

# Nursing2005<sup>®</sup>

THE JOURNAL OF CLINICAL EXCELLENCE

## How to measure Ankle/Brachial Index



Reprinted from *Nursing2005*, January, © 2005 LWW.



# How to measure Ankle/Brachial Index

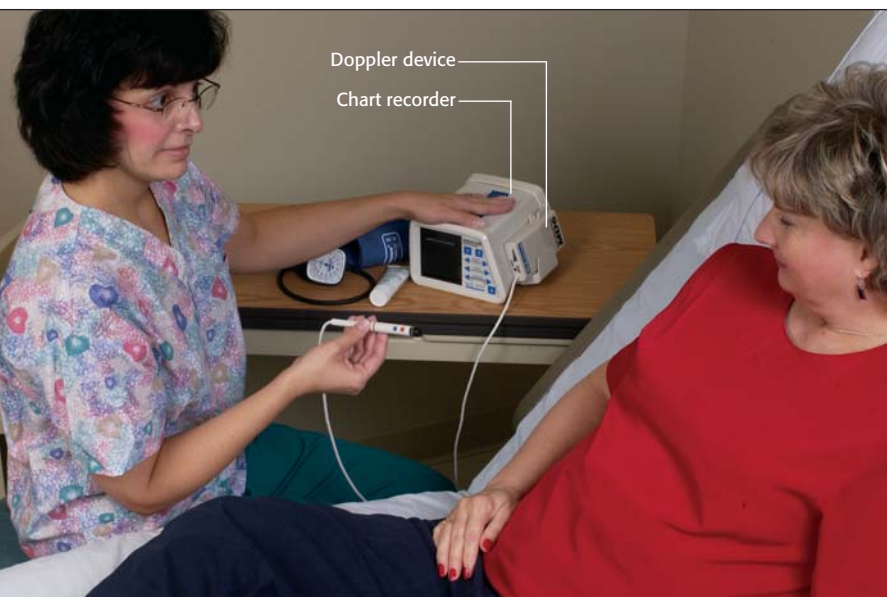
**Learn how to assess for peripheral vascular disease using a few blood pressure readings and simple calculations.**

BY KAREN L. RICE, APRN, BC, MSN

WHEN YOUR PATIENT HAS (or may have) peripheral vascular disease, you can perform an ankle/brachial index (ABI) to gauge the severity of disease or to establish a baseline. The American Diabetes Association recommends ABI screening in anyone over age 50. Using a Doppler ultrasound device to measure blood pressure (BP) in a patient's arms and ankles provides the data you need to calculate ABI. (Learn how to do the math in *Calculating ankle/brachial index.*)

The Doppler device shown here can also be used with a chart recorder that produces real-time pulse waveforms. Although waveforms aren't necessary to determine ABI, they indicate flow velocity to help identify occlusion at the arterial site being tested. Some insurers require a waveform strip in the medical record for reimbursement purposes.

Follow the steps shown with the photos to determine your patient's ABI.



**1. Explain the procedure** to your patient and gather the equipment:

- mercury or aneroid sphygmomanometer with cuff
- handheld Doppler device with vascular probe
- conductivity gel
- clean gauze or tissues
- waveform chart recorder with chart paper (optional).

Place the tube of conductivity gel in your pocket to warm it. Remove the patient's slippers or shoes and socks. Keep her warm and have her lie supine for at least 15 minutes.



**2. Wash your hands.**

Apply the BP cuff to the patient's arm and palpate for the brachial pulse. As shown, apply a fingertip-sized mound of warm conductivity gel over the brachial artery. Turn on the Doppler device.

If you're using a waveform chart recorder, plug the Doppler device into the recorder and turn on the recorder (inset).



**3. Place the tip** of the Doppler probe into the top of the conductivity gel at a 45-degree angle. Listen for a “whooshing” sound, which indicates the brachial pulse. If necessary, adjust the probe angle between 30 and 60 degrees and move it slightly from side to side to optimize the sound.



**4. Pump the BP cuff** until you no longer hear the sound, then 20 to 30 mm Hg above that point. Deflate the cuff at a rate of 2 to 4 mm Hg/second until the sound returns, which indicates systolic BP. Repeat the procedure in the other arm and record the readings. If using a chart recorder, clip the waveform and label it with the site.



Posterior tibial



Dorsalis pedis

**5. Locate the posterior tibial pulse** at the medial aspect of your patient’s ankle and the dorsalis pedis pulse on the dorsum of the foot, lateral to the extensor tendon of the great toe. As you did on her arms, assess and record the systolic pressure at each site on both feet.

Clean the gel from your patient’s skin. Calculate the ABI and clip and label the waveform strips in the medical record. **N**

SELECTED REFERENCE

Redberg R, et al. (Writing Group III). Risk assessment in persons with diabetes. American Heart Association Conference Proceedings: Prevention Conference VI: Diabetes and cardiovascular disease. *Circulation*. 105(18):e144-e152, May 7, 2002.

Karen L. Rice is an adult nurse practitioner/clinical specialist at the Ochsner Clinic Foundation in New Orleans, La.

The equipment shown is courtesy of D.E. Hokanson, Inc.

## Calculating ankle/brachial index

Divide the higher systolic pressure from each leg by the higher brachial systolic pressure.

Systolic readings, mm Hg	Left	Right
Brachial	130	128
Dorsalis pedis	130	90
Posterior tibial	128	98
Calculations	$130 \div 130 = 1$	$98 \div 130 = 0.75$

Interpreting the results:

**Greater than 1.3:** results not reliable because calcified vessels (such as in someone with diabetes) show falsely elevated pressures\*

**1.01 to 1.3:** correlate with history, especially if the patient has diabetes

**0.97 to 1:** normal

**0.8 to 0.96:** mild ischemia

**0.4 to 0.79:** moderate to severe ischemia

**0.39 or less:** severe ischemia; danger of limb loss

\* When results are unreliable, toe/brachial index is another way to assess for peripheral arterial disease. (See “Determining the Toe Brachial Pressure Index” in the September issue of *Nursing2003*.) Or a trained, experienced practitioner may perform photoplethysmography on the patient’s toe. Using a photoplethysmograph device with a chart recorder, the practitioner applies the toe cuff and watches the graph as she inflates and slowly deflates the cuff. The waveform will flatten as she inflates the cuff above systolic pressure; with deflation, it’ll reappear at the point of systolic pressure and she’ll note the sphygmomanometer reading.

# The Portable ABI Kit

The **Ankle/Brachial Index (ABI)** is a simple, noninvasive test used to assess peripheral arterial disease.



The Hokanson Portable ABI Kit has all the instruments and accessories needed to perform an ABI:

- MD6 Doppler: Detects peripheral bloodflow in the ankle and arm
- MD6VR Chart Recorder: Prints real-time Doppler waveforms from the MD6
- Four Straight Segmental Blood Pressure Cuffs: One cuff for each arm, and one for each ankle
- S300 Aneroid Sphygmomanometer: Rugged cuff inflator with a trigger release for controlled cuff bleed rate
- Custom Carrying Case: Transport and store the Portable ABI Kit
- Optional MD6RP Photo Plethysmograph: Expands the Portable ABI Kit to also obtain the toe pressures and Toe/Brachial Index

**Hokanson**<sup>®</sup>

*Specializing in peripheral vascular technology since 1973.*

D.E. Hokanson, Inc. (425) 882-1689 or (800) 999-8251 [www.hokanson.cc](http://www.hokanson.cc)