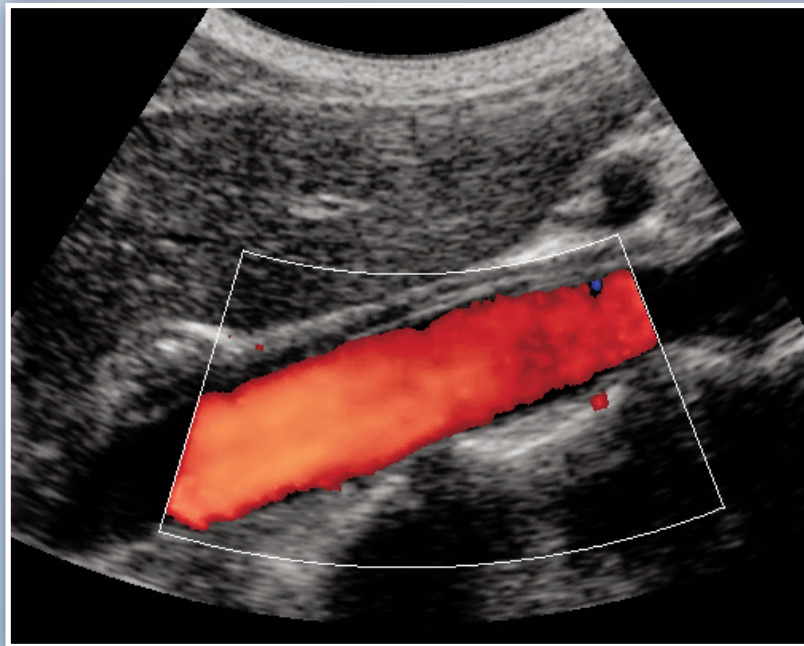


AIUM Practice Parameter for the Performance of

# Diagnostic and Screening Ultrasound Examinations of the Abdominal Aorta in Adults

*Parameter developed in collaboration with the American College of Radiology  
and the Society of Radiologists in Ultrasound.*



The association for medical ultrasound  
**aium**<sup>®</sup>  
AMERICAN INSTITUTE OF ULTRASOUND IN MEDICINE

© 2015 by the American Institute of Ultrasound in Medicine

The American Institute of Ultrasound in Medicine (AIUM) is a multidisciplinary association dedicated to advancing the safe and effective use of ultrasound in medicine through professional and public education, research, development of parameters, and accreditation. To promote this mission, the AIUM is pleased to publish in conjunction with the American College of Radiology (ACR) and the Society of Radiologists in Ultrasound (SRU) this *AIUM Practice Parameter for the Performance of Diagnostic and Screening Ultrasound Examinations of the Abdominal Aorta in Adults*.

The AIUM represents the entire range of clinical and basic science interests in medical diagnostic ultrasound, and, with hundreds of volunteers, this multidisciplinary organization has promoted the safe and effective use of ultrasound in clinical medicine for more than 50 years. This document and others like it will continue to advance this mission.

Practice parameters of the AIUM are intended to provide the medical ultrasound community with parameters for the performance and recording of high-quality ultrasound examinations. The parameters reflect what the AIUM considers the minimum criteria for a complete examination in each area but are not intended to establish a legal standard of care. AIUM-accredited practices are expected to generally follow the parameters with recognition that deviations from these parameters will be needed in some cases, depending on patient needs and available equipment. Practices are encouraged to go beyond the parameters to provide additional service and information as needed.



14750 Sweitzer Ln, Suite 100  
Laurel, MD 20707-5906 USA  
800-638-5352 • 301-498-4100  
[www.aium.org](http://www.aium.org)

## I. Introduction

The clinical aspects contained in specific sections of this parameter (Introduction, Indications/Contraindications, Specifications of the Examination, and Equipment Specifications) were developed collaboratively by the American Institute of Ultrasound in Medicine (AIUM), the American College of Radiology (ACR), and the Society of Radiologists in Ultrasound (SRU). Recommendations for physician requirements, written request for the examination, procedure documentation, and quality control vary among the three organizations and are addressed by each separately.

These parameters are intended to assist in the performance and interpretation of a dedicated sonographic examination of the abdominal aorta. The examination may be performed as a diagnostic or screening study.<sup>1-3</sup> While it is not possible to detect every abnormality, following this parameter will maximize the detection of abnormalities of the abdominal aorta.

## II. Qualifications and Responsibilities of Personnel

See [www.aium.org](http://www.aium.org) for AIUM Official Statements including *Standards and Guidelines for the Accreditation of Ultrasound Practices* and relevant Physician Training Guidelines.

## III. Indications/Contraindications

Indications for ultrasound of the abdominal aorta include but are not limited to:

### A. Diagnostic Evaluation for an Abdominal Aortic Aneurysm

1. Palpable or pulsatile abdominal mass or abdominal bruit.
2. Unexplained lower back pain, flank pain, or abdominal pain.
3. Follow-up of a previously demonstrated abdominal aortic aneurysm.
4. Follow-up of patients with an abdominal aortic and/or iliac endoluminal stent graft.

### B. Screening Evaluation for an Abdominal Aortic Aneurysm

1. Men 65 years or older.
2. Women 65 years or older with cardiovascular risk factors.
3. Patients 50 years or older with a family history of aortic and/or peripheral vascular aneurysmal disease.
4. Patients with a personal history of peripheral vascular aneurysmal disease.

Groups with additional risk include patients with a history of smoking, hypertension, and certain connective tissue diseases (eg, Marfan syndrome).

There are no absolute contraindications to ultrasound of the aorta. If aortic rupture or dissection is clinically suspected, ultrasound is usually not the examination of choice.

## IV. Written Request for the Examination

The written or electronic request for an ultrasound examination should provide sufficient information to allow for the appropriate performance and interpretation of the examination.

The request for the examination must be originated by a physician or other appropriately licensed health care provider or under their direction. The accompanying clinical information should be provided by a physician or other appropriate health care provider familiar with the patient's clinical situation and should be consistent with relevant legal and local health care facility requirements.

## V. Specifications of the Examination

### A. Diagnostic Examination

The examination includes the following, when feasible:

1. Abdominal aorta:
  - a. Longitudinal images (along the long axis of the vessel):
    - i. Proximal (below diaphragm, near the celiac artery);
    - ii. Mid (near the level of the renal arteries);
    - iii. Distal (above the iliac bifurcation);
    - iv. The aorta should be imaged in the plane that is parallel to the long axis of the lumen (for measurement of the anteroposterior [AP] dimension) and perpendicular to the long axis of the lumen (for measurement of the transverse dimension). The transverse measurement may also be obtained in the coronal plane.<sup>4</sup>
  - b. Transverse images (perpendicular to the long axis of the vessel):
    - i. Proximal (below diaphragm, near the celiac artery);
    - ii. Mid (near the level of the renal arteries);
    - iii. Distal (above the iliac bifurcation).
  - c. Measurements:
    - i. Measurements of the proximal, mid, and distal aorta should be obtained using predominantly the long axis view to measure the AP dimension. Transverse or coronal views should also be obtained to measure the width. Measurements are taken at the greatest diameter of the aorta from outer edge to outer edge.

- ii. If an aneurysm is present, the maximal size and location of the aneurysm should be documented and recorded. The relationship of the dilated segment to the renal arteries and to the aortic bifurcation should be determined if possible.
    - iii. At a minimum, the largest measurement should be recorded and reported. A measurement of the length of the aneurysm is not necessary.
  2. Common iliac arteries:
    - a. Longitudinal images of the proximal right and left common iliac arteries (along the long axis of the vessel).
    - b. Transverse images (perpendicular to the long axis of the vessel) of the proximal common iliac arteries just below the bifurcation.
    - c. Measurement of the widest visualized portion of each common iliac artery from outer edge to outer edge.

Color Doppler and/or spectral Doppler imaging with waveform analysis of the aorta and iliac arteries may be helpful to demonstrate patency and the presence of intraluminal thrombus.

After endoluminal graft placement, color (or power) Doppler imaging and spectral Doppler imaging are required to document the presence or absence of endoleaks.

Interobserver measurements of an aortic aneurysm can vary by as much as 5 mm. Visual comparison with prior studies is recommended to ensure measurements are obtained at similar locations and to assess for interval change in aneurysm size. Consistent measurements of aneurysm diameter are recommended following endograft repair to check for interval enlargement in sac size.<sup>5</sup>

## **B. Screening Examination for an Abdominal Aortic Aneurysm**

1. Abdominal aorta:
  - a. Longitudinal images (along the long axis of the vessel):
    - i. Proximal (below diaphragm, near the celiac artery);
    - ii. Mid (near the level of the renal arteries);
    - iii. Distal (above the iliac bifurcation).
  - b. Transverse images (perpendicular to the long axis of the vessel):
    - i. Proximal (below diaphragm near the celiac artery);
    - ii. Mid (near the level of the renal arteries);
    - iii. Distal (above the iliac bifurcation).
  - c. Measurements

Anteroposterior measurements of the aorta sufficient to determine if an aortic aneurysm exists according to the criteria in Section V, A “Diagnostic Examination” should be obtained. If an aneurysm is present, its greatest dimension should be reported. However, if no aneurysm is identified, the largest diameter of the abdominal aorta should be reported.

**C. Interpretation of the screening examination should include at least 3 categories:**

1. Positive—Infrarenal abdominal aortic aneurysm greater than or equal to 3 cm in diameter or greater than or equal to 1.5 times the diameter of the more proximal infrarenal aorta.<sup>6</sup> The latter definition is particularly important in women and small adults.<sup>7</sup>
2. Negative—No infrarenal abdominal aortic aneurysm.
3. Indeterminate—Aneurysmal status not defined because of nonvisualization or partial visualization of the infrarenal abdominal aorta.
4. The report should also state whether or not the suprarenal aorta was seen and, if seen, should reflect whether or not it is normal. The report should also state whether dilation of the aorta above the celiac artery is noted. For the area above the celiac artery, an aneurysm may be reported if the diameter is greater than 3.9 cm for males or 3.1 cm for females.

## VI. Documentation

Adequate documentation is essential for high-quality patient care. There should be a permanent record of the ultrasound examination and its interpretation. Images of all appropriate areas, both normal and abnormal, should be recorded. Variations from normal size should be accompanied by measurements. Images should be labeled with the patient identification, facility identification, examination date, and the side (right or left) of the anatomic site imaged. An official interpretation (final report) of the ultrasound findings should be included in the patient's medical record. Retention of the ultrasound examination should be consistent both with clinical needs and with relevant legal and local health care facility requirements.

Reporting should be in accordance with the *AIUM Practice Parameter for Documentation of an Ultrasound Examination*.

## VII. Equipment Specifications

Abdominal aortic ultrasound examinations should be performed with real-time scanners with transducers that allow for appropriate penetration and resolution, depending on the patient's body habitus. Diagnostic information should be optimized while keeping total ultrasound exposure as low as reasonably achievable.

## VIII. Quality Control and Improvement, Safety, Infection Control, and Patient Education

Policies and procedures related to quality control, patient education, infection control, and safety should be developed and implemented in accordance with the *AIUM Standards and Guidelines for the Accreditation of Ultrasound Practices*.

Equipment performance monitoring should be in accordance with the *AIUM Standards and Guidelines for the Accreditation of Ultrasound Practices*.

## IX. ALARA Principle

The potential benefits and risks of each examination should be considered. The ALARA (as low as reasonably achievable) principle should be observed when adjusting controls that affect the acoustic output and by considering transducer dwell times. Further details on ALARA may be found in the AIUM publication *Medical Ultrasound Safety, Third Edition*.

## Acknowledgments

This parameter was revised by the American Institute of Ultrasound in Medicine (AIUM) in collaboration with the American College of Radiology (ACR) and the Society of Radiologists in Ultrasound (SRU) according to the process described in the *AIUM Clinical Standards Committee Manual*.

## Collaborative Committee

Members represent their societies in the initial and final revision of this practice parameter.

### AIUM

Lin Diacon, MD, RDMS, RPVI  
Carl C. Reading, MD

### ACR

John S. Pellerito, MD, *Chair*  
Helena Gabriel, MD  
Jason B. Katzen, MD  
Jason Wagner, MD

### SRU

Raymond E. Bertino, MD  
Franklin N. Tessler, MD

### AIUM Clinical Standards Committee

Joseph Wax, MD, *Chair*  
John Pellerito, MD, *Vice Chair*  
Susan Ackerman, MD  
Sandra Allison, MD  
Genevieve Bennett, MD  
Bryann Bromley, MD  
Rob Goodman, MB, BCh  
Charlotte Henningsen, MS, RT, RDMS, RVT  
Alexander Levitov, MD, FCCP, FCCM, RDCS  
Resa Lewiss, MD  
Vicki Noble, MD, RDMS  
David Paushter, MD  
Dolores Pretorius, MD  
Tatjana Rundek, MD, PhD  
Khaled Sakhel, MD  
Ants Toi, MD  
Isabelle Wilkins, MD



## References

1. Adams DC, Tulloh BR, Galloway SW, Shaw E, Tulloh AJ, Poskitt KR. Familial abdominal aortic aneurysm: prevalence and implications for screening. *Eur J Vasc Surg* 1993; 7:709–712.
2. Ashton HA, Buxton MJ, Day NE, et al. The Multicentre Aneurysm Screening Study (MASS) into the effect of abdominal aortic aneurysm screening on mortality in men: a randomised controlled trial. *Lancet* 2002; 360:1531–1539.
3. U.S. Preventive Services Task Force. Screening for Abdominal Aortic Aneurysm 2005; <http://www.uspreventiveservicestaskforce.org/uspstf05/aaascr/aaars.htm>. Accessed September 4, 2014.
4. Pellerito J, Polak JF. *Introduction to Vascular Ultrasonography*, 6th Edition. 2012:704.
5. Comstock CE, Bluth EI, Peattie RA, Schrader T, Leslie BR. Inter-observer variability in ultrasonic evaluation of abdominal aortic aneurysms. *J La State Med Soc* 1994; 146:526–530.
6. Johnston KW, Rutherford RB, Tilson MD, Shah DM, Hollier L, Stanley JC. Suggested standards for reporting on arterial aneurysms. Subcommittee on Reporting Standards for Arterial Aneurysms, Ad Hoc Committee on Reporting Standards, Society for Vascular Surgery, and North American Chapter, International Society for Cardiovascular Surgery. *J Vasc Surg* 1991; 13:452–458.
7. Isselbacher EM. Contemporary Reviews in Cardiovascular Medicine: Thoracic and abdominal aortic aneurysms. *Circulation* 2005; 111:816–828.