

For each viewpoint, **wet the fur** with alcohol, **part the fur** to prevent air trapping prior to placing the probe, and **add gel if needed**. There is no need to shave, or turn the room lights off. Unless otherwise indicated, orient the probe in the **sagittal** plane, with probe **maker toward the head**. Abdominal preset and microconvex probe are ideal. If video clips are always done in the same order, minimal alphanumeric labeling is needed, unless to clarify abnormal findings.

### Tips for VetBLUE® 8 Point Lung Scan

- **Place** the probe perpendicular to skin and centered in the intercostal space for each point, in sagittal plane. Standing or sternal/modified sternal recumbency are preferred.
- Set depth to 4-6 cm and adjust from there as needed.
- The **"Gator Sign"** is the target view for each point on the lung scan. The two eyes of the gator are created by rib shadows, with horizontal white lung line in between. Once the Gator Sign is optimized at each point, the probe is held stationary and a **video clip recorded**. Spend the first third of the clip in that **home intercostal space (ICS)**, the next third in **one ICS caudal**, and the last third **one ICS cranial** to the home ICS.



### STEP 1: VetBLUE® Lung Scan Left Side

- **Point 1: Left Caudal Lung Lobe Point (LCd)** – Palpate the xyphoid and draw a line dorsally to where the lumbar muscles meet lung field. Place the probe here, and explore locally until you find the transition zone between lung and abdominal contents. Move 1-2 rib spaces toward the head to locate LCd, where abdominal contents are no longer visualized. Optimize the Gator Sign, and take **Video Clip 1**.
- **Point 2: Left Perihilar Point (LPh)** – Draw an imaginary line from LCd to the left elbow. Place the probe half way between LCd and the elbow, on this line to find LPh. Optimize the Gator Sign, and take **Video Clip 2**.
- **Point 3: Left Middle Lung Lobe Point (LMd)** – Place the probe just behind the left elbow to find LMd. If you are over the heart, slide toward the spine until you optimize the gator sign. Take **Video Clip 3**.

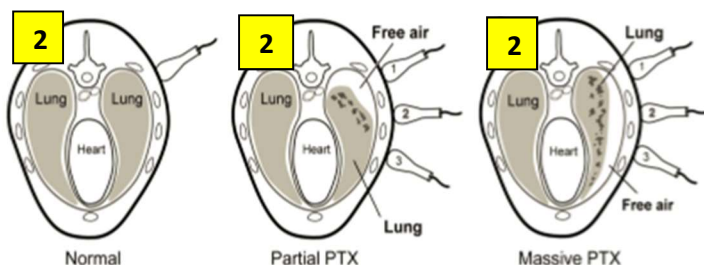
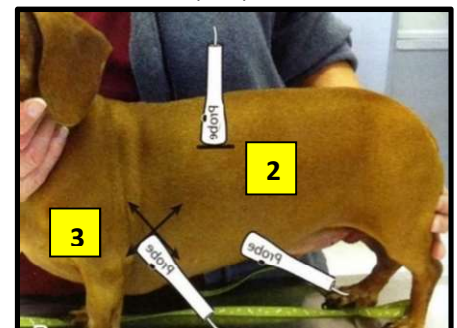
● **Point 4: Left Cranial Lung Lobe Point (LCr)** – Have the assistant pull the left front limb toward the head so the paw comes off the table. Slide the probe into the left axillary space until you reach the thoracic inlet, then slide 1-2 rib spaces caudally to find LCr, which is dorsal and cranial to LMd. Optimize the Gator Sign, and take **Video Clip 4**.

### Tips for TFAST® Chest Tube Site (CTS) & Pericardial Slide (PCS)

- TFAST® should be done in sternal/standing, if at all possible. Very mild pneumothorax (PTX) may be best assessed in right lateral recumbency, but this position can cause respiratory compromise in the patient with PTX, pericardial effusion (PCE) or PLE.

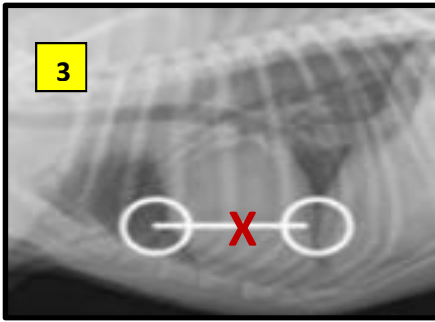
### STEP 2: TFAST® Left Chest Tube Site (LCTS)

- The Chest Tube Site (CTS) is the highest point on the thoracic wall where the cap of air would rise, in case of pneumothorax (PTX).
- **Place** the probe at the **Left CTS** (see **Point 1 (LCd)** above and/or **"2"** in the image at the right – they are assessed the same location). Obtain the **Gator Sign**. If **Lung Rockets** or **Glide Sign** are present, **PTX** is ruled out. PLE is almost never seen at this dorsal point in the live patient, as fluid falls and PLE that severe is usually fatal.
- If **A lines** are seen as in dry lung, with no lung rockets or glide sign, the dog likely has PTX at that point. **Search for the Lung Point (LP)** where contact is re-established between



lung and thoracic wall, by continuing ventrally on the thorax until LP is found, to confirm PTX. Locating a **Curtain Sign of PTX** can help to find the LP.

- When LP is found, **score PTX** as **mild** (dorsal third of thorax), **moderate** (middle third) or **severe** (lower third). Presence of lung beat with no LP found indicates **massive pneumothorax**.
- Take **Video Clip 5** at LCTS and **Optional Video Clip 5b** if/when LP found.



### STEP 3: TFAST® Left Pericardial Slide (LPCS)

- The **Pericardial Site (PCS)** is used mainly to detect fluid in the pericardial and/or pleural spaces. PCE/PLE can and should be confirmed at other points below, used to detect both.
- **Palpate** the apical beat near the left sternum if standing/sternal, and **place** the probe there (see red "X" in figures at left). The beam is parallel to the sternum (see white line in figure at left). If in right lateral, palpate the apical beat on the down right side with the forefingers, and place the probe where the thumb natural falls on the right thoracic wall (see red "X" in photo at right and below).
- **Increase depth** to include the bright white

**pericardium** in the far field, so the entire heart and pericardial space are seen. If the heart is severely enlarged (left ventricle >5cm), the pericardium may fall off the bottom of the screen, even when set to maximum depth.

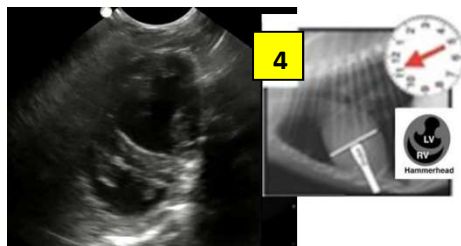
- **Slide the probe caudal** to find the caudal most aspect of the heart where it contacts the **diaphragm** (see white circle at right end of white line in figure above). If present, **Pericardial Effusion (PCE)** will be seen as a **Racetrack Sign** (black ring of fluid between the gray L myocardium and the bright white pericardium). If present, **Pleural Effusion (PLE)** will appear as black polygons or ribbons, the latter at the top of the screen, and/or you might see a **Curtain Sign of PLE**. Check for **Glide Sign** and **lung pathology** at the diaphragm, as you would with VetBLUE®.

- Take **Video Clip 6** of the left caudal pericardial slide, including any abnormalities seen.
- **Slide the probe cranial** to find the cranial most aspect of the heart where it contacts **lung** (see white circle at left end of white line in figure above). Check for PCE (**Racetrack Sign**) and PLE (**black polygons**, **black ribbons**, or **Curtain Sign of PLE**).
- **HINT:** o detect very small amounts of PLE, **rotate the probe 90°** (parallel to the ribs) at the end of the cranial and caudal pericardial slide, and look **for fluid polygons** (see white circles at ends of the white line in figure above and left).
- Take **Video Clip 7** of the left cranial pericardial slide, including any abnormalities seen.



### Tips for TFAST® Echo Views

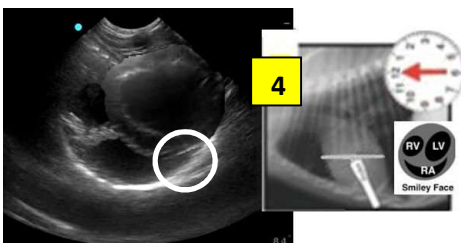
- The TFAST® left echo views are best obtained standing or sternal.
- The TFAST® right echo views can be obtained standing, sternal or in right lateral recumbency. Right lateral may be necessary if lungs are well inflated and there is no pleural effusion, especially for the short axis Pulmonary Artery view.
- Never diagnose PCE based on right sided short axis echo views only, as PCE can be confused with heart chambers. Confirm with other views – the right sided Bullseye and 4 Chamber views, as well as the left sided Hammerhead view.



### STEP 4: TFAST® Left Echo Views

- **Hammerhead View** – **Place** the probe at the left apical beat, as described above for **Left PCS** (see red "X" in photo and radiograph above). Orient the probe across the short axis of the heart with the probe marker toward the left elbow (see white line in figure at left). You will see the round **Left Ventricle (LV)** in the near field and the crescent shaped **Right Ventricle (RV)** in the far field. Look for **PCE** and/or **PLE**. This is a good view for seeing **heartworms**, if they are there.

- Take **Video Clip 8** of the Hammerhead View.



- **Smiley Face View** – **Rotate** the probe clockwise, until the marker points toward the head, and the beam is parallel to the long axis of the body. You will see the round **RV** in the near field and on the left of the screen, the round **LV** in the near field and on the right of the screen, and the crescent shaped **Right Atrium (RA)** in the far field. Look for **PLE** and **PCE**. If a **heart base tumor** is present, it is often best seen in this view at the **Right Auricle** (see white circle in figure at left).

- Take **Video Clip 9** of the Smiley Face View.

**STEP 5: Take Blank Video Clip 10** to indicate that you are moving from the patient's left to right side.

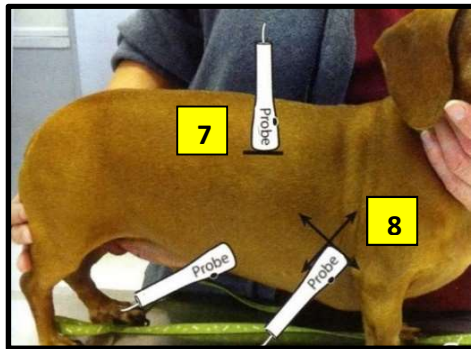


### STEP 6: VetBLUE® Lung Scan Right Side

- **Point 5: Right Caudal Lung Lobe Point (RCd)** – See **Point 1 LCd** on page 1 and repeat on the right side (see Figure at left). Take **Video Clip 11** of RCd.
- **Point 6: Right Perihilar Point (RPh)** – See **Point 2 LPh**. Take **Video Clip 12**.
- **Point 7: Right Middle Lung Lobe Point (RMd)** – See **Point 3 LMd**. Take **Video Clip 13**.
- **Point 8: Right Cranial Lung Lobe Point (RCr)** – See **Point 4 LCr**. Take **Video Clip 14**.

### STEP 7: TFAST® Right Chest Tube Site (RCTS)

- See **Step 2** and repeat on the right side (see figure 7 below and left). Take **Video Clip 15** of the right CTS, and if PTX present, **Video Clip 15b** of the right LP.

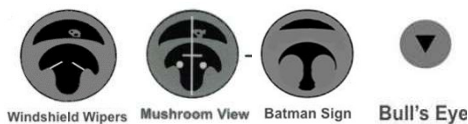
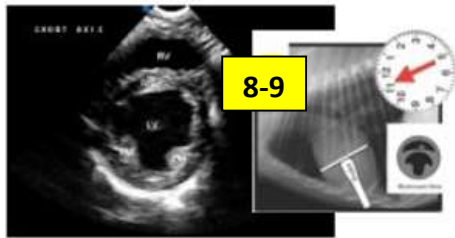


### STEP 8: TFAST® Right Pericardial Slide (RPCS)

- **Mushroom View** - See **Step 3 – Hammerhead View** - and repeat probe positioning and pericardial slide on the right. You will see the round LV with papillary muscles that make the LV lumen look like a mushroom in the far field, and the crescent shaped RV in the near field (see echo figure 8-9 below and left).
- Take **Video Clip 16** of the right caudal pericardial slide, and **Video Clip 17** of the cranial pericardial slide, including any abnormalities seen.

### STEP 9: TFAST® Right Short Axis Echo Views - “Down & Up the Ladder”

- **Mushroom View** - Without moving the probe position from right PCS, **fan** up toward the heart base and down toward the heart apex to find the place in the LV where both **papillary muscles** are seen, and the crescent shaped RV wraps around the LV in the near field (see figure 8-9 at left). The LV lumen looks like a black mushroom. Optimize the view by rotating the probe in either direction, until the papillary muscles appear symmetrical and the LV is round rather than oval. Assess LV **volume status** and **contractility**. Take **Video Clip 18**.



- **Batman Sign View** - **Fan** toward the heart apex until you see **the papillary muscles** take up more of the **LV** lumen, so that it looks like a black Batman Sign (see drawing below and left). You may or may not see RV. Look for **PCE**.

- **Bullseye View** - **Fan** even farther toward the heart apex, until the RV and the papillary muscles disappear (see drawing above and left). This is the best short axis view for assessing **PCE**, as there aren't multiple heart chambers present to confuse with PCE.

- **Windshield Wiper View** – **Return** to the Mushroom View, optimize it, and then **fan** slightly toward the heart base until the papillary muscle split up, then the **chordae tendinae** appear as windshield wipers in the LV, running between the **papillary muscles** and the **mitral valve (MV)**.



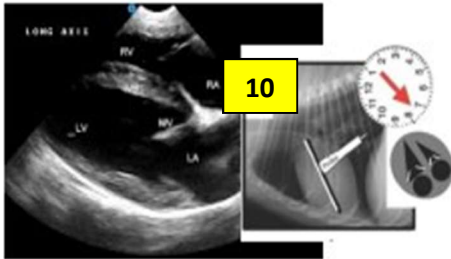
- **Fish Mouth View** – **Fan** even farther toward the heart base, until you see the **MV** opening and closing in the LV, like a Fish Mouth (see drawing at left), and the **RV** in the near field. If **mitral valve dysplasia** is present, you will see a thickened MV.

- **Mercedes Sign View** – **Continue fanning** toward the heart base until you see the **aortic valve (Ao)**, which will look like a Mercedes Sign in the center of the heart (see figures at left). The **Left Atrium (LA)** will look like a black whale below and to the left of Ao on the screen. Assess for **LA enlargement** (maximum LA width should be less than 1.5X Ao). Take **Image 1**.

- **Pulmonary Artery View** – Continue fanning toward the heart base until you see the branching of the **pulmonary artery (PA)** (see drawing to left). Assess for **PA enlargement** (PA should the same size as Ao). Take **Image 3**.

- Take **Video Clips Series 19** to capture the entire right short axis heart scan.



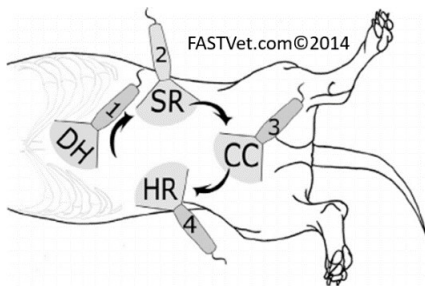


### STEP 10: TFAST® Right 4 Chamber View

- **Return** to the Windshield Wiper View, and **then rotate the probe marker 90° toward the sternum**, until you see all 4 chambers of the heart in long axis (see figure at left). The view is optimized when the walls of the LV are parallel and you see the hyperechoic area in the septum where all 4 chambers come together.
- Assess the **LV:RV** lumen ratio (normal is greater than 2-3). LV:RV <2-3 indicates pulmonary hypertension or pulmonic stenosis. **LA** size can also be assessed here, as it is normally about the same size as the RA in this view (normal **LA:RA**=1).
- Take **Video Clip 20**, being sure to capture any abnormalities seen.

### Tips for AFAST®

- The AFAST® views can be obtained in R or L lateral, sternal, modified sternal recumbency or standing. R lateral recumbency may be needed for DH View evaluation of the caudal vena cava and for sampling abdominal fluid at the HR-U site.



### STEP 11: HR5th AFAST® Bonus View

- **Place** the probe on the right side, caudal to the last rib, where the costal arch meets the lumbar muscles. Point the beam cranially, to view the **Right Kidney** in long axis and **Liver**. In deep chested dogs, you may need to move into the 11<sup>th</sup> or 12<sup>th</sup> intercostal space to find this view. In cats, the kidney may be separated from the liver by soft tissue.
- **Fan** left to right through the kidney, and record **Video Clip 21**. Look for **retroperitoneal fluid** and **ascites**.
- There is no rock, return or AFS in this "bonus" AFAST® view.



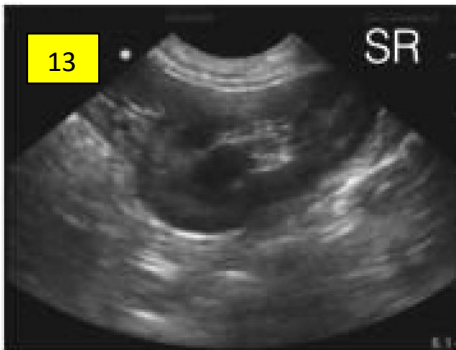
### STEP 12: AFAST® & TFAST® Diaphragmatic Hepatic (DH) View

- **Place** the probe with marker toward the pet's head just caudal to the xyphoid, and increase the depth to target the liver filling  $\frac{3}{4}$  of the screen, so that the **diaphragm** and caudal vena cava do not move out of view at the bottom of the screen with breathing.
- Angle the beam cranially until you see the **gall bladder kiss the diaphragm**. Look for fluid triangles around the **gall bladder**, and for gall bladder **halo sign**. Look at the **diaphragm-lung** line for **lung rockets**, **glide sign**, **pleural effusion** and **polygons (ascites)**.
- **Fan** left to right and back again, looking for **fluid triangles** between the **liver lobes**. Take **Video Clip 22**, being sure to capture any abnormalities seen.
- **Rock cranially** to see the **heart** bumping the diaphragm. Look for **pericardial** and **pleural effusion**. Take **Video Clip 23**, being sure to capture any abnormalities seen.
- **Return** to the gall bladder and then point the probe toward mid-abdomen to evaluate the **caudal vena cava** as it passes through the diaphragm (**fat**, **bounce**, or **flat**). Take **Video Clip 24**.
- If fluid triangles are all less than 5mm in the cat or less than 10mm in the dog, add 0.5 to the **abdominal fluid score** (AFS – see Step 16). If at least one area of free fluid is  $\geq 5$ mm in the cat or  $\geq 10$ mm in the dog, add 1 to the AFS.



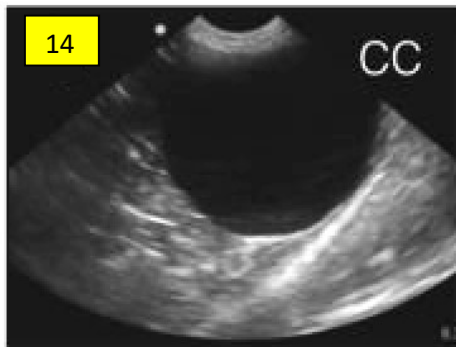
for fluid triangles around the **gall bladder**, and for gall bladder **halo sign**. Look at the **diaphragm-lung** line for **lung rockets**, **glide sign**, **pleural effusion** and **polygons (ascites)**.

### STEP 13: AFAST® SplenoRenal (SR) View



- Palpate where the left costal arch meets lumbar muscles. **Place** the probe here, with the notch toward the patient's head, so the beam is parallel to the spine.
- Find the long axis Tomato View of the **left kidney** seen in figure "13" (left). **Fan** through the kidney, medial to lateral and back again. Take care not to apply so much pressure that the left kidney is pushed out of the way. Look for **retroperitoneal fluid**, and **polygons** in the abdomen. **Great vessels** and **colon** will be seen.
- **Rock** the probe cranially to find the **spleen**, and look for more **fluid polygons**. **Stomach** and **colon** will be seen.
- **Return** the probe to mid-abdomen for 30 seconds to look for **fluid polygons**.
- Take **Video Clip 25**, including any abnormalities seen.
- If abdominal fluid triangles are all <5mm in the cat or <10mm in the dog, add 0.5 to

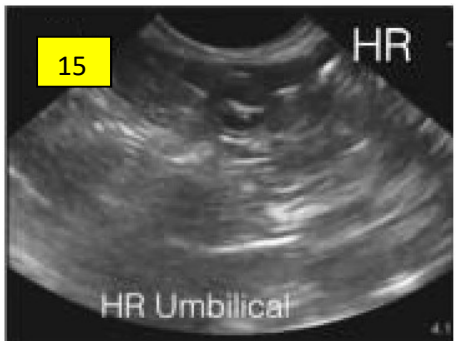
the **AFS** running total which was started in Step 8 (DH View). If at least one area of free fluid is  $\geq 5\text{mm}$  in the cat or  $\geq 10\text{mm}$  in the dog, add 1 to the AFS.



### STEP 14: AFAST® CystoColic (CC) View

- **Place** the probe over the bladder, with the notch pointing toward the head, and visualize the **bladder** kissing the abdominal wall at the **thigh muscles**. This is the most sensitive location for finding abdominal **fluid triangles**, called the "CC Pouch." Wait for 30 seconds for fluid to pool there. The **colon** may or may not be seen. If the colon obstructs the view of the bladder, slide the probe ventrally toward midline.
- **Fan** from right to left and back, through the **bladder**. **Rock** cranially to look for **fluid triangles**. You will see loops of **small bowel**.
- **Return** to the bladder. Take **Video Clip 26**, including any abnormalities seen.
- If abdominal fluid triangles are <5mm in the cat or <10mm in the dog, add 0.5 to

the **AFS**. If free fluid is  $\geq 5\text{mm}$  in the cat or  $\geq 10\text{mm}$  in the dog, add 1 to the AFS.



### STEP 15: AFAST® HepatoRenal Umbilical (HR-U) View

- **Place** the probe between the umbilicus and the table if in right lateral recumbency, with the notch pointed toward the head. Direct the beam into the lower half of the abdomen. **Small bowel** is seen, but liver and right kidney are not usually seen.
- **Fan** the probe toward and away from the table, looking for **fluid triangles**. **Rock** forward, and then **return** to the starting point.
- Take **Video Clip 27**, including any abnormalities seen.
- If abdominal fluid triangles are <5mm in the cat or <10mm in the dog, add 0.5 to the **AFS**. If free fluid is  $\geq 5\text{mm}$  in the cat or  $\geq 10\text{mm}$  in the dog, add 1 to the AFS.
- If abdominal fluid is found, **tap** using a 22g 1-1/2 inch needle, and collect by gravity

drip into red top and purple top blood tubes.

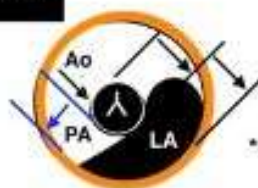
### STEP 16: AFAST® Abdominal Fluid Score (AFS)

- AFS is the sum of AFS points collected from each of the four AFAST views: DH, SR, CC and HR-U. Do not count abdominal fluid seen at HR5th Bonus View in the AFS.
- Retroperitoneal, pericardial and pleural fluid are not included in the AFS.
- Minimum AFS is 0. Maximum AFS is 4.

### STEP 17: Focused Spleen Ultrasound (see separate handout)

**Base**

# TFAST® Echo Views - Rogue Version



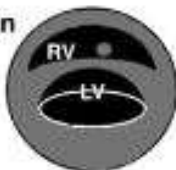
Normal  
LA:Ao  
\*Dog < 1.3 :1  
\*Cat < 1.6 :1  
\*Obvious Abnormal > 2:1

**Non-echo Option Vet BLUE®**  
Dry All Views vs. B-lines  
Dry All Views Rules Out  
Left-sided Congestive Heart Failure



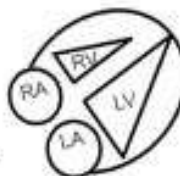
Long-axis 4-chamber View

Mercedes Benz Sign



Fishmouth View

Rotate 90 degrees



R/O Pulmonary Hypertension  
PA:Ao > 1:1  
RV:LV > 1:2  
Flattened IVS on Mushroom View

Windshield Wipers



Mushroom View

M-mode

Normal Dog & Cat  
RA:LA 1:1  
RV:LV 1:3-4  
\*Obvious Abnormal ~ 1:1

**Non-echo Option**  
Caudal Vena Cava  
flat, Bounce, FAT  
Non-FAT CVC  
Rules Out Right-sided  
Congestive Heart Failure



Batman Sign

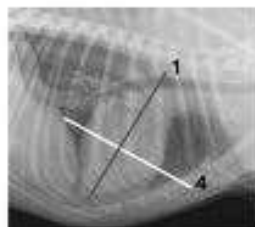


Bull's Eye

**Apex**



Short-axis View



Left Short-axis View



Hammerhead



Smiley Face

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