Abdominal FAST\(^3\) (AFAST\(^3\)), 17–43
addition to Gastrointestinal and Pancreas-COAST\(^3\), exams, 119–120
addition to Kidney-COAST\(^3\), exams, 97–8
addition to Liver and Gallbladder-COAST\(^3\), exams, 60–61
addition to Reproductive-COAST\(^3\), exams, 133
addition to Spleen-COAST\(^3\), exams, 78
addition to Urinary Bladder-COAST\(^3\), exams, 108
advantages of, 42–3
AFS with
blunt trauma, 35–6, 37f
cats vs. dogs, 35–6, 37f
non-hemorrhagic effusions, monitoring tool, 38
non-traumatic bleeding patient subsets, 37–8, 41t
penetrating trauma, 38–9
in anaphylaxis, 39–41, 39f–40f, See also Gallbladder in anemia, 41t
small bleeder vs. big bleeder, 35–38
in blunt trauma, 35–7, 41t
cysto-colic (CC) view, 30–32, 31f
diaphragmatico-hepatic (DH) view of, 21, 22f–6f, 160–61
for lung ultrasound lung rockets, 24, 156f
glide sign, 24, 156f
for pericardial effusion, 21–3, 23f, 40f, 41
for pleural effusion, 21–3, 23f, 41, 160–61
for volume status, 24, 24f, 49f,
See also Volume status
documentation of, 42
dorsal recency in, 19
in Gallbladder-COAST\(^3\), 62f
incidental findings, 58–64
as routine add-on, 60–61
how to do, 20–21
hepato-renal (HR) view, 34–5, 34f
incidental findings in, 42
indications for, 19, 41t
introduction to, 17–18
in Kidneys-COAST\(^3\), 34f, 80, 97–8
as routine add-on, 108
in Liver and Gallbladder-COAST\(^3\), 60–61
incidental findings, 55f
as routine add-on, 60–61
naming views of, 19–21
objectives of, 19
organ injury during, 42f
other tests compared to, 272f
in Pancreas-COAST\(^3\), 110, 121
patient positioning for, 19
dorsal, not recommended, 19
right lateral, preferred, 19
left lateral, 19
modified sternal, 19
patient preparation not shaved, 19
in penetrating trauma, 38–9, 41t
pericardial effusion, for detection of, 21, 23, 23f, 41, See also Diaphragmatico-hepatic (DH) view
pleural effusion, for detection of, 23, 23f, See also Diaphragmatico-hepatic (DH) view
probes for, 19, 22f
orientation, stay longitudinal, 21
in Reproductive-COAST\(^3\), 133
respiratory distress detected by, 184t
retroperitoneal fluid, 29–30
settings for, 19
in Spleen-COAST\(^3\), 65, 78
as routine add-on, 78
incidental findings, 74f, 75f
spleno-renal (SR) view, 26–30, 27f–8f
staging of hemangiosarcoma, 74
AFAST\(^3\), 74
TFAST\(^3\), 74
Vet BLUE, 74
target organ approach, 19–21
techniques for, 20f
Vet BLUE with, 166
Abdominal fluid score (AFS)
AFAST\(^3\) with
blunt trauma, 35–6
cats vs. dogs, 35–6
non-hemorrhagic effusions, monitoring tool, 38
non-traumatic bleeding patient subsets, 37–8, 41t
penetrating trauma, 38–9
in anaphylaxis, 39–41, 39f–41f, See also Abdominal FAST\(^3\) (AFAST\(^3\)); Gallbladder, halo sign
applications of AFS
clinical significance of, 35–6
common positive sites in, 37, 37f
decision-making algorithm for, 36f
in lateral recency, 37f
for ascites, other effusions, 38
how to calculate the AFS, 37f
retroperitoneal fluid, not part of, 29–30, 30f, 282
Abdominal fluid score (AFS) (cont’d)
indicators for, 19
monitoring (tracking) tool,
  hemorrhagic effusions,
  35–7, 36t
monitoring (tracking) tool,
  non-hemorrhagic effusions, 37–8, 36t
objectives of, 19
for predicting degree of anemia, 36f
routine add-on of, to COAST3, 60–63,
  78, 97–8, 108, 119–120
scope of, 18
small (AFS 1, 2) vs. big bleeder (AFS
  3, 4), 35–8, 37f
cats, unreliable, 36
dogs, reliable, 35–6
Abdominocentesis
MUG-DPL with, 301f
ultrasound-guided
  advantages/disadvantages, 286
  free-hand, 297f–8f
  indications for, 295–6
  needle location by ultrasound,
    288f, 294, 294f, 297f, 298f
  comet-tail artifact, 6, 8f, 213f
  ring-down artifact, 6, 8f, 213f
  scanning technique for, 296
  ultrasonographic findings for,
    296–8
Absorption, 3
Acoustic coupling gel, 15, 245
  alcohol-based, 15, 15f, 245
  aqueous-based, 245
Acoustic enhancement, 4–6, 6f
Acoustic impedance, 2–3, 3f
Acquired herniation, 235, 235f
diaphragmatic hernia, 21, 159f, 161
inguinal hernia, 235f, 265f
peritoneopericardial hernia, 47f, 235f
Acute cardiogenic pulmonary edema,
  175f–6f, 183f
Acute tamponade, 40f, 158f, 159f, 203f
Adrenal glands, 88f, 226f, 228f
AFAST3. See Abdominal FAST3 (AFAST3)
AFS. See Abdominal fluid score (AFS)
Air interference, 4, 5f
avoiding
  FAST3, diaphragmato-hepatic
    (DH) view, 21–3, 23f,
    157–9, 158f
  intercostal approach, 235
  subcostal view, 197–9, 198f
  use of phase array (sector) probe,
    for heart, 11–12, 12f, 191
Airway ultrasound examination
lower airway, 274f, 278, 278f, See also
  Vet BLUE; TFAST3
  upper airway, 275–7, 275f, 276f, 277f
  abnormal, 275–7, 275f, 277f, 280
  normal, 273, 277f
A-lines, 6, 8f, 148–152
dry lung, with a glide sign, 146–7,
  147f, 172, 174f, 274f
PTx, without glide sign, 148–152,
  150f, 17151f, 151t, 181f, 186
  reverberation artifacts, 6, 8f, 150f,
    174f, 181f, 186
  See also
    A-lines
  signs, summary of, 151t, 185t
  with glide sign, 146–7, 147f, 172,
    174f, 274f, 280
  See also
    Pneumothorax (PTx)
   Alternate imaging tools, 14
Anaphylaxis
AFAST3 in, 39–41, 39f–40f
gallbladder halo sign, 39–42,
  39f-40f, 59f
false positives, 40f, 280f
other causes of, 40, 40f, 280f
pericardial effusion, 40, 40f
volume overload, 280f
  gallbladder role in, 39–41, 39f
  hemoabdomen role in, 41
major rule out, pericardial
  effusion, 40, 40f
Anatomic obstruction, 231f, 232
enteric duplication, 232
enteric agenesis, 232
imperforate anus, 231, 231f
pyloric stenosis, 232
Anechoic
  in ascites, 230
  in bile, 58
  in kidneys, 96f
  in urine, 101
  terminology of, xii
Anemia. See also Abdominal fluid score (AFS)
AFAST3 in, 35–8, 41t
AFS algorithm for, 36f
small (AFS 1, 2) vs. big bleeder
  (AFS 3, 4), 35–8, 37f
  in cats vs. dogs, 35–6
Anorexia, 222, 265f
Anterior eye chamber
  normal, 248f, 248t
cataracts, 251f
shallow, 251f
mass, 254f, 255f, 257f
perforation, 258f
Anterior lens luxation, 251–2,
  251f–2f
Anticoagulant (Warfarin) rodenticide
toxicosis, 88f
Aortic thrombus, 218–19, 219f
Arterial catheter placement
color Flow Doppler, 14, 216
  compression technique, 216–17, 216f
  importance of, 206
  longitudinal vs. transverse image
    for, 217f, 218
  technique for, 217
Arterial thromboembolism (ATE), 218,
  219f
Artifacts
  air interference, 4, 5f
  A-lines, 6, 8f
  colon interference, 28
  associated with urinary bladder
    exam, 101–2, 102f
  of attenuation, fluid-filled structures
    of, 4–6, 4f–6f
  acoustic enhancement, 4, 6f
  edge shadowing, 4–5, 5f
  slice-thickness, 7–8, 9f
  side-lobe, 7–8, 9f
  in bladder, 9f
B-lines (ultrasound lung rockets),
  6–7, 8f, 22f, 146, 148f, 156f,
  172, 173f, 175f, 176f, 185t,
  186, 274f
bone interference, 4, 5f
COAST3 of, 1–16
  indications, 1
  introduction, 1
  objectives, 1
  pearls/pitfalls, 15
  comet-tail, 6, 7f, 213f, 298f
  cysto-colic (CC) view, 30
  DH view, 25
  in gallbladder, 7f, 49
  in liver, 49–50
  mirror, 6, 7f, 22f, 23, 25, 49, 55f
  false mirror, 28, 28f
  of multiple echoes
    side-lobe, 7–9, 9f
  slice-thickness, 7, 9f
  of propagation, 6–7, 6f–7f
  reverberation A-lines, 6, 8f
  ring-down, 6, 7f, 213
  shadowing, “clean” and “dirty”, 4,
    5f, 61f, 63f, 93f, 106f, 107f,
    117f, 118f, 120f, 213f, 240f,
    263f, 264f, 267f, 268f
  slice-thickness, 7–9, 9f
stone interference, 4, 5f, 61f, 93f, 102f, 106f, 240f
strong reflectors, 4, 5f
bone, stone, and air, 3
interface, 4, 5f, See also A-lines
interface, bone and stone, 4, 5f
shadowing, clean and dirty, 4, 5f
of ultrasound examination, 1
ultrasound lung rockets (B-lines), 6–7, 8f, 22f, 146, 148f, 156f, 172, 173f, 175f, 176f, 185t, 186, 274f
in urinary bladder, 101–2, 107f
of velocity or propagation, 6–7, 6f–7f
comet-tail or ring-down, 6, 8f
false, 28f
mirror artifacts, 6, 7f, 55f
reverberation or A-lines, 6, 8f, See also Thoracic FAST3 (TFAST3), Vet BLUE with ultrasound lung rockets or B-lines, 6, 8f, See also Thoracic FAST3 (TFAST3), Vet BLUE with
B-lines, 6, 8f, See also Thoracic FAST3 (TFAST3), Vet BLUE with
Ascarid, 233f
Attenuation, artifacts of fluid-filled structures, 4–6, 4f–6f. See also Artifacts
acoustic enhancement, 4, 6f
edge shadowing, 4–5, 5f
slice-thickness, 7–8, 9f
side-lobe, 7–8, 9f
Bar code sign (M-mode), 162, 162f
Basenji, 234
Basic scanning, 9–13
care of, machine and probe, 15
COAST3 of, 1–16
indications, 1
objectives, 1
pears/pitfalls, 15
color flow Doppler, 14
color signatures (blue vs. red), 14, 211
examples of, use in, 66f, 78f, 101f, 114–15f, 120f, 216, 219f, 236f
pitfalls of, 211
image optimization, the big 4 knobs, 13
depth, 13
focus position and number, 13
frequency, 13
gain, 13
Biopsy
of liver, 60–63
serial AFAST3 4-hour post-interventional procedure, 35–7
of spleen, 72, 78
of urinary bladder, 103–5, 108
use of AFAST3 and AFS for complications, See Abdominal FAST3 (AFAST3), addition to
Bladder neoplasia, 102–8, 105f
other rule outs, See Bladder wall benign polyps, 104, 104f
cystitis, 102, 102f, 103f, 240f
non-distended urinary bladder, 101
thrombus (blood clots), 42, 107, 108f
ureteral papilla, 101, 101f
transitional cell carcinoma (TCC), 104–5, 105f
in cats, 105
in dogs, 104
Bladder stone
colon interference, 102f
diagnosis of, 106
imaging of, 106f, 107f, 240f
multiple stones, 106f
single stones, 106–71, 240f
shape
jackstone, 106f, 240f
smooth, 106f, 240f
mineralized sediment (sand), 107f
Bladder wall. See also Urinary bladder
abnormal findings, clinical significance of, 102–5, 102f–5f
benign polyps, 104, 104f
cystitis, 102, 102f, 103f, 240f
emphysematous cystitis, 102–3, 103f
thrombus (blood clots), 42, 107, 108f
tumor, neoplasia, 102–5
transitional cell carcinoma, 105–6
in cats, 106
in dogs, 105
ureteral papilla, 101
jetting urine, 101f
thickened, 102f, 103f, 240f
normal ultrasonographic findings, 101, See also Urinary bladder
B-planes artifacts
definition of, 6–7, 146, 172, 186, See also Vet BLUE
diagnostic algorithm of lung ultrasound findings, 151f, 185f
B-lines artifacts (cont’d)
false positives, 186
significance of, 6–7, 8f, See also Vet BLUE
signs, summary of, 151f, 185t
along the diaphragm, 22f, 24, 156f
in cardiogenic lung edema, 172, 175f, 183f
in lung contusion, 146, 148f, 156f, 176f, 183f
in non-cardiogenic lung edema, 183f
wet lung, 184–7
Blood clots, 107, 108f, 218–19. See also Thrombus
in aorta (ATE), 218, 219f
in bladder, 42f, 108f
in deep venous thrombus (DVT), 217–19
in left atrium, 200–01, 201f
in lungs (PTE), 217–18
in peripheral veins (DVT), 217–18
in retroperitoneal space, 87–88, 88f
in splenic vein, 77–8, 78f
in vena cava, 219f
Blunt trauma, 41t
use of AFAST over radiographical serosal detail, 17
Bone(s)
frontal, 267f
interference artifacts, 4, 5f, See also Artifacts
clean vs. dirty shadowing, 263f, 264f, 267f, 268f
normal scans of, 263f–4f
rib fracture protocol, 267f
skull fracture protocol, 266f
ultrasonographic findings in fractures, 266–7, 267f
in normal, 263, 263f
Bowel perforation, 232–3
pneumoperitoneum, 119–20, 121f, 232f, 233
Boysen, Dr. Søren, xi
BPH. See Benign prostatic hypertrophy (BPH)
Breathing
CPR-COAST3 in, 280–81
ultrasound examination for, 273
Bulging eye, 244f
Buphthalmos, 257f
C. See Circulation (C)
Cairn Terrier, 90, 238
Cardiac tamponade, 157–8, 158f, 161, 203–4, 204f
Cardiopulmonary Resuscitation (CPR)
A (airway) in, 273, 275–7f
abnormal findings, clinical significance of, 279–84
abnormal, in airway, 280
American Heart Association (AHA)
CPR Guidelines, 269–70
H’s and T’s, knowing your, 269
asytrole, 270
true asyatole vs. pseudo-asytrole, 270
B (breathing) in, 280–81
intubation, 276f
lower airway, 278f
lung point, 278f
Vet BLUE, 272f
upper airway, 275f, 277f
C (circulation) in, 282
of abdominal circulation (C), 282
of thoracic circulation (C), 282
cardiac views, 279f
volume assessment/status, 274f, 280f
COAST3 of, 269–85
how to do, 273–9
indications, 271
introduction, 269–70
objectives, 271
pearls/pitfalls, 284
D (disability) in, 283–4
eye injury, 283f
optic nerve sheath diameter (ONSD), 281f
E (exposure) in, 284
FAST-ABCDE exam, defined, 273–9
FEEL protocol, 269
Global FAST (GFAST3), defined, 273, 272f
pulsless electrical activity (PEA), 269–70
ture PEA vs. pseudo-PEA, 270
return of spontaneous circulation (ROSC), 269
use of ultrasound, FEEL study, 269–70
scope of, 270–71
serial exams, 284
volume assessment/status, 274f
Carotid artery, 210f
Cats
AFS score in, 36
anterior chamber mass in, 255f
aortic thromboembolism (ATE), 218–19, 219f
bile duct tortuosity in, 63f
bilobed gallbladder, 50f
cardiomyopathy, 200–02, 201f
ECHO-COAST3 in, 194f, 196t
hemoabdomen, 36
hepatic abscess in, 53f
histoplasmosis, 72f
liver mass in, 54f
lymphoma, kidney, 91f
normal gallbladder of, 50f, 58
bilobed, 50f, 58
normal kidneys in, 85, 85f
normal spleen, 67
normal urinary bladder, 101
pericardial effusion in, See Appendix IV
perinephric cysts, 90f
polycystic kidney disease, 89f
pregnancy in, 128
pseudohypertrophy, left ventricle, 204
pyometra in, 132f
renal infarcts, 96
renal lymphoma (LSA), 91
reproductive system of, abnormalities in, 128–34
respiratory-compromised, positioning, 143f, 194f
sterilization of, 126
TCC in, 105
TFAST3 in, 143f
tortuosity of common bile duct, 58–9, 63f
Caudal lung lobe region (cdll), 170, 170f–71f. See also Vet BLUE
Caudal vena cava, 274f, 280f
association with hepatic veins, 48–9, 49f
hepatic venous distension, 24, 24f, 198–9, 199f, 274f
tree trunk sign, 49, 49f
imaging of, 24, 24f, 198–9, 199f, 226f
equal sign, as passes through the diaphragm, 24, 24f, 199f
thrombus, 218–19, 219f
volume status, fluctuations of, 198–9, 199f
cdll. See Caudal lung lobe region (cdll)
CEH. See Cystic endometrial hyperplasia (CEH)
Celiac artery, 226f
Central arterial catheter. See also Central line placement
COAST3 of, 206–21
how to do, arterial (femoral a.), 215–17, 216–17f
indications, 207
introduction, 206–7
objectives, 208
pearls/pitfalls, 220
Central line placement. See also
Central arterial catheter;
Central venous catheter
COAST\(^3\) of, 206–21
how to do, arterial (femoral a.), 215–17, 216–17f
how to do, venous (jugular v.), 209–14, 210–14f
indications, 207
introduction, 206–7
objectives, 208
pearls/pitfalls, 220
equipment, 209
how to place, arterial, 215–17, 216–17f
how to place, venous, 209–14, 210–14f
pre-measuring the central venous line, 209
identification of arteries and veins
compression technique, 215–16, 216f
color flow Doppler, 211, 216 imaging of
the catheter, 211f, 212f, 217f
the guidewire, 213f
landmark technique, 206–7
orientation
central arterial catheter, 215–17, 216f
central venous catheter, 210–12, 212f
transverse vs. longitudinal, 218
perivascular hematoma, 207
probe head damage from needle, 212f
safety of, 207
Seldinger CVC, 209

Central venous catheter. See also
Central line placement
benefits of, 207
catheter location of, 211f, 212f, 217f
complications of, 206–7
equipment used for, 209
importance of, 206
jugular, 209–10, 210f
landmark technique, 206–7
longitudinal orientation for, 213–14
needle location for, 213f
pearls/pitfalls of, 220
perivascular hematomas, 206–7
placement of, 208
probe damage from needle, 212f
probes for, 208f, 212f
proper measurement of CVC, 209
scope of, 207–8
Seldinger CVC, 209
sizes, for dogs, 214
techniques for, 209, 210f–11f
dynamic real-time technique, 207
static technique, 207
transverse orientation of, 211, 212f–13f
Cervix, 127
Chest tube site view. See also Caudal lung lobe region (cdll)
gator sign orientation, 144–5, 145f
for glide sign, 146, 147f
for pitfalls, See Step sign
PTX at, 151f
partial vs. massive PTX, 150–51, 151f, 278f
use of the lung point, 150–51, 151f, 278f
for TFAST\(^3\), 146–7, 146f–7f
tricks of the trade, 145, 146f
one-eyed gator, 145
pivoting the probe, 146f
Chinese Sharpei, 234
Cholelithiasis, 58, 60f, 61f
Circulation (C)
Abdominal circulation (C), 270, 275–6, 282
Thoracic circulation (C), 270, 275, 279f, 282
COAST\(^3\). See also specific system of interest, i.e. Kidney or CPR
documentation of, 14–15, 15f
focal number for, 13
types of, xii
ultrasound examination for, 13
Colon
AFAST\(^3\) cysto-colic (CC) view, 28f, 30–32
bladder stone false positive, 102f
foreign bodies in, 230f
gas interference, 28f, 106 peristalsis, 124
Color flow Doppler
in identifying vessels, 66f, 114f, 115f, 120f, 236f
importance of, 14
meaning of, blue vs. red, 14, 211
in thrombus, 78f, 219f
ureteral jetting, 101f
Comet-tail artifacts, 6, 7f
needle, from 213f
shred sign, association with, 172–4, 173f, 177f, 185f
Congenital herniation, 233f, 234–5
Congenital portosystemic shunts, 236–7, 237f–8f
Contractility, 162, 156f
Corneal opacity, 244f
Cornea, normal, 248f, 248t, 283f
Corrugated intestine, 119f, 122–3, 232f
corrugated small bowel, 118f–19f, 122–3, 232f
Coupling gel
acoustic, 15, 245
alcohol-based, 245
aqueous-based, 245
for eye exams, 246f
CPR-COAST\(^3\). See Cardiopulmonary Resuscitation (CPR)
Cranial lung lobe region (cdll), 170, 170f–71f. See also Vet BLUE
Cranial mesenteric artery, 226f
crdll. See Cranial lung lobe region (cdll)
Cryptorchidism, 136, 241f, 242
CVC-COAST\(^3\). See Central line placement
Cystic calculi. See also Urinary bladder colon, false positive, 102f
diagnosis of, 106
imaging of, 106f, 240f
inpediatrics, 240f, 241
shadowing, clean vs. dirty, 4–5, 5f
Cystic endometrial hyperplasia (CEH)
mammary glands in, 133, 133f
mounting after, 133
pyometra complex, 130, 131, 132f
stump pyometra, 131–3
uterine torsion in, 133
Cystitis, 102–8, 102f, 103f, 240, 240f
Cysto-colic view, AFAST\(^3\), 30–32, 31f

D. See Cardiopulmonary Resuscitation (CPR); Disability (D)
Dachshund, 236
DCM. See Dilated cardiomyopathy (DCM)
See also Blood clots
in peripheral veins, 219–20
in splenic vein, 77–8, 78f
techniques for, 218–20
compression, 216f
color flow Doppler, 215
in vena cava, 219f
Depth, 13
DH. See Diaphragmatico-hepatic (DH) view
Diaphragmatic herniation, 159f, 161–2
Diaphragmatico-hepatic (DH) view
AFAST\(^3\), 21, 22f–6f
for pericardial effusions, 41
for caudal vena cava, 24–5, 274f
classic positives of, 22f, 25
diaphragmatic herniation at, 159f, 161–2
false negatives in, 26
Diaphragmatico-hepatic (DH) view
AFAST\(^3\) (cont’d)
false positives in, 25, 26f
indirect right-sided volume (cardiac)
assessment with, 24, 24f
liver/gallbladder at, 157
liver rockets and, 22f, 24
for pericardial effusion, 21, 23f,
41–2, 157, 157f, 159f, 160–61
bull’s eye sign, 157f, 160–61
race track sign, 23f, 157f, 160–61
pericardial imaging and, 22, 23f,
157f, 159f, 160–61
left atrial tear, 159f
pitfalls of, 25
for pleural effusion, 23, 23f, 158, 158f
TFAST\(^3\), 155–9, 155f–9f
ULRs seen at, 15f
ultrasound lung rockets (ULRs) at
DH view, 22f, 156f
Diffuse homogeneous hypoechoic
liver, 56f–7f
Dilated cardiomyopathy (DCM), 200,
200f
Directional terms, xii–xiii
Dirty shadowing, 4, 5f. See also
Artifacts
Disability (D), 276–9. See also
Cardiopulmonary resuscitation (CPR)
imaging optic nerve, 250, 250f, 276–9,
281, 281f
in optic nerve sheath diameter
(ONSD), 283
use of, 276–9
Dogs. See also specific type i.e. French
Bulldog
AFS score in, 35, 36f, 37f
anaphylaxis in, 39–41, 39f–40f
anterior chamber mass in, 254f
with anticoagulant rodenticide
withxicosis, 88f
aortic thrombus, 219f
bee stings in, 39–40, 39f
cholelithiasis in, 58, 60f, 61f
cystitis in, 102f, 103f, 240f
diaphragmatic hernia, 159f
dilated cardiomyopathy (DCM), 200
DVT in, 219f
ECHO-COAST\(^3\) in, normal values,
195t
epididymitis, 137f
fluid resuscitation in, 24f, 199f, 274f,
280f
fractures, skull, long bones, 264–8,
264f–8f
gallbladder halo sign, 39–40f
gallbladder mucocele in, 58, 62f
heart base tumor, 203f
heartworms, 202f
with heat stroke, 97f
hemangiosarcoma, right atrial, 203f
hydrocephalic, 238f
hyperplastic nodule in liver, 51f
kidneys of, normal size, 85
laryngeal evaluation in, 273, 275f
left atrial tear, 159f
liver masses in, 51f–6f
lymphoma, spleen, 77f
normal echocardiographic
measurements, 195t
normal gallbladder of, 50f, 58
panting in, 223
pregnancy in, 128–30
pyometra, 132f
reproductive system of, 127–34
respiratory-compromised,
positioning for, 143
spleenic thrombus, 78f
splenic torsion, 77f
stereolization of, 126
TCC in, 104–5, 105f
stereotactic evaluation in, 254f
sterilization of, 126
submandibular lymph node, 104
tissue swellings in, 263–6, 265f
uterus of, 127–8, 127f
Vet BLUE in, 168f
Doppler, 14, 187, 219f
color flow Doppler, See Color flow
Doppler
power Doppler, 187
power slide, 187
Dorsal recumbency position
for AFAST\(^3\), not recommended,
19–20
for FAST\(^3\), not recommended,
19–20
for gastrointestinal examination, 112
for kidneys, 81
for liver/gallbladder, 45
for pancreas, 112
for pediatrics, 223
for pregnancy, 128
for reproductive system exam, 127
for scanning, basic, 10
for spleen, 66
for TFAST\(^3\), not recommended, 142
for urinary bladder exam, 100
Dry lung
false positive (PTx), 150, 186
stratosphere or bar code sign
(M-mode), 162, 162f
findings of, 151f, 172, 173f–4f, 183f,
183f, 185f
glide sign with A-lines, 146, 147,
151f, 172, 174f, 182f, 183f,
185t
seashore sign (M-mode), 162, 162f
pattern-based approach, 182f, 183f,
184–7, See also Vet BLUE
ultrasonographic findings in, 184
wet vs. dry lung principle, 172, 183f
wet lung, 152
Duodenum, 121, 224f, 228f, 229f
normal peristalsis, 121
normal wall thickness, 124
DVT. See Deep vein thrombosis (DVT)
Dystocia, 128–30, 129f–30f
counting fetuses
inaccuracy of ultrasound, 130
fetal heart rates, calculating
eyeball method, 129
M-mode, 129
fetal heart rates, distress, 130
use of serial exams, 130
E. See Exposure (E)
ECHO (Heart)
abnormal findings, clinical
significance of, 199–204
cardiac tamponade, 203f
dilated cardiomyopathy, 200, 200f
heart base tumor, 203f
heartworms, 202f
hepatic venous distension, 199f
hypertrophic cardiomyopathy,
200, 201f
pseudohypertrophy, left
ventricle, 204
intravascular volume, 204, See also
in resuscitation
left atrial thrombus, 203f
mitral valve disease, 199–200
pericardial effusion, 203–4, 203f,
See also Abdominal FAST\(^3\)
(FAST\(^3\)); Thoracic FAST\(^3\)
(TFAST\(^3\))
pleural effusion, 204, See also
Abdominal FAST\(^3\)
(FAST\(^3\)); Thoracic FAST\(^3\)
(TFAST\(^3\))
pulmonary hypertension, 202–3,
202f
right atrial tumor, 203f
right-sided volume overload, 199f
in cats, normal values, 196t, See also
Appendix IV
COAST\(^3\) of, 189–205
how to do, 191–9
indications, 190–91
introduction, 189–90
objectives of, 190–91
pearsl/pitfalls of, 205
in common cardiac diseases, 199–205
in dogs, normal values, 195t, See also
Appendix IV
heart base tumor, 203f
heartworms, 202f
hemangiosarcoma, right atrial, 203f
hepatic venous distension, 199f
hypertrophic cardiomyopathy, 200, 201f
pseudohypertrophy (cats), left ventricle, 204
importance of, 189–90
intravascular volume, 199f, 204
left atrial thrombus (cats), 203f
mitral valve disease, 199–200
M-mode, 195f, 199f, 200f
normal echocardiographic values, 195f, 196f
in cats, normal values, 196t, See also Appendix IV
in dogs, normal values, 195t, See also Appendix IV
patient positioning for, 191, 192f, 194, 194f, 197f, 198f
pearls/pitfalls of, 205
pericardial effusion, 203–4, 203f, See also Abdominal FAST3 (AFAST3); Thoracic FAST3 (TFAST3)
pleural effusion, 204, See also Abdominal FAST3 (AFAST3); Thoracic FAST3 (TFAST3)
probe settings, 191
probes for, 191, 192f, 197f
pulmonary hypertension, 202–3, 202f
in resuscitation, caudal vena cava, 198–9, 199f
M-mode use, 198–9
right atrial tumor, 203f
right-sided volume overload, 199f
scope of, 190
three main ECHO windows for, 192–9, 192f–9f
views, 192–9
subcostal, 197–9, 198f
left parasternal apical and cranial, 196–7, 197f
right parasternal long-axis, 192–3, 192f
right parasternal short-axis, 194–5, 193f
Echogenic ascites, 230f
Echogenicity
comparing liver/kidneys/spleen, 46f, 68f, 82f
degrees of, xii, xiiif
of kidneys, 83–5, 82f
of liver, 48–50, 63, 68f
of pancreas, 113–15, 114f
SLiCK pneumatic for, 48, 67, 83
of spleen, 63, 67, 68f, 71f–2f, 74–6
splenomegaly with, 70, 70f, 76f, 77f
of ultrasound examination, xii
Edge shadowing, 4, 5f
mistaking for rent in urinary bladder wall, 5f
stomach wall, 5f, 26f
Emphysematous cystitis, 102–3, 103f
Enteric parasites, 233f, 234
Enteric thrombosis, 234
Epididymitis, 136–7, 136f–7f
Exophthalmos, 256–7, 258f
Exposure (E), 278–9, 284
Eye
abnormal findings, 249t, 251–60
anterior chamber, cloudiness, opacities, 244f
anterior chamber mass in, 255f
anterior lens luxation, 251–2, 251f–2f
buphthalmos, 244f
corneal opacities, 244f
dorsal recumbency, 19–20, 142, 143f, 144f, 146f, 271–2, 272f
dorsal recumbency, 19–20, 142
not recommended, poses risk, 19–20, 142, 169
lateral recumbency, 19–20, 142, 146f, 272f
modified sternal recumbency, 19
sternal or standing, 142, 143f, 144f
respiratory distress detected by, 184t
FAST-ABCDE. See also Cardiopulmonary resuscitation (CPR)
A for airway, 273, 275–8f
B for breathing, 273–5, 275–8f
donot recommended, poses risk, 273–5, See also Vet BLUE
for lung injury, lung point, and PTx, 273, 280–81, 278f
dread not recommended, poses risk, 273–5, See also Vet BLUE
for upper airway, 273, 275f, 277f
C for circulation, 275–6
abdominal C, 275–6, 282
cardiac, 279f, 280f, 282
thoracic C, 275–6
volume status, 279f, 280f, 282
use of hepatic venous distension, 274f, 282
use of left ventricular short-axis mushroom view, 274f, 282
use of ultrasound lung rockets (ULRs), 274f, 282
D for disability, 276–7, 281f, 283–4, 283f
eye trauma, 283f
optic nerve sheath diameter (ONSf), 281f, 283
posterior lens luxation, 251f
probes for, 246–7f
scope of, 243
settings for, 245
ultrasonographic findings in abnormal, 253f–9f, 254–60
in normal eye, 247–50, 248f–51f
views for imaging, 245–6, 246–7f
horizontal, 246f
lateral, 246f
posterior, 247f
vertical, 246f
Falciform fat, 22f, 46f
FAST3. See also Abdominal FAST3 (AFAST3); FAST-ABCDE; Global FAST3 (GFAST3); Thoracic FAST3 (TFAST3)
beginning settings for, 13
documentation of, 14–15, 15f
focal number for, 13
positioning in, 19–20, 142–3, 143f, 144f, 146f, 271–2, 272f
Emphysematous cystitis, 102–3, 103f
Enteric parasites, 233f, 234
Enteric thrombosis, 234
Epididymitis, 136–7, 136f–7f
Exophthalmos, 256–7, 258f
Eye
abnormal findings, 249t, 251–60
anterior chamber, cloudiness, opacities, 244f
anterior chamber mass in, 255f
anterior lens luxation, 251–2, 251f–2f
buphthalmos, 244f
corneal opacities, 244f
dorsal recumbency, 19–20, 142
not recommended, poses risk, 19–20, 142, 169
lateral recumbency, 19–20, 142, 146f, 272f
modified sternal recumbency, 19
sternal or standing, 142, 143f, 144f
respiratory distress detected by, 184t
FAST-ABCDE. See also Cardiopulmonary resuscitation (CPR)
A for airway, 273, 275–8f
B for breathing, 273–5, 275–8f
donot recommended, poses risk, 273–5, See also Vet BLUE
for lung injury, lung point, and PTx, 273, 280–81, 278f
dread not recommended, poses risk, 273–5, See also Vet BLUE
for upper airway, 273, 275f, 277f
C for circulation, 275–6
abdominal C, 275–6, 282
cardiac, 279f, 280f, 282
thoracic C, 275–6
volume status, 279f, 280f, 282
use of hepatic venous distension, 274f, 282
use of left ventricular short-axis mushroom view, 274f, 282
use of ultrasound lung rockets (ULRs), 274f, 282
D for disability, 276–7, 281f, 283–4, 283f
eye trauma, 283f
optic nerve sheath diameter (ONS), 281f, 283
FAST-ABCDE. See also Cardiopulmonary resuscitation (CPR) (cont’d)
development of, 269
E for exposure, 278, 284
serial exams, 284
donot at tube placement, 276f
direct method, double trachea sign, 273, 276f
indirect method, glide sign, 273,
See also Glide sign imaging
optic nerve sheath diameter
(OnSD), 281f, 283
pearls/pitfalls of, 284
procedures for, 273
protocol for, 270
scope of, 270–71
settings for, 272–3
Femoral arterial catheters, US-guided
color flow Doppler, 216
compression technique for, 215–16,
216f
tube vs. vein, 215–16
equipment for, 214–15
indications, 207–8
placement of, 215–17
sampling from, 215, 216f
Fetus
counting fetuses, 129
abdominal radiography, 130
inaccuracy of ultrasound, 130
difficulty finding, 128
fetal death, 129
fetal distress, 129–30
intrauterine gas, 129
fetal maturation
aging using ultrasound, 129f
intestinal maturation of, 129f
fetal viability, 129
heart rates, 129–30
heart rates of, 129–30
calculating, eyeball vs. M-mode method, 129
degrees of distress, 130
normal/expected, 129
Fluid-filled structures. See also Artifacts
acoustic enhancement of, 4–6, 4f–6f
dependent vs. independent method, 289
indirect US-guidance, 289
French Bulldog, 118f
Frequency, 13
Gain, 13
Gallbladder
abnormal findings, clinical significance of, 58–60
biliary tract, 58–9, 63f
ycholangiohepatitis, 56f
distension, 60, 63f
halo sign
in anaphylaxis, 39–41, 39f, 59f
other causes of, 40
in pericardial effusion, 40f, 59f
in volume overload, 280f
mineralization, 60f, 61f
mucocele, in dogs, 58, 62f
kiwi fruit sign, 58, 62f
obstruction, 58–59
rupture of, 62f
sediment, sludge, degrees of, 56f, 58, 60f
stones, 58, 61f, 63f
tortuosity of common bile duct, 58–9, 60, 63f
acoustic enhancement example in, 6f
artifacts in, 6f, 7f, 25, 49
mirror image in, 7f
mistaken for pleural effusion, 7f, 25
COAST® of, 44–64
how to do, 45-6
indications, 45
introduction, 44–5
objectives, 45
pearls/pitfalls, 63–4
DH view for, 26f, 157
halo sign, 39–41, 39f, 40f, 59f
in anaphylaxis, 39–41, 59f
in pericardial effusion, 40f, 59f
in volume overload, 280f
other causes of, 40
location of, 58
mirror image in, 7f
mistaken for pleural effusion, 7f, 25
normal ultrasonographic findings, 48–50, 49f–50f
associated biliary tract, 58–60
bilobed, 50f
of cats/dogs, 50f
lumen, 58, 62f, 224f
routine add-on AFAST® in, 60, 62f
sediment, degrees of, 56f, 58, 60f
tortuosity of common bile duct, 58–9, 63f
ultrasound settings for, 45
wall of, 58, 224f
abnormal, 59f
measurements, See Appendix IV
normal, 50f, 58
pearls/pitfalls of, 62
positioning for, 45
 directional recumbency in, 45
Gastric ulcer, 121f
Gastroenterocolitis, 233–4
Gastrointestinal 110–25
abnormal findings, clinical
significance of, 115–23,
116f–23f
corrugated intestine, 122, 119f, 232f
association with enteritis, 119
causes of, 119
in duodenum, association with
pancreatitis, 119
vs. plication, 122
foreign bodies, 116–17, 117f, 118f,
231f
linear, 117–18, 118f, 231f
plication, sign of, 117–18
pyloric, 117f
small bowel, 117f, 118f
ileus, 121–2, 124
intestinal obstruction, 119
findings supportive of, 119
hypermotility, 119
intraluminal gas, 118f
non-uniform peristalsis, 119
segmental luminal distension,
119
shadowing, 117f, 231f
intussusception, 119, 120f, 233f
pancreatitis, 122–3, 123f
septic peritonitis and
pneumoperitoneum, 119–20,
121f, 232f
use of AFAST3
stomach perforation and
peritonitis, 121f, 232f
wall thickening, 124f, 233f
use of serial exams, 121
COAST3 of, 110–25
how to do, 112–14
for intestinal tract, 112–13, 116f,
229f
for pancreas, 113–14, 114f
for peritoneal fluid, add-on
AFAST3
indications for, 111–12
introduction, 110–11
objectives, 112
pears/ritfalls of, 123–4
echogenicity of, 114f
in emergency setting, 110
intestinal motility in, 121–2
normal ultrasonographic findings,
112–14
intestinal tract, 112–13, 116f, 229f
hamburger sign, 115, 29f, 129f
5-layers, 115, 116f, 229f
measurements, wall and
luminal, 124, See also
Appendix IV
mnemonic, remembering
5-layers, 115, 228
pancreas, 113–14, 114f
peristalsis, contractions per
minute, 121, See also
Appendix IV
colon, 124
duodenum, 121
small intestine, 121
stomach, 121
rugal folds, 231f, 232f
wall thickness, normal
measurements, 124
patient positioning for, 112
pears/ritfalls of, 123–24
duodenal vs. small bowel wall
measurements, 124
fasting for 12 hours, reduces gas
interference, 123
intraluminal gas vs. foreign body,
118f
peristalsis of, See also Appendix IV
duodenum, 121
large colon, 121, 124
small intestine other than
duodenum, 121
stomach, 121
probe selection for, 112
routine add-on AFAST3, 110, 121
scanning techniques for, 112–13,
112f–13f
wall layering, 115, 116f, 229f
mnenomic, 115, 228
Gastrointestinal disease, 229
Halo sign (kidney), 86, 98, 86f
in ethylene glycol, 86–7, 86f
false positives, 86–7, 86f
in gallbladder FAST3, 40f
medullary rim sign, 86–7
normal finding, 86–7
HCM. See Hypertrophic
cardiomyopathy (HCM)
Heart. See also ECHO (Heart)
B-mode images in, 198f
cross-sectional of, 151f
failure, 199f, 201f
failure, subcostal views in, 199f
fetal, 129–30
left-sided, failure, 186–7
long-axis views of, 279f
in pleural effusion/PCE, 155f
right-sided failure, 199f
short-axis views of, 279f
standard views, 192–9, 192–4f, 197–8f
left parasternal apical view, 196–7,
197f
right parasternal view, 192–6,
192f, 193f, 194f
subcostal view, 197–9, 198f
Heat stroke, 97f
acute kidney injury (AKI), 96, 97f
Hemoabdomen, 35–8
abdominal fluid scoring system
(AFS), 35–8, 36t, 37f
cats vs. dogs, 35–6
non-traumatic, 37–8
post-interventional, 38
predicting degree of anemia, 35–8,
36t, 37f
small vs. big bleeder concept, 35–8,
36t, 37f
traumatic, 35–7
Hemothorax, 295
Hepatic abscess, 53f
Hepatic cysts, 52f
Hepatic parenchyma, 55f
Hepatic veins, 56f, 58, 198, 224, 224f. See also Hepatic venous congestion; Portal veins
differentiating from portal veins, 56f, 198, 224, 224f
equal signs, 56f
relative size to portal veins, 198
starry night, 56f
volume status, 24f, 49f, 162f, 199f, 274f, 280f
branching into caudal vena cava, 24f, 49f, 198f
normal relative size, 198

Hepatic venous distension, 280f. See also Hepatic veins
differentiating from portal veins, 56f, 198, 224, 224f
relative size to portal veins, 198
volume status, 199f, 274f, 280f

Hepato-renal (HR) view, 34–5, 34f
Humerus, fracture of, 263f
Hydronephrosis
clinical significance of, 94–6, 95f
look for lower urinary tract obstruction, 94–5
pediatric, 239, 239f

Hyperechoic
in bladder/gallbladder areas, 6f
kidneys, 86f
liver, 56f
SLiCK, pneumonic, 48
of spleen, 71f
terminology of, xii

Hypertrophic cardiomyopathy (HCM), 200–01, 201f

Hyperechoic
in bladder/gallbladder areas, 6f
kidneys, 86f
liver, 56f

Hydroureter
clinical significance of, 94–6, 95f
look for obstruction, 94–5
pediatric, 239, 239f

Hyperechoic
in bladder/gallbladder areas, 6f
kidneys, 86f
liver, 56f
SLiCK, pneumonic, 48
of spleen, 71f
terminology of, xii

Hypertrophic cardiomyopathy
(HCM), 200–01, 201f

Hyperechoic
in bladder/gallbladder areas, 6f
kidneys, 86f
liver, 56f

Hyperechoic
in bladder/gallbladder areas, 6f
kidneys, 86f
liver, 56f
SLiCK, pneumonic, 48
of spleen, 71f
terminology of, xii

Hypertrophic cardiomyopathy
(HCM), 200–01, 201f

Hypoechoic
liver, diffuse homogeneous, 56f
of spleen, 72f
terminology of, xii

Ileus, 121–2
normal peristalsis, 124 See also Appendix IV
as related to bowel obstruction, 119

Image optimization, 13

Image orientation, 9–10, 10f
Indirect vs. direct ultrasound-guided pericardiocectesis, 289
Interventional ultrasound-guided procedures, 286–303
abdominocectesis, 295–8, 297f–8f
diagnosis of, ascites/effusion, 296, 299f
indications for, 295–6
materials needed, 296
procedure, 296–8, 297f, 298f
scanning technique, 296
COAST® of, 270–86
how to do
abdominocectesis, 295–8, 297f–8f
pericardiocectesis, 286–91, 288f–90f
thoracocectesis, 291–5, 294f
indications, 287, 291, 295–6
introduction, 286
pearls/pitfalls, 301–2
MUG-DPL, 298–301, 299f–301f
diagnosis of, ascites/effusion, 296, 299f
indications, 298
materials/supplies needed, 299
procedure MUG-DPL, 299–301, 300f, 301f
scanning technique, 299
ultrasound-guided vs. blind diagnostic peritoneal
lavage (DPL), 298

Hyperechoic
in bladder/gallbladder areas, 6f
kidneys, 86f
liver, 56f

Hyperechoic
in bladder/gallbladder areas, 6f
kidneys, 86f
liver, 56f

Iris
abnormal, 248t, 255f
normal, 249f, 250
Irish Setters, 236
Irish Wolfhounds, 236
Ischeoic, xii
Isopropyl alcohol, 15, 15f
fire hazard with electrical defibrillator, 19, 143, 210, 271
probe head damage, 15, 15f

Jugular vein
placement in, 209–10, 210f
short-temporary peripheral catheter
for, 214

Kidney
abnormal findings, clinical significance of, 86–98
acute kidney injury (AKI), 96–7, 97f
cortical cysts, 88–90, 89f, 90f
cysts, 88–92, 89f, 90f
diuresis-induced, pyelectasia, 92, 225f
halo sign, 86–7, 86f, See also Medullary rim sign
heat stroke, 97f
hydronephrosis, 94–6, 95f, 239f
infects, 95–6, 96f
kidney infects, 95–6, 96f
kidney stones, 92, 93f
lymphoma, 91f
masses, 86–9
fungul disease, 88
lymphoma, 91f
retroperitoneal, 88f
medullary rim sign, 86–7, 86f, See also Halo sign (kidney)
neoplasia, 87f
neoplastic retroperitoneal
effusions of, 87f, 88f, 91f
in parenchymal disorders, 86–92,
86f–90f, 98
perinephric cysts, 90, 90f
perinephric pseudocysts, 90–91, 90f
perirenal, subcapsular fluid, 86f,
91f, 96f, 97f
polycystic kidney disease, 89–90,
89f
pyeletasis, 92, 94f, 98, 225f
pyelonephritis, 94
retroperitoneal hemorrhage, 88f
cogulopathic, 88f
neoplastic, 88f
retroperitoneal, perirenal/
subcapsular fluid, 96–7,
86f, 88f, 90f, 91f, 96f, 97f
stones, nephroliths, 92, 93f
AFAST³ in, 34f, 80, 97–8, 108
COAST³ of, 80–98
how to do, 81
indications for, 80–1
introduction, 80
objectives, 81
pearls/pitfalls, 98
cysts in, 88–9, 89f–90f
echogenicity of, 46f, 83f
in ethylene glycol toxicity, 86–7, 86f
in heat stroke, 97f
hepato-renal (HR) view, 34f
hyperechoic, 86f
location of, 81–2, 82f
mass lesions in, 87–8, 87f
mass off caudal pole of, 87f
medullary rim sign, 86–7, 86f
normal ultrasonographic findings,
83–5, 82f, 84–6f
anatomy of, 83–5, 84f–5f
interlobar/arcuate vessels,
83–5, 84f
tomato in cross-section, 84f
medullary rim sign, 86–7, 86f,
See also Halo sign (kidney)
in pediatrics, 225f
renal pelvis measurements, dogs,
cats, 92, 94f, See also Appendix IV
size of, 85, 85f, See also Appendix IV
in dogs/cats, 85
parenchymal disorders, 86–92
patient positioning for, 81
probes for of, 81
pearls/pitfalls of, 98
poly cystic disease of, 89f, 90
routine add-on, AFAST³ and AFS in,
97–8, 108
routine add-on, Urinary bladder–
COAST³, 97, 108
scope of, 80
SLiCK mnemonic, 86
spleno-renal (SR) view at, 27f–8f
Labeling images, 14–15
Labrador Retriever, 118f–19f
LAT. See Left atrial tears (LAT)
Lateral recumbency, 37f
Lateral recumbency, 37f
Left atrial tears (LAT), 159f
Left parasternal apical/cranial views,
196–7
Left-sided heart failure, 186–7
Left ventricular short-axis views, 156f
Lens, 248f, 248t, 250
Left atrial tears (LAT), 159f
 Left parasternal apical/cranial views,
196–7
Left-sided heart failure, 186–7
Left ventricular short-axis views, 156f
determining volume status by,
contractility and, 162, 162f
Lens, 248f, 248t, 250
anter ior lens luxation, 251–2, 251f–2f
posterior lens luxation of, 251f
Mesentery, 248f, 249f
Lhasa Apso, 236
Labeling images, 14–15
Liver
artifacts in, 7f, 48–50
COAST³ of, 44–64
cross-sectional of, 148f, 151f
Liver
artifacts in, 7f, 48–50
COAST³ of, 44–64
how to do, 45–8
indications for, 44–5
introduction, 44
objectives, 45
pearls/pitfalls, 63–4
echogenicity of, 63, 68f
diffuse homogeneous hypoechoic,
56f, 56f–7f
hyperechoic, 56f
SLiCK mnemonic for, 48
keys for, 63–4
normal ultrasonographic findings,
48–50, 49f–50f
anatomy of, 48
comparative echogenicity of, 46f
at DH view, 157
echogenicity
SLiCK mnemonic for, 48
cysts, nephroliths, 92, 93f
coagulopathic, 92, 93f
origins of, 92, 93f
with target lesions, 55f
parenchymal disease in, 55f–6f, 57–8
positioning for, 45
dorsal recumbency in, 45
routine add-on, AFAST³, 60–63
settings for, 45
SLiCK mnemonic for, 48
Long-axis heart views, 154f, 192f, 279f
Longitudinal orientation, 10, 10f
for arterial catheter, 217f
for CVC, 213–14
vs. transverse, 10f, 21, 218
LSA. See Renal lymphoma (LSA)
Lungs. See also Vet BLUE
A-lines in, 150f
contusion, 148f
cross-sectional of, 148f, 151f
imaging
B-mode, 178f
future of, 187
lung point, 150, 152, 278f
mass, nodule sign, 176, 179f–80f, 186
M-mode for, 162, 163f, 187
pearls/pitfalls in, 187–8
power Doppler for, 187
ultrasonographic findings of
abbreviations of, 178
basic, 173f
dry lung, 152, 172, 173f–4f, 184, 186
wet lung, 148f, 152, 172, 173f–6f, 186
Lymphosarcoma, 74, 76f. See also
Liver; Kidney
Maltese, 236
Mammary gland neoplasia, 133, 133f
mdll. See Middle lung lobe region
(mdll)
Medical records, xii, 14. See also
Appendix II
for AFAST³, 42
for TFAST³, 164
for Vet BLUE, 179
Medullary rim sign, 86f
Mesenteric lymph nodes, 229, 229f
Metacarpals, 264f
Middle lung lobe region (mdl), 170, 170f–1f
Miniature Schnauzer, 236
Mirror artifacts, 6, 7f. See also Artifacts
Mitral valve disease (MVD), 159f, 199f
M-mode, 14
  caudal vena cava, 199f, 204
for dilated cardiomyopathy, 200f
for fetal heart rates, 129–30, 130f
importance of, 14
for left ventricle short-axis, 194–6, 195f–6f
for pneumothorax, 162–3, 163f, 187
seashore sign, 162–3, 163f, 187
stratosphere of bar code sign, 162–3, 163f, 187
for volume status, 199f, 204
Modified ultrasound-guided diagnostic peritoneal lavage (MUG-DPL)
abdominocentesis with, 301f
findings for, 299, 299f
fluid connection, 300f
indications for, 298, 299f–301f
procedures for, 298–301, 299f–301f
MUG-DPL. See Modified ultrasound-guided diagnostic peritoneal lavage (MUG-DPL)
Multiple echoes, 7–9, 9f
Musculoskeletal, 261–8
abnormal findings, clinical significance of, 263–6, 265f–6f
foreign bodies, soft tissue, 265
fractures, 262, 266–7, 267f–8f
herniation, inguinal, 265
soft tissue swellings, 262
COAST3 of, 261–8
how to do, 263–7
  long bones, 263–4, 264f
  ribs, 267f
  skull, 266f, 267f
  soft tissue swellings, 265f
indications, 262
introduction, 261
objectives, 262
pearls/pitfalls of, 267
importance of, 261
normal ultrasonographic findings
  bone, 263, 263f
  soft tissue, 262
patient positioning for, 262
pearls/pitfalls of, 267
scope of, 261–2
MVD. See Mitral valve disease (MVD)
Myelolipomas, 73f
Needles
  location, for COAST3, 213f
  probe angles with, 302
  visualization of, 301, 301f
Neoplastic retroperitoneal effusions, 87f
Nodule sign, lung mass, 176, 179f–80f, 186
Ocular anatomy, 248f
Omphalocele, 233f
OnSD. See Optic nerve sheath diameter (OnSD)
Optic nerve
  abnormal, 248t
  imaging of, 281f
  normal, 248f, 250f
Optic nerve sheath diameter (OnSD)
  in D, 283
  normal, 278
  in trauma, 270
Orbital ligament, 247f
Orchitis, 136, 136f
Organ injury, during AFAST3, 42f
Pancreas. See also Gastrointestinal abnormalities, clinical significance of, 122–3
left limb, more commonly affected, cats, 113
pancreatitis, 122–3, 115f, 123f
right limb, more commonly affected, dogs, 113
COAST3 of, 110–25
how to do, 112–14
  for intestinal tract, 112–13, 116f, 122f
  for pancreas, 113–14, 114f
  for peritoneal fluid, add-on AFAST3
indications for, 111–12
introduction, 110–11
objectives, 112
pearls/pitfalls of, 123–4
in emergency setting, 110
factors for, 111
normal ultrasonographic findings, 113–15, 114f
echogenicity of, 114f
normal scan of, 114f
in pediatrics, See Pediatrics
patient positioning for, 112
pearls/pitfalls of, 123–4
probe selection for, 112
scope of, 111
routine add-on, AFAST3 of, 110, 121
scanning techniques for, 112–13, 112f–13f
Pancreatitis, 122–3, 115f, 123f
diagnosis of, 122–3, 115f, 123f
Panting, 223
Parallel probe, 294–5
Paraprostatic cysts, 135
Parenchymal disorders
  in kidneys, 86–92, 86f–90f, 98
  in liver, 55f–56f, 57–8
  in spleen, 77f
Patent urachus, 241–2, 241f
Patient positioning
  for AFAST3, 19
  for ECHO-COAST3, 191, 192f
  for Eye-COAST3 exams, 281f
  for gastrointestinal examination, 112
  for GFAST3, 271, 272f
  for Kidney-COAST3 exam, 81
  for liver/gallbladder, 45
  for Musculoskeletal-COAST3, 262
  for pancreas, 112
  for reproductive system exam, 127
  for spleen, 66
  for TFAST3, 142, 143f
  for urinary bladder exam, 100
  for Vet BLUE, 168–9, 168f
PCE. See Pericardial effusion (PCE)
pdll. See Pericardial effusion (PCE)
Pediatrics
abnormal abdominal conditions in acquired herniation in, 235, 235f
adrenal gland imaging in, 226f, 228f
anatomic obstruction in, 231, 232
ascites, 229f, 230f
bladder stones (urolithiasis), 241, 240f
bowel perforation in, 232–3
colon foreign body, 230f
congenital herniation in, 233, 234–5
corrugated bowel, 232
cryptorchidism, 242, 241f
cystic calculi in, 240f, 241
cystitis, 240f
testicular parasites in, 233f, 234
testicular thrombosis in, 234
gastrointestinal disease in, 229
gastrointestinal foreign bodies in, 230–2, 231f–2f
hydrocephalus, 237–8, 238f
hydronephrosis, 239, 239f
inguinal hernia, 235f
intussusception in, 233f, 234
linear foreign body, 231f
mesenteric lymph nodes in, 229, 229f
microhepatica, 235f
omphalocele, 233f
index

patent urachus, 241, 241f
peritoneopericardial
  diaphragmatic hernia, 235f
peritonitis/peritoneal effusion in, 230
pneumoperitoneum, 232f, 233f
portosystemic shunts, 236–7, 236f, 237f
prostate gland imaging in, 227f
pyelonephritis, 240f
pyloric foreign body, 230f
renal agenesis, 238
renal dysplasia, 238, 239f
small intestinal thickening, 233f
splenic infarction, 230f
urachal diverticulum, 241f
ureterocele, 240, 240f
urinary tract infection, 240–1, 240f
urogenital ectopia, 238–9

COAST® of, 222–2
how to do, 223–9
indications, 222
introduction, 222
objectives, 222–3
pearls/pitfalls, 242

color flow Doppler, 236f, See also Color flow Doppler
equipment for, 223
genitourinary disorders in
cryptorchidism, 241f, 242
  scanning for, 241f
patent urachus, 241–2, 241f
renal agenesis, 238
renal dysplasia, 238, 239f
ureter, 240, 240f
urinary tract infection, 240, 240f
urogenital ectopia, 238–9, 239f

COAST® of, 222–2
how to do, 223–9
indications, 222
introduction, 222
objectives, 222–3
pearls/pitfalls, 242

color flow Doppler, 236f, See also Color flow Doppler
equipment for, 223
genitourinary disorders in
cryptorchidism, 241f, 242
  scanning for, 241f
patent urachus, 241–2, 241f
renal agenesis, 238
renal dysplasia, 238, 239f
ureter, 240, 240f
urinary tract infection, 240, 240f
urogenital ectopia, 238–9, 239f

COAST® of, 222–2
how to do, 223–9
indications, 222
introduction, 222
objectives, 222–3
pearls/pitfalls, 242

peritoneal effusion with, 230
use of initial and serial AFAST®, 38

Pericardial effusion (PCE)
  AFAST® DH views at, 21, 23, 23f, 40f, 41
  bull’s eye sign, 157
  characterization of, 161
  contained vs. uncontained, 157f, 160,
    See also Pleural effusion
determining pleural from, 160–1
  DH for, 41, 161
  ECHO-COAST® in, 203–4, 203f
  indirect ultrasound-guided imaging
    of, 288f
  masses, 203–4, 203f
  heart base, 203f
  hemangiosarcoma, 203f
  mistaking pericardial fat for, 204
  misjudging heart chambers for, 155f
  normal volume, 160, See also Appendix IV
  race track sign, 157
  short-axis view of, 158f
  TFAST® views, 157, 157f, 159, 159f

Pericardial exam, 153–5, 154f–5f.
  See also Pleural effusion

Pericardiocentesis
  free-hand ultrasound-guided, 289–90,
    290f, 294f
  indications for, 287
  indirect ultrasound-guided, 289
  pearls/pitfalls of, 291
  positioning, dependent vs. independent, 289
  procedure for, 288–9
  ultrasonographic findings for, 287, 288f
  ultrasound-guided procedures, 286–7

Peripheral lung lobe region (pdll), 170, 170f–1f

Persian cats, 90, 238

Pleural effusion, 23, 23f, 158f, 201f
  characterization of, 161
  determining pericardial from, 157–8f,
    160–1
  ECHO-COAST® in, 201f, 204
  Fluid (Ff) sign, 177
  indirect ultrasound-guided, 288f
  misjudging heart chambers for, 155f
  thoracocentesis, 291–5, 294f
  uncontained vs. contained fluid,
    158f, 160–1
  use of multiple views, 41, 157f
  axiom, 1 view is no view, 41, 203
  diaphragmatically-hepatic view, 41, 157f

parasternal view, 203f
pericardial site (PCS) view, 157f, 160f
  subcostal view, 198f
use of TFAST®, monitoring post-
  procedure, 295

Pneumoperitoneum, 119–20, 121f,
  232f, 233

Pneumothorax (PTX)
  algorithm for, for TFAST®, 151f
  A-lines in, without a glide sign,
    179f, 181f
  at chest tube site, 151f
  at DH view, 156f
diagnosis of, 148–50, 148f–50f
lung point, degrees of, 278f
Pneumothorax (PTx) (cont’d)
partial vs. massive PTx, 150–51, 151f
M-mode, 162, 163f
post-analgesia, 149, 151f
power Doppler, power slide, 187
step sign in, 146, 148f–9f
Polycystic kidney disease, 90
in Cairn terriers, 90
in Persian cats, 90
Poodle, 236
Portal veins, 49f. See also Hepatic veins
differentiating from hepatic veins, 56f, 198, 224, 224f
equal signs, 56f
starry night sign, 56f
normal ratio hepatic to portal veins, 198
porto-systemic shunts, 236–7
Posterior lens luxation, 251f
Post-interventional procedures, 64
use of AFAST3
for hemorrhage, 35, 38, 60, 78, 97, 130
for peritonitis, 38, 121, 230
use of TFAST3
for hemorrhage, 141
for PTX, 152
for types of pleural effusion, 141
Power Doppler, 187
Power slide, 187
PP-line, 178. See also Gator sign
Pregnancy, 128
diagnosis of, 128
fetal heart rates, 129–30
pseudopregnancy, 133
ultrasound pearls/pitfalls in, 138
Preload volume status, 162f
caudal vena cava, 24f, 162f, 199f
fluctuations with respiration, 199f
use of M-mode, 199f
DH views of, indirect right-sided cardiac assessment, 24, 24f
hepatic venous distension, See Hepatic veins
left ventricular short-axis
mushroom view, 156f, 274f
Probes (Transducers)
for abdominocentesis, 297f
for AFAST3, 19, 22f
care of, 15, 15f
for COAST3
of kidneys, 81
of pancreas, 112
of spleen, 66
of urinary bladder, 100, 101f
for CVC, 208f, 212f
damage to, 15f
alcohol-related, 15f
needle-related, 212f
during free-hand procedures, 302
for ECHO-COAST3, 191, 192f, 197f
for Eye-COAST3, 246f–7f
for GFAST3, 271, 272f
needle/probe angles, 302
in pericardial exams, 154f–5f
single crystal, 14
for TFAST3, 142
for thoracocentesis, 293, 293f, 294–5
Power Doppler, 187
Power slide, 187
PP-line, 178.
See also Gator sign
Pregnancy, 128
diagnosis of, 128
fetal heart rates, 129–30
pseudopregnancy, 133
ultrasound pearls/pitfalls in, 138
Preload volume status, 162f
caudal vena cava, 24f, 162f, 199f
fluctuations with respiration, 199f
use of M-mode, 199f
damage to, 15f
alcohol-related, 15f
needle-related, 212f
during free-hand procedures, 302
for ECHO-COAST3, 191, 192f, 197f
for Eye-COAST3, 246f–7f
for GFAST3, 271, 272f
needle/probe angles, 302
in pericardial exams, 154f–5f
single crystal, 14
for TFAST3, 142
for thoracocentesis, 293, 293f, 294–5
Prostate
abnormalities of, 134–5, 135f
imaging of, normal, 134, 134f
landmark of, hyperechoic butterfly, 134
pediatric imaging of, 227f
Prostatic abscesses, 135
Prostatic neoplasia, 135
Prostatitis, 135
Pseudopregnancy, 133
PTx. See Pneumothorax (PTx)
Pug, 236
Pulmonary hypertension, ECHO-COAST3 in, 202–3, 202f
Pulmonary-pleural line (PP-line). See Gator sign
Pyelonephritis, 94, 240f
Pyometra
distinguishing from hydrometra, mucometra, 131
examination of, 130–31
fluid characterization, sonographic appearance, 131
severe fluid distention with, in cat, 132f
stump, 131
Radiographic serosal detail, 17
in blunt trauma, 17
in penetrating trauma, 38
Radius, fracture of, 264f
Recording Findings, xii, 14
goal-directed templates, See Appendix II
Reflection, of US, 3
Renal agenesis, 238
Renal artery, 226f
Renal cysts, 88–9, 89f–90f
Renal dysplasia, 238, 239f
Renal lymphoma (LSA), 91f, 92
Renal lymphosarcoma (LSA), 91f, 92
Renal medulla, normal, 85f
Renal pelvis, 85
difference dog vs. cat, 85
effects of fluid therapy, 92
fat vs nephroliths and mineralization, 85, 84f, 85f
measurements of, 92
Reproductive system
abnormal findings, clinical significance of, 128–34
(female)
cystic endometrial hyperplasia (CEH), 130–31
dystocia, 128
fetal stress, 129–30
heart rates and levels of distress, 130, See also Appendix IV
use of M-mode, 129–30, 130f
use of serial exams, 130
mammary glands, 133–4, 133f
neoplasia, 134f
peritonitis, 133
mounting of post-operative estrous spayed females, 133
pseudo-pregnancy, diagnosis of, 133
pyometra, 130–32, 132f
stump pyometra, 131–3
uterine rupture, hemorrhage, 130
use of AFAST3, 126–7
uterine torsion, 133
abnormal findings, clinical significance of, 135–8 (male)
benign prostatic hypertrophy (BPH), 134–5, 135f
cryptorchidism, 136
orchitis and epididymitis, 136–7, 136f, 137f
Brucella canis, 137
paraprostatic cysts, 135
prostatic abscess and cysts, 135
prostatic neoplasia, 135
prostatitis, 135
scrotal swellings, 137–8
testicular torsion, 137
association with intra-abdominal cryptorchidism, 137
testicular tumors, types of, 137
COAST3 of, 126–39
how to do, 127
indications, 127
in unknown medical histories, 126
introduction, 126
objectives, 127
pearls/pitfalls of, 138
normal ultrasonographic findings, 127 (female)
luminal contents, 128, See also Appendix IV
in pediatrics, See Pediatrics
pregnancy, 128
diagnosis, 128
fetal development, internal structures, 128–9, See also Appendix IV
fetal kidney, 129, 129f
fetal small bowel, last to mature, 129, 129f
fetal heart rates, determination of, 130
eyeball method, 129
use of M-mode, 129–30, 130f
fetal number, inaccuracy of, 130
fetal viability, 129
normal ultrasonographic findings, 134, 134f (male)
in pediatrics, See Pediatrics
prostate, 134–5, 134f, 135f
imaging of, 134
hyperechoic butterfly sign, 134
scrotum and testes, 135–6, 136f, 137f
mediastinum testes, landmark, 136f
patient positioning, 127
pearls/pitfalls, 138
routine add-on AFAST3, 126–7, 130
scope of, 126–7
serial focused exams of, during medical management of dystocia, 130
Respiratory distress
causes of, 184t
differential diagnosis of, 185t
rapidly rule out cardiogenic lung edema, 187
use of Vet BLUE, 185t
Retinal detachment
findings for, 252–4
image of, 253f
trauma-related
FAST-ABCDE, 283f
types of, 253f
gull-wing sign, 253f
Retroperitoneal fluid, 29–30, 88–91, 88f, 89f, 90f, 91f, 96–7, 96f–7f, 282
differentiating from peritoneal fluid, 30f
hematomas, 88f
not scored, APS, 30f, 282
rule outs for, 28, 96–7
at spleno-renal view, 30f
Retroperitoneal hematoma, 88f
Reverberation A-lines, 6, 7f
Rib fracture protocol, 267f
Ribs, fracture of, 145f
Right long-axis view, in mitral valvular disease, 199f
Right parasternal long-axis views, 192–4, 194f
Right parasternal short-axis views, 194–6
Ring-down artifacts, 6, 7f
from needles, 7f, 213f, 294f
Samoyeds, 236
Scanning, basic for AFAST3, 20, 20f
for central lines, 209–14
for eye, 245–7, 246–7f
for FAST-ABCDE, 192–4f, 197–8f
for kidney, 81–2
for liver and gallbladder, 45–8
for lung, See Vet BLUE, Thoracic FAST3 (TFAST3)
for musculoskeletal, 265f, 266–7f
for pancreas and gastrointestinal, 112–14, 112–13f
for pediatrics, 223–9
probe types, 11–12, 12f, See also specific FAST3 or COAST3 exams
for reproductive, 127–34
for spleen, 66–7
for TFAST3, 144, 143f, 144f
in ultrasound examination, image orientation, 9–10, 10f
for upper airway, See FAST-ABCDE
for urinary bladder, 100–01
for Vet BLUE, 168f, 170–71f
Scatter, 3
Scrotal swellings, 137–8
Scrotum, 135
Seashore sign, 162, 162f. See also M-mode
Sediment
gallbladder, 60f
urinary bladder, 107f
Seizure disorders, 237, 238f
imaging brain, 238f
Setting up and ultrasound program, 15. See also Appendix I
Shadowing, 4, 5f
clean, 5f, 61f, 63f, 93f, 102f, 106f, 117f, 118f, 230f, 231f, 232f, 263–4f, 267f, 275f
dirty, 5f, 28f, 232f, 277f
Shih tzu, 236
Short-axis heart views, 279f
mushroom view, 154f, 156f, 274f
Short-temporary peripheral jugular catheter, 214
Shred sign, 174, 177f, 186
Side-lobe artifacts, 7–9, 9f
Signs
bar code sign, 162–3, 163f, 187
bull’s eye sign, 157, 157f, 160
butterfly sign, 134
equal sign, caudal vena cava, 24, 24f, 119f
equal sign, portal veins, 56f
gallbladder halo sign, 39–40f
gator sign, 145, 145f, 169f, 293f
glide sign, 146, 147f, 152, 172, 174f, 182f
gull wing sign, 253f
go (kidney), 86, 98, 86f
hamburger sign, 115, 29f, 73f, 116, 116f, 129f
kiwi fruit sig, 58, 62f
mediullary rim sign, 86–7
nodule sign, 176–7, 179–80f, 186
one-eyed gator sign, 145
power slide, 187
perivious hyperechoic triangle sign, 77f
race track sign, 157, 157f
seashore sign, 162–3, 163f, 187
shred sign, 172–4, 174, 177f, 186
starry night sign, 56f
step sign, 146, 148–9f
stratosphere sign, 162–3, 163f, 187
Swiss cheese sign, 76
target lesion sign, 55–6, 55f, 74, 76f
tissue sign, 175, 178f, 183f
tree trunk sign, 24f, 162f
Y sign, 66, 66f, 67f
Skull fracture
with confirmatory skull radiograph, 268f
protocol, 266f
scan of, 267f
Slice-thickness artifacts, 7–9, 9f
SLiCK pneumonic
for kidneys, 83
for liver, 48
SLiCK pneumonic (cont’d)
for pediatrics, 224
for spleen, 67
Small bleeders, 17
Small bowel. See also Small intestine
colon and comparative peristalsis, 124
corrugated, 118f–19f, 232f
elements of, images, 117f
functional ileus, 121
hamburger sign, 29f, 73f, 116, 116f, 129f
intussusception of, 119–20, 120f
pediatric, 233f, 234
layers of, 115, 116f, 229f
pediatric imaging of, 229f, 233f
perforation of, 232f
peristalsis of, 121
plication of, 118f, 232f
wall thickness, normal
measurements, 124, See also Appendix IV
abnormal, 119f, 232f
Small intestine. See also Small bowel
hamburger sign of, 29f, 73f, 116, 116f, 129f
spleno-renal view at, 29f
peristalsis of, 121
Smartphone application, for ultrasound examination, 14
Soft tissue swellings. See also Musculoskeletal, COAST3 of
abnormal, 263–6, 265f–6f
normal, 262
Sound waves, 2
Spleen
abnormal findings, clinical
significance of, 67–78, 67f–78f
abscess in, 72
erhlichiosis, 70f
hemangiosarcoma, 75f
hematomas, infarcts, 71, 72, 74f
hemorrhage during, 78
histoplasmosis, 72f
infarction, 74f
lymphoma, 70f, 74, 76f
“Swiss cheese” or moth-eaten appearance, 76
lymphosarcoma, 70f, 74, 76f
masses, 55f, 70–74
myelolipoma, 71, 73f
nodular hyperplasia, 71f, 73, 73f
other tumors, 74
parenchymal disorders in, 77f
splenitis, 72f
splenomegaly, enlargement, 67, 69–70, 69f–71f, 70, 72f
folded, 69f
hyperechogenicity with, 71f
hypoechogenicity with, 71f
lymphosarcoma (LSA), 70f
normal echogenicity with, 70f
target lesions, 74, 76f
thrombosis, 76–7, 77f, 78f
in lymphosarcoma, 74, 78f
torsion, 77f
perivenous hyperechoic triangle sign, 77, 77f
trauma-related injury, 74f
biopsy of, 72
use of AFAST3 and AFS for hemorrhage, 78
COAST3 of, 65–79
how to do, 66
indications, 65–6
introduction, 65
limitations of, 78
objectives, 66
pearls/pitfalls, 78–9
echogenicity of, 74–6
comparative, 46f, 63, 68f
hyperechogenicity of, 71f
hypoechogenicity of, 72f
normal echotexture, 68f
comparative, 46f, 63, 68f
normal echotexture, 68f
SLiCK pneumonic for, 67
normal ultrasonographic findings, 66–67f, 67
echogenicity of, 68f, 74–6
comparative, 46f, 63, 68f
hyperechogenicity of, 71f
hypoechogenicity of, 72f
normal echotexture, 68f
parenchymal disorders in, 77f
normal ultrasonographic findings, 66–67f, 67
echogenicity of, 68f, 74–6
comparative, 46f, 63, 68f
normal echotexture, 68f
SLiCK pneumonic for, 67
normal ultrasonographic findings, 66–67f, 67
Step sign
subsets of,
nodule sign, 176–7, 179–80f
shred sign, 172–4, 173f, 177f
tissue sign, 175, 178f
summary of, 185t
in TFAST3, 146, 148f–9f
in Vet BLUE, 172, 185t
Sternal recumbency
cross-sectional canine thoraces in, 151f
for ECHO view, 194f
for lung point in PTX, 151f
for respiratory distress, safer, 142
for TFAST3, 142, 143–4f
for Vet BLUE, 168f, 169
Stomach, 121
edge shadowing artifact, 25, 109
false positive during AFAST3, 26f
rugal folds, 231f, 232f
wall, normal, 121f
Stone interference artifacts, 4, 5f
Stratosphere sign (M-mode), 162, 162f
Subcostal Views. See also Diaphragmatico-hepatic (DH) view
in heart failure, 199f
use of, 197–9
Subcutaneous emphysema
interference, using TFAST³, 152–3, 153f
testing for, 170
Suspected globe rupture, 259–60, 259f
Suspected retrobulbar masses
buphthalmos, 257
exophthalmos, 256–7, 258f
Target lesions
association with malignancy, 55, 55f, 74, 76f
liver masses with, 55, 55f
of spleen, 74, 76f
Target organ approach, 19–21. See also
Abdominal FAST³ (AFAST³), cysto-colic (CC) view;
Abdominal FAST³ (AFAST³), diaphragmatic-hepatic
(DH) view; Abdominal FAST³ (AFAST³), hepato-
renal (HR) view; Abdominal FAST³ (AFAST³), spleno-
renal (SR) view
TCC. See Transitional cell carcinoma
(TCC)
Testicles, 135–6, 136f, 241f
normal landmark, mediastinum
testes, 136f, 241f
Testicular torsion, 137
Testicular tumors, 137
TFAST³. See Thoracic FAST³ (TFAST³)
Thoracic FAST³ (TFAST³), 140–65
chest tube site (CTS) view for, 146–7, 146f–7f
DH view, 155–9, 155f–9f
documentation of, 140
in medical records, 164, See also
Appendix II
findings, at the chest tube site (CTS) view, 146–53
definition of, 142, 144f, 146f
gator sign, basic orientation, 143, 143f
glide sign, 146, See also Dry lung
pneumothorax (PTX), 148–52, 150f, 151f, 151t
partial vs. massive, degree of
PTX, 150–52, 151f
search for the lung point, 150–52
step sign, 146–7, 149f
subcutaneous emphysema
(SQE), 152–3, 153f
ultrasound lung rockets, 146, 148f, See also Vet BLUE
use of M-mode, 162, 163f
seashore sign, 162, 163f
stratosphere or bar code sign, 162, 163f
use of power Doppler, 187
power slide, 187
wet vs. dry lung, concept, 152, See also Vet BLUE
findings, at the diaphragmatico-
hepatic (DH) view, 155–9
diaphragmatic hernia, suspicion/
diagnosis of, 161–2, 159f
how to do, 155
depth into thorax, 25–33% rule, 157, 156f
new fifth (5th) view for TFAST³, 155, 144f
pericardial imaging, cats, dogs, 155–7
ultrasound lung rockets (ULRs), 156f
confluent or white lung ULRs, 156f
single ULR, 156f
volume status, hepatic venous
distension, 157, 162f
tree trunk sign, 162f, See also
Hepatic veins
findings, at pericardial site (PCS) view, 153–5, 160–62
definition of, 153–4
how to do, short-axis and long-
axis views, 152–3, 153f
pericardial effusion, 160, 157f, 158f, 159f, See also Focused
or COAST³ ECHO
characterization of effusion, 161
fluid-contained, 160
bull’s eye sign, 160, 157f
one view is no view, 160
raccoon eye sign, 157f
zoom out, increase depth, 160
left atrial tear, 159f
mistaking heart chambers for
pericardial effusion, 160, 155f
zoom out, increase depth, 160
pericardium landmark, 160, 156f
zoom out, increase depth, 160
pericardial effusion, See also Focused
or COAST³ ECHO
characterization of effusion, 161
fluid-uncontained, 160–61, 158f
one view is no view, 160
zoom out, increase depth, 160
mistaking heart chambers for
pleural effusion, 160, 155f
zoom out, increase depth, 160
use of the diaphragmatico-
hepatic (DH) view, 161
routine add-on, Vet BLUE, 162
staging of hemangiosarcoma, 74
AFAST³, 74
TFAST³, 74
Vet BLUE, 74
summary of clinical utility of
TFAST³ views, 163–4
volume status and contractility,
left ventricular short-axis view, 156f, 162
fifth point, the DH view, 144, 144f
how to do, 142–3, 143f, 144f
indications for, 141
introduction, 140–41
left ventricular short-axis views at,
156f
objectives, 142
other tests compared to, 272f
patient positioning for, 142, 143f, 144f
patient restraint, safety, 145
perineal/pitfalls of, 164
pericardial exam in, 153–5, 154f–5f
pneumoencephalography, 148–50, 148f–50f
probe settings, 142
probes for, 142
PTX algorithm for, 151f
respiratory distress detected by, 184t
scope of, 141
subcutaneous emphysema presence
in, 152–3, 153f
techniques for, 142–4, 143f
tricks of trade, 145, 146f
one-eyed gator, 145
pivoting the probe, 145, 146f
ULRs in, 146, 148f
Vet BLUE with, 140, 162, 166, 171f
views of, 163–4
Thoracocentesis, 295
parallel probe placement for, 294–5
probe placement for, 293, 293f
techniques for, 292
ultrasoundographic findings for, 292
ultrasound-guided, 291–5, 294f
use of TFAST³, monitoring post-
procedure, 295
Thrombosis
arterial (ATE), 218, 219f
venous (DVT), 218–20
venous, central, 218–19, 219f
Thrombus. See Blood clots
Tissue sign, 178. See also Vet BLUE
Trachea, 276f
Transducers. See Probes (Transducers)
Transitional cell carcinoma (TCC), 104–5, 105f
Transhthoracic view, 157
Transverse, image, 10f
Transverse orientation for CVC, 211, 212f–13f
longitudinal v., 218
Trauma
AFS in, 41t
AFS/AFAST3 in non-traumatic bleeding patient subsets, 37–8, 41t
in penetrating trauma, 38–9
differential diagnosis in, 185t
OnSD in, 270
signs in, 185t
ULRs in, 152

Ulna, 264f
ULRs. See Ultrasound lung rockets (ULRs)
Ultrasoundix, 302
Ultrasound examination abbreviated terminology for, xi–xii for abdominal, cardiac, small parts, 13 alternate imaging tools for, 14 artifacts of, 1 basic principles of, 1–4, 2f basic scanning in, 9–10, 10f basic settings for, 12–13 for COAST3, 13 directional terms for, xii–xiii echogenicity of, xii in human medicine, xii image optimization for, 13 labeling still images of, 14–15, 15f single crystal probes for, 14 Smartphone application for, 14 Ultrasound-guided techniques for central line placement, 211f CVC-COAST3, 209–14, 210f–13f interventional abdominocentesis, 295–8, 297f–8f MUG-DPL, 298–301, 299f–301f needle visualization for, 301, 301f pearls/pitfalls of, 301–2 pericardiocentesis, 286–91, 288f–90f thoracocentesis, 291–5, 294f types of, 286 needles used in, 301–2 Ultrasound lung rockets (ULRs) false, 186 in real-time, 274f

Ultrasound machine (US)
absorption of, 3 acoustic impedance of, 2–3, 3f attenuation of, 3–4, 4f care of, 15 for lung, 140–41 probes for, 11 reflection of, 3 scatter of, 3 selection of, 11 sound waves of, 2 velocity of, 2, 2f


Uterus. See also Reproductive system

uterine torsion, 133
INDEX

in estrus, 128
in hydrometra, 131
in mucocoele, 131
in pyometra, 131–132, 132f

Vascular lesion, splenic torsion, 77f
differentiating splenic torsion from lymphosarcoma (LSA), 76–7, 76–7f

Vasculature
of liver, 58
of spleen, 76, 77f–8f

Velocity
artifacts of, 6–7, 6f–7f
of US, 2, 2f

Vet BLUE
algorithm for lung ultrasound signs and differentials, 185t
basic orientation for, 169f, See also Gator sign
case-based patterns of, 180–84, 183f
clinical relevance of, 186–7
differential diagnosis of, 185f
in dogs, 168f
false negative limitations of, 178–9
forms of consolidation, patterns and differentials, 184–6, 183f
future of lung ultrasound, 187
gator sign in, 169f
importance of, 166
indications for, 168
introduction, 166–7
lung ultrasound findings, 172–8
dry lung, glide sign with A-lines, 172, 173f, 174f, 182f, 183f, 185t
fluid (Ff) sign, 177
nodule(s) (Nd) sign, 176–7, 179f, 180f, 183f, 185t
shred (Sh) sign, lung consolidation with aeration, 172–4, 173f, 177f, 183f, 185t
signs of consolidation, 172–7
tissue (Ti) sign, lung consolidation without aeration, 175, 178f, 183f, 185t
wet vs. dry lung principle, 172
wet lung ultrasound findings, 172, 173f–6f
imaging, 148f
using ULRs, 6–7, 8f, 22f, 24, 146, 148f, 156f, 175–6f, 181f

warfarin rodenticide toxicosis, 88f
Wet lung, 184–7. See also Vet BLUE
dry lung, 152
false, 186
findings of, 172, 173f–6f
imaging, 148f
using ULRs, 6–7, 8f, 22f, 24, 146, 148f, 156f, 175–6f, 181f

Yorkshire Terrier, 123f, 236