Echo IMPC_ECH_001

Purpose

To assess the functionality of the heart in order to determine the presence of a mutant phenotype.

Experimental Design

- **Minimum number of animals :** 5M or 5F
- **Age at test:** Week 12
- **Sex:** We would expect the results of this test to show sexual dimorphism

Procedure

1. Place animal in induction chamber and anesthetize the mouse and ensure sedation.
2. Once the animal is sedated, move it to a nose cone for hair removal using cream. Only apply cream to the area of the chest that will be utilized for imaging. Once the hair is removed, wipe area with wet gauze to ensure all hair is removed.
3. Move the animal to the imaging platform and tape its paws to the ECG lead plates and insert rectal probe. Body temperature should be maintained at 36-37°C. During imaging, reduce anesthesia to maintain proper heart rate. If the animal shows signs of being awake, use a higher concentration of anesthetic.

** Before imaging, decrease the Sector X so that the frame rate increases to 110 and change the orientation of the heart by clicking the dot as shown in Fig. 1.*

4. Apply gel on to the area to be imaged.
5. Lower the probe to the gel until it makes contact, making sure that all areas of the probe are covered with gel.
6. The image of the heart should be taken in the short-axis mode with papillary muscles being the point of reference. The papillary muscles should be parallel to the screen as shown on Fig. 2. Some manipulation of the platform may be necessary in order to get a clear image.
7. Once the papillary muscles are parallel in B-Mode, press the M-mode button and place the yellow line in the middle of the LV. Change the Display window to 1000ms. If image is not clear as in Fig. 3, move the yellow line to the left or right. Another option is to leave the line in the center of the LV and move the platform left or right, forward or backwards.
8. When a good clear image is obtained press the Cine store button to save the M-mode data. Save at least 4 short loops of data.
9. To view the heart two dimensionally in the parasternal long-axis choose the Presets: B-mode, parasternal long axis view.
10. Place the transducer vertically to the animal body on the left side of its sternum with the notch of transducer pointing to the animal head. Optimal parasternal views are obtained by adjusting gain settings for visualization of endocardial and epicardial walls (approximately 45

dB). A proper image in this orientation includes the left atrium and ventricle, a slight portion of the right ventricular wall and the output of the aorta, with the heart forming a gourd-like structure. The beginning ascending aorta and the apex of the heart are on the same horizontal line.
11. When a good clear image is obtained press the Cine store button to save data. Each animal should have at least 3 short B-Mode, parasternal long axis view images captured.
12. Once imaging is complete, remove animal from the platform and allow to recover atop a heating pad.

Figure 1.

Figure 2.

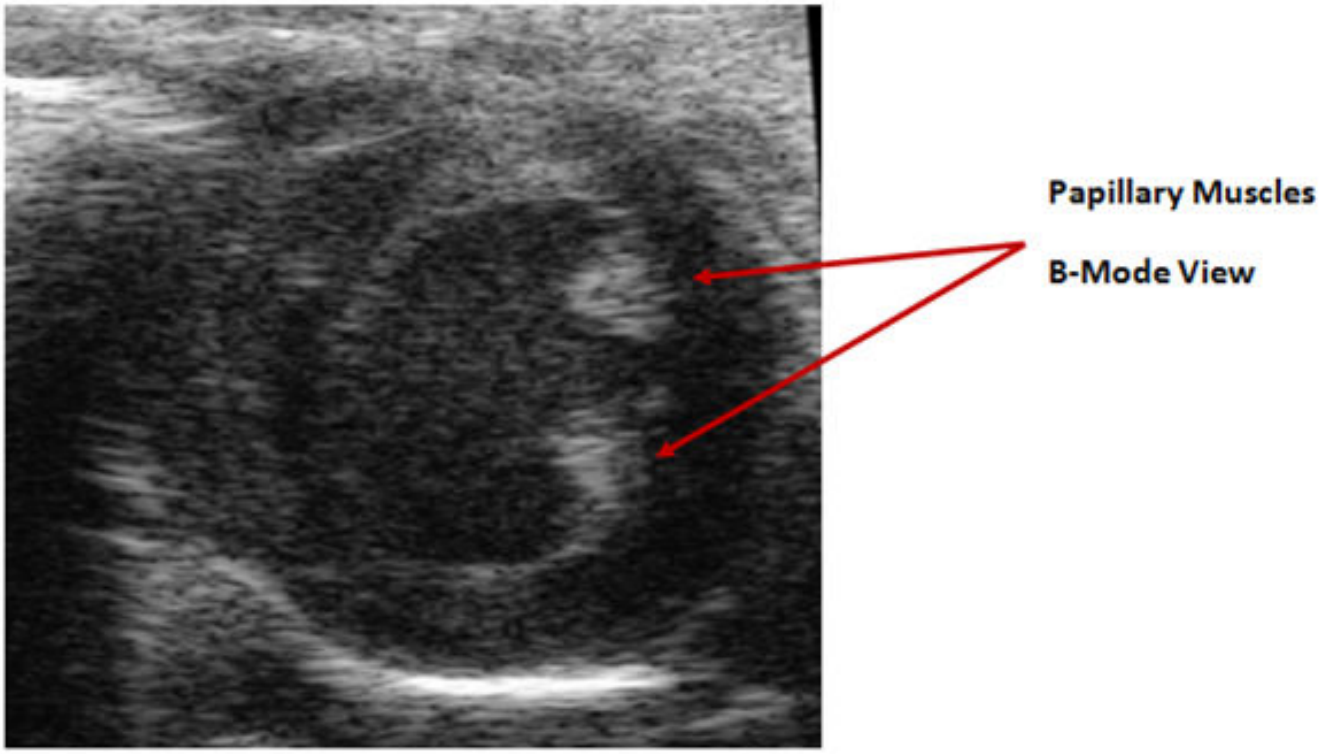
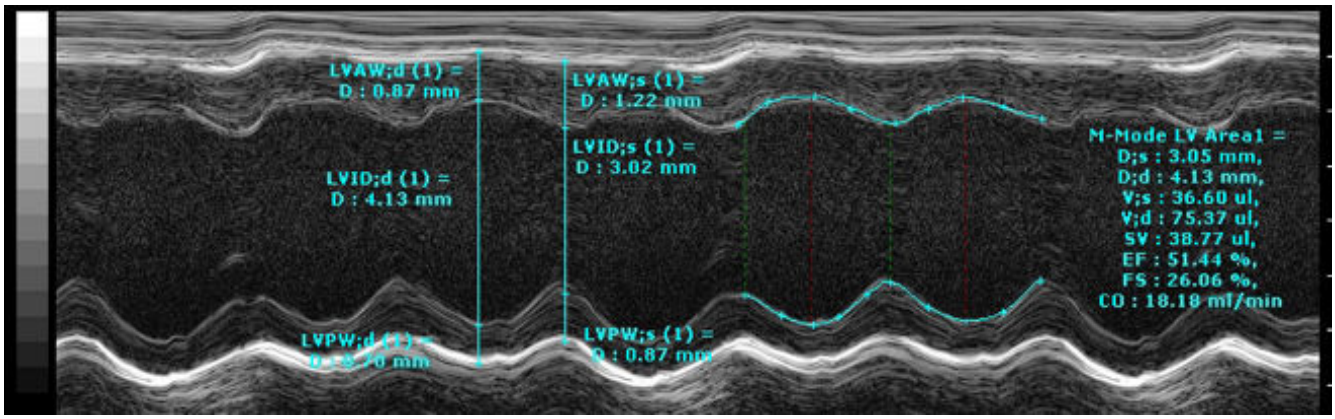
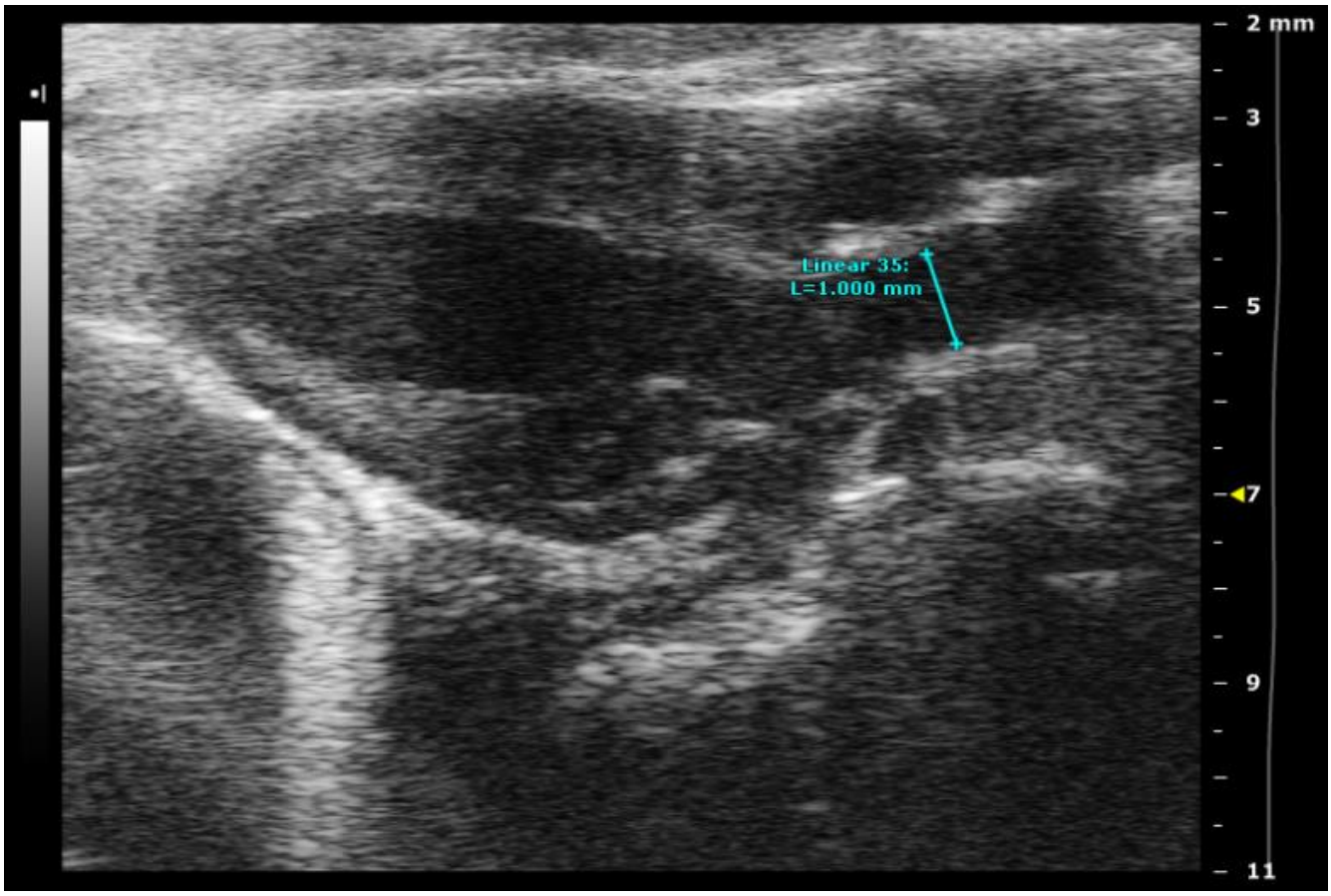


Figure 3.



Offline analysis:
To define the diameter of the aortic arch, ensure that this measurement is done during systole of the heart. The diameter is to be measured perpendicular to the aortic wall (Figure 4). Use the ruler to measure the diameter. Place it on the right of aortic valves and on the left of the beginning right atrium. Each animal should have at least three ascending aorta diameters taken.

Figure 4.



Notes

Each animal should have at least four short M-Mode images captured.

In order to analyze these data files, you must use the software package provided by the manufacturer. Perform the analysis using the best image by tracing a minimum of four cycles as well as averaging two wall measurements for diastole and systole as seen in Fig. 3. The parameters derived from the trace are End systolic/diastolic diameter (d;s/d;d), systolic/diastolic volume (V;s/V;d),stroke volume (SV), ejection fraction (EF), fractional shortening (FS), heart rate (HR) and body temp (temp).

All four images can be uploaded as part of the data submission.

These data points can be displayed in a bar graph or a line graph.

Parameters and Metadata

End-Systolic Diameter IMPC_ECH_001_001 | v1.0

simpleParameter

Req. Analysis: false **Req. Upload:** false **Is Annotated:** true

Unit Measured: mm

End-Diastolic Diameter IMPC_ECH_002_001 | v1.0

simpleParameter

Req. Analysis: false **Req. Upload:** false **Is Annotated:** true

Unit Measured: mm

Stroke Volume IMPC_ECH_003_001 | v1.0

simpleParameter

Req. Analysis: false **Req. Upload:** false **Is Annotated:** true

Unit Measured: ul

Ejection Fraction IMPC_ECH_004_001 | v1.0

simpleParameter

Req. Analysis: false **Req. Upload:** false **Is Annotated:** true

Unit Measured: %

Fractional Shortening IMPC_ECH_005_001 | v1.0

simpleParameter

Req. Analysis: false **Req. Upload:** false **Is Annotated:** true

Unit Measured: %

Cardiac Output IMPC_ECH_006_001 | v1.0

simpleParameter

Req. Analysis: false **Req. Upload:** false **Is Annotated:** true

Unit Measured: ml/min

LVAWd IMPC_ECH_007_001 | v1.1

simpleParameter

Req. Analysis: false **Req. Upload:** false **Is Annotated:** true

Unit Measured: mm

LVIDd IMPC_ECH_008_001 | v1.0

simpleParameter

Req. Analysis: false **Req. Upload:** true **Is Annotated:** true

Unit Measured: mm

LVPWd IMPC_ECH_009_001 | v1.0

simpleParameter

Req. Analysis: false **Req. Upload:** true **Is Annotated:** true

Unit Measured: mm

LVAWs IMPC_ECH_010_001 | v1.1

simpleParameter

Req. Analysis: false **Req. Upload:** false **Is Annotated:** true

Unit Measured: mm

LVIDs IMPC_ECH_011_001 | v1.0

simpleParameter

Req. Analysis: false **Req. Upload:** true **Is Annotated:** true

Unit Measured: mm

LVPWs IMPC_ECH_012_001 | v1.0

simpleParameter

Req. Analysis: false **Req. Upload:** false **Is Annotated:** true

Unit Measured: mm

HR IMPC_ECH_013_001 | v1.1

simpleParameter

Req. Analysis: false **Req. Upload:** true **Is Annotated:** true

Unit Measured: bpm

Body Temp IMPC_ECH_014_001 | v1.0

simpleParameter

Req. Analysis: false **Req. Upload:** false **Is Annotated:** true

Unit Measured: C

VTI of aortic flow (Pulse wave doppler mode) IMPC_ECH_015_001 | v1.0

simpleParameter

Req. Analysis: false **Req. Upload:** false **Is Annotated:** true

Unit Measured: cm

Aortic diameter (Dao) IMPC_ECH_016_001 | v1.0

simpleParameter

Req. Analysis: false **Req. Upload:** false **Is Annotated:** true

Unit Measured: mm

Tpeak Tend Interval IMPC_ECH_017_001 | v1.0

simpleParameter

Req. Analysis: false **Req. Upload:** false **Is Annotated:** true

Unit Measured: s

Respiration Rate IMPC_ECH_018_001 | v1.0

simpleParameter

Req. Analysis: false **Req. Upload:** false **Is Annotated:** true

Unit Measured: bpm

Equipment ID IMPC_ECH_019_001 | v1.0

procedureMetadata

Req. Analysis: false **Req. Upload:** true **Is Annotated:** false

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Equipment Manufacturer IMPC_ECH_020_001 | v1.0

procedureMetadata

Req. Analysis: true **Req. Upload:** true **Is Annotated:** false

Options: VisualSonics, Philips,

Equipment Model IMPC_ECH_021_001 | v1.0

procedureMetadata

Req. Analysis: true **Req. Upload:** true **Is Annotated:** false

Options: Vevo2100, Vevo770, Sonos 4500, Sonos 5500, Vevo3100, Vevo F2,

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Anesthetic IMPC_ECH_022_001 | v1.0

procedureMetadata

Req. Analysis: true **Req. Upload:** true **Is Annotated:** false

Options: No anesthesia, Isoflurane, Avertin, Tribromoethanol,

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Experimenter ID IMPC_ECH_023_001 | v1.0

procedureMetadata

Req. Analysis: false **Req. Upload:** true **Is Annotated:** false

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Date equipment last calibrated IMPC_ECH_024_001 | v1.1

procedureMetadata

Req. Analysis: false **Req. Upload:** false **Is Annotated:** false

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M-Mode Images IMPC_ECH_025_001 | v1.2

seriesMediaParameter

Req. Analysis: false **Req. Upload:** false **Is Annotated:** false

Increments: Minimum 1