Large numbers of patients have undiagnosed dyslipidemia, and those who do receive a diagnosis are often given inadequate therapy. The American Heart Association estimates that more than 100 million adults in the United States have total cholesterol levels greater than 200 mg/dL and at least 40% of these individuals have cholesterol levels in excess of 240 mg/dL. The true number of dyslipidemic individuals in the United States may never be known because of the enormity of effort and magnitude of cost required for screening all at-risk individuals. Because more than 12.6 million Americans have coronary heart disease (CHD) and more than 500,000 deaths are attributed to this disease each year, physicians should be strongly encouraged to heed the advice of the National Cholesterol Education Program (NCEP) Adult Treatment Panel III (ATP III) set of cholesterol management guidelines to improve diagnosis and treatment of dyslipidemia.

Persistence with therapy is another challenge, as more than 70% of patients fail to maintain their therapy beyond 12 months. If a realistic attempt is to be made to reduce the risk of coronary heart disease (CHD) among Americans, diagnosis of dyslipidemia and treatment to therapeutic targets must be improved. This article discusses the underdiagnosis and undertreatment of lipid disorders and reviews the role of osteopathic physicians in strategies achieving ATP III LDL-C goals.

(Key words: Adult Treatment Panel III [ATP III], compliance, cholesterol, dyslipidemia)
gram (NCEP) Adult Treatment Panel III (ATP III) and complete an assessment of CHD risk factors for each of their patients.

The ATP III emphasis on risk factor assessment will significantly enhance the ability of physicians to identify patients at risk for CHD and to match the lipid-modification therapy to the risk category. This aggressive, standardized approach will substantially increase the number of patients considered to be at risk for CHD and will therefore expand the number of individuals who qualify to receive lifestyle intervention and drug treatment. The net result of the new guidelines is that physicians and the healthcare system will be challenged to identify the appropriate patients, select a therapy capable of achieving the low-density lipoprotein cholesterol (LDL-C) target level, and ensure that patients adhere to their therapeutic regimen to reap the CHD risk–reduction benefits of lipid-modification therapy.

### Unmet needs

**Underdiagnosis**

Owing to the emphasis on CHD risk assessment, the identification of CHD risk equivalents and the new, lower LDL-C treatment thresholds, the recently published ATP III set of guidelines more than triples (to > 65 million) the number of adult Americans eligible for lipid-modifying therapy. Despite the increased awareness of the relationship between dyslipidemia and CHD risk, however, lipid disorders are significantly underdiagnosed. The Lipid Treatment Assessment Project (L-TAP) indicates that as many as 50% of all patients do not have their cholesterol levels assessed, and a survey of cholesterol management practices among US physicians indicates that only 1 in 12 adults has received cholesterol screening.

Diagnosis of a lipid disorder, however, does not guarantee treatment; less than 45% of those who qualify for treatment receive lipid-modifying therapy, and fewer than 30% of patients adhere to their therapy for more than 12 months. The undertreatment of dyslipidemia is compounded by the fact that more than 75% of patients who do receive therapy fail to reach their NCEP target LDL-C.

### Figure


<table>
<thead>
<tr>
<th>STEP 1</th>
<th>Obtain a complete lipid profile with patient in fasting state.</th>
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<tbody>
<tr>
<td>STEP 2</td>
<td>Identify presence of clinical atherosclerosis, a risk equivalent for coronary heart disease (CHD).</td>
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<tr>
<td>STEP 3</td>
<td>Determine presence of major risk factors in addition to low-density lipoprotein cholesterol (LDL-C) level:</td>
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<td></td>
<td>- Cigarette smoking</td>
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<td>- Hypertension</td>
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<td>- Family history of premature CHD</td>
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<td>- Age (men ≥ 45 y; women ≥ 55 y)</td>
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<tr>
<td>STEP 4</td>
<td>Assess 10-year CHD risk (in patients with two or more risk factors without CHD or CHD risk equivalent, excluding elevated LDL-C levels).</td>
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<tr>
<td>STEP 5</td>
<td>Determine patient’s risk category.</td>
</tr>
<tr>
<td>STEP 6</td>
<td>Initiate therapeutic lifestyle changes (TLC) if patient’s LDL-C level is higher than goal.</td>
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<td>STEP 7</td>
<td>Consider adding drug therapy if LDL-C level is higher than target determined for patient’s risk category.</td>
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<tr>
<td>STEP 8</td>
<td>Identify metabolic syndrome and treat if present after 3-month treatment with TLC.</td>
</tr>
<tr>
<td>STEP 9</td>
<td>Treat to lower triglyceride concentration.</td>
</tr>
</tbody>
</table>
level. In fact, among patients with CHD, nearly 80% failed to achieve LDL-C reduction sufficient to reduce their risk of subsequent CHD events.

The ATP III set of guidelines advocates that physicians implement a nine-step process to determine CHD risk (Figure) and identify the need for lipid-modification therapy. Screening is recommended for all patients older than 20 years and every 5 years thereafter.

The first step is measurement of plasma LDL-C (preferably in the fasting state), followed by an evaluation to determine the presence or absence of CHD and CHD risk equivalents such as diabetes, peripheral arterial disease, abdominal aortic aneurysm, and symptomatic carotid artery disease. Risk assessment continues with the identification of the major CHD risk factors (other than elevated LDL-C), such as cigarette smoking, hypertension, low high-density lipoprotein cholesterol (HDL-C) level, family history of premature CHD, and age. The LDL-C measurement and the presence or absence of CHD risk factors form the basis of the Framingham risk score.

The Framingham risk score estimates the patient’s risk of having a CHD-related event in the next 10 years. Those at highest risk (eg, patients with CHD or CHD risk equivalents) have a greater than 20% chance of having a CHD event in the next 10 years and are considered at highest risk and therefore candidates for therapy to lower LDL-C to less than 100 mg/dL. Patients at moderate risk have a 10-year risk of a CHD event of 10% to 20%, whereas those at lowest risk have a less-than-10% chance of having a CHD event in 10 years. Thus, the Framingham risk score not only profiles a measure of the patient’s risk, it also provides a standard that can guide therapy.

Additional features of ATP III that add to the ability of physicians to better diagnose and treat CHD risk include the identification of type 2 diabetes mellitus as a CHD risk equivalent (as opposed to its previous ATP II classification as a risk factor), the identification of the metabolic syndrome as a condition requiring attention, and new treatment thresholds for triglyceride concentrations and HDL-C levels. Identifying type 2 diabetes mellitus as a CHD risk equivalent places the diabetic patient in the same 10-year risk category as a patient with clinically evident CHD and makes diabetic patients prime candidates for aggressive lipid-lowering therapy. The ATP III also recognizes the importance of the metabolic syndrome as a potential contributor to CHD risk. This condition is estimated to affect 70 to 80 million Americans and is characterized by obesity, hypertension, dyslipidemia, and impaired glucose tolerance.

Elevated triglyceride concentrations are now considered as contributing to the CHD disease process and thus have been included as a target of lipid therapy by ATP III. When triglyceride concentrations are greater than or equal to 200 mg/dL and the patient has achieved his or her LDL-C goal, a second target for therapy is non-HDL-C levels. Non–HDL-C (total cholesterol minus HDL-C) accounts for the non–LDL-C atherogenic particles (very low-density lipoprotein cholesterol [VLDL-C], intermediate-density lipoproteins, remnant particles) that can contribute to atherosclerosis. The non–HDL-C goals can be 30 mg/dL greater than the goal for LDL-C (ie, <130 mg/dL, <160 mg/dL, and <190 mg/dL, corresponding to LDL-C goals of <100 mg/dL, <130 mg/dL, and <160 mg/dL, respectively).

Finally, ATP III considers patients with an HDL-C level of less than 40 mg/dL to be at increased risk for CHD.

Undertreatment

Data that describe the extent to which physicians actually follow lipid treatment guidelines and the degree to which their patients reach treatment target levels indicate a significant gap exists between guidelines and practice. One study found that although 96% of subjects qualified for lipid therapy (under ATP I), only 47% received any treatment and only 67% of these subjects achieved the much less aggressive ATP I target LDL-C levels. Several studies conducted in the Veterans Affairs health system indicate that less than 50% of patients with CHD achieved the ATP II LDL-C target level. Data collected in the primary care setting are even less encouraging, as only 9% of dyslipidemic patients with two or more CHD risk factors achieved their ATP II target level. These studies suggest dyslipidemic patients across the risk spectrum are not achieving NCEP goals and indicate that more aggressive treatment and effective modes of therapy are needed.

The strongest evidence suggesting that patients are being undertreated comes from the L-TAP study, which surveyed the lipid treatment patterns of nearly 900 primary care physicians. Evaluation of the L-TAP data indicates that only 38% of patients achieved their ATP II LDL-C target level. The success rate was highest in the low-risk group (68%), followed by patients at higher risk (37%). A success rate of only 18% was observed in patients with CHD.

A study conducted by Fonarow and colleagues indicates that risk management also needs to be improved in patients hospitalized with acute myocardial infarction. In that study, medication records of 138,000 patients discharged from the hospital after an acute myocardial infarction were evaluated. The investigators noted that only 31.7% of patients were receiving lipid-lowering therapy at the time of discharge. To improve on the undertreatment of patients with the greatest risk, the authors suggested that when persons are hospitalized for acute coronary procedures or syndromes, lipid measures should be taken within 24 hours to guide the decision of whether to initiate lipid therapy before or at the time of discharge.

The sum of these studies suggests that dyslipidemic patients at all risk levels are being undertreated. Patients are not receiving optimal therapy, or they are receiving prescribed therapy inconsistent with their CHD risk. This perspective is supported by the observation that high doses of drugs and combination modes of therapy of lipid-modifying drugs are being used.

Data from numerous outcomes trials indicate that aggressive lipid lowering in the context of a tightly monitored clinical trial setting can result in a predictable reduction of CHD events. In many clinical settings, lipid-lowering therapy is not properly titrated and progress toward lipid goals is poorly monitored. Consequently, patients risk the possi-
bility of forfeiting the significant risk-reduction benefits inherent with aggressive lipid treatment. Therefore, a more aggressive approach to LDL-C reduction is required.

The challenge of reaching ATP III goals and the impact on osteopathic medical practice

The results of L-TAP are pertinent to osteopathic physicians because large numbers of DOs practice in the primary care setting. The L-TAP data indicated that many primary care physicians failed to implement optimal lipid-modification therapy. Although the reasons for this remain unclear, L-TAP investigators suggested that many primary care physicians used inappropriately low doses of drugs, used drugs with limited effectiveness, failed to choose the correct drug for a specific lipid disorder, or failed to consider the tolerability or side effect profile (or both) of the drug. This same study evaluated physician awareness of the NCEP guidelines and noted that 64% of primary care physicians indicated they knew that cholesterol reduction had a great effect on reducing CHD risk, whereas 36% thought it had only a moderate effect. In addition, 63% of primary care physicians indicated that they follow NCEP lipid treatment guidelines “quite a bit;” 31% stated they followed the guidelines “somewhat;” and 2% said they did not follow the guidelines. Despite primary care physicians’ understanding of the NCEP guidelines, a substantial number of their patients failed to reach LDL-C goals.

An essential tenet of osteopathic medical training is a focus on the human body as a whole. As a result, osteopathic physicians are uniquely qualified to encourage CHD risk reduction through nonpharmacologic therapy such as therapeutic lifestyle changes (TLC) outlined in ATP III. Components of TLC, namely dietary modification, weight loss, and regular physical activity, have frequently been maligned as either or both an ineffective and inefficient way to alter the lipid profile. The L-TAP study assessed the advice primary care physicians provided on adopting dietary changes as a means to lower LDL-C. The study also noted the patient’s willingness to comply with the dietary advice. The results suggest that advice provided by physicians and patient compliance with the advice were independent predictors of success in reaching LDL-C goals. These results underscore the influence of a physician on patient behaviors and suggest that even a minimal amount of education and encouragement can have a favorable impact on CHD risk reduction.

As discussed earlier, L-TAP data indicated a high level of awareness of the NCEP guidelines among primary care physicians. Nonetheless, very few of their patients achieved target lipid levels. In addition, the evidence showed that lipid-modification therapy is not as widely used as the guidelines recommend, even in high-risk patients who have the most to gain from lipid lowering. These findings challenge primary care physicians to more aggressively diagnose lipid disorders in their patients, treat them with the appropriate therapy, and encourage patient compliance.

Comment

Achieving ATP III goals is a step-by-step process involving risk assessment, designing and implementing the appropriate therapy, monitoring and adjusting the therapy as required, and patient adherence to prescribed intervention. Both physicians and their patients share the responsibility for diagnosing and treating lipid disorders to achieve target levels. Guidelines do not work if they are not implemented and followed.

References