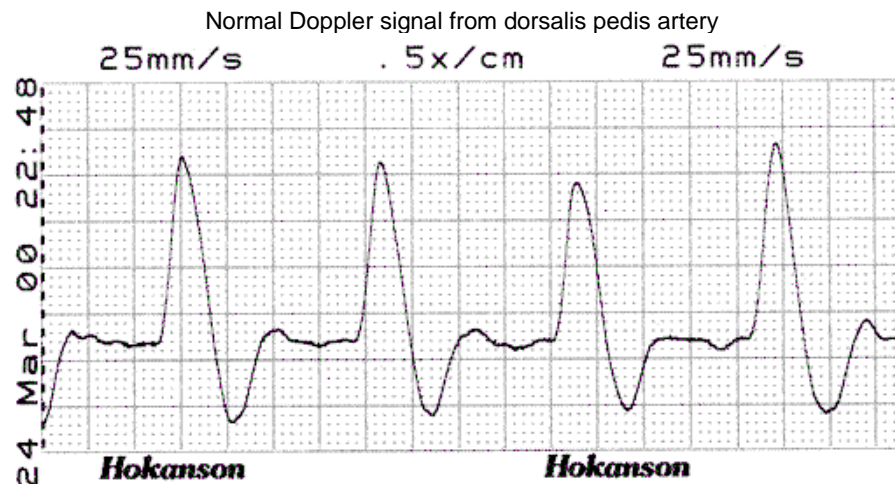


## Ankle/Brachial Index

**Description** The ankle-arm pressure index (also known as the Ankle / Brachial Index, ABI) compares the systolic blood pressure of the ankle to that of the arm (brachial). These pressure measurements are useful in the assessment, follow-up and treatment of patients with peripheral vascular disease (PVD). ABI's provide an objective baseline to follow the progression of the disease process and evaluate the effectiveness of the treatment plan. The results are usually combined with Doppler or pulse volume waveform analysis. Significant changes in arterial systolic pressure between sites indicate reduced blood flow caused by stenoses or obstructions of blood vessels.

To measure the systolic blood pressure, use a Doppler or Photo Plethysmograph (PPG) sensor. Pulse waveforms can be recorded on a chart recorder attached to the sensing instrument. The effects of stenoses can be emphasized by increasing blood flow by exercising the patient or by inducing reactive hyperemia with an occlusive cuff. Patients with calcified vessels, such as diabetics, may show falsely elevated ankle pressures. In this case more accurate pressure measurements can be made on the foot or toes using a PPG sensor.



**Procedure** The patient should be allowed to rest at least 20 minutes prior to the test, and the extremities should be comfortably warm during the measurements. Position the patient supine with the extremities at the same level as the heart. Blood pressure cuffs must be the proper size to prevent obtaining inaccurate high or low readings. The width of the cuff should be at least 20% greater than the diameter of the limb so the artery under evaluation can be compressed when the cuff bladder is inflated. All cuffs must be placed straight on the extremity site and should fit snugly so the bladder inflation transmits the pressure into the tissue.

1. Obtain systolic blood pressures using Hokanson SC12 or SC10 cuffs, a Doppler, and a cuff inflation device such as a Hokanson TD312 Calculating Cuff Inflator or an S300 Aneroid Sphygmomanometer.
2. Apply Hokanson SC10 or SC12 cuffs to each arm above the elbow.
3. Apply Hokanson SC10 cuffs to each ankle.
4. Locate an arterial signal in the arm by listening with the Doppler at the brachial, radial or ulnar area.
5. Position the Doppler transducer at a 45 – 60 degree angle along the long axis of the artery to obtain the clearest and best signal possible.

6. Inflate the cuff to a pressure 20 - 30 mmHg above the occlusive pressure, or where the arterial Doppler signal disappears.
7. Slowly deflate the cuff and listen for the return of blood flow to the distal part of the limb. Note the pressure reading when the first arterial signal is heard. This is the systolic pressure at the level of the cuff.
8. Take both arm systolic pressures. Use the higher of the two pressures to calculate the ratios.
9. For ankle measurements follow the procedure as described above in steps 5 through 7. Use the Doppler signal from either the dorsalis pedis or posterior tibial artery, whichever gives the strongest signal. The peroneal artery may be used if one or both of the previous sites are not available.
10. If resting pressure measurements need to be repeated, the cuff should be fully deflated for about a minute prior to each inflation. This prevents the effects of induced reactive hyperemia.

Ankle pressure measurement. Doppler transducer at posterior tibial artery.



**Interpretation** The ankle / brachial index (ABI) is calculated by dividing the ankle pressure by the **higher** of the two brachial pressures. Note: If there were a subclavian stenosis present unilaterally, there would be a systolic pressure difference of 15-20 mmHg or greater, with the affected side being lower, so the higher brachial pressure is used.

$$\frac{\text{Ankle Pressure}}{\text{Brachial Pressure}} = \text{Index (ABI)}$$

Resting Ankle / Brachial Index	Findings
Greater or equal to 1.0	Normal
0.9 - 1.0	Asymptomatic obstructive disease
0.5 - 0.9	Claudication
Less than 0.5	Rest pain; severe arterial disease

**References** Rumwell C., McPharlin M.: Vascular Technology; an Illustrated Review. Davies Publishing, Inc., Pasadena, CA, 1996.  
 Carter S.A.: Role of Pressure Measurements. Bernstein E. F., editor: Vascular Diagnosis, Fourth Edition, Chapter 55. Mosby-Year Book, Inc., St. Louis, MO, 1993.