Interventional Cardiology
Certification Examination Blueprint

**Purpose of the exam**

The exam is designed to evaluate the knowledge, diagnostic reasoning, and clinical judgment skills expected of the certified interventional cardiologist in the broad domain of the discipline. The ability to make appropriate diagnostic and management decisions that have important consequences for patients will be assessed. The exam may require recognition of common as well as rare clinical problems for which patients may consult a certified interventional cardiologist.

**Exam content**

Exam content is determined by a pre-established blueprint, or table of specifications. The blueprint is developed by ABIM and is reviewed annually and updated as needed for currency. Trainees, training program directors, and certified practitioners in the discipline are surveyed periodically to provide feedback and inform the blueprinting process.

The primary medical content categories of the blueprint are shown below, with the percentage assigned to each for a typical exam:

<table>
<thead>
<tr>
<th>Medical Content Category</th>
<th>% of Exam</th>
</tr>
</thead>
<tbody>
<tr>
<td>Case Selection and Management</td>
<td>20%</td>
</tr>
<tr>
<td>Procedural Techniques</td>
<td>20%</td>
</tr>
<tr>
<td>Complications of Coronary Intervention</td>
<td>8%</td>
</tr>
<tr>
<td>Catheter-Based Management of Noncoronary Disease</td>
<td>13%</td>
</tr>
<tr>
<td>Basic Science</td>
<td>6%</td>
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<tr>
<td>Anatomy, Anatomic variants, Anatomic pathology</td>
<td>6%</td>
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<tr>
<td>Pharmacology</td>
<td>12%</td>
</tr>
<tr>
<td>Cardiac Imaging and Assessment</td>
<td>9%</td>
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<tr>
<td>Miscellaneous</td>
<td>6%</td>
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</tbody>
</table>

Exam questions in the content areas above may also address topics requiring the understanding and integration of results of significant clinical trials.
Exam format

The exam is composed of multiple-choice questions with a single best answer, predominantly describing patient scenarios. Questions ask about the work done (that is, tasks performed) by physicians in the course of practice:

- Making a diagnosis
- Ordering and interpreting results of tests
- Recommending treatment or other patient care
- Assessing risk, determining prognosis, and applying principles from epidemiologic studies
- Understanding the underlying pathophysiology of disease and basic science knowledge applicable to patient care

Some questions require interpretation of pictorial material, such as coronary angiograms, ventriculograms, intravascular ultrasound images, nuclear perfusion studies, computed tomograms, magnetic resonance images, electrocardiograms, echocardiograms, and peripheral vascular imaging studies.

A tutorial including examples of ABIM exam question format can be found at http://www.abim.org/certification/exam-information/interventional-cardiology/exam-tutorial.aspx.

The blueprint can be expanded for additional detail as shown below. Each of the medical content categories is listed there, and below each major category are the content subsections and specific topics that may appear in the exam. Please note: actual exam content may vary.

<table>
<thead>
<tr>
<th>Case Selection and Management</th>
<th>20% of Exam</th>
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</thead>
<tbody>
<tr>
<td>Chronic ischemic heart disease</td>
<td>6%</td>
</tr>
<tr>
<td>Clinical characteristics (demographics and comorbidities)</td>
<td></td>
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<tr>
<td>Laboratory abnormalities and cardiac catheterization</td>
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<tr>
<td>(hematology, coagulation, and chemistry)</td>
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<tr>
<td>Renal insufficiency and cardiac catheterization</td>
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<tr>
<td>Noninvasive testing before diagnostic catheterization</td>
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<tr>
<td>Selection of treatment modality</td>
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<tr>
<td>Interventional therapy</td>
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<tr>
<td>Surgical therapy</td>
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<tr>
<td>Medical therapy</td>
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<tr>
<td>Preoperative cardiac evaluation for noncardiac surgery</td>
<td></td>
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<tr>
<td>Preoperative revascularization before noncardiac surgery</td>
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</tbody>
</table>
Unstable angina and non–ST-segment elevation myocardial infarction (UA and NSTEMI) 4%
- Evaluation and risk stratification of the UA and NSTEMI patient
- UA/NSTEMI—pharmacologic management
- UA/NSTEMI—timing of cardiac catheterization
- UA/NSTEMI—percutaneous coronary intervention (PCI)

ST-segment elevation myocardial infarction (STEMI) 6%
- STEMI systems of care
- Primary PCI—procedure
- Primary PCI—stents
- Primary PCI—thrombectomy
- Primary PCI—outcomes
- Right ventricular infarction
- Multivessel PCI
- Primary PCI following cardiopulmonary arrest
- STEMI—differential diagnosis
- Acute aortic dissection
- Therapeutic hypothermia
- Fibrinolytic therapy
- Transfer for PCI
- Rescue PCI
- Surgical therapy in STEMI
- Medical management after STEMI

STEMI complications 4%
- Shock
- Electrophysiologic complications
- Emergency pacing
- Acute respiratory distress
- Mechanical complications (mitral regurgitation [MR], ventricular septal defect [VSD], rupture, pseudoaneurysm)
- Advanced Cardiovascular Life Support (ACLS)

<table>
<thead>
<tr>
<th>Procedural Techniques</th>
<th>20% of Exam</th>
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</thead>
<tbody>
<tr>
<td>Planning and execution of interventional procedures</td>
<td>5%</td>
</tr>
<tr>
<td>General decision-making</td>
<td></td>
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<tr>
<td>Access-site selection</td>
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<tr>
<td>Radial access</td>
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<tr>
<td>Femoral access</td>
<td></td>
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<tr>
<td>Other access sites (ulnar, brachial)</td>
<td></td>
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<tr>
<td>Vascular access closure devices</td>
<td></td>
</tr>
</tbody>
</table>
Pericardiocentesis
Right heart catheterization
Right ventricular biopsy

Lesion subsets
Ostial
Bifurcation
Long
Tortuous
Calcified
Restenosis
Complex single-vessel disease
Multivessel disease
Saphenous vein graft disease
Coronary artery bridge
PCI in the anomalous coronary
Left main
Chronic total occlusion

Selection and use of equipment
Guide catheters
Guidewires
Balloon catheters
Bare metal stents
Drug-eluting stents
Rotational atherectomy
Embolic protection devices
Intra-aortic balloon pump counterpulsation
Impella®
TandemHeart PTVA®
Extracorporeal membrane oxygenation (ECMO)

PCI technical troubleshooting and problem solving
Failure to engage guide catheter
Failure to cross lesion with guidewire
Failure to cross lesion with device
Failure to dilate lesion

Complications of Coronary Intervention
Cardiac
Coronary dissection
Abrupt closure of coronary artery
Stent thrombosis
Coronary thromboembolism
Air embolism
No reflow
Periprocedural myocardial infarction
Perforation
Tamponade

Noncardiac 3%
Systemic thromboembolism
Cerebrovascular complications
Bleeding and hemorrhage
Vascular access and major vessel dissection
Aortic dissection (due to PCI)
Acute limb ischemia

Catheter-Based Management of Noncoronary Disease 13% of Exam

Hemodynamics 2%
Arterial pressure evaluation
Right heart catheterization
Valvular stenosis
Valvular regurgitation
Shunt quantification

Evaluation and case selection in structural and valvular heart disease 6%
Structural heart disease
Mitral valve
Aortic valve
Pulmonic valve
Tricuspid valve
Hypertrophic cardiomyopathy
Patent foramen ovale
Atrial septal defect
Coarctation
Ventricular septal defect

Evaluation and case selection in noncardiac vascular disease 5%
Carotid disease
Subclavian disease
Aortic disease
Chronic aortic dissection
Renal artery stenosis
Iliac and femoral arterial disease
Peripheral interventional therapy
Ankle-brachial index
### Basic Science

**Vascular biology**
- Normal vascular biology
- Atherosclerosis
- Atherosclerotic plaque
- Vascular injury
- Vasoreactivity
- Reperfusion injury
- Effects of diabetes mellitus
- Restenosis after balloon percutaneous transluminal coronary angioplasty (PTCA)
- Restenosis after stent PCI
- Vascular remodeling
- Microvascular dysfunction

**Physiology**
- Clotting cascade
- Platelet function
- Thrombosis and thrombolysis
- Lipid metabolism and lipid abnormalities

### Anatomy, Anatomic variants, Anatomic pathology

**Cardiac**
- Normal coronary anatomy, dominance
- Anomalous left circumflex
- Anomalous left coronary
- Anomalous right coronary
- Indications for surgery for coronary anomalies
- Collateral vessels
- Coronary fistulae
- Coronary ectasia and aneurysm
- Other anatomic abnormalities
- Angiographic assessment of coronary flow (Thrombolysis in Myocardial Infarction Trial [TIMI] flow grade, TIMI frame count)
- Angiographic assessment of microcirculation (TIMI myocardial perfusion grade)
- Flow and perfusion effects of arterial spasm, or microembolization
- Left ventriculography
- Left ventricular dysfunction—stunning and hibernation
- Takotsubo syndrome
Surgical shunts and baffles

**Extracardiac**
- Aortic arch anatomy and variants
- Arterial anatomy of the cerebral vessels
- Arterial anatomy of the upper extremities and variants
- Arterial anatomy of the abdominal vessels
- Arterial anatomy of the lower extremities and variants
- Superior vena cava (SVC) and inferior vena cava (IVC) anatomy and variants

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**Pharmacology**

### General
- Vasopressors
- Inotropes
- Vasodilators
- Moderate sedation
- Reversal agents
- Local anesthetic agents
- Drug-eluting stent (DES) compounds
- Fibrinolytic agents
- Anti-arrhythmic agents
- Anti-anginal agents
- Anti-lipid agents

### Intravenous antiplatelet agents
- Eptifibatide
- Tirofiban
- Cangrelor

### Oral antiplatelet agents
- Aspirin
- Clopidogrel
- Prasugrel
- Ticagrelor
- Cilostazol
- Vorapaxar
- Platelet function testing (genotype and phenotype)

### Intravenous anticoagulants
- Unfractionated heparin
- Low-molecular-weight heparins
- Bivalirudin

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<table>
<thead>
<tr>
<th><strong>Oral anticoagulants</strong></th>
<th>&lt;2%</th>
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<tbody>
<tr>
<td>Warfarin</td>
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<tr>
<td>Novel oral anticoagulants</td>
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<thead>
<tr>
<th><strong>Contrast agents</strong></th>
<th>2%</th>
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<tbody>
<tr>
<td>Contrast physics</td>
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<tr>
<td>Osmolality and other properties</td>
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<tr>
<td>Contrast-induced nephropathy</td>
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<td>Contrast allergy and anaphylactoid reactions</td>
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### Cardiac Imaging and Assessment 9% of Exam

<table>
<thead>
<tr>
<th><strong>General tests</strong></th>
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<tbody>
<tr>
<td>Stress testing</td>
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<tr>
<td>Stress test imaging</td>
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<tr>
<td>Transthoracic echocardiography</td>
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<tr>
<td>Transesophageal echocardiography</td>
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<tr>
<td>Intracardiac echocardiography</td>
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<tr>
<td>Magnetic resonance imaging</td>
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<tr>
<td>Computed tomography angiography (CTA)</td>
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<tr>
<td>Structural cardiac imaging</td>
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<table>
<thead>
<tr>
<th><strong>Diagnostic coronary imaging</strong></th>
<th>5%</th>
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<tbody>
<tr>
<td>Catheter shapes and sizes</td>
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<tr>
<td>Angiographic views and techniques</td>
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<tr>
<td>Coronary lesion morphology (plaque, stenosis, thrombus)</td>
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<tr>
<td>Fractional flow reserve (FFR), instantaneous wave-free ratio (iFR), volumetric flow rate (VFR), and coronary flow reserve (CFR)</td>
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<tr>
<td>Intravascular ultrasonography (IVUS)</td>
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<tr>
<td>Optical coherence tomography (OCT)</td>
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<tr>
<td>Vulnerable plaque imaging</td>
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<thead>
<tr>
<th><strong>X-ray radiography</strong></th>
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<tbody>
<tr>
<td>Radiation physics and safety</td>
<td></td>
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<tr>
<td>Radiographic imaging chain</td>
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<tr>
<td>Radiation exposure parameters</td>
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<tr>
<td>Risks, injury, and methods of control</td>
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<tr>
<td>Equipment operation and imaging techniques</td>
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### Miscellaneous 6% of Exam

<table>
<thead>
<tr>
<th><strong>Ethical and legal issues and risks</strong></th>
<th>&lt;2%</th>
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<tbody>
<tr>
<td>Patient consent</td>
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<tr>
<td>Patient safety</td>
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</table>
Ethics and professionalism
Documentation requirements for operative and invasive procedures

**Procedure-related data**
- Statistics and literature interpretation
- Epidemiology
- Cost, cost-effectiveness, and quality of life

**Quality of care and appropriateness**
- Clinical quality measurement and performance improvement
- Appropriate use criteria (AUC)
- Adverse event reporting and device surveillance

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