

**WOMEN'S INTERAGENCY HIV STUDY**  
**ARTERIAL BRACHIAL INDEX MEASUREMENT FORM (ABI)**  
**QUESTION-BY-QUESTION SPECIFICATIONS**

The Arterial-Brachial Index (ABI) should precede the blood draw whenever possible. If it does not, ensure at least one hour elapses, and that the blood draw site has clotted, before performing the ABI procedure. Explain the procedure to the participant and allow her to ask questions. Conduct the examination in a quiet, warm, and comfortable room. If the room is cool, a blanket may be used to cover the participant (including arms, hands, and feet), except while the actual measurements are being made.

Have the participant lie supine on a comfortable horizontal examination table. The head and heels must be at the same level, and therefore the table must be long enough so that, for each participant, the entire head and both feet must be on the table, not overhanging. Because having the feet even slightly lower than the rest of the body will produce an invalid ABI measurement, an oversized examination table must be available at the field center for tall study participants. Arms below the shoulder and legs below the knee should be bare.

Inspect all four blood pressure (BP) cuffs before placement and use only cuffs that are clean and dry. Do not place blood pressure cuffs over any lesion that could be a potential source of contamination. If a lesion is visible that could be a potential source of contamination, then do not perform the measurement in the affected extremity.

Have the participant rest quietly for at least 5 minutes before beginning the measurement procedure. The participant may be sitting or supine while resting.

While the participant is resting, place an appropriate BP cuff around both arms, based on arm circumference at midpoint. The general rule is that the cuff width must be at least 40% of the arm circumference. The three cuff sizes should be employed as follows:

- Adult (12 cm Blue cuff) cuff for circumference of < 32 cm
- Large adult (16 cm Black cuff) cuff for circumference of 32-42 cm
- Thigh (20 cm Black cuff) cuff for circumference of  $\geq$  43 cm

The widths of the bladder for "Adult," "Large Adult," and "Thigh" cuffs are 12, 16, and 20 cm, respectively. The width of the bladder used for each site should be recorded on the ABI form. If the limb circumference at any site is too large for the largest cuff size, that should be indicated, as well, and that limb measurement skipped.

Place a cuff on each ankle, so that the tube is facing the torso, not the toes, and the lower portion rests 3 cm proximal to the greatest protuberance of the medial malleolus (ankle bone). Once all four cuffs are in place and the 5 minutes of resting are complete, you may begin the measurements as described below.

## **PROCEDURE**

Before you begin the procedure, instruct the participant to remain relaxed and to refrain from helping you (e.g., lifting the arm to facilitate placement of the cuff). Once you begin the procedure, explain the steps to the participant as you proceed.

Arterial Systolic Blood Pressure (SBP) Measurement:

By palpation, locate the brachial artery on both arms (antecubital fossa), and the dorsalis pedis (dorsum of the foot and often in direct line with the 2<sup>nd</sup> toe) and posterior tibial (medial ankle just behind the medial malleolus) arteries on both legs. Mark the location of each artery with a marker. Sometimes an arm or ankle pulse will not be palpable but can be found with the Doppler.

Using the procedure below, measure SBPs in the following order (same as on the form):

1. Right brachial artery
2. Right dorsalis pedis artery (*top of the right foot, in line with the second toe*)
3. Right posterior tibial artery (*inside right ankle*)
4. Left posterior tibial artery (*inside left ankle*)
5. Left dorsalis pedis artery (*top of the left foot, in line with the second toe*)
6. Left brachial artery

Place an appropriate amount of ultrasound conducting gel over the end of the Doppler.

On occasion, there may be skin lesions on the arms, legs or at the auscultation site that are of concern for performing the measurement of the SBP. In these instances, ABI should not be assessed in the affected extremity; "999" should be entered on the form for that anatomical location, and a reason for the missing value should be recorded on form.

For participants with an amputated limb, enter "999" on the form and move onto the next anatomical location. If the participant is missing both legs or both arms, the ABI procedure should not be performed, since the ABI calculation requires at least one arm measurement and one leg measurement. The missing limb should be recorded on the form to explain the missing values, under "other."

After palpating the location of the pulse, turn on the Doppler and place the probe over the artery. With this large probe, careful angulation is not necessary. Place the probe in line with the artery and move it from side to side until the strongest pulse is heard. Don't press too hard on the artery with the probe. Rest your hand comfortably so that the probe is secured in place once a strong pulse is heard. Explain the procedure to the participant and ask if the participant has any questions before the measurements begin. If applicable, suggest to the participant to rest comfortably and to try to be quiet and still.

In a small percentage of participants, you may not be able to find the posterior tibial or dorsalis pedis pulse. If you are having trouble, be patient and continue to search for at least three minutes. If you are still unable to locate a pulse, enter a systolic pressure of "000" for that artery.

Inflate the cuff until the pulse is no longer audible. Inflate to 20 mm Hg above the level at which the pulse sound disappears. If the pulse cannot be obliterated, you may raise pressure to a maximum of 300 mm Hg. If not obliterated at that point, record "300." Deflate the cuff slowly allowing the pressure to drop at a rate of 2 mm Hg per second. Record the pressure at which the first sustained (more than one beat) pulse reappears. This is the SBP at this location. Deflate the cuff completely.

Enter the measurement in the appropriate field on the ABI form immediately. If a given measurement was not done, be sure to list the specific reason why on the form.

If the signal remains faint as more pressure is released or if the probe moves off the artery, deflate the cuff completely, and then repeat the measurement.

After completing the ABI measurements, thoroughly clean the Doppler probe with T-Spray or a Clorox Disinfecting Wipe. Please note that the Doppler must be completely clean and dry between participants.

### **CALCULATION OF ABI**

The ABI will be calculated from your measurements in the following manner:

**The ABI denominator** - There is only one ABI denominator per participant for both the left and right ABIs. This denominator is the higher arm SBP.

**The right ABI numerator** is defined as the higher of (1) the right posterior tibial SBP or (2) the right dorsalis pedis SBP.

**The left ABI numerator** is defined as the higher of (1) the left posterior tibial SBP or (2) the left dorsalis pedis SBP.

**The right ABI** is the right ABI numerator divided by the ABI denominator.

**The left ABI** is the left ABI numerator divided by the ABI denominator.

### **NOTES**

If the clinician is not able to perform ABI (e.g., both arms are swollen or the participant gets vertigo while lying flat and cannot continue), the clinician should enter "-9" on the form and explain the reason at Question A8. In this case, the *SDCQ* and *PAQ* forms need not be completed, or if already completed, need not be entered into Apollo.

If it is discovered that results of the ABI are invalid (e.g., wrong cuff used, or at the end discovered that the participant's heel was off the table during measurements), redo the ABI exam. If this is not possible, then enter "-9" on the form and explain the reason at Question A8. Again, the *SDCQ* and *PAQ* forms need not be completed, or if already completed, need not be entered into Apollo.