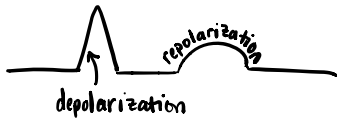
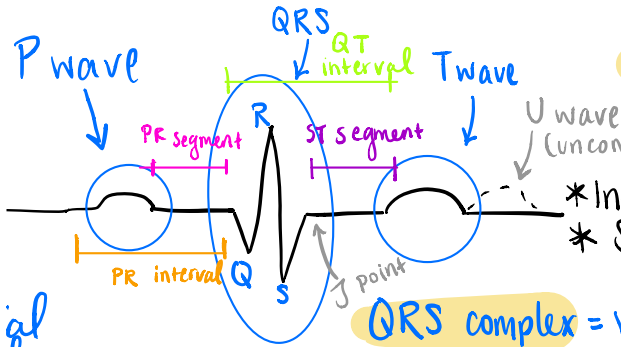


EKGs



Myocardial contraction is caused by **depolarization** of the myocytes. The recovery phase that follows depolarization is known as **repolarization**.



T wave = ventricular repolarization (ventricles are relaxing)

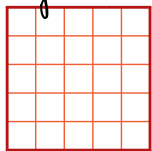
* Interval includes waves
* Segments are between waves

P wave = atrial depolarization (atria are contracting)

QRS complex = ventricular depolarization (ventricles contracting)

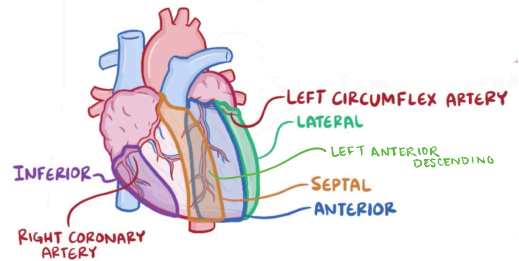
* Atrial repolarization occurs within the QRS complex. (Hidden)

Reading an EKG strip:



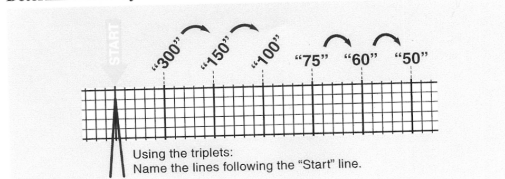
Each big box = 0.20 sec
Each small box = 0.04 sec

PR interval should be ≤ 0.2 sec. (one big box)
QRS segment should be ≤ 0.12 seconds (three small boxes)

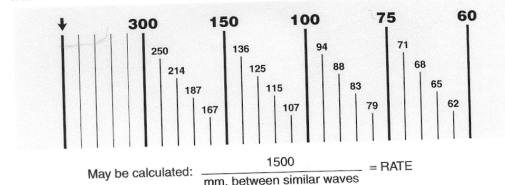


Determining Pulse:

Determine Rate by Observation (pages 78-88)



Fine division/rate association: reference (page 89)



Rate = ~ 75 bpm



* There are about 4 "big" red squares between each R wave, $\therefore$ the rate is 75 bpm.

"Sinus Rhythm" = normal rhythm

$\ominus \rightarrow \oplus$ Positive inflection on ECG

$\ominus \leftarrow \oplus$ Negative inflection

12 Lead ECG Placement:

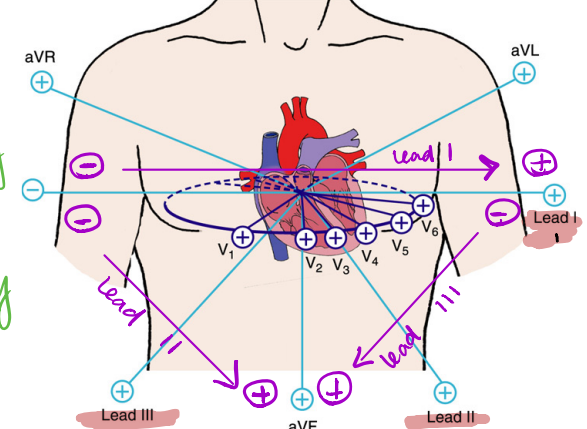
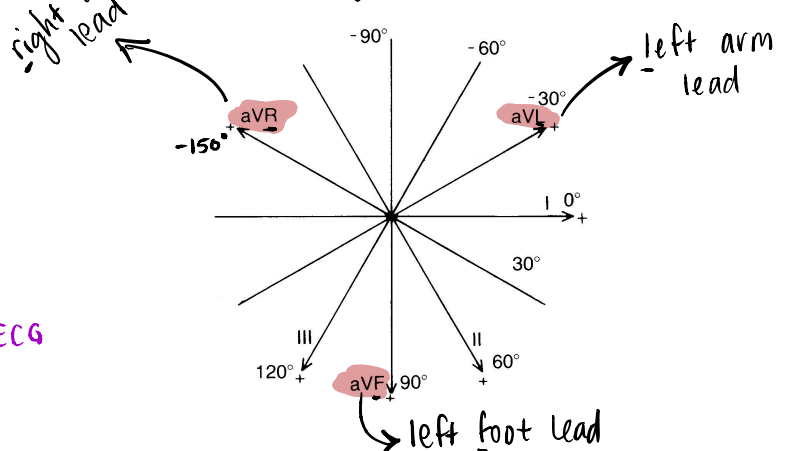


Figure 17-42 Electrocardiographic views of the heart.

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Inferior leads:
2, 3, aVF
R. coronary artery
Lateral leads:
I, aVL, V5, V6
Left circumflex artery
Septal leads
V1, V2
Anterior leads
V3, V4
Left anterior descending artery

Hexaxial Reference System:

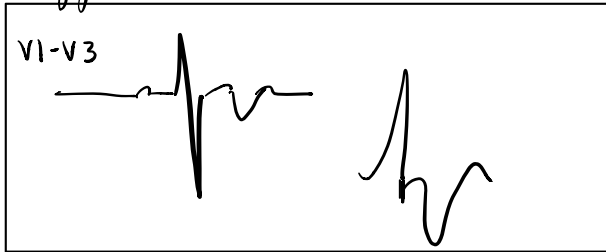


Brugada Sign: Coved ST elevation $>2\text{mm}$ in ≥ 1 lead of V1-V3 followed by a negative T wave.

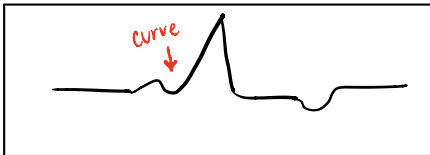


Way to remember: "RBB, invert T, STE, V1-3"
Looks similar to a RBB w/ ST elevation in V1-V3

Hypertrophic Cardiomyopathy (HOCM): left ventricular hypertrophy; narrow "dagger" Q waves in lateral/inferior leads, deep T wave inversion.



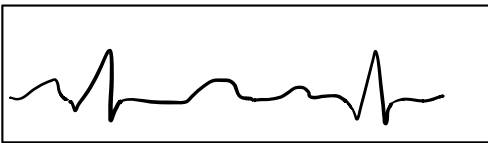
Wolff - Parkinson - White (WPW): Short PR $<120\text{s}$, delta wave (curved stroke), Wide QRS $\geq 120\text{s}$, secondary ST repolarization



QTc Prolongation: QTc $>500\text{ msec}$

Normal Values:

- Men $<440\text{ msec}$
- Women $<460\text{ msec}$



Commonly d/t electrolyte abnormality, meds & toxins.
familial.

ECG Checklist:

- 1) Is there a P wave in front of every QRS? Are they all the same?
- 2) Is the PR interval normal or prolonged? Does it stay the same?
- 3) Is the QRS complex normal or wide? Are they all the same?
- 4) Is the rhythm regular or irregular? Are there any premature beats?
- 5) Is there any T-wave inversion or ST segment elevation or depression?

Abnormal Rhythms

NAME	EKG	INFO.
Normal Sinus Rhythm		- Normal ratio P, QRS, T - Paced by SA @ 60-100
Tachycardia		- Normal ratio P, QRS, T - Rate > 99 bpm
Bradycardia		- Normal ratio P, QRS, T - Rate < 60 bpm
Junctional Rhythm		- SA node not functioning so AV node takes over - Absent P (no atrial dep.) or inverted P (signal spreads backwards from AV).
1° Heart Block		- Partial block of AV. - PR > 0.20 sec (one big box) - If R is far from P, then it is 1°.
2° Heart Block I (Wenckebach)		- Partial block of AV. - Progressively longer PR, then drop a QRS. - Longer, longer, than you drop... then you have a "Wenckebach".
2° Heart Block II		- Partial block at bundle of His - Occasional dropped QRS (QRS; reg. irreg.) 2:1 → when you drop a QRS for every second P wave. (3:1 = for every 3rd P wave)
3° Heart Block		- QRS is wide d/t block at the AV node. - QRSs are coming with no connection to a preceding P wave.
STEMI		- ST elevation myocardial infarction. - At least 0.04 sec (one small square) or 1/3 of the entire QRS amplitude. - Emergency
A-Fib		- Irregularly Irregular - No P waves, normal QRS.
V-Tach		- Rapid irregular electrical activity - Emergency - With or without pulse!

MI notes:

Anterior MI = ST elevation in V₁-V₄. * Left main or LAD *

Lateral MI = leads I, aVL, V₅, 1/3 V₆. * L main or L. Circumflex *

Posterior MI = V₁-V₃ + horizontal ST depression, tall/broad R waves, upright T waves, dominant R wave. * R. coronary artery *

Inferior MI = leads II, III, aVF * R. coronary artery or L. Circumflex *

Ischemia = ST seg. depression; inverted T wave (except in V₁ & V₂)

Infarction = elevated ST seg.

Necrosis = pathologic Q wave (old MI)

NAME	EKG	INFO. Created by Leila Nabavi
V-Fib		- Irregularly irregular - Emergency
Torsades de Pointes		- Wave-like pattern "Somewhere between V-Fib and V-tach" - Will turn into V-Fib if left untreated. - Emergency
Bundle Branch Blocks		- Ventricles do not depolarize simultaneously. - QRS > .12 sec. (3 small blocks) - Produces a 'RiR' pattern (aka "Bunny Ears") - RBBB = seen in V1-V3 - LB BB = V4-V6
Left Ventricular Hypertrophy		- R waves are VERY tall in any leads V4-V6 + the deepest S wave in any leads V1-V3 exceeds 40mm. - Right vent. hypert. = Tall R's in V1-V3
Supra-ventricular tachycardia		- Fast, narrow, but regular (but no P wave) - Originates at AV node in a cycle that repeats - May break with vagal maneuvers - Rate: Usually around 180 bpm.
Atrial Flutter		- Fast, narrow, regular (saw-tooth pattern) - Rate is usually 150 bpm b/c of 2:1 block

* Treat with adenosine.

* Rate is controlled w/ β -blockers or calcium channel blockers