

心臟應用解剖學 Applied Cardiac Anatomy

洪瑞松 教授

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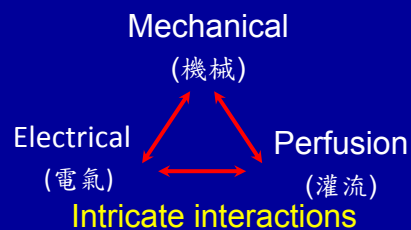
[1] 心臟應用解剖學

在種種心臟病，要認清與瞭解其結構上及功能上的狀態，首先就要對心臟解剖學有基本的認識。

心臟結構由三種系統組成：

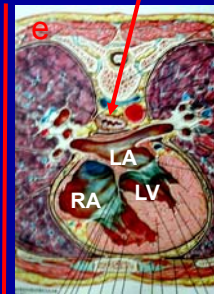
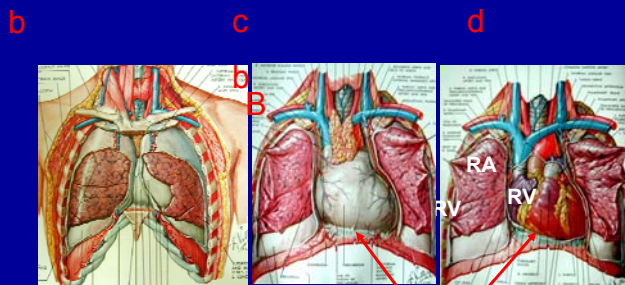
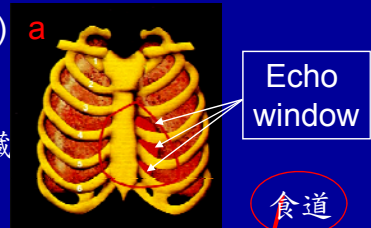
- 1) 機械系統(主要為心肌及瓣膜)
- 2) 電氣系統
- 3) 冠狀動脈灌流系統

心臟功能則由此三系統相互協調運作



心臟位於前、中中膈腔 (mediastinum)
稍偏左側、橫膈膜上方、及食道前方

胸腔前壁移開後，可見心臟雙側為肺臟
包夾，而前方亦有部份為肺臟覆蓋



正面圖

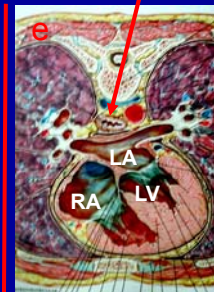
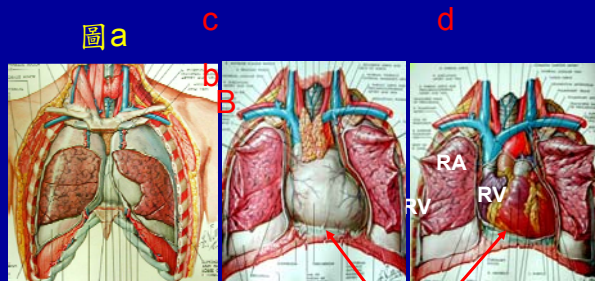
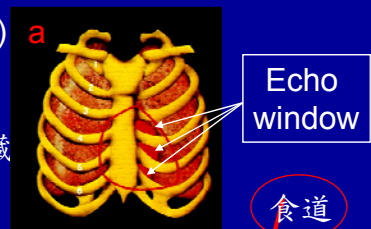
橫膈膜

橫切面圖

LA = left atrium; LV = left ventricle; RA = right atrium; RV = right ventricle

心臟位於前、中中膈腔 (mediastinum)
稍偏左側、橫膈膜上方、及食道前方

胸腔前壁移開後，可見心臟雙側為肺臟
包夾，而前方亦有部份為肺臟覆蓋(圖a)



正面圖

橫膈膜

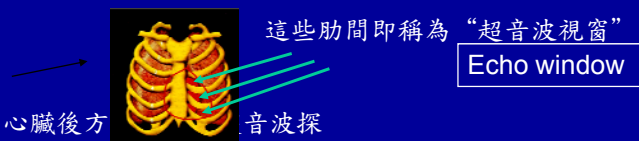
橫切面圖

LA = left atrium; LV = left ventricle; RA = right atrium; RV = right ventricle

機械系統 大體解剖

心臟真正結構無法目視，但可以經由影像技術間接檢視。這些影像技術包括X光檢查、超音波檢查以及較特殊之電腦斷層掃描及核磁共振造影。

X光檢查簡便，但超音波檢查則因為空氣與骨骼會干擾超音波束傳送，經由胸前做心臟超音波檢查（胸前心臟超音波檢查）必須把超探頭置放於心尖或胸骨左側的第3、4、5肋間。



因為食道緊鄰心臟後方

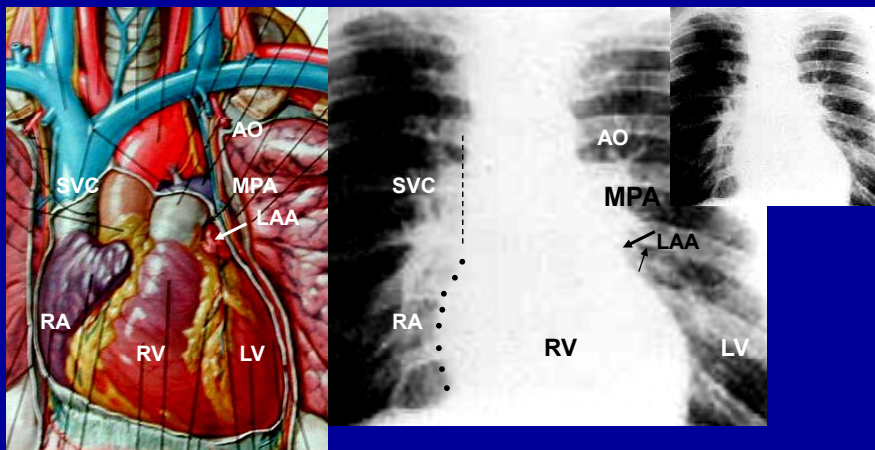
頭置入食道做心臟超音波檢查(經食道心臟超音波檢查)

超音波束傳送即不受干擾(圖2e)。

雖然無法直接目視心臟，但經物理學檢查觀察心臟動態亦可以對一些心臟結構做間接的評估（參考理學檢查）。

圖3

PA Chest X-ray



LA = left atrium; LAA = left atrial appendage; LV = left ventricle; MPA = main pulmonary artery; RA = right atrium; RV = right ventricle; SVC = superior vena cava

圖4

心臟解剖學取向—
長軸(Long-axis) 與短軸(Short-axis)

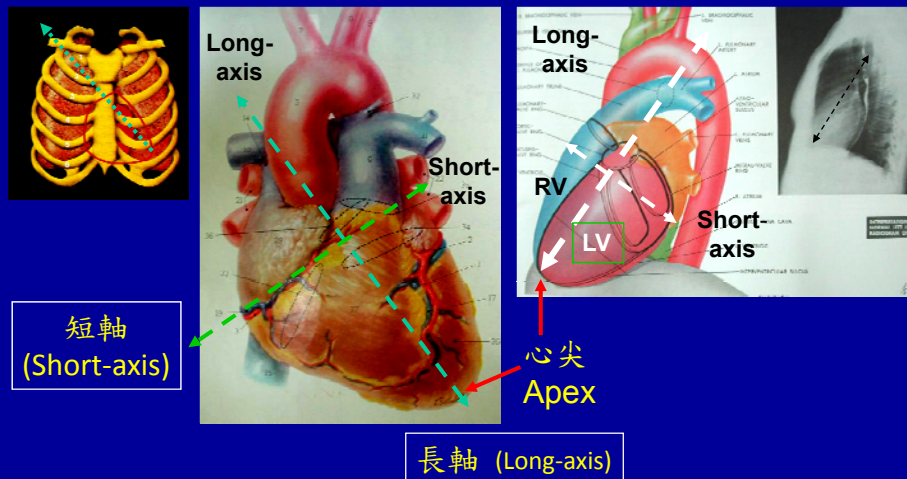
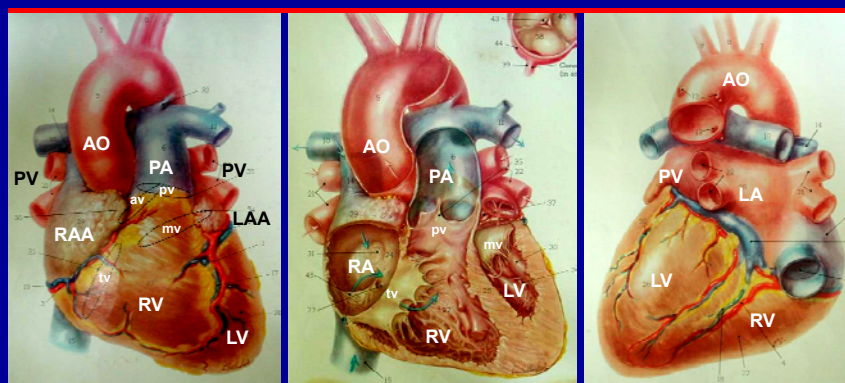


圖5

心臟腔室與瓣膜相關位置
Relative Anatomic Relationship



RA (right, anterior, caudal); LA (left, posterior, cephalid)
 RV (right, anterior); LV (left, posterior)
 PV (left, anterior, cephalid); AV (right, posterior, caudal)

圖6

Short-axis Plane – Cardiac Valves

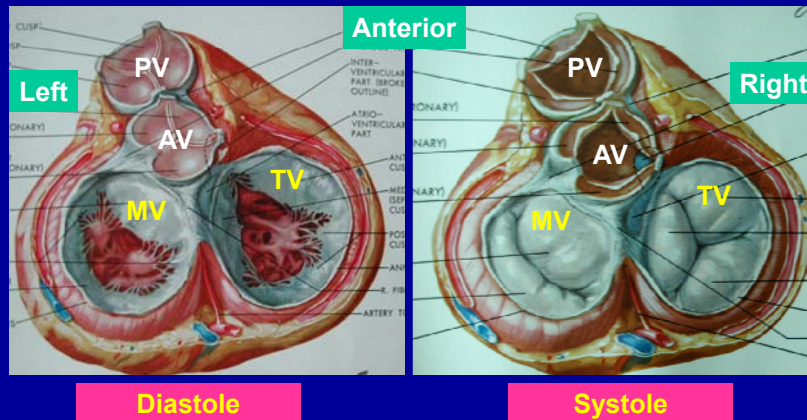
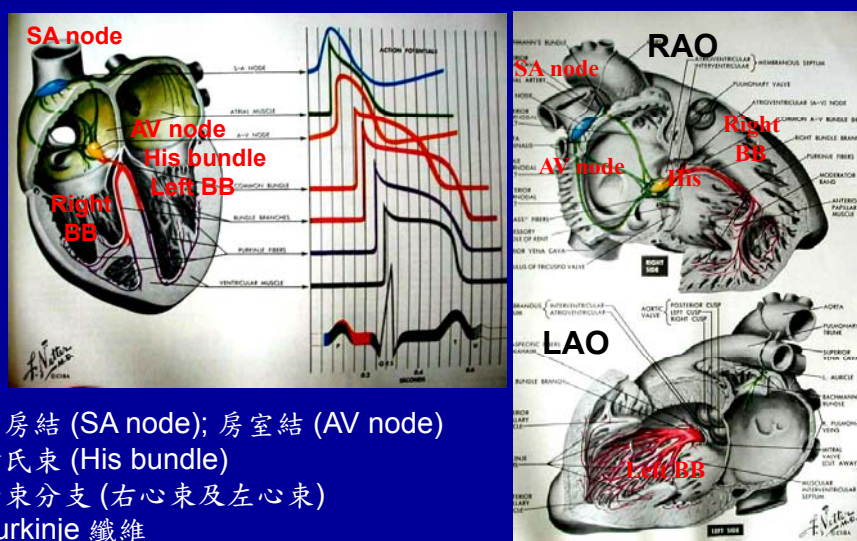


圖7

電氣系統-傳導系統 (Conduction System)



竇房結 (SA node); 房室結 (AV node)
 希氏束 (His bundle)
 心束分支 (右心束及左心束)
 Purkinje 纖維

圖8

傳導系統

- 竇房結 (SA node) 位於上腔靜脈與右心房交界之處。
- 心房與心室間由環狀纖維組織隔間，使得心臟電波脈衝無法隨意傳導，因此，正常之下電波由心房傳到心室唯一的路徑是經由房室結 (AV node)
- 電波傳導經過房室結時有 0.12~0.20 秒的延遲，之後電波脈衝便以很快的速度經過希氏束 (His bundle)、心束分支 (右心束及左心束) 及 Purkinje 纖維，傳導到右心室與左心室心肌，激發心室收縮。

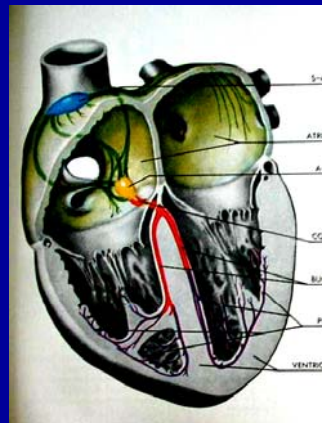


圖9

心電圖

心房去極化方向
從右上方向下
與第II導程方向大致相符

P波 –
導程I、II、aVF為正，
導程aVR及aVL為負，

右心房去極化在左心房之前
導程V1-2的P波一般為雙向

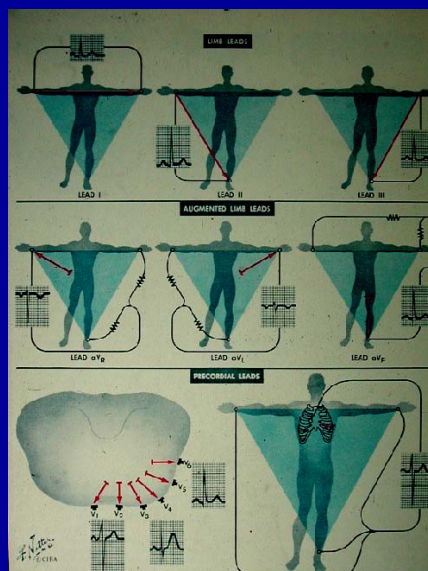
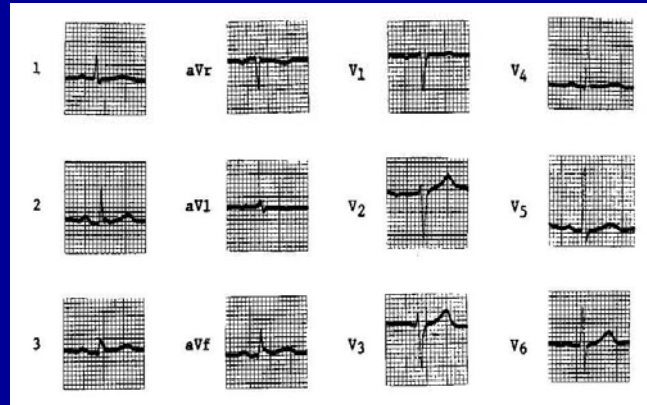


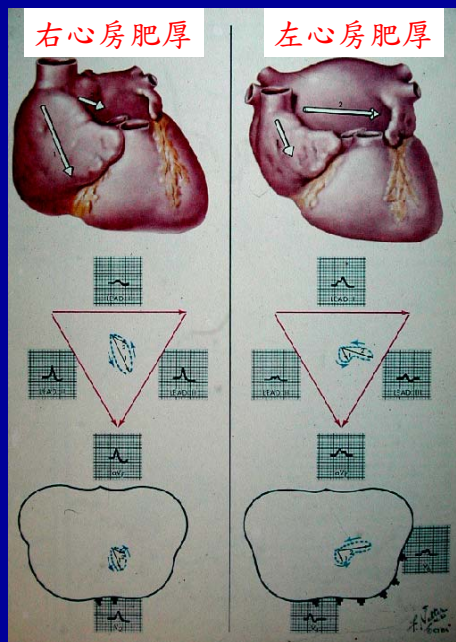
圖10

Normal ECG



- 心室的去極化由心室中隔開始，由左向右
- 心室去極化是左心室及右心室幾乎同時發生，因為較肥厚的左心室在去極化電位佔優勢，因此QRS波主向量指向左側及後方

圖11



Normal ECG

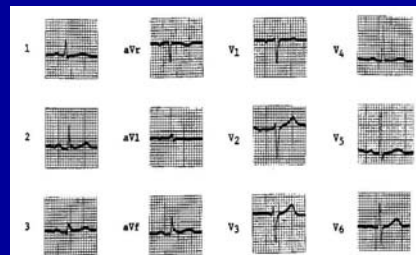
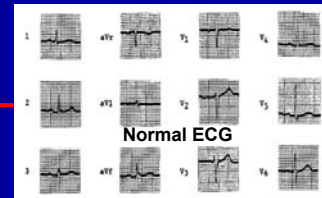
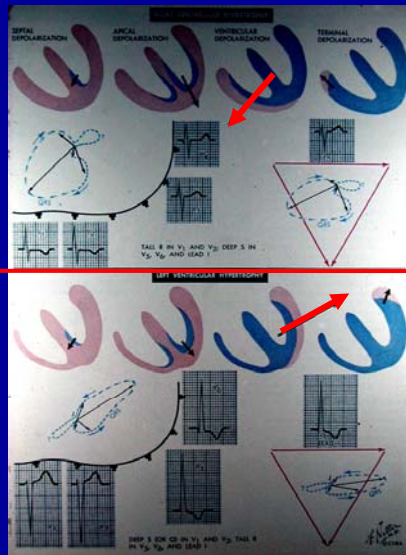
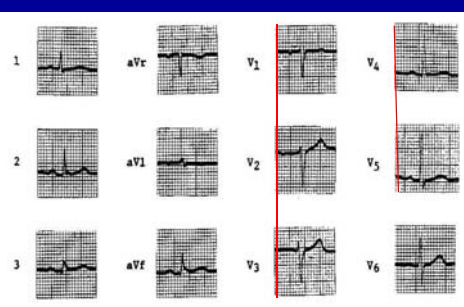
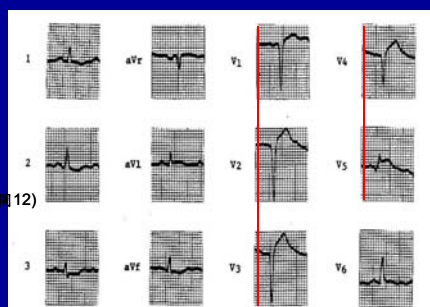


圖11 右心室肥厚(Right ventricular hypertrophy, RVH)



左心室肥厚(Left ventricular hypertrophy, LVH)

圖12 Anterior Myocardial Infarction (前壁心肌梗塞)



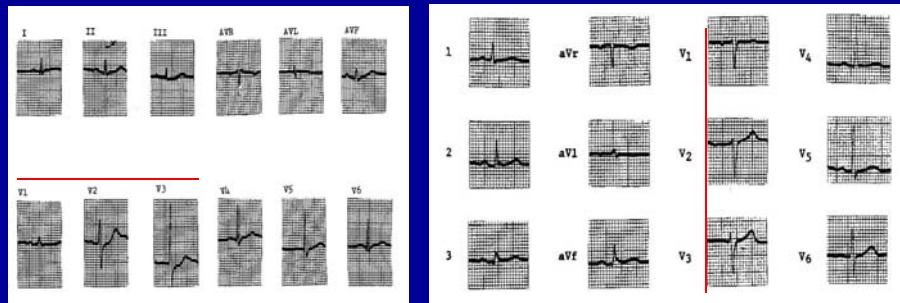
Anterior MI

Normal

在前壁心肌梗塞時，前方的電位力量會減弱，

因此在導程V1、V2、V3、r波消失而出現q波

圖 13



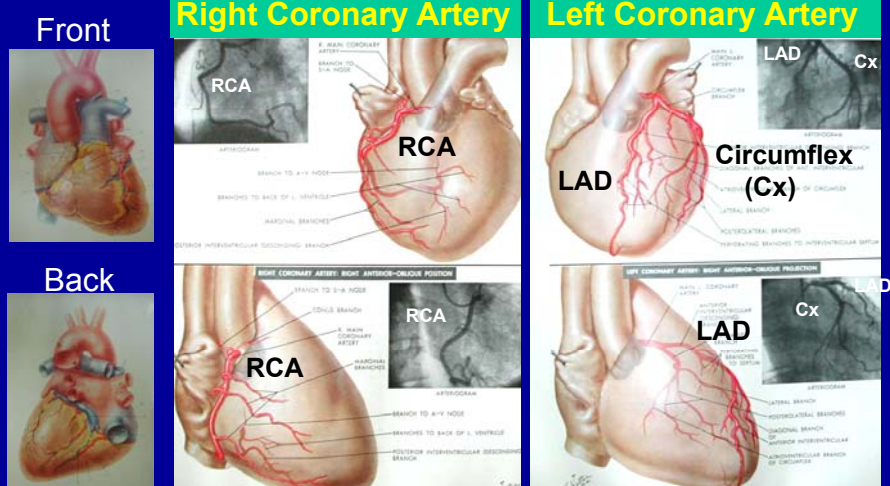
Posterior Myocardial Infarction (後壁心肌梗塞)

Normal ECG

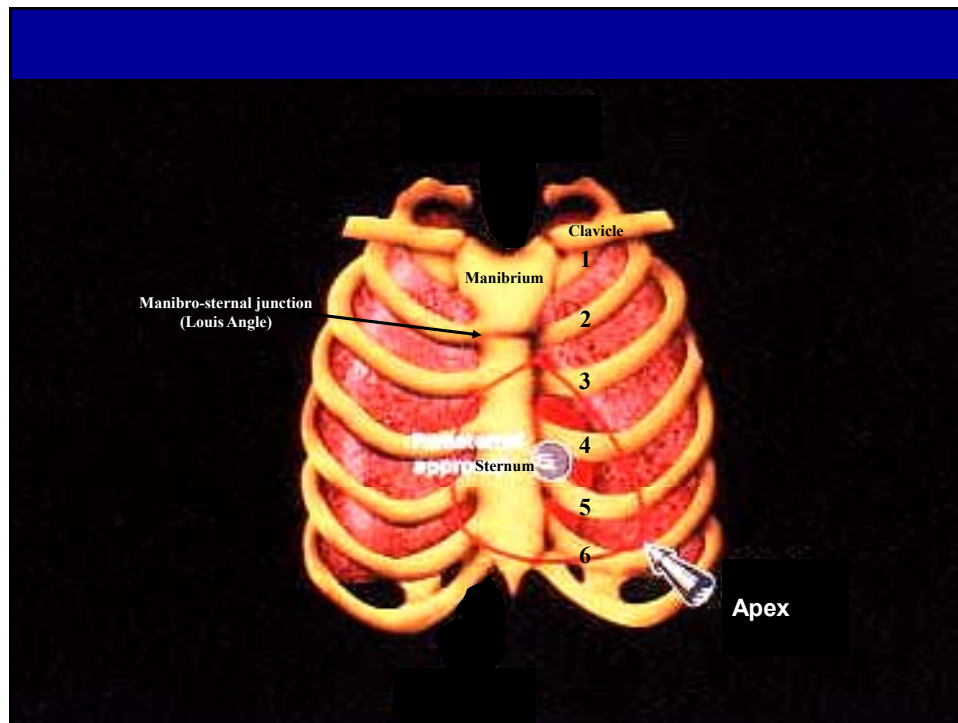
在後壁心肌梗塞，因為向後方力量減弱，往前力量相對增強，使得右前胸導程V1-3的R波增強(類似右心室肥厚，但在後者往前力量則為絕對性增加)

圖 14

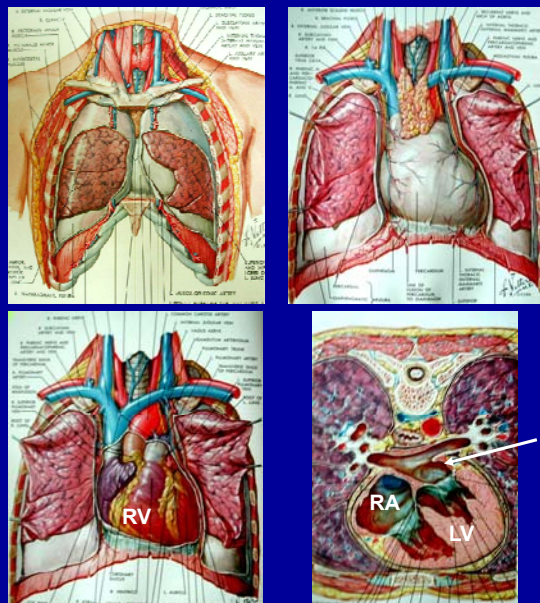
Coronary Arteries

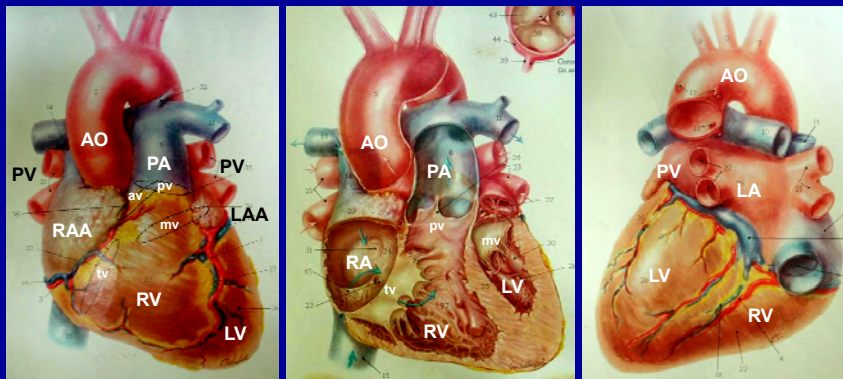


LAD = left anterior descending artery; RCA = right coronary artery



Mediastinum





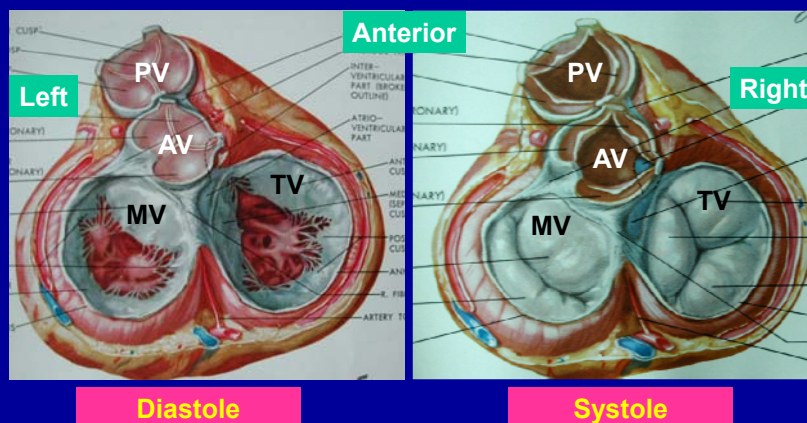
Relative Anatomic Relationship

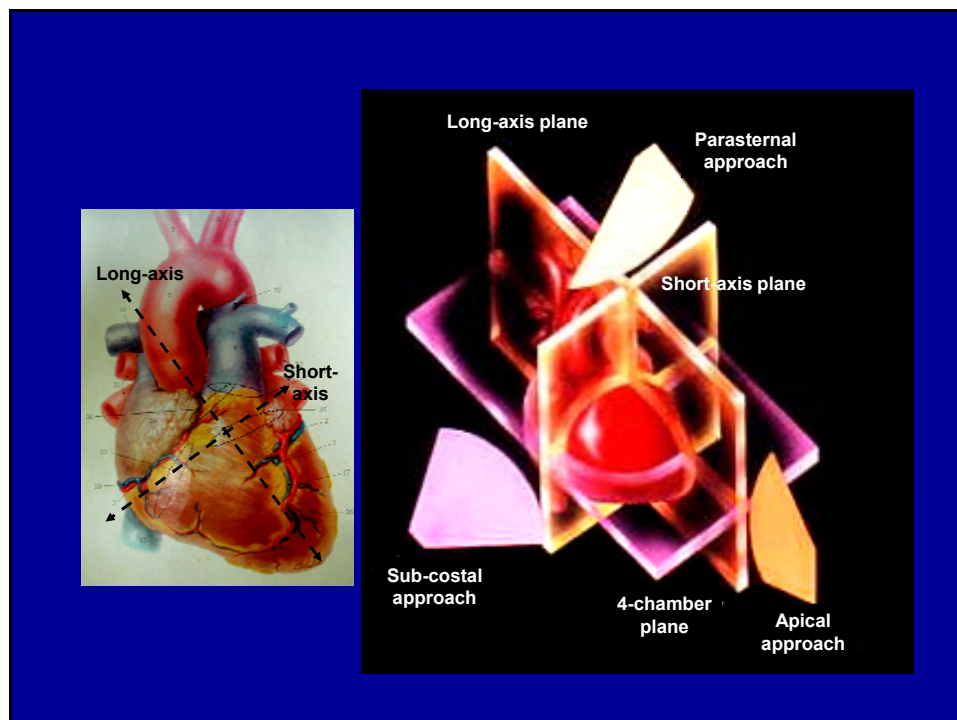
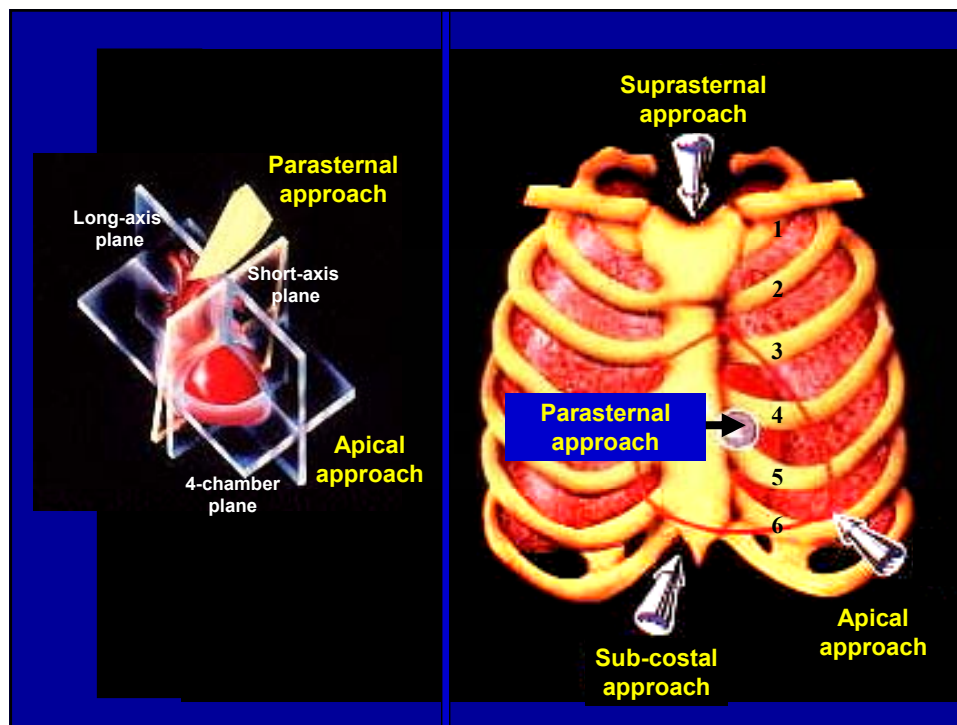
RA (right, anterior, caudal); LA (left, posterior, cephalid)

RV (right, anterior); LV (left, posterior)

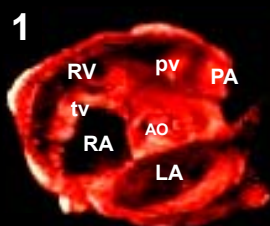
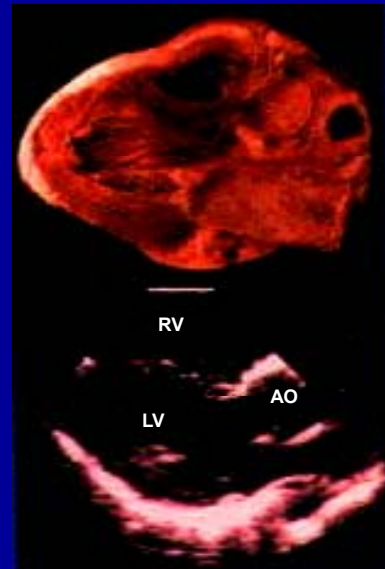
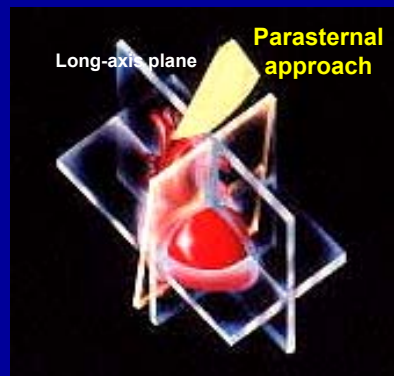
PV (left, anterior, cephalid); AV (right, posterior, caudal)

Short-axis Plane – Cardiac Valves

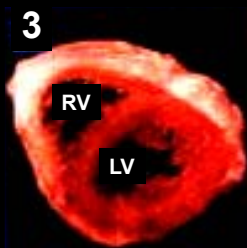




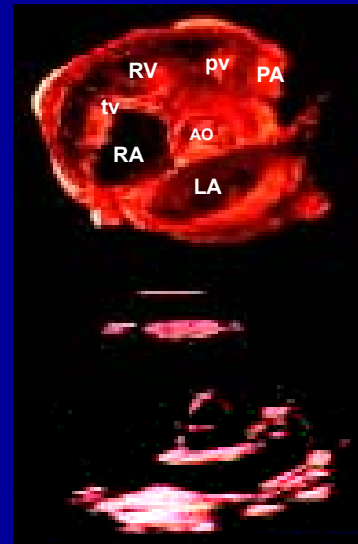
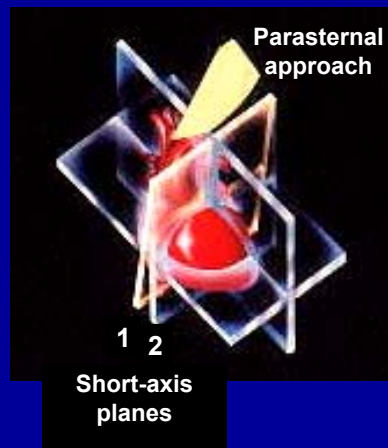
Parasternal Long-axis View



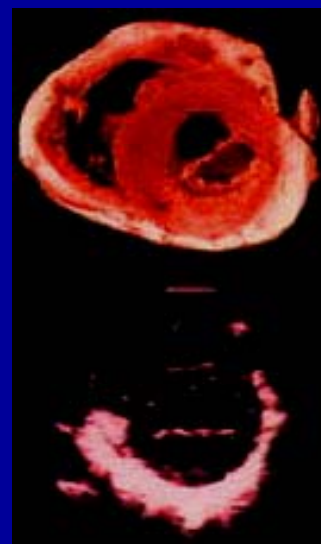
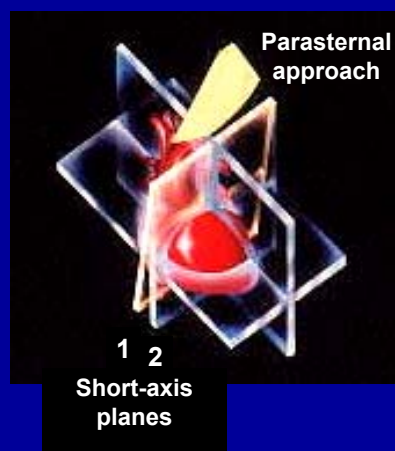
Parasternal Short-axis Views



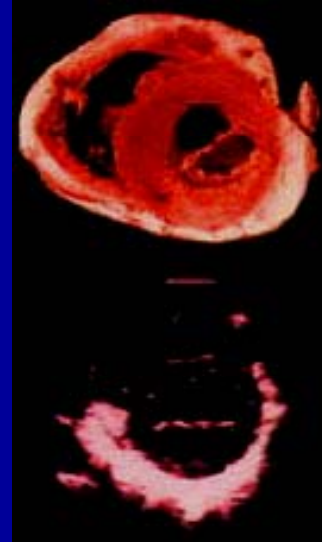
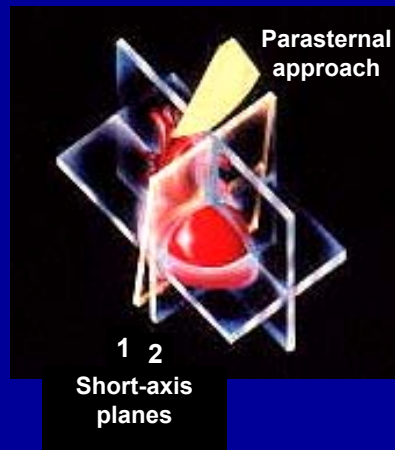
Parasternal Short-axis View (1)



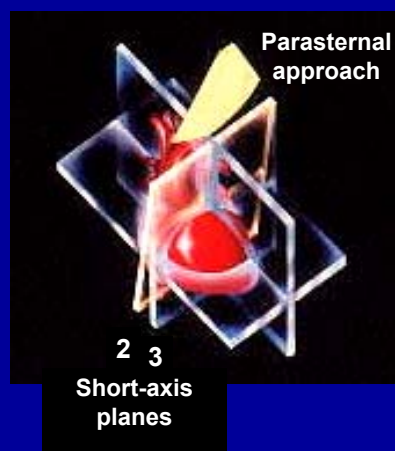
Parasternal Short-axis View (2)

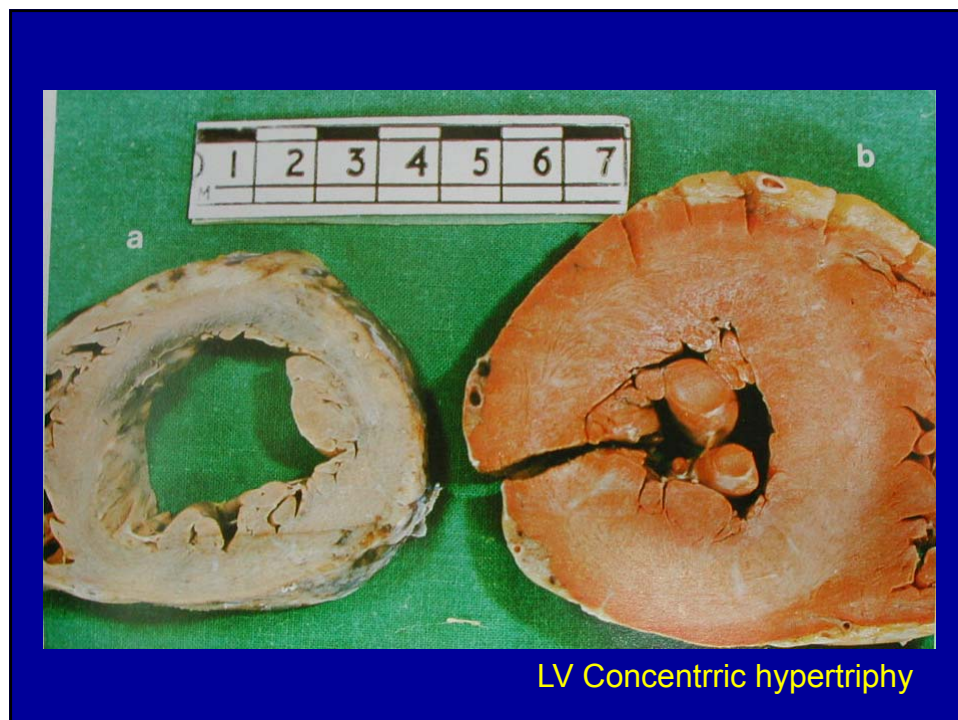
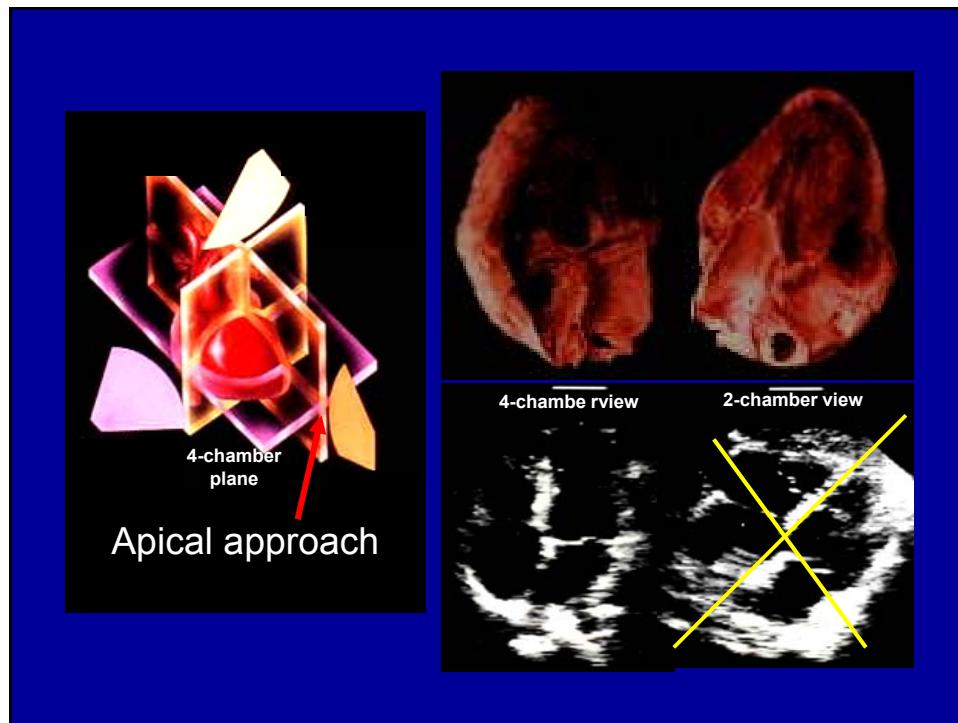


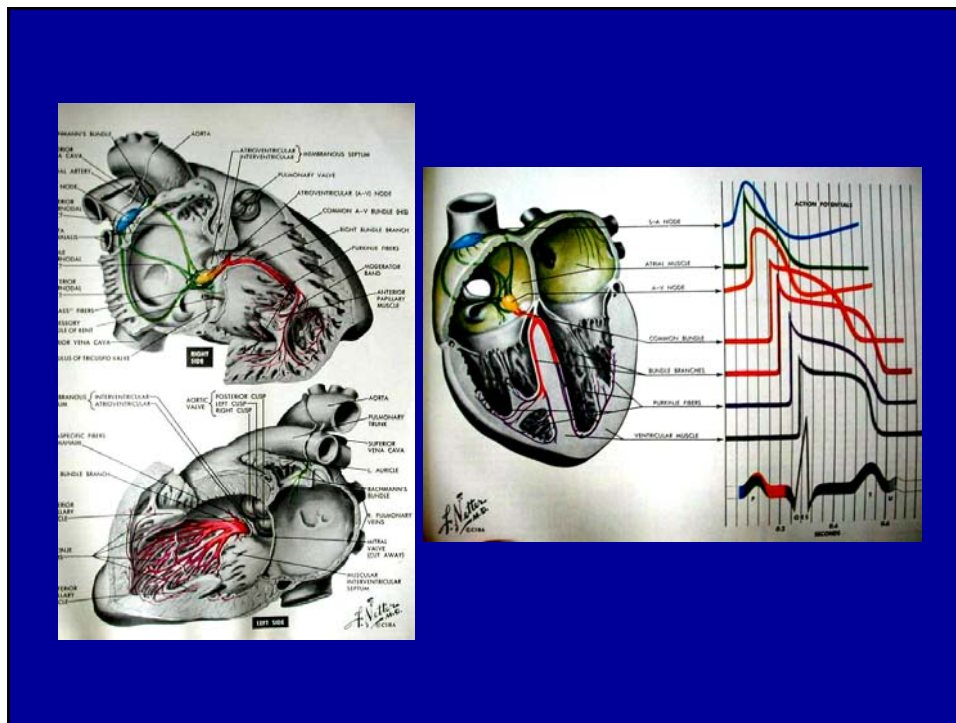
Parasternal Short-axis View (2)



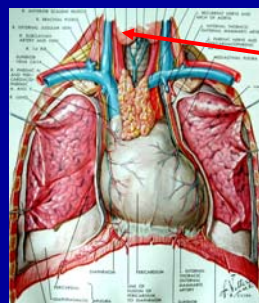
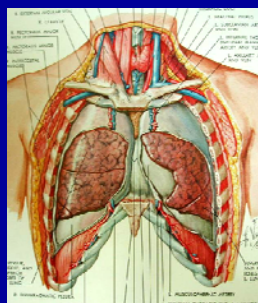
Parasternal Short-axis View (3)







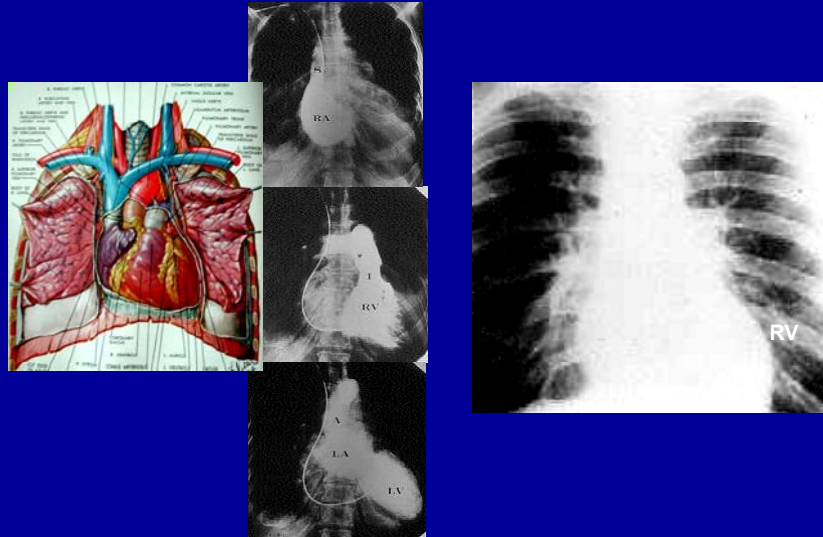
心包膜 (Pericardium)



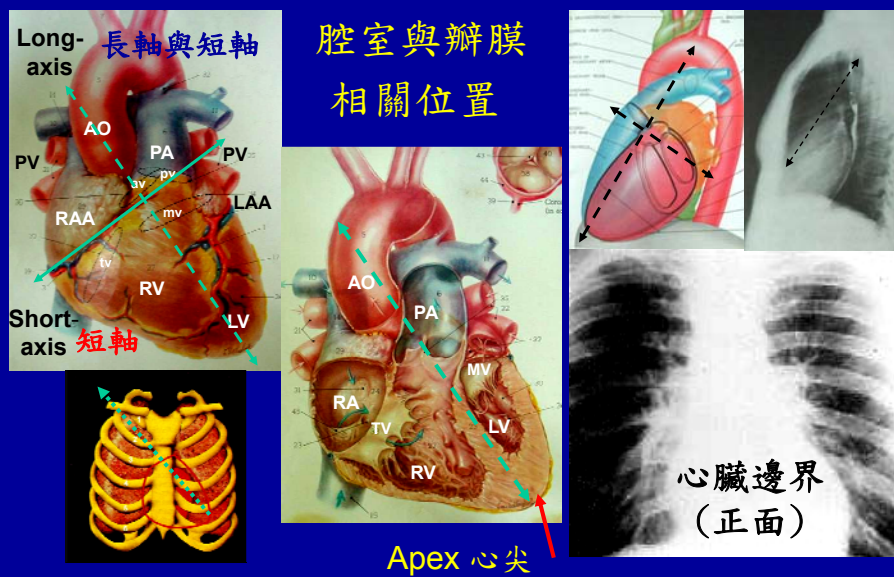
體壁心包膜(parietal pericardium) - 反折
 內臟心包膜 (visceral pericardium或epicardium)
 心包膜腔(pericardial cavity) - 內正常含少量液體。
 心包膜腔積 (pericardial effusion) - 心包膜炎或血液
 心包膜填塞(pericardial tamponade) - 低血壓或休克

圖3

PA Chest X-ray

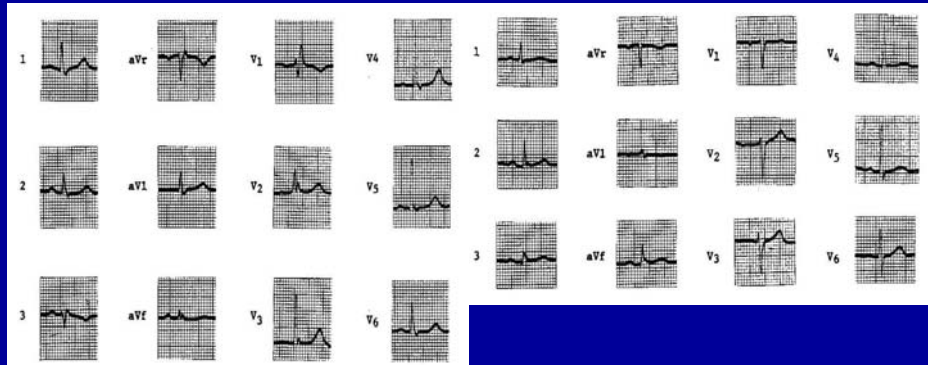


心臟解剖學取向- 長軸與短軸



RBBB (Right Bundle Branch Block)

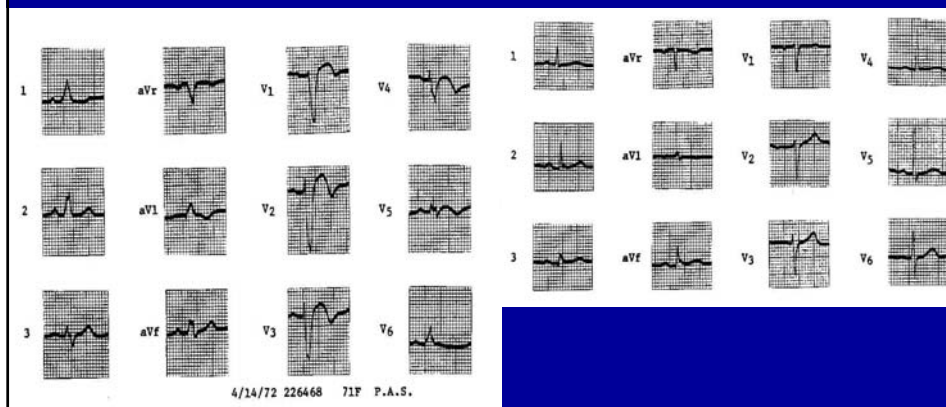
Normal ECG



Widened QRS

LBBB (Left Bundle Branch Block)

Normal ECG



Widened QRS