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# Fetal Echo Review

**Fetal Echocardiography** A Q&A Review for the ARDMS Specialty Exam



Continuing Education Activity

Approved for **6** hours CME Credit

NIKKI C. STAHL

VALRIE KUNES

BRADLEY W. ROBINSON

# Fetal Echocardiography Review

Test yourself before the ARDMS tests you! *Fetal Echocardiography Review* illuminates the facts and principles on which you will be tested, hones your test-taking skills, and reveals your strengths and weaknesses by exam topic. Based precisely on the Fetal Echo specialty exam outline published by ARDMS, this review contains 445 registry-like questions (including CME activity questions) together with answers, clear explanations, and quick references for further study. Image-based cases and schematic illustrations prepare you to tackle images, anatomy, and pathology on the exam. Coverage includes embryology, indications, incidence of congenital heart disease, timing of the fetal echo exam, standard sonographic views, normal anatomy and physiology, structural cardiac anomalies, dysrhythmias, acquired pathology, and other conditions—all in the same proportion as the exam itself. *Fetal Echocardiography Review* is very effective in combination with *Ultrasound Physics Review: SPI Edition*, by Cindy A. Owen, RT, RDMS, RVT, FSDMS, and James A. Zagzebski, PhD. Why are the Davies mock exams so popular and effective? Because they contain the same kinds of thought-provoking questions you will find on the exam! *Fetal Echocardiography Review* is also a very handy reference for fellows and residents in pediatric cardiology, maternal fetal medicine, radiology, obstetrics, and perinatology. Approved for 6 hours of continuing medical education credit.

## About the authors . . .

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PUBLISHING



# **Fetal Echocardiography Review**

**A Q&A REVIEW FOR THE ARDMS EXAM**

# Fetal Echocardiography

A Q&A REVIEW FOR THE ARDMS EXAMINATION

2014

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# Preface

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**T**HIS MOCK EXAM is a question/answer/reference review of fetal echocardiography for those RDMS and RDCS candidates who plan to take the ARDMS specialty examination in fetal echocardiography.

Cardiology fellows and pediatric cardiologists who are learning fetal echocardiography will also find this book very helpful. It is designed as an adjunct to your regular study and as a method to help you determine your strengths and weaknesses so that you can study more effectively. *Fetal Echocardiography Review* covers everything on the current ARDMS exam content outline and in fact follows that outline, which you will find in Part 14 of this book.

Facts about *Fetal Echocardiography Review*:

- It precisely covers and follows the current ARDMS exam outline.
- It focuses exclusively on the Fetal Echo specialty exam to ensure thorough coverage of even the smallest subtopic on the exam. (For the Sonography Principles and Instrumentation exam, see *Ultrasound Physics Review: SPI Edition* by Cindy Owen and James Zagzebski.)
- Topics are covered to the same extent as on the exam itself. Subject headings include the approximate percentage of the exam that a particular topic represents so you know the relative importance of each topic and can study more effectively.
- *Fetal Echocardiography Review* contains nearly 400 questions, many of which are image-based or otherwise illustrated.
- Explanations are clear and conveniently referenced for fact-checking or further study.
- Each section is keyed to the ARDMS exam outline so that you always know where you are, what you are studying, and how it applies to your preparation.
- The ARDMS exam outline and contact information for the ARDMS appears in Part 14 at the end of the book.

*Fetal Echocardiography Review* effectively simulates the content and the experience of taking the exam. Current ARDMS standards call for approximately 170 multiple-choice questions to be answered during a three-hour period. That is, you will have an average time of 1 minute to answer each question. Timing your practice sessions according to the number of questions you need to finish will help you prepare for the pressure experienced by Fetal Echo candidates taking this exam. It also helps to ensure that your practice scores accurately reflect your strengths and weaknesses so that you study more efficiently and with greater purpose in the limited time you can devote to preparation. Because the content of this Q&A review is formatted and weighted according to the registry's outline of topics and subtopics, you can readily identify those areas on which you should concentrate.

ARDMS test results are reported as a “scaled” score that ranges from a minimum of 300 to a maximum of 700. A scaled score of 555 is the passing score (the “passpoint” or “cutoff score” for *all* ARDMS examinations. The scaled score is simply a conversion of the number of correct answers that also, in part, takes into account the difficulty of a particular question. Google or otherwise search for *Angoff scoring method* if you want to learn more about scaled scoring. Suffice it to say that it helps to ensure the fairness of the exams and that in the case of all ARDMS exams 555 is the minimum passing score.

We include below and strongly recommend that you read *Taking and Passing Your Exam*, by Don Ridgway, RVT, who offers useful tips and practical strategies for taking and passing the ARDMS examinations.

Finally, you have not only our best wishes for success, but also our admiration for taking this big and important step in your career.

*Nikki C. Stahl*  
*Valrie Kunes*  
*Bradley W. Robinson*

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Bradley W. Robinson, MD, FACC

# Taking and Passing Your Exam

by Don Ridgway, RVT

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## Preparing for your Exam . . .

**Study.** And then study some more. Knowing your stuff is the most important factor in your success. Start early, set a regular study schedule, and stick to it. Make your schedule specific so you know exactly what to study on a particular day. Write it down. Establish realistic goals so that you don't build a mountain you can't climb.

As to *what* you study, don't just read aimlessly. Focus your efforts on what you need to know. Rely on a core group of dependable references, referring to others as necessary to firm up your understanding of specific topics. Let the ARDMS exam outlines guide you. And use different but complementary study methods—texts, flashcards, and mock exams—to exercise those neural pathways.

**Ease down on studying the week before.** Wind down, reduce stress, build confidence, and rest up. Don't cram! And no studying the night before. You had your chance. Watch a movie, relax, go to bed early, and sleep well.

**Organize your things the night before.** Lay out comfortable clothes (including a sweater or sweatshirt in case the testing center is cold), pencils, your ARDMS test-admission papers, car and house keys, glasses, prescriptions, directions to the test center, and any other personal items you might need. Be prepared!

## The Day of Your Exam . . .

**Eat lightly.** You do not want to fall asleep during the exam. Go easy on the coffee or tea so your bladder doesn't distract you halfway through the exam.

**Arrive early.** Plan to arrive at the test center early, especially if you haven't been there before. Take directions, including the telephone number of the testing center in case you have to make contact en route. You don't need a wrong-offramp adventure.

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Don Ridgway is the author of *Introduction to Vascular Scanning: A Guide for the Complete Beginner* and editor of *Vascular Technology Review*. Don teaches and practices at Grossmont College and Hospital in El Cajon, California.

**Be confident.** As you wait for the exam to begin, smile, lift both hands, wave them toward yourself, and say, “Bring it on.”

### **During the Exam . . .**

**Read each question twice before answering.** Guess how easy it is to get one word wrong and misunderstand the whole question.

**Try to answer the question before looking at the choices.** Formulating an answer before peeking at the possibilities minimizes the distractibility of the incorrect answer choices, which in the test-making business are called—guess what!—*distractors*.

**Knock off the easy ones first.** First answer the questions you feel good about. Then go back for the more difficult items. Next, attack the really tough ones. Taking notes on long or tricky questions often can jog your memory or put the question in new light. For questions you just cannot answer with certainty, eliminate the obviously wrong answer choices and then guess.

**Guessing.** Passing the exam depends on the number of correct answers you make. Because unanswered questions are counted as *incorrect*, it makes sense to guess when all else fails. The ARDMS itself advises that “it is to the candidate’s advantage to answer all possible questions.” Guessing alone improves your chances of scoring a point from 0 (for an unanswered question) to 25% (for randomly picking one of four possible answers). Eliminating answer choices you know or suspect are wrong further improves your odds of success. By using your knowledge and skill to eliminate two of the four answer choices before guessing, for example, you increase your odds of scoring a point to 50%.

**Don’t second-guess.** The common wisdom is that your first answer is more likely than revised answers to be correct. Actual studies indicate that when you return to a question and change the answer, you’ll probably be wrong. Change an answer only if you’re quite sure you should.

**Pace yourself; watch the time.** Work methodically and quickly to answer those you know, and make your best guesses at the gnarly ones. Leave no question unanswered.

**Don’t despair 50 minutes into the exam.** At some point you may feel that things just aren’t going well. Take 10 seconds to breathe deeply—in for a count of five, out for a count of five. Relax. Recall that you need only about three out of

four correct answers to pass. If you've prepared reasonably well, a passing score is attainable even if you feel sweat running down your back.

### **Taking the Exam on Computer . . .**

Some candidates express concern about taking the registry exam on computer. Most folks find this to be pretty easy; some find it off-putting, at least in prospect. But the computerized exams are quite convenient: You can take the exam at your convenience (a far cry from the days of one exam per year), you know whether or not you passed before you leave the testing center (compare that to waiting weeks and even months, as used to be the case), and you can reschedule the exam after 90 days if you happen not to pass the first time (rather than waiting another six months to a year). Another good point: The illustrations are said to be clearer on computer than in the booklets at a Scantron-type exam.

Taking the test by computer is not complicated. The center even gives you a tutorial to be sure you know what you need to do. You sit in a carrel with a computer and answer the multiple-choice questions by pointing and clicking with a mouse. There is a clock on the display letting you know how much time is left. Use it to pace yourself. Scratch paper is available; make liberal use of it.

You can mark questions to return for answering later. A display shows which questions have not been answered so you can return to them. When you have finished, you click on "DONE," and you find out immediately whether you passed.

It's nothing to be afraid of. The principles are the same as those for any exam. Be methodical and keep breathing.

### **Summary . . .**

Preparing for the exam:

- Study
- Use flashcards
- Join a study group
- Wind down a week before
- Don't cram
- Relax!

The day of your exam:

- Eat lightly, avoid coffee
- Arrive early
- Take a sweater
- Be confident!

During the exam:

- Read each question twice
- Answer the question before looking at the answer choices
- Answer the easy ones first
- Guess when necessary
- Don't second-guess your first answers
- Pace yourself
- Don't despair

Taking the exam on computer:

- Just point and click
- Take notes
- Mark and return to the hard questions
- Use the on-screen clock to pace yourself
- Be methodical
- Breathe!

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## PART 1

# Embryology

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Timing of heart formation

Teratogenic insults

Atrial septal components

Endocardial cushion

D- and I-looping

---

1. The pacemaker of the heart is the:
  - A. Bundle of His
  - B. Purkinje fibers
  - C. Atrioventricular node
  - D. Sinoatrial node
  - E. Coronary sinus
2. At what gestational age is a fetus most susceptible to teratogen exposure?
  - A. 0–4 weeks
  - B. 4–8 weeks
  - C. 12–16 weeks
  - D. 20–24 weeks
  - E. 30–36 weeks
3. The fourth aortic arch and common dorsal aorta become the:
  - A. Pulmonary arteries
  - B. Ductal arch
  - C. Definitive aorta
  - D. Azygous vein
  - E. Inferior vena cava
4. Abnormal looping of the heart tube to the left will result in:
  - A. Complete transposition of the great arteries
  - B. Corrected transposition of the great arteries (l-ventricular loop)
  - C. Tetralogy of Fallot
  - D. Situs inversus totalis
  - E. Both A and B
5. At what point in heart development does the fetal heart begin to beat?
  - A. 7–10 days
  - B. 12–14 days
  - C. 21–28 days

- D. 28–35 days
  - E. 35–48 days
6. In the sequence of fetal heart development, embryologically what is last to form?
- A. Bulboventricular looping
  - B. Semilunar valves
  - C. Atrioventricular valves
  - D. Coronary sinus
  - E. Paired heart tube
7. A fully septated fetal heart is achieved by gestational week:
- A. 4
  - B. 6
  - C. 8
  - D. 10
  - E. 12
8. Four separate pulmonary veins are formed when the left and right pulmonary veins are absorbed. The four pulmonary veins then normally enter into the:
- A. Coronary sinus
  - B. Right atrium
  - C. Left atrium
  - D. Right ventricle
  - E. Left ventricle
9. Endocardial cushions are involved in the development of the:
- A. Semilunar valves
  - B. Atrioventricular valves
  - C. Membranous septum
  - D. Both A and B
  - E. All of the above
10. What syndrome is thought to be a result of a midline development field defect?
- A. Polysplenia syndrome
  - B. Asplenia syndrome
  - C. Ivemark syndrome
  - D. Right atrial isomerism
  - E. All of the above
11. The period of organogenesis occurs between which weeks of gestation?
- A. 0–3
  - B. 3–6
  - C. 4–8
  - D. 8–10
  - E. 10–12

12. If the primitive heart tube loops to the right instead of the left, the result would be:
- A. Normal great artery relationship (d-ventricular loop)
  - B. Ventricular inversion
  - C. Corrected transposition of the great arteries (l-ventricular loop)
  - D. Situs inversus
  - E. Bilateral right-sidedness
13. The partitioning of the embryonic fetal heart into the chambers of the atria and ventricles begins at approximately what gestational day?
- A. Unknown
  - B. 16
  - C. 18
  - D. 22
  - E. 28
14. Coarctation of the aorta is thought to be the result of:
- A. Aberrant ductal tissue
  - B. Decreased blood flow through the aortic isthmus
  - C. Failure of the fourth and sixth aortic arch to connect with the descending aorta
  - D. A and B only
  - E. All of the above

## PART 2

# Indications

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Maternal

Fetal

Environmental

---

15. All of the following are indications for a fetal echocardiography exam EXCEPT:
- A. Family history of congenital heart defect
  - B. History of tuberous sclerosis
  - C. Extracardiac abnormality
  - D. Echogenic foci
  - E. Exposure to teratogenic medications
16. Which of the following maternal condition is not an indication for a fetal echocardiography exam?
- A. Maternal diabetes
  - B. Maternal connective tissue disorder
  - C. Maternal use of alcohol
  - D. Maternal hyperphenylalaninemia (phenylketonuria)
  - E. Maternal hyperthyroidism
17. Which of the following maternal infections is not an indication for a fetal heart exam?
- A. Human immunodeficiency virus (HIV)
  - B. Rubella
  - C. Cytomegalovirus
  - D. Parvovirus
  - E. Coxsackievirus
18. Noncardiac fetal anomalies detected on a routine exam may increase the risk for a complex heart defect in that fetus. Which fetal anomaly, if found in isolation, would not warrant further evaluation with a fetal echocardiography exam?
- A. Omphalocele
  - B. Gastroschisis
  - C. Renal agenesis
  - D. Dandy-Walker malformation
  - E. Diaphragmatic hernia

19. Of the fetal findings listed below, which one would not be an indication for a fetal heart examination?
- A. Oligohydramnios
  - B. Polyhydramnios
  - C. Bradycardia
  - D. Intrauterine growth restriction
  - E. A fetal heart rate of 230 bpm
20. Maternal exposure to certain medicinal drugs increases a fetus' risk for a congenital heart defect. Which of the following drugs does not increase the risk of a heart defect?
- A. Thalidomide
  - B. Trimethadione
  - C. Lithium
  - D. Nifedipine
  - E. Amphetamines
21. If there were a family history of a syndrome, which one would warrant a fetal echocardiography exam?
- A. Marfan syndrome
  - B. DiGeorge syndrome
  - C. Holt-Oram syndrome (heart-hand syndrome)
  - D. A and B only
  - E. All of the above