Indications of Coronary Angiography

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Indications for cardiac catheterization

◆ **Before a decision to perform an invasive procedure such as cardiac catheterization, the operator should conduct a thorough review of the patient's symptoms, traditional risk factors, physical examination findings, laboratory test results, resting 12-lead electrocardiogram (ECG), and additional cardiac noninvasive test results, where applicable.**

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◆ **A planned interventional procedure should include careful consideration of the:**

1. **Anticipated benefit of the procedure.**

2. **Potential treatment alternatives**

3. **Risk of proceeding versus the risk of alternative treatments**

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Common diagnostic catheterization laboratory procedures

Procedure	Goals of procedure
Left heart catheterization	Evaluation of systemic and left ventricular pressures and assessment of transvalvular aortic pressure gradient
Right heart catheterization	Evaluation of right-sided cardiac pressures, pulmonary artery pressures, pulmonary capillary wedge pressure, and cardiac output. Can also include vasodilator challenges to evaluate transpulmonic gradients.
Coronary angiography	Evaluation of presence, location, and severity of coronary artery disease; can include visualization of arterial and venous bypass grafts.
Left ventriculography	Evaluation of left ventricular function, mitral regurgitation, and ventricular defects.
Endomyocardial biopsy	Evaluation of transplant rejection and primary myocardial disease.
Peripheral angiography	Evaluation of presence, location, and severity of peripheral arterial disease (including anomalous anatomy).

Known or suspected CAD who are currently a symptomatic or have stable angina *(Class I and III only)*

I	IIa	IIb	III

B **A** **B**
- CCS class III and IV angina on medical treatment
- High-risk criteria on noninvasive testing regardless of anginal severity
- Patients who have been successfully resuscitated from sudden cardiac death or have sustained (>30 seconds) monomorphic ventricular tachycardia or non-sustained (<30 seconds) polymorphic ventricular tachycardia

C
- Angina in patients who are not candidates for coronary revascularization or in whom revascularization is not likely to improve quality or duration of life

C
- As a screening test for CAD in asymptomatic patients

C
- After CABG or angioplasty when there is no evidence of ischemia on noninvasive testing

C
- Coronary calcification on fluoroscopy, electron beam computed tomography, or other screening tests without criteria listed above

Known or suspected CAD who are currently a symptomatic or have stable angina *(Class I and III only)*
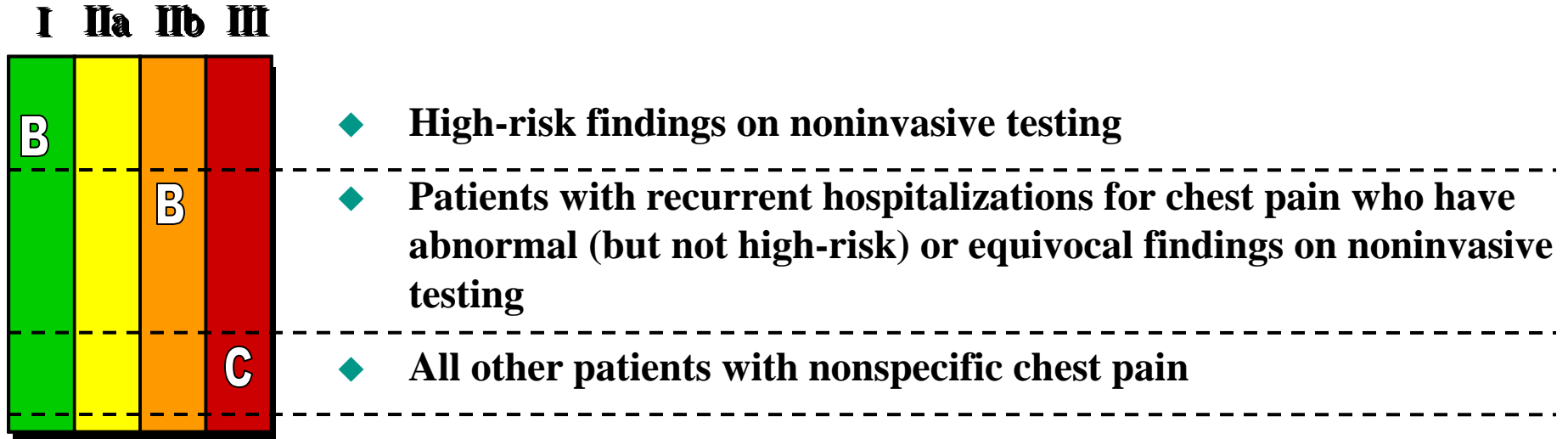
Class IIa:

1- CCS class III or IV angina, which improves to class I or II with medical therapy *(level of evidence: C).*

2- Serial non-invasive testing with identical testing protocols, at the same level of medical therapy, showing progressively worsening abnormalities *(level of evidence: C).*

3- Patients with angina and suspected coronary disease who, due to disability, illness, or physical challenge, cannot be adequately risk stratified by other means *(level of evidence: C).*

4- CCC class I or II angina with intolerance to adequate medical therapy or with failure to respond, or patients who have recurrence of symptoms during adequate medical therapy *(level of evidence: C).*

5- Individual whose occupation involves the safety of others (e.g, pilors, bus drivers, etc) who have abnormal but not high-risk stress test results or multiple clinical features that suggest high risk *(level of evidence: C).*

Known or suspected CAD who are currently a symptomatic or have stable angina *(Class I and III only)*

### Class IIb:

1- CCS class I or II angina with demonstrable ischemia but no high-risk criteria on non-intensive testing *(level of evidence: C).*

2- Asymptomatic man or postmenopausal woman without known coronary heart disease with $\geq$2 major clinical risk factors and abnormal but not high-risk criteria on non-invasive testing (performed for indications stated in the ACC/AHA non intensive testing guidelines) *(level of evidence: C).*

3- Asymptomatic patients with prior MI with normal resting left ventricular function and ischemia or non intensive testing but without high-risk criteria *(level of evidence: C).*

4- Periodic evaluation after cardiac transplantation *(level of evidence: C).*

5- Candidate for liver, lung, or renal transplant $\geq$40 years old as part of evaluation for transplantation *(level of evidence: C).*

Patients With Nonspecific Chest Pain

I	IIa	IIb	III
B			
		B	
			C

◆ **High-risk findings on noninvasive testing**

◆ **Patients with recurrent hospitalizations for chest pain who have abnormal (but not high-risk) or equivocal findings on noninvasive testing**

◆ **All other patients with nonspecific chest pain**

Patients With Unstable Acute Coronary Syndromes *(Class I and III only)*

I	IIa	IIb	III
B			
A			
			C
			C
			C
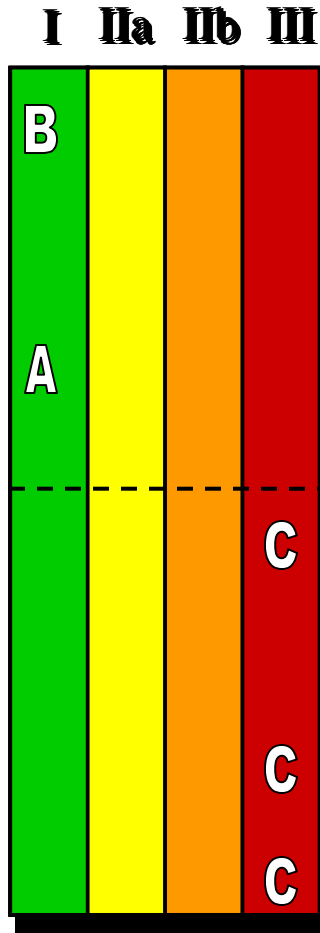
- ◆ An early invasive strategy (i.e., diagnostic angiography with intent to perform revascularization) is indicated in UA/NSTEMI patients who have refractory angina or hemodynamic or electrical instability (without serious comorbidities or contraindications to such procedures)

- ◆ An early invasive strategy is indicated in initially stabilized UA/NSTEMI patients (without serious comorbidities or contraindications to such procedures) who have an elevated risk for clinical events

- ◆ An early invasive strategy is not recommended in patients with extensive comorbidities (e.g., liver or pulmonary failure, cancer), in whom the risks of revascularization and comorbid conditions are likely to outweigh the benefits of revascularization

- ◆ An early invasive strategy is not recommended in patients with acute chest pain and a low likelihood of ACS

- ◆ An early invasive strategy should not be performed in patients who will not consent to revascularization regardless of the findings

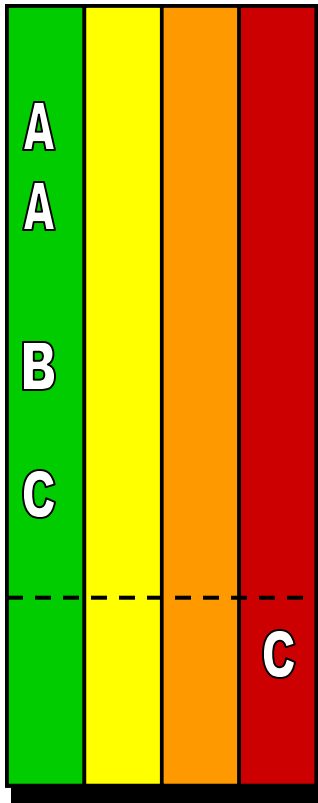# Patients With Unstable Acute Coronary Syndromes *(Class I and III only)*

Class IIa:

None.

Class IIb:

Low short term risk unstable angina, without high-risk criteria on non invasive testing *(level of evidence: C).*

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Patients With STEMI *(Class I and III only)*

I   IIa   IIb   III

A
A
B
C

◆ **Diagnostic coronary angiography should be performed:**

    a.   **In candidates for primary or rescue PCI**

    b.   **In patients with cardiogenic shock who are candidates for revascularization**

    c.   **In candidates for surgical repair of ventricular septal rupture (VSR) or severe MR**

    d.   **In patients with persistent hemodynamic and/or electrical instability**

C

◆ **Coronary angiography should not be performed in patients with extensive comorbidities in whom the risks of revascularization are likely to outweigh the benefits**

Patients With Post-revascularization Ischemia *(Class I and III only)*

I	IIa	IIb	III
B			
C			
			C
			C
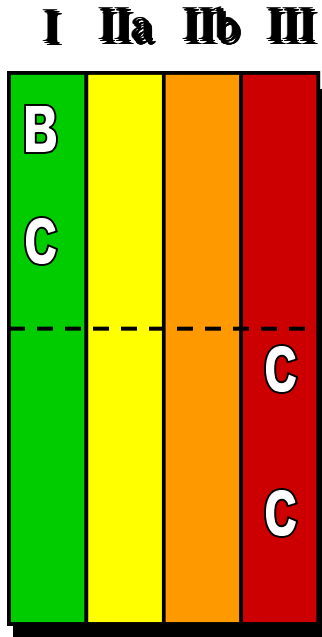
- ◆ Suspected abrupt closure or subacute stent thrombosis after percutaneous revascularization.

- ◆ Recurrent angina or high-risk criteria on noninvasive evaluation within 9 months of percutaneous revascularization

- ◆ Symptoms in a post bypass patient who is not a candidate for repeat revascularization

- ◆ Routine angiography in asymptomatic patients after percutaneous transluminal coronary angioplasty (PTCA) or other surgery, unless as part of an approved research protocol

Patients With Post-revascularization Ischemia *(Class I and III only)*

Class IIa:

1- Recurrent symptomatic ischemia within 12 months of coronary artery bypass graft *(level of evidence: B).*

2- Noninvasive evidence of high-risk criteria at any time postoperatively *(level of evidence: B).*

3- Recurrent angina inadequately controlled by medical means after revascularization *(level of evidence: C).*

Class IIb:

1- Asymptomatic post-PTCA patient suspected of having restenosis within the first month after angioplasty because of an abnormal noninvasive test result but without noninvasive high-risk criteria *(level of evidence: B).*

2- Recurrent angina without high-risk criteria on noninvasive testing occurring >1 year postoperatively *(level of evidence: C).*

3- Asymptomatic post-bypass patient in whom a deterioration in serial noninvasive testing has been documented but who is not at high risk on noninvasive testing *(level of evidence: C).*

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Perioperative Evaluation Before (or After) Noncardiac Surgery *(Class I and III only)*

I	IIa	IIb	III

C ◆ **Evidence for high risk of adverse outcome based on noninvasive test results**

C ◆ **Angina unresponsive to adequate medical therapy**

C ◆ **Unstable angina, particularly when facing intermediate or high-risk noncardiac surgery**

C ◆ **Equivocal noninvasive test result in a high-clinical- risk in patients**

B ◆ **Low-risk noncardiac surgery, with known CAD and no high-risk results on noninvasive testing**

C ◆ **Asymptomatic after coronary revascularization with excellent exercise capacity (>7 METs)**

B ◆ **Mild stable angina with good left ventricular function and no high-risk noninvasive test results**

C ◆ **Noncandidate for coronary revascularization owing to concomitant medical illness, severe left ventricular dysfunction (eg, LVEF <0.20), or refusal to consider revascularization.**

C ◆ **Candidate for liver, lung, or renal transplant >40 years old as part of evaluation for transplantation, unless noninvasive testing reveals high risk for adverse outcome**

Perioperative Evaluation Before (or After) Noncardiac Surgery *(Class I and III only)*

Class IIa:

1- **Multiple intermediate-clinical-risk markers and planned vascular surgery** *(level of evidence: B).*

2- **Ischemic on noninvasive testing but without high-risk criteria** *(level of evidence: B).*

3- **Equivocal noninvasive test result in intermediate-clinical-risk patient undergoing high-risk non-cardiac surgery** *(level of evidence: C).*

4- **Urgent non-cardiac surgery while convalescing from acute MI** *(level of evidence: C).*

Class IIb:

1- **Perioperative MI** *(level of evidence: B).*

2- **Medically stabilized class III or IV angina and planned low-risk or minor surgery** *(level of evidence: C).*

Patients With Valvular Heart Disease *(Class I and III only)*

I   IIa   IIb   III

B ◆ Before valve surgery or balloon valvotomy in an adult with chest discomfort, ischemia by noninvasive imaging, or both

C ◆ Before valve surgery in an adult free of chest pain but of substantial age and/or with multiple risk factors for coronary disease

C ◆ Infective endocarditis with evidence of coronary embolization

C ◆ Before cardiac surgery for infective endocarditis when there are no risk factors for coronary disease and no evidence of coronary embolization

C ◆ In asymptomatic patients when cardiac surgery is not being considered

C ◆ Before cardiac surgery when preoperative hemodynamic assessment by catheterization is unnecessary, and there is neither preexisting evidence of coronary disease nor risk factors for CAD

Source: Scanlon PJ et al. ACC/AHA Guidelines for Coronary Angiography: Executive Summary and Recommendations. A Report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines (Committee on Coronary Angiography). *Circulation 1999;99;2345-2357*

Patients With Valvular Heart Disease *(Class I and III only)*

Class IIa:

None.

Class IIb:

During left-heart catheterization performed for hemodynamic evaluation before aortic or mitral valve surgery in patients without preexisting evidence of coronary disease, multiple CAD risk factors, or advanced age (level of evidence C).

Patients With Congenital Heart Disease *(Class I and III only)*

I	IIa	IIb	III	
C				◆ **Before surgical correction of congenital heart disease when chest discomfort or noninvasive evidence is suggestive of associated CAD**
C				◆ **Before surgical correction of suspected congenital coronary anomalies such as congenital coronary artery stenosis, coronary arteriovenous fistula, and anomalous origin of left coronary artery**
C				◆ **Forms of congenital heart disease frequently associated with coronary artery anomalies that may complicate surgical management**
B				◆ **Unexplained cardiac arrest in a young patient**
			C	◆ **In the routine evaluation of congenital heart disease in asymptomatic patients for whom heart surgery is not planned**

Source: Scanlon PJ et al. ACC/AHA Guidelines for Coronary Angiography: Executive Summary and Recommendations. A Report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines (Committee on Coronary Angiography). *Circulation 1999;99;2345-2357*

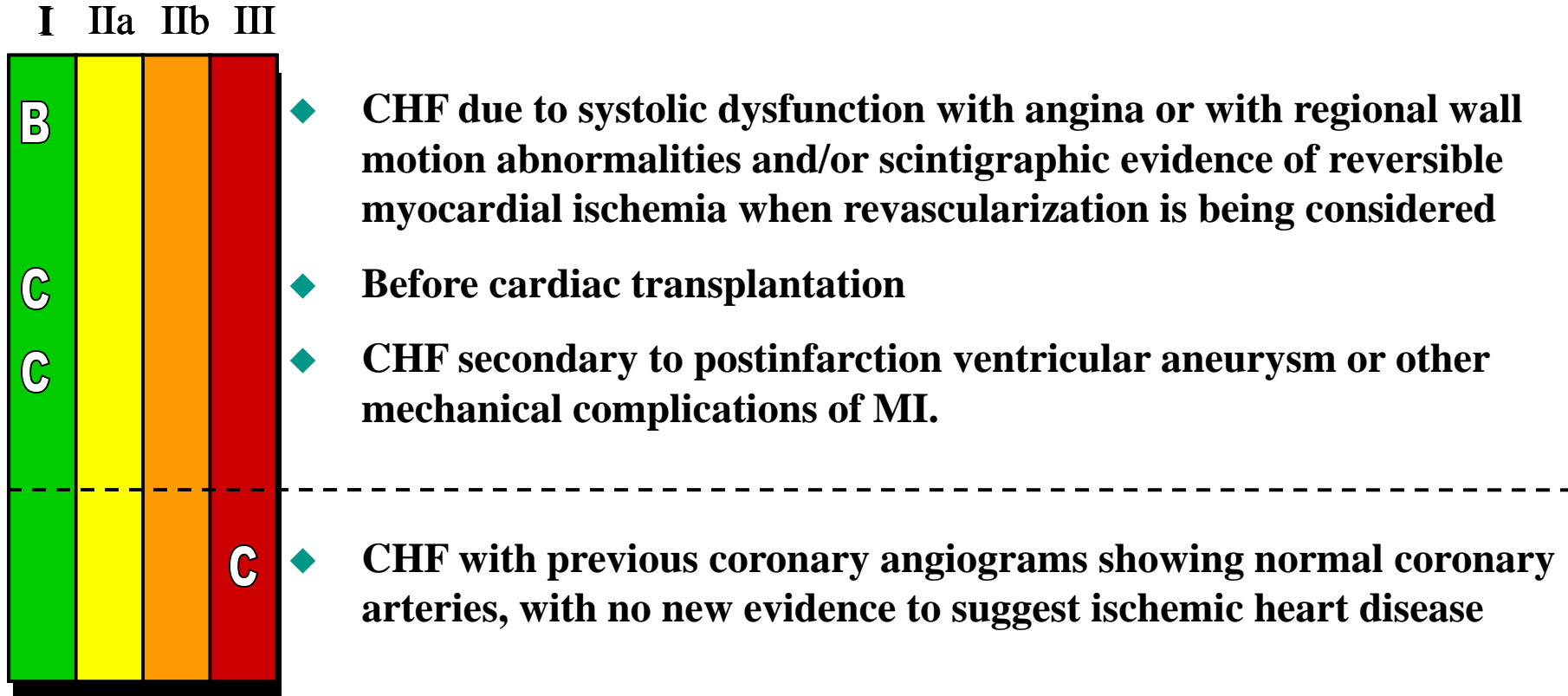## Patients With Congenital Heart Disease *(Class I and III only)*

Class IIa:

After corrective open heart surgery for congenital heart disease in an adult whose risk profile increases the likelihood of coexisting coronary disease *(level of evidence: C).*

Class IIb:

During left-heart catheterization for hemodynamic assessment of congenital heart disease in an adult in whom the risk of coronary disease is not high *(level of evidence: C).*

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Patients With CHF *(Class I and III only)*

I	IIa	IIb	III
B			
C			
C			

◆ **CHF due to systolic dysfunction with angina or with regional wall motion abnormalities and/or scintigraphic evidence of reversible myocardial ischemia when revascularization is being considered**

◆ **Before cardiac transplantation**

◆ **CHF secondary to postinfarction ventricular aneurysm or other mechanical complications of MI.**

I	IIa	IIb	III
			C

◆ **CHF with previous coronary angiograms showing normal coronary arteries, with no new evidence to suggest ischemic heart disease**

Patients With CHF *(Class I and III only)*

Class IIa:

1- Systolic dysfunction with unexplained cause despite non-invasive testing *(level of evidence: C).*

2- Normal systolic function, but episodic heart failure raises suspicion of ischemically mediated left ventricular dysfunction *(level of evidence: C).*

Class IIb:

None.

Recommendations for use of coronary angiography in other conditions:

Class I:

1- Diseases affecting the aorta when knowledge of the presence or extent of coronary artery involvement is necessary for management (e.g aortic dissection or aneurysm with known coronary disease) (level of evidence: B).

2- Hypertrophic cardiomyopathy with angina despite medical therapy when knowledge of coronary anatomy might affect therapy (level of evidence: C).

3- Hypertrophic cardiomyopathy with angina when heart surgery is planned (level of evidence: B).

Class IIa:

1- High risk for coronary disease when other cardiac surgical procedures are planned (e.g. pericardiectomy or removal of chronic pulmonary emboli) (level of evidence: C).

2- Prospective immediate cardiac transplant donors whose risk profile increases the likelihood of coronary disease (level of evidence: B).

3- Asymptomatic patients with Kawasaki disease who have coronary artery aneurysms on echocardiography (level of evidence: B).

4- Before surgery for acute aneurysm/dissection in patients without known coronary disease.

5- Recent blunt chest trauma and suspicion of acute MI, without evidence of preexisting CAD (level of evidence: C).

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Contraindications

◆ **There are no absolute contraindications to cardiac catheterization**

◆ **Relative contraindications include:**

  ◆ **Coagulopathy (Radial approach can be attempted based on urgency)**

  ◆ **Decompensated congestive heart failure**

  ◆ **Uncontrolled hypertension**

  ◆ **Pregnancy**

  ◆ **Inability for patient cooperation**

  ◆ **Active infection**

  ◆ **Renal failure**

  ◆ **Contrast medium allergy**

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Thank You