

# What's the best test for renal artery stenosis in patients with refractory hypertension?

## Evidence-based answer

Magnetic resonance angiography (MRA) and computed tomography angiography (CTA) are the most consistently accurate, noninvasive screening methods. MRA is

likely the preferred option because of its lack of radiation and reduced risk of contrast media (strength of recommendation [SOR]: A, large meta-analyses).

## Evidence summary

Significant renal artery stenosis (RAS) is defined anatomically as >50% stenosis of the lumen by renal angiography; stenosis is considered hemodynamically significant (potentially causing renovascular hypertension) if it exceeds 75%.<sup>1</sup> The prevalence of renovascular hypertension among the general hypertensive population varies from 1% to 5%. The prevalence increases to 20% to 40% in the presence of certain clinical criteria:

- hypertension in patients <30 years
- worsening or sudden onset of hypertension in patients >50 years
- hypertension refractory to multiple medications
- malignant hypertension
- worsening renal function after

starting an angiotensin-converting enzyme inhibitor (ACE-I).<sup>2,3</sup> (Worsening renal function is defined as >30% decline in estimated glomerular filtration rate or >30% increase in serum creatinine during the first 2 months of ACE-I therapy.<sup>1</sup>)

Refractory hypertension associated with generalized atherosclerosis is the most predictive risk factor for RAS.

## MRA is usually best, but don't overlook ultrasound

Among the primary diagnostic tests for RAS (see **TABLE W1** on page 216a), MRA is the most consistently accurate<sup>4</sup> and least operator dependent—which makes it the best choice in most situations. One rare but serious concern with MRA is that contrast agents may cause nephrogenic systemic fibrosis (NSF), a debilitating and sometimes fatal diffuse disease affecting the skin, muscle, and internal organs. In 2006, 25 cases of NSF after exposure to gadolinium-based contrast agents were reported, prompting an FDA warning.<sup>5</sup>

Kidney duplex Doppler ultrasound can rival MRA and CTA in accuracy, but is highly operator dependent. If access to highly skilled, experienced technicians is available, this safe and less expensive option can be considered, especially for patients with chronic kidney disease.

## Recommendations

The American College of Radiology recommends stratifying patients into 3 groups:

- high index of suspicion with nor-

Michael Stevenson, MD  
Brian Crownover, MD  
Nellis Family Medicine Residency,  
Nellis Air Force Base, Nev

Leslie Mackler, MSLS  
Director, Moses Cone Health  
System Library, Greensboro, NC

## FAST TRACK

**Refractory hypertension associated with generalized atherosclerosis is the most predictive risk factor for renal artery stenosis.**

mal renal function

- high index of suspicion with diminished renal function
- low index of suspicion.

Recommendations include:

- MRA or CTA for high suspicion with normal renal function
- MRA or ultrasonography for high suspicion with impaired renal function
- All methods equally inappropriate if suspicion is low.<sup>3</sup>

Cost-effectiveness was not evaluated in the meta-analysis used to derive the guidelines.

The National Kidney Foundation recommends MRA and CTA as accurate, noninvasive, and consistent means of diagnosing RAS. The foundation also recommends duplex ultrasonography as a less invasive and less expensive alternative when local expertise is available. The guidelines include a moderately predictive rule for identifying patients who should be screened for renovascular hypertension—that is, patients with intermediate or high pretest probability ([www.kidney.org/professionals/kdoqi/guidelines\\_bp/guide\\_4.htm](http://www.kidney.org/professionals/kdoqi/guidelines_bp/guide_4.htm)).<sup>1</sup>

The American College of Cardiology and the American Heart Association list advantages and disadvantages of each

diagnostic method and recommend choosing the one that is best suited to the patient.<sup>6</sup> ■

#### Acknowledgments

The opinions and assertions contained herein are the private view of the authors and are not to be construed as official, or as reflecting the view of the US Air Force Medical Service or the US Air Force at large.

#### References

1. National Kidney Foundation. *KDOQI Clinical Practice Guidelines on Hypertension and Antihypertensive Agents in Chronic Kidney Disease*. Guideline 4: Evaluation for Renal Artery Disease. 2004. Available at: [www.kidney.org/professionals/Kdoqi/guidelines\\_bp/guide\\_4.htm](http://www.kidney.org/professionals/Kdoqi/guidelines_bp/guide_4.htm). Accessed July 28, 2008.
2. Vasbinder GB, Nelemans PJ, Kessels AG, et al. Diagnostic tests for renal artery stenosis in patients suspected of having renovascular hypertension: a meta-analysis. *Ann Intern Med*. 2001;135:401-411.
3. Kawashima A, Francis IR, Baumgarten DA, et al, for the Expert Panel on Urologic Imaging. *Renovascular Hypertension*. 2007. Available at: [www.guideline.gov/summary/summary.aspx?view\\_id=1&doc\\_id=11590](http://www.guideline.gov/summary/summary.aspx?view_id=1&doc_id=11590). Accessed July 28, 2008.
4. Tan KT, van Beek EJ, Brown PW, et al. Magnetic resonance angiography for the diagnosis or renal artery stenosis: a meta-analysis. *Clin Radiol*. 2002;57:617-624.
5. US Food and Drug Administration. *Information for Healthcare Professionals. Gadolinium-Based Contrast Agents for Magnetic Resonance Imaging*. Available at: [www.fda.gov/cder/drug/InfoSheets/HCP/gcca\\_200705.htm](http://www.fda.gov/cder/drug/InfoSheets/HCP/gcca_200705.htm). Accessed July 28, 2008.
6. Hirsch AT, Haskal ZJ, Hertzler NR, et al. *American College of Cardiology/American Heart Association 2005 Guidelines for the Management of Patients with Peripheral Arterial Disease (Lower Extremity, Renal, Mesenteric, and Abdominal Aortic): A Collaborative Report*. 2005. Available at: [www.guideline.gov/summary/summary.aspx?doc\\_id=8503&nbr=004740&string=Hirsch](http://www.guideline.gov/summary/summary.aspx?doc_id=8503&nbr=004740&string=Hirsch). Accessed July 28, 2008.

#### FAST TRACK

**Kidney duplex Doppler ultrasound can rival MRA and CTA in accuracy, but is highly operator dependent.**

THE JOURNAL OF  
**FAMILY  
PRACTICE**

**CLINICAL INQUIRIES**  
online this month at [www.jfponline.com](http://www.jfponline.com)

- Do abnormal fetal kick counts predict intrauterine death in average-risk pregnancies?
- What is the role of prokinetic agents for constipation?

Get the answers to these Clinical Inquiries by going to [www.jfponline.com](http://www.jfponline.com) and clicking on "Online Exclusives" in the left-hand navigation bar.

**TABLE W1****Diagnostic tests for renovascular hypertension**

<b>TEST</b>	<b>COMPOSITE RATING</b>	<b>SENSITIVITY</b>	<b>SPECIFICITY</b>	<b>SPECIAL CONSIDERATIONS</b>
<b>MRA</b>	1	94%-97% <sup>4</sup>	85%-93% <sup>4</sup>	No radiation; expensive; small risk of nephrogenic systemic fibrosis from gadolinium contrast agents
<b>CTA</b>	2	88%-96% <sup>3</sup>	77%-98% <sup>3</sup>	Similar accuracy to MRA; moderate radiation exposure; requires iodinated contrast media
<b>US duplex Doppler</b>	3	0%-90% <sup>3</sup>	95% <sup>3</sup>	Noninvasive; highly operator dependent
<b>ACE-I renography/scintigraphy</b>	4	58%-95% <sup>2</sup>	17%-100% <sup>2</sup>	Noninvasive; can be used in renal insufficiency; high radiation exposure; literature is not uniform regarding techniques and interpretation criteria
<b>Invasive arteriography</b>	5	—	—	Gold standard; invasive; better used as confirmation than screening
<b>Invasive renal vein renin assays</b>	6	65%-74% <sup>3</sup>	100% <sup>3</sup>	Good confirmatory test; invasive; possibility of sampling error

ACE-I, angiotensin-converting enzyme inhibitor; CTA, computed tomography angiography; MRA, magnetic resonance angiography; US, ultrasound.