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Examination Overview

RCES

Registered Cardiac Electrophysiology Specialist

Courtesy St. David's Medical Center

Registered Cardiac Electrophysiology Specialist (RCES)

This Examination Overview is meant to assist you as a prospective candidate of the Registered Cardiac Electrophysiology Specialist (RCES) credentialing program. It provides an overview of the Qualification Requirements and Examination Content. For more details on CCI policies, the testing process, and procedures to submit an application, please visit www.cci-online.org to view or download the Applicant Handbook. **Examination fee is $365 USD and all exam fees include a $100 USD non-refundable filing fee.**

Qualification Requirements

All applicants must meet the following criteria:

1. Have a high school diploma or general education diploma at the time of application.
2. Fulfill one (1) of the qualifications of the exam for which you are applying. See qualifications listed in the tables below.
3. Provide typed documentation to support the qualification prerequisite under which you are applying. Required documentation for each qualification is listed below. CCI reserves the right to request additional information.

Qualification Prerequisite (All applicants must fulfill one of the following)	Supporting Documentation
RCES1** Two years of full-time or full-time equivalent work experience in diagnostic and interventional cardiac electrophysiology. (It is anticipated, but NOT required that the successful candidate will have participated in a minimum of 200 diagnostic/ interventional cardiac electrophysiology procedures and 300 device implants at the time of application.) It is recommended, but not a requirement, that the applicant have experience in the following areas: • Diagnostic/Interventional Procedures • Advanced Mapping • Device Implants (pacemaker, ICD, and CRT)	**RCES1**** Employment Verification Letter
RCES235** A graduate of a certificate or degree granting program or post-secondary educational program in a health science (includes, but not limited to, cardiovascular technology, ultrasound, radiologic technology, respiratory therapy, nursing or paramedic/EMT) **AND** One year full-time work experience in electrophysiology It is anticipated, but NOT required that the successful candidate will have participated in a minimum of 200 diagnostic/ interventional cardiac electrophysiology procedures and 300 device implants at the time of application in their career which is defined as work experience and/or clinical experience gained during a formal educational program. It is recommended, but not a requirement, that the applicant have experience in the following areas: • Diagnostic/Interventional Procedures • Advanced Mapping • Device Implants (pacemaker, ICD and CRT)	**RCES235**** Completion certificate and/or educational transcript **AND** Employment Verification Letter One year work experience must occur after graduation from a health science program. Time spent in an externship that is part of a formal education program would not count towards the one year work experience requirement.
RCES5 A graduate of a NON-programmatically accredited program in electrophysiology which has a minimum of one year of specialty training and includes a minimum of 800 clinical hours in the specialty in which the examination is being requested. *IMPORTANT: If an individual's clinical hours were completed after graduation or if the hours are not a requirement for their educational program, then those hours WOULD NOT count toward the 800-hour minimum under qualification RCES5. All clinical hours must be earned in a setting in which patients are being tested or medically treated.*	**RCES5** Completion certificate and/or educational transcript **AND** Student Verification Letter **AND** Clinical Experience Letter *Students applying to take examination prior to graduation will be required to submit this documentation*
RCES4 Applicant must be a graduate of a programmatically accredited* program in electrophysiology.	**RCES4** Completion certificate and/or educational transcript **AND** Student Verification Letter *Students applying to take examination prior to graduation will be required to submit this documentation*

* An accredited program is accredited by an agency recognized by the Council for Higher Education Accreditation (CHEA), United States Department of Education (USDOE), or Canadian Medical Association (CMA) that specifically conducts programmatic accreditation for cardiovascular technology, diagnostic cardiac sonography, or vascular technology.

**CCI now accepts employment verification for clinical industry employed allied health professionals (IEAHPs) who participate in cardiac electrophysiology, cardiac device, and device related procedures under the direct supervision of a physician.

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Examination Matrix

This examination matrix is provided to illustrate the general distribution of questions and the relative weight or emphasis given to a skill or content area on the examination.

Content Category	Approx. % of Examination
A. Conducting Pre-Procedural Activities	11%
B. Conducting Intra-Procedural Activities	37%
C. Performing Diagnostic Procedures	24%
D. Assisting with Therapeutic Procedures	23%
E. Conducting Post-Procedural Activities	5%
TOTAL	**100%**

Task List

The task list below describes the activities which a Registered Cardiac Electrophysiologist Specialist is expected to perform on the job. All examination questions are linked to these tasks.

Duties and Tasks	Approx. % of Exam
A Conducting Pre-Procedural Activities	**11%**
1 Prepare procedure room (e.g., equipment, radiation safety, sterile supplies)	
2 Review and validate patient and procedure information (e.g., laboratory results, medical records, history and physical, physician orders, patient consent, allergies, universal time-out)	
3 Perform patient identification	
4 Transport patient to procedure room	
5 Prepare patient for procedures (e.g., assess IV access, interrogate cardiac devices, position patient, patch placement, monitoring equipment)	
6 Prepare the procedural site (e.g., sterile technique, drape, insertion site)	
B Conducting Intra-Procedural Activities	**37%**
1 Implement patient comfort measures (e.g., sedation, temperature)	
2 Monitor patient vital signs	
3 Recognize pharmacologic effects of medications (e.g., mechanism of action, pharmacokinetics)	
4 Assist with vascular access	
5 Monitor inter-procedural labs values (e.g., ACT, glucose, ABG)	
6 Interrogate implanted devices (e.g., pacemakers, ICDs, CRTs, ILR)	
7 Interpret interrogated data from implanted devices	
8 Maintain aseptic and sterile technique	
9 Operate EP recording system and cardiac stimulator	
10 Operate 3D mapping system (e.g., set up, interpretation, troubleshooting)	
11 Troubleshoot hardware/software communication issues (e.g., connectology, noise, filters, cables, catheters)	
12 Ensure radiation safety (e.g., time, distance, shielding, ALARA)	
13 Assist in performing radiographic procedures (e.g., set-up, positioning, operation)	
14 Acquire/interpret radiographic and non-radiographic (e.g., MRI, ultrasound, 3D mapping system) images	

Duties and Tasks	Approx. % of Exam
C Performing Diagnostic Procedures	**24%**
1 Identify diagnostic catheter position	
2 Perform pacing stimulation (e.g., pacing threshold, baseline measurements, standard pacing protocols)	
3 Perform ECG/EGM measurements	
4 Analyze ECGs/EGMs	
5 Perform differential diagnostic techniques (e.g., pharmacological, vagal maneuvers, pacing maneuvers)	
6 Assist with intra-cardiac echocardiography (ICE) utilization	
D Assisting with Therapeutic Procedures	**23%**
1 Assist with transeptal access	
2 Assist with arrhythmia mapping (e.g., EGM/ECG analysis, activation, pace, entrainment mapping)	
3 Operate ablation equipment	
4 Monitor ablation parameters (e.g., time, temperature, impedance)	
5 Assist with pacemaker and defibrillator implant	
6 Assist with cardiac resynchronization therapy device implant	
7 Assist with subcutaneous cardiac device implant	
8 Assist with LAA closure device implant	
9 Assist with lead extraction	
10 Assist with procedural complications (e.g., pericardiocentisis, emergency pacing, esophageal temperature monitoring)	
E Conducting Post-Procedural Activities	**5%**
1 Obtain hemostasis (e.g., manual, closure devices, wound assessment, pulse assessment)	
2 Manage post-procedure complications (e.g., bleeding, heart block, rhythm changes, neurologic changes)	
3 Provide patient education	
4 Perform final patient assessment (e.g., vital signs, access site, pulses)	
5 Report and transfer of care	
TOTAL	**100%**

Registered Cardiac Electrophysiology Specialist (RCES)

Knowledge List

The list below describes general areas of knowledge that are needed in order to perform the tasks identified. This knowledge will apply across multiple tasks.

12-lead ECG placement and interpretation
Ablation physics
Arrhythmia recognition and diffrential diagnosis
ACLS
ACT equipment operation
General anatomy and physiology
Basic chemistry
Basic cardiac device technology
Basic electronics
Basic pharmacology
Basic radiology
Basic ultrasound
Biohazardous waste disposal
BLS
Body mechanics
Cabling connectology
Calibration of equipment
X-Ray camera angles
Cardiac action potential
Cardiac anatomy and physiology
Cardiovascular pathophysiology
Procedural equipment
Collection and handling of lab specimens
Congenital anomalies and EP (Ebstein's, ASD, etc.)
Normal and abnormal/critical lab values
Defibrillation theory
Device programmer operation(s)
Intracardiac electrogram (EGM) interpretation
Electrocautery
Basic electrophysiology theory and concepts
Basic cardiac device theory
Equipment operation and compatability and troubleshooting
Hemodynamics
Hemostasis
Image processing and interpretation
Implantable cardiac device systems
Indications for electrophysiology procedures
Regulatory and legal issues (orders, consent, power of attorney, etc.)
Magnetic fields
Mapping concepts
Mechanisms of arrhythmias
Medical terminology
Medication administration and dosages
Monitoring equipment operations and troubleshooting
MSDS
Normal and abnormal vital signs
Pain management
Patient care and assessment
Patient positioning
Phlebotomy
Potential complications for all procedures (symptoms, treatment, etc.)
Moderate sedation
Sterile techniques
Stimulation protocols
Universal protocol
Vascular intervention procedures

Sample Questions

1. **Phase 2 of the action potential is dependent on _____ influx.**
   a. Sodium
   b. Calcium
   c. Chloride
   d. Potassium
2. **_____ is a Class 1b antiarrhythmic.**
   a. Flecainide
   b. Mexiletine
   c. Propafenone
   d. Procainamide
3. **During LV pacing, one would expect the QRS in V1 to be mostly**
   a. Positive
   b. Biphasic
   c. Negative
   d. Isoelectric
4. **Which of the following programmed settings would be the safest and most efficient for a threshold that measured 2.0v @ 0.5 ms PW?**
   a. 2.0v @ 1.0 ms PW
   b. 2.5v @ .06 ms PW
   c. 4.0v @ 0.5 ms PW
   d. 4.0v @ 1.0 ms PW
5. **The doctor orders isoproterenol to infuse at 3mcg/min. If the concentration is 1 mg in 250 cc, what is the rate in cc/hour?**
   a. 4 cc/hour
   b. 12 cc/hour
   c. 45 cc/hour
   d. 60 cc/hour

Answers

1. b 2. b 3. a 4. c 5. c

Online Self-Assessment Practice Examinations are available for purchase for self-evaluation purposes. It is important to note that the results of the self-assessment exam do not guarantee or indicate individual success on the CCI exam, nor should the self-assessment serve as the only means for preparing for the CCI examination. **To order the self-assessment examinations online visit www.cci-online.org.**

CCI Applicant Handbook is required reading prior to applying for a CCI exam. Included is important information regarding the application policies, CCI procedures, and the testing process. **Download at www.cci-online.org/applicanthandbook.**

RCES References

The textbooks listed below are intended as recommended resources when preparing for examination. You may have previous or later editions of these or other references available that also present acceptable coverage of the subject matter. Any general text in cardiovascular techniques and evaluation, and cardiac patient care and management may be used. It is not necessary to use all of the texts identified. They are provided as suggestions only. CCI does not endorse or recommend any third-party review course or material.

1. American Heart Association (2016) *Advanced cardiac life support provider manual*
2. Ellenbogen K. A. & Wood, M. A.(2014) *Cardiac pacing and ICD's, 6th ed.* Pittsburgh, PA; Blackwell
3. Hayes, D.L., Asirvatham, S.J., Friedman, P.A. (2013) *Cardiac pacing, defibrillation and resynchronization: a clinical approach, 3rd ed.* Armonk, NY; Blackwell Publishing
4. Opie, L.H., (2013) *Drugs for the heart, 8th ed.* Saunders W.B./Elsevier
5. Wilbur, D. J., Packer, D., Stevenson. W.G. (2008) *Catheter ablation of cardiac arrhythmias; basic concepts and clinical applications, 3rd ed.* Malden, MA; Blackwell

The most recent editions of reference books are listed above. Applicants may have earlier editions that would be appropriate to study from.