

# Managing Incidental Findings on Abdominal and Pelvic CT and MRI, Part 2: White Paper of the ACR Incidental Findings Committee II on Vascular Findings

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This white paper describes vascular incidental findings found on CT and MRI of the abdomen and pelvis. Recommendations for management are included. This represents the second of 4 such papers from the ACR Incidental Findings Committee II, which used a consensus method based on repeated reviews and revisions and a collective review and interpretation of relevant literature. Topics include definitions and recommended management for abdominal aortic, iliac, splenic, renal, and visceral artery aneurysms. Other incidentally discovered aortic conditions, systemic venous anomalies, compression syndromes, abdominal venous thrombosis, and gonadal and pelvic venous conditions are also discussed. A table is provided for reference.

**Key Words:** Incidental findings, incidentaloma, ACR, consensus, CT, MRI, aneurysm

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## FOREWORD

This white paper does not comprehensively review the interpretation and management of vascular abnormalities but provides general guidance for managing common, incidental vascular findings on CT and MRI, appreciating that individual care will vary depending on each patient's specific circumstances, the clinical environment, available resources, and the judgment of practitioners. Also, the term *guidelines* is not used in this or prior white papers to avoid the implication that these represent components of the ACR Practice Guidelines

and Technical Standards (which represent official ACR policy, having undergone a rigorous drafting and review process culminating in approval by the ACR Council) or the ACR Appropriateness Criteria<sup>®</sup> (which use a formal consensus-building approach using a modified Delphi technique). This white paper, which represents the collective experience of the members of the ACR Incidental Findings Committee II, was developed through a less formal process of repeated reviews and revisions of the draft document and does not represent official ACR policy. For these reasons, this white paper should not be used to establish the legal standard of care in any particular situation.

Credits awarded for this enduring activity are designated "SA-CME" by the American Board of Radiology (ABR) and qualify toward fulfilling requirements for Maintenance of Certification (MOC) Part II: Lifelong Learning and Self-assessment.

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## INTRODUCTION

Please refer to the overview of the work of the Incidental Findings Committee II [1] for a description of the purposes, structure and process, and conventions used in these 4 white papers, of which this is the second. The authors of this white paper represent the Vascular Subcommittee membership, as listed in the appendix. The roster of the entire Incidental Findings Committee II is listed in the appendix of the overview of this project [1].

## INCIDENTAL VASCULAR FINDINGS

This section describes the committee's consensus on nomenclature and recommendations for managing and fol-

lowing up the most common and important types of incidental vascular findings seen on CT and MRI of the abdomen and pelvis.

### Abdominal Aortic Aneurysm (AAA)

AAA represents a progressive increase in the aortic luminal diameter and is the 10th most common cause of death in the Western world [2]. AAA is usually described by its relationship to renal arteries (ie, suprarenal or infrarenal). The normal diameter of the suprarenal abdominal aorta is up to 3.0 cm, and that of the infrarenal abdominal aorta is 2.0 cm. Aneurysmal dilation of the infrarenal aorta is defined as a diameter  $\geq 3.0$  cm or dilation of the aorta  $\geq 1.5$  times the normal diameter [3]; on the basis of these criteria, 9% of people aged  $>65$  years have an AAA [4].

Multiple causes may contribute to the development and progression of aortic aneurysms, including smoking, male gender, age at detection, diabetes, hypertension, and hypercholesterolemia [5,6]. There is also a strong association between initial size and the subsequent rate of growth of an AAA. Therefore, we recommend tailoring follow-up intervals according to the size of the AAA at the time of detection, especially when previous growth patterns are unknown [7,8]. Emergency surgery for aortic aneurysm rupture is associated with 46% mortality (as opposed to 4%-6% for elective repair), and rupture occurs with increasing frequency as the aneurysm size exceeds 5 cm [9]. It is therefore valuable to detect AAAs and follow up until elective repair is indicated [10].

**Detection and Characterization.** An AAA may be encountered as an incidental finding on ultrasound, CT, or MRI. Ultrasound can detect and size AAAs, with the advantages of being relatively inexpensive and noninvasive and not requiring the use of intravenous contrast material. The limitations are that overlying bowel gas can obscure findings, and ultrasound is operator dependent. CT and MRI can define the extent and size of an aneurysm, depict intraluminal thrombus, and show the involvement and relationship of branch vessels, allowing the correct choice of therapy. Optimizing follow-up imaging intervals can help balance safety, cost, and patient anxiety. For abdominal aortic diameters  $<2.5$  cm, follow-up is generally thought to be unnecessary. Because the rupture of smaller AAAs is less likely [10], and a recent meta-analysis [11] suggested that less frequent follow-up on smaller aneurysms in male patients may be equally safe, we recommend longer intervals between follow-up examinations. The follow-up intervals for imaging may also vary depending on comorbidities and the growth rate of the aneurysm [12]. Our recommendations, listed in Table 1, are based on published literature [7,13,14] and the consensus opinion of the committee.

**Table 1.** Recommended intervals for initial follow-up imaging of ectatic aortas and abdominal aortic aneurysms

Aortic Diameter (mm)	Imaging Interval
2.5-2.9	5 y
3.0-3.4	3 y
3.5-3.9	2 y
4.0-4.4	1 y
4.5-4.9	6 mo*
5.0-5.5	3-6 mo*

Note: For abdominal aortic diameters  $<2.5$  cm, follow-up is generally thought to be unnecessary. Because the rupture of smaller abdominal aortic aneurysms is less likely, we recommend longer intervals between follow-up examinations. Follow-up intervals may vary depending on comorbidities and the growth rate of the aneurysm.

\*In addition to planning follow-up imaging, one should also consider surgical or endovascular referral.

### Penetrating Aortic Ulcer (PAU)

Penetrating aortic ulcers (PAUs) represent disruption of atherosclerotic plaque with penetration of luminal blood for variable distances into or through the aortic wall. They may present with acute symptoms and findings, but they may also be recognized as chronic, asymptomatic, incidental findings. A PAU may progress to an intramural hematoma, a focal dissection, or a pseudoaneurysm and rupture, or it may completely resolve [15]. It is typically seen in elderly patients with atherosclerosis, and because the symptoms of a rupturing PAU may be insidious, it may be difficult to determine by imaging alone if it is causing a patient's symptoms or is incidental. It also may be difficult to differentiate PAU from asymptomatic aortic conditions such as saccular pseudoaneurysms and true aneurysms on the basis of imaging alone. Studies have shown that the natural history of PAU is variable, unpredictable, and may be one of progressive enlargement resulting in rupture. Because the lack of symptoms does not necessarily imply stability, we recommend annual follow-up when asymptomatic and more frequent follow-up if symptoms arise [16], with consideration of surgical or endovascular intervention.

Dissections and intramural hematomas are almost always symptomatic and, therefore, are not usually incidental findings and are not further discussed in this white paper.

### Iliac Artery Aneurysm

Aneurysms involve common and internal iliac arteries more commonly than external iliac arteries. Iliac artery aneurysm is defined as a vessel diameter  $\geq 1.5$  times the normal iliac artery diameter or  $\geq 2.5$  cm in diameter. Iliac artery aneurysms are rare in isolation; Lawrence et al [17] reported a prevalence of 6.58 per 100,000 hospitalized men and 0.26 per 100,000 hospitalized women in the United States. Aneurysms that are  $<3.0$  cm in diameter tend to be asymptomatic, rarely rupture, and expand slowly; those that are 3.0 to 3.5 cm should be followed up with cross-sectional imaging initially at about 6 months. If stable, repeat scan-

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