

AIMVT KNOWLEDGE LIST  
Cardiology

A qualified candidate will “know” or, understand, be familiar with, recognize, utilize, and/or intuit the following information. The topics listed below are in ADDITION to the Cardiology Skills List, and though some overlap will occur, any topic that appears on either list is suitable information for examination.

Acquired cardiac disease

1. Pathogenesis of both right and left congestive heart failure (CHF)
2. Acute treatment of CHF
3. Chronic management of CHF
4. Pathogenesis of aortic thromboembolism in cats (FATE)
5. Pathologic changes that define and pathogenesis of:
  - a. Dilated Cardiomyopathy (DCM)
  - b. Hypertrophic Cardiomyopathy (HCM)
  - c. Mitral or Tricuspid Endocardiosis (Chronic Myxomatous Valvular Degeneration)
  - d. Arrhythmogenic Right Ventricular Cardiomyopathy (ARVC)
  - e. Systemic hypertension
  - f. Pulmonary hypertension
  - g. Restrictive Cardiomyopathy (RCM)
  - h. Pericardial Effusion and cardiac tamponade
  - i. Cardiac neoplasia
  - j. Heartworm disease and caval syndrome
6. Chemotherapeutic induced cardiac toxicity
7. Mitral systolic anterior motion (SAM) in cats
8. Hyperthyroid heart disease in cats
9. Pathophysiology of arrhythmia induced CHF
10. Indications for clinical pathology tests
  - a. Serum chemistry
  - b. Complete blood count
  - c. Plasma/Whole blood taurine
  - d. Digoxin level
  - e. Troponin
11. Use of cardiac drugs, their adverse effects and treatment goals
  - a. Diuretics
  - b. ACE inhibitors
  - c. Digoxin
  - d.  $\beta$ -Blockers
  - e. Catecholamine drugs
  - f. Calcium channel blockers
12. Dietary management in congestive heart failure
13. Nutritional causes of heart disease (taurine deficiency, etc.)

### Cardiac Anatomy, Physiology and Physical Examination

1. Path of blood flow through the heart
2. Circulatory system through the body
3. Circulatory system of the fetus
4. Normal cardiac anatomy (chambers, valves, myocardium, & great vessels)
5. The cardiac cycle (timing relation of ECG wave forms and cardiac cycle)
  - a. Timing of Systolic phases
  - b. Timing of Diastolic phases
  - c. Timing of valve movements
  - d. Timing of normal heart sounds
  - e. Timing of abnormal heart sounds
  - f. Chamber pressures and changes during cardiac cycle
6. Gross anatomical specimen evaluation of normal anatomy
7. Gross anatomical specimen evaluation of cardiac disease
8. Normal values of all vital signs including systemic blood pressure
9. Mechanism of arterial blood pressure regulation
10. Major determinants of cardiac performance (preload, afterload, contractility)
11. Cardiovascular effects of the Renin-Angiotensin-Aldosterone- System (RAAS)
12. Effects of vagal tone on cardiac rhythm
13. Other neurohormonal effects on the cardiovascular system (sympathetic / parasympathetic effects)
14. Respiratory system, especially in its relationship with the cardiovascular system
15. Techniques of the cardiovascular physical exam and implications of the observations
  - a. Jugular vein evaluation
  - b. Abdomino-jugular reflux
  - c. Palpation and pulses
16. Proper use of the stethoscope (diaphragm vs. bell)
17. Characterization of heart murmurs (timing, location and grade)
18. Clinical implications of abnormal transient heart sounds (Gallop sounds, Split heart sounds, Mid-systolic clicks, Bruits)
19. Auscultation features of common arrhythmias (SA, bradycardia, tachycardia, atrial fibrillation, premature beats)
20. Respiratory auscultation features of CHF and pulmonary disease

### Cardiac catheterization and intervention

1. Common cardiac catheters (function and sizing information)
2. Common guide wires (function and sizing information)
3. Common catheter accessories (introducers, wire handles, manifolds, etc.)
4. Care, cleaning, reesterilization of catheterization instruments
5. Use and maintenance of C-Arm/fluoroscopy systems
6. Radiation safety
7. Use and maintenance of automatic power injectors
8. Expected post catheterization arrhythmias or hemodynamic changes (reflex bradycardia, VPCs, Bundle Branch Blocks, etc.)
9. Maintenance of a surgical suite

10. Use of direct blood pressure transducers and recording equipment
11. Use and maintenance of cardiac output computers and catheters
12. Cardiac catheterization intervention procedures for:
  - a. Permanent cardiac pacemaker placement
  - b. Patent ductus arteriosus
  - c. Pulmonic Stenosis
  - d. Atrial septal defect
  - e. Coronary Angiography
13. Use and side effects of contrast materials

### Congenital cardiac disease

1. Volume vs. pressure loads
2. Anatomical derangements and clinical implications of:
  - a. Patent Ductus Arteriosus (PDA)
  - b. Ventricular Septal Defect (VSD)
  - c. Atrial Septal Defect (ASD)
  - d. Patent Foramen Ovale
  - e. Supravalvular mitral stenosis and Cor Triatriatum Sinister
  - f. Cor Triatriatum Dexter
  - g. AV valve dysplasia
  - h. Sub-Aortic/Aortic Stenosis
  - i. Pulmonic Stenosis
  - j. Tetralogy of Fallot
  - k. Reversed PDA
  - l. Pulmonary hypertension on cardiac shunts (Eisenmenger's physiology)
  - m. Endocardial cushion defect (ASD-VSD)
  - n. Peritoneopericardial diaphragmatic hernia (PPDH)
  - o. Vascular ring and venous formation anomalies (persistent left cranial vena cava)

### Echocardiography

1. Physical principles of ultrasound
  - a. Relating to how to perfect an image
  - b. Relating to artifacts
  - c. Relating to Doppler ultrasound
2. Methods of measuring systolic function and assessing cardiac performance
3. Methods of measuring cardiac chambers and vessels using two dimensional images, m-mode images
4. Methods of measurement of Doppler recordings and their implications
5. Application of normal values for dogs and cats
6. Echocardiographic appearance and findings of common acquired heart disease (see list in the acquired disease section)
7. Echocardiographic appearance and findings of common congenital heart disease (see list in the congenital disease section)
8. Techniques for echocardiographic contrast studies (bubble studies, etc.)

## Electrocardiography and arrhythmia intervention

1. Basic concepts of electrocardiography (ECG) recording (electrode placement, patient positioning, dipole theory, what to record, etc.)
2. Cellular electrophysiology (depolarization, repolarization) and transmembrane action potential
3. Specialized electrical conduction system of the heart (SA node to Purkinje fibers)
4. Normal morphology of ECG wave forms
5. Recognize intraventricular conduction disturbances
6. Lead systems used to evaluate the ECG
7. ECG measurements and normal values for heart rate, P-QRS-T complex intervals/durations/heights, and mean electrical axis-MEA)
8. Chamber enlargement effects on depolarization and MEA shifts
9. Recognize common recording artifacts and know possible corrections
10. Use of ambulatory ECG recording (Holter and Event monitors, telemetry, etc.)
11. Performance of Vagal maneuvers
12. Common clinical conditions associated with ventricular arrhythmias
13. Abnormal impulse conduction vs. abnormal impulse formation
14. Arrhythmia therapy indications
15. Definition, recognition and classification of arrhythmias (bradyarrhythmias vs. tachyarrhythmias and their subsets by their ECG features)
16. Recognize ECG changes associated with common acquired heart disease
17. Recognize ECG changes associated with common congenital heart disease
18. Arrhythmia management (acute vs. chronic therapy; mono vs. combination therapy)
19. Antiarrhythmic drug classification system
20. Use of antiarrhythmic drugs, their adverse effects and treatment goals
  - a. Calcium channel blockers
  - b. Beta-adrenergic blockers
  - c. Digoxin
  - d. Lidocaine
21. Reasons for therapeutic failure
22. Indications for pacemaker therapy
23. Pacing equipment-basic concepts (pulse generator and lead systems, unipolar vs. bipolar)
24. Single chamber vs. dual chamber pacing
25. Pacing hemodynamics
26. Programming (rate, amplitude, pulse width, sensing, thresholds, strength duration curves etc.)
27. Pacing complications
28. External temporary pacemakers
  - a. Transvenous temporary pacing
  - b. Transthoracic temporary pacing

## Radiography

1. Clinical indications for thoracic radiographs
2. Technical factors that influence the thoracic radiographic image (exposure settings, film type and film processing)
3. Patient positioning for thoracic radiographic projections
4. Influence of patient positioning on the thoracic radiographic image
5. Methods of measuring the cardiac silhouette (vertebral heart scale, rib comparison, etc.)
6. Proper positioning of films on a radiograph illuminator for viewing.
7. Common causes of radiographic artifacts
8. Physical and chemical restraint techniques
9. Variables that influence the thoracic radiographic image (age, breed, conformation, phases of respiratory and cardiac cycle)
10. Use of radiographic contrast media
11. Advantages of cardiac nuclear medicine imaging
12. Radiographic findings in patients with left and right congestive heart failure
13. Specific radiographic chamber and vessel changes in moderate to severe acquired disease (see list in the acquired disease section)
14. Specific radiographic chamber and vessel changes in moderate to severe congenital disease (see list in the congenital disease section)
15. Specific radiographic chamber changes that affect the trachea and mainstem bronchi in moderate to severe acquired and congenital heart disease
16. Radiographic features of pleural effusion