

# Cardiovascular Testing in Asymptomatic Patients



## Carotid Duplex, Cardiac Stress Testing, Screen for Peripheral Arterial Disease

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### KEYWORDS

- Cardiovascular screening • Carotid artery stenosis • Peripheral vascular disease
- Cardiac stress testing

### KEY POINTS

- Screening patients who are at high risk for asymptomatic carotid artery stenosis is unnecessary because they should already be on intense medical therapy and revascularization is unlikely to benefit them.
- Do not perform cardiac stress testing in asymptomatic, low-risk individuals.
- Only perform cardiac stress testing in asymptomatic patients if it will change medication management decisions.
- Revascularization procedures in patients with asymptomatic peripheral arterial disease do not improve outcomes.

### INTRODUCTION

Approximately one-third of all deaths in the United States are from cardiovascular disease.<sup>1,2</sup> Managing modifiable risk factors, such as smoking, hypertension, and hyperlipidemia, is paramount to reducing an individual's risk of heart disease and stroke. It is logical to try to identify patients with silent disease that may predispose them to significant morbidity and mortality. Unfortunately, it is unclear if routine screening for the presence of carotid stenosis, coronary artery disease (CAD), and peripheral arterial disease is beneficial. Many of these tests, especially cardiac stress tests, are financially costly. This review explores the evidence behind screening tests, costs associated with the tests, and the implications of positive screening for each of the 3 listed conditions.

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## CAROTID DUPLEX

### *The Disease*

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Carotid artery stenosis is the narrowing of the internal and/or the common carotid artery by atherosclerosis. It is frequently asymptomatic. The measurement of stenosis depends on the method being used but is commonly reported as the percentage reduction of the luminal diameter. Furthermore, studies vary in how they define moderate or severe stenosis. The most feared complication of carotid artery stenosis is an ischemic stroke. Stroke is the leading cause of serious long-term disability in this country.<sup>2</sup>

The prevalence of carotid artery stenosis in the general population increases with age. A 2010 meta-analysis found that in patients  $\leq 50$  years old, the prevalence of severe stenosis (defined as  $\geq 70\%$ ) is very low (0.1% in men and 0% in women). This increases with age to 3.1% in men  $\geq 80$  years of age and 0.9% in woman of the same age.<sup>3</sup> Approximately 800,000 people in the United States suffer a stroke each year. It is estimated that 90% of all strokes in the United States are ischemic and 10% of ischemic strokes are caused by carotid artery stenosis.<sup>4</sup>

### *Possible Interventions*

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It is well established that most patients with *symptomatic* carotid artery stenosis (transient ischemic attack or stroke) should undergo vascular intervention<sup>5</sup> in addition to optimizing medical management with antiplatelet agents, statins, and antihypertensives. This has been shown to reduce the incidence of future cerebrovascular events. These same options are available for individuals with asymptomatic carotid artery stenosis, including carotid endarterectomy, carotid artery stenting, and intensification of medical management, but it is unclear if this would provide the same benefit.

### *Test Characteristics*

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The most frequently used modality for detecting carotid artery stenosis is the carotid duplex: an ultrasound test that is painless and does not pose any risk to the patient (from the test alone). The sensitivity and specificity for this test depends on the degree of stenosis that one is looking for. One meta-analysis reported a sensitivity of 90% and a specificity of 94% in detecting a stenosis  $\geq 70\%$ .<sup>6</sup> These values are consistent with other studies evaluating similar degrees of stenosis. It is important to note that clinically relevant variability in performing and interpreting these studies exists and has been reported.<sup>7</sup>

The financial cost of carotid duplex studies is not insignificant. Healthcare Bluebook estimates the average fair price is \$388 per study.<sup>8</sup> Patients identified as having mild to moderate carotid artery stenosis may then go on to annual testing for progression. After only 3 years, the cost of this strategy exceeds \$1000.

### *Potential Benefits*

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The goal of screening asymptomatic patients for carotid artery stenosis is to identify patients at higher risk for stroke and to alter the management in these patients to reduce this risk. In addition to reducing the risk of stroke, patients identified as having carotid artery stenosis may also benefit by being placed in higher risk categories for CAD, and intensifying medical management. This may reduce these individuals' risk of cardiovascular events in the future.

There have been several trials that have demonstrated the utility of carotid endarterectomy for patients with asymptomatic severe carotid stenosis. A Cochrane review of this topic found that this intervention reduced the risk of stroke by 30% over 3 years

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