

Index

A

AAo. *See* Ascending aorta
Abscess formation, 41
Acute myocarditis, 120. *See also* Ischemic heart diseases
Acute severe aortic insufficiency, 54
Acute thoracic aortic dissection, diagnosis of, 169
American National Standards Institute/
Institute of Electrical and
Electronics Engineers (ANSI/
IEEE), 12
Anomalous pulmonary venous connection, 128
Aorta-to-pulmonary artery, 162
Aortic anatomy, 177
Aortic aneurysms, 171, 176
 diagnosis of, 174
Aortic coarctation, 137, 169
Aortic lumen stenosis, 48
Aortic pathology, 180
Aortic pseudoaneurysms, 180
Aortic rupture, 62–63
Aortic stenosis, 39, 43
Aortic valve, 52–53
Aortic wall pathology, 169
Aortocoronary bypass, CMR coronary
 angiography in, 112–113
Aortopulmonary collaterals, 148
Apical hypertrophic cardiomyopathy, 99. *See also* Hypertrophic cardiomyopathy
Arrhythmias, 16
Arrhythmogenic right ventricular dysplasia, 23
 and CMR study, 74
Ascending aorta, 81
Atherosclerosis, 169
Atherosclerotic aortic walls, 176
Atherosclerotic plaque, intravascular contrast
 media, 117
Atrial arrhythmias, 130

Atrial fibrillation, 22
Atrial septal defect (ASD), 131
Atrioventricular groove, 28
Atrioventricular septal defect, 46
Autoimmune vasculitis. *See* Takayasu
 arteritis

B

Bacterial endocarditis, 41
Basal intraventricular septum, 154
Bicuspid aortic valves, 177
Black blood CMR image, 155
Blalock–Taussig shunt, 46–47, 147
Brain clip, for intracranial aneurysm, 15

C

CAD. *See* Coronary artery disease
CAD detection, obutamine stress CMR, 122
CAD patient
 CMR test in, 111
 diastolic frame and contrast-enhanced
 image, 110
Cardiac prosthetic valves, 15
Cardiac (RR) cycle, 8
Cardiomyopathy, evaluation of, 172
Cardiovascular magnetic resonance imaging
 (CMR), 2, 21, 104
 anatomic and functional requirement, 20
 to assess aortic regurgitation, 23
 claustrophobia management in, 20
 contraindication to, 14
 contrast agents, 13
 coronary angiogram, 126
 for coronary atherosclerosis, 21
 for evaluation of dyspnea, 16
 examination, nerve stimulation, 12
 hemodynamic instability for, 23

- Cardiovascular magnetic resonance imaging (CMR) (*cont.*)
- for left and right ventricular volumes and ejection fraction, 21
 - for myocardial viability in patients, 23
 - in non pacemaker dependent patient, risks, 16
 - patients with new murmur, clinical usefulness for, 40–41
 - phase encoding, 47
 - for short axis orientation, 30–31
 - studies in
 - abnormal echocardiogram, 96
 - arrhythmogenic right ventricular dysplasia, 74
 - breath shortness, 86
 - constrictive pericarditis diagnosis, 94
 - coronary artery disease, 92
 - multiple myeloma and heart failure, 82
 - pericardial constriction diagnosis, 84
 - transverse slice, 32
 - from SSFP bright blood sequence, 54
 - transverse T1-weighted spin-echo, 168
 - Cartesian k-space. *See* K-space
 - Center for Devices and Radiological Health (CDRH), 12
 - CE Physio Ring, 15
 - Chest computed tomography (CT) scan, 20
 - Cine CMR, study, 22. *See also* Cardiovascular magnetic resonance imaging
 - at aorta root, 52
 - at base of heart in with chest pain, 183
 - in 3-chamber orientation, 48–49
 - 4-chamber orientation with SPAMM tagging, 75
 - Cine image, 8. *See also* Cine CMR, study
 - at plane of aortic valve with murmur, 43
 - CMR. *See* Cardiovascular magnetic resonance imaging
 - CMR angiography, 157
 - CMR coronary angiography
 - and angiogram, 161
 - in aortocoronary bypass, 112–113
 - usage of, 113–114
 - Coarctation, 23
 - phase-contrast sequences for evaluation, 48
 - Collateral flow, 48
 - Computed tomography (CT), 7, 73, 170
 - Congenital heart disease, 155
 - Constrictive pericarditis, diagnosis, 58–59, 64
 - Contrast-to-noise ratio (CNR), 9
 - Coronary artery aneurysms, 171
 - Coronary artery disease, 110
 - Coronary atherosclerosis, 21, 47
 - Coronary calcium, detection, 20
 - Coronary MR angiogram, 28–29
 - Coronary sinus (CS), 150, 152
 - Coronary sinus flow reserve, 47
 - Coronary vessels, atrial fibrillation and RR variability, 121
 - CT. *See* Computed tomography
 - Current 64-row MDCT technology, 21
- D**
- DAo. *See* Descending aorta
 - Descending aorta, 81
 - Diagnostic cardiac catheterization, 177
 - Diamagnetic materials, 3
 - Diastolic frame structures on, identification of, 24–25
 - Distal intraventricular septum, 182
 - Dobutamine echocardiography and dobutamine CMR, comparison, 113
 - Dobutamine stress
 - CMR, advantages, 122
 - in left ventricular systolic function, 112
 - Dyspnea, 16, 50–51, 158
- E**
- Ebstein anomaly, 131
 - Echo time (TE), 39
 - Eddie currents, 14, 16
 - Endocardial cushion defect, 154
 - Endocardial late gadolinium enhancement, 60
 - Endocarditis, 41, 50
- F**
- False lumen (FL), 179
 - Ferromagnetic material, 3
 - Flow scan, plane perpendicular to aortic root with murmur, 44–45
 - Fluoroscopy and CT, for coronary calcifications, 20
 - Forward systolic aortic flow, 47
 - Fourier transformation, 7
- G**
- Gadofosveset trisodium, 117
 - Gadolinium administration in cardiovascular MRI, 60, 73, 78
 - Gadolinium-based contrast agents, 14
 - Gadolinium chelates (Gd-DTPA), 13
 - Gadolinium doses in myocardial viability, 106. *See also* Ischemic heart diseases

Gadolinium-enhanced CMR angiogram, 26–27
 Global and regional systolic function augmentation, dobutamine stress in, 112
 Gradient-echo sequences, 10
 in CMR coronary angiogram, 121
 Gyromagnetic ratio, 3, 7

H

Heart failure patients
 4-chamber image and diagnosis, 107
 diastolic frame and contrast-enhanced image, 110
 Heart rate, 8
 Hemithorax, 141
 Hemochromatosis, 74, 93. *See also* Thalassemia major
 Hydrogen resonance frequency, 3
 Hypertrophic cardiomyopathy, 23, 70–71, 154
 Hypoplastic pulmonary artery, 150

I

Implantable cardiac defibrillator (ICD), 14
 Inferior vena cava (IVC), 164
 Intra-atrial septum, 29, 128, 135
 Intracranial aneurysm clips, 15
 Intraocular metal objects, X-rays/CT scanning, 16
 Intra-plaque ulceration, 176
 Intraventricular septum, 128, 152
 Inversion time (TI), 10
 Ischemia, 9
 Ischemic cardiomyopathy, 104–105, 107, 154.
 See also Ischemic heart diseases
 with anterior and apical myocardial infarction, 119–120
 systolic dysfunction, 111
 Ischemic heart diseases
 aortocoronary bypass assessment, 112–113
 atrial fibrillation and RR variability in coronary vessels, 121
 cardiomyopathy and CMR study, 104, 119–120
 4-chamber image of heart failure patient, diagnosis of, 107
 2-chamber image of myocardial infarction patient, diagnosis of, 108–109
 CMR evaluation in CAD patient, 111
 coronary magnetic resonance (MR) angiography, 104
 dobutamine echocardiography, 113

dobutamine stress CMR advantages, 122
 dobutamine stress in left ventricular systolic function, 112
 gadolinium doses for myocardial viability assessment, 106
 gradient echo sequence in CMR coronary angiogram, 121
 images of patient with CAD, heart failure, and pulmonary embolism, 110
 intravascular contrast media in
 atherosclerotic plaque, 117
 ion-specific CMR evaluation, 105
 late gadolinium enhancement, 116
 perfusion CMR in CAD detection, 114
 stenosis in, 118
 systolic improvement in myocardial infarction, 105–106
 vasodilation perfusion CMR, 115

K

Kawasaki disease, 171
 K-space, 7. *See also* Magnetic resonance imaging (MRI)

L

Larmor equation, 7
 Late gadolinium enhancement, 116. *See also* Ischemic heart diseases
 Left anterior descending (LAD), 127
 Left aortic arch (LAA), 158
 Left circumflex (LCx) coronary arteries, 127
 Left common carotid (LCCA), 158
 Left internal mammary artery, 85
 Left subclavian artery (LSCLVA), 158
 Left subpulmonic ventricle (LV), 164
 Left superior vena cava (LSVC), 150
 Left ventricular apical clot, 110
 Left ventricular concentric hypertrophy, 135
 Left ventricular hypertrophy, 48
 Left ventricular stroke volume, 47
 LIMA. *See* Left internal mammary artery
 Lipoma of heart, 65–66
 Longitudinal magnetization, 4
 Luminal stenosis, 171

M

Magnetic field strength, 2
 Magnetic resonance imaging (MRI), 2
 of biologic tissues, 4
 generation, 7
 Magnetohydrodynamic effect, for ECG, 9

Malignant cardiac tumors, 83
 Marfan syndrome, 174, 177
 Maximal intensity projection (MIP), 147, 180
 Maximal stenosis, 133
 Metastatic malignancy, 61
 Mid diastole, 104. *See also* Ischemic heart diseases
 Mitral regurgitant volume, 47
 Mitral regurgitation, 47
 Mitral valve annulus, 131, 152
 Mitral valve regurgitant fraction, 40
 MR angiography, 170
 MS-325, 117. *See also* Gadofosveset trisodium
 Multidetector CT (MDCT) scan, 20, 21
 Mural thrombus, 108
 Myocardial infarction and systolic improvement, 105–106. *See also* Ischemic heart diseases
 Myocardial infarction patient, 2-chamber image, 108–109
 Myocardial perfusion with gadolinium imaging, 114–115
 Myocardial signal enhancement slope, 14–115. *See also* Ischemic heart diseases
 Myocardial tagging, 75. *See also* Spatial modulation of magnetization tagging
 Myocardial viability assessment, gadolinium doses, 106
 Myxoma of heart, 65–66

N

Nephrogenic systemic sclerosis/nephrogenic fibrosing dermopathy, 14
 New York Heart Association, 80
 Noncoronary (NC) cusps, 43
 NYHA. *See* New York Heart Association

P

Paramagnetic material, 3
 Patent ductus arteriosus, 128, 145, 173
 PC. *See* Pericardial cysts
 Perfusion CMR
 advantages, 118
 in CAD detection, 114
 Pericardial constriction, 75, 94
 Pericardial cysts, 63
 therapies for treating, 73
 Pericardium diseases
 constrictive pericarditis, 58–59

 pericardial constriction, 75, 94
 pericardial effusion, 61
 Phase-contrast (PC), 11
 Phase encoding CMR, 47
 Pl. eff. *See* Pleural effusion
 Pleural effusion (Pl. eff), 67, 173
 Polyarteritis nodosa, 171
 Poststenotic dilation, 133, 180
 Pulmonary artery, 138, 139
 Pulmonary embolism, 138
 patient, diastolic frame and contrast-enhanced image, 110
 Pulmonary regurgitation, 139
 Pulmonary valve atresia, 152
 Pulmonary veins, 138, 143
 Pulmonary venous blood, 164
 Pulmonic circulation, 138
 Pulmonic valve stenosis, 42

R

Radio frequency (RF), 3
 energy, used in CMR, 12
 Repetition time (TR), 11
 Resonance frequency, 2
 Rheumatic heart disease, 40
 Right aortic arch (RAA), 158
 Right atrium (RA), 164
 Right common carotid (RCCA), 158
 Right coronary artery (RCA), 28, 29, 127, 162
 Right coronary cusp, 29
 Right subclavian artery (RSCLVA), 158
 Right ventricle (RV), 147
 Right ventricular outflow tract (RVOT), 43, 127

S

Secundum atrial septal defect, 33
 Short-axis midventricular black blood image, 58
 Short echo time (TE), 11
 Signal-to-noise ratio (SNR), for CMR, 8
 Single-photon emission computed tomography (SPECT), 20
 Situs solitus, 141
 Sodium ion in infarcted and scarred myocardium, 105. *See also* Ischemic heart diseases
 SPAMM. *See* Spatial modulation of magnetization tagging
 Spatial modulation of magnetization tagging, 75
 Specific absorption rate (SAR), 12

Spin-echo sequences, 10, 11
 Spiral k-space. *See* K-space
 Starr–Edwards valves, 15. *See also* Cardiac prosthetic valves
 Steady-state free precession (SSFP), 39
 Stenosis, 118. *See also* Ischemic heart diseases
 Stroke volume, 50
 Subclavian artery, 133, 171
 Superior mesenteric artery (SMA), 175
 Superior vena cava (SVC), 143, 148, 156, 164, 179
 Supravalvular aortic stenosis, 140. *See also* Williams syndrome
 Supraventricular arrhythmias, 131
 Syncope, 23
 Syphilitic aortitis, characterization of, 171
 Systolic function, 140
 Systolic magnitude and phase images, pulmonary artery, 41–42

T

Takayasu arteritis, 171
 Takayasu disease, 171, 180
 Takotsubo cardiomyopathy, 120
 T1 and T2 values, biologic tissues, 5
 T1- and T2-weighted sequences, 6
 Temporal resolution, for CMR, 8, 20, 21
 Tetralogy of Fallot, 46
 characterization of, 138
 variants of, 148
 Thalassemia major, 74, 82
 Thoracic aorta, 128, 150
 Time-varying magnetic fields (dB/dt), 13
 Tissue synthesis disorders, 177

Titanium and titanium-alloy brain clips.
 See Intracranial aneurysm clips
 Transesophageal echocardiography (TEE), 174
 Transposition of great arteries (TGA), 139
 Transthoracic echocardiography, for murmur, 40
 Transverse black blood images, 138
 Transverse relaxation. *See* T2 relaxation
 T2 relaxation, 4
 Tricuspid annulus, 135
 Tricuspid valve, 131
 subvalvular apparatus, vegetation in, 68–69
 Trileaflet aortic valve, 43
 True lumen (TL), 179
 T1-weighted spin-echo sequence, 6
 T2-weighted spin-echo sequence, 6

U

US Food and Drug Administration (FDA), 12

V

Valvular regurgitation, 41
 Valvular stenosis, 21
 Vasodilation perfusion CMR, 115
 Velocity-encoded (VENC) sequences, 11
 Ventricular dilation, 128
 Ventricular septal defect (VSD), 148
 Viral myocarditis, diagnosis of, 60

W

Williams syndrome, 149, 176