

## EVIDENCE-STATEMENT:

# LIPID DISORDERS (Screening, Counseling, and Treatment)

Why This Chapter is Important for Employers: An Overview

- Lipid disorders result from abnormal levels of cholesterol in the blood.
- Cardiovascular disease is caused by atherosclerosis, a thickening or hardening of the arteries, and is particularly sensitive to lipid (including cholesterol) levels. Coronary heart disease, a type of cardiovascular disease, can lead to angina pectoris (heart pain), heart attack, or both.<sup>1</sup>
- The American Heart Association estimates that more than 70 million women and men in the United States have some form of cardiovascular disease and 927,000 die of the disease every year. Heart disease and stroke, the major forms of cardiovascular disease, account for nearly 38% of all reported deaths nationally in the United States.<sup>1</sup>
- Several large studies have found that patients who take cholesterol-lowering drugs for 5 to 7 years can decrease their risk of heart disease by about 30%.<sup>2</sup>
- The estimated direct and indirect costs of all types of cardiovascular disease in 2006 totaled \$403.1 billion; this included the costs associated with coronary heart disease, which exceed \$142 billion.<sup>1</sup>
- Screening for lipid disorder allows patients and clinicians to begin lipid-lowering treatment. Reducing low-density lipoprotein cholesterol levels to a normal level reduces the risk of coronary heart disease and thereby reduces a person's risk of cardiovascular disease events, such as heart attacks and strokes.

## Clinical Preventive Service Recommendations

U.S. Preventive Services Task Force Recommendation

The U.S. Preventive Services Task Force strongly recommends that clinicians screen men aged 35 and older and women aged 45 and older for lipid disorders and that they treat abnormal lipid levels in persons who are at increased risk of coronary heart disease (based on such factors as age, total or low-density lipoprotein cholesterol level, high-density lipoprotein cholesterol level, smoking status, and systolic blood pressure).<sup>3</sup>

*Evidence Rating: A*  
(Strongly Recommended/Good Evidence)

The USPSTF found good evidence that lipid measurement can identify asymptomatic middle-aged people at increased risk of coronary heart disease and good evidence that lipid-lowering drug therapy substantially decreases the incidence of coronary heart disease in such people with abnormal lipids and causes few major harms. The USPSTF concluded that the benefits of screening for and treating lipid disorders in middle-aged and older people substantially outweigh harms.<sup>3</sup>

*Evidence Rating: B*  
(Recommended /At Least Fair Evidence)

The USPSTF recommends that clinicians routinely screen younger adults (men aged 20 to 35 and women aged 20 to 45) for lipid disorders if they have other risk factors for coronary heart disease.<sup>3</sup>

The USPSTF found good evidence that lipid measurement can identify younger people at increased risk for coronary heart disease, that risk is highest in those with other risk factors, and that the absolute benefits of lipid-lowering treatment depend on a person's underlying risk of coronary heart disease. The USPSTF concluded that benefits of screening for and treating high-risk young adults outweigh harms.<sup>3</sup>

**Note:** The National Cholesterol Education Program’s Adult Treatment Expert Panel-III is the most recent national guideline for lipid screening and treatment.<sup>4</sup> Please refer to the “Other Recommendations” section.

Centers for Disease Control and Prevention (CDC) Guidance

The Centers for Disease Control and Prevention (CDC) supports the National Cholesterol Education Program’s Adult Treatment Expert Panel-III recommendations. More information is available on the CDC website ([www.cdc.gov/dhdsp/library/fs\\_cholesterol.htm](http://www.cdc.gov/dhdsp/library/fs_cholesterol.htm)).

Other Recommendations National Cholesterol Education Program Adult Treatment Panel-III

Since the release of the U.S. Preventive Services Task Force recommendation in 2001, the National Heart, Lung, and Blood Institute’s (NHLBI) National Cholesterol Education Program (NCEP) has updated its guidelines for lipid screening and treatment. The NCEP’s Adult Treatment Expert Panel-III recommends that clinicians routinely screen all adults aged 20 and older for elevated blood cholesterol levels every 5 years.<sup>4</sup> Screening should involve a complete lipoprotein profile that includes low-density lipoprotein cholesterol levels.<sup>4</sup>

The Adult Treatment Expert Panel-III also recommends that clinicians counsel all patients at risk for cardiovascular disease about healthy lifestyles, including methods for lowering saturated fat intake, losing weight, and increasing exercise levels. Persons considered at high risk include those with elevated low-density lipoprotein or diminished high-density lipoprotein cholesterol levels.<sup>4</sup>

*Evidence Rating:*

The Adult Treatment Expert Panel-III contains both evidence statements and recommendations based on those statements. The panel’s recommendations are based on large randomized controlled clinical trials, prospective epidemiological studies, and smaller clinical trials. An expert panel assigned each statement to a category of type of evidence (based on the source of the evidence) and strength of evidence as follows<sup>4</sup>:

Category of Type of Evidence:

- A Large randomized controlled clinical trials.
- B Smaller clinical trials and meta-analyses of clinical trials.
- C Observational and metabolic studies.
- D Clinical experience.

Strength of Evidence:

- 1 Very strong evidence.
- 2 Moderately strong evidence.
- 3 Strong trend.

The Adult Treatment Expert Panel-III states that the benefits of screening for lipid disorders outweigh the risks and costs<sup>1</sup> for the reasons listed below. The codes for type of evidence and strength of evidence are provided for each statement.

1. Elevated low-density lipoprotein cholesterol levels increase a person’s risk of coronary heart disease, coronary artery disease, and other forms of cardiovascular disease {A1, B1, C1}.

2. Total cholesterol levels in young adults correlate with coronary heart disease rates in later life {C1}.
3. Screening for lipid disorders can identify persons at increased risk of coronary heart disease {A1, B1, C1}.
4. Treating abnormal lipids in persons at increased risk of coronary heart disease can substantially decrease their risk of cardiovascular disease events, such as heart attacks, and their risk of coronary heart disease mortality {A1, B1}.

Information Sources

The recommendations and supporting information contained in this document came from several sources, including the:

- Agency for Health Care Research and Quality (AHRQ)
- American Heart Association
- Centers for Disease Control and Prevention (CDC)
- National Center for Health Statistics (NCHS)
- National Cholesterol Education Program Adult Treatment Expert Panel-III
- National Heart, Lung, and Blood Institute (NHLBI)
- Peer-reviewed research
- U.S. Preventive Services Task Force (USPSTF)

The background and supporting information in this document is based on a compilation of research findings. All information presented in this document should be attributed to its referenced sources and should not be considered a reflection of the opinions of other organizations cited in the text.

Condition/Disease-Specific Information

Explanation of Condition

Lipid disorders, which result from abnormal levels of cholesterol in the blood, increase the risk of cardiovascular diseases, including coronary heart disease. Some amount of cholesterol in the blood is normal and, in fact, necessary. However, high levels of low-density lipoprotein cholesterol increase the risk of — and can even cause — coronary heart disease. In contrast, low levels of high-density lipoprotein cholesterol are strongly associated with increased risks of coronary heart disease and high levels of high-density lipoprotein are associated with protection. Elevated serum triglycerides are associated with increased risk of coronary heart disease.<sup>4</sup>

**Table 1: Classification of Low-Density Lipoprotein Cholesterol, High-Density Lipoprotein Cholesterol, Total Cholesterol, and Triglyceride Levels**

Low-Density Lipoprotein (bad) Cholesterol Levels (mg/dL)	Classification by Association with Cardiovascular Disease Risk
Less than 100	Optimal
100-129	Near or above optimal
130-159	Borderline high
160-189	High
190 and above	Very high
High-Density Lipoprotein (good) Cholesterol Levels (mg/dL)	Classification by Association with Cardiovascular Disease Risk
Less than 40	Low (major risk factor for coronary heart disease)
60 and above	High (protective against heart disease)
Total cholesterol levels (mg/dL)	
Less than 200	Desirable
200-239	Borderline high
240 and above	High
Triglyceride levels (mg/dL)	
Less than 150	Desirable
150-199	Borderline high
200-499	High
500 and above	Very high

**Adapted from:** National Heart, Lung, and Blood Institute's *Third Report of the National Cholesterol Education Program (NCEP) on Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults (Adult Treatment Panel III)*; May 2001, p. 3.

Reducing low-density lipoprotein cholesterol levels to normal reduces the risk of coronary heart disease and cardiovascular events such as heart attacks and strokes. Because low-density lipoprotein cholesterol levels are so strongly correlated with coronary heart disease and reducing low-density lipoprotein cholesterol has been shown to reduce coronary heart disease risk, goals and thresholds for low-density lipoprotein cholesterol have been established.<sup>4</sup> Please refer to Table 2 for information about recommended target low-density lipoprotein cholesterol levels.

**Epidemiology of Condition/Disease**

Between 1999 and 2002, about 17% of adults aged 20 years and over in the United States had high cholesterol levels (total cholesterol 240 mg/dL or higher).<sup>5</sup>

Clinical studies have repeatedly shown a strong and graded relationship between increasing levels of low-density lipoprotein cholesterol (“bad” cholesterol) and increasing risk of coronary heart disease events. Low levels of high-density lipoprotein cholesterol levels are strongly associated with increased risks of coronary heart disease. Evidence from clinical trials suggests that increasing high-density lipoprotein cholesterol (“good” cholesterol) levels reduces the risk of coronary heart disease.<sup>1</sup>

Elevated lipid levels contribute to the development of cardiovascular diseases, including coronary heart disease, stroke, and coronary atherosclerosis.<sup>6</sup> Coronary heart disease, which kills more Americans than any other single disease, can lead to angina pectoris (heart pain), heart attack, or both.<sup>1</sup> One American has a heart

attack about every 26 seconds, and about 40% will die from the heart attack in any given year.<sup>1</sup> At age 40, a man in the United States has a 49% chance and a woman has a 32% chance of having a coronary heart disease event (such as a heart attack) in his or her lifetime.<sup>7</sup>

About 65 million adults require therapeutic lifestyle changes (such as dietary changes, increased physical activity, and weight control) to reduce their low-density lipoprotein cholesterol levels. Of these people, about 36 million also require both drug therapy and therapeutic lifestyle changes to reduce their low-density lipoprotein cholesterol levels to safe amounts.

**Condition/Disease  
Risk Factors**

Risk factors that are associated with high cholesterol levels include a family history of cardiovascular disease (including familial hypercholesterolemia, an inherited genetic condition), older age, male sex, a diet high in fats, overweight, and lack of exercise.

Many of these risk factors including diet, overweight, and lack of exercise are modifiable<sup>4</sup>:

- Diets high in saturated fat increases low-density lipoprotein (low-density lipoprotein) cholesterol levels more than any other factor in the human diet. Trans-fatty acids, formed when vegetable oil is hydrogenated to harden it, also increase cholesterol levels. These fatty acids are found in such foods as stick margarine, crackers, and French fries. Cholesterol is found in foods from animal sources, such as egg yolks, meat, and cheese.
- Being overweight tends to increase low-density lipoprotein levels, decrease high-density lipoprotein levels, and increase total cholesterol levels.
- Lack of regular exercise can lead to weight gain, which can increase low-density lipoprotein cholesterol levels. Poor physical fitness appears to be associated with cardiovascular disease, even if it has not produced overweight or obesity.

**Value of Prevention**

**Economic Burden of  
Condition/Disease**

The economic burden of lipid disorders is substantial due to the impact of lipid levels on the risk of cardiovascular disease and coronary heart disease events. The direct and indirect costs of all types of cardiovascular disease in 2006 were estimated to be \$403.1 billion, including costs associated with coronary heart disease (estimated to exceed \$142 billion annually).<sup>1</sup> The cost of cardiovascular disease exceeds that of many other high-cost medical conditions. For example, in 2004, the estimated total cost of all cancers was \$190 billion and in 1999, the estimated total cost of HIV infections was \$28.9 billion.<sup>1</sup>

**Workplace Burden of  
Condition/Disease**

Heart disease and stroke are not only a major cause of premature death in persons younger than 65 years but are also major causes of serious disability in the United States.<sup>1</sup> The indirect costs of cardiovascular disease, including those related to lost productivity, are enormous; it is estimated that the indirect cost of cardiovascular disease will total over \$145 billion in 2006.<sup>1</sup>

<p>Economic Benefit of Preventive Intervention</p>	<p>Cost-effectiveness analyses show that reducing low-density lipoprotein cholesterol levels can reduce costs in three ways<sup>4</sup>:</p> <ol style="list-style-type: none"> <li>1) Direct economic savings from decreased hospital and ambulatory services from angina, myocardial infarction, revascularization procedures, stroke, and heart failure.</li> <li>2) Prevention of coronary heart disease mortality, which increases rates of gainful employment and productivity.</li> <li>3) Prevention of the disability, distress, and pain associated with coronary heart disease, which increases quality-adjusted life expectancy as well as rates of gainful employment and productivity.</li> </ol>
<p>Estimated Cost of Preventive Intervention</p>	<p>The cost of implementing a lipid screening program varies by location, provider base, method of screening, which cholesterol measurements are taken, and other factors. The average cost of a single cholesterol or lipid profile test is relatively low but the cumulative costs of screening can be substantial, especially if all recommended screening and follow-up procedures are followed.<sup>8</sup> In 2004, the private-sector cost of cholesterol and lipids screening averaged \$13; approximately 95% of all paid claims fell within the range of \$0 to \$32.<sup>9</sup> Preventive medicine counseling averaged \$39 and approximately 95% of all paid claims fell within the range of \$0 to \$129.<sup>9</sup></p>
<p>Estimated Cost of Counseling and Treatment</p>	<p>The total cost of reducing low-density lipoprotein includes the costs of physician services, lifestyle counseling, screening, case finding and monitoring, dietary and exercise modifications, medications, and treatment of side effects. The annual cost of statin drugs to reduce low-density lipoprotein cholesterol levels can range from \$100 to \$1,500 per year.<sup>4</sup> The cost of follow-up or treatment-related appointments varies by type of provider, location, and practice setting. Although the cost of reducing low-density lipoprotein cholesterol levels can be high, it is much lower than the direct and indirect costs of cardiovascular disease.</p>
<p>Cost-Effectiveness and/or Cost-Benefit Analysis of Preventive Intervention</p>	<p>In 2002, the National Cholesterol Education Program (NCEP) panel found that, based on current retail prices for lipid-lowering drugs, low-density lipoprotein-lowering drug therapy is <i>highly cost-effective</i> for persons with established coronary heart disease (including a prior coronary heart disease event); <i>cost-effective</i> for the primary prevention of coronary heart disease in persons with a coronary heart disease risk equivalent (the person does not have coronary heart disease but does have an absolute 10-year risk of developing major coronary events, such as myocardial infarction and coronary death, equal to that of persons with coronary heart disease), and those at high risk for coronary heart disease; and <i>acceptable</i> for the primary prevention of coronary heart disease in persons whose 10-year risk of “hard coronary heart disease” (heart attack and death from coronary heart disease) is between 10% and 20%.<sup>4,10</sup></p> <p>The National Cholesterol Education Program recommends using dietary therapy, which is more cost-effective than low-density lipoprotein-lowering drugs, as the first-line therapy in persons with a 10-year risk of coronary heart disease that is less than 10% per year. (Information about dietary therapy is found in the Other Important Information section of this document).</p>

Preventive Intervention Information	
<p style="text-align: center;">Preventive Intervention: Purpose of Screening, Counseling, and Treatment</p>	<p>Screening for lipid disorders allows patients and clinicians to begin lipid-lowering treatment before cardiovascular disease develops or progresses. Most patients agree to be screened for lipid disorders, even when the screening involves fasting.<sup>7</sup></p>
<p style="text-align: center;">Benefits and Risks of Intervention</p>	<p>Clinical trials have shown that reducing low-density lipoprotein levels reduces coronary heart disease risk, but the benefits of increasing high-density lipoprotein levels have not yet been fully demonstrated. In short-term clinical trials, a 1% reduction in low-density lipoprotein cholesterol levels, on average, reduced the risk of hard coronary heart disease events by about 1%. Persons who take low-density lipoprotein cholesterol-lowering drugs for about 5 years reduce their low-density lipoprotein levels by approximately 30% and decrease their risk of cardiovascular disease, including heart attacks, by about 30%.<sup>2</sup> However, only about half of those who would benefit from lipid treatment receive it.<sup>11</sup></p> <p>In persons with established coronary heart disease, low-density lipoprotein-lowering therapy reduces risk of stroke by about 30%.<sup>7</sup> Statin therapy for the primary and secondary prevention of cardiovascular disease can reduce adverse cardiovascular events (including heart attacks and strokes) by 32% among patients aged 65 and older.<sup>12</sup> Primary prevention trials using statins have shown a significant reduction in coronary heart disease mortality, no increase in non-coronary heart disease mortality, and a strong trend toward lower overall mortality.</p>
<p style="text-align: center;">Initiation, Cessation, and Interval Screening</p>	<p>All adults aged 20 and older should be screened for abnormal lipid and elevated blood cholesterol levels every 5 years. Evidence is insufficient to determine the age at which screening is no longer necessary; therefore decisions regarding when to stop screening are left to the discretion of the clinician.<sup>4</sup></p>
<p style="text-align: center;">Counseling and Treatment</p>	<p>Beginning at the initial visit with a patient who has a high level of cholesterol, the clinician should counsel and encourage the patient to make therapeutic lifestyle changes — such as dietary changes, increased physical activity, and weight control — and monitor the patient's progress.<sup>4,11</sup> The clinician should evaluate the patient's low-density lipoprotein cholesterol level at the 6-week, 12-week, and 4 to 6-month follow-up visits, or more often if necessary.<sup>4</sup></p>
<p style="text-align: center;">Intervention Process Risk Assessment</p>	<p>Low-density lipoprotein cholesterol levels should be the primary target of cholesterol-lowering therapy.<sup>4</sup> The first step in selecting a low-density lipoprotein-lowering therapy is assessing the patient's coronary heart disease risk status, which requires measuring low-density lipoprotein cholesterol levels as part of lipoprotein analysis; identifying risk factors, such as family history; and determining whether the patient has coronary heart disease, other clinical forms of atherosclerotic disease, or the major risk factors for coronary heart disease other than low-density lipoprotein cholesterol.<sup>4</sup></p> <p>Patients are considered to be at high risk of coronary heart disease if they have coronary heart disease or coronary heart disease risk equivalents (the person does</p>

not have coronary heart disease but does have an absolute 10-year risk of developing major coronary events, such as myocardial infarction and coronary death, equal to that of persons with coronary heart disease), including:

- Other clinical forms of atherosclerotic disease (such as peripheral arterial disease, abdominal aortic aneurysm, or symptomatic carotid artery disease).
- Diabetes.
- Multiple risk factors that confer a 10-year risk of coronary heart disease of at least 20%.

Risk status in persons *without* coronary heart disease or other forms of atherosclerotic disease is determined by a two-step procedure.

First, the clinician counts the number of risk factors for coronary heart disease, including:

- Cigarette smoking.
- Hypertension (blood pressure of 140/90 mmHg or higher, or the patient is taking antihypertensive medication).
- Diminished high-density lipoprotein cholesterol level (less than 40 mg/dL).
- Family history of premature coronary heart disease (in male first degree relative younger than 55 or a female first degree relative younger than 65).
- Age (men aged 45 years or older; women aged 55 years or older).

If the clinician determines that the patient has at least two of these risk factors, the Framingham scoring is used to determine the patient's 10-year risk of coronary heart disease.<sup>4</sup> Risk factors used in Framingham scoring include age, total or low-density lipoprotein cholesterol level, high-density lipoprotein cholesterol level, smoking status, systolic blood pressure, and whether the individual is taking antihypertensive therapy. Persons with several of these risk factors are assigned to one of three categories of 10-year risk of coronary heart disease: higher than 20%, 10% to 20%, or less than 10%. A person with 10-year risk that is higher than 20% is categorized as "coronary heart disease risk equivalent," meaning that the person does not have coronary heart disease but does have an absolute 10-year risk of developing major coronary events, such as myocardial infarction and coronary death, equal to that of persons with coronary heart disease, or the person has diabetes. Framingham scoring is the most reliable method available for identifying high-risk persons to determine the appropriate low-density lipoprotein level goal and treatment intensity.<sup>4</sup> A Framingham-based risk assessment tool is available online (<http://hp2010.nhlbihin.net/atp/iii/calculator.asp?usertype=prof>).

### Screening

Lipid measurement should include a comprehensive lipoprotein profile in addition to assessing other risk factors such as family history, smoking status, weight, blood pressure, and age.

The National Cholesterol Education Program (NCEP) recommends a 9 to 12-hour fasting lipoprotein profile of total cholesterol, low-density lipoprotein, high-density lipoprotein cholesterol, and triglycerides every 5 years for adults aged 20 and over,

## Counseling and Treatment

although total cholesterol and high-density lipoprotein cholesterol can be measured on either fasting or non-fasting samples (venous or capillary blood samples). The results of the lipoprotein profile should be used to assess coronary heart disease risk as recommended in the Adult Treatment Expert Panel-III guidance.

Beginning at the initial visit with a patient who has a high level of cholesterol, the clinician should counsel and encourage the patient to make therapeutic lifestyle changes — such as dietary changes, increased physical activity, and weight control — and monitor the patient's progress.<sup>4,11</sup> The clinician should evaluate the patient's low-density lipoprotein cholesterol level at the 6-week, 12-week, and 4 to 6-month follow-up visits, or more often if necessary.<sup>4</sup>

Target goals for low-density lipoprotein levels and treatment are based on the person's 10-year risk of coronary heart disease, as described in the "Risk Assessment" section.

The first line of therapy for elevated low-density lipoprotein cholesterol levels is therapeutic lifestyle changes; drug therapy can be combined with therapeutic lifestyle changes if additional low-density lipoprotein reduction is required.

**Therapeutic Lifestyle Interventions (Initial Treatment/"First-Line" Therapy):** On the therapeutic lifestyle change diet, saturated fat should account for no more than 7% of calories, no more than 200 mg of cholesterol should be consumed per day, and total fat intake may range from 25% to 35% of all calories.<sup>4,11</sup> Trans-fat intake should be as low as possible. The person's diet should also include 2–3 g/day of plant stanol esters (sitostanol and sitostanol esters, found in soft margarine), 10–25 g/day of soluble fiber (fruits, vegetables, and whole grains), and 400 mg/day of folate consumed largely from dietary sources. Carbohydrates should be limited to 60% of total calories. Therapeutic lifestyle interventions also include smoking cessation, weight management, regular physical exercise, and moderation of alcohol intake — no more than two drinks per day for men and one drink per day for women (one alcoholic drink is defined as 5 ounces of wine, 12 ounce of beer, or 1.5 ounces of hard liquor). If, after 3 months, therapeutic lifestyle interventions in a patient who is not at high risk have not reduced low-density lipoprotein cholesterol levels sufficiently, the addition of drug therapy to the treatment plan should be considered. In high-risk patients, drug therapy should be considered together with therapeutic lifestyle changes at the initiation of treatment if the low-density lipoprotein level is at least 100 mg/dL. The intensity of risk-reduction therapy should be adjusted to an individual's absolute 10-year risk of coronary heart disease, which is based on age, lipoprotein profile, previous history of coronary heart disease events, and other risk factors.

A combination of sustained changes in diet, weight loss, and exercise can lower low-density lipoprotein cholesterol levels by as much as 20% to 30%.<sup>4</sup>

If the patient's target low-density lipoprotein cholesterol level has not been achieved by the 6-week visit, the clinician should intensify the low-density lipoprotein-lowering therapy by adding plant stanol/sterol esters and viscous

(soluble) fiber to the diet (refer to “Treatment Information and Therapeutic Lifestyle Interventions” for more information). If the low-density lipoprotein goal is not achieved by the 12-week follow-up visit, the therapeutic lifestyle changes should be intensified by increasing the emphasis on physical activity and weight control. Drug treatment, such as statins, should also be considered. After the 12-week visit, adherence to therapeutic lifestyle changes and drug treatment should be monitored every 4 to 6 months, or more often if necessary.<sup>4</sup>

The recommended first-line therapy for elevated serum triglycerides is therapeutic lifestyle changes, including reduced intake of fat, avoidance of very high carbohydrate intake (no more than 60% of calories), increased physical activity, weight control, and restriction of alcohol intake.

Therapeutic lifestyle changes and drug therapy by risk category are summarized in Table 2.

**Table 2: Target Low-Density Lipoprotein Cholesterol Levels and Treatment Recommendations**

Risk Category	Target Low-Density Lipoprotein Level (mg/dL)	Low-Density Lipoprotein Levels (mg/dL) at Which to Initiate Therapeutic Lifestyle Changes	Low-Density Lipoprotein Levels (mg/dL) at Which to Consider Drug Therapy
<b>High Risk:</b> Coronary heart disease or a 10-year coronary heart disease risk equivalent (including diabetes or two or more risk factors and a 10-year risk of at least 20%)	<100 (<70 optional goal for patients with coronary heart disease)	≥100	≥100 (if lipoprotein levels are <100, a lipid-lowering drug is a therapeutic option, based on clinical trials)
<b>Moderately High Risk:</b> Two or more risk factors (10-year risk 10% to 20%)	<130	≥130	≥130 (after 3 months of therapeutic lifestyle changes)
<b>Moderate Risk:</b> Two or more risk factors (10-year risk <10%)	<130	≥130	≥160 (after 3 months of therapeutic lifestyle changes)
<b>Lower Risk:</b> No risk factors or one risk factor	<160	≥160	≥190 (after 3 months of therapeutic lifestyle changes) (at 160-189 mg/dL, low-density lipoprotein-lowering drugs are optional)

**Table adapted from:** Grundy SM, Cleeman JI, Merz CN, Brewer HB Jr, Clark LT, Hunninghake DB, Implications of recent clinical trials for the National Cholesterol Education Adult Treatment Panel III (ATP III) guidelines. *Circulation* 2004; 110:227-39.

### Other Important Information

Physicians should have primary responsibility for implementing the Adult Treatment Expert Panel-III treatment guidelines. In addition, a multidisciplinary team, potentially including nurses, dietitians, nurse practitioners, pharmacists, and health educators, should be involved in and reimbursed whenever possible for these services. The model of a multidisciplinary case management approach for patients with lipid disorders encompasses primary and secondary prevention across the lifespan and nutritional and exercise management, defines the indications for pharmacological therapy, and emphasizes the importance of treatment adherence.<sup>13</sup> Use of this collaborative approach for the treatment of lipid disorders will ultimately reduce cardiovascular and cerebrovascular (stroke) morbidity and mortality.

More information on adherence methods that payers can use to improve beneficiary adherence to lipid-lowering treatments is available in Part VI of the *Purchaser's Guide, Leveraging Benefits*.

More information on the therapeutic lifestyle intervention diet is available in the National Heart, Lung, and Blood Institute tipsheets ([www.nhlbi.nih.gov/chd/Tipsheets/daily.htm](http://www.nhlbi.nih.gov/chd/Tipsheets/daily.htm)).

Information on ways to reduce low-density lipoprotein cholesterol levels is available in *Your Guide to Lowering your Cholesterol Level with Therapeutic Lifestyle Changes* ([www.nhlbi.nih.gov/health/public/heart/chol/\\_tlc.pdf](http://www.nhlbi.nih.gov/health/public/heart/chol/_tlc.pdf)).

### Strength of Evidence for the Clinical Preventive Service

The level of evidence supporting the recommendations contained in this chapter is described below.

#### ***Evidence-Based Research:***

The U.S. Preventive Services Task (USPSTF)

Strength of Evidence: A (Strongly Recommended / Good Evidence)

- The USPSTF force strongly recommends that clinicians screen men aged 35 and older and women aged 45 and older for lipid disorders and that they treat abnormal lipid levels in persons who are at increased risk of coronary heart disease (based on such factors as age, total or low-density lipoprotein cholesterol level, high-density lipoprotein cholesterol level, smoking status, and systolic blood pressure).<sup>3</sup>

#### ***Recommended Guidance:***

Adult Treatment Expert Panel-III, National Cholesterol Education Program (NCEP) Strength of Evidence: The Adult Treatment Expert Panel-III recommendations are based on large randomized controlled clinical trials, prospective epidemiological studies, and smaller clinical trials. An expert panel assigned each recommendation to a category of type of evidence (based on the

source of the evidence) and strength of evidence as follows<sup>4</sup>:

Category of Type of Evidence:

- |   |   |
|---|---|
| A | Major randomized controlled clinical trials.  |
| B | Smaller randomized controlled clinical trials and meta-analyses of clinical trials. |
| C | Observational and metabolic studies.  |
| D | Clinical experience.  |

Strength of Evidence:

- |   |                             |
|---|-----------------------------|
| 1 | Very strong evidence.       |
| 2 | Moderately strong evidence. |
| 3 | Strong trend.               |

The Adult Treatment Expert Panel-III recommended that:

- Clinicians screen all adults aged 20 and older for elevated blood cholesterol levels every 5 years {A1, B1, C1}.<sup>4</sup> Screening should involve a complete lipoprotein profile, including an evaluation of low-density lipoprotein cholesterol level.<sup>4</sup>
- Clinicians treat all patients with abnormal lipid levels to decrease their risk of cardiovascular disease events, such as heart attacks. The first line of treatment should be counseling about healthy therapeutic lifestyle changes.<sup>4</sup>
- Reducing low-density lipoprotein cholesterol levels should be the primary target of cholesterol-lowering therapy {A1, B1, C1}.<sup>4</sup>

These recommendations are supported by the:

- Centers for Disease Control and Prevention (CDC)

**Authored by:**

Matson Koffman D. Lipid disorders evidence-statement: screening, counseling, and treatment. In: Campbell KP, Lanza A, Dixon R, Chattopadhyay S, Molinari N, Finch RA, editors. *A Purchaser's Guide to Clinical Preventive Services: Moving Science into Coverage*. Washington, DC: National Business Group on Health; 2006.

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