



# Advanced PTEeXAM Content Outline

- 01 Principles of Ultrasound
  - 01.A Nature of Ultrasound
  - 01.B Frequency, Wavelength, Speed of Sound in Tissue
  - 01.C Properties of Ultrasound Waves
  - 01.D Ultrasound/Tissue Interactions
- 02 Principles of Doppler Ultrasound
  - 02.A Doppler Effect
  - 02.B Doppler Equation
  - 02.C Doppler Shift Frequencies and Influencing Factors (e.g., transducer frequency, angle of beam incidence, flow velocity)
  - 02.D Pulsed-wave Doppler
  - 02.E Continuous-wave Doppler (e.g., range ambiguity)
  - 02.F Color flow Doppler (e.g., gain, variance, color maps)
  - 02.G Quantitative Doppler
- 03 Transducers
  - 03.A Piezoelectric Effect
  - 03.B Crystal Thickening and Resonance
  - 03.C Damping
  - 03.D Sound Beam Formation
  - 03.E Focusing
  - 03.F Spatial Resolution
  - 03.G Arrays
- 04 Equipment, Infection Control, and Safety
  - 04.A Biological Effects of Ultrasound
  - 04.B Electrical and Mechanical Safety
  - 04.C Infection Control
  - 04.D Safety of Probe Insertion and Manipulation
  - 04.E Contraindications to Transesophageal Echocardiography
  - 04.F Complications of Transesophageal Echocardiography
- 05 Principles of Imaging
  - 05.A Imaging Modalities
  - 05.B Image Optimization
- 06 Chamber Anatomy and Measurements
  - 06.A Cardiac Chambers and Walls
  - 06.B Timing of Cardiac Measurements to Cardiac Cycle
- 07 Global Ventricular Systolic Function and Pathology
  - 07.A Volumetric Measurements and Calculations (e.g. stroke volume and cardiac output)
  - 07.B Assessment of Left Ventricular Systolic Function
  - 07.C Assessment of Right Ventricular Systolic Function
  - 07.D Cardiomyopathies
- 08 Segmental Left Ventricular Systolic Function and Pathology
  - 08.A Myocardial Segment Identification
  - 08.B Coronary Artery Distribution and Flow
  - 08.C Normal and Abnormal Segmental Function
  - 08.D Left Ventricular Aneurysm
  - 08.E Left Ventricular Pseudoaneurysm
  - 08.F Left Ventricular Rupture
  - 08.G Ventricular Septal Defect Post Myocardial Infarction
- 09 Cardiac Valves
  - 09.A Principles of Valve Assessment (not valve specific)
  - 09.B Tricuspid Valve
  - 09.C Pulmonic Valve
  - 09.D Mitral Valve
  - 09.E Aortic Valve
  - 09.F Acquired Valve and Annular Diseases
- 010 Valve Repair and Replacement Assessment
  - 010.A Valve Repair Evaluation
  - 010.B Valve Replacement Evaluation (types and valve dysfunction)
- 011 Intracardiac Masses and Devices
  - 011.A Intracardiac Masses
  - 011.B Devices and Foreign Material
- 012 Vasculature
  - 012.A Pulmonary Arteries
  - 012.B Pulmonary Veins
  - 012.C Vena Cavae and Systemic Veins
  - 012.D Coronary Arteries
  - 012.E Aorta
- 013 Pericardium and Extracardiac Structures - Anatomy and Pathology
  - 013.A Pericardium and Pericardial Space
  - 013.B Pleural Space and Lung
  - 013.C Other Structures
- 014 Assessment of Perioperative Events
  - 014.A Causes of Cardiovascular Instability
  - 014.B Cardiopulmonary Bypass, including Minimally Invasive Management
  - 014.C Mechanical Circulatory Support
  - 014.D Transplantation Surgery
  - 014.E Assessment Related to Aortic Surgery
  - 014.F Assessment Related to Myectomy (ventricular septal defect)
- 015 Congenital Heart Disease
  - 015.A Identification of Morphologic Left and Right Structures
  - 015.B Assessment of Shunt (e.g. shunt fraction)
  - 015.C Atrial Septal Defects
  - 015.D Ventricular Septal Defects
  - 015.E Aortic Valve and Left Ventricular Outflow Tract Abnormalities
  - 015.F Anomalous Coronary Arteries
  - 015.G Congenital Abnormalities of the Aorta
  - 015.H Ebstein's Anomaly
  - 015.I Persistent Left Superior Vena Cava
  - 015.J Tetralogy of Fallot (and Sequelae)
  - 015.K Transposition of the Great Arteries
  - 015.L Atrioventricular Septal Defect (Common Atrioventricular Canal) including Clef
  - 015.M Single Ventricle/Fontan
  - 015.N Cor Triatriatum and Other Congenital Atrial Abnormalities (e.g., supramitral membrane)
  - 015.O Double-chambered right ventricle/RVOT
- 016 Normal Anatomy/Variants Mistaken for Pathology
  - 016.A Chiari Network
  - 016.B Crista Terminalis
  - 016.C Eustachian Valve
  - 016.D Inverted/Bilobed Left Atrial Appendage
  - 016.E Lamb's Excrescences
  - 016.F Lipomatous Hypertrophy of the Atrial Septum
  - 016.G Pectinate Muscles
  - 016.H Coumadin Midge
  - 016.I Trabeculations, Muscle Bands, Moderator Band
  - 016.J Thebesian Valve
- 017 Artifacts
  - 017.A Two-Dimensional Imaging Artifacts
  - 017.B Three-Dimensional Imaging Artifacts
  - 017.C Doppler Artifacts
- 018 Related Diagnostic Modalities
  - 018.A Epiaortic Scanning
  - 018.B Epicardial Scanning
  - 018.C Contrast Echocardiography
  - 018.D TEE Compared to Other Imaging Modalities
- 019 Ventricular Diastolic Filling and Function
  - 019.A Basic Principles
  - 019.B Echocardiographic Assessment of Left Ventricular Diastolic Function
  - 019.C Grading of Left Ventricular Diastolic Function
  - 019.D Estimates of Left Ventricular Diastolic Filling Pressures
- 020 Structural Heart Disease and Other Hybrid Procedures
  - 020.A Atrial Septum
  - 020.B Ventricular Septum
  - 020.C Defect Closures
  - 020.D Left Atrial Appendage Occlusion (Watchman, Amulet, etc.)
  - 020.E Aortic Valve
  - 020.F Mitral Valve
  - 020.G Pulmonic Valve and Pulmonary Artery
  - 020.H Tricuspid Valve
  - 020.I Mechanical Thrombectomy
  - 020.J Endovascular

## Reference Statement

NBE does not endorse or recommend any third-party review course or material. Any text in cardiovascular techniques and evaluation, cardiac patient care, and management may be used. Current standards and guidelines endorsed by professional societies are also appropriate.