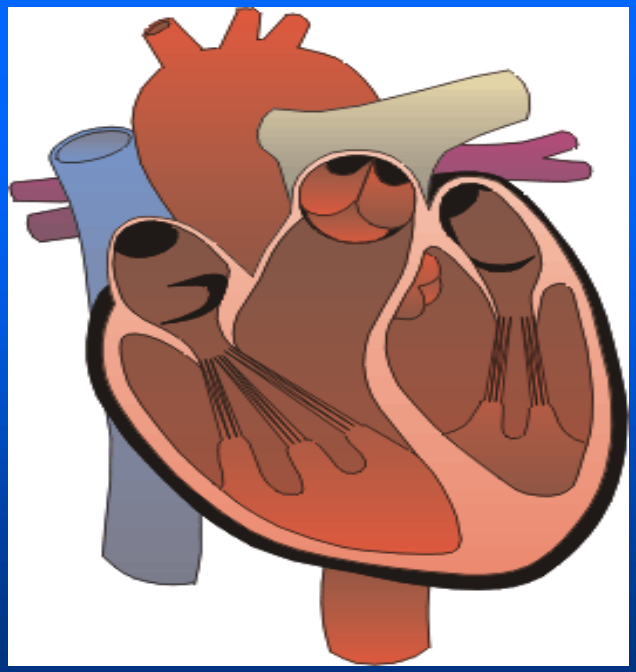
Examination methods in cardiology

L.Křivan



History

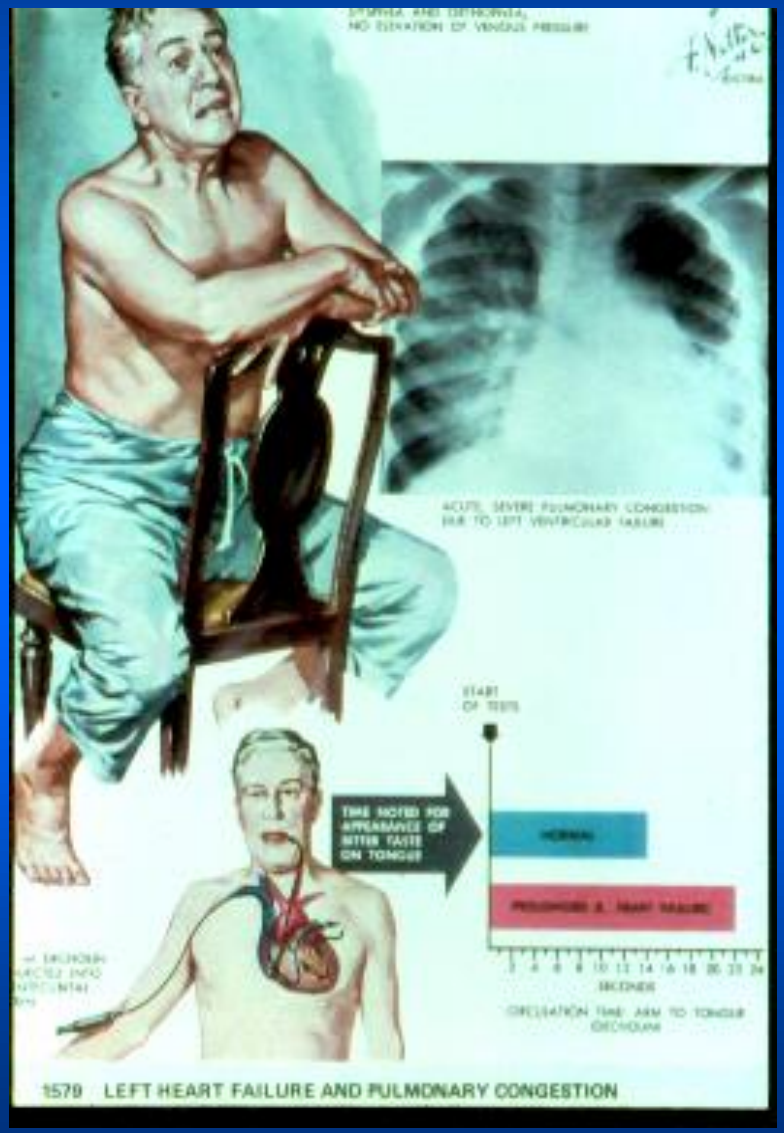
- Heart disease in patient´s history
- Family history
- Risk factors (gender, age, smoking, cholesterol, diabetes)
- Physical performance
- Syncope
- Arrhythmias
- Medication

General inspection of the patient

- **Cyanosis**

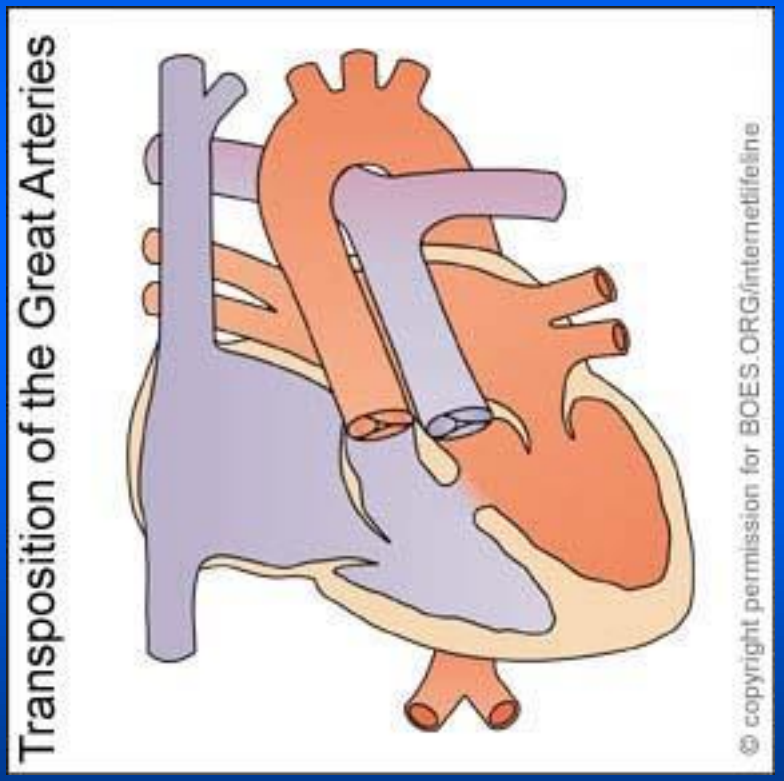
Reduced hemoglobin in capillary blood > 50g/l

General inspection of the patient

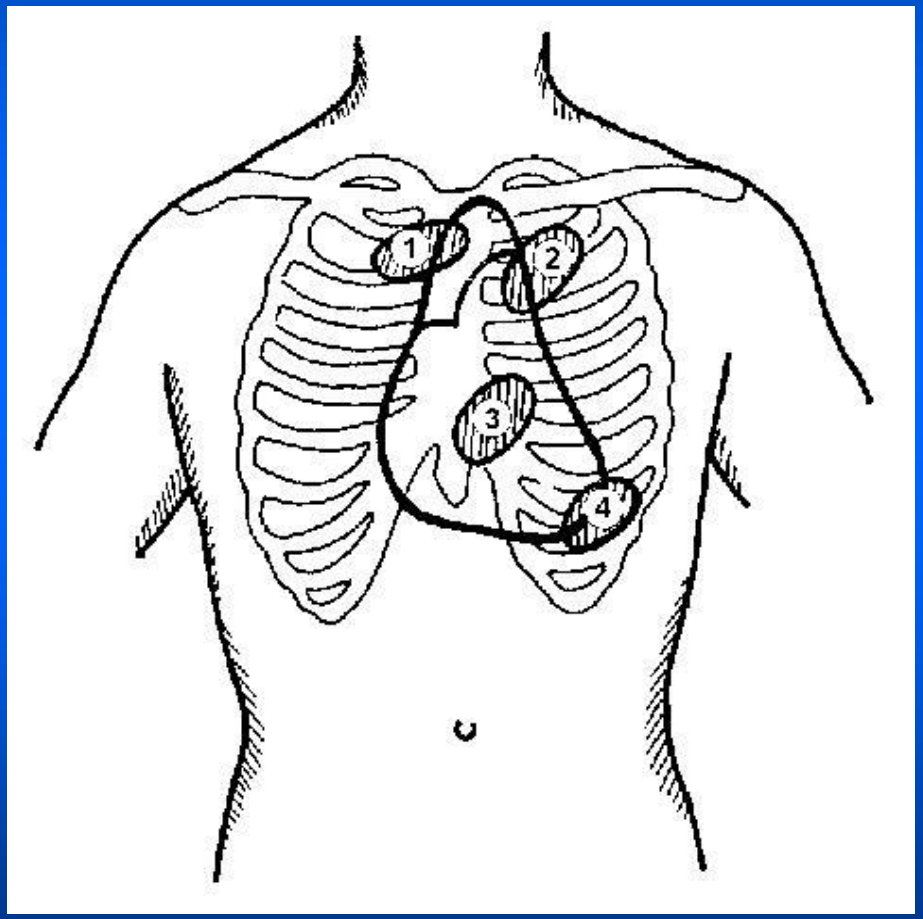


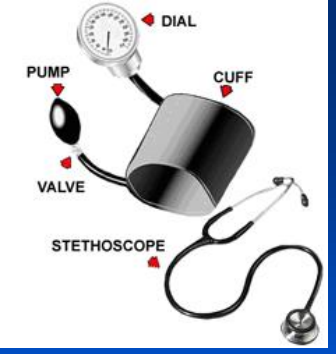
General inspection of the patient

General inspection of the patient

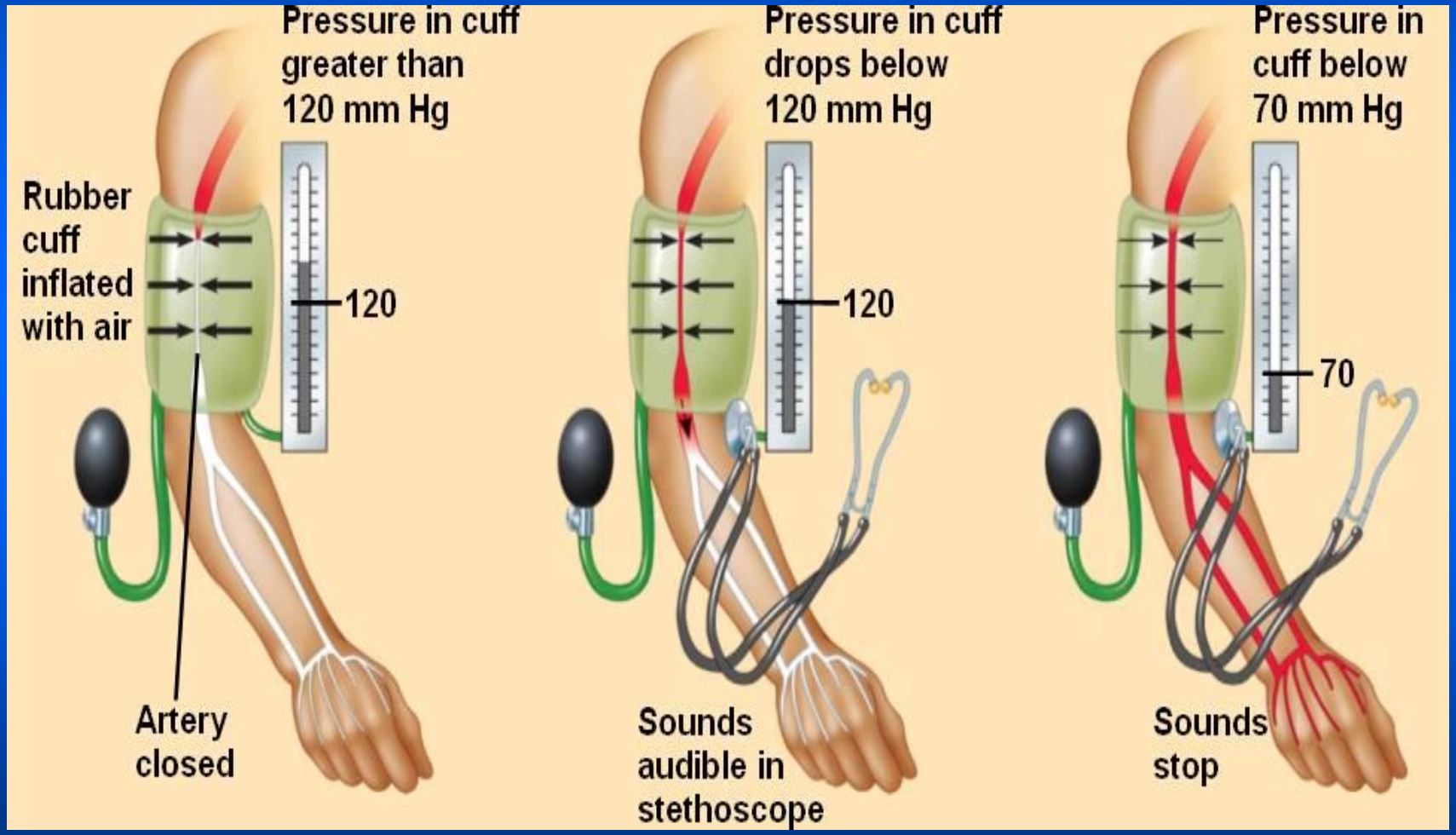


Auscultation of the heart





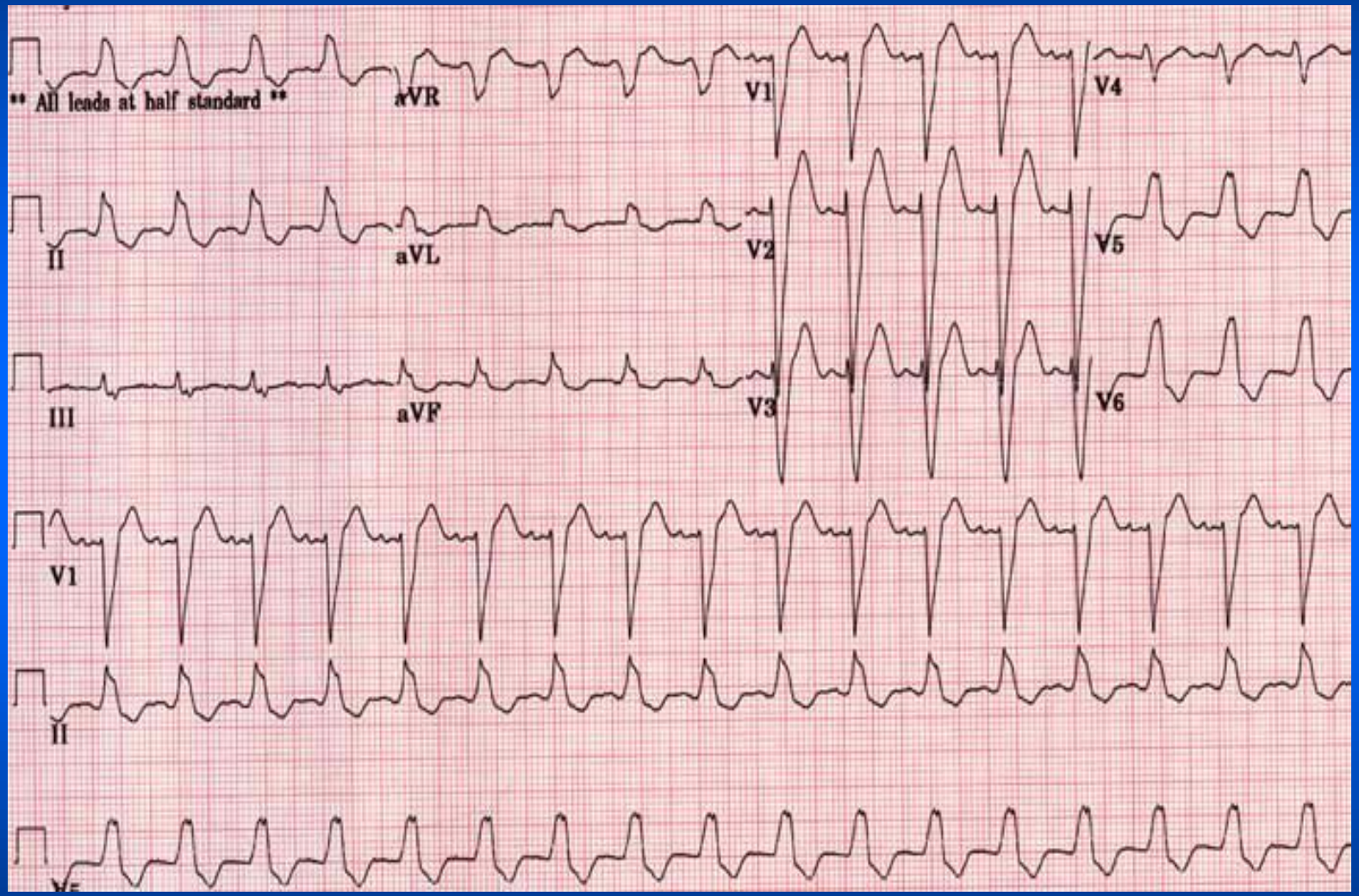
Blood pressure



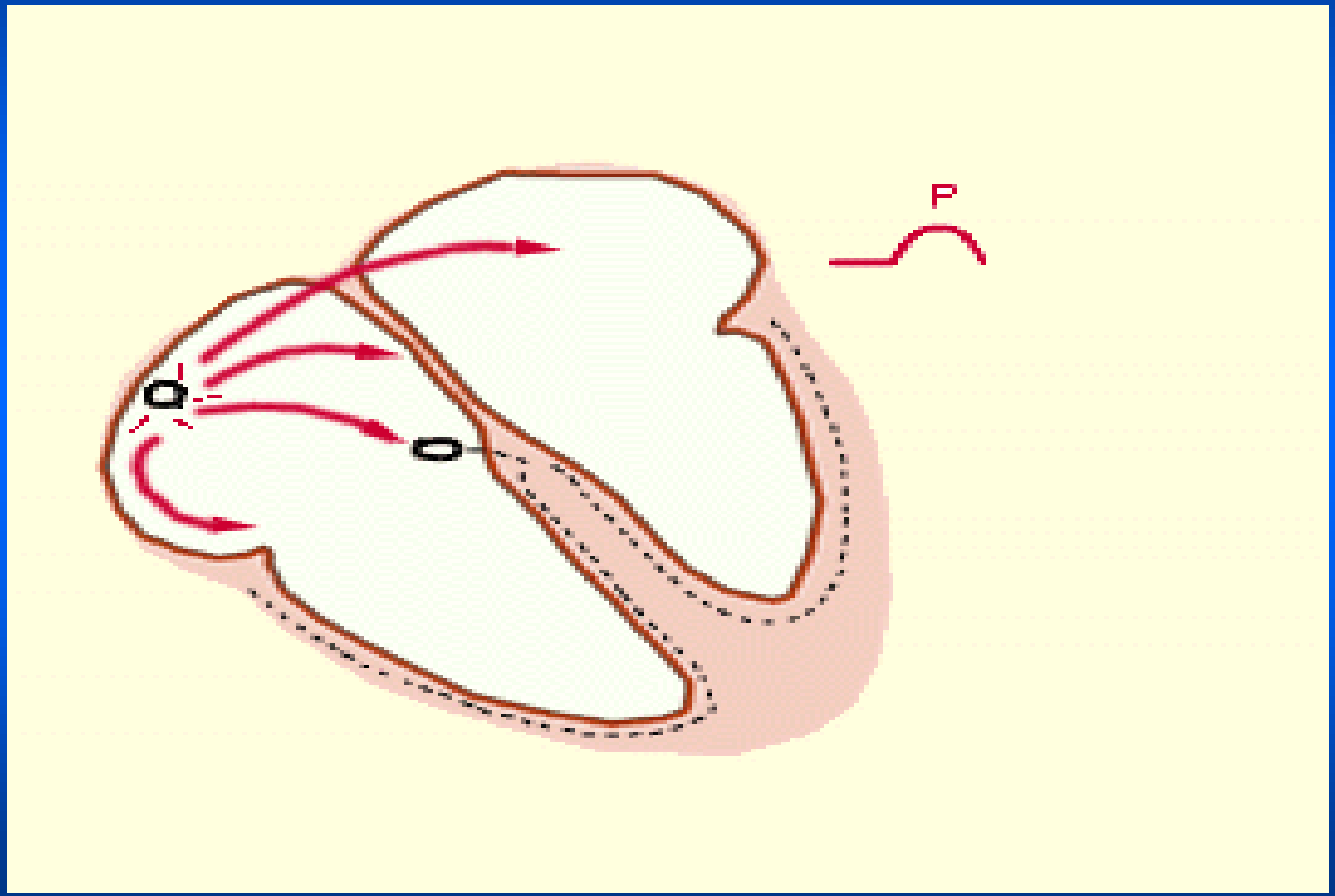
Noninvasive

- ECG – arrhythmias, ischaemia, previous MI, LV hypertrophy, ionic disorders

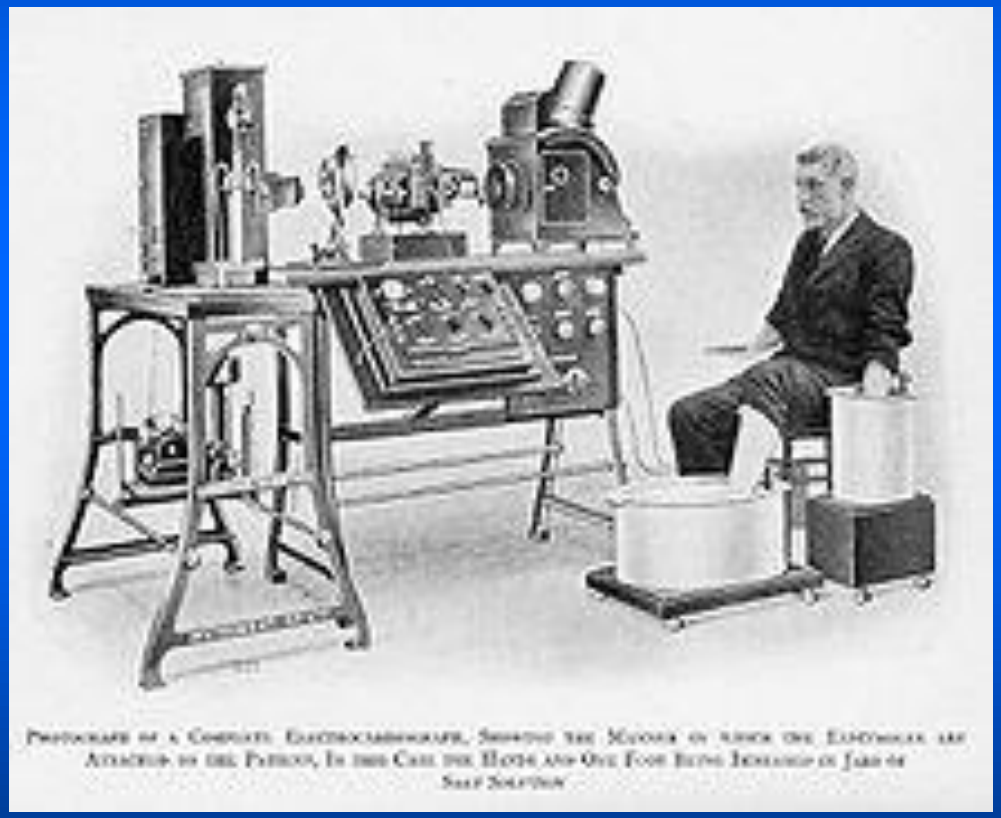
- X - RAY – CT index, lung congestion, valvular diseases


** All leads at half standard **
aVR
V1
V4
II
aVL
V2
V5
III
aVF
V3
V6
V1
II

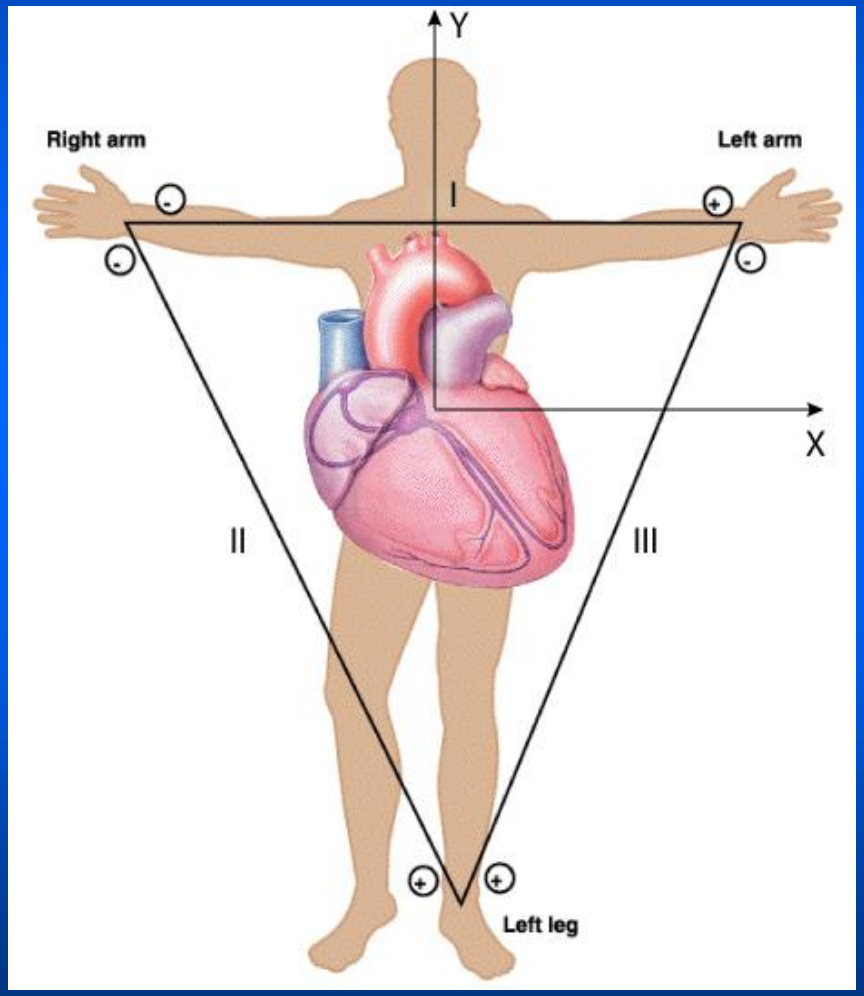
ECG (Willem Einthoven 1893)

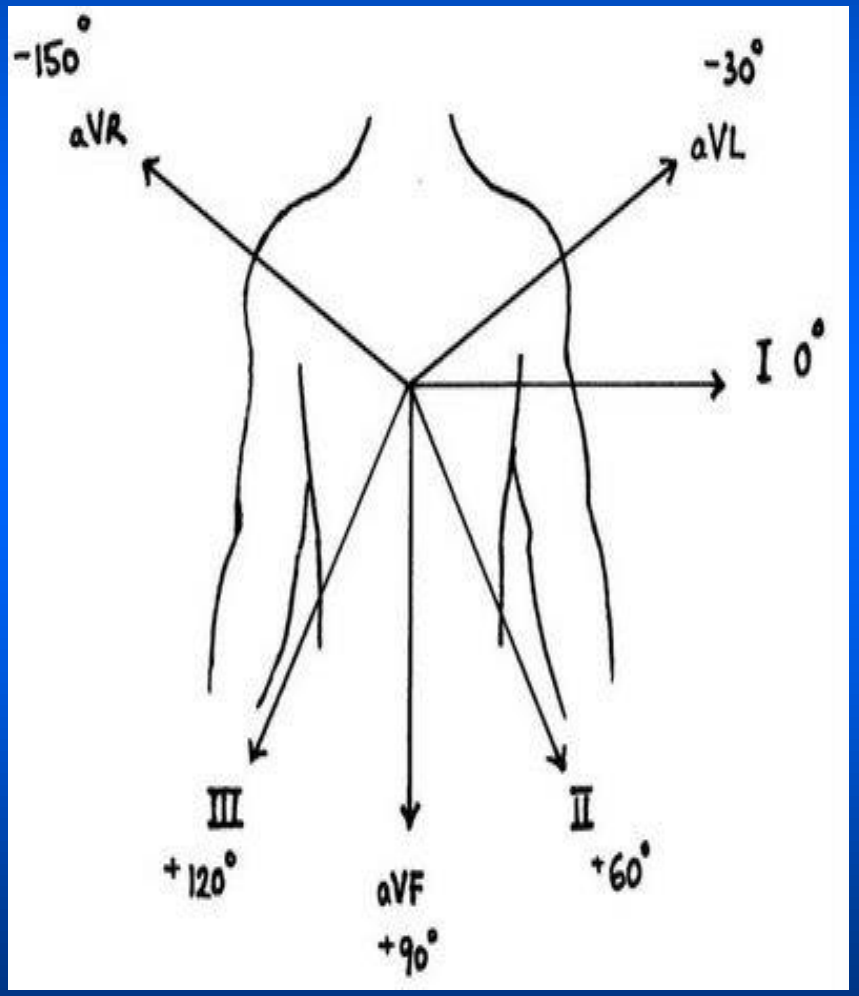


ECG history

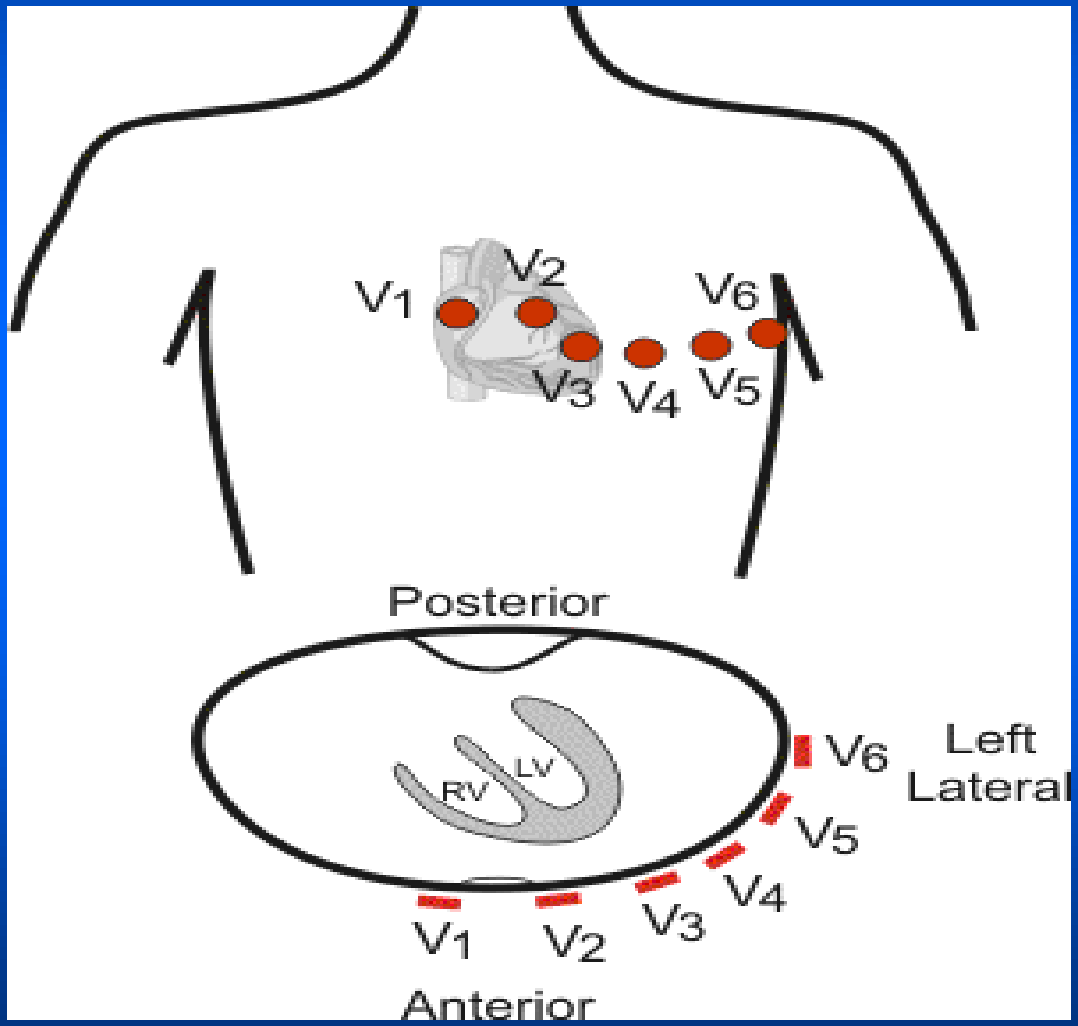


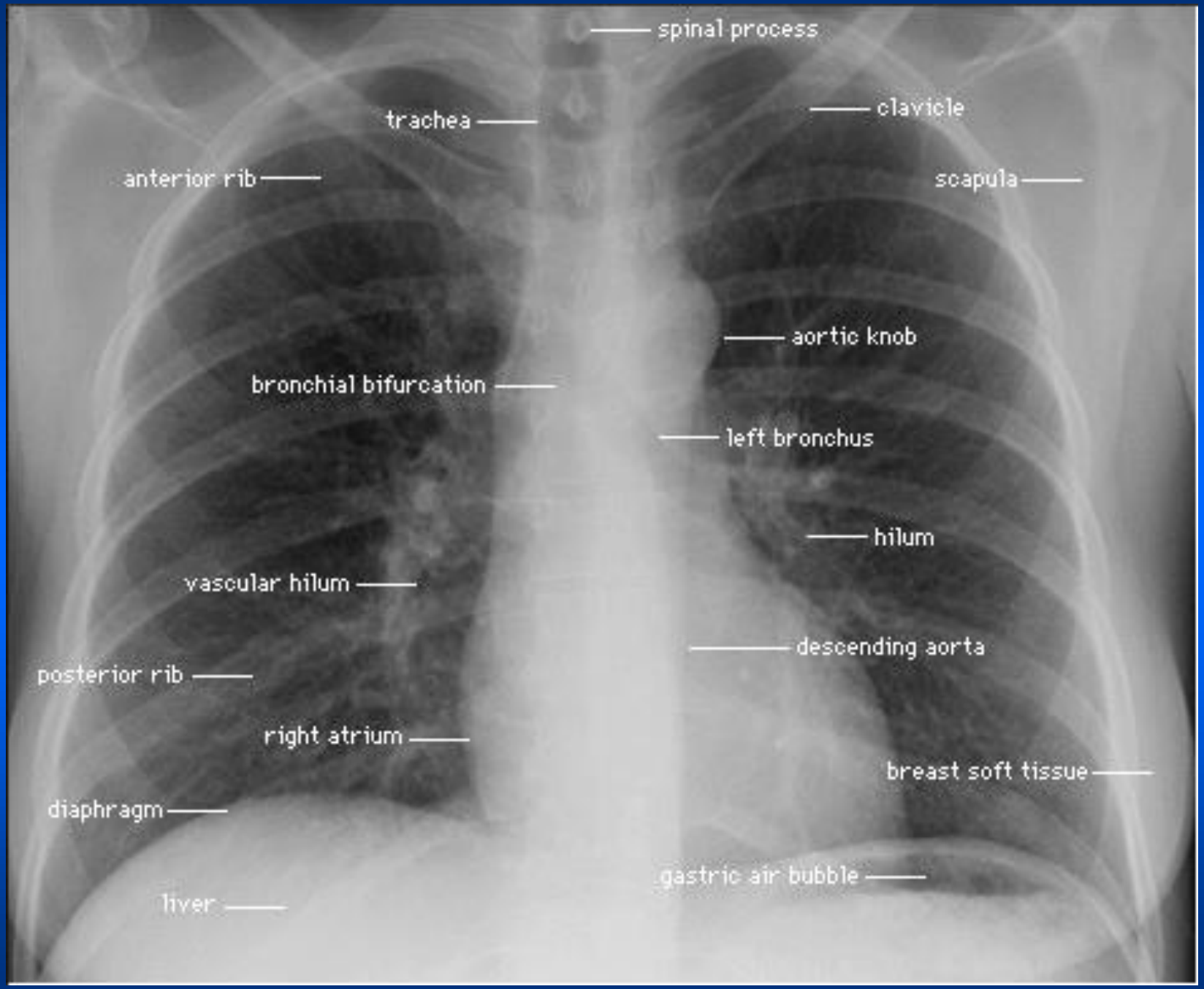
ECG – limb leads



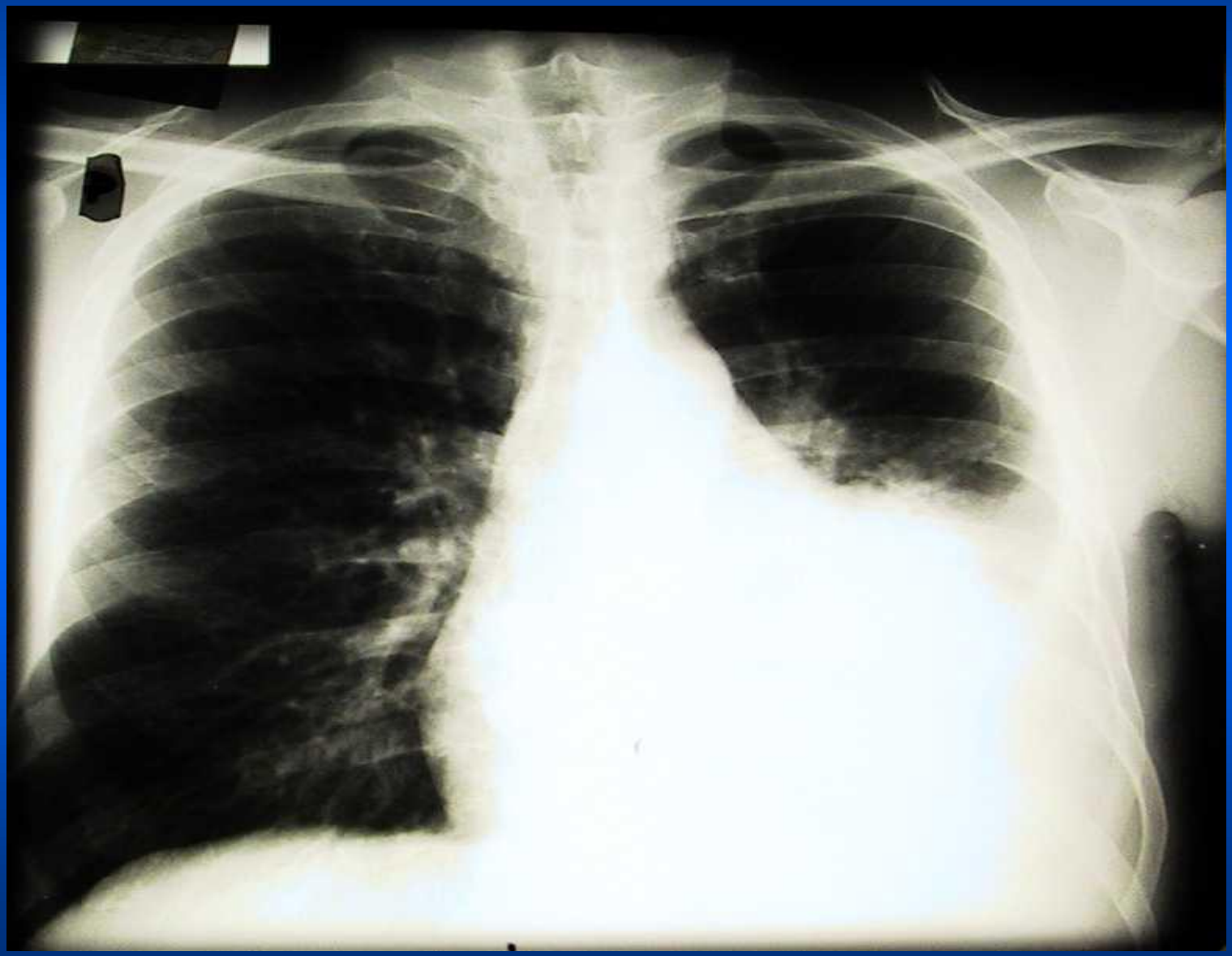


ECG- precordial leads

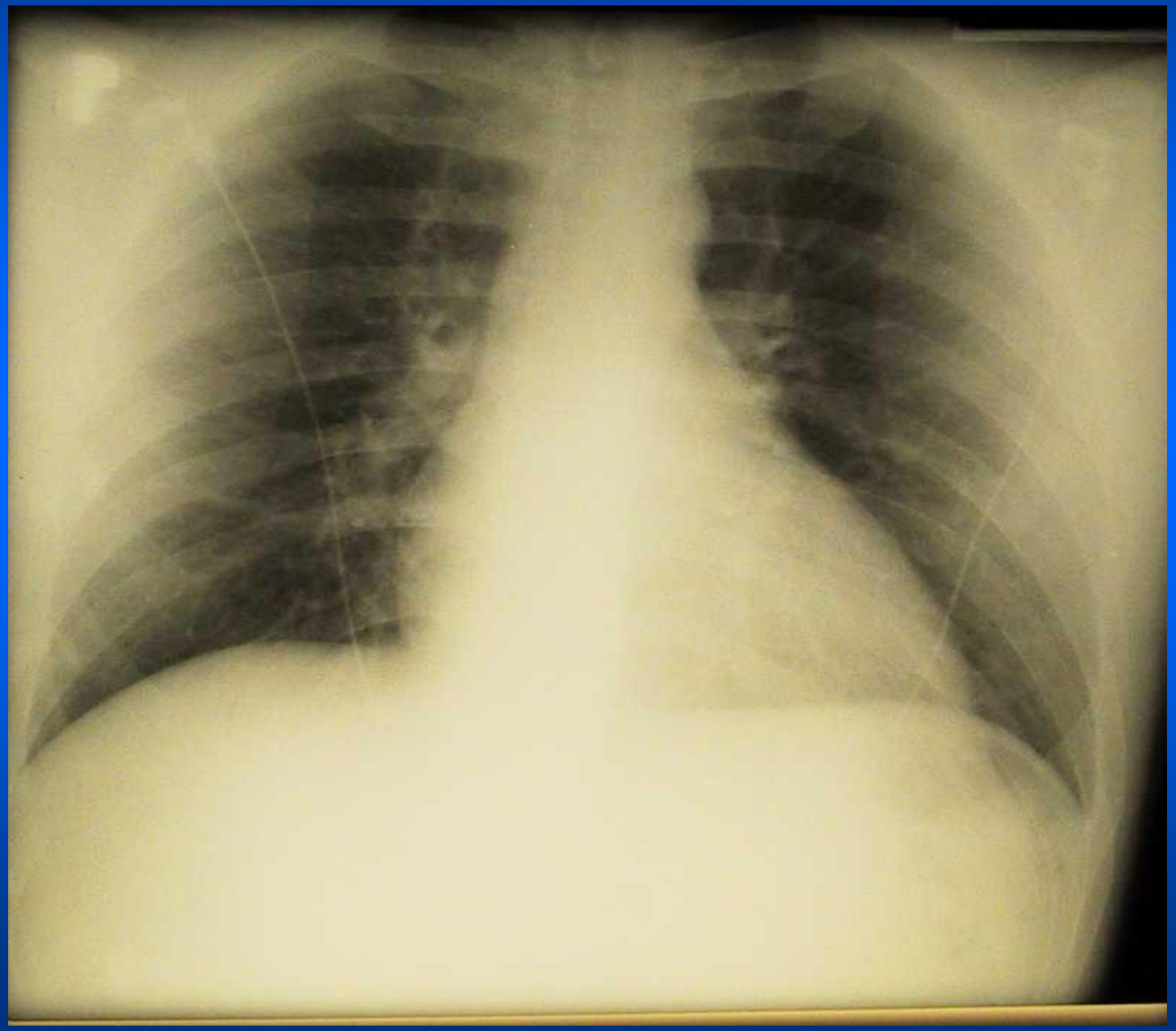



spinal process
trachea
clavicle
anterior rib
scapula
aortic knob
bronchial bifurcation
left bronchus
hilum
vascular hilum
descending aorta
posterior rib
right atrium
breast soft tissue
diaphragm
gastric air bubble
liver

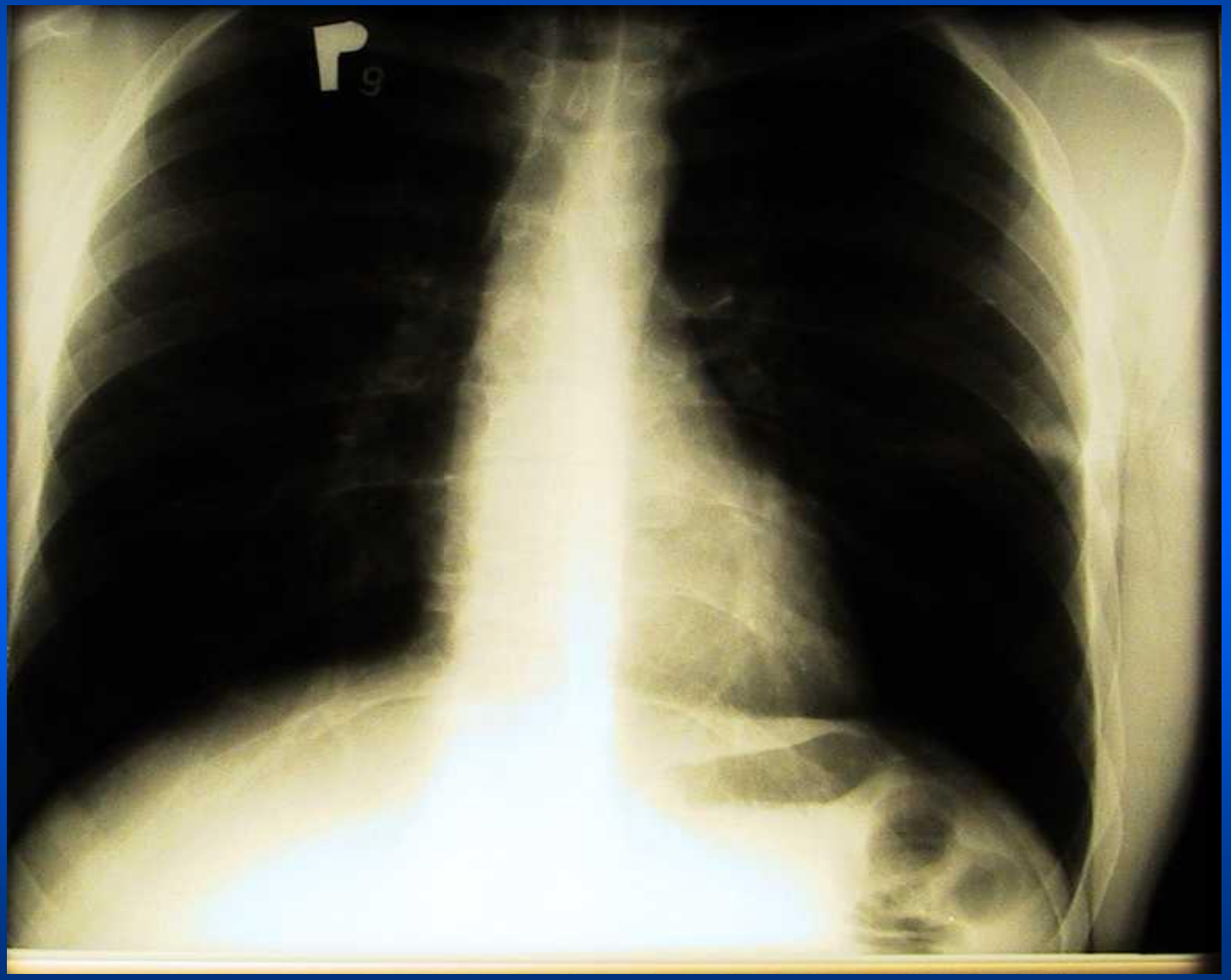
Tumor in left hemithorax



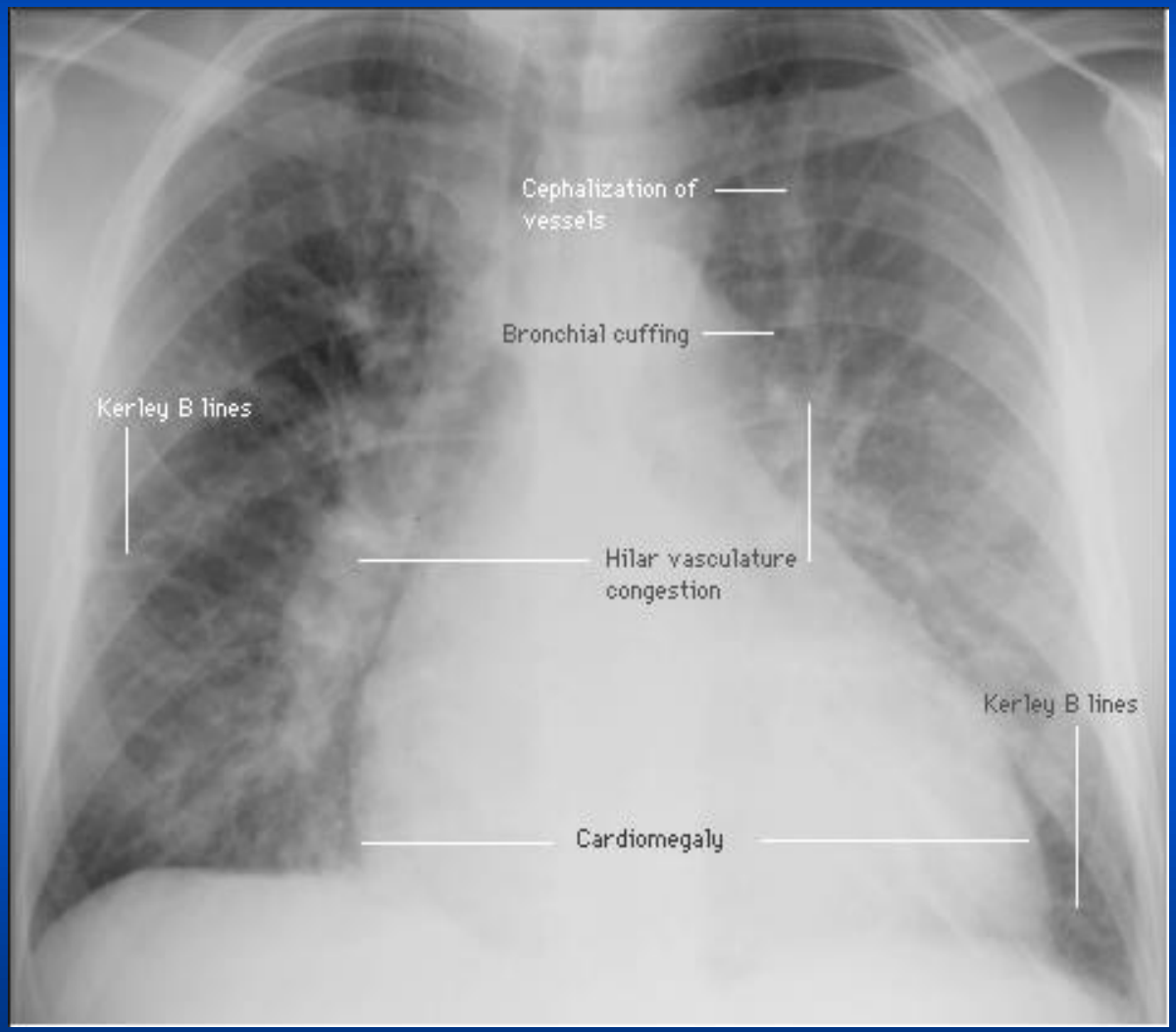
Cardiac tamponade



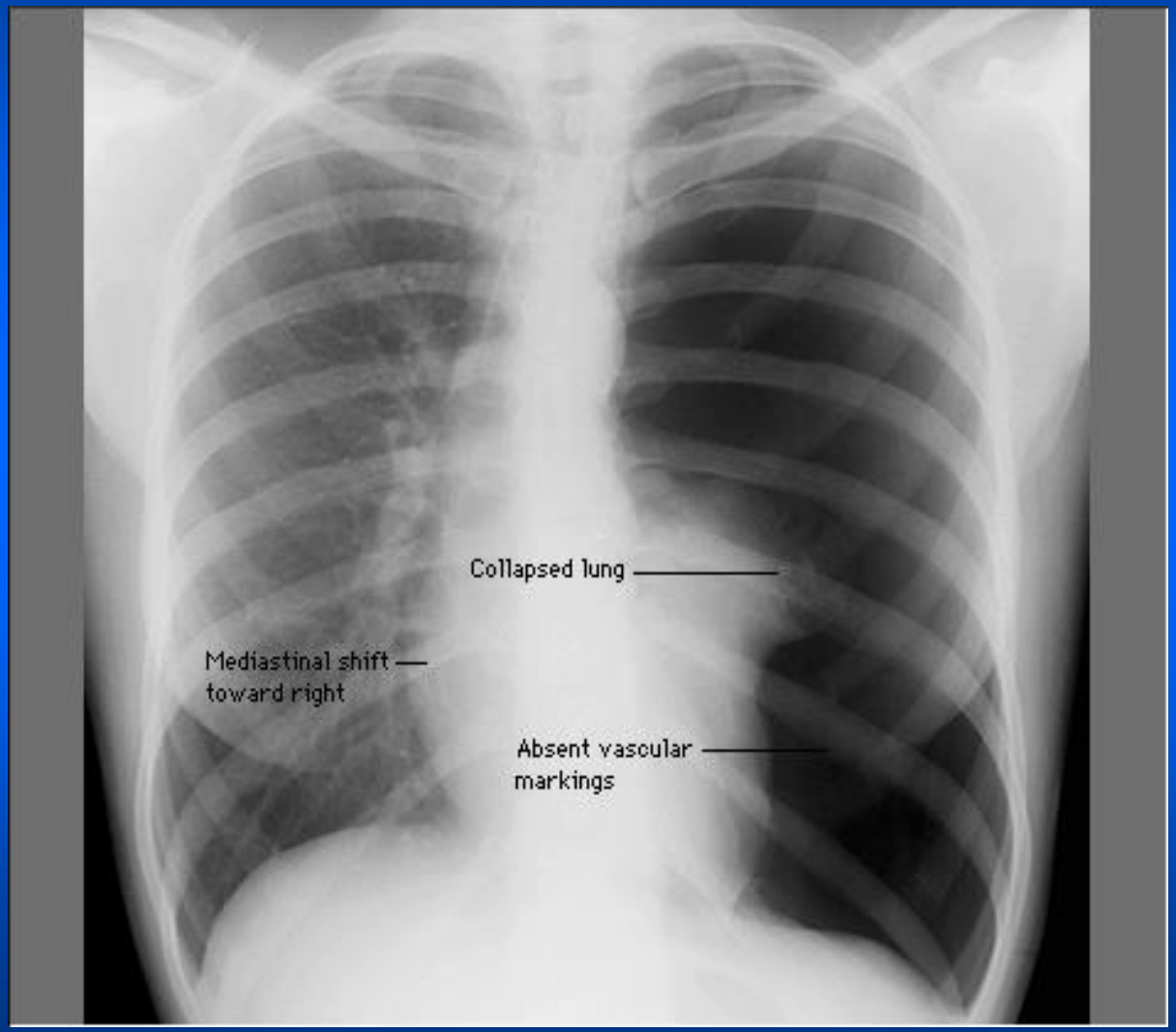
After pericardial punction



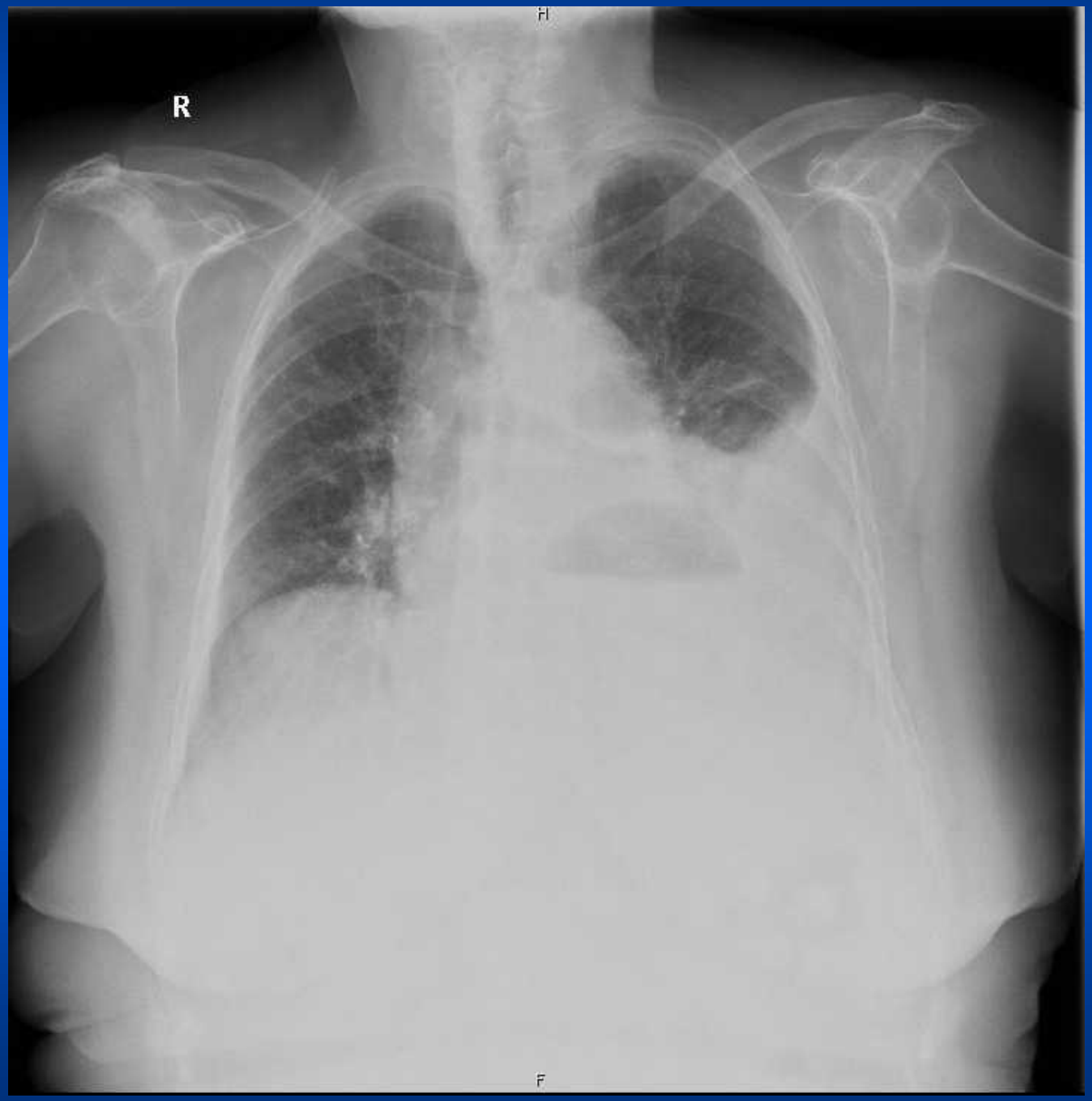
Pulmonary oedema



PNO


Collapsed lung
Mediastinal shift toward right
Absent vascular markings

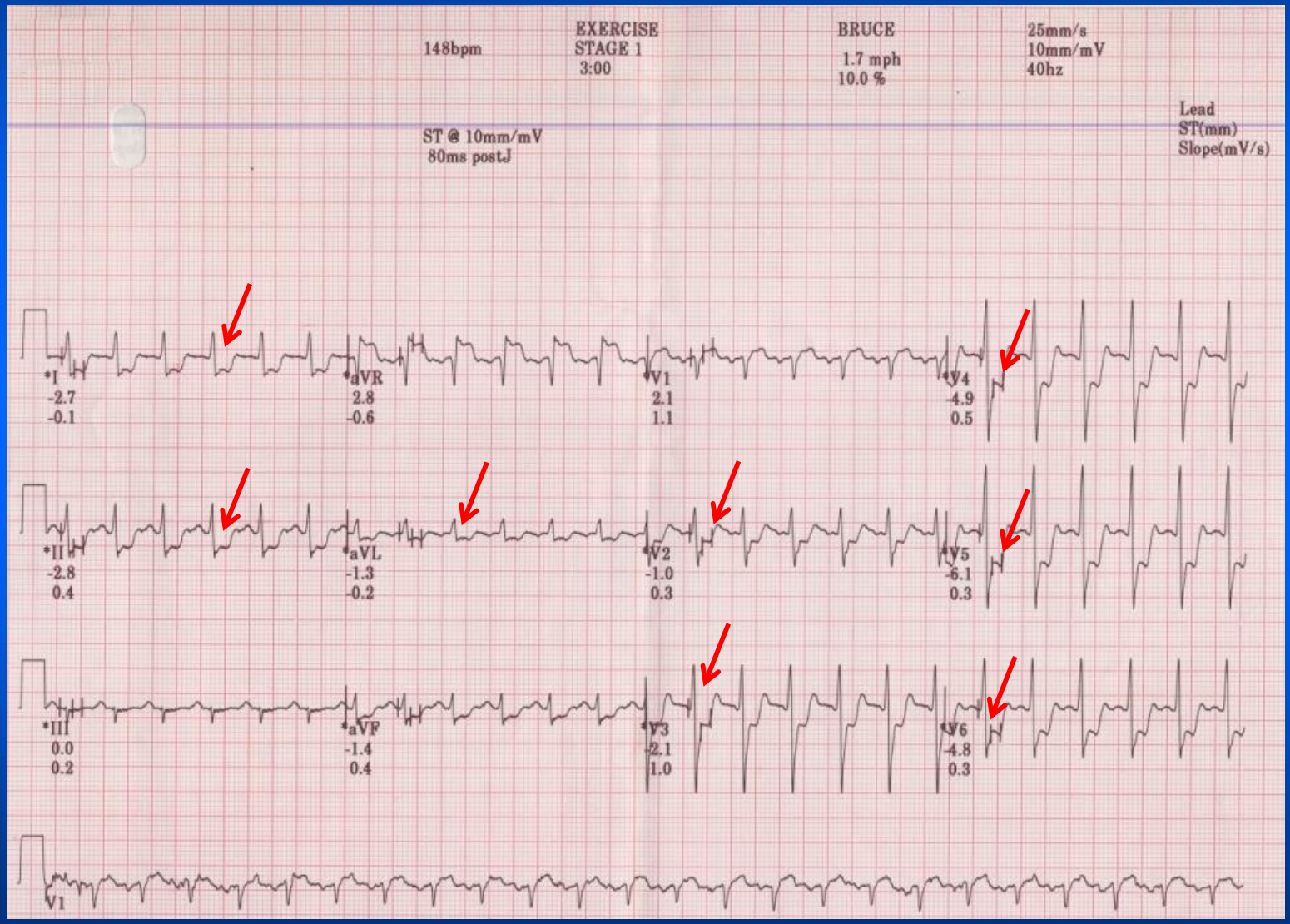
Stomach in the chest



Noninvasive assessment of CAD

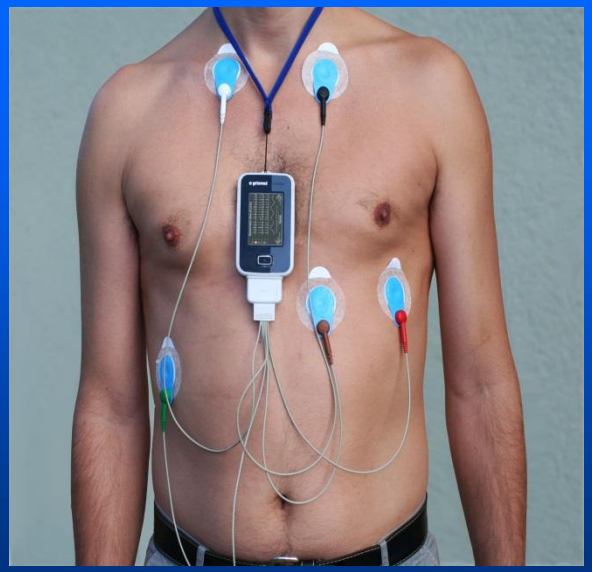
- Bicycle treadmil test – submaximal aerobic frequency (220 – age) depressions and elevations of ST .
- Treadmil echocardiography – segmental hypokinesis during hypoperfusion
- Dobutamin. echokard. – farmacologic tachycardia

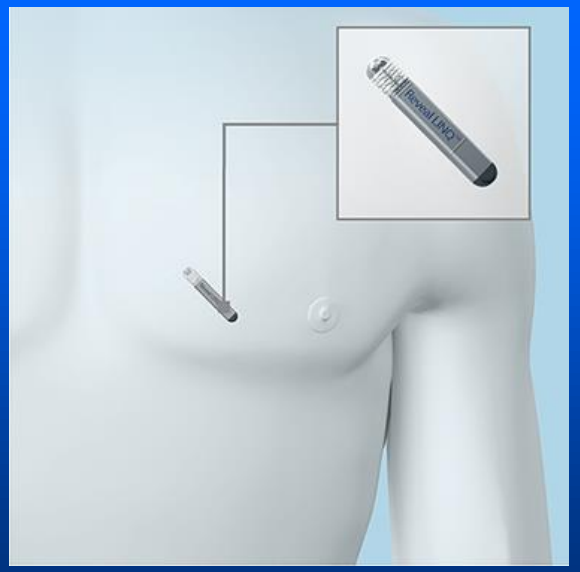
Positive treadmill test



Noninvasive assessment of arrhythmias

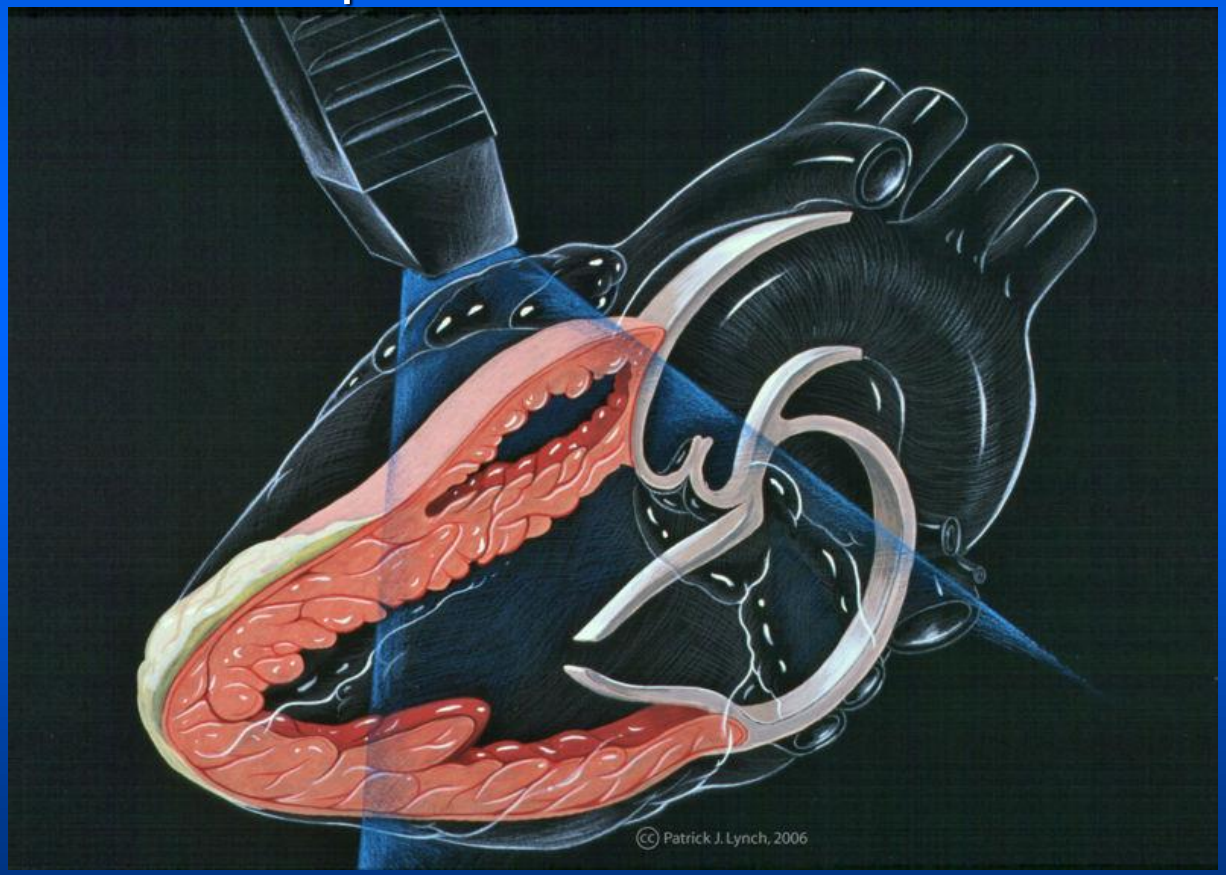
- **ECG Holter** – detection of arrhythmia in 24 h (up to 7 days)
- **R – test, rhythm card** –5 days – 3 months monitoring
- **ILR** – 3 years monitoring in pts with arrhythmias, unexplained syncope

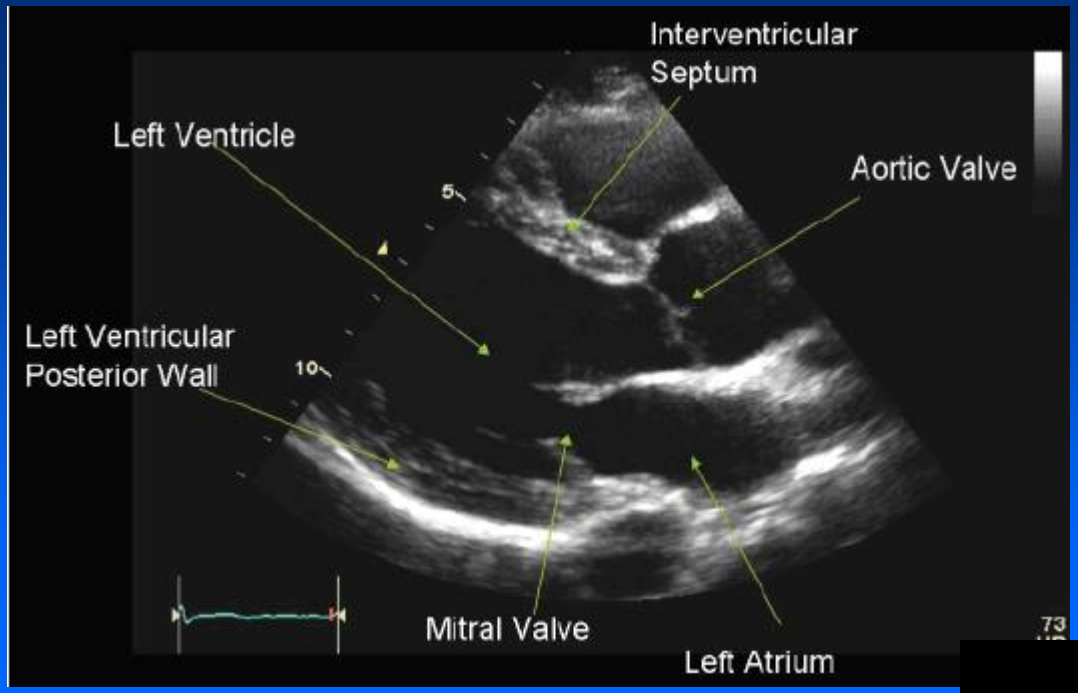


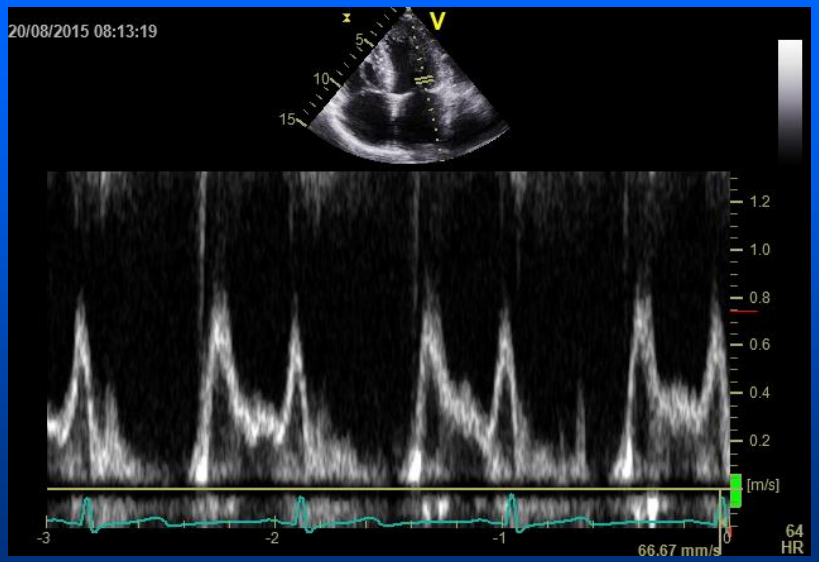


Noninvasive assessment of LV function

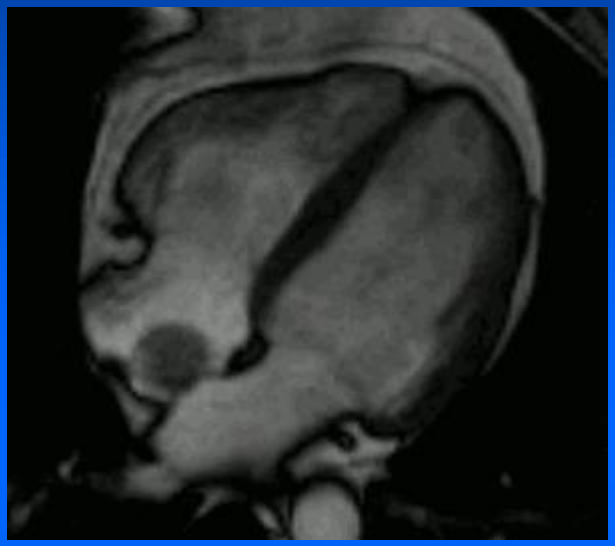
- ECHO – kinetics of the heart chambers, pericardium, valves, valvular diseases, detection of thrombi , atrial and ventricular septal deffects

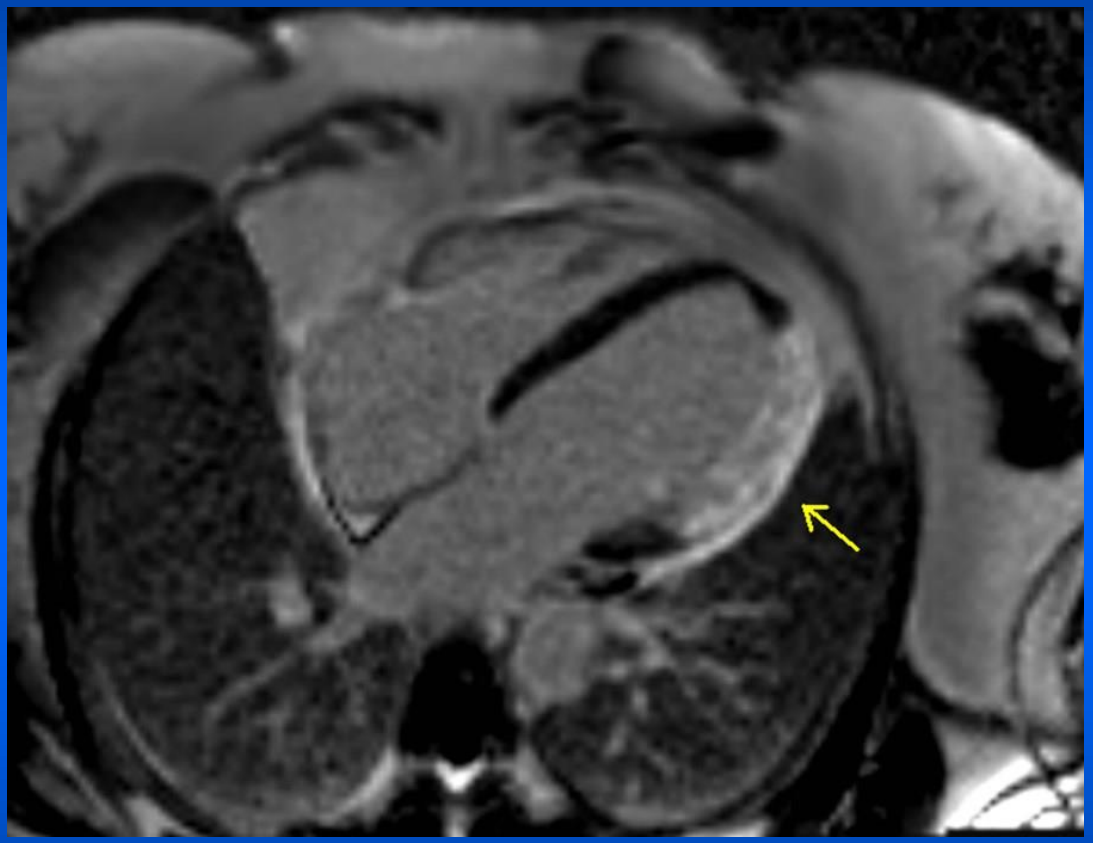



Interventricular
Septum
Left Ventricle
Aortic Valve
Left Ventricular
Posterior Wall
Mitral Valve
Left Atrium


20/08/2015 08:13:19
1.2
1.0
0.8
0.6
0.4
0.2
[m/s]
66.67 mm/s
64
HR

Cardiac MRI

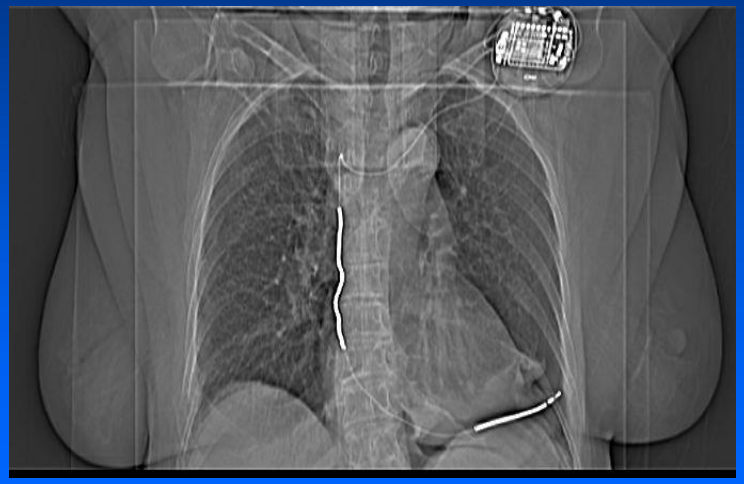


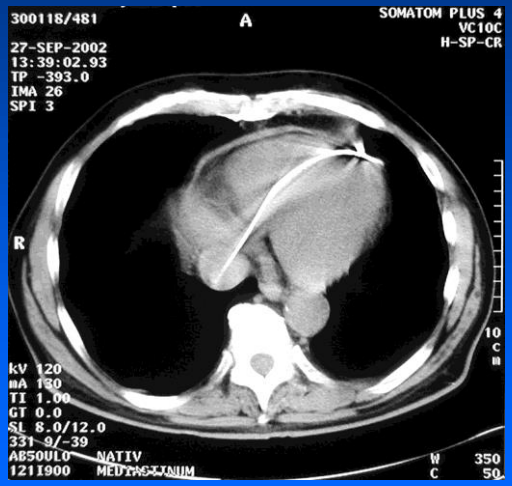


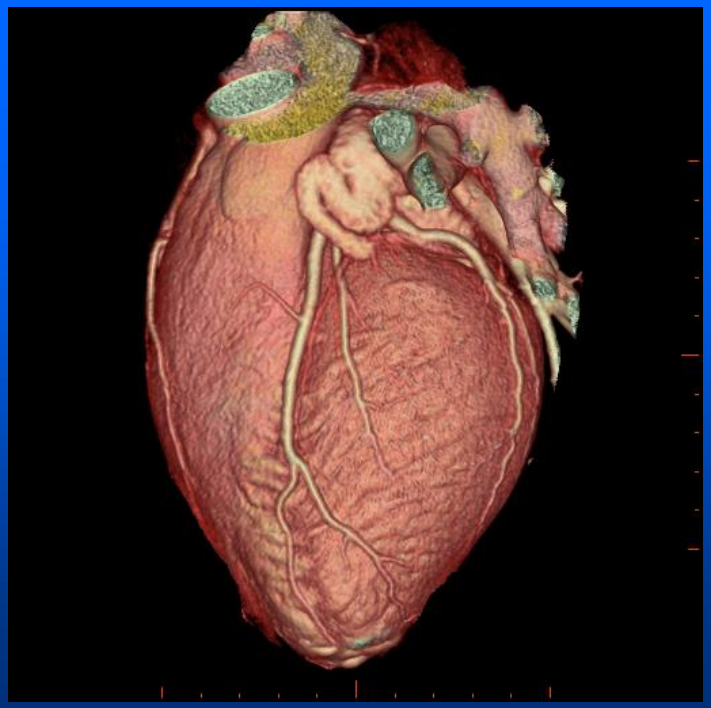
Structure of the heart wall

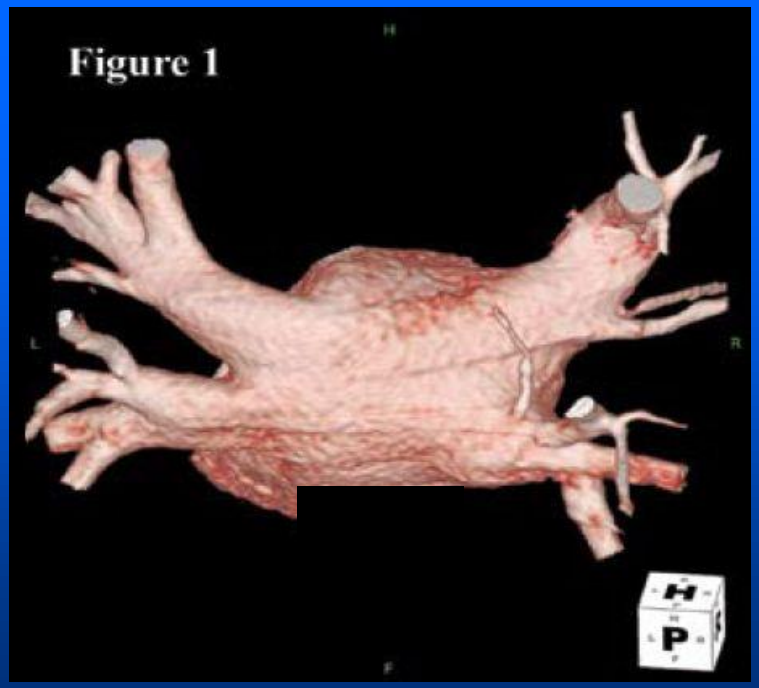
- Scars
- Myocarditis
- ARVC

CT of the heart

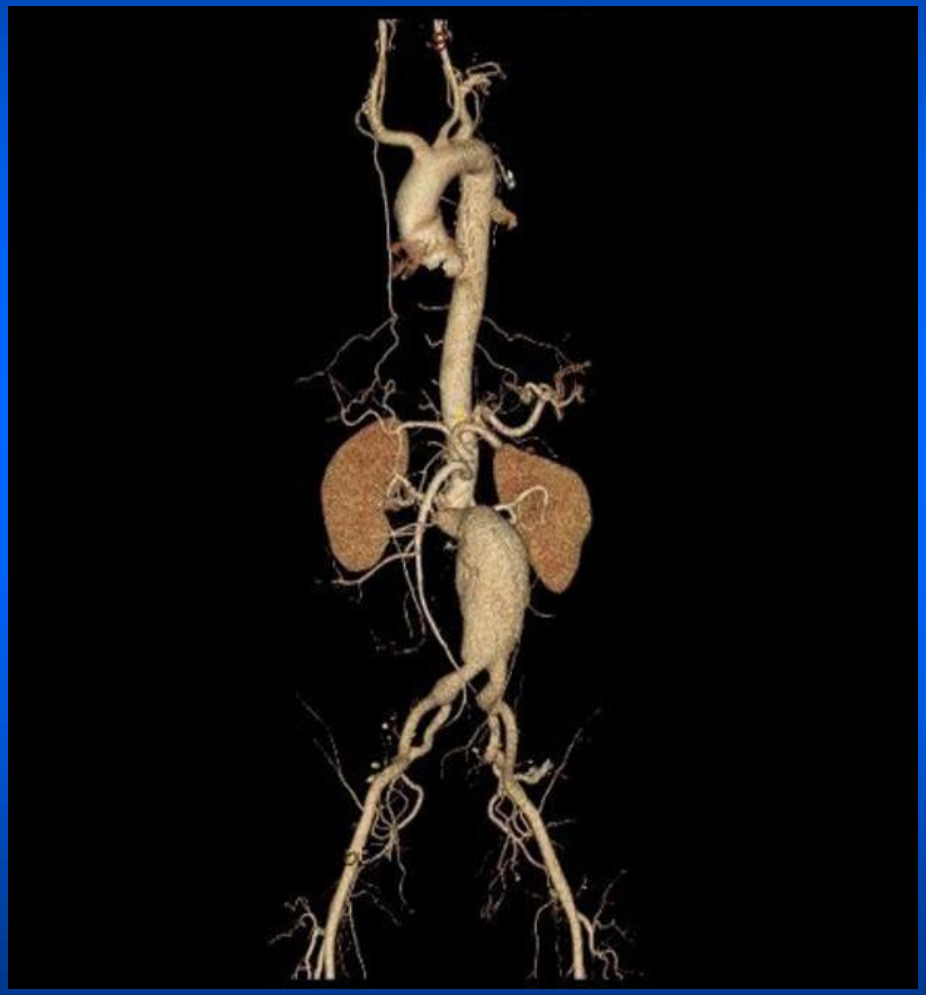


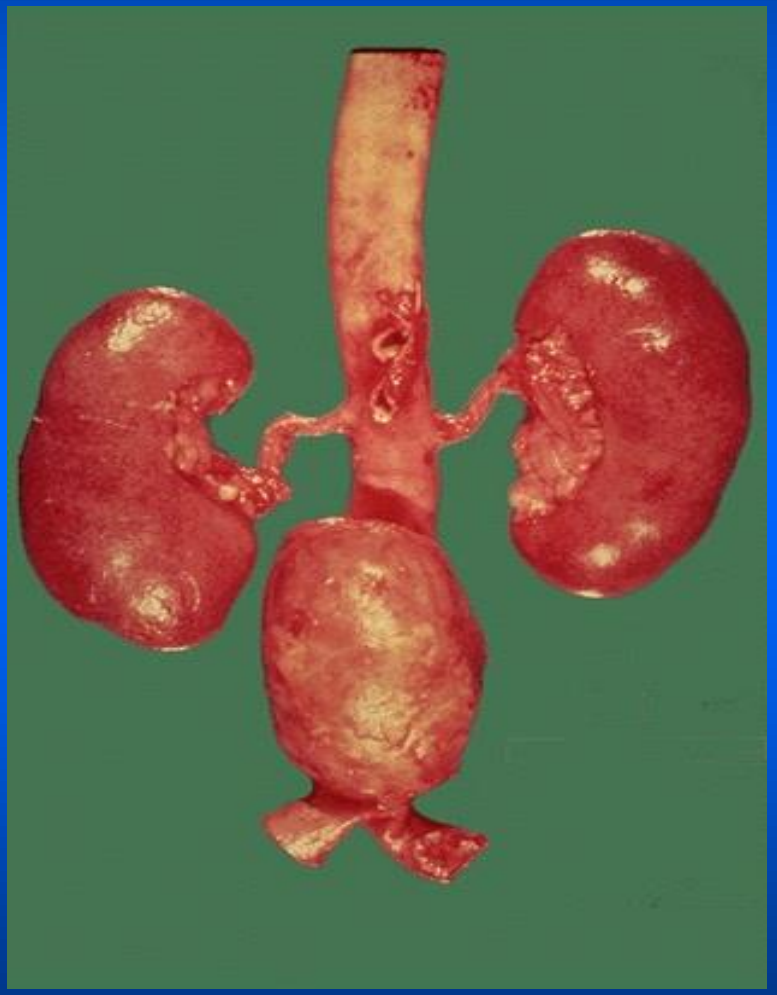






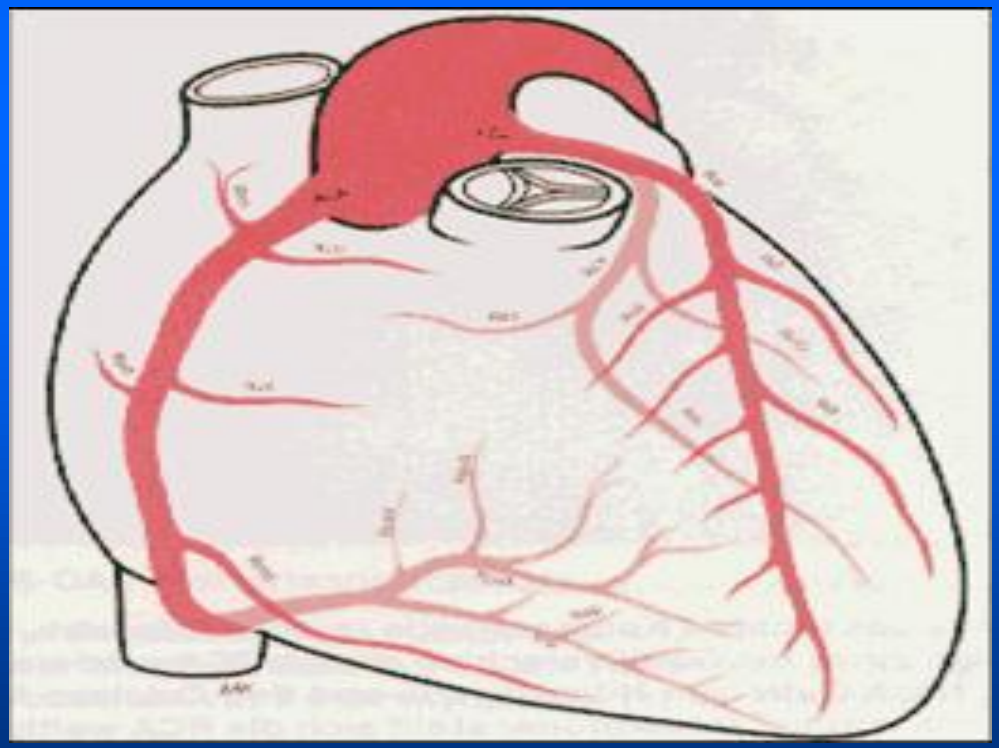
CT AG of aorta



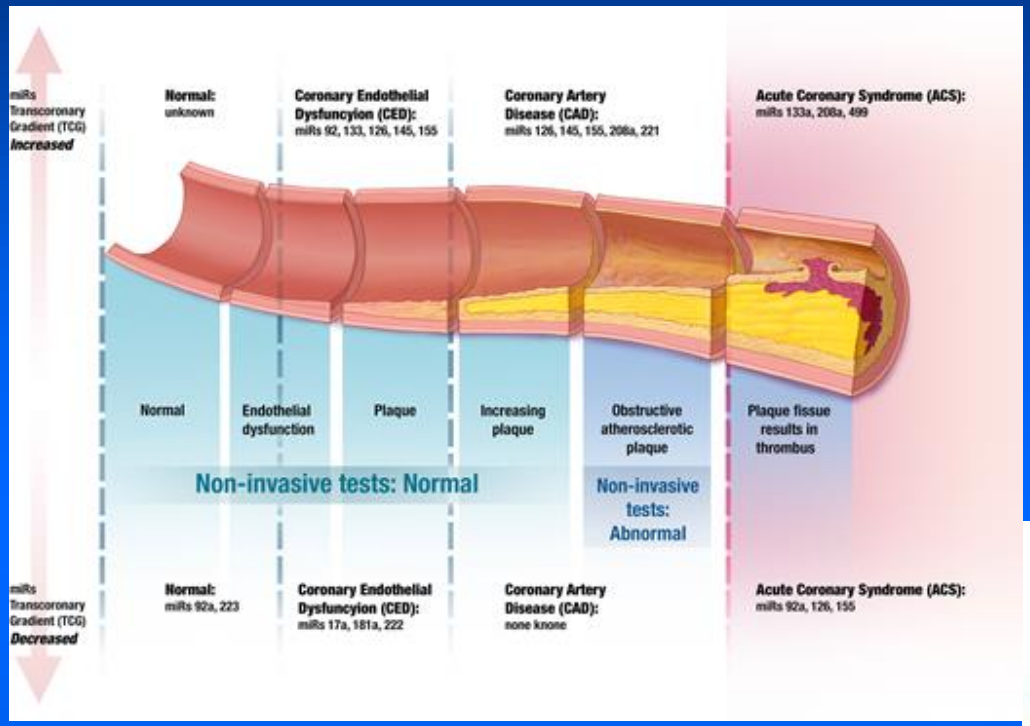


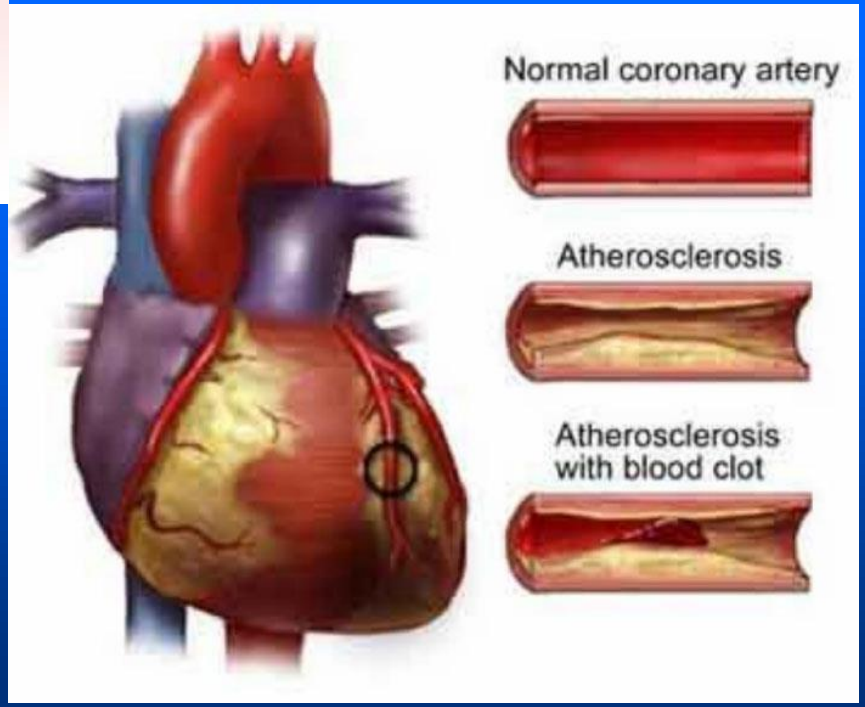
Invasive CAD assessment

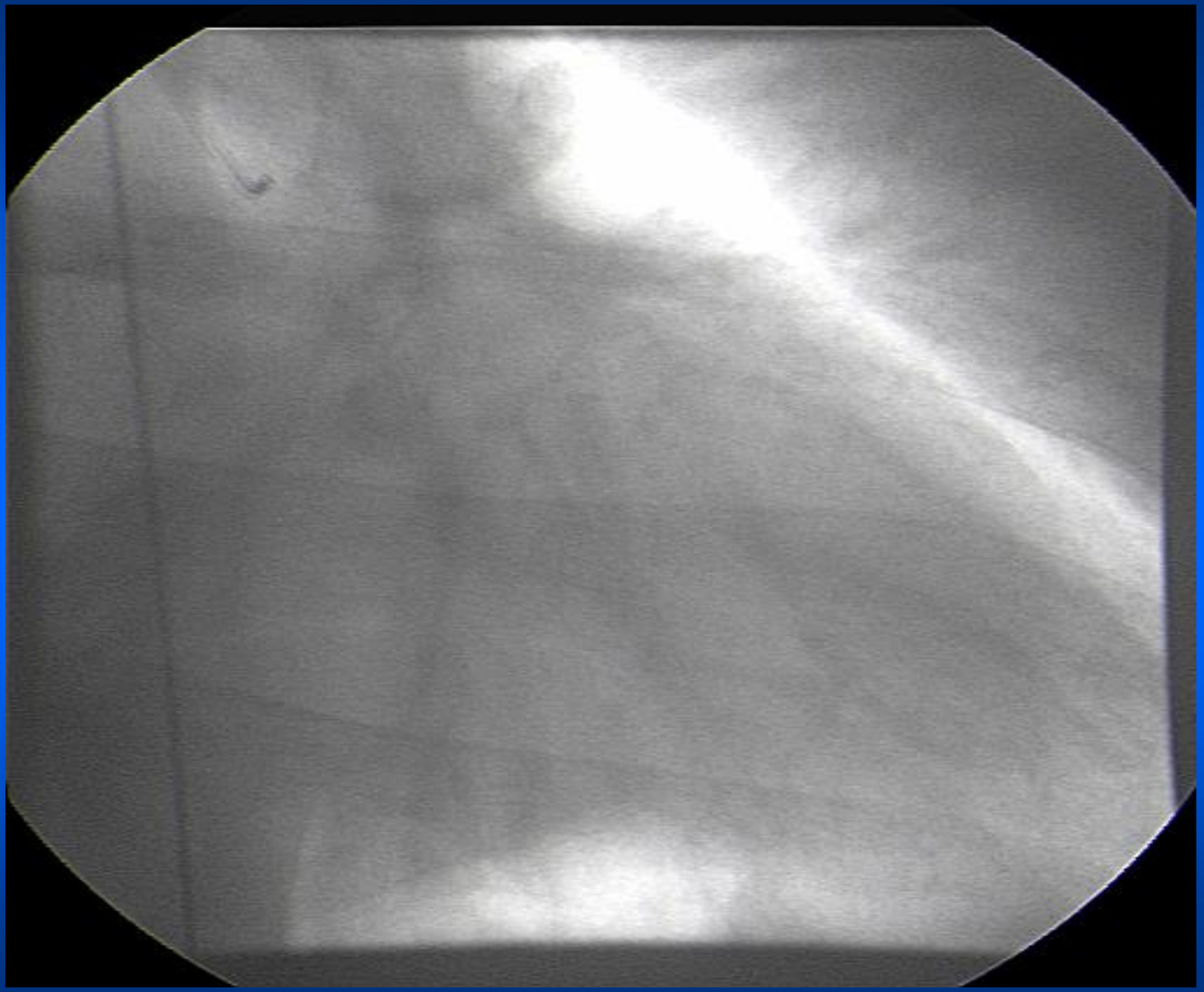
- Selective angiography – examination of coronary artery stenoses with high accuracy



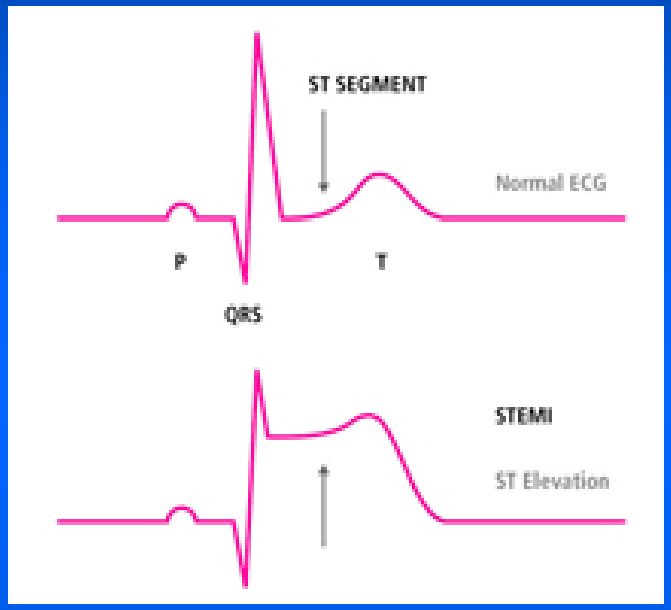
Coronary artery disease

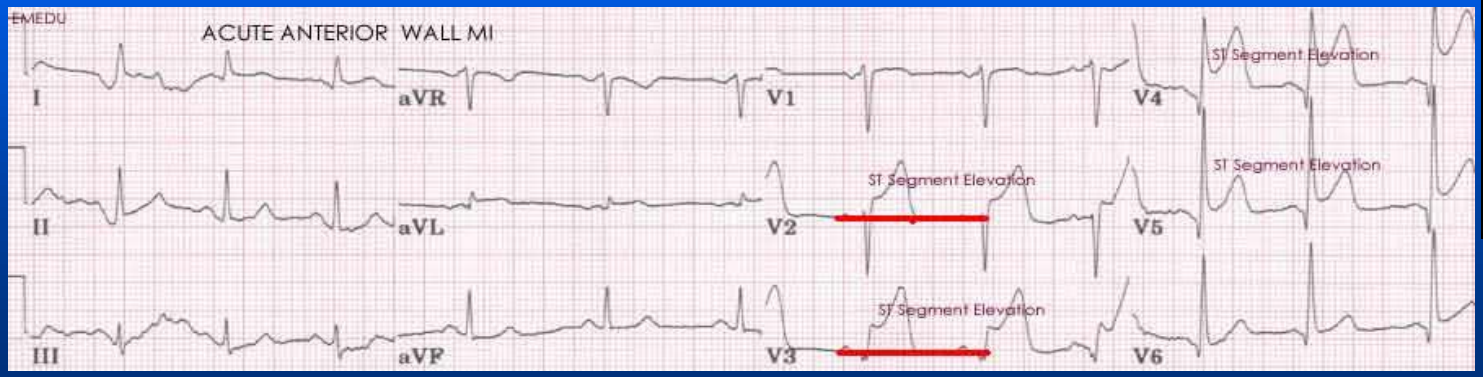




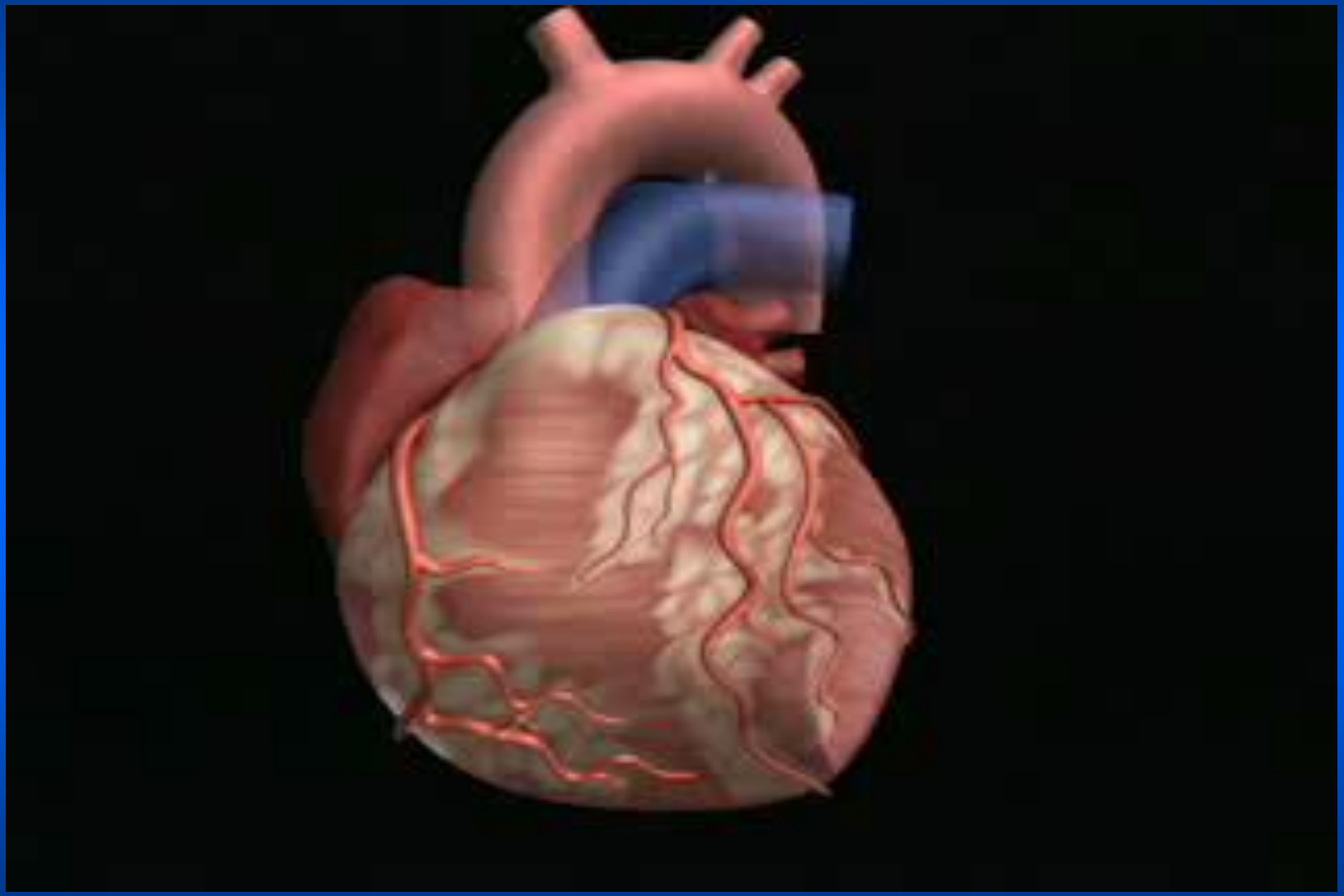


Chest pain STE MI

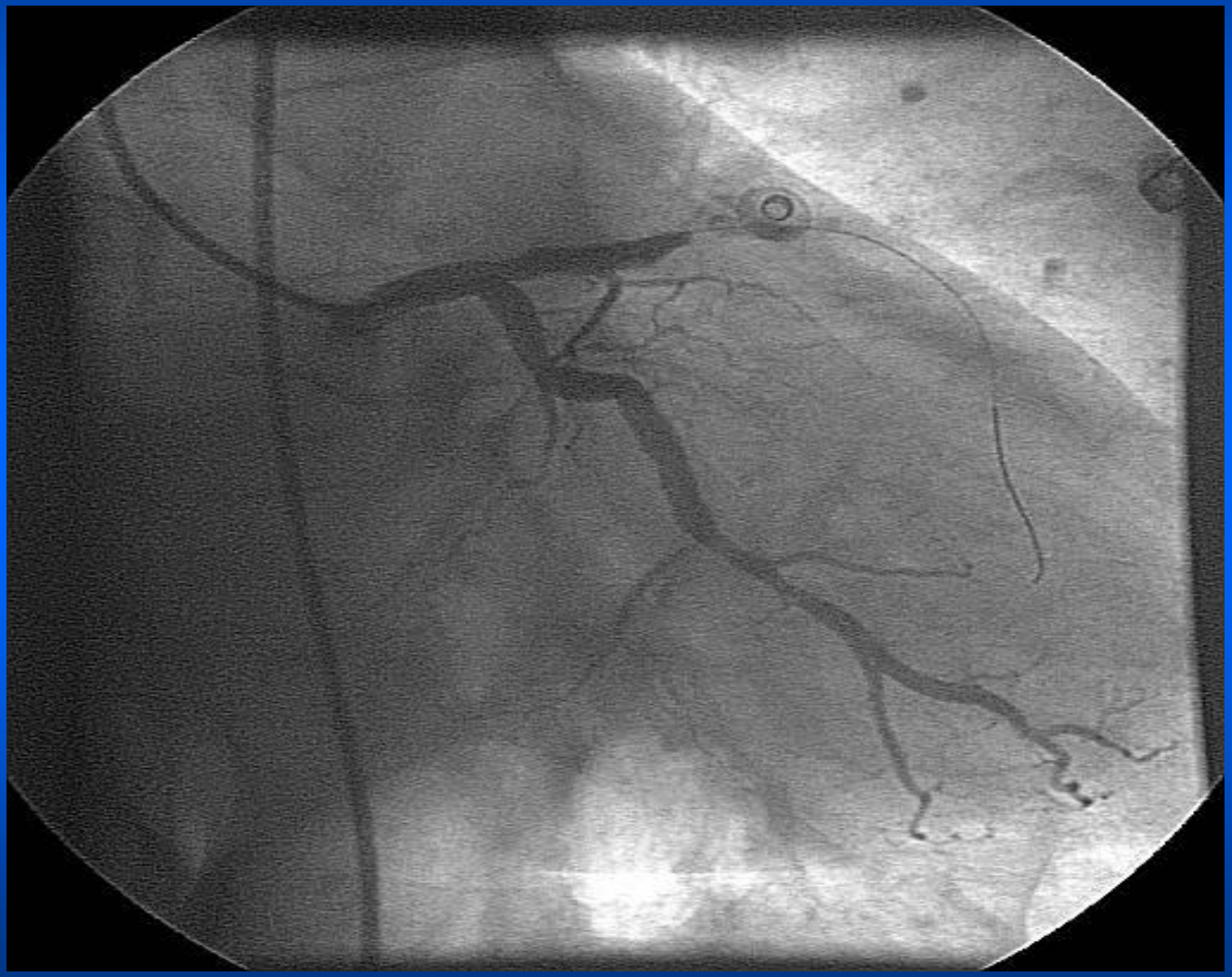




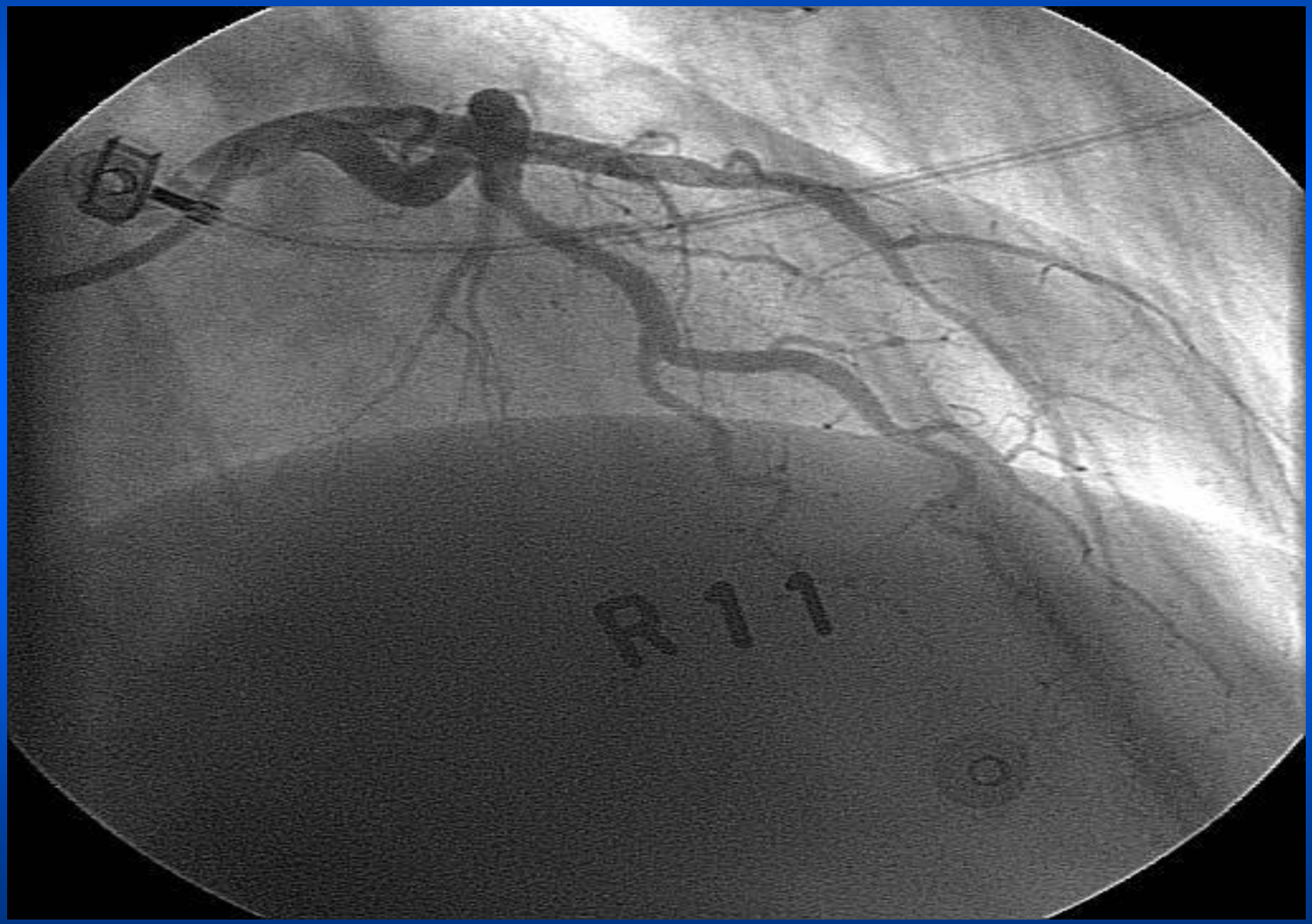
Stop in ramus interventricularis anterior



PCI wire in the artery

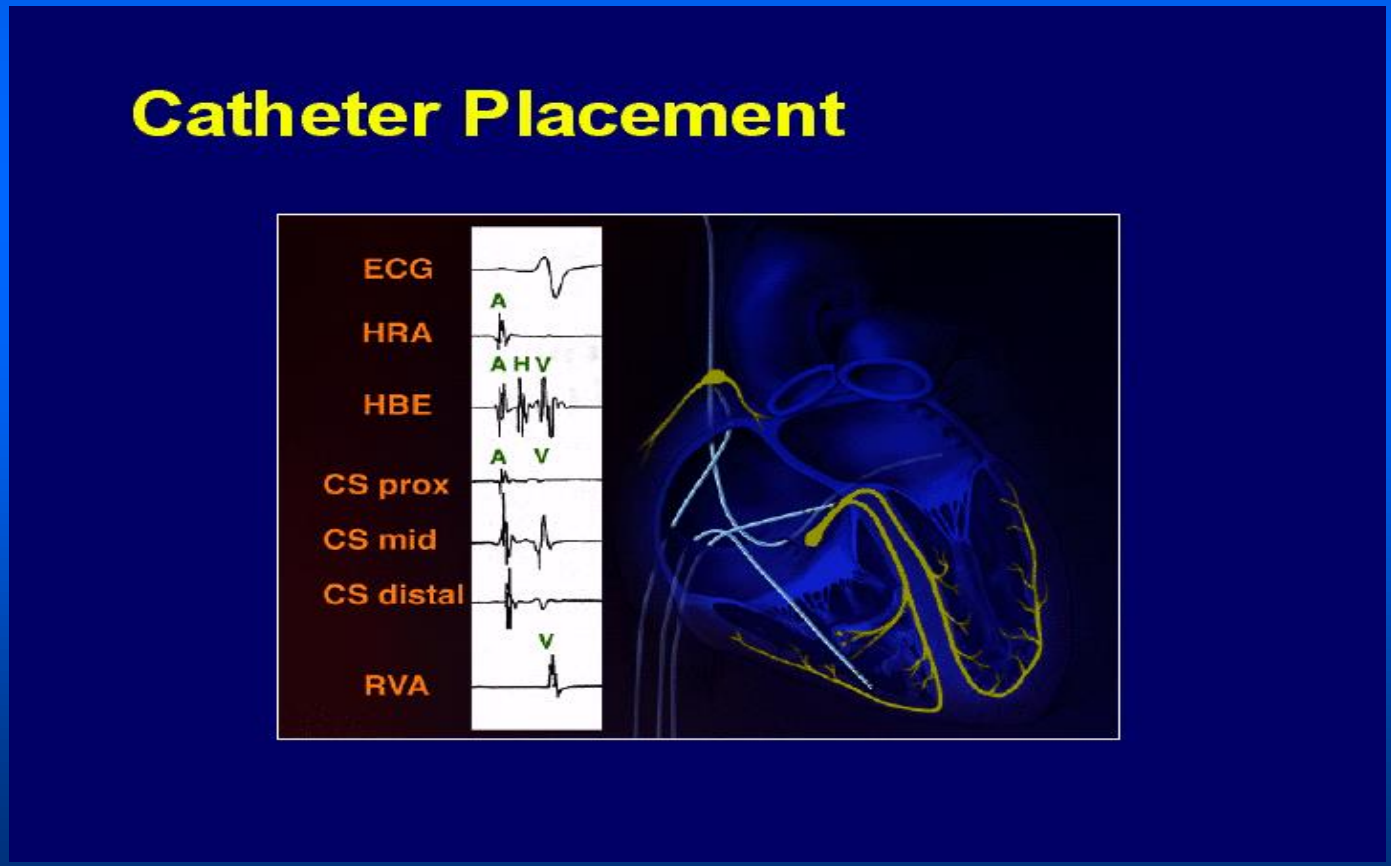


After treatment with PTCA

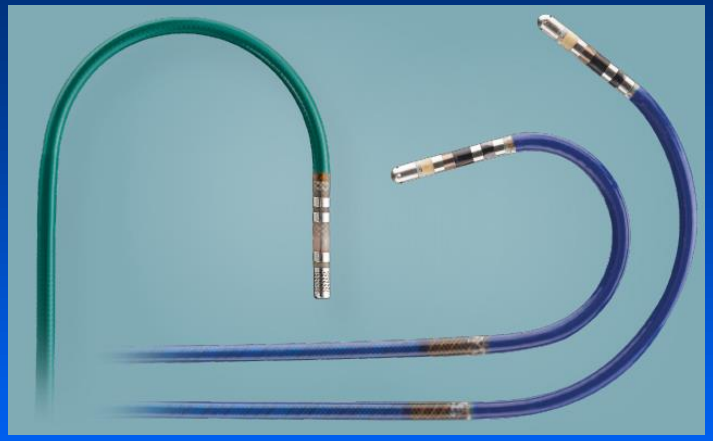


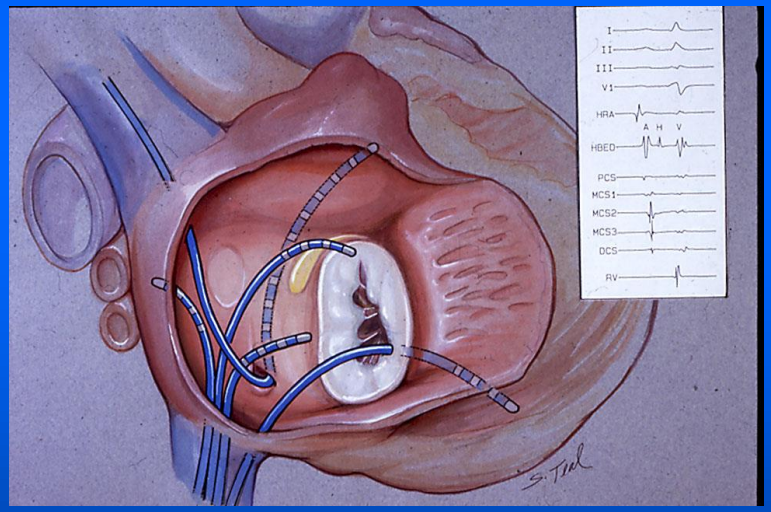
Invasive assessment of arrhythmias

- **Electrophysiology** – capacity of the conduction systém, induction and precise classiffication of arrhythmias – followed by RFA



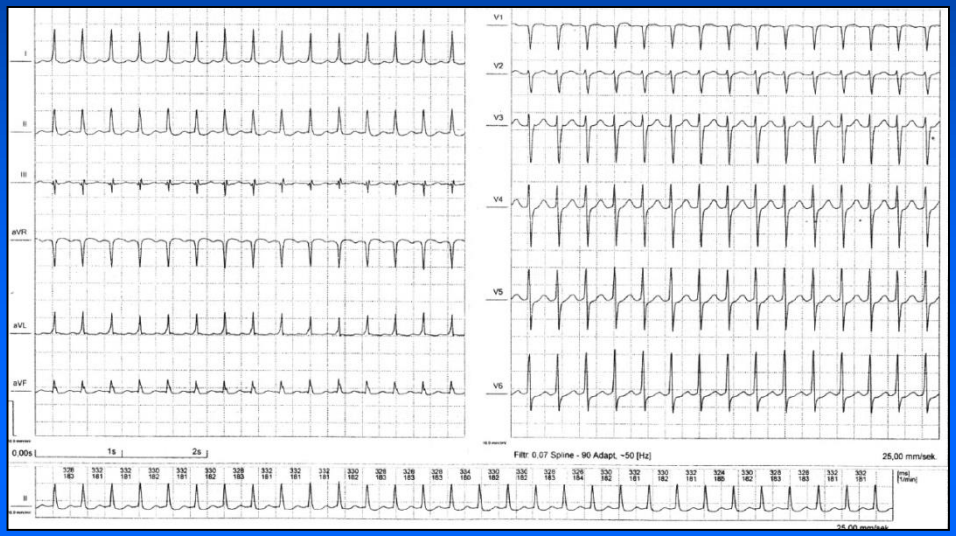
IKEG

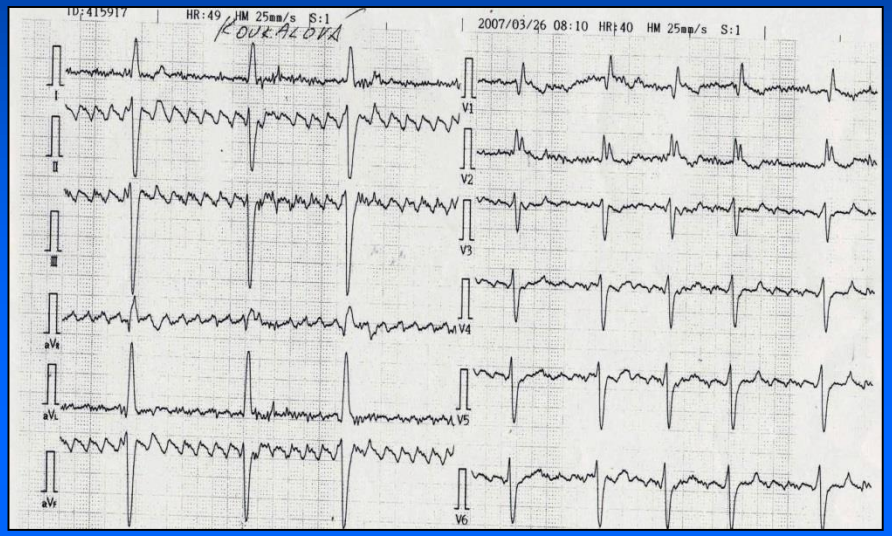


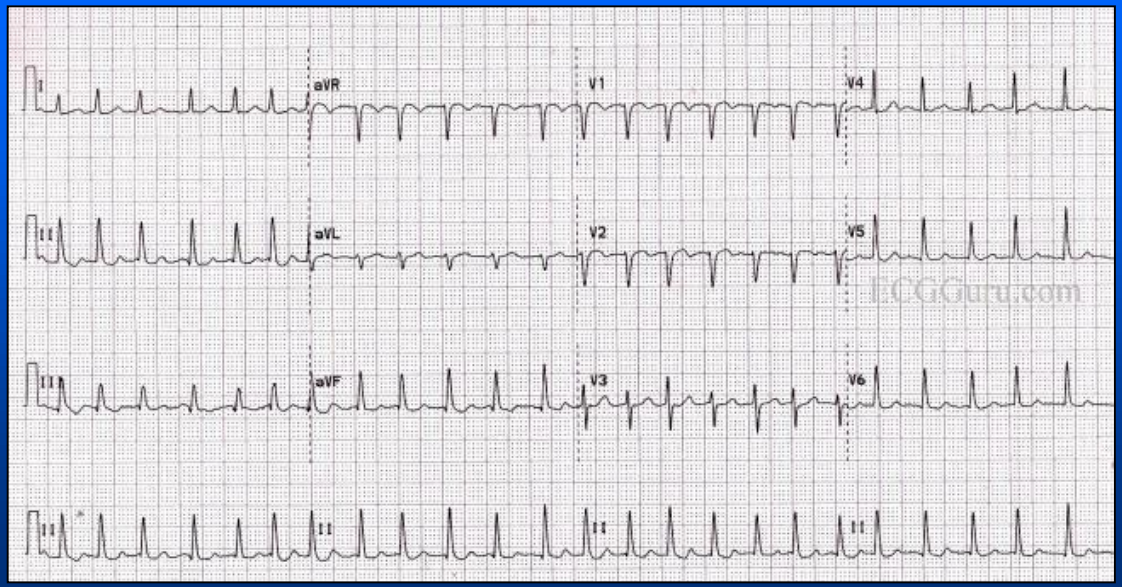

I
II
III
V1
HRA
A H V
HBED
PCS
MCS1
MCS2
MCS3
DCS
RV

III
V1
V6
HRA 1–2
HIS 7–8
HIS 5–6
HIS 3–4
HIS 1–2
RVA 1–2
CS 9–10
CS 7–8
CS 5–6
CS 3–4
CS 1–2

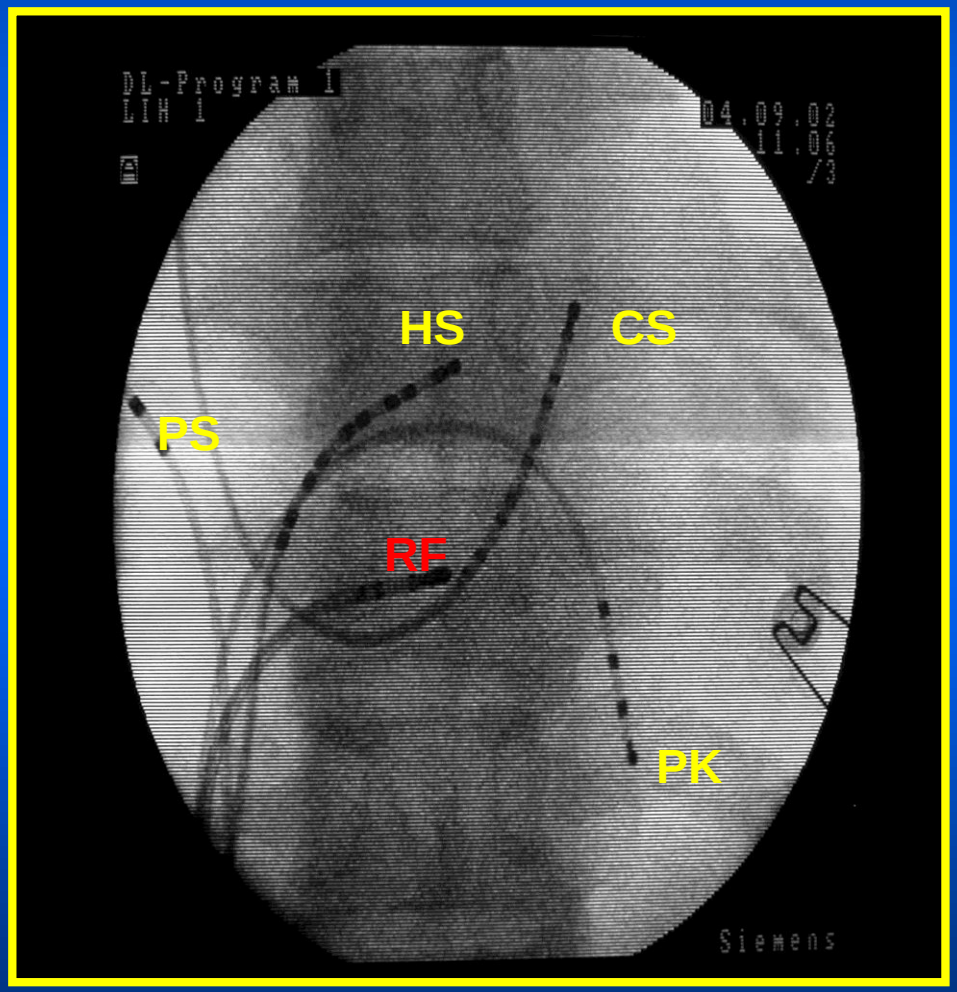
Nejčastější SVT

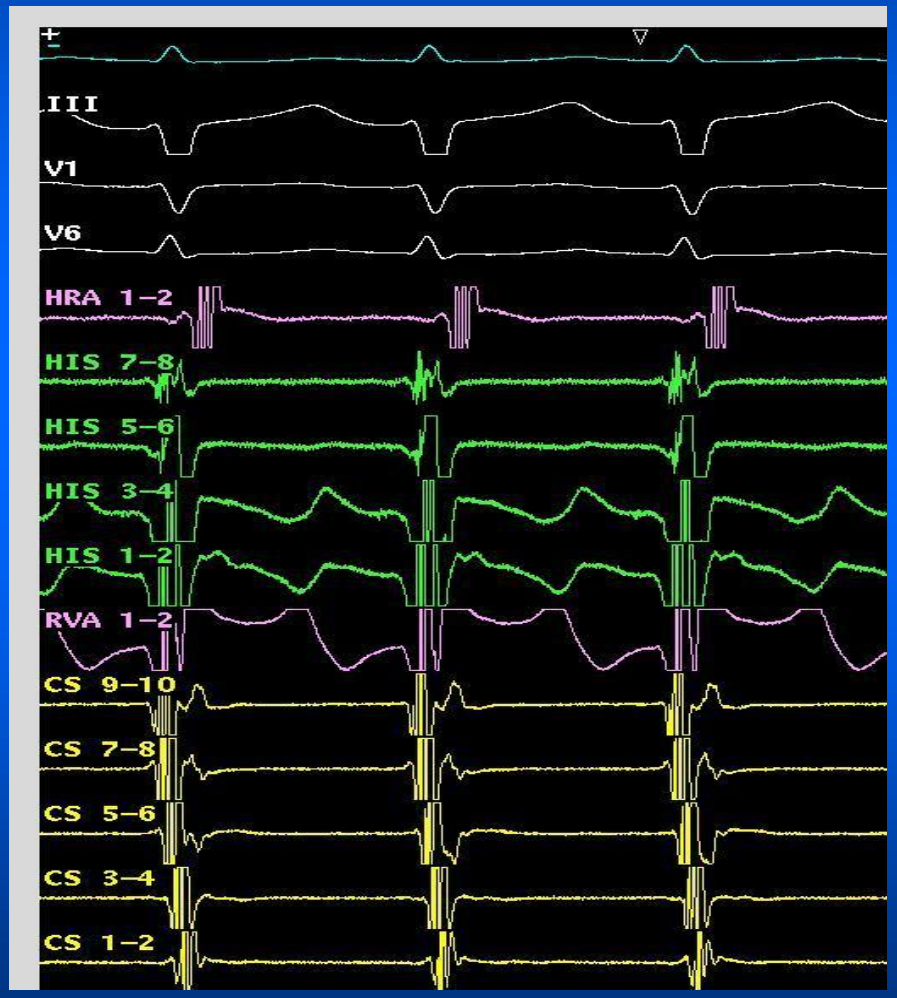




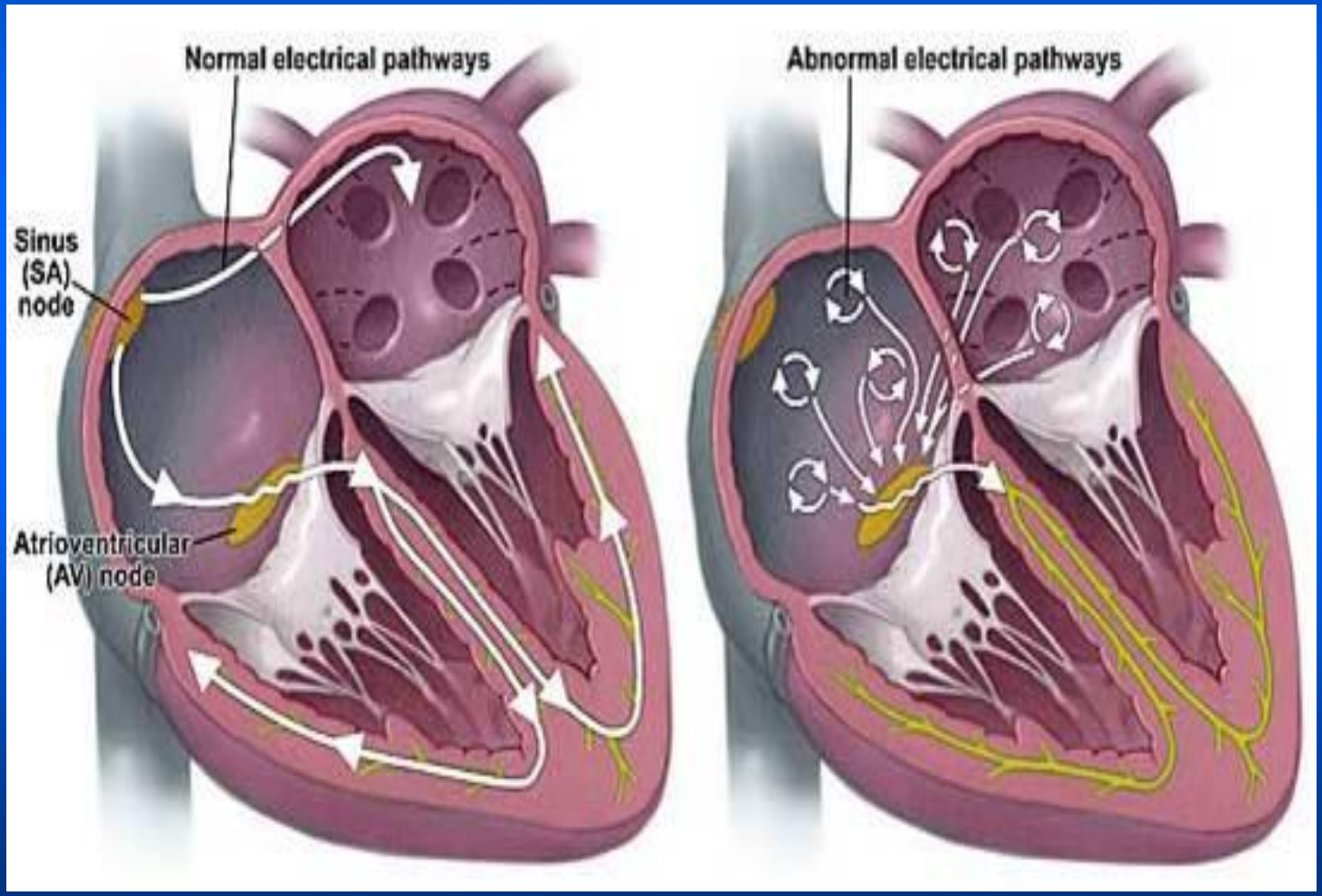


Catether placement during AVNRT ablation

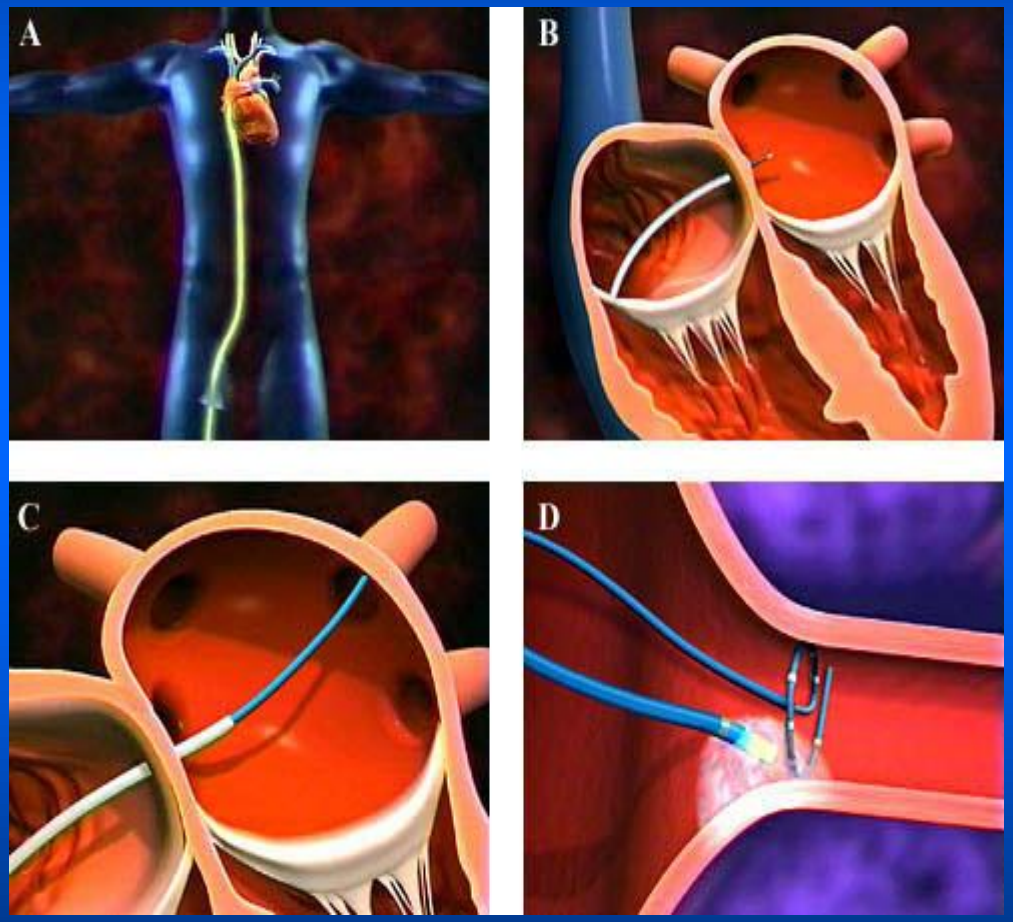


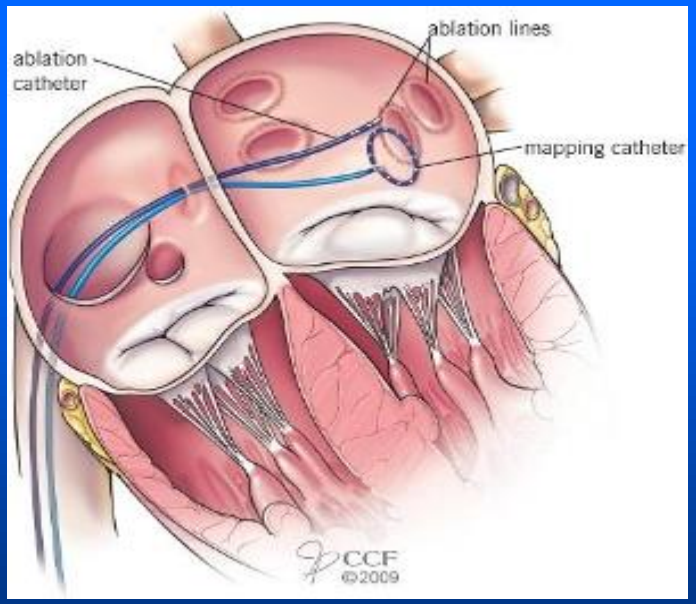


Atrial fibrilation



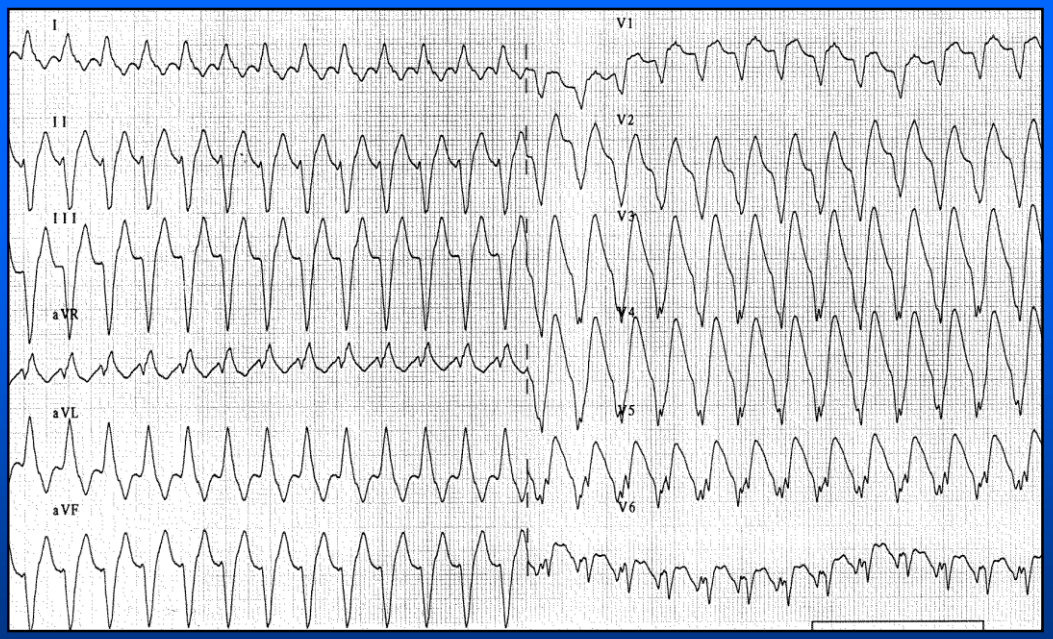
RFA x Cryoablation

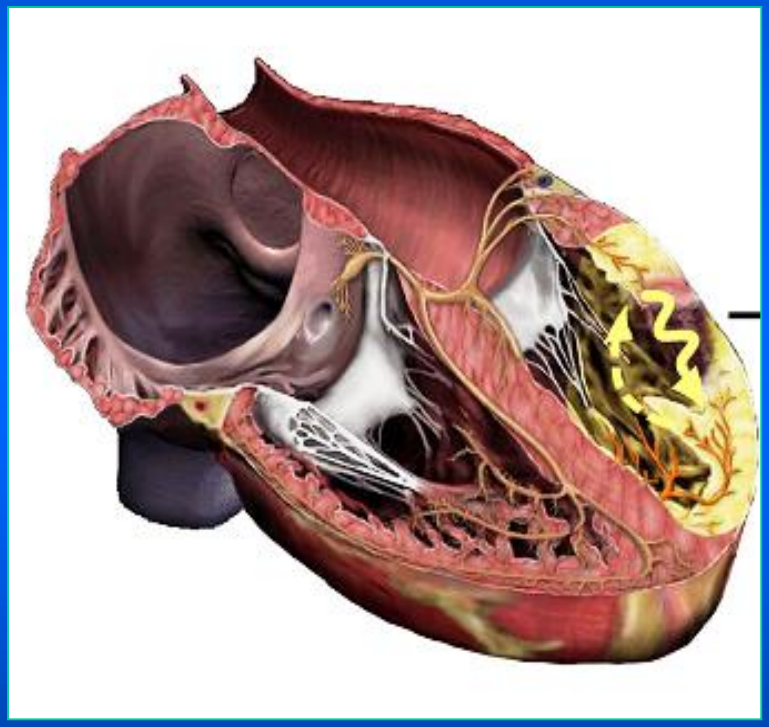




VT in structural heart disease

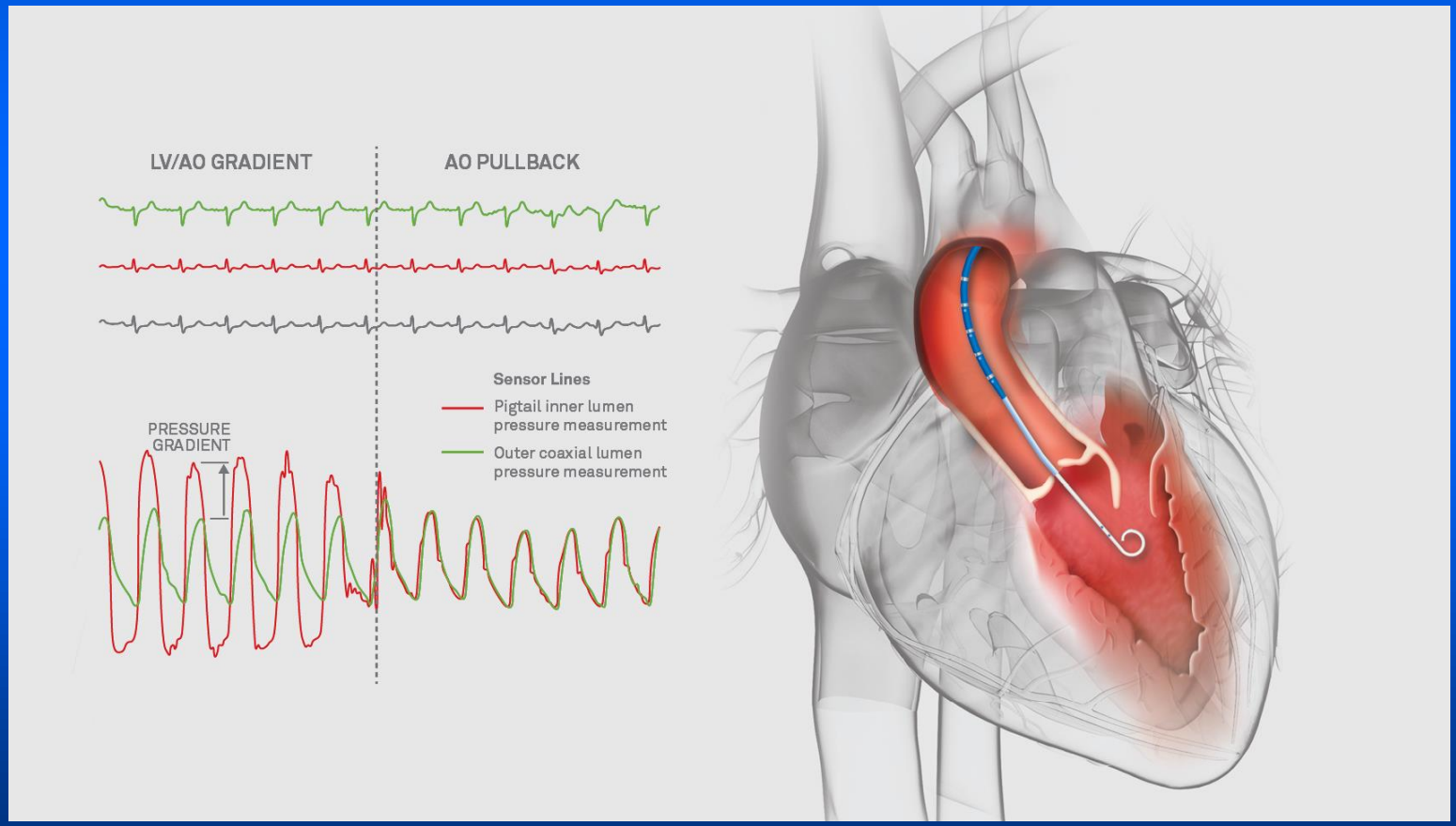
Reentry – possible in tissues with different conduction time





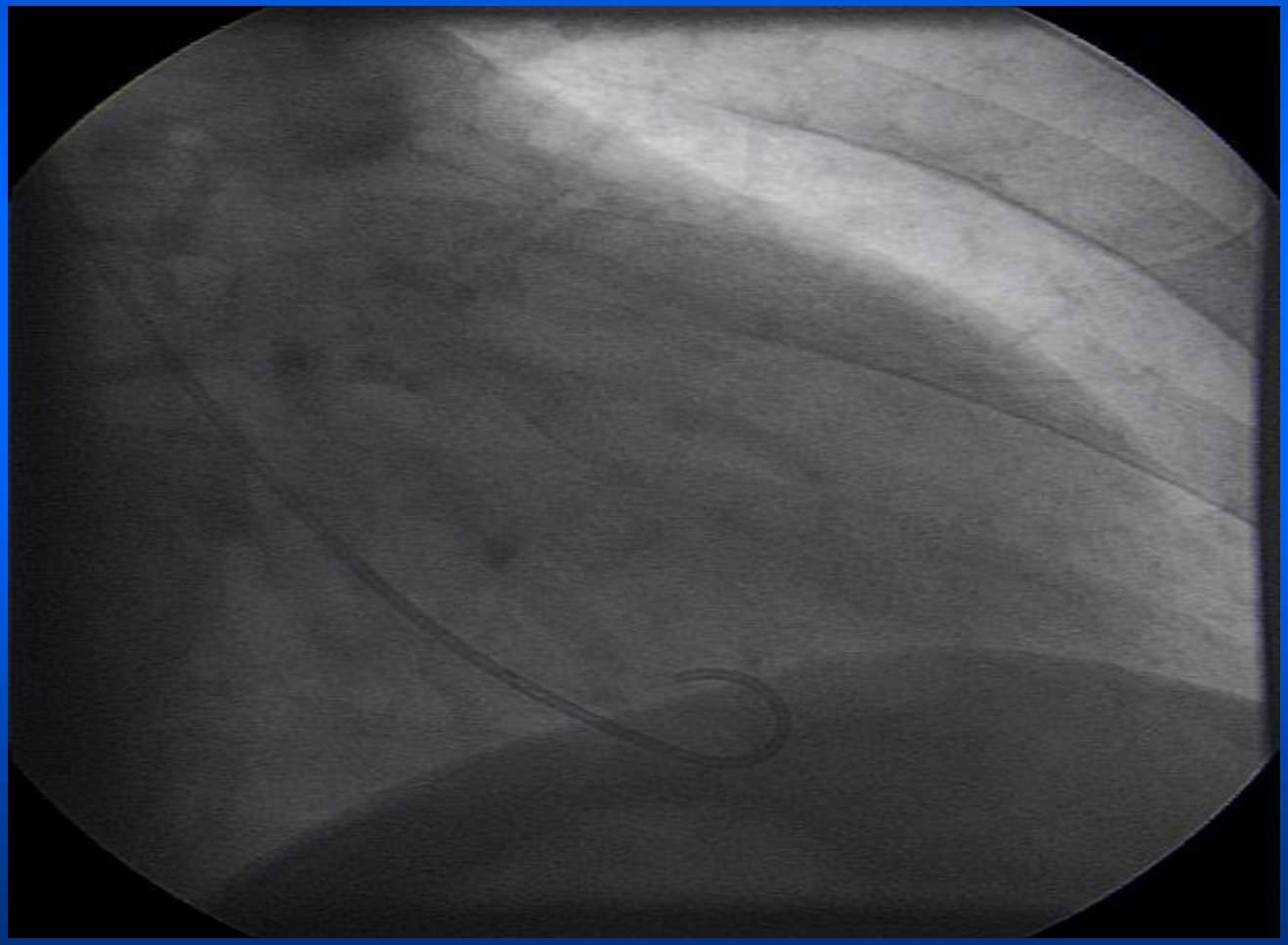
Invasive assessment of ventricular function

- Ventriculography – 2D imaging of ventricular function



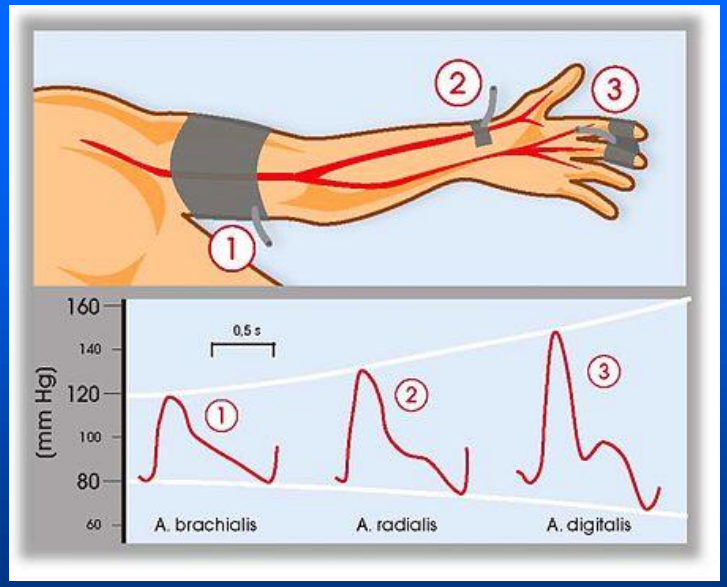
Invasive assessment of ventricular function

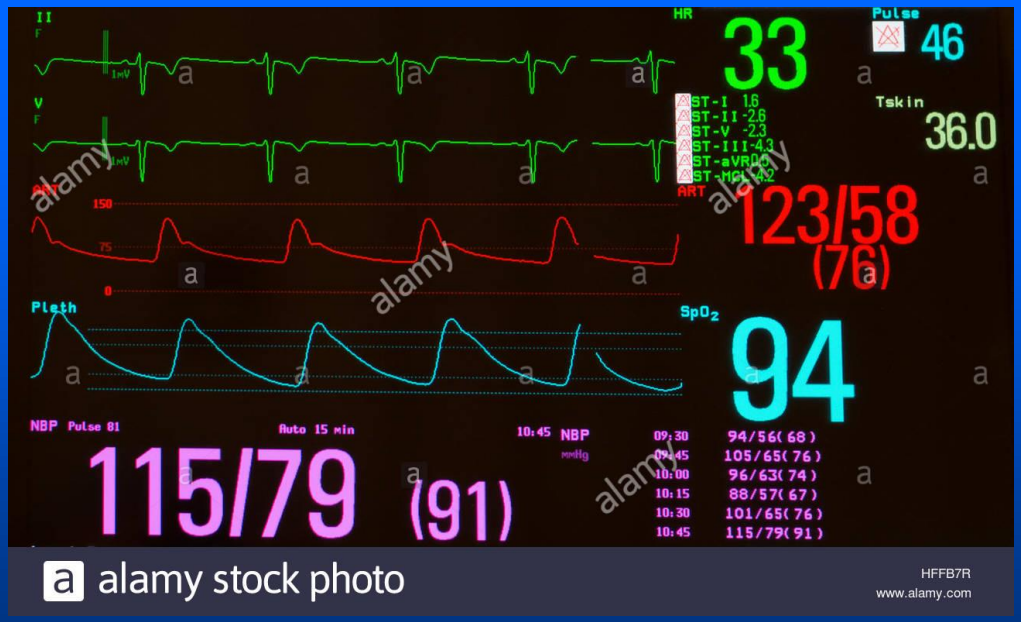
- Ventriculography – 2D imaging of ventricular function



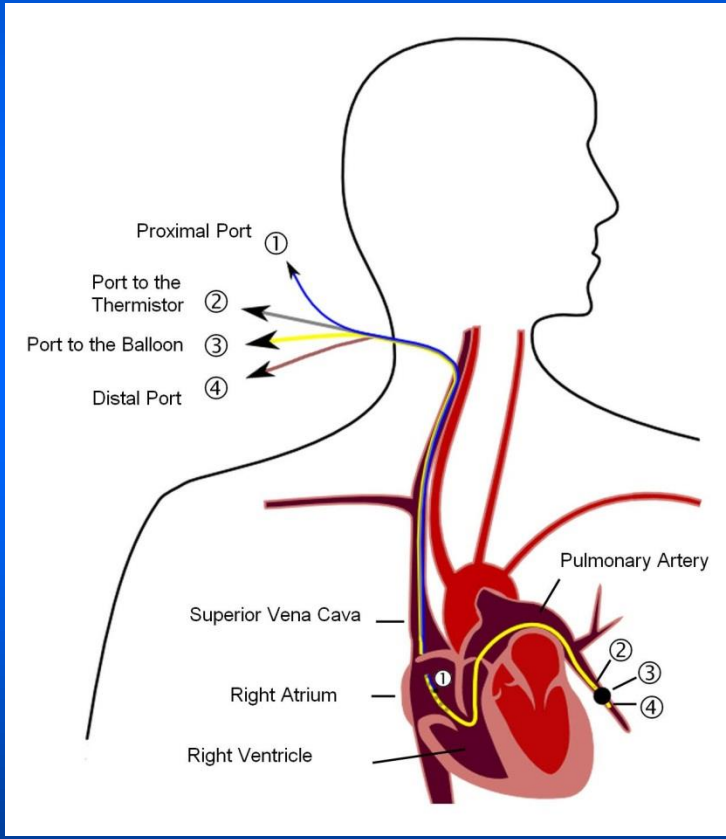
Invasive cardiac monitoring

- **Swan-Ganz catether** – measurement of pressure in PA, cardiac output
- **Arterial blood pressure** – beat to beat BP monitoring





Invasive monitoring of PCW, cardiac output



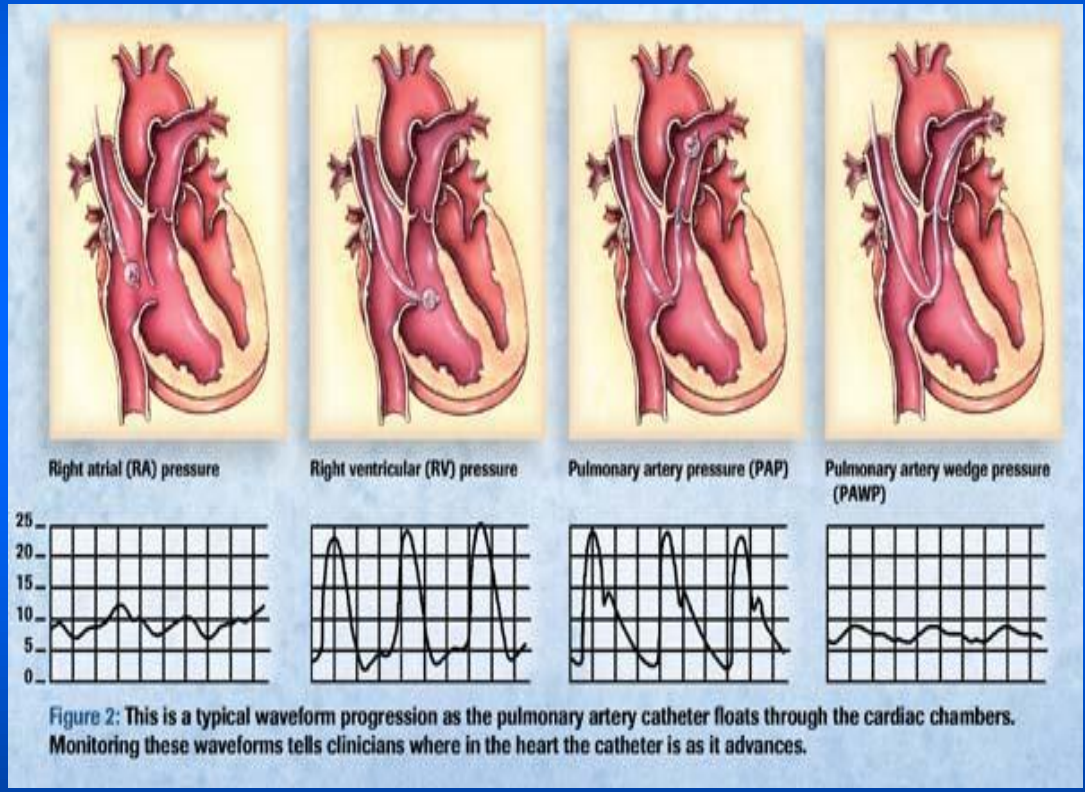
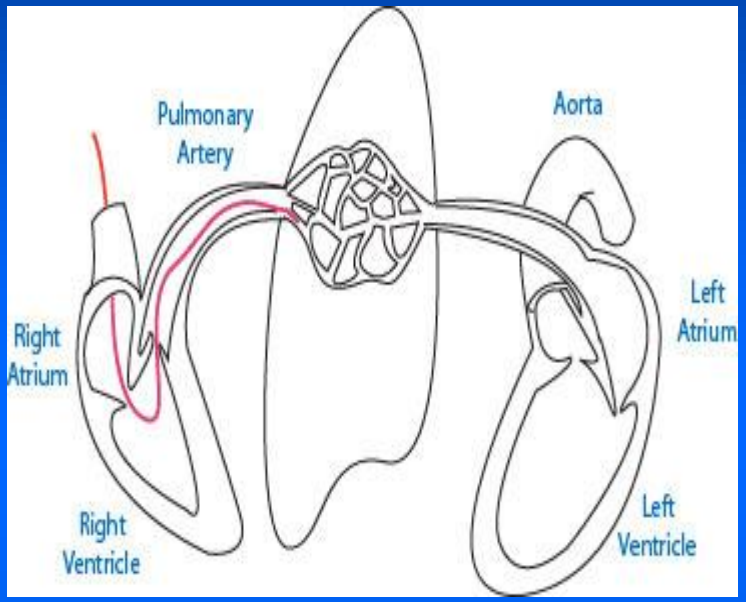
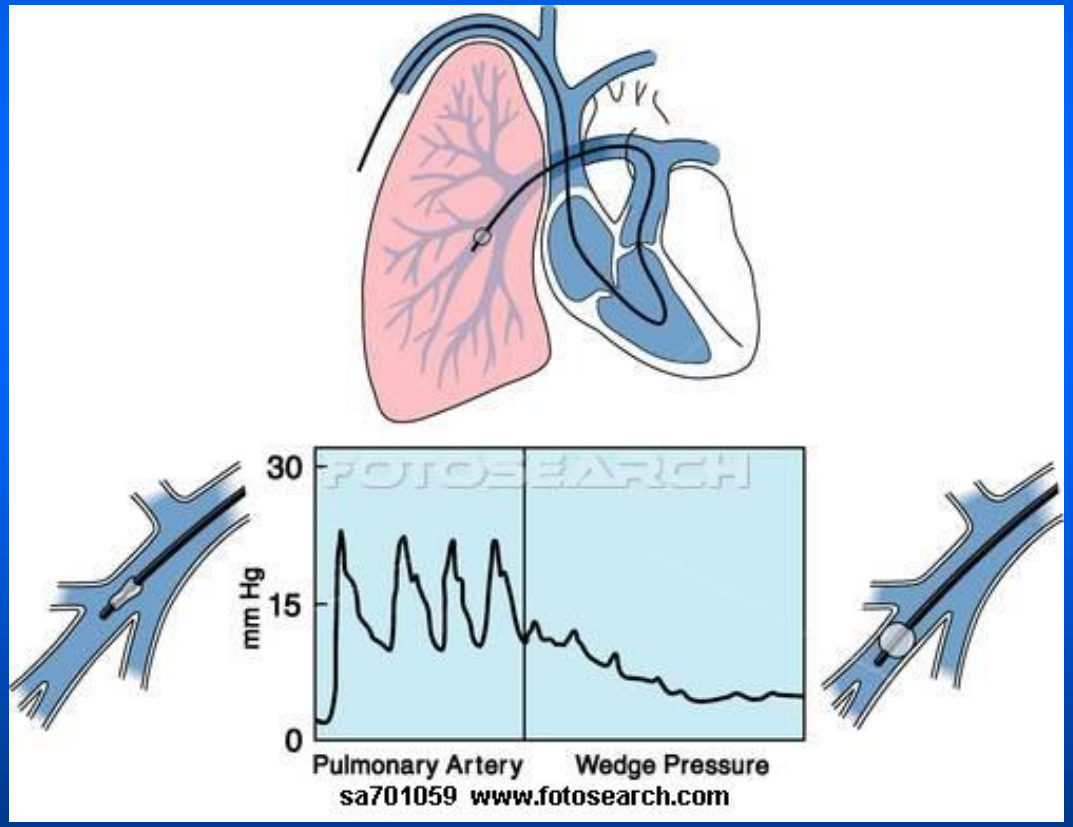


Figure 2: This is a typical waveform progression as the pulmonary artery catheter floats through the cardiac chambers. Monitoring these waveforms tells clinicians where in the heart the catheter is as it advances.

Invasive monitoring of PCW, cardiac output