Interventional Cardiology Blueprint

Certification Examination (CERT)

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:

Medical Content Category	% of Exam
Case Selection and Management	20%
Procedural Techniques	20%
Complications of Coronary Intervention	8%
Catheter-Based Management of Noncoronary Disease	13%
Basic Science	6%
Anatomy, Anatomic variants, Anatomic pathology	6%
Pharmacology	12%
Cardiac Imaging and Assessment	9%
Miscellaneous	6%
	100%

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

ABIM is committed to working toward health equity and believes that board-certified physicians should have an understanding of health care disparities. Therefore, health equity content that is clinically important to each discipline will be included in assessments, and the use of gender, race, and ethnicity identifiers will be re-evaluated.

Exam format

The exam is composed of up to 220 single-best-answer multiple-choice questions, of which approximately 35 are new questions that do not count in the examinee's score. Most questions describe patient scenarios and 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. Learn more information on how exams are developed.

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.

Case Selection and Management	**20%** of Exam

Chronic ischemic heart disease 6%

Clinical characteristics (demographics and comorbidities)
Laboratory abnormalities and cardiac catheterization
(hematology, coagulation, and chemistry)
Renal insufficiency and cardiac catheterization

Noninvasive testing before diagnostic catheterization	
Selection of treatment modality	
Interventional therapy	
Surgical therapy	
Medical therapy	
Preoperative cardiac evaluation for noncardiac surgery	
Preoperative revascularization before noncardiac surgery	
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	
Cardiac Arrest	
Electrophysiologic complications	
Emergency pacing	
Acute respiratory distress	
Mechanical complications (mitral regurgitation [MR], ventricular septal defect [VSD], rupture, pseudoaneurysm)	

Procedural Techniques	**20%** of Exam

Planning and execution of interventional procedures 5%

- General decision-making
- Access-site selection
- Radial access
- Femoral access
- Other access sites (ulnar, brachial)
- Vascular access closure devices
- Pericardiocentesis
- Right heart catheterization
- Right ventricular biopsy

Lesion subsets 6%

- 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 6%

- Guide catheters
- Guidewires
- Balloon catheters
- Bare metal stents
- Drug-eluting stents
- Plaque modifications (Rotational atherectomy, orbital atherectomy, lithotripsy laser)
- Embolic protection devices
- Intra-aortic balloon pump counterpulsation
- Impella®

TandemHeart PTVA®

Extracorporeal membrane oxygenation (ECMO)

PCI technical troubleshooting and problem solving 3%

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 — **8%** of Exam

Cardiac 5%

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 — **6%** of Exam

Vascular biology 4%

- 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 2%

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

Anatomy, Anatomic variants, Anatomic pathology — 6% of Exam

Cardiac 5%

- 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)
- 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
- Spontaneous Coronary Artery Dissection (SCAD)

Extracardiac <2%

- 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

Pharmacology	**12%** of Exam

General	3%
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	2%
Eptifibatide	
Tirofiban	
Cangrelor	
Oral antiplatelet agents	2%
Aspirin	
Clopidogrel	
Prasugrel	
Ticagrelor	
Cilostazol	
Platelet function testing (genotype and phenotype)	
Intravenous anticoagulants	2%
Unfractionated heparin	
Low-molecular-weight heparins	
Bivalirudi	
Oral anticoagulants	<2%
Warfarin	
Novel oral anticoagulants	
Contrast agents	2%
Contrast physics	
Osmolality and other properties	
Contrast-induced nephropathy	
Contrast allergy and anaphylactoid reactions	

Cardiac Imaging and Assessment — **9%** of Exam

General tests — 2%
- Stress testing
- Stress test imaging
- Transthoracic echocardiography
- Transesophageal echocardiography
- Intracardiac echocardiography
- Magnetic resonance imaging
- Computed tomography angiography (CTA)
- Structural cardiac imaging

Diagnostic coronary imaging — 5%
- Catheter shapes and sizes
- Angiographic views and techniques
- Coronary lesion morphology (plaque, stenosis, thrombus)
- Fractional flow reserve (FFR), instantaneous wave-free ratio (iFR), and coronary flow reserve (CFR)
- Intravascular ultrasonography (IVUS)
- Optical coherence tomography (OCT)
- Microvascular assessment (example, MINOCA)

X-ray radiography — 2%
- Radiation physics and safety
- Radiographic imaging chain
- Radiation exposure parameters
- Risks, injury, and methods of control
- Equipment operation and imaging techniques

Miscellaneous — **6%** of Exam

Ethical and legal issues and risks — <2%
- Patient consent
- Patient safety
- Ethics and professionalism
- Documentation requirements for operative and invasive procedures

Procedure-related data	3%
Statistics and literature interpretation	
Epidemiology	
Cost, cost-effectiveness, and quality of life	
Quality of care and appropriateness	2%
Clinical quality measurement and performance improvement	
Appropriate use criteria (AUC)	
Adverse event reporting and device surveillance	
Heart Team Approach	

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