

## AHA Releases Recommendations on Ankle-Brachial Index Measurement and Interpretation

**Guideline source:** American Heart Association

**Evidence rating system used?** Yes

**Literature search described?** Yes

**Guideline developed by participants without relevant financial ties to industry?** No

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The ankle-brachial index (ABI) is the ratio of the systolic blood pressure at the ankle to the systolic blood pressure at the brachial artery. It is one of the most widely available markers of atherosclerosis and least expensive to perform. In the primary care setting, it is effectively used to assess cardiovascular risk and diagnose peripheral artery disease (PAD). The American Heart Association (AHA) released a scientific statement on the measurement and interpretation of ABI, including standardization of measurement technique and the threshold for diagnosing PAD.

### Protocol for Determining ABI with the Doppler Method

To determine the ABI with the Doppler method, the patient should be at rest for five to 10 minutes in the supine position. The head and heels should be supported, and the room should be at a comfortable temperature. The patient should not smoke at least two hours before ABI measurement. The blood pressure cuff should contour at least 40% of the limb circumference. Cuffs should not be placed on a distal bypass or on an ulcer, and open lesions should be covered with an impermeable dressing to avoid contamination. Patients must remain still during the measurement; if they are unable to remain still (e.g., tremor), another method of measurement should be used. The

cuff should be positioned around the ankle with the straight wrapping method, as with brachial measurement, and the lower edge should be 2 cm above the superior aspect of the medial malleolus.

Using an 8- to 10-MHz Doppler probe with gel applied over the sensor, the device should be placed in the area of the pulse at a 45- to 60-degree angle to the skin surface. The probe should be moved to find the clearest signal. To detect the pressure, the cuff should be inflated progressively to 20 mm Hg above the level of flow signal disappearance and then slowly deflated to detect signal reappearance. If flow is still detected at the maximum level of inflation (300 mm Hg), the cuff should be deflated immediately to avoid pain.

Doppler should also be used to detect brachial blood flow during the arm pressure measurement. The same sequence of limb pressure measurement should be used, and the sequence should be the same for all patients within the same practice. If the first arm measurement is 10 mm Hg or greater than the other arm, then it should be repeated at the end of the sequence, and the two numbers averaged. For example, when beginning with the right arm and using the counterclockwise sequence (i.e., right arm, right posterior tibial, right dorsalis pedis, left posterior tibial, left dorsalis pedis, left arm), the right arm measurement would be repeated and the two measurements should be averaged. However, if the difference between the two numbers is greater than 10 mm Hg, only the second measurement should be used to lessen the white coat effect. If the entire sequence of ABI measurements is repeated, then the order of measuring the four limb pressures should be reversed (e.g., a clockwise sequence should follow a counterclockwise sequence). The

ABI should be reported separately for each leg, and should be calculated by dividing the higher of the posterior tibial or dorsalis pedis blood pressure by the higher of the right or left arm systolic blood pressure.

### Recommendations for ABI Interpretation

If there is clinical suspicion of PAD based on symptoms and clinical findings, ABI measurement should be the first-line noninvasive option to confirm the diagnosis. An ABI of 0.9 or less is the threshold for confirming lower-extremity PAD. If the ABI is greater than 0.9 but there is suspicion of PAD, postexercise ABI measurement or other noninvasive options, such as imaging, should be used. A postexercise ankle pressure decrease greater than 30 mm Hg or an ABI decrease greater than 20% may be considered a criterion for PAD. If the ABI is greater than

1.4 but there is clinical suspicion of PAD, a toe-brachial index measurement or other noninvasive options, such as imaging, should be used.

When interpreting ABI during follow-up, a decrease greater than 0.15 can effectively detect significant PAD progression. ABI alone should not be used to monitor revascularized patients.

In asymptomatic individuals, ABI can provide incremental information beyond standard risk scores to predict future cardiovascular events. Persons who have an ABI of 0.9 or less, or 1.4 or greater, are at increased risk of cardiovascular events and mortality, regardless of the presence of PAD symptoms or other cardiovascular risk factors. An ABI between 0.91 and 1.0 is considered borderline for cardiovascular risk. Additional evaluation is appropriate in these cases.

MARA LAMBERT, *AFP Senior Associate Editor* ■

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