with greater than 70% carotid stenosis may respond better to aspirin than to ticlopidine. No difference in cardiac outcome between ticlopidine- and aspirin-treated patients was observed, suggesting that the two drugs are approximately equal in the prevention of cardiac events in stroke-prone patients.

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# TREATING HIGH CHOLESTEROL: EVERYDAY APPLICATIONS OF THE NATIONAL GUIDELINES

The National Cholesterol Education Program guidelines vary, depending on the patient's history and laboratory evaluations. The following case histories show how this information influences treatment decisions.

## BORDERLINE CHOLESTEROL, NO RISK FACTORS

A 54-year-old woman participated in a cholesterol screening at a local mall, where a total cholesterol of 300 mg/dL was discovered. A subsequent evaluation revealed a total cholesterol of 310 mg/dL; triglycerides, 89 mg/dL; HDL cholesterol, 75 mg/dL; and LDL cholesterol, 221 mg/dL. Her family history for hypercholesterolemia and premature heart or vascular disease was negative, as was her medical history for risk factors.

Although the use of malls and drugstores for cholesterol screening is controversial, this patient's actions demonstrate an appropriate use of these screening measures; ie, she obtained another measurement as well as an evaluation for cardiovascular risk factors.

According to the NCEP guidelines, this patient is a candidate for diet therapy, with a target LDL threshold of 160 mg/dL. Some might argue with this approach. For example, it is unresolved whether treatment is indicated when the HDL is acceptably high, as in this patient's case. In both men and women, HDL and the incidence of coronary artery disease are inversely related; overall mortality from heart disease is very low in people whose HDL levels exceed 65 mg/dL, even with LDL-C levels in this range.

Because this patient was considered low risk, we opted for diet counseling, which she followed aggressively. The strategy would change in the presence of risk factors, where the goal would be to lower the LDL to less than 130 mg/dL, even if the HDL were high.

## IMPORTANCE OF TRIGLYCERIDES

A 68-year-old diabetic man weighed 170 pounds at 5'5" and had a history of myocardial infarction and coronary artery bypass surgery. He had hypertension that was controlled with a calcium channel blocking agent. His lipid profile revealed a markedly elevated triglyceride level of 1,456 mg/dL; total cholesterol, 408 mg/dL; HDL, 26 mg/dL; and LDL, 136 mg/dL. Other studies showed a blood glucose of 253 mg/dL and hemoglobin A1C of 10.3%.

The NCEP guidelines recommend screening with total cholesterol. Screening in this patient could lead to the false assumption that he has a disturbance of cholesterol metabolism when, in fact, the primary abnormality is disturbed triglyceride metabolism. The triglyceride level is related to high very-low-density lipoprotein (VLDL) particles which also contain cholesterol; 20 to 25% of VLDL particles are made up of cholesterol esters. Therefore, patients who have markedly elevated plasma triglyceride levels can have concomitant elevations in total cholesterol. With correction of the triglyceride level, the cholesterol comes down. A high triglyceride level by itself is not a proven cardiovascular risk factor, but a strong inverse relationship exists between triglyceride and HDL levels. Correction of elevated triglyceride is often enough to increase the HDL. Furthermore, when the triglyceride level is higher than 1000 mg/dL, the risk of pancreatitis increases substantially.

A high triglyceride level is often caused by obesity (as little as 10 to 15 pounds excess weight), diabetes, or excess alcohol intake. Drugs such as certain beta blockers, thiazides, isotretinoin, and estrogens also can be responsible. Treatment requires correction of the underlying problem—eg, achieving ideal body weight or controlling diabetes. Exercise by itself has little effect on the total cholesterol, but it can lower the triglyceride level by as much as 30%.

This patient's course demonstrates the power of weight reduction. In 8 weeks, he reduced his weight from 170 to 154 pounds and achieved normal blood

glucose, close to normal hemoglobin A1C, total correction of the triglyceride level, and HDL increased to an acceptable range.

## PREMENOPAUSAL ATHEROSCLEROSIS

A 39-year-old woman was evaluated by a vascular surgeon because of a right carotid bruit; she was found on ultrasound examination to have 60% to 79% stenosis of the right internal carotid artery. The patient had stopped smoking 2 years earlier and had no other cardiovascular risk factors. She had followed a low-cholesterol, low-saturated fat diet for the preceding 6 months. Her total cholesterol was 288 mg/dL; triglycerides, 125 mg/dL; HDL, 42 mg/dL (which is low for a premenopausal woman); and LDL, 226 mg/dL.

The NCEP recommendation is a goal LDL of less than 130 mg/dL for any patient with coronary artery disease or two risk factors. But this may not be enough for a premenopausal woman with documented atherosclerosis. A more appropriate target threshold in the presence of *any documented vascular disease* may be an LDL-C of less than 130 mg/dL.

Aggressive lipid-lowering therapy can stabilize or even cause regression of atherosclerotic lesions. We started this patient on nicotinic acid, 1,000 mg bid. This regimen achieved a decrease in total cholesterol from 288 mg/dL to 172 mg/dL; an HDL increase from 42 mg/dL to 60; and an LDL-C decreased from 200 mg/dL to 175 mg/dL. Although cholestyramine might have lowered the LDL-C, it would have had little effect on the HDL. Nicotinic acid effectively lowers total cholesterol, triglycerides, and LDL, and increases HDL-C. An additional benefit is the low cost of nicotinic acid, which is less than $5 per month at this dose.

## GENETIC HYPERLIPIDEMIAS

A 49-year-old man with a 10-year history of hypercholesterolemia underwent percutaneous transluminal coronary angioplasty followed by emergency coronary artery bypass surgery. His father had died of a myocardial infarction at age 64; his mother had coronary bypass surgery at age 58; his two brothers had elevated cholesterol levels and one had a myocardial infarction.

The patient's family physician started him on lovastatin (40 mg bid) when his total cholesterol was 400 mg/dL. When low back pain developed and the patient's CPK measured 300 IU/L, he was switched to gemfibrozil (600 mg bid) and cholestyramine (1 scoop bid). On this regimen, his lipid profile included total cholesterol of 282 mg/dL; triglycerides, 281 mg/dL; HDL, 25 mg/dL; and LDL, 221 mg/dL.

A patient such as this is likely to have a familial form of hyperlipidemia, such as familial heterozygous hypercholesterolemia or familial combined hyperlipidemia.

This patient's LDL-C level would be difficult to control without lovastatin. Since it is doubtful that his backache was caused by lovastatin-induced myositis, we would restart the drug at a lower dose, possibly in combination with a bile acid-binding resin, in an attempt to lower the LDL-C to less than 130 mg/dL.

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