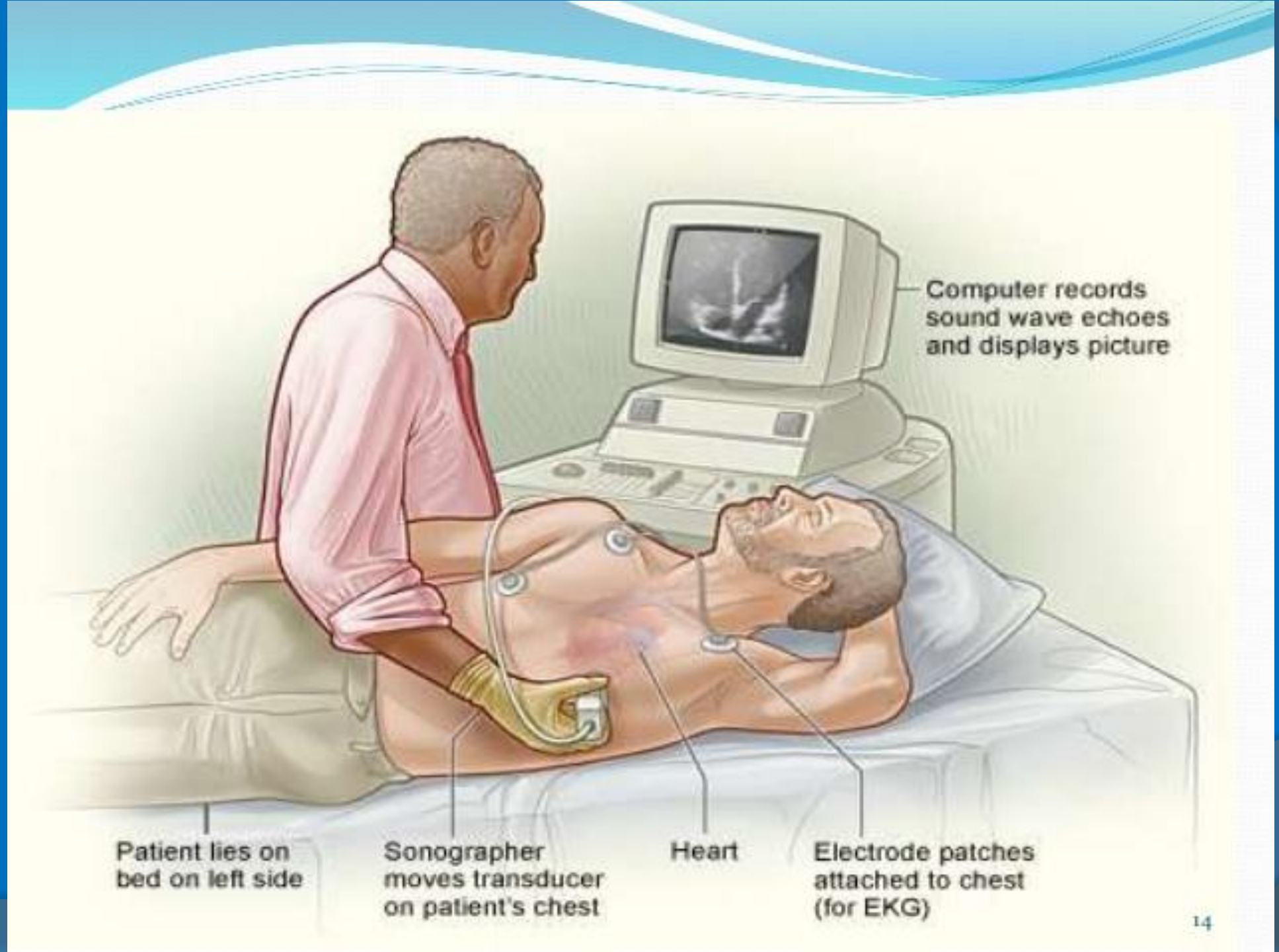
Computer records sound wave echoes and displays picture
Patient lies on bed on left side
Sonographer moves transducer on patient's chest
Heart
Electrode patches attached to chest (for EKG)
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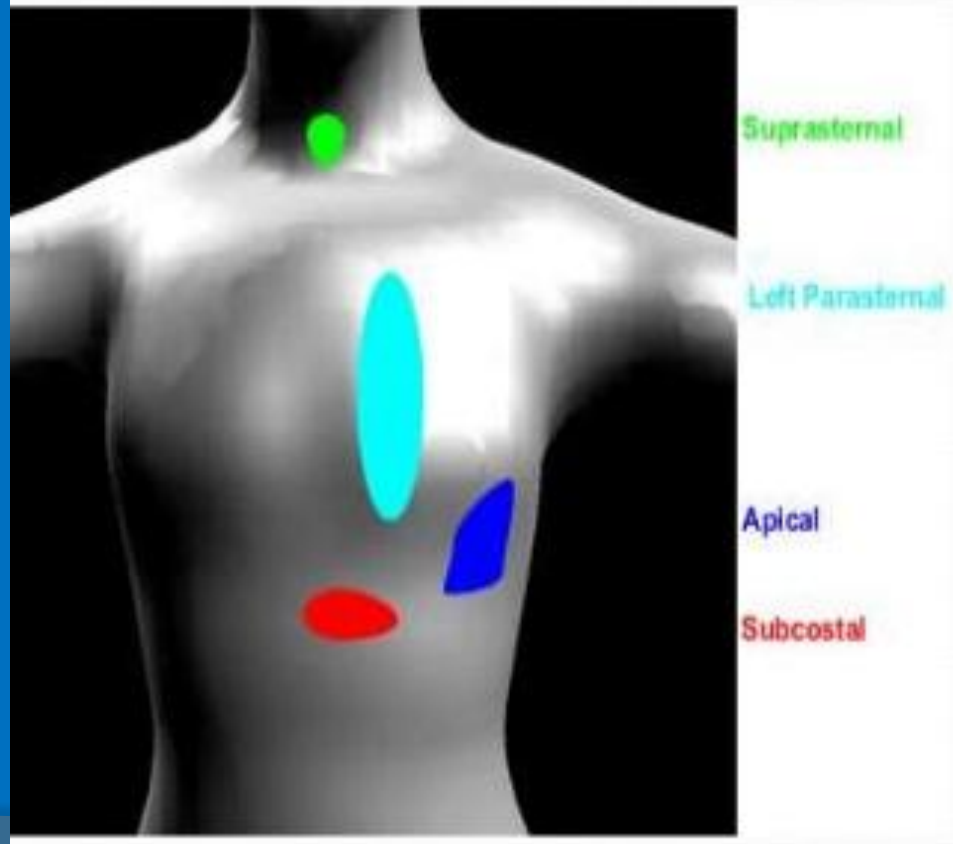
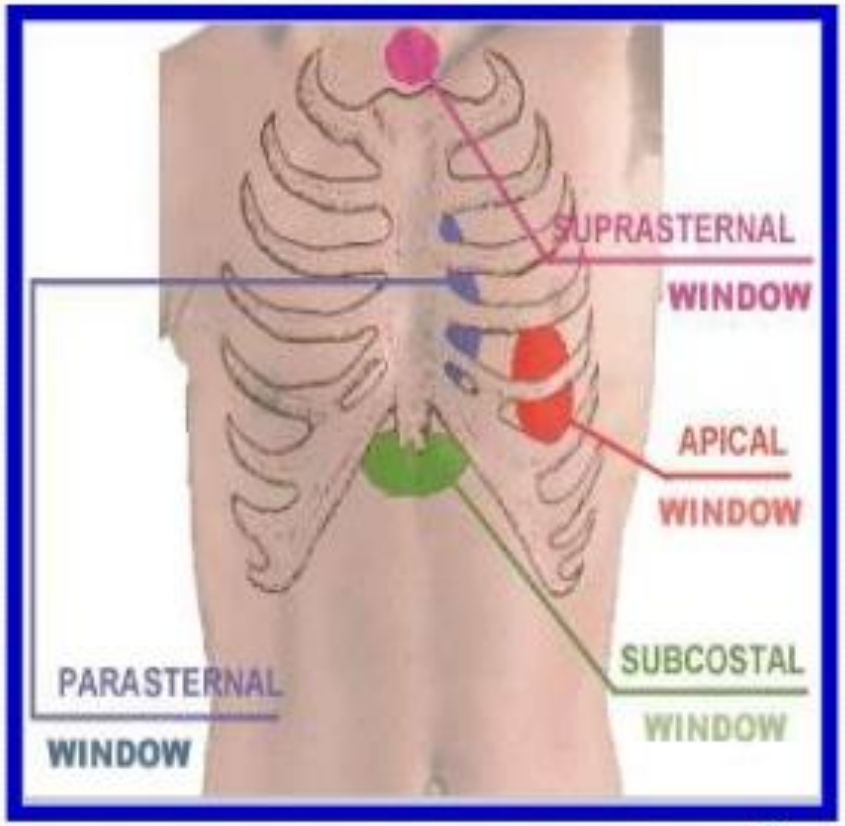
Standard positions on the chest wall are used for placement of the transducer called " echo windows"





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1.Parasternal Long-Axis View (PLAX)

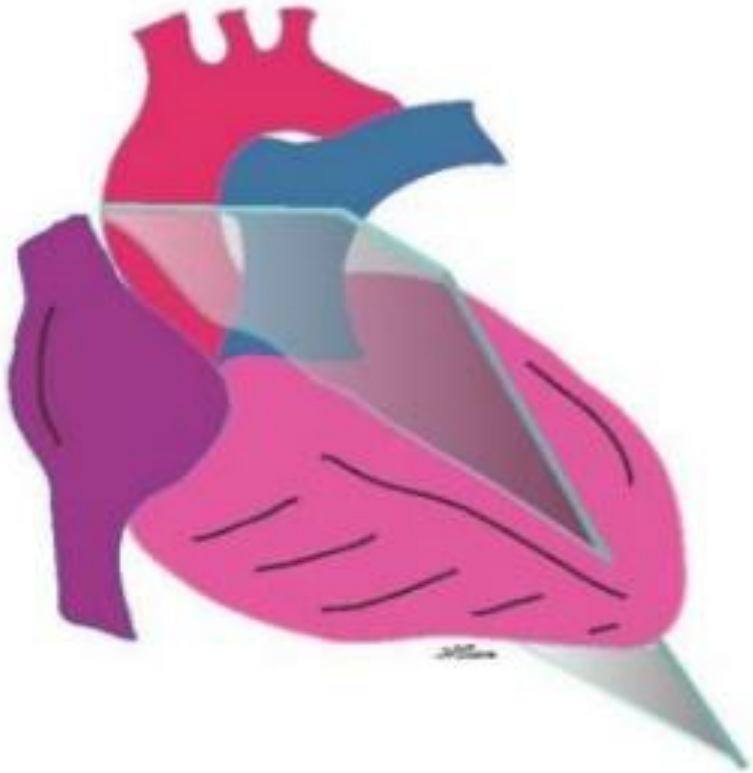
Transducer position: left sternal edge; 2^{nd} – 4^{th} intercostal space

Marker dot direction: points towards right shoulder

Most echo studies begin with this view

It sets the stage for subsequent echo views

Many structures seen from this view



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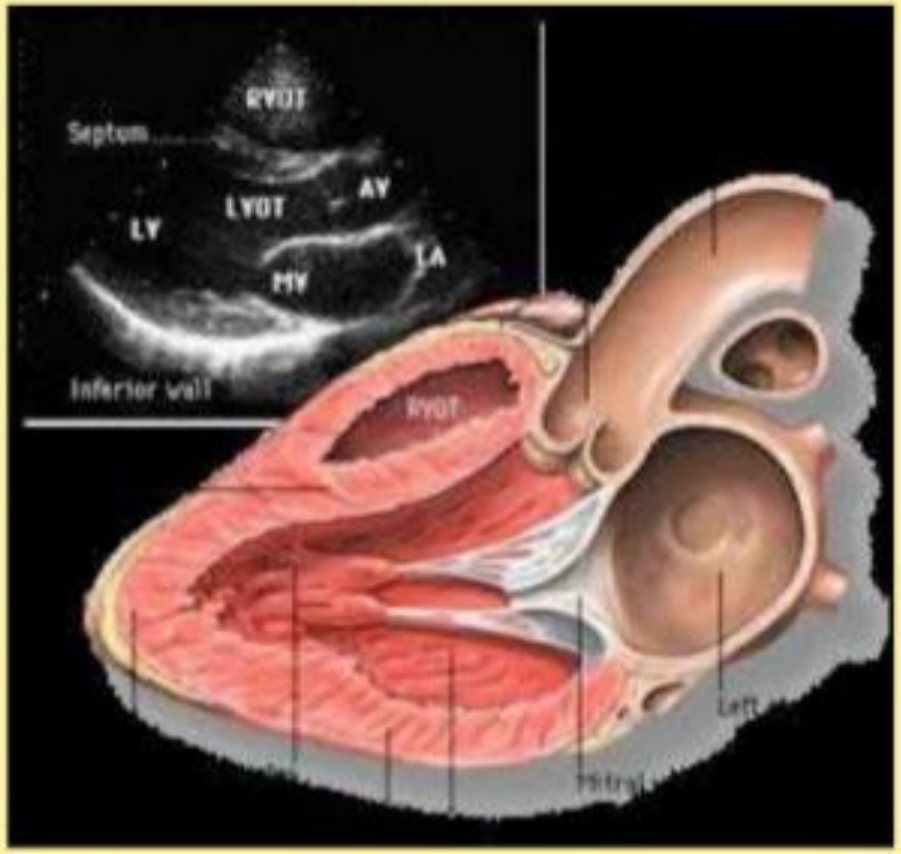
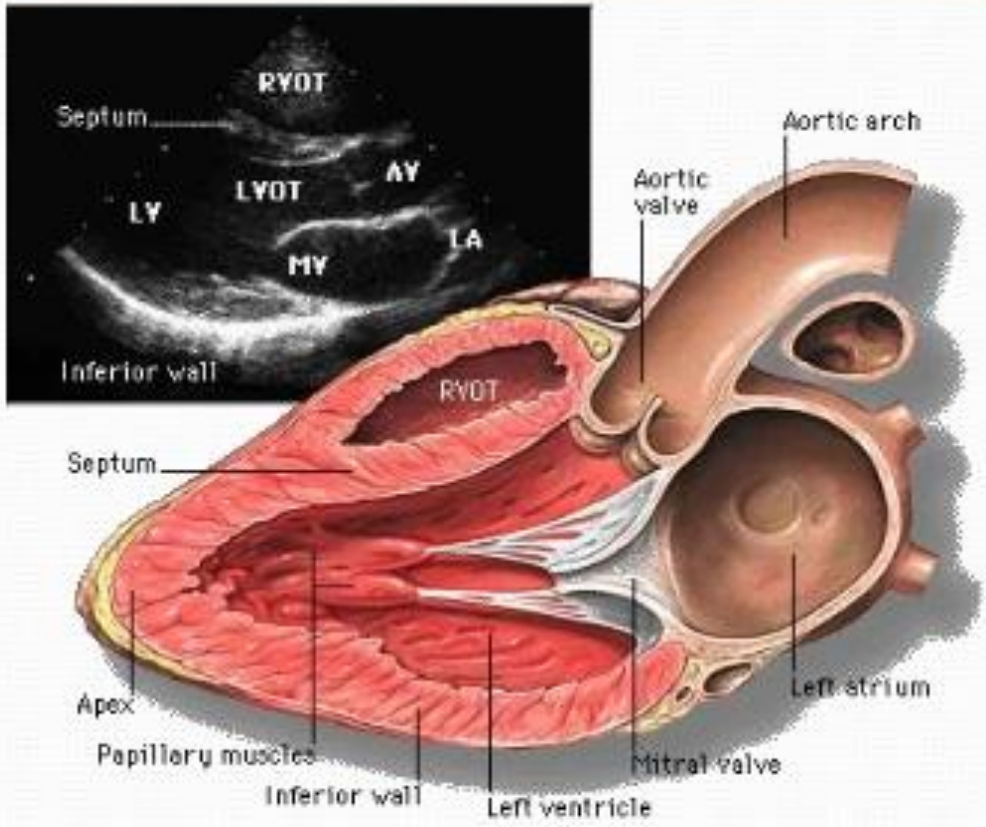
Parasternal Long Axis View (PLAX)



* marker orientated towards the right clavicle (approximately 11 o'clock)

PARASTERNAL LONG AXIS VIEW

Structure	Assessment
RV (right ventricle)	Size and function
LV (left ventricle)	Size and function **(septum)**
Ao (ascending aorta)	Size
AV (aortic valve)	Motion, opening and calcification
MV (mitral valve)	Motion, opening and calcification
Pericardium	Fluids



Parasternal Short Axis View (PSAX)

Transducer position: left sternal edge; $2^{nd} – 4^{th}$ intercostal space

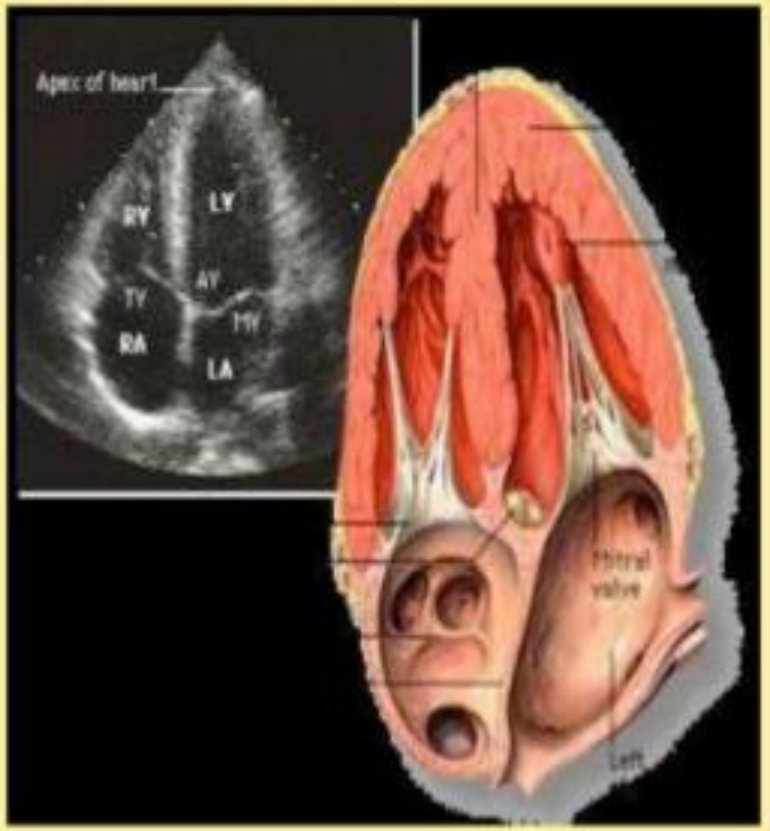
Marker dot direction: points towards left shoulder(90^0 clockwise from PLAX view)

By tilting transducer on an axis between the left hip and right shoulder, short axis views are obtained at different levels, from the aorta to the LV apex.

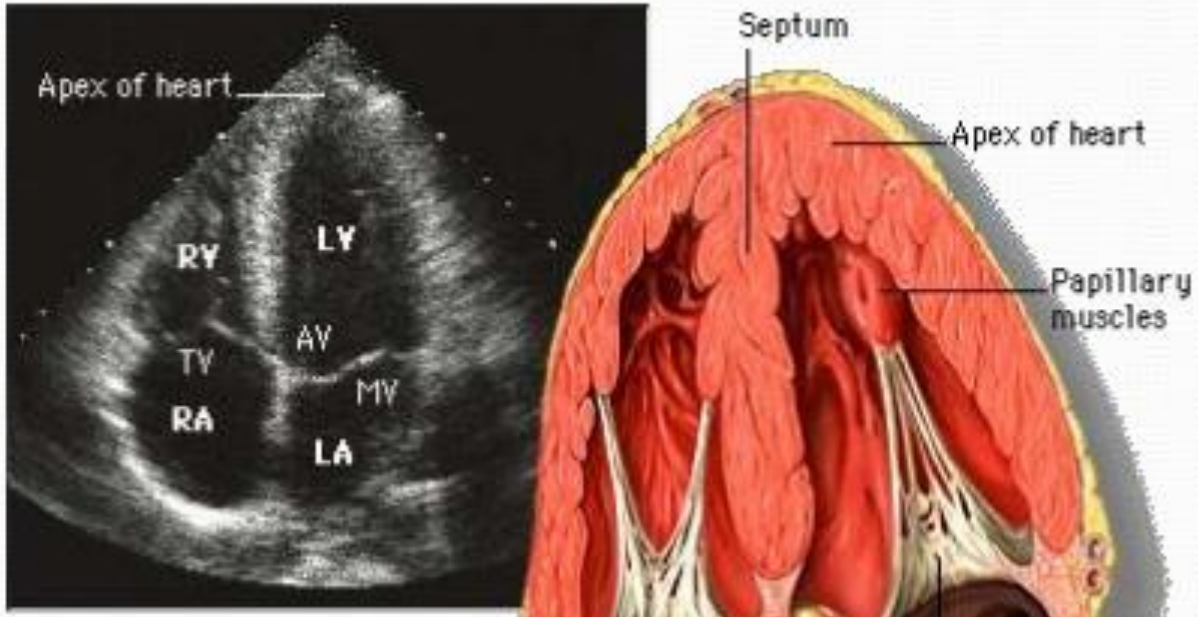
Many structures seen

Apical Four Chamber View (A4C)

* marker is at around 3 o'clock.



Apical 4-Chamber View (AP4CH)



Apical 2-Chamber View (AP2CH)

Transducer position: apex of the heart

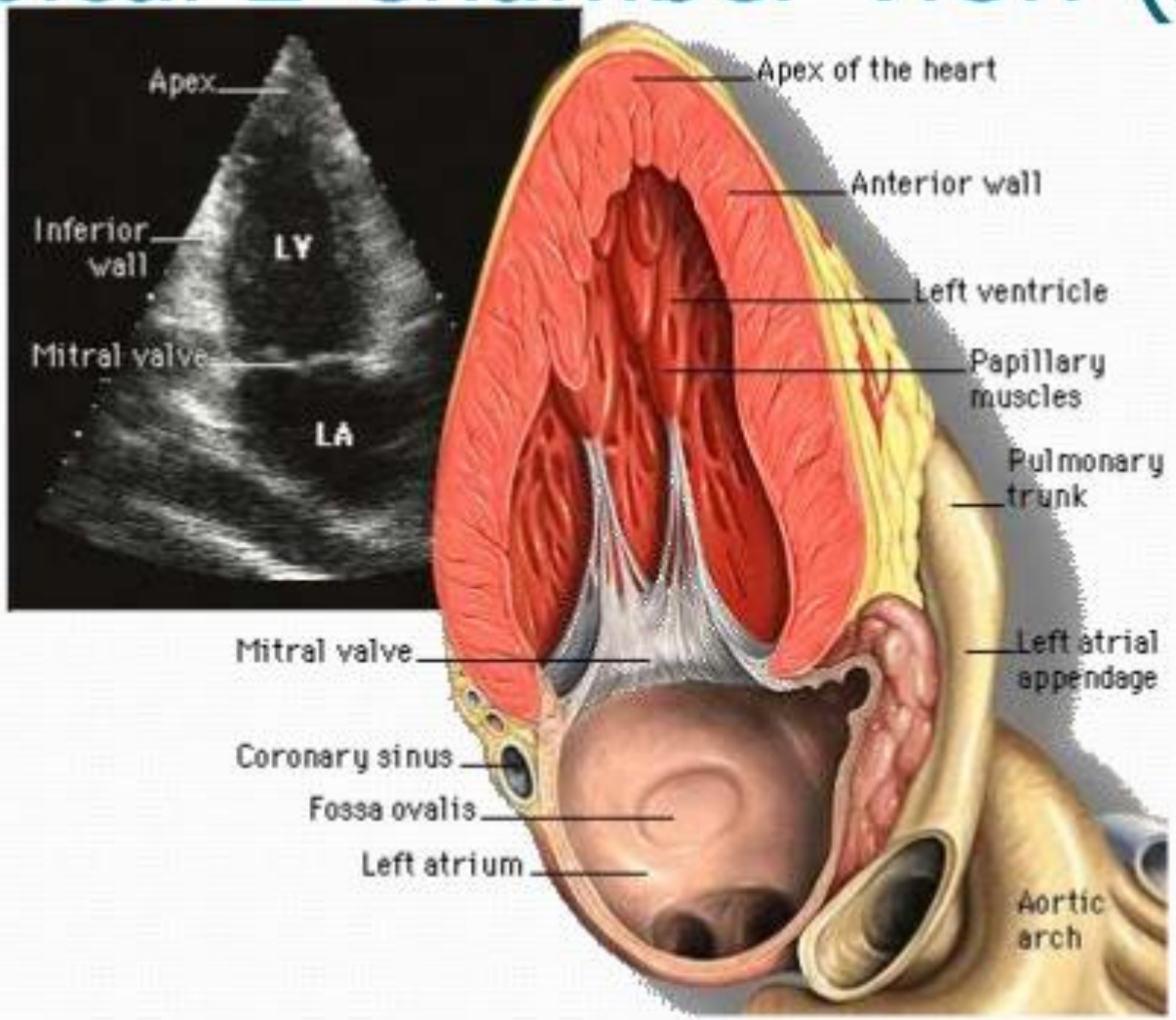
Marker dot direction: points towards left side of neck (45^0 anticlockwise from AP4CH view)

Good for assessment of

LV anterior wall

LV inferior wall

Apical 2-Chamber View (AP2CH)



3. Sub–Costal 4 Chamber View(SC4CH)

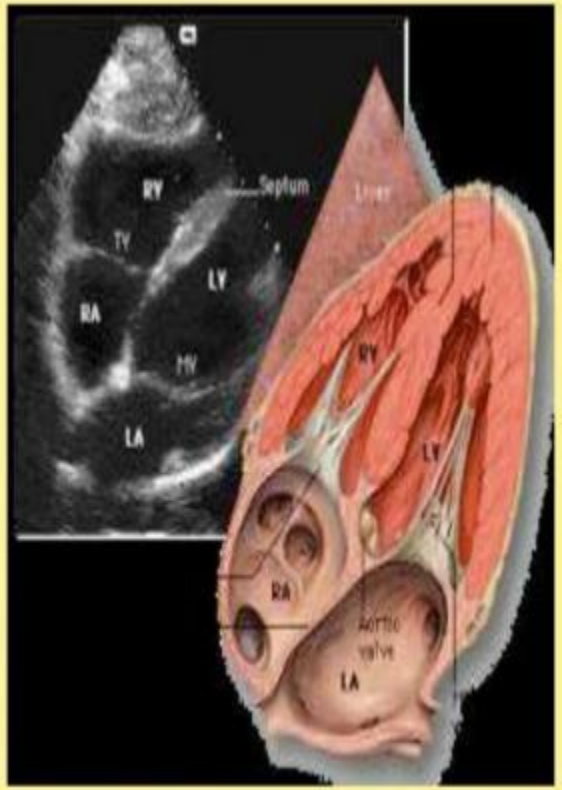
Transducer position: under the xiphisternum

Marker dot position: points towards left shoulder

The subject lies supine with head slightly low (no pillow). With feet on the bed, the knees are slightly elevated

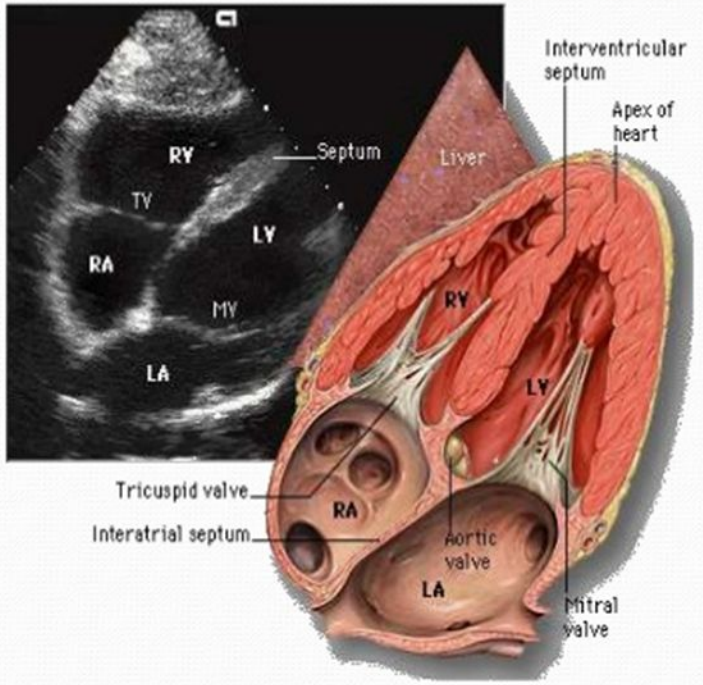
Better images are obtained with the abdomen relaxed and during inspiration

Interatrial septum, pericardial effusion, desc abdominal aorta



* Transducer in Right sub xiphiod area & side marker in 3 o'clock position

Sub–Costal 4 Chamber View(SC4CH)



Assessment :

1. Pericardial space
2. RV
3. Septum
4. MV annulus
5. LV
6. IVC

4.Suprasternal View

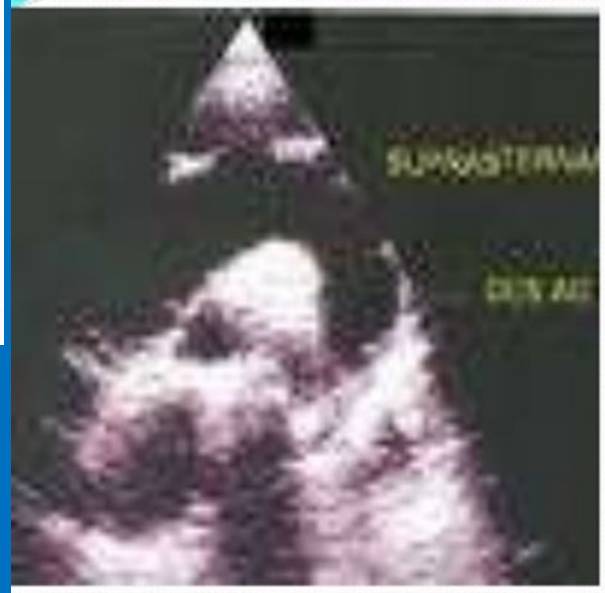
Transducer position: suprasternal notch

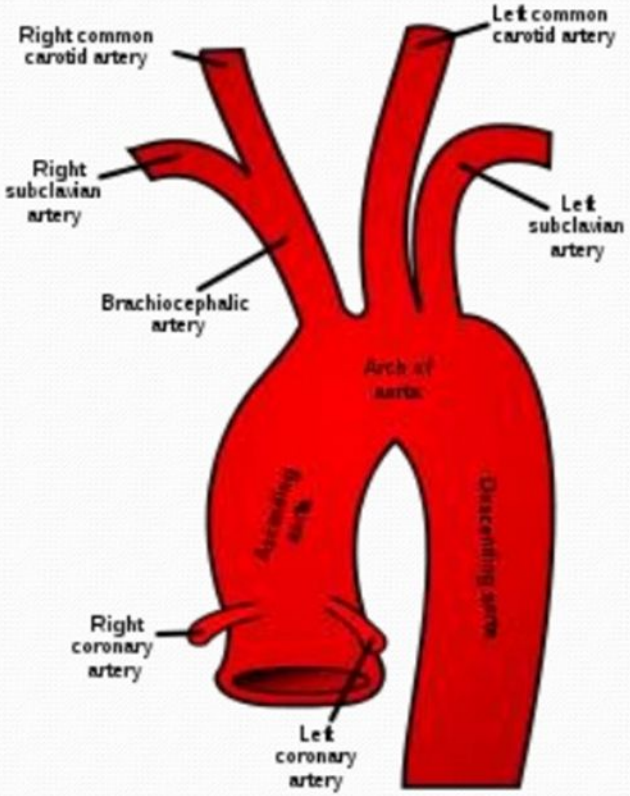
Marker dot direction: points towards left jaw

The subject lies supine with the neck hyperexrended. The head is rotated slightly towards the left

The position of arms or legs and the phase of respiration have no bearing on this echo window

Arch of aorta





The Modalities of Echo

The following modalities of echo are used clinically:

1. Conventional echo
   Two-Dimensional echo (2-D echo)
   Motion- mode echo (M-mode echo)

2. Doppler Echo
   Continuous wave (CW) Doppler
   Pulsed wave (PW) Doppler
   Colour flow(CF) Doppler

All modalities follow the same principle of ultrasound
Differ in how reflected sound waves are collected and analysed

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1. Two-Dimensional Echo (2-D echo)

This technique is used to "see" the actual structures and motion of the heart structures at work.

Ultrasound is transmitted along several scan lines(90-120), over a wide arc(about 90^0) and many times per second.

The combination of reflected ultrasound signals builds up an image on the display screen.

A 2-D echo view appears cone shaped on the monitor.

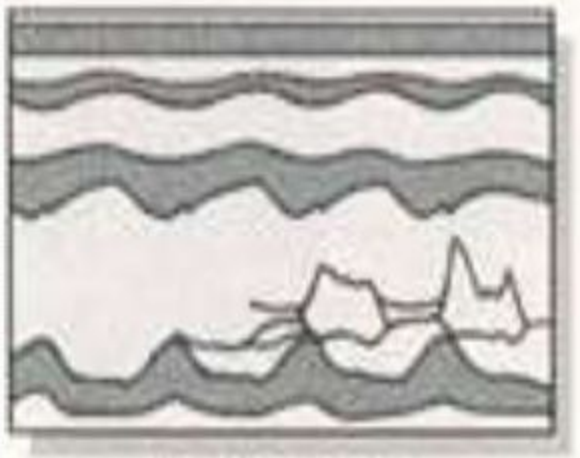
2-D Echo

2. M-Mode echocardiography

An M- mode echocardiogram is not a "picture" of the heart, but rather a diagram that shows how the positions of its structures change during the course of the cardiac cycle.

M-mode recordings permit measurement of cardiac dimensions and motion patterns.

Also facilitate analysis of time relationships with other physiological variables such as ECG, and heart sounds.



M-mode Echo

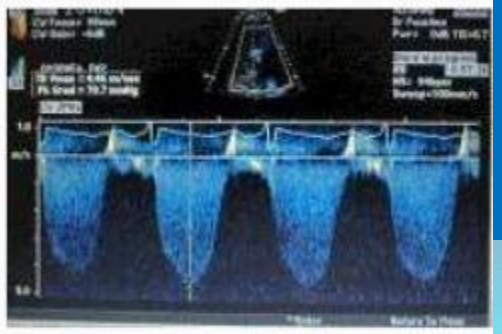
3. Doppler echocardiography

Doppler echocardiography is a method for detecting the direction and velocity of moving blood within the heart.

Pulsed Wave (PW) useful for low velocity flow e.g. MV flow

Continuous Wave (CW) useful for high velocity flow e.g aortic stenosis

Color Flow (CF) Different colors are used to designate the direction of blood flow. red is flow toward, and blue is flow away from the transducer with turbulent flow shown as a mosaic pattern.



DOPPLER ECHOCARDIOGRAPHY

- The different colors indicate the direction of blood flow:
  - **Red** toward the transducer
  - **Blue** away from the transducer
  - **Green** superimposed when there is turbulent flow.

Blue Away **Red** Towards (BART)