The Normal ECG
Normal ECG-Axis

**Normal to go in the same direction**

For quick axis, look at Leads I and II.

- If going same direction = Normal axis
- If they are leaving each other..they have ”left” each other, which is left axis deviation.
- If they come together it’s “right” to come together.

**Left Axis Deviation**

The QRS complexes have “left” each other..so left axis deviation

Causes:
1. LAFP
2. LVH-severe
3. Inferior M.I
4. COPD
5. WPW
Right Axis Deviation

Qrs are coming together...always “right” to come together=“right axis deviation”.

Causes:
1. RVH
2. Lateral or apical MI
3. LAFP
4. WPW

Right Superior Axis

Causes:
1. Severe RVH
2. Apical MI
3. Ventricular Tachycardia
4. Hyperkalemia
Normal ECG Intervals

- P-R interval.
- LEAD II.
- <200 is normal

Causes of Prolonged P-R.
- Age related changes
- Drugs
- High vagal tone

*** If not reversible and symptomatic, indication for PPM.

QRS Interval

- Should be between 80-100ms. >120ms is prolonged

**IF Prolonged and in Sinus
1. RBBB
2. LBBB
3. Paced RHYTHM
4. WPW

--NOT SINUS
1. PACED
2. V.T
3. SVT/ABERRANCY
4. WPW
**Q-T Interval**

Best looked at in V3. If not V3, lead with clearest t wave.

Worry a little - when greater than 500ms
Worry a lot if >600ms.

1. - computer not accurate in atrial fibrillation. Accurate when sinus.

- avoid q-t prolonging medications if q-t or corrected q-t is longer than 500ms.

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**Chamber Enlargement**

**Left Atrial Enlargement**

P wave longer than 3 small boxes... 120ms

Large 2nd deflection of p-wave
Right Atrial Enlargement

P wave height >2.5mm
-usually goes along with
rvh
-COPD/PHTN

RVH

1. Tall R wave in v1, V2
2. RAD
3. RAE
LVH

Best criteria is greater 10mm in avL.

V2 + V5 > 7 big boxes

Q waves

Should be one small box long, and 1/3 height of qrs to be called pathological q-waves

Allowed a q wave in III

Q waves
RBBB

Slurred s wave

>120 ms, 3 small boxes

Matching slurred s wave in V6

RBBB/Ischemia
**LBBB**

1. Q-S pattern in V1
2. >120ms “broad R wave”

Matching broad R wave in V6

**Paced Rhythm**
Paced Rhythm
WHEN A PACEMAKER GOES FAST:

1. It may be a BI-V pacemaker
2. IF NOT a BiV
   - SVT
   - PMT
   - undersensing
   - pt may have rate responsiveness

Clinical Issues with PPM.
- If poking thru skin--immediate hospitalization
- If redness..refer back to EP to assess
- If pt rate is going below 50 ppm may not be working
Battery life is usually 5-10 years
Leads can stay in indefinitely

Coronary Anatomy
Anterior M.I
Inferior M.I

Focus RCA
Infero-posterior M.I

Isolated Posterior
RV Infarction

Lateral Wall M.I
PERICARDITIS

Opposite in avR. P-r elevation, ST depression.

Diffuse ST-elevation, with p-r segment depression.
Electrolyte Abnormalities

Prolonged s-t segment, leading to prolonged q-t.

HYPOCALCEMIA

TX-CALCIUM

Electrolyte Abnormalities

Peaked T waves.

Hyperkalemia
WPW
First degree AVB

Second degree type 1
Weinkebach

Increasing PR intervals followed by dropped beat
Dropped QRS complex
Wienkebach

Grouped Beating

Second degree type 2
Complete Heart Block

Atrial Flutter
LOW VOLTAGE

RHYTHM STRIP: II
25 mm/sec; 1 cm/mV

Differential?
Torsades de Pointes with LONG-QT

2mg iv Mg given
Frequent miscall by computer/ER physicians of inferior ST-elevation