized LDL (oxLDL)

Increased OxLDL levels signify increased risk for:

- Metabolic syndrome
- Cardiovascular disease
- Acute myocardial infarction

OxLDL levels may be decreased by:

- Maintaining a healthy weight/diet
- Exercising more
- Cholesterol-lowering medications

Description

OxLDL measures protein damage due to oxidative modification of the apolipoprotein B (ApoB) subunit on low-density lipoprotein cholesterol (LDL-C).¹ Briefly, LDL-C enters the artery wall where it becomes oxidized. OxLDL is then recognized by scavenger receptors on the macrophages which engulf oxLDL, resulting in foam cell formation,² vascular inflammation,¹ and initiation of atherosclerosis.³

Clinical Use

The OxLDL test may be performed on individuals at risk of cardiovascular disease (CVD) and metabolic syndrome (MetS).

Clinical Significance

- Individuals with high levels of oxLDL are 3.5X more likely to develop metabolic syndrome in the next 5 years.⁴
- Increased oxLDL levels are associated with the presence of coronary artery disease (CAD).^{1,2,5}

- OxLDL inhibits production of endothelial nitric oxide⁶ which can also lead to cell death,⁷ increased endothelial dysfunction,⁶ plaque formation,² and platelet aggregation.⁸
- In healthy middle-aged men, high oxLDL levels are associated with a 4X greater risk of developing coronary heart disease.⁹
- Levels of oxLDL increase in a step-wise fashion as the severity of CAD increases.¹⁰
- OxLDL levels may also be elevated in patients with kidney disease,¹¹ polycystic ovary syndrome,¹² and known autoimmune disorders.¹³

Testing Frequency

OxLDL testing is determined by an individual's medical history, but it may be performed semi-annually or annually as necessary. If the initial test result is abnormal, then follow-up testing may be performed within 3-6 months following treatment.

Sample Type

The OxLDL test should be performed on a serum or EDTA plasma sample. Fasting is recommended, but not required.

Commercial Insurance or Medicare Coverage

Coverage guidelines, also known as NCD (National Coverage Determination) or LCD (Local Coverage Determination) have not been established or posted by CMS (Medicare and Medicaid). We have reviewed the larger carriers (Aetna, United Healthcare, Cigna, Blues) and information has not been posted or is limited.

RELATIVE RISK

OxLDL
(U/L)

<60
Low

60-69
Moderate

≥70
High

Treatment Considerations[†]

These treatment considerations are for educational purposes only. Specific treatment plans should be provided and reviewed by the treating practitioner.

✓ **Assess lifestyle habits.**

- Consider diet/exercise/weight reduction efforts if appropriate, as studies demonstrate a decrease in oxLDL levels following 6 months of lifestyle modification.¹⁴

✓ **Assess LDL levels.**

- If LDL levels are not optimal,^{4,9,15} consider lipid-lowering therapies described in the National Cholesterol Education Program/Adult Treatment Panel III (NCEP ATP III) Guidelines.¹⁶

✓ **Assess insulin sensitivity.**

- If not at an optimal level,¹⁵ consider insulin-sensitizing therapies described in the American Diabetes Association guidelines for the management of pre-diabetes/diabetes.¹⁷

✓ **Assess omega-3 fatty acid levels.**

- If not at an optimal level,¹⁸ consider fish oil supplements, other dietary supplements, and dietary recommendations for increasing omega-3 fatty acid levels.

* 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.

† The treatment considerations are provided for informational purposes only and are not intended as medical advice. A physician's test selection and interpretation, diagnosis, and patient management decisions should be based on his/her education, clinical expertise, and assessment of the patient.

References

1. Tsimikas S et al. Oxidized phospholipids, Lp(a) lipoprotein, and coronary artery disease. *N Engl J Med*. 2005; 353: 46-57. 2. Nishi K et al. Oxidized LDL in carotid plaques and plasma associates with plaque instability. *Atheroscler Thromb Vasc Biol*. 2002; 22: 1649-1654. 3. Berliner JA et al. Atherosclerosis: Basic Mechanisms Oxidation, Inflammation, and Genetics. *Circulation*. 1995; 91: 2488-2496. 4. Holvoet P et al. Association between circulating oxidized low-density lipoprotein and incidence of the metabolic syndrome. *JAMA*. 2008; 299: 2287-2293. 5. Holvoet P et al. Circulating oxidized LDL is a useful marker for identifying patients with coronary artery disease. *Arterioscler Thromb Vasc Biol*. 2001; 21: 844-848. 6. Mehta JL et al. Inhibition of LOX-1 by Statins May Relate to Upregulation of eNOS. *Biochem Biophys Res Comm*. 2001; 289(4): 857-861. 7. Li D and Mehta JL. Upregulation of Endothelial Receptor for Oxidized LDL (LOX-1) by Oxidized LDL and Implications in Apoptosis of Human Coronary Artery Endothelial Cells. *Atheroscler Thromb Vasc Biol*. 2000; 20: 1116-1122. 8. Chen R et al. Platelet Activation by Low Concentrations of Intact Oxidized LDL Particles Involves the PAR Receptor. *Arterioscler Thromb Vasc Biol*. 2009; 29: 363-371. 9. Meisinger C et al. Plasma oxidized low-density lipoprotein, a strong predictor for acute coronary heart disease events in apparently healthy, middle-aged men from the general population. *Circulation*. 2005; 112: 651-657. 10. Ehara S et al. Elevated levels of oxidized low density lipoprotein show a positive relationship with the severity of acute coronary syndromes. *Circulation*. 2001; 103: 1955-1960. 11. Samouilidou EC et al. Lipid Abnormalities and Oxidized LDL in Chronic Kidney Disease Patients on Hemodialysis and Peritoneal Dialysis. *Renal Failure*. 2012; 34(2): 160-164. 12. Macut D et al. Oxidized low-density lipoprotein concentration – early marker of an altered lipid metabolism in young women with PCOS. *Eur J Endocrinol*. 2006; 155: 131-136. 13. Frostegård J et al. Lipid Peroxidation Is Enhanced in Patients With Systemic Lupus Erythematosus and Is Associated With Arterial and Renal Disease Manifestations. *Arthritis Rheum*. 2005; 52: 192-200. 14. Srimahachota S et al. Effects of lifestyle modification on oxidized LDL, reactive oxygen species production and endothelial cell viability in patients with coronary artery disease. *Clin Biochem*. 2010; 43: 858-862. 15. Holvoet P et al. Oxidized LDL and the metabolic syndrome. *Future Lipidol*. 2008; 3(6): 637-649. 16. Third report of the National Cholesterol Education Program (NCEP). Expert panel on detection, evaluation and treatment of high blood cholesterol in adults (Adult Treatment Panel III). *National Institutes of Health*. September 2002. NIH Publication No. 02-5215. 17. American Diabetes Association: Standards of Medical Care in Diabetes-2018. *Diabetes Care*. 2018; 41(Supplement 1). 18. Moradi M-T et al. the effects of Purslane (*Portulaca oleracea* L.) on serum levels of lipids, lipoproteins and paraoxanase 1 (PON1) activity in hypercholesterolemia patients. *Life Sci*. 2012; 9(4): 5548-5552.

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