CCI Adult Echocardiography Board Exam Review

The CCI adult echocardiography board examination consists of 170 multiple choice questions (150 are graded – approximately 25 questions are test questions for future examinations) including 20 to 25 video cases.

87% of the CCI adult echocardiography consists of multiple choice questions related to performing non-imaging responsibilities (9%), performing echocardiographic imaging (24%), evaluating valvular echocardiographic findings (25%) and evaluating anatomy, physiology and hemodynamics (29%).

Test information including the adult echocardiography complete test outline is available at the CCI website - https://cci-online.org

Duties and Tasks

Approx. % of Exam Score

A. Performing Non-Imaging Responsibilities

9%

1. Review patient's clinical history
2. Review patient's prior studies
3. Verify echocardiographic order
4. Maintain ergonomic safety
5. Prepare patient for echocardiographic exam (e.g., position patient, explain procedure, provide post-procedural instructions)
6. Prepare a report of echocardiographic findings for the reading physician
7. Communicate significant echocardiographic findings

B. Performing Echocardiographic Imaging

24%

1. Perform 2D transthoracic echocardiography
2. Perform M-mode
3. Perform color Doppler
4. Perform spectral Doppler
5. Perform contrast echocardiography (i.e., ultrasound enhancing agent)
6. Perform agitated saline studies
7. Perform exercise echocardiography
8. Perform pharmacological echocardiography
9. Perform non-ischemic stress echocardiography
10. Assist with transesophageal echocardiography
11. Perform strain imaging
12. Perform 3D TEE imaging
13. Perform 3D TTE imaging

C. Evaluating Valvular Echocardiographic Findings

25%

1. Assess aortic valve structure and function
2. Assess aortic valve stenosis
3. Assess aortic valve regurgitation
4. Assess mitral valve structure and function
5. Assess mitral valve stenosis
6. Assess mitral valve regurgitation
7. Assess tricuspid valve structure and function
8. Assess tricuspid valve stenosis
9. Assess tricuspid valve regurgitation
10. Assess pulmonic valve structure and function
11. Assess pulmonic valve stenosis
12. Assess pulmonic valve regurgitation
13. Assess prosthetic valves
14. Assess valvular endocarditis

D. Evaluating Anatomy, Physiology, and Hemodynamics

29%

1. Evaluate cardiac chambers and structures
2. Evaluate cardiomyopathies
3. Evaluate diastolic function
4. Evaluate systolic function
5. Assess ischemic heart disease
6. Evaluate pericardial disease
7. Evaluate great vessels
8. Evaluate diseases of the aorta
9. Evaluate pulmonary hypertension
10. Evaluate cardiac masses
11. Recognize congenital heart disease
12. Recognize implanted devices (e.g., ICD, pacemaker, LAA occluder, closure devices, mechanical support)
13. Evaluate strain imaging
14. Evaluate cardiac hemodynamics
15. Evaluate infiltrative disease

Mitral Stenosis (MS) (Video case)

1. MS occurs during:
    A. Ventricular systole
    B. Ventricular diastole
    C. Isovolumic contraction
    D. Isovolumic relaxation
2. The most common etiology of mitral stenosis is:
    A. Rheumatic fever
    B. Congenital
    C. Iatrogenic (doctor caused)
    D. Intracardiac tumor (e.g.; myxoma)
3. The most common type of congenital mitral stenosis is:
    A. Supravalvular mitral ring
    B. Parachute (one papillary muscle and all chordae attached)
    C. Cor triatriatum
    D. Mitral valve arcade
4. The **LEAST** likely valve involved in rheumatic heart disease is the:
    A. Aortic
    B. Mitral
    C. Pulmonary
    D. Tricuspid
5. Which is **NOT** considered a classic two-dimensional (2-D) finding for mitral stenosis?
    A. Thickened leaflets especially at the leaflet tips-chordae tendineae
    B. Diastolic doming
    C. Left atrial dilatation
    D. Left ventricular hypertrophy
6. A mean pressure gradient of 22 mm Hg was acquired in a patient with mitral stenosis. This indicates____ mitral stenosis.
    A. No
    B. Mild
    C. Moderate
    D. Severe
7. The chordae tendineae in mitral stenosis are usually:
    A. Normal
    B. Thick, fused, shortened
    C. Elongated, thin
    D. Ruptured

8. Which is **INCORRECT** concerning determining mitral valve area (MVA) by two-dimensional echocardiography?
    A. Planimetry in early-mid diastole at the leaflet tips
    B. Apical four chamber view is preferred
    C. Ultrasound beam must be perpendicular to the leaflet tips
    D. Too much gain may result in overestimation of severity
9. Which is **INCORRECT** concerning determining mitral valve area by Doppler?
    A. PW Doppler preferred
    B. Apical four chamber view is recommended
    C. Measurement of the deceleration time
    D. Choose the dominant slope if "ski-slope" flow pattern is present
10. The formula used to determine mitral valve area is:
    A. EDV – ESV ÷ EDV x 100
    B. $4 \times V_2^2$
    C. 220 ÷ Pressure half time (PHT) (msec)
    D. $4 \times TR^2 + RAP$
11. The mitral valve PHT is 88 msec. The mitral valve area is: _____ cm^2. Severity: _____
12. The MV deceleration time is 700 msec. PHT: _____ msec. MVA: ____ cm^2 Severity: ____
13. The TR peak is 3.0 m/sec. The inferior vena cava measures 2.6 cm with greater than 50% inspiratory collapse. The right ventricular systolic pressure (RVSP) and systolic pulmonary artery pressure (SPAP) are: _____ mm Hg.
14. Why is the above important to measure in MS?
15. The normal mitral valve area (MVA) is: _____ cm^2.
    A. 4 to 7
    B. 4 to 6
    C. 2.5 to 5
    D. 3 to 4
16. Normal MVA: _____ cm^2; Severe MS: ____ cm^2; Moderate MS: _____ cm^2; Mild MS: _____ cm^2
17. The suggested waiting period to use the pressure half-time method for mitral valve area post-mitral balloon valvuloplasty is:
    A. 2 to 4 hours
    B. 24 to 48 hours
    C. 7 days
    D. 30 days

Answers : 1.B; 2.A; 3.B; 4.C; 5.D; 6.D; 7.B; 8.B; 9.A; 10.C; 11.2.5; mild; 12. 1.1; 13.44; 14.Pulmonary hypertension is a common secondary finding in patients with mitral stenosis; 15.B; 16.4 to 6; Less than 1.0; 1.0 to 1.5; 1.5 to 2.0; 17. B

Mitral Regurgitation (MR)

1. When does MR occur?
    A. Ventricular diastole
    B. Diastasis
    C. Ventricular systole
    D. Atrial systole
2. An example of functional (secondary) MR is:
    A. Infective endocarditis
    B. Ruptured chordae tendineae
    C. Flail mitral valve leaflet
    D. Dilated cardiomyopathy
3. Which of the following would **NOT** be an example of primary (anatomic) (organic) MR?
    A. Mitral annular calcification
    B. Mitral valve prolapse
    C. Ruptured chordae tendineae – flail mitral valve
    D. Dilated cardiomyopathy
4. The murmur of MR is classically described as:
    A. Holosystolic heard best at the cardiac apex radiating to the axilla
    B. Systolic ejection murmur (SEM) heard best at the right upper sternal border (RUSB)
    C. Continuous (machinery-like) murmur
    D. Holodiastolic decrescendo heard best at the left sternal border
5. Chronic significant MR is a:
    A. Left heart pressure overload (Concentric LVH)
    B. Left heart volume overload (LAE, LVE, Hyperkinesis)
    C. Right heart pressure overload (concentric RVH)
    D. Right heart volume overload (RAE, RVE, Paradoxical IVS motion)
6. The echocardiography findings for left ventricular volume overload (LVVO) are:
    A. LAE; LVH
    B. LAE; RAE
    C. LVE; Hyperkinesis
    D. LVH, Hypokinesis
7. Which of the following would **NOT** be a secondary effect of significant chronic MR?
    A. LAE
    B. LVE with hyperkinesis (LVVO pattern)
    C. Pulmonary hypertension
    D. Hepatic vein systolic flow reversal
8. What effect does severe mitral regurgitation (acute and/or severe) have on pulmonary vein flow?
    A. No effect
    B. Reversal of the S wave
    C. Reversal of the D wave
    D. Reversal of the AR wave

9. The Doppler wall filter should be set ____ for the evaluation of MR with CW Doppler and _____ when evaluating pulmonary vein flow with PW Doppler
    A. High; High
    B. Low; Low
    C. High; Low
    D. Low; High
10. The color flow Doppler velocity scale for echocardiography should be set between: ____ cm/sec to _____ cm/sec.
    A. 10; 20
    B. 20; 30
    C. 50; 70
    D. 90; 110
11. Which syndrome is associated with mitral regurgitation?
    A. Marfan
    B. Williams
    C. Lutembacher
    D. Noonan
12. What effect does the coanda effect have on color flow Doppler jet area size?
    A. Increases
    B. Decreases
    C. Remains unchanged
    D. Depends on color flow map
13. Calculations – PISA, Vena Contracta, RV, RF, ERO (Please see attached)

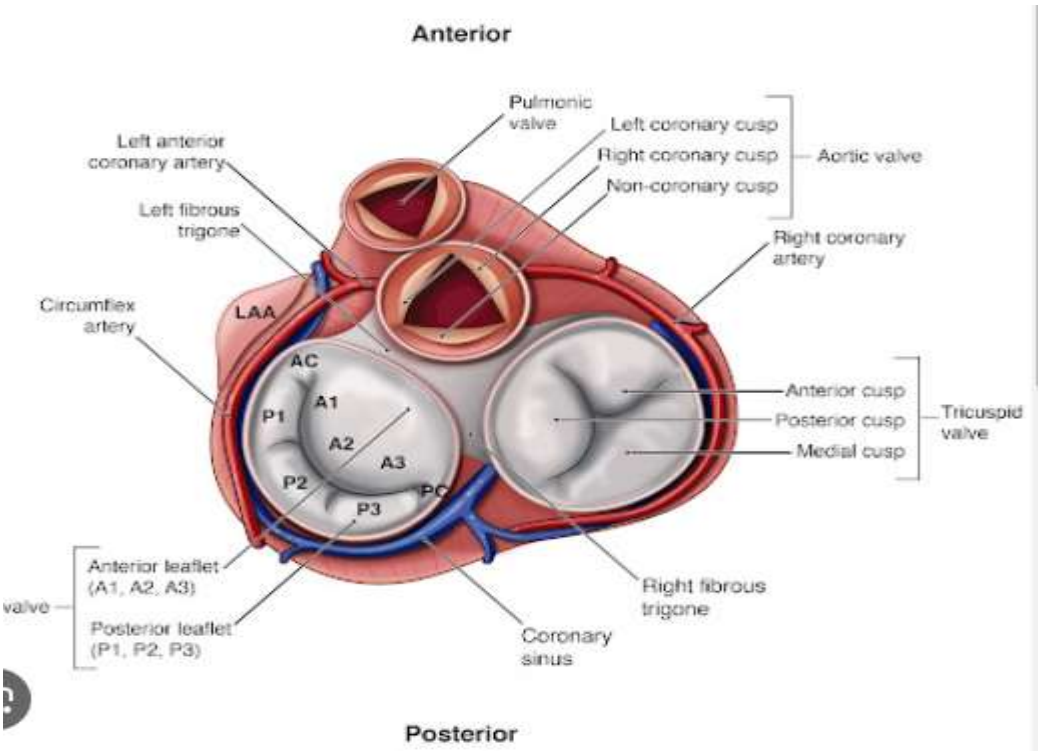
Answers: 1.C; 2.D; 3.D; 4.A; 5.B; 6.C; 7.D; 8.B; 9;C; 10.C; 11.A; 12.B; 13.Please see calculations section.

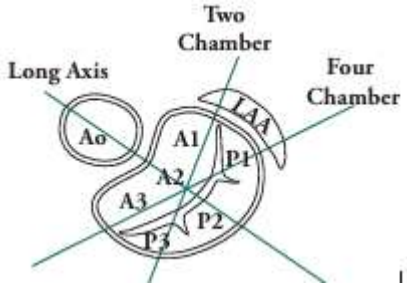
Mitral Valve Prolapse (MVP) (Video case)

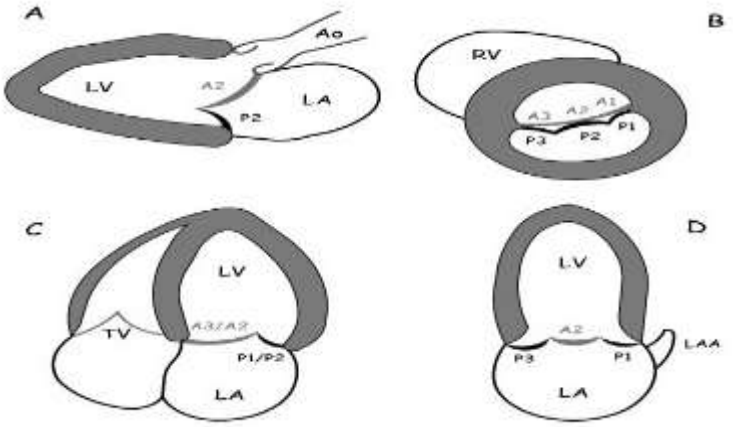
1. Which of the following is **NOT** a type of MVP:
    A. Mid to late
    B. Holosystolic
    C. Pansystolic
    D. Atrial systolic
2. Which is **NOT** considered a classification of mitral valve prolapse?
    A. Classic thick, redundant, myxomatous
    B. Non-classic thin (normal < 5mm)
    C. Secondary RVE – LV smaller resulting in secondary MVP
    D. Iatrogenic physician caused
3. The mitral valve is thick (> 5mm), redundant, myxomatous-like. This is _____ MVP.
    A. Classic
    B. Non-classic
    C. Functional Secondary
    D. Idiopathic

4. The “gold standard” view for MVP is the:
    A. PLAX
    B. PSAX of MV
    C. Apical 4
    D. Apical 2
5. The chordae tendineae in MVP are:
    A. Thick, fused, shortened
    B. Thin, elongated
    C. Infected
    D. Absent
6. The classic auscultatory findings for MVP are:
    A. Holosystolic murmur heard best at the cardiac apex-axilla
    B. Holodiastolic murmur heard best at the left sternal border
    C. Mid-systolic click(s) with late systolic murmur
    D. SEM at RUSB
7. The mitral valve leaflet tip is pointing towards the left atrium with lack of systolic coaptation. This is a definition of:
    A. Severe mitral valve prolapse
    B. Parachute mitral valve
    C. Shone’s complex
    D. Flail mitral valve
8. There is posterior mitral valve prolapse. The color flow Doppler jet direction will be:
    A. Anterior
    B. Posterior
    C. Medial
    D. Lateral
9. Which two mitral valve leaflet scallops are evaluated in the parasternal long axis view?
    A. A1; P3
    B. A2; P2
    C. A3; P1
    D. A1; P1

Answers: 1.D; 2.D; 3.A; 4.A; 5.B; 6.C; 7.D; 8.A; 9.B


Anterior
Pulmonic valve
Left coronary cusp
Right coronary cusp
Non-coronary cusp
Aortic valve
Left anterior coronary artery
Left fibrous trigone
Right coronary artery
Circumflex artery
LAA
AC
A1
P1
A2
A3
P2
P3
PC
Anterior cusp
Posterior cusp
Medial cusp
Tricuspid valve
Anterior leaflet (A1, A2, A3)
valve
Posterior leaflet (P1, P2, P3)
Right fibrous trigone
Coronary sinus
Posterior


Two Chamber
Long Axis
Four Chamber
Ao
LAA
A1
P1
A2
A3
P2
P3


A
Ao
LV
A2
LA
P2
B
RV
A3
A2
A1
P3
P2
P1
C
LV
TV
A3/A2
P1/P2
LA
D
LV
A2
P3
P1
LAA
LA

Aortic Stenosis (AS) (Video case – Bicuspid Aortic Valve – Thickened in a 50 yoa male)

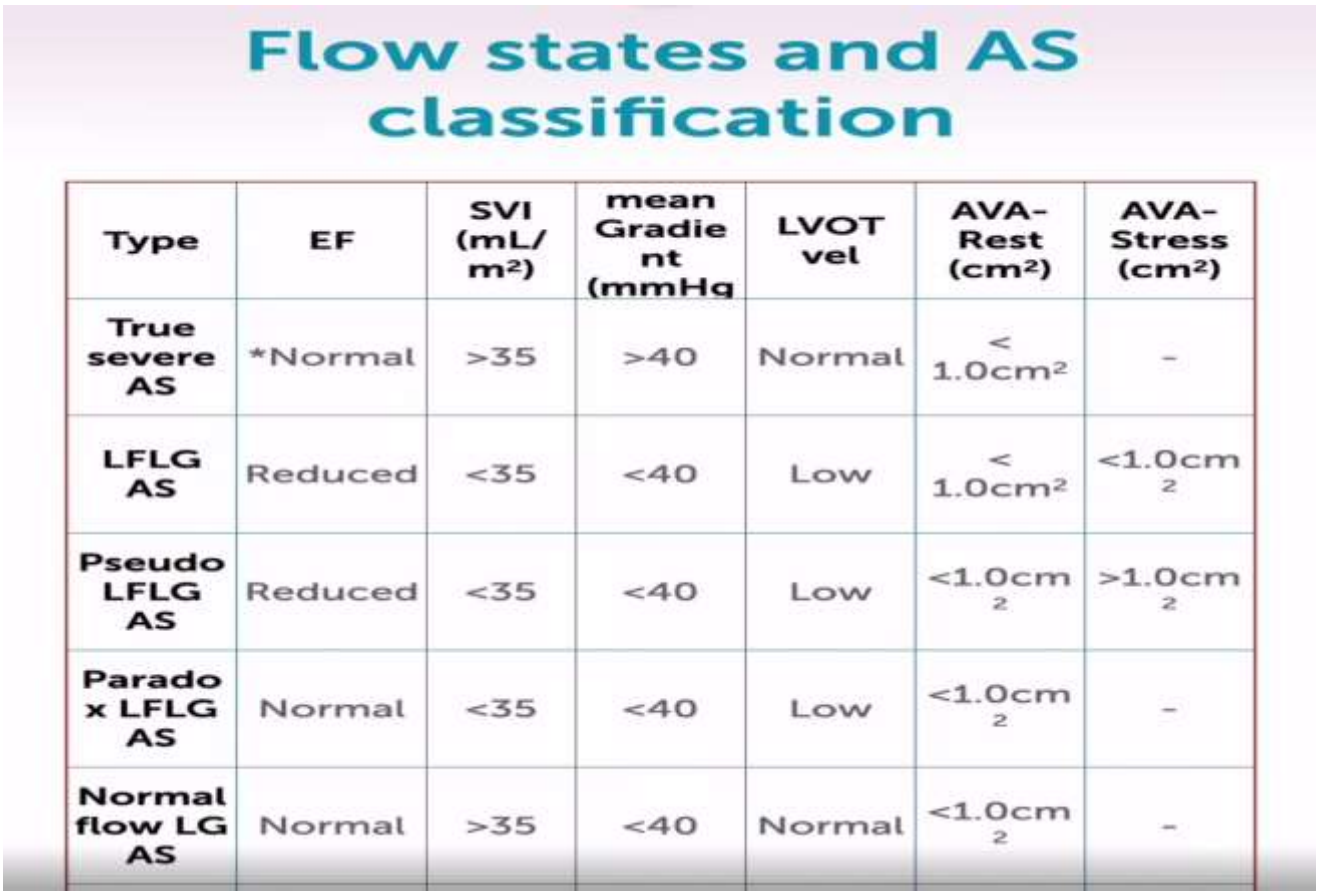
1. AS occurs during:
    A. Ventricular diastole
    B. Ventricular systole
    C. Isovolumic contraction
    D. Isovolumic relaxation
2. The most common etiology for AS is:
    A. Degenerative
    B. Congenital
    C. Rheumatic
    D. Iatrogenic (prosthetic valve replacement)
3. AS is a:_____.
    A. Pressure overload of the LV (LVH)
    B. Pressure overload of the RV (RVH)
    C. Volume overload of the LV (LAE, LVE, Hyperkinesis)
    D. Volume overload of the RV (RAE, RVE, Paradoxical IVS motion)
4. The classic secondary finding for AS is:
    A. Concentric LVH
    B. Eccentric LVH
    C. Asymmetric LVH
    D. Normal LV wall thickness
5. The cardiac catheterization laboratory measures the peak-to-peak pressure gradient. The Doppler peak (maximum instantaneous) pressure gradient will be:
    A. Less than
    B. Equal to
    C. Greater than
    D. Dependent on sonographer
6. Flow in = Flow out or Stroke volume (SV) is = SV is the principle of the:
    A. Bernoulli equation
    B. Doppler effect
    C. Poiseuille's
    D. Continuity
7. The formula for determining aortic valve area (AVA) is based on the re-arrangement of the:
    A. Doppler
    B. Bernoulli
    C. Continuity
    D. PHT

8. The aortic valve is thick with normal excursion with a peak velocity of less than or equal to 2.5 m/sec. This is:
    A. Aortic dissection
    B. Aortic stenosis
    C. Aortic sclerosis
    D. Aortic atherosclerosis
9. The expected peak velocity range for aortic stenosis (AS) is: _____ msec.
    A. 1 to 2
    B. 2 to 3
    C. 3 to 5
    D. 4 to 7
10. The aortic valve peak velocity is 4.0 m/sec. The peak (maximum instantaneous) pressure gradient is: _____ mm Hg.
    A. 4
    B. 16
    C. 64
    D. 74
11. The left ventricular outflow tract (LVOTd) is 2.0 cm. The LVOT velocity time integral (VTI) is 20 cm. The aortic valve (AoV) VTI is 100 cm. The aortic valve area (AVA) is: _____ cm^2. Severity? _____ The normal AVA is: _____ cm^2
12. The LVOTd is 2.0 cm. The LVOT peak velocity is 1.0 msec. The AoV peak velocity is 4 m/s. The AVA is: _____ cm^2. Severity: _____.
13. The LVOT area is 3.14. The LVOT peak velocity is 100 cm/sec. The aortic valve peak velocity is 4 msec. The AVA: _____ cm^2. Severity: _____
14. Which of the following is **LEAST** important when evaluating aortic stenosis? (ASE Recommendations)
    A. Peak velocity
    B. Peak pressure gradient
    C. Mean pressure gradient
    D. Aortic valve area
15. The ejection fraction is 20 to 25%. The aortic valve is thick with reduced excursion. The aortic valve peak velocity is 2.3 m/sec. The peak (maximum instantaneous) pressure gradient is 21 mm Hg. The aortic valve area by the continuity equation is 0.7 cm^2. The severity of the aortic stenosis is:
    A. Mild
    B. Moderate
    C. Severe
    D. Requires Dobutamine stress echo study – low flow – low gradient aortic stenosis

16. The AVA improved to greater than 1.0 cm^2 in the above case during a low dose dobutamine exam. This indicates:
    A. True severe AS
    B. Low Flow-Low Gradient (LFLG) AS
    C. Pseudo-LFLG
    D. Paradoxical LFLG
    E. Normal flow -LG
17. The aortic valve is thick with reduced systolic excursion. There is significant left ventricular hypertrophy. The aortic valve peak velocity is 2.4 m/sec and the aortic valve area is 0.6 cm^2. The `severity of the aortic stenosis is:
    A. Mild
    B. Moderate
    C. Severe
    D. Example of paradoxical low flow-low gradient – requires further study
18. The cut-off peak velocity to distinguish aortic sclerosis from aortic stenosis is:
    A. 1.0 m/sec
    B. 2.6 m/sec
    C. 0.5 m/sec
    D. 50 to 70 cm/sec

Severity of Aortic Stenosis

	Mild	Moderate	Severe
Jet Velocity (m/s)	2.6-2.9	3.0-4.0	>4.0
Mean gradient (mmHg)	<20	20-40	>40
AVA (cm2)	>1.5	1.0-1.5	<1.0



19. If the EF reduced (<40%), the severity of AS may be Underestimated? Overestimated?
20. How many windows are required for the Pedof probe?
21. Atrial fibrillation – how many measurements should you make?
22. The top normal LVOT peak velocity?

Answers: 1.B; 2.A; 3.A; 4.A; 5.C; 6.D; 7.C; 8.C; 9.C; 10.C; 11.0.63 cm^2; Severe AS; 3 to 5 cm^2; 12.0.79 cm^2; Severe AS; 13.0.79 cm^2; Severe AS; 14.B; 15.D; 16.E; 17.D; 18.B; 19.Overestimate; 20.3- apical, right parasternal, suprasternal; 213 to 5 with normal R-R interval; 22. 110 cm/sec

Aortic Regurgitation (AR)

1. When does AR occur?
    A. Ventricular systole
    B. Ventricular diastole
    C. Atrial systole only
    D. Continuous
2. The most common etiology (cause) of acute aortic regurgitation is:
    A. Systemic hypertension
    B. Aortic sclerosis
    C. Aortic valve vegetation (infective endocarditis)
    D. Sinus of Valsalva aneurysm (ruptured)

3. Which method is **LEAST** useful when evaluating the severity of AR?
    A. Jet Width (JW) ÷ Left ventricular outflow tract (LVOT) width
    B. Jet cross-sectional area (CSA) ÷ LVOT CSA
    C. AR peak velocity 3 to 5 msec
    D. Holodiastolic flow reversal in the descending thoracic aorta/abdominal aorta
4. What is the secondary effect of significant chronic AR?
    A. Left atrial dilatation
    B. Left ventricular hypertrophy
    C. Left ventricular dilatation
    D. Asymmetric septal hypertrophy
5. The CW Doppler AR pressure half-time is 189 msec. This suggests that there is _____ AR.
    A. Physiologic (trace)
    B. Mild
    C. Moderate
    D. Severe
6. Premature closure of the mitral valve (M-mode finding) in acute severe AR indicates increased:
    A. Right atrial pressure (RAP
    B. Right ventricular systolic pressure (RVSP)
    C. Systolic pulmonary artery pressure (SPAP)
    D. Left ventricular end-diastolic pressure (LVEDP)
7. The classic finding for the presence of AR:
    A. Fine diastolic flutter of the mitral valve
    B. Premature closure of the mitral valve
    C. Premature opening of the aortic valve
    D. Coarse diastolic flutter of the mitral valve
8. Aortic valve replacement (AVR) in chronic, severe aortic regurgitation may be indicated if the LV measures:
    A. 15 mm end-diastole
    B. 25 end-systole
    C. 50 mm end-diastole
    D. 55 mm end-systole

Answers: 1.B; 2.C; 3.C; 4.C; 5.D; 6.D; 7.A; 9.D

Tricuspid Stenosis (TS)

1. TS occurs during:
    A. Atrial systole only
    B. Ventricular diastole
    C. Ventricular systole
    D. Continuous flow pattern is present
2. The most common etiology of TS is:
    A. Rheumatic
    B. Congenital
    C. Carcinoid
    D. Iatrogenic ("physician induced")
3. The two-dimensional findings for TS would **NOT** include:
    A. Thickened leaflets at the leaflet tips
    B. Diastolic doming
    C. Right atrial dilatation
    D. Flail tricuspid valve
4. Which echocardiography finding would be **LEAST** useful in evaluating tricuspid stenosis?
    A. Planimetry of the tricuspid valve
    B. Pressure half time (PHT) (> 190 msec)
    C. Mean pressure gradient (MPG) (≥ 5 mm Hg)
    D. TV VTI (> 160 msec)
5. The right ventricular outflow tract (RVOT) diameter is 2.0 cm. The RVOT VTI is 20 cm. The TV VTI is 60 cm. The tricuspid valve area (TVA) by the continuity equation is: _____ cm^2 Severity: ____ Normal TVA? _____ cm^2

Answers: 1.B; 2.A; 3.D; 4.A; 5.1.0 cm^2; Severe; 4 to 7 cm^2

Tricuspid Regurgitation (TR) (Video case – Determine severity)

1. When does TR occur?
    A. Atrial systole
    B. Ventricular diastole
    C. Ventricular systole
    D. Diastasis
2. The most common physiologic regurgitation is:
    A. Aortic
    B. Mitral
    C. Tricuspid
3. The most common etiology of chronic TR is:
    A. Vegetation (primary)
    B. Carcinoid (primary)
    C. Prolapse (primary)
    D. Pulmonary hypertension (secondary)

4. What are the secondary effects of significant chronic TR?
    A. Right atrial dilatation, Right ventricular dilatation, Paradoxical IVS motion
    B. Right atrial dilatation, Right ventricular hypertrophy
    C. Left atrial dilatation, Left ventricular dilatation, Hyperkinesis of the left ventricular walls
    D. Left atrial dilatation, Left ventricular hypertrophy
5. What effect does significant chronic TR have on the inferior vena cava (IVC) and hepatic veins (HV)?
    A. No effect
    B. Dilatation
    C. Dissection
    D. Stenosis
6. Right ventricular dilatation with paradoxical septal motion is the definition of the _____ pattern.
    A. LV pressure overload
    B. LV volume overload
    C. RV pressure overload
    D. RV volume overload
7. The hepatic vein finding in severe TR is:
    A. Normal
    B. Diminished D wave
    C. Absent AR wave
    D. S wave reversal
8. The TR peak velocity is 3 m/sec. The inferior vena cava measures 2.9 cm with a greater than 50% inspiratory collapse. The right ventricular systolic pressure (RVSP) and systolic pulmonary artery pressure (SPAP) are: ____ mm Hg.
    A. 36
    B. 39
    C. 44
    D. 51

Answers: 1.C; 2.C; 3.D; 4.A; 5.B; 6.D; 7.D; 8.C

Tricuspid Valve Prolapse (TVP)

1. How many views are needed to evaluate TVP?
    A. 1
    B. 2
    C. 3
    D. 4
2. What percentage of patients with classic MVP have TVP?
    A. 10%
    B. 30%
    C. 50%
    D. 100%
3. Which syndrome is most likely to have TVP?
    A. Down
    B. Marfan
    C. Williams
    D. Noonan

Answers: 1.B; 2.C; 3.B

Pulmonary Regurgitation (PR)

1. When does PR occur?
    A. Ventricular diastole
    B. Isovolumic contraction
    C. Atrial systole only
    D. Ventricular diastole
2. The most common etiology (cause) of PR is:
    A. Pulmonary stenosis
    B. Pulmonary hypertension
    C. Pulmonary valve endocarditis
    D. Pulmonary valve carcinoid
3. Significant chronic PR will result in:
    A. Right atrial dilatation
    B. Right ventricular dilatation
    C. Left atrial dilatation
    D. Left ventricular dilatation
4. Chronic significant PR will result in the _____ pattern.
    A. RV pressure overload
    B. RV volume overload
    C. LV pressure overload
    D. LV volume

5. Right ventricular dilatation with paradoxical interventricular septal motion is the _____ pattern.
    A. LV pressure overload
    B. RV pressure overload
    C. LV volume overload
    D. RV volume overload
6. The PR end-diastolic velocity is 2.0 m/sec. The inferior vena cava measures 2.7 cm and with greater than 50% collapsibility. The pulmonary artery end-diastolic pressure (PAEDP) is: __ mm Hg.
    A. 2
    B. 4
    C. 16
    D. 24
7. The PR peak velocity is 3.0 m/sec. The inferior vena cava measures 2.9 cm and the inspiratory collapse is less than 50%. The mean pulmonary artery pressure (MPAP) is: _____ mm Hg. Normal MPAP: _____ mm Hg.
8. The RVOT acceleration time is 56 msec. This indicates: ____.
    A. Normal
    B. Pulmonary hypertension
    C. Severe pulmonary regurgitation
    D. Pulmonary valve endocarditis

Answers: 1.A; 2.B; 3.B; 4.B; 5.D; 6.D; 7.51; 9 to 18 mm Hg; 8.B

Infective Endocarditis (IE) (Video)

1. A patient presents with fever of unknown origin (FUO), new murmur and positive blood cultures. This suggests:
    A. Aortic dissection
    B. Mitral stenosis
    C. Infective endocarditis
    D. Aortic stenosis
2. The primary echo-Doppler findings in infective endocarditis are:
    A. Vegetation; Regurgitation
    B. Abscess, Stenosis
    C. Flail, Regurgitation
    D. Septal defect; Shunt flow
3. Which of the following is **NOT** a likely finding in infective endocarditis?
    A. Valve perforation
    B. Fistula
    C. Pericardial effusion
    D. Valve stenosis

4. An echolucent area is found around the aortic valve ring in a patient with suspected infective endocarditis. This finding is:
    A. Normal
    B. Abscess
    C. Dissection
    D. Cleft
5. The marantic (non-bacterial) vegetation associated with systemic lupus erythematosus (SLE) is:
    A. Marfan
    B. Ehlers-Danlos
    C. Libman-Sacks
    D. Williams
6. Thin, linear echoes are noted on the basal portion of the aortic valve in an elderly patient – there is no clinical indication for infection. The diagnosis is most likely:
    A. Lambl's excrescences
    B. Marfan
    C. Trisomy 21
    D. Noonan
7. Transthoracic echocardiography (TTE) cannot detect vegetations which are:
    A. < 3 mm
    B. < 3 cm
    C. > 1.0 cm
    D. > 10 mm
8. The test of choice for detecting vegetation in infective endocarditis is:
    A. CT
    B. MRI
    C. Transthoracic echocardiography (TTE)
    D. Transesophageal echocardiography (TEE)
9. Yes or No: The two most common bacteria which cause infective endocarditis are streptococci viridans (mouth; most common cause of subacute) and staphylococcus aureus (most common; most common cause of acute IE -skin)

Answers: 1.C; 2.A; 3.D; 4.B; 5.C; 6.A; 7.A; 8.D; 9.Yes

Prosthetic Heart Valves (PHV) (Video)

1. The most common mechanical (metal) bileaflet tilting disc valve is the:
    A. Starr-Edwards
    B. St. Jude
    C. Bjork-Shiley
    D. Medtronic-Hall
2. The most common mechanical (ball and cage) valve is the:
    A. Starr-Edwards
    B. St. Jude
    C. Bjork-Shiley
    D. Medtronic-Hall
3. All prosthetic heart valves are inherently:
    A. Stenotic
    B. Regurgitant
    C. Dehisced
    D. Normal
4. An autograft valve is:
    A. Self to self (Ross procedure)
    B. Animal to man
    C. Man to man
    D. Xenograft
5. The placement of the patients own pulmonary valve in the aortic position, reimplantation of the coronary arteries with a homograft placed the pulmonary position to treat valvular aortic stenosis is:
    A. Glenn
    B. Jatene
    C. Ross
    D. Mustard-Senning
6. A heterograft or xenograft is:
    A. Self to self (e.g.; Ross procedure)
    B. Animal to man
    C. Man to man
    D. Autograft

7. A homograft is:
    A. Self to self (Ross procedure)
    B. Animal to man
    C. Man to man
    D. Xenograft

8. Excessive rocking motion of a PHV is:
    A. Normal
    B. Dehiscence
    C. Pannus
    D. Flow masing
9. The excessive ingrowth of tissue in a PHV is:
    A. Dehiscence
    B. Pannus
    C. Flow masking
    D. Normal
10. A patient with a mitral valve replacement (MVR) did not have significant PHV regurgitation by TTE but TEE there was severe MR. The explanation is:
    A. Change in heart rate
    B. Ultrasound machine failure during TTE
    C. Patient was uncooperative
    D. Flow masking
11. Aortic stenosis may be treated by replacement of the aortic valve non-surgically. This procedure is:
    A. Aortic valve replacement (AVR)
    B. TAVR
    C. Mitraclip
    D. Transplant
12. Significant mitral regurgitation may be treated non-surgically. This procedure is:
    A. MVR
    B. TAVR
    C. MitraClip
    D. Transplant

Answers: 1.B; 2.A; 3.A; 4.A; 5.C; 6.B; 7.C; 8.B; 9.B; 10.D; 11.B; 12.C

Pericardial Effusion (Video case)

1. The two layers of the pericardium are:
    A. Endocardium; Myocardium
    B. Epicardium, Endocardium
    C. Visceral pericardium (epicardium); Parietal pericardium (fibrous)
    D. Myocardium, Visceral pericardium
2. The cardiac auscultatory finding for pericarditis is:
    A. Opening snap
    B. Midsystolic click – late systolic murmur
    C. Holosystolic murmur heard best at the cardia apex radiating to the axilla
    D. Friction rub
3. Dry pericarditis is:
    A. Normal
    B. Pericardial effusion with pleural effusion
    C. Cardiac tamponade
    D. Pericarditis without effusion
4. Which pathology is pericardial effusion common?
    A. Marfan syndrome
    B. Renal failure
    C. Down syndrome
    D. Noonan syndrome
5. Which cardiac structure is useful when differentiating pericardial effusion from pleural effusion?
    A. Coronary sinus
    B. Descending thoracic aorta
    C. Aortic isthmus
    D. Mitral annulus
6. A clear space is noted to occur only during ventricular systole. This is:
    A. Physiologic
    B. Small pericardial effusion
    C. Moderate pericardial effusion
    D. Large pericardial effusion
7. A clear space is noted to measure 1 to 2 cm at end-diastole. This is:
    A. Physiologic
    B. Small pericardial effusion
    C. Moderate pericardial effusion
    D. Large pericardial effusion
8. A swinging heart suggests ____ pericardial effusion.
    A. Physiologic
    B. Mild
    C. Moderate
    D. Large

9. Which of the following is the **LEAST** likely explanation for fibrin strands within a pericardial effusion?
    A. Rheumatic fever
    B. Long standing effusion
    C. Infection
    D. Hemopericardial effusion

Answers: 1.C; 2.D; 3.D; 4.B; 5.B; 6.A; 7.C; 8.D; 9.A

Cardiac Tamponade (Video Case)

1. What is required for cardiac tamponade to be present?
    A. Thickened pericardium
    B. Pericardial effusion
    C. History of rheumatic fever
    D. Aortic dilatation
2. Which of the following is **NOT** echocardiographic evidence of cardiac tamponade?
    A. RA pre-systolic collapse
    B. RV diastolic collapse (most specific sign)
    C. Inferior vena cava (IVC) plethora
    D. Swinging heart
3. Which of the following is **CORRECT** concerning respiratory variation in cardiac tamponade?
    A. Mitral valve peak velocity increases with inspiration
    B. Tricuspid valve peak velocity increases with expiration
    C. Mitral valve peak velocity decreases with expiration > 30%
    D. Tricuspid valve peak velocity increases with inspiration > 25%
4. Which of the following describes the clinical findings in cardiac tamponade?
    A. Beck's triad
    B. Marfan's
    C. Downs
    D. Libman-Sacks
5. The hepatic vein finding for cardiac tamponade is:
    A. Normal
    B. Increased peak velocity with inspiration
    C. Decreased flow with inspiration
    D. Flow reversal with expiration
6. A drop in blood pressure greater than 10 mm Hg with inspiration is:
    A. High blood pressure
    B. Pulmonary hypertension
    C. Pulsus paradoxus
    D. Pulsus alternans

7. The treatment for cardiac tamponade is:
    A. Coronary artery bypass graft (CABG)
    B. Transcatheter aortic valve replacement (TAVR)
    C. Pericardiocentesis
    D. Glenn
8. Which is **NOT** a component of Beck's triad?
    A. Reduced (low) blood pressure (hypotension)
    B. Distended neck veins
    C. Muffled heart sounds
    D. Mid-systolic click

Answers: 1.B; 2.D; 3.D; 4.A; 5.D; 6.C; 7.C; 8.C; 9.D

Constrictive Pericarditis

1. The most common etiology for constrictive pericarditis worldwide is:
    A. Post-cardiac surgery
    B. Rheumatic fever
    C. Tuberculosis
    D. Diabetes
2. Which is **the LEAST** likely finding in constrictive pericarditis?
    A. Dilated atria
    B. Abnormal IVS motion (e.g.; "septal bounce")
    C. Hepatic vein flow reversal during expiration
    D. Respiratory variation of the atrioventricular valves

Answers: 1.C; 2.A

Systemic Hypertension

1. Are these categories correct for systemic hypertension: Yes or No
   Normal: < 120/80 mmHg
   Elevated: 120 to 129 mm Hg; and less than 80 mm Hg
   Stage 1: 130 to 139 mm Hg; or 80 to 89 mm Hg
   Stage 2: 140 or higher or 90 mm Hg or higher
   Hypertension crisis: Over 180 mm Hg; or over 120 mm Hg
2. For stress echocardiography, when should the exam be stopped: BP of:
    A. 120/80 mm Hg
    B. 130/85 mmHg
    C. 140/90 mm Hg
    D. Greater than 220 mm Hg or a drop of greater than 10 mm Hg
3. The secondary effect of systemic hypertension on the heart is:
    A. Right atrial enlargement (RAE)
    B. Right ventricular hypertrophy (RVH)
    C. Left ventricular hypertrophy (LVH)
    D. Left ventricular dilatation (LVE)

4. The most common regurgitation associated with systemic hypertension is:
    A. Aortic
    B. Mitral
    C. Pulmonary
    D. Tricuspid
5. Which of the following is **NOT** associated with systemic hypertension?
    A. Diastolic dysfunction
    B. Left atrial dilatation
    C. Right ventricular hypertrophy (RVH)
    D. Aortic root dilatation/aneurysm
    E. Proximal aorta effacement
    F. Mitral annular calcification (MAC)
    G. Aortic valve sclerosis
6. A 70-year-old male patient with systemic hypertension. The following measurements were acquired:
    EF: 60 to 65%
    Mild LVH
    Left atrial volume index (LAVI): 28 mL/m^2
    Left atrial reservoir strain (LARS) 22%
    e' lateral peak velocity: 12 cm/sec
    e' septal peak velocity: 8 cm/sec
    E/e' average: 7
    Mitral valve E/A ratio: 1.3
    Tricuspid regurgitation peak velocity: 2.4 m/sec

Which statement is **CORRECT** concerning left ventricular diastolic function?

    A. Normal
    B. Grade 1
    C. Grade 2
    D. Grade 3
    E. Indeterminate

7. A 78-year-old female presents with a history of systemic hypertension. The following measurements were acquired:

    EF: 40 to 45%
    LAVI: 44 mL/m^2
    LARS: 15%
    e' lateral peak velocity: 6 cm/sec
    e' septal peak velocity: 4 cm/sec
    e' average: 5 cm/sec
    E/e' ratio (average): 16
    Mitral valve E/A ratio: 2.2
    Tricuspid regurgitation peak velocity: 3.4 m/sec

    Which statement is **CORRECT** concerning left ventricular diastolic function?

    A. Normal diastolic function
    B. Mild diastolic dysfunction
    C. Mild to moderate diastolic dysfunction
    D. Severe diastolic dysfunction

Answers: 1.Yes; 2.D; 3.C; 4.A; 5.C; 6.A; 7.D

Pulmonary Hypertension (Video Case) (D-shaped left ventricle)

1. A 33-year-old female presents with echocardiographic evidence of pulmonary hypertension. This is most likely:

    A. Iatrogenic
    B. Idiopathic (Primary)
    C. Congenital
    D. Secondary

2. The most common combination of regurgitations in pulmonary hypertension is:

    A. Aortic; Mitral
    B. Tricuspid; Pulmonary
    C. Aortic; Pulmonary
    D. Mitral; Tricuspid

3. Which of the following is **NOT** an echo finding for pulmonary hypertension?

    A. Right ventricular hypertrophy (RVH)
    B. Right ventricular dilatation
    C. Flattened IVS during ventricular systole (D-shaped LV)
    D. Aortic dilatation
    E. Inferior vena cava (IVC) - Hepatic vein (HV) dilatation

4. The tricuspid regurgitation (TR) peak velocity is 3.0 m/sec. The inferior vena cava measures 2.6 cm and with no inspiratory collapse. The right ventricular systolic pressure (RVSP) and systolic pulmonary artery pressure (SPAP) are: _____ mm Hg.
    A. 3
    B. 9
    C. 36
    D. 51
5. The PR end-diastolic velocity is 2.0 m/sec. The inferior vena cava measures 2.4 cm with an inspiratory collapse of 60%. The pulmonary artery end diastolic pressure (PAEDP) is: _____ mm Hg.
    A. 2
    B. 4
    C. 16
    D. 24
6. The pulmonary regurgitation (PR) peak velocity is 1.0 m/sec. The inferior vena cava measures 1.5 cm with a greater than 50% inspiratory collapse. The mean pulmonary artery pressure (MPAP) is: _____ mm Hg.
    A. 1
    B. 4
    C. 7
    D. 36
7. The right ventricular outflow tract (RVOT) acceleration time is 58 msec. This suggests:
    A. Normal
    B. Systemic hypertension
    C. Cardiac tamponade
    D. Pulmonary hypertension
8. The tricuspid regurgitation (TR) peak velocity is less than or equal to 2.8 m/sec. Pulmonary hypertension is:
    A. Likely
    B. Unlikely
    C. Requires further evaluation
9. The tricuspid regurgitation (TR) peak velocity is greater than 3.4 m/msec. Pulmonary hypertension is:
    A. Likely
    B. Unlikely
    C. Further evaluation is required
10. The TR peak velocity is > 2.8 m/sec but is less than or equal to 3.4 m/sec. Pulmonary hypertension is
    A. Likely
    B. Unlikely
    C. Further evaluation is required

11. Which of the following would be the **LEAST** useful parameter to use to determine if pulmonary hypertension is present?
    A. RV -LV ratio > 1.0
    B. D-shaped LV
    C. MPA diameter > 2.5 cm
    D. IVC plethora
    E. Right atrial area > 18 cm^2
    F. RVOT acceleration time < 105 msec
    G. PR peak velocity > 2.2 m/sec
    H. Aortic effacement

Answers: 1.B; 2.B.;3.D; 4.D; 5.D; 6.C; 7.B; 8.B; 9A; 10.C; 11.H

Dilated Cardiomyopathy (Video case)

1. Left ventricle and/or right ventricular dilatation with reduced global systolic function is_____ cardiomyopathy.
    A. Dilated
    B. Hypertrophic
    C. Restrictive/Infiltrative
    D. RV type
    E. Unclassified (e.g.; Non-compaction)
2. Which of the following is a **LEAST** likely cause of dilated cardiomyopathy?
    A. Pulmonary hypertension
    B. Familial (most common)
    C. Idiopathic
    D. Viral
    E. Post-partum
    F. Alcohol
    G. AIDS
    H. Chagas
    I. Lyme
3. The most common regurgitation associated with dilated cardiomyopathy is:
    A. Aortic
    B. Mitral
    C. Pulmonary
    D. Tricuspid
4. The most likely finding in dilated cardiomyopathy is:
    A. Vegetation
    B. Valve stenosis
    C. Thrombus at the apex
    D. Aortic dissection

5. A patient with dilated cardiomyopathy presents. A TR peak velocity of 4 m/sec is acquired. This finding is:
    A. Unexpected
    B. Expected
6. Which diastolic grade is **LEAST** likely to be present in dilated cardiomyopathy?
    A. I
    B. II
    C. III
    D. Normal

Answers: 1.A; 2.A; 3.B; 4.C; 5.B; 6.D

Hypertrophic Cardiomyopathy (HCM) (HOCM) (Video case)

1. The definition of asymmetric septal hypertrophy (ASH) is an IVSd/LVPWd ratio of:
    A. 1:1
    B. ≥ 1.3 to 1
    C. 1.5
    D. 2.0
2. The definition of ASH is an IVS wall thickness at end-diastole of:
    A. Less than 5
    B. Less than 10 mm
    C. 10 to 15 mm
    D. Greater than 15 mm
3. Which of the following is **NOT** a finding in HCM (or HOCM)?
    A. Asymmetric septal hypertrophy (ASH)
    B. Systolic anterior motion (SAM)
    C. Mid-systolic closure of the aortic valve (M-Mode)
    D. LV dilatation
    E. Mitral regurgitation (MR)
4. Which of the following causes the obstruction in HOCM?
    A. ASH
    B. SAM
    C. MR
    D. Mid-systolic closure of the aortic valve
5. The shape of the CW Doppler waveform in HOCM is:
    A. Parabolic
    B. Bullet
    C. Dagger
    D. Rectangular

6. Which maneuver would **NOT** decrease venous return and enhance the obstruction in HCM?
    A. Strain phase Valsalva
    B. Inhalation of amyl nitrate
    C. Supine to standing
    D. Leg raising
7. The cardiac apex appears “spade-like” shape. There is giant T wave inversion (> 10 mm) in the precordial leads on EKG. This suggests:
    A. Normal
    B. Systemic hypertension
    C. Non-compaction of the left ventricle
    D. Apical HCM (non-obstructive)
8. The direction of the MR jet in HOCM is:
    A. Anterior
    B. Posterior
    C. Medial
    D. Lateral

9. HCM vs Athlete’s Heart

Yes or No: If a correct statement concerning athletes heart: Yes or No

Symmetric hypertrophy

LV cavity size is large

LA normal or mildly dilated

Diastolic Function: Normal

LVOT obstruction: Absent

Effect of detraining: Normalizes

Family history: Negative

Genetics: Normal

EKG: Normal

Arrhythmias: Absent

BMI: Increased

Answers: 1. B; 2.D; 3.D; 4.B; 5.C; 6.D; 7.D; 8.B; 9.Yes to all

Restrictive/Infiltrative Cardiomyopathy (Video Cases: Amyloidosis, Hypereosinophilic syndrome)

1. The primary problem in restrictive/infiltrative cardiomyopathy is:
    A. Global systolic function
    B. Segmental systolic function
    C. Diastolic dysfunction
    D. Valve stenosis
2. A patient presents with normal wall motion, apical and basal thrombus and severe mitral regurgitation and tricuspid regurgitation. These findings are associated with:
    A. Amyloidosis
    B. Hemochromatosis
    C. Sarcoidosis
    D. Hypereosinophilic syndrom
3. There is left ventricular hypertrophy (LVH), right ventricular hypertrophy (RVH), "ground-glass" speckled myocardium, biatrial dilatation, pericardial effusion, pleural effusion, apical sparing pattern (strain rate) and low voltage on EKG. These findings suggest:
    A. Hypereosinophilic syndrome
    B. Amyloid
    C. Sarcoidosis
    D. Hemochromatosis
4. Which restrictive/infiltrative cardiomyopathy is most often associated with dilated cardiomyopathy?
    A. Hypereosinophilic syndrome
    B. Amyloidosis
    C. Sarcoidosis
    D. Hemochromatosis
5. Which restrictive/infiltrative cardiomyopathy is associated with thin, akinetic segmental wall motion abnormalities mimicking old (chronic) myocardial infarction?
    A. Hypereosinophilic syndrome
    B. Amyloidosis
    C. Sarcoidosis
    D. Hemochromatosis
6. The left ventricle appears to be heavily trabeculated especially at the apex. This suggests:
    A. Normal
    B. Dilated cardiomyopathy
    C. Hypertrophic cardiomyopathy
    D. Non-compaction of the left ventricle
7. Hyperkinesis of the basal and mid-ventricular walls with apical ballooning is:
    A. Dilated cardiomyopathy
    B. Takotsubo
    C. Amyloidosis
    D. Hypereosinophilic syndrome

8. Which is INCORRECT concerning how to differentiate restrictive-infiltrative cardiomyopathy from constrictive pericarditis? Restrictive- infiltrative cardiomyopathy presents with:
    A. Respiratory variation of the atrioventricular valves
    B. Normal interventricular septal motion
    C. Reduced septal e' peak velocity
    D. Significant biatrial dilatation

Answers: 1.C; 2.D; 3.B; 4.D; 5.C; 6.D; 7.B; 8.A

Cardiomyopathy Review

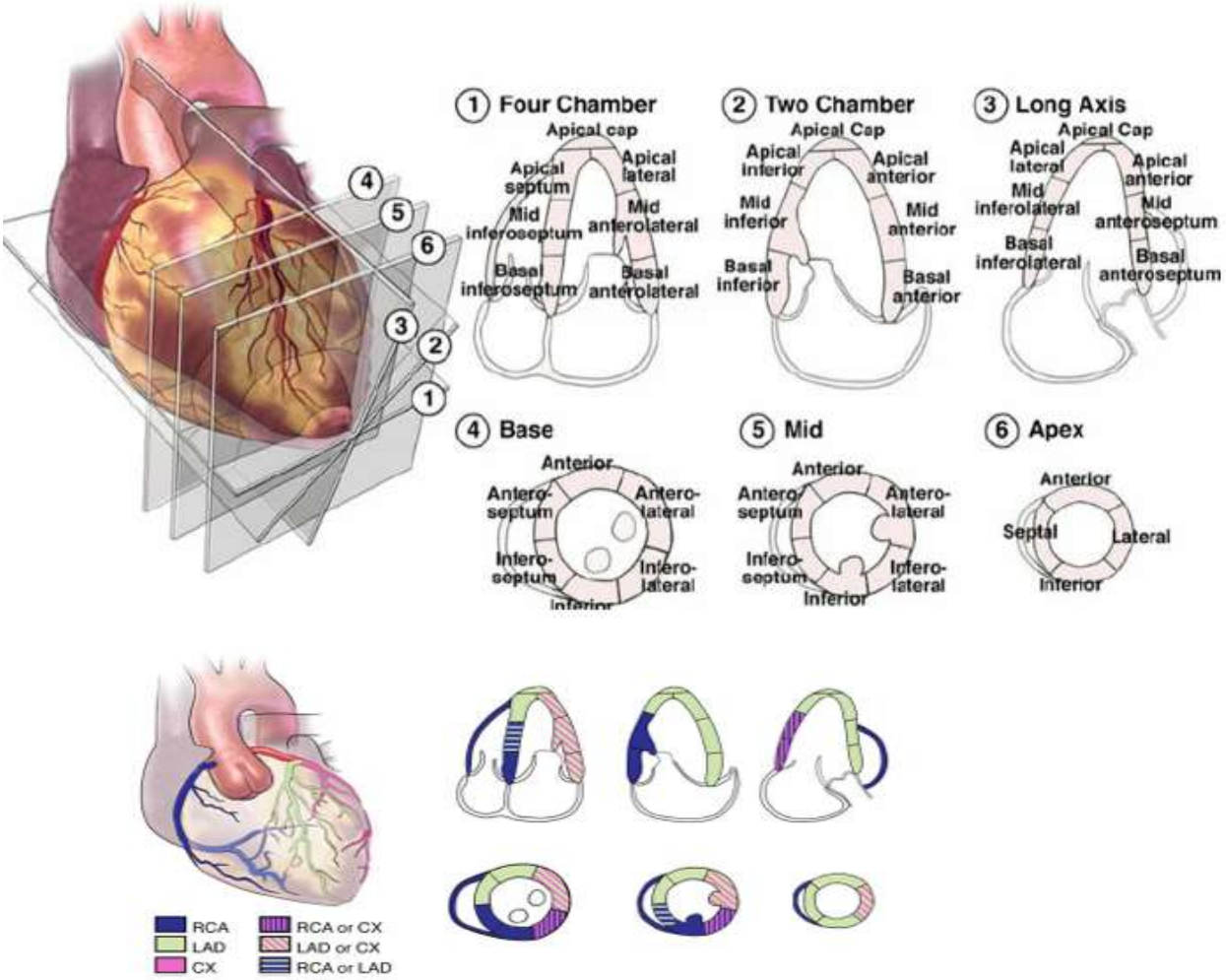
1. LV and/or RV dilatation with reduced global systolic function (reduced EF) is the biomarker for _____ cardiomyopathy
2. ASH is the biomarker for: _____ cardiomyopathy.
3. Biatrial dilatation is the biomarker for: _____ cardiomyopathy.
4. Yes or No: Arrythmogenic RV dysplasia is considered a RV cardiomyopathy?
5. Yes or No: Is non-compaction considered a cardiomyopathy?
6. Yes or No: Is Takotsubo considered a cardiomyopathy?

Answers: 1.Dilated; 2.Hypertrophic; 3.Restrictive-Infiltrative; 4.Yes; 6.Yes; 7.Yes

Ischemic Heart Disease (Coronary Artery Disease) (Video Case: pseudoaneurysm)

1. The segmental wall motion score for hypokinesis (systolic wall thickening (10 to 40%) is:
    A. 1 Normal or Hyperkinetic
    B. 2
    C. 3
    D. 4
2. The segmental wall motion score for akinesis is (systolic wall thickening less than 10%) is:
    A. 1
    B. 2
    C. 3
    D. 4
3. A patient presents with Dressler's syndrome post-myocardial infarction (MI). The sonographer should evaluate for:
    A. Mitral stenosis
    B. Pulmonary stenosis
    C. Pericardial effusion
    D. Takotsubo
4. Are the following correct concerning coronary artery blood flow?
    Yes or No: Left anterior descending (LAD): Anterior IVS, Anterior LV, Cardiac apex
    Yes or No: Circumflex (Cx): Anterolateral LV, Inferolateral LV
    Yes or No: Right Coronary Artery (RCA): Inferior LV, Inferior IVS, Inferior RV

5. Which coronary arteries supply the wall segments (anterior LV, cardiac apex, inferior LV) seen in the apical two chamber view?
    A. Left anterior descending; Circumflex
    B. Left anterior descending; Right coronary artery
    C. Right coronary artery; Circumflex
    D. Posterior descending; Circumflex
6. Which 2-D view is best to use to visualize the anterolateral wall of the LV?
    A. Parasternal long axis
    B. Parasternal short axis of the LV
    C. Apical 4
    D. Apical 2
7. The echo finding for acute myocardial infarction (MI) is:
    A. Hypertrophy
    B. Normal thickness with akinesis
    C. Thin, bright, akinetic
    D. Normal
8. The echo finding for "old" (chronic) myocardial infarction (MI) is:
    A. Thin, bright, akinetic
    B. Akinesis with normal wall thickness
    C. Hypertrophy
    D. ASH
9. Which of the following is **NOT** considered a complication of myocardial infarction?
    A. Thrombus
    B. Pericardial effusion
    C. True aneurysm
    D. Pseudoaneurysm
    E. Ventricular septal rupture (VSR)
    F. Papillary muscle dysfunction (including papillary muscle rupture)
    G. Right ventricular dilatation
    H. Valve stenosis
10. Yes or No: Is pericardial effusion common in acute myocardial infarction?
11. Yes or No: The number one rule to determine the presence of ventricular thrombus is there must be a segmental wall motion abnormality.
12. How is true aneurysm differentiated from pseudoaneurysm?
    A. Width of the neck
    B. Type of infarction
    C. Degree of mitral regurgitation
    D. Wall thickness
13. Yes or No: Is ventricular rupture considered an acute finding post-MI?
14. Yes or No: Is papillary muscle rupture considered an acute finding post-MI?
15. Be able to identify coronary blood flow to each wall segment.



Answers: 1.B; 2.C; 3.C; 4.Yes, Yes, Yes; 5.B; 6.C; 7.B; 8.A; 9.H; 10.Yes; 11.Yes; 12.A; 13.Yes; 14.Yes; 15. Must know the wall segments and coronary artery distribution

Cardiac Tumors (Video case – Myxoma; Carcinoid)

1. The most common primary benign intra-cardiac tumor in the adult is the:
    A. Myxoma
    B. Rhabdomyoma
    C. Papilloma (papillary fibroelastoma)
    D. Sarcoma
2. The most common primary benign cardiac valve tumor in the adult is the:
    A. Myxoma
    B. Rhabdomyoma
    C. Papilloma, Papillary fibroelastoma
    D. Sarcoma
3. The most common primary benign intra-cardiac tumor in the child is:
    A. Myxoma
    B. Rhabdomyoma
    C. Sarcoma
    D. Papilloma
4. The most common primary malignant intra-cardiac tumor in the adult is the:
    A. Myxoma
    B. Rhabdomyoma
    C. Sarcoma
    D. Papilloma
5. The interatrial septum appears “dumb-bell” in shape. This suggests:
    A. Myxoma
    B. Papilloma
    C. Lipomatous hypertrophy
    D. Libman-Sack’s
6. The most common metastatic (secondary) intra-cardiac tumor is the:
    A. Angiosarcoma
    B. Melanoma
    C. Myxoma
    D. Fibroma
7. Which echo finding is most common finding in patients with cardiac tumors?
    A. Valve stenosis
    B. Valve regurgitation
    C. Pericardial effusion
    D. Aortic aneurysm

8. Which of the following is **NOT** a common finding in carcinoid heart disease?
    A. Tricuspid regurgitation (TR)
    B. Functional tricuspid stenosis
    C. Pulmonary regurgitation (PR)
    D. Valvular pulmonary stenosis (PS)
    E. Aortic dissection

Answers: 1.A; 2.C; 3.B; 4.C; 5.C; 6.B; 7.C; 8.E

Left Ventricular Systolic Function (Video case: Estimate ejection fraction)

1. The formula for ejection fraction (EF) is:
    A. EDD-EDD/EDD x 100
    B. EDV-ESV/EDV x 100
    C. CSA x VTI
    D. $4 \times V_2^2$
2. The normal range for ejection fraction (EF) is:
    A. M: 52 to 72%; W: 54 to 74%
    B. M: 41 to 51%; W: 41 to 53%
    C. 30 to 40%
    D. Less than 30%
3. The wall score for hypokinesis is:
    A. 1
    B. 2
    C. 3
    D. 4
4. The normal wall motion score index is (Sum of wall score/Total segments evaluated):
    A. 1
    B. 2
    C. 3
5. The formula for stroke volume (SV) calculated by cardiac Doppler is:
    A. EDV-ESV
    B. EDD-ESD/EDD x 100
    C. CSA (.785 x D^2) x VTI
    D. $4 \times V_2^2$
6. Calculate the following:
    The LVOT diameter is 2.0 cm. The left ventricular outflow tract (LVOT) velocity time integral (VTI) is 20 cm. The stroke volume (SV) is: ___mL. Normal range? ____ mL.
    The heart rate (HR) is 100 bpm. The cardiac output (CO) is: ____ lpm. Normal range: _____ lpm.
    The body surface area (BSA) is 2.0 m^2.
    The CI is: ____ lpm/m^2. Normal range: ___lpm/m

7. The two-dimensional (2-D) method used in echocardiography to determine ejection fraction (EF)?
    A. Simpson's method of discs (MOD) biplane
    B. CSA x VTI
    C. Strain rate
    D. Tissue Doppler
8. Know the normal and abnormal ranges for ejection fraction (EF)

    EF: 52 to 72% 54 to 74%

    Mildly reduced: 41 to 51 41 to 53%

    Moderately reduced: 30 to 40%

    Severely reduced: Less than 30%

Answers: 1.B; 2.A; 3.B; 4.A; 5.C; 6.63; 70 to 100; 6.3; 4 to 8; 3.1; 2,4 to 4.2; 7.A

Left Ventricular Strain Rate

1. Which of the following measures how fast the heart muscle deforms (contracts and relaxes) over time?
    A. Stroke volume (SV)
    B. Ejection fraction (EF)
    C. Cardiac index (CI)
    D. Strain rate
2. The most common technique used to acquire strain rate in echocardiography is:
    A. M-mode
    B. Speckle tracking
    C. Tissue Doppler
    D. Three-dimensional
3. Which of the following is **NOT** considered a type of left ventricular strain rate?
    A. Longitudinal
    B. Circumferential
    C. Radial
    D. Three-dimensional
4. The normal range for left ventricular longitudinal strain is: _____% (note: dependent on equipment brand)
    A. 60 to 65
    B. 40 to 45
    C. 20 to 24
    D. Less than 16

5. A patient with known coronary artery disease longitudinal strain measures 13%. This is considered:
    A. Normal
    B. Abnormal
6. Left ventricular strain rate would be **LEAST** useful is patients with:
    A. Chemotherapy
    B. Heart failure with preserved ejection fraction (HFpEF)
    C. Aortic valve sclerosis
    D. Cardiac amyloidosis

Answers: 1.D; 2.B; 3.D; 4.C; 5.B; 6.C

LV Diastolic Function

1. Which patient would **LEAST** likely present with left ventricular diastolic dysfunction?
    A. Systemic hypertension
    B. Coronary artery disease
    C. Dilated cardiomyopathy
    D. High school athlete
2. The biomarker for LV diastolic dysfunction is:
    A. Left atrial dilatation (LAE)
    B. Right atrial dilatation (RAE)
    C. Left ventricular dilatation (LVE)
    D. Right ventricular dilatation (RVE)
3. The following is acquired from a 26-year-old presenting for cardiovascular screening:
    e' (average): 15
    E/e' (average): 6
    Tricuspid regurgitation peak velocity: 2.3 m/sec
    MV E/A ratio: 1.2
    The diastolic grade and left atrial pressure (LAP) are:
    A. Normal; Normal
    B. I; Normal
    C. II; Mild to moderately increased
    D. III; Severely increased
    E. Indeterminate

4. The following is acquired from a 77-year-old female presenting with chest pain:

   e' (average): 6

   E/e': 11

   Tricuspid regurgitation peak velocity: 2.6 m/sec

   MV E/A ratio: 0.7

   The diastolic grade is grade and LAP are:

   A. Normal; Normal
   B. I; Normal
   C. II; Mild to moderately increased
   D. III; Severely increased
   E. Indeterminate

5. The following is acquired from a 66-year-old male with a history of systemic hypertension:

   e' (average): 5 cm/sec

   E/e': 18

   Systolic pulmonary artery pressure (SPAP) calculated from the tricuspid regurgitation peak velocity: 44 mm Hg

   MV E/A ratio: 1.2

   Th diastolic grade and LAP are:

   A. Normal; Normal
   B. I; Normal
   C. II; Mild to moderately increased
   D. III; Severely increased
   E. Indeterminate

6. The following is acquired from a 49-year-old male with shortness of breath:

   e' (average) 3

   E/e': 15

   SPAP: 48 mm Hg

   E/A ratio: 2.3

   The diastolic grade is grade and LAP are:

   A. Normal; Normal
   B. I; Normal
   C. II; Mild to moderately increased
   D. III; Severely increased
   E. Indeterminate

7. According to the American Society of Echocardiography (2025), may all of the following parameters be used to evaluate left ventricular diastolic function? Yes or No
    A. Pulmonary vein S/D ratio
    B. Left atrial reservoir strain (LARS)
    C. Left atrial volume index (LAVI)
    D. Pulmonary artery end-diastolic pressure (Pulmonary regurgitation method)
    E. Mitral valve PW Doppler of the MV - L wave
    F. Pulmonary vein A duration compared to the mitral valve A eave duration > 30 msec
    G. Valsalva maneuver

Answers: 1.D; 2.A; 3.A; 4.B; 5.C; 6.D; 7.Yes

Diseases of the Aorta (Video case: Aortic Dissection)

1. The most common location for aortic aneurysm is:
    A. Ascending
    B. Aortic arch (transverse aorta)
    C. Descending thoracic aorta
    D. Abdominal aorta
2. Which syndromes are associated with aortic aneurysm?
    A. Williams; Downs (Trisomy 21)
    B. Marfan's; Ehlers-Danlos Loeys Dietz
    C. Noonan's; Turners
    D. Downs (Trisomy 21); Dresslers
3. Which type of aneurysm involves the entire circumference of the aorta?
    A. Fusiform
    B. Saccular
    C. Dissection
    D. Ruptured
4. There is a DeBakey type 2 aortic dissection. The dissection is confined to the:
    A. Ascending aorta
    B. Transverse aorta
    C. Descending thoracic aorta
    D. Entire aorta
5. There is a DeBakey type 3 aortic dissection. The dissection is confined to the:
    A. Ascending aorta
    B. Transverse aorta
    C. Descending thoracic aorta
    D. Entire aorta
6. There is DeBakey type 1 aortic dissection. This involves: (2 + 3 = 1)
    A. Ascending aorta
    B. Transverse aorta
    C. Descending thoracic aorta
    D. Entire aorta

7. Yes or No: There is a Stanford aortic classification – Type A – involves ascending aorta; Type B – only involves DTA
8. An aortic dissection involves the entire aorta – this is Stanford type ____ and DeBakey type _____.
    A. A; 1
    B. B; 3
9. Which of the following is **NOT** a finding for aortic dissection?
    A. Dilated aorta
    B. Intimal flap (seen in two orthogonal views)
    C. True lumen, False lumen
    D. Pericardial effusion; Left pleural effusion
    E. Aortic regurgitation (DeBakey type 2 and 1)
    F. Mitral stenosis
10. The most common type of supravalvular stenosis (SAS) is:
    A. Membranous
    B. Hourglass
    C. Discrete
    D. Fusiform
11. The syndrome associated with SAS hourglass type is:
    A. Marfan's
    B. Ehlers-Danlos
    C. Williams
    D. Noonan's
12. The syndrome associated with coarctation of the aorta (and bicuspid aortic valve) is:
    A. Down
    B. Marfan
    C. Williams
    D. Turner
13. The syndrome associated with inflammation of the walls of the aorta and its branches which may result in obstruction is:
    A. Takotsubo
    B. Takayasu arteritis
    C. Turner
    D. Tetralogy
14. The most common location for sinus of Valsalva aneurysm is:
    A. RCC
    B. NCC
    C. LCC
    D. All three aortic sinuses of Valsalva

15. The most common location for sinus of Valsalva aneurysm to rupture into is:
    A. RA
    B. RV
    C. LA
    D. LV
16. The murmur of ruptured sinus of Valsalva aneurysm is:
    A. Holosystolic heard best at the cardiac apex radiating to the axilla
    B. Systolic ejection murmur (SEM) heard best at the RUSB
    C. Continuous (machinery-like) murmur (similar to patent ductus arteriosus (PDA) and coronary artery fistula)
    D. Holodiastolic decrescendo murmur heard best at the LLSB
17. Aortic dissection Review -
    DeBakey type 2: _____
    DeBakey type 3: _____
    DeBakey type 1: _____
    Stanford type A: _____
    Stanford type B: _____

Answers: 1.D; 2.B; 3.A; 4.A; 5.C; 6.D; 7.Yes; 8.A; 9.F; 10.B; 11.C; 12.D; 13.B; 14.A; 15.A; 16.C; 17. DeBakey type 2: Ascending aorta; DeBakey type 3: Descending thoracic aorta; DeBakey type 1: Entire aorta; Stanford type A: Ascending aorta; Stanford type B: Descending thoracic aorta

Cardiac Transplantation

1. Which of the following is **NOT** a "normal" finding post-cardiac transplantation?
    A. Biatrial dilatation
    B. Post-op septum (paradoxical IVS motion)
    C. Trace MR, TR, PR
    D. Reduced EF

Answer: D

Stress Echocardiography (Exercise, Pharmacologic)

1. Which of the following would **NOT** be considered a normal response of the heart to exercise?
    A. Increased heart rate
    B. Increased end-systolic volume
    C. Increased EF (greater than 5%)
    D. Increase in blood pressure
    E. Hyperkinetic segmental wall motion
2. Stress echocardiography is **BEST** at detecting:
    A. Single vessel disease
    B. Multivessel disease
    C. Left main disease
    D. Right coronary artery disease only
    E.

3. The most common drug used for pharmacologic stress echocardiography in the US is:
    A. Dobutamine
    B. Inderal
    C. Dipyridamole
    D. Nitroprusside
4. Which of the following would **NOT** be a contraindication for a stress echocardiographic exam?
    A. HOCM
    B. Left main disease
    C. Unstable angina
    D. Suspicion of coronary artery disease
    E. Increased blood pressure (> 220 mm Hg)

Answer: 1.B; 2.A; 3.A; 4.D

Congenital Heart Disease in the Adult (Video Cases)

1. The most common atrial septal defect (ASD) is:
    A. Ostium secundum
    B. Ostium primum
    C. Sinus venosus
    D. Common atrium
2. The view of choice for ASD is:
    A. Parasternal long axis
    B. Apical four chamber
    C. Subcostal four chamber
    D. Suprasternal long axis of the aorta
3. ASD is a:
    A. Right heart pressure overload (RVH)
    B. Left heart pressure overload (LVH)
    C. Right heart volume overload (RAE, RVE, Paradoxical IVS motion)
    D. Left heart volume overload (LAE, LVE, Hyperkinesis)
4. In the parasternal long axis (PLAX) view, there is right ventricular dilatation. This may suggest:
    A. Atrial septal defect (ASD)
    B. Ventricular septal defect (VSD)
    C. Patent ductus arteriosus (PDA)
    D. Coarctation of the aorta
5. Which is **INCORRECTLY MATCHED** for associated defects with atrial septal defects?
    A. Ostium secundum ASD – Mitral valve prolapse (MVP)
    B. Ostium primum ASD – Cleft mitral valve
    C. Sinus venosus ASD – PAPVR (partial anomalous pulmonary venous return)
    D. Coronary sinus type ASD – Mitral stenosis (MS)

6. A dilated coronary sinus is noted. Which is **NOT** a possible etiology?
    A. Persistent left superior vena cava (PLSVC)
    B. Significant tricuspid regurgitation (TR)
    C. Significant pulmonary regurgitation (PR)
    D. Increased right atrial pressure (RAP)
7. Which arm should be used when evaluating a patient for PLSVC with agitated saline contrast?
    A. Right
    B. Left
    C. Both
    D. Neither
8. The most common ventricular septal defect (VSD) in adults is:
    A. Perimembranous
    B. Outlet
    C. Inlet
    D. Trabecular
9. VSD is considered to be a: _____.
    A. Right heart volume overload
    B. Left heart volume overload
    C. Right heart pressure overload
    D. Left heart pressure overload
10. A VSD beneath the aortic valve is: _____.
    A. Perimembranous
    B. Inlet
    C. Outlet
    D. Trabecular
11. A VSD beneath the atrioventricular (AV) valves (mitral valve, tricuspid valve) is a: _____.
    A. Perimembranous
    B. Inlet
    C. Outlet
    D. Trabecular
12. A VSD beneath the pulmonary valve is: _____.
    A. Perimembranous
    B. Inlet
    C. Outlet
    D. Trabecular
13. A VSD involving the anterior IVS is: _____.
    A. Perimembranous
    B. Inlet
    C. Outlet
    D. Trabecular

14. The VSD associated with complex congenital heart defects (e.g.; Tetralogy of Fallot) is: _____.
    A. Perimembranous
    B. Inlet
    C. Outlet
    D. Trabecular
    E. Mal-alignment
15. A combination of primum ASD, inlet VSD, common AV valve is:
    A. Partial atrioventricular septal (AV) defect
    B. Incomplete (AV) septal defect
    C. Complete AV septal defect complete endocardial cushion, complete AV canal
    D. Downs syndrome
16. Which of the following is associated with a continuous (machinery-like) murmur?
    A. ASD
    B. VSD
    C. Patent ductus arteriosus (PDA)
    D. Complete atrioventricular (AV) septal defect
17. Abnormal displacement of the TV towards the cardiac apex with RV dysplasia (atrialization) of the RV is:
    A. Sinus venosus ASD
    B. Trabecular VSD
    C. Ebstein's anomaly
    D. Uhl's anomaly
18. The effect of valvular pulmonary stenosis (PS) is:
    A. Left atrial dilatation
    B. Right atrial dilatation
    C. Right ventricular hypertrophy
    D. Left ventricular hypertrophy
19. The combination of RVH, perimembranous VSD, over-riding aorta and right ventricular outflow tract (RVOT) obstruction (pulmonary stenosis) is:
    A. Ebstein's anomaly
    B. Uhl's anomaly
    C. Tetralogy of Fallot
    D. Shone's complex
20. The most common location for aortic coarctation is:
    A. Ascending aorta
    B. Aortic arch
    C. Descending thoracic aorta
    D. Aortic isthmus

21. The view of choice for aortic coarctation is:
    A. Parasternal long axis
    B. Parasternal short axis of the aortic valve of aortic valve
    C. Apical five chamber
    D. Suprasternal long axis of the aorta
22. Aortic coarctation will result in (secondary finding):
    A. Left atrial dilatation
    B. Left ventricular hypertrophy
    C. Right atrial dilatation
    D. Right ventricular hypertrophy
23. The continuous-wave (CW) Doppler pattern of aortic coarctation is described as:
    A. Saw-tooth
    B. Dagger
    C. Parabolic
    D. Rectangular
24. The abnormal abdominal aorta flow pattern for aortic coarctation is:
    A. Normal
    B. Blunted
    C. Parabolic
    D. Dagger
25. The reversal of a shunt from left to right to right to left due to increased pulmonary vascular resistance is:
    A. Marfan's
    B. Ehlers-Danlos
    C. Down's
    D. Eisenmenger
26. A thin membrane located beneath the aortic valve is:
    A. HCM
    B. HOCM
    C. DSS (discrete subaortic stenosis)
    D. Tunnel aortic stenosis
27. The absence of tissue of the anterior mitral valve leaflet is:
    A. Normal
    B. Cleft mitral valve
    C. Mitral stenosis
    D. Mitral valve prolapse
28. A membrane above the fossa ovalis dividing the left atrium is:
    A. Cor triatriatum
    B. Supravalvular MV ring
    C. Pulmonary vein stenosis
    D. DSS (discrete subaortic stenosis)

Answers: 1.A; 2.C; 3.C; 4.A; 5.D; 6.C; 7.B; 8.A; 9.B; 10.A; 11.B; 12.C; 13.D; 14.E; 15.C; 16.C; 17.C. 18.C; 19.C; 20.D; 21.D; 22.B; 23.A; 24.B; 25.D; 26.C; 27.B; 28.A

Video cases for Adult Congenital Heart Disease (CHD)

RVE in PLAX, Complete AV septal defect (endocardial cushion defect), Ebstein's anomaly, Tetralogy of Fallot, Coarctation of aorta (CW Doppler flow pattern), Discrete subaortic stenosis (DSS), Cleft MV, Parachute MV, Cor triatriatum, PFO with agitated saline, Pulmonary AV fistula with agitated saline contrast study), Corrected TGA.

Calculations – Must Know

1. The _____ equation predicts the pressure drop (pressure gradient, pressure difference) between two chambers.
    A. Doppler
    B. Teichholz
    C. Bernoulli
    D. Poiseuille
2. $4 \times V^2$ is the simplified ____ equation used for calculating the peak pressure gradient.
    A. Doppler
    B. Teichholz
    C. Bernoulli
    D. Poiseuille
3. Determine the peak pressure gradient for a peak velocity of 3.0 m/sec. _____ mm Hg
    A. 3
    B. 9
    C. 36
    D. 46
4. The tricuspid regurgitation peak velocity is 3.0 m/sec. The inferior vena cava (IVC) measures 2.7 cm without inspiratory collapse. Determine the right ventricular systolic pressure (RVSP) and systolic pulmonary artery pressure (SPAP): ____ mm Hg.
5. Determine the RVSP and SPAP for a ventricular septal defect (VSD). Blood pressure (BP) is 120/80 mm Hg. VSD peak velocity: 5 m/sec. RVSP and SPAP: ___ mm Hg.
6. Determine the left atrial pressure (LAP): BP: 120/80 mm Hg. Mitral regurgitation (MR) peak velocity: 5 m/sec. LAP: ____ mm Hg.
7. Determine the pulmonary artery end-diastolic pressure (PAEDP. Pulmonary regurgitation (PR) end-diastolic velocity: 2.0 m/sec. the inferior vena cava measures 1.8 cm with less than 50% inspiratory collapse. PAEDP: _____ mm Hg.
8. Determine the mean pulmonary artery pressure (MPAP). The peak PR is 3.0 m/sec. The inferior vena cava measures 1.3 cm with less than 50% inspiratory collapse. The MPAP is: _____ mm Hg.
9. Determine the left ventricular end-diastolic pressure (LVEDP): The BP is 120/66. The aortic regurgitation (AR) end-diastolic velocity is 3.0 m/sec. The LVEDP is: _____ mm Hg.

Answers: 1.C; 2.C; 3.C; 4.51; 5.20; 6.20; 7.24; 8.44; 9.30

Stroke Volume (SV) Cardiac Output (CO) Cardiac Index (CI)

10. Cross-sectional area (CSA) x velocity time integral (VTI = _____.
    A. Stroke volume (SV)
    B. Cardiac output (CO)
    C. Cardiac index (CI)
    D. Aortic valve area (AVA)
11. .785 x diameter^2 =
    A. Cross-sectional area (CSA
    B. Stroke volume (SV)
    C. Cardiac output (CO)
    D. Cardiac index (CI)
12. Determine the left ventricular stroke volume (SV): LVOTd: 2.0 cm; LVOT VTI: 20 cm SV:_____ mL.
13. Stroke volume (SV) x heart rate (HR) =
    A. Stroke volume (SV)
    B. Cardiac output (CO)
    C. Cardiac index (CI)
    D. Aortic valve area (AVA)
14. Determine the cardiac output for the stroke volume (SV) calculated in the previous question (#11) HR: 100 bpm. CO = _____ lpm
15. Cardiac output (CO) ÷ Body surface area (BSA) =
    A. Stroke volume (SV)
    B. Cardiac output (CO)
    C. Cardiac Index: (CI)
    D. Aortic valve area (AVA)
16. Determine the cardiac index (CI) for the cardiac output calculated in the previous question (#13) Body surface area (BSA): 2.0 m^2 CI = _____ lpm/m^2

Answers: 10.A; 11.A; 12.63; 13.B; 14.6.3; 14.C;.15.C; 16.3.2

Additional Calculations

17. Determine mitral valve area (MV). The mitral valve (MV) pressure half-time (PHT) is 100 msec. MVA: _____ cm^2.
18. Determine the MVA. The MV deceleration time is 700 msec. The MVA is: _____ cm^2.
19. Determine the aortic valve area (AVA) using the continuity equation. LVOTd: 2.0 cm; LVOT VTI: 20 cm; AoV VTI: 100 cm AVA: ____ cm^2.
20. Determine the AVA. LVOTd: 2.0 cm; LVOT peak velocity: 1.0 m/sec; AoV peak velocity: 5 m/sec; AVA:___ cm^2.
21. Determine the MVA using the continuity equation. LVOTd = 2.0 cm; LVOT VTI = 20 cm; MV VTI = 100 cm. MVA? _____ Severity? _____
22. Determine stroke volume. End-diastolic volume: 100 mL. End-systolic volume (ESV): 50 mL. Stroke volume (SV) _____ ml.
23. In the parasternal long axis (PLAX) the mitral regurgitation (MR) vena contracta measured 1.1 cm. How severe is the MR? Mild Moderate or Severe? _____?

24. Calculate the severity of the mitral regurgitation (MR) using the proximal isovelocity surface area method (PISA). PISA radius: 1.0 cm; Aliasing velocity: 40 cm/sec; MR peak velocity: 500 cm/sec; MR VTI: 150 cm. Calculate: Effective regurgitant orifice area (EROA) ____ cm^2; Regurgitant volume (RV): _____ mL.
25. The normal MVA: _____ cm^2; Severe MS: _____ cm^2.
26. The normal AVA: ____ cm^2; Severe AS: ____ cm^2.
27. The expected peak velocity range for aortic stenosis (AS)? _____ m/sec.
28. The normal tricuspid valve area (TVA): _____ cm^2
29. The normal pulmonary valve area (PVA): _____ cm^2
30. The top normal MV peak velocity is: ____ cm/sec.
31. The top normal LVOT peak velocity: _____ cm/sec.
32. The aortic valve (AoV) peak velocity which indicates aortic stenosis (AS) is present is greater than or equal to: _____ m/sec.
33. The top normal tricuspid velocity TV peak velocity: _____ cm/sec.

Answers: 17.2.2; 18.1.0; 19.0.63; 20.0.63; 21.0.63; 22.50; 23.Severe; 24.0.25; 38; 25.4 to 6; Less than 1.0; 26.3 to 5; Less than 1.0; 27.3 to 5; 28.4 to 7; 29.2.5 to 3.5; 30.130; 31.110; 32.2.6; 33.70

Syndromes

1. Aortic root-ascending aortic aneurysm, mitral valve prolapse (MVP), (40%) aortic regurgitation (AR), mitral regurgitation (MR) and aortic dissection are **NOT** associated findings with which syndrome listed below?
    A. Marfan's
    B. Ehlers-Danlos
    C. Loeys-Dietz
    D. Lutembacher
2. Mitral stenosis (MS) with atrial septal defect (ASD) is _____ syndrome.
    A. Marfan's
    B. Ehlers-Danlos
    C. Loeys-Dietz
    D. Lutembacher
3. The most common finding in Dressler's syndrome is: _____.
    A. Aortic aneurysm
    B. Mitral valve prolapse
    C. Pericarditis
    D. Aortic stenosis
4. Which syndrome is associated with supravalvular aortic stenosis (SAS) – hourglass type and peripheral pulmonary stenosis (PPS)?
    A. Williams
    B. Lutembacher
    C. Marfan's
    D. Trisomy 21 (Down's)

5. Which syndrome is associated with complete atrioventricular canal defect?
    A. Down's
    B. Williams
    C. Lutembacher
    D. Marfan's
6. Dysplastic pulmonary valve – pulmonary valve stenosis is associated with which syndrome?
    A. Down's
    B. Noonan's
    C. Marfan's
    D. Loeys-Dietz
7. Coronary artery aneurysm is associated with _____ syndrome.
    A. Marfan's
    B. Down's
    C. Kawasaki
    D. Takotsubo
8. Which syndrome is referred to as the "broken-heart" syndrome with findings of hyperkinesis of the basilar and mid left ventricular walls with apical ballooning?
    A. Kawasaki
    B. Takotsubo
    C. Lutembacher
    D. Noonan's
9. Aortic coarctation and bicuspid aortic valve are associated with _____ syndrome.
    A. Turner
    B. Noonan
    C. Down's
    D. Takotsubo
10. Inflammation of the aorta which may result in occlusive pathology is associated with _____ syndrome.
    A. Kawasaki
    B. Takotsubo
    C. Takayasu
    D. Marfan's
11. The **MOST** likely echocardiography finding for post-pericardiotomy syndrome is:
    A. Mitral stenosis
    B. Pericardial effusion
    C. Pleural effusion
    D. Coronary artery aneurysm
12. Pericarditis – pericardial effusion is **LEAST** likely to be present in the _____ syndrome.
    A. Dressler
    B. Post-pericardiotomy
    C. Post-perfusion
    D. Williams

Answers: 1.D; 2.D; 3.C; 4.A; 5.A; 6.B; 7.C; 8.B; 9.A; 10.C; 11.B; 12.D

Miscellaneous

1. Which of the following is associated with pulmonary embolism?
    A. Marfan's
    B. Down's
    C. Noonan
    D. McConnell's sign

Answer: 1.D

Videos Checklist – There are approximately 20 to 25 video cases presented on the CCI Adult Echocardiography board examination – the test taker should be able to identify the following: (not an all-inclusive list but the following list represents possible video cases)

1. Mitral stenosis (MS)
2. Mitral valve prolapse (MVP)
3. Tricuspid regurgitation (TR)
4. Aortic stenosis (AS)
5. Prediction of EF
6. Diastolic function grade
7. Infective endocarditis (vegetation)
8. Pericardial effusion
9. Cardiac tamponade
10. HOCM
11. Dilated cardiomyopathy
12. Hypereosinophilic syndrome
13. Cardiac Amyloidosis
14. Kawasaki
15. Marfans (or Ehlers-Danlos)
16. Bicuspid aortic valve
17. Aortic coarctation
18. Rhabdomyoma
19. Carcinoid
20. LA myxoma
21. Ventricular septal rupture
22. Systemic hypertension
23. Aortic dissection
24. Pericardiocentesis
25. Sinus of Valsalva aneurysm
26. Interatrial septal aneurysm
27. Lipomatous hypertrophy
28. ASD closure device (Amplatzer)
29. IVC filter floating in RA
30. Congenital heart disease (see CHD section)