

12 Lead ECG Interpretation- Part 2a Determination of Axis



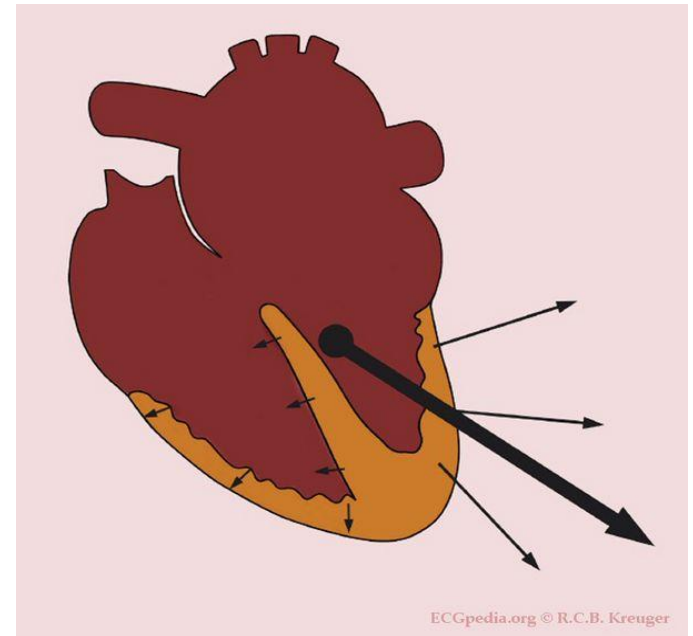
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Univ of North Carolina at Chapel Hill

No disclosures relevant to this presentation.

What is Meant by Axis?

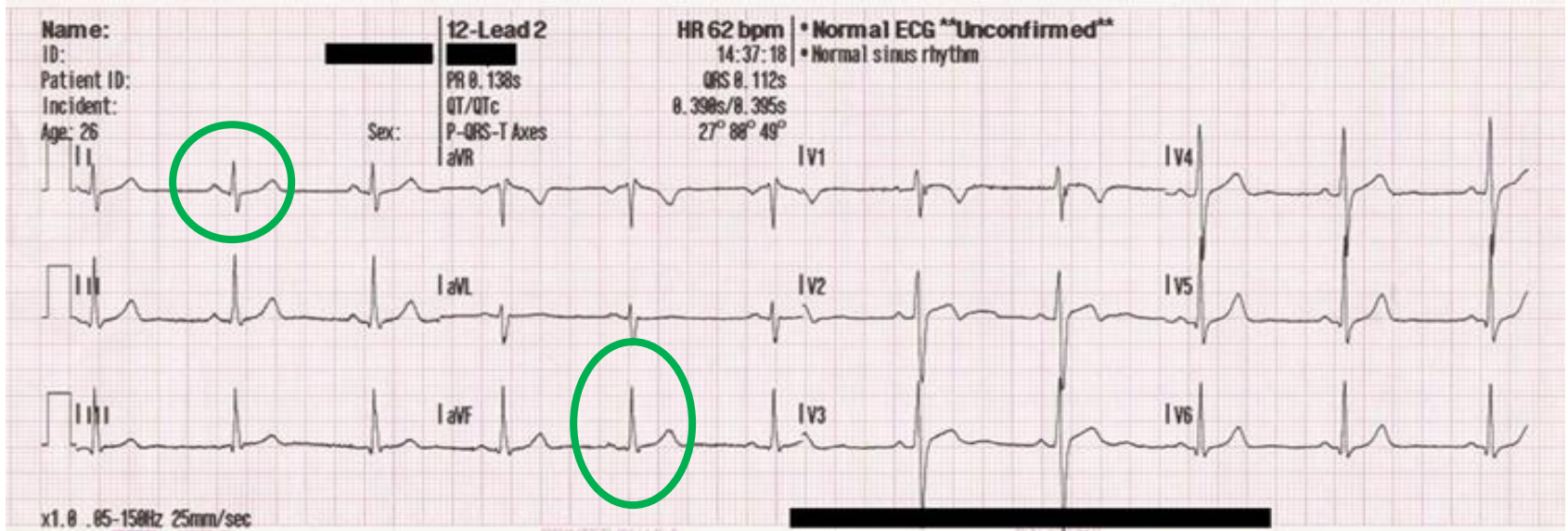
- Net direction of electrical vector during ventricular depolarization
 - Average direction of current flow
 - As the ventricles depolarize the direction of current flows leftward & downward b/c most of the ventricular mass is on the left

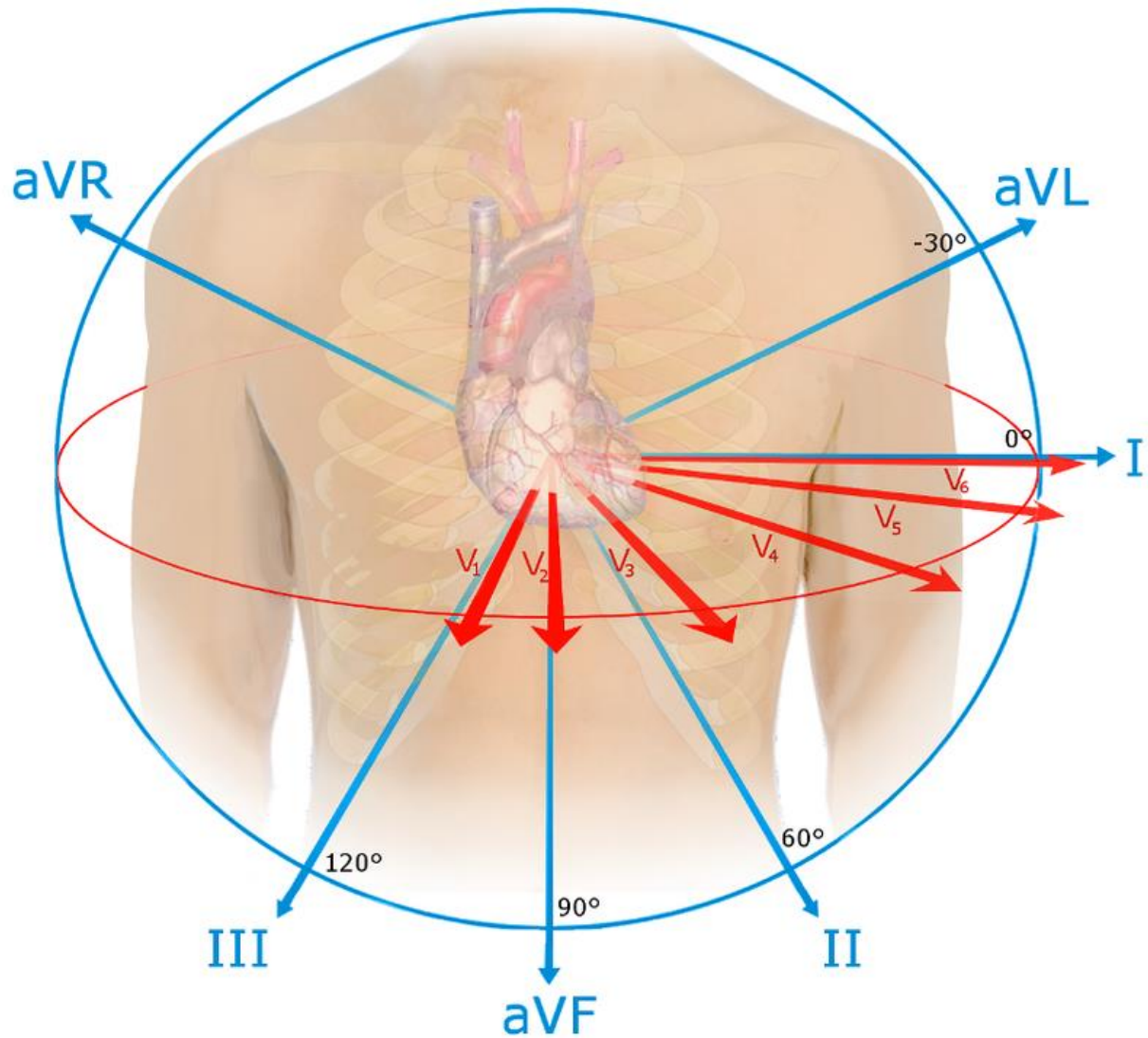


Systematic Interpretation of 12 Lead EKGs

– Step 2: Determine axis

- Determined by looking at 6 frontal plane leads
- Leads I & aVF most often used
 - Some sources use Leads I & II
- Variable among individuals





Courtesy of Dr. Nicholas Patchett. Available through creative commons via Wikipedia at: https://en.wikipedia.org/wiki/Electrocardiography#/media/File:EKG_leads.png

Determining Axis

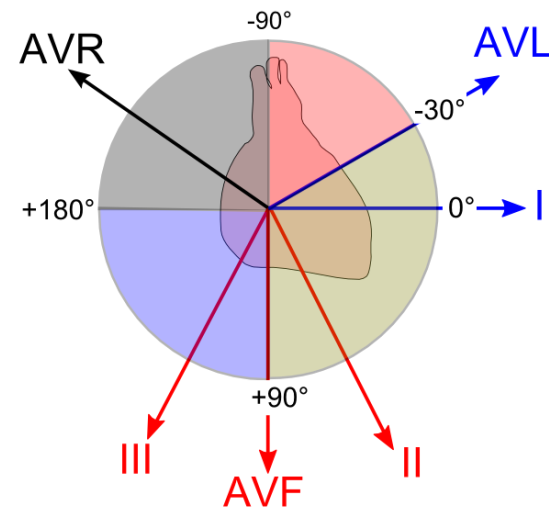
The QRS axis is determined by overlying a circle, in the frontal plane. By convention, the degrees of the circle are as shown.

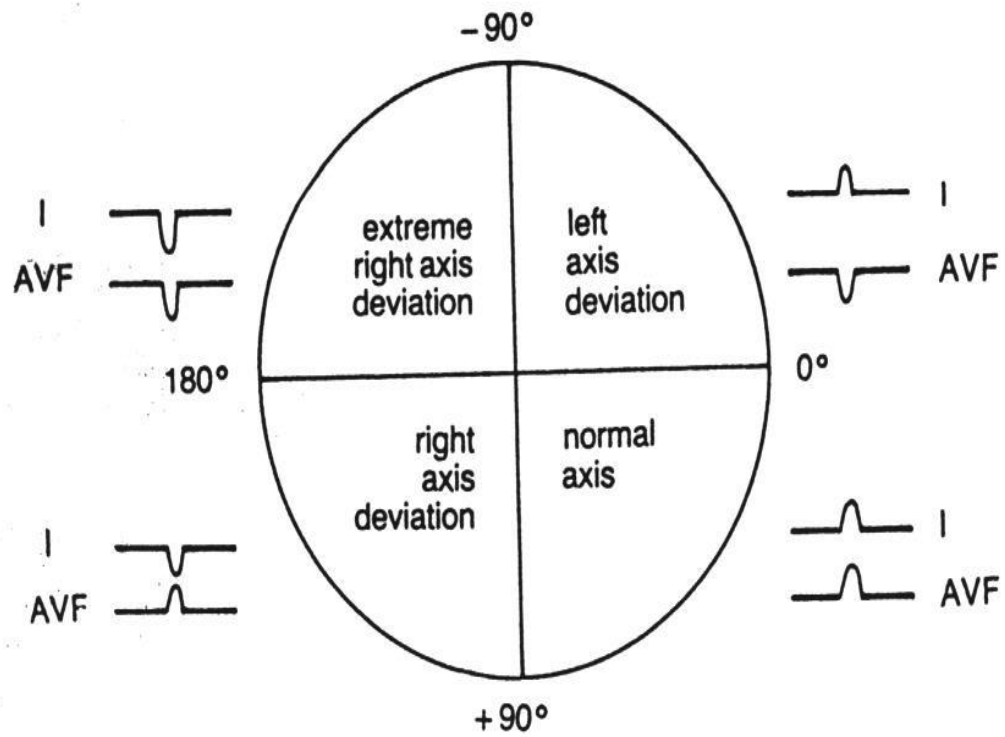
The **normal QRS axis** lies between -10° and $+110^{\circ}$.

A QRS axis that falls between -10° and -90° is **abnormal** and called **left axis deviation**.

A QRS axis that falls between $+110^{\circ}$ and $+180^{\circ}$ is abnormal and called **right axis deviation**.

A QRS axis that falls between $+180^{\circ}$ and -90° is **abnormal** and called **extreme right axis deviation**.





Thaler, 2007

Causes of Left Axis Deviation

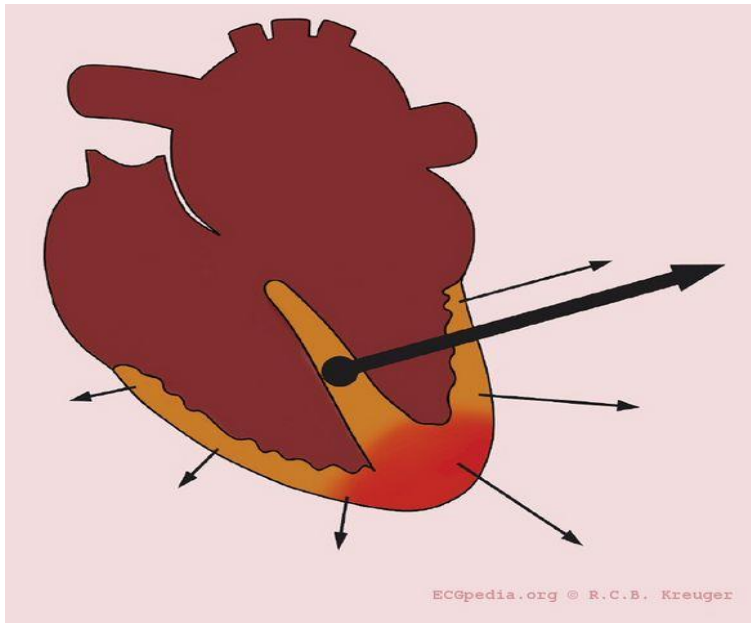
• Electrical Shifts:

- **Left ventricular hypertrophy**
- **Left bundle branch block**
- **Left anterior fascicular block**
- **Inferior wall MI**
- **Antero-septal MI**
- **WPW, Ventricular ectopy**

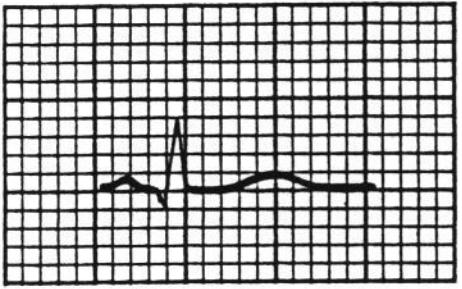
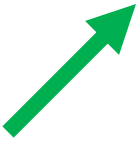
Mechanical Shifts:

- Expiration
- Emphysema
- Pregnancy; obesity
- Tumors; ascites
- Patient positioning
- Bleeding (trauma)
- Hyperkalemia

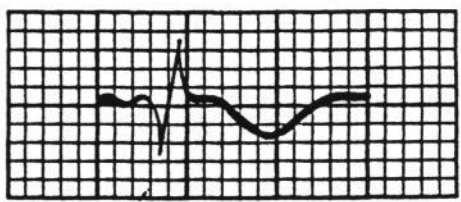
➤ *May be normal*



Source: Rob Kreuger, Medical illustrator, AMC, The Netherlands
Avail at: http://en.ecgpedia.org/wiki/File:Left_axis_dev.jpg

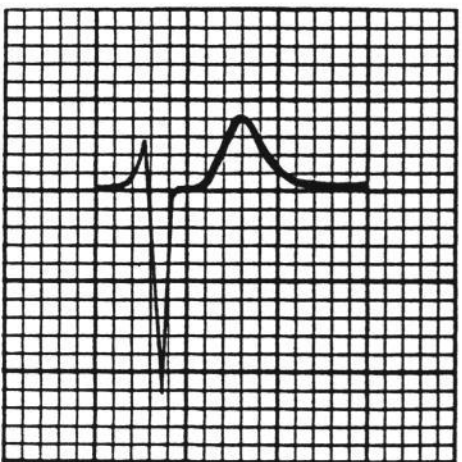


I

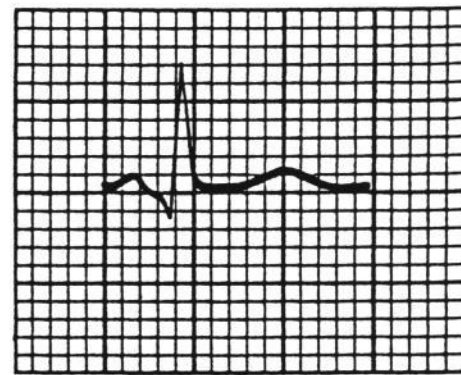


AVR

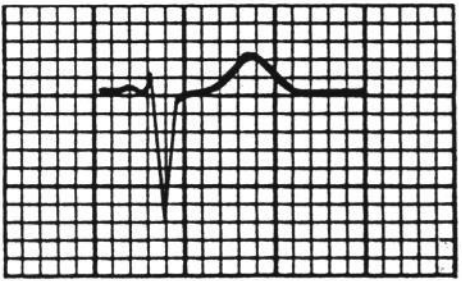
Thaler,
1999



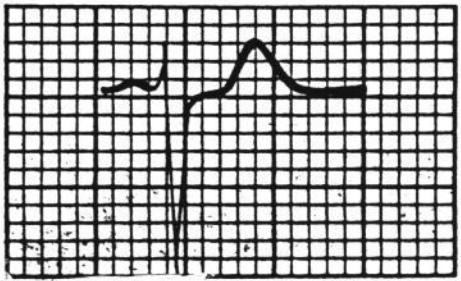
II



AVL



III



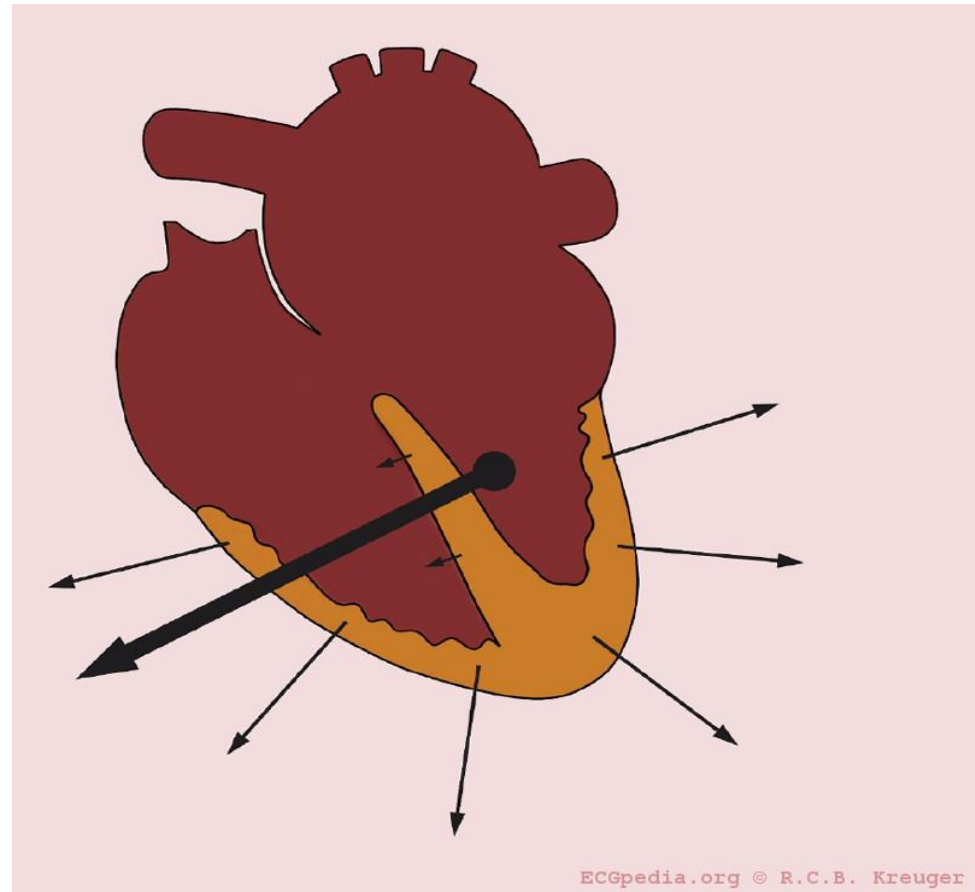
AVF

...

...

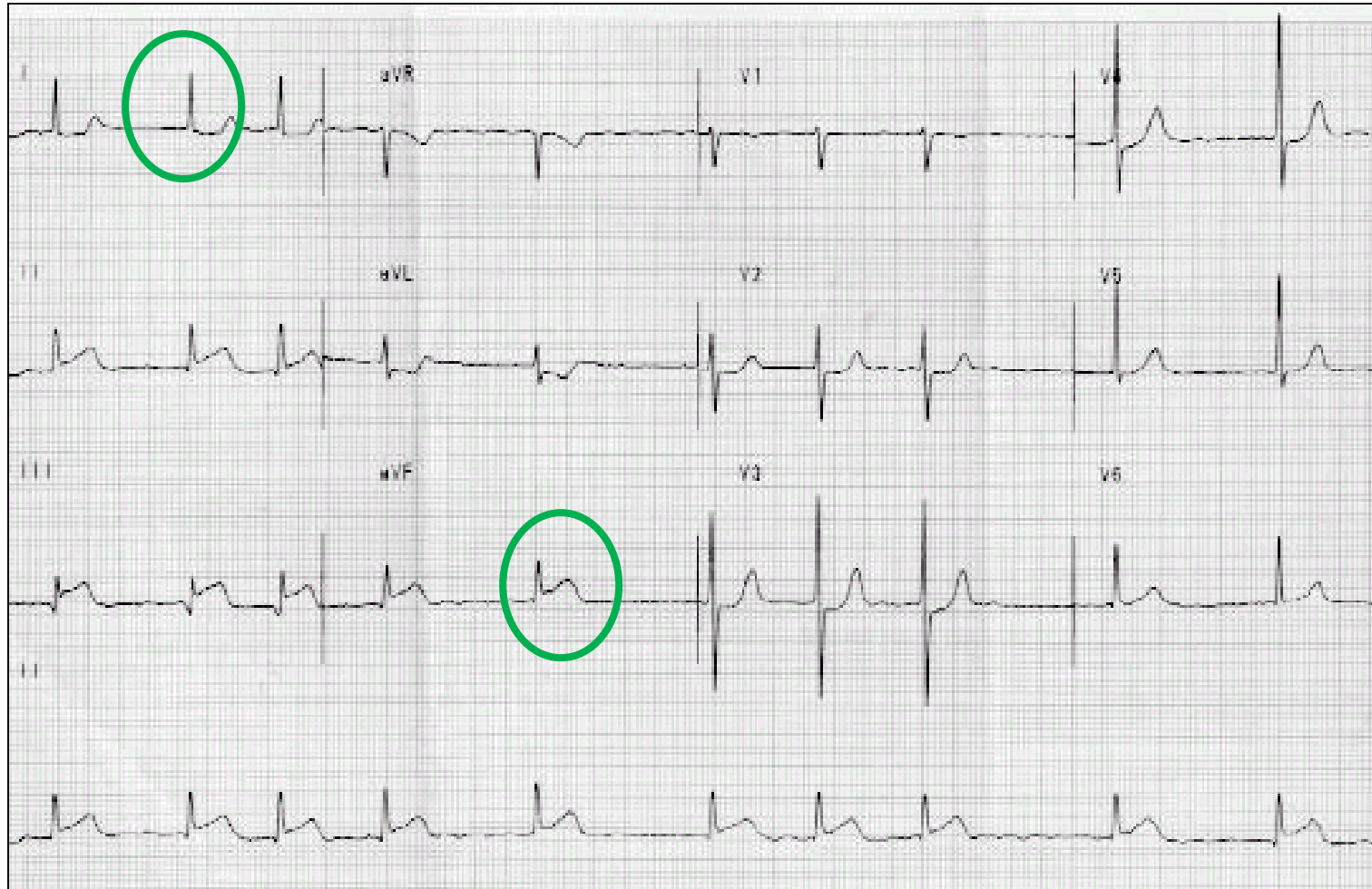
Common Causes of Right Axis Deviation

- **Electrical Causes:**
 - **Right ventricular hypertrophy**
 - **Right bundle branch block**
 - **Left posterior hemi-block**
 - **Lateral wall MI**
 - **Antero-lateral wall MI**
 - **WPW, V. Ectopy**
 - **May be normal**
- **Mechanical Causes:**
 - **Inspiration**
 - **Emphysema hypertension**
 - **Patient positioning**
 - **Bleeding, trauma**

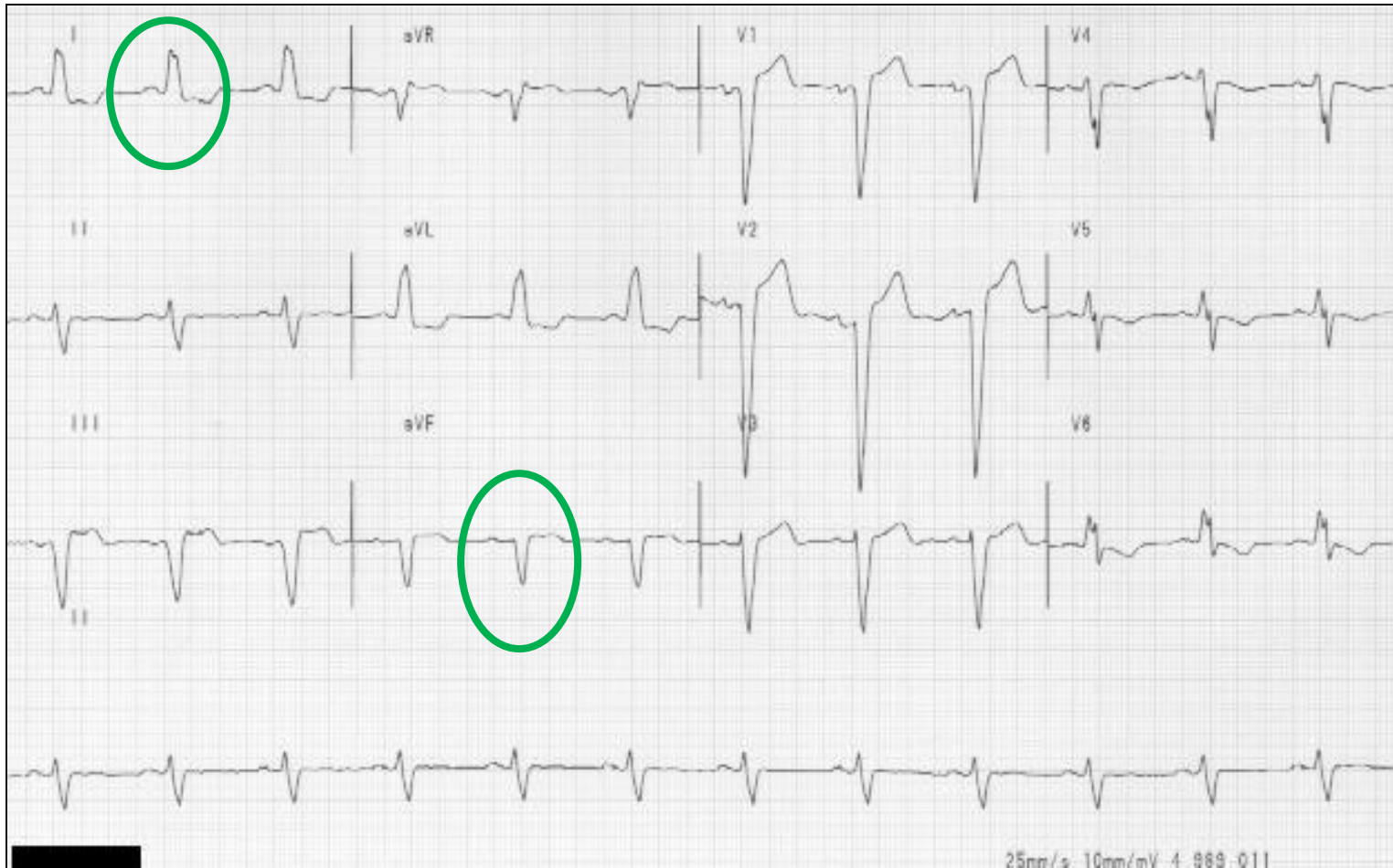


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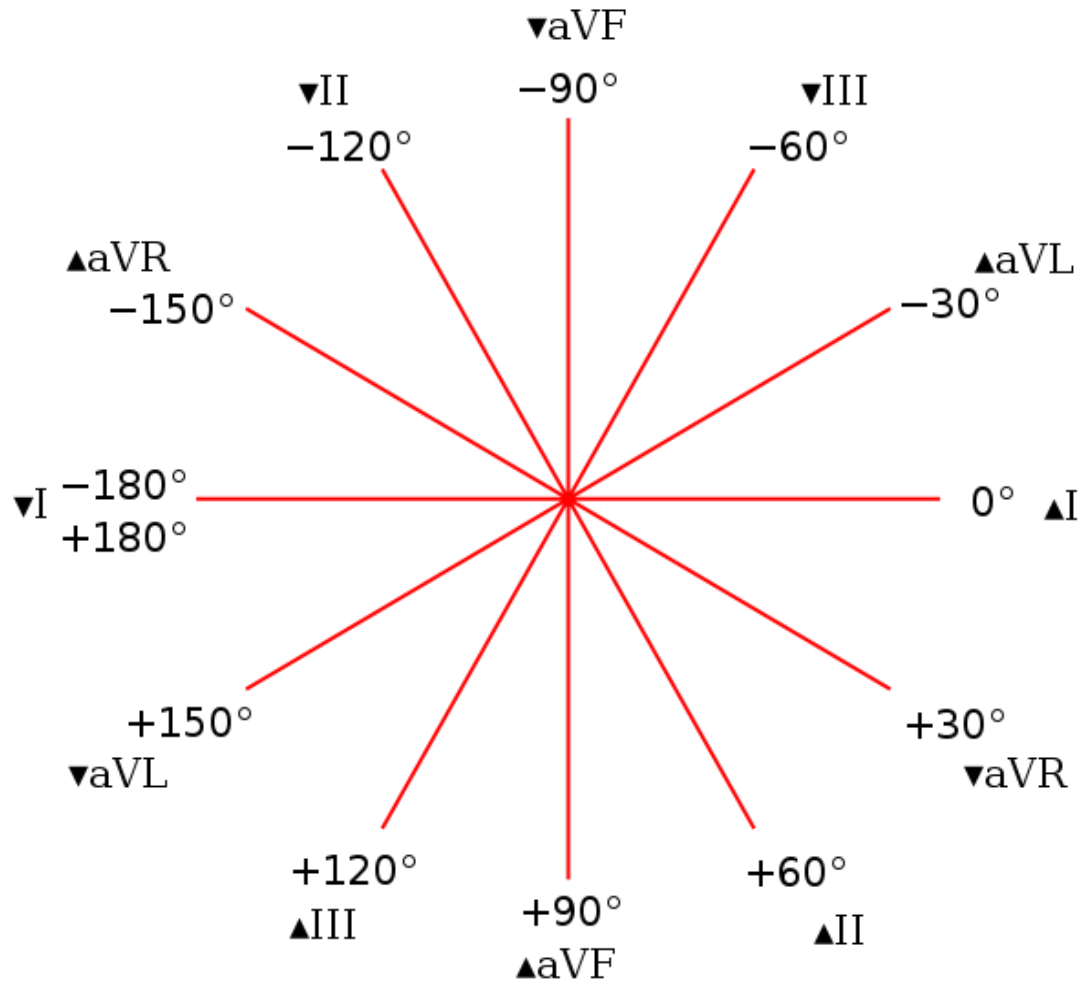
Determine the Axis for this ECG



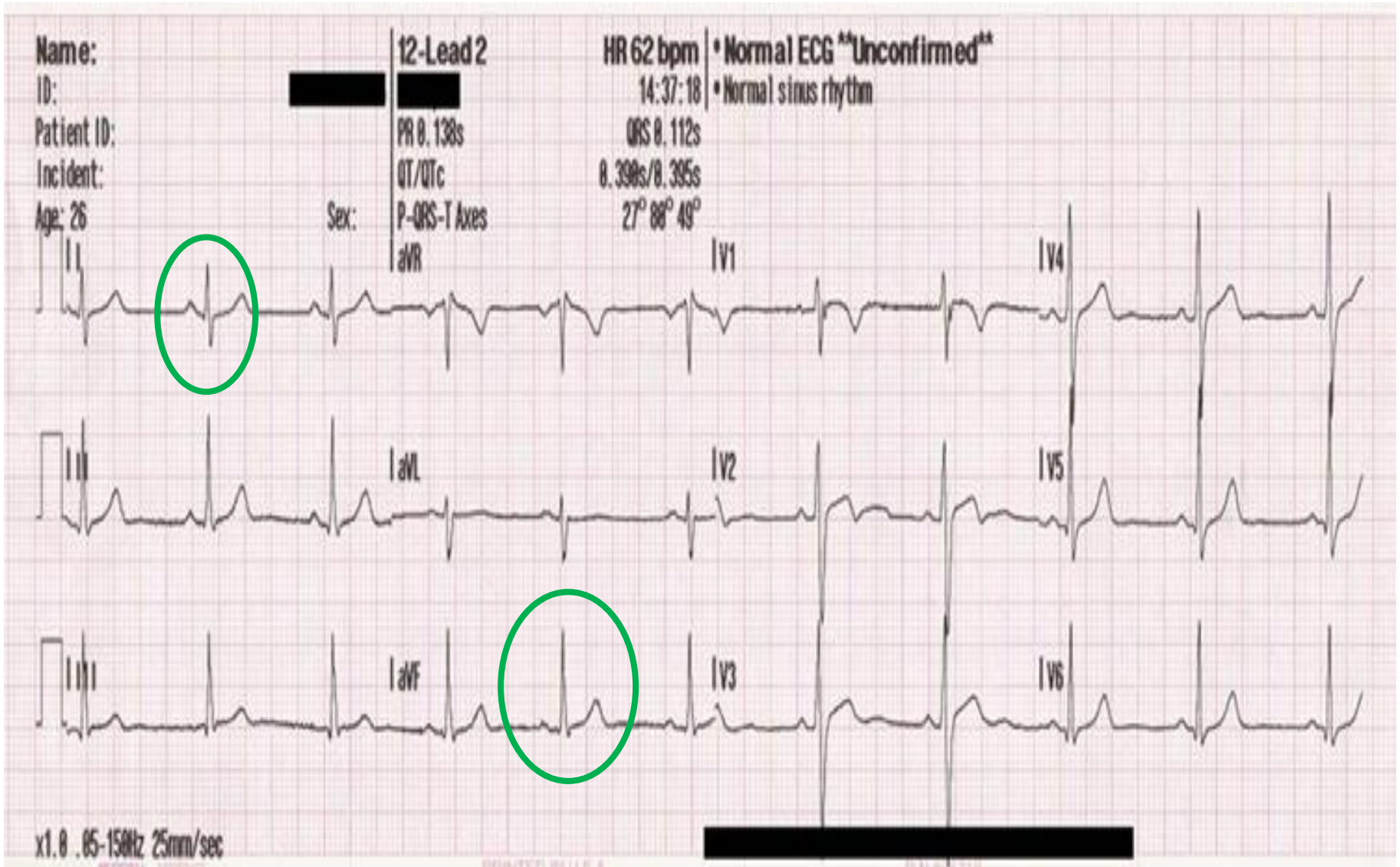
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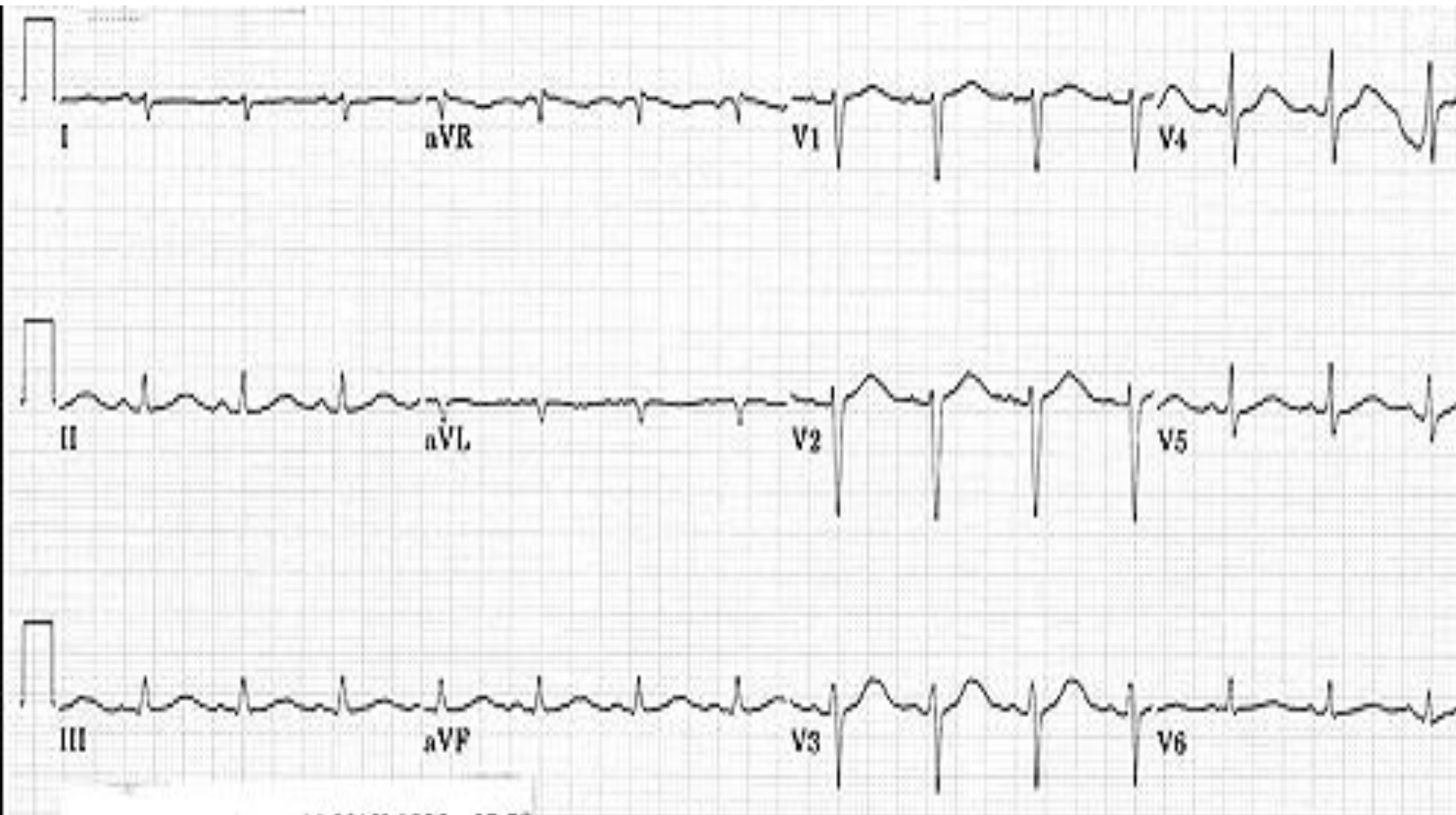
Determining The Exact Axis



Determining Exact Axis



Practice ECG: Rate, Intervals, Rhythm, Axis



Axis:

BBB:

PR interval? _____

QRS width? _____

Rate? _____

Rhythm? _____ Interpretation: _____