

Dr. Lawrence G. Altman

www.lawrencegaltman.com

Some illustrations are courtesy of McGraw-Hill.



LAB

EKG *and* **Blood Pressure**

Review Lecture notes on conduction through the heart.

SELF-STIMULATION (SA Node)

The heart does NOT require nerves to beat.

(Nerves usually change the RATE the heartbeat)

Ectopic beats: originate outside of the normal pacemaker.

**Conduction through GAP JUNCTIONS (low resistance)
found in intercalated discs of cardiac muscle.**

EKG values are small voltages since readings are taken through the skin (some distance from the heart).

Actually, measures average voltage output of millions of cardiac cells.

Electrode Placement

For a 3 lead setup:

Ground

LEAD 1

(BASE of HEART)

Right wrist, left wrist

left ankle

LEAD 2

(RIGHT SIDE OF HEART)

Right wrist, left ankle

left wrist

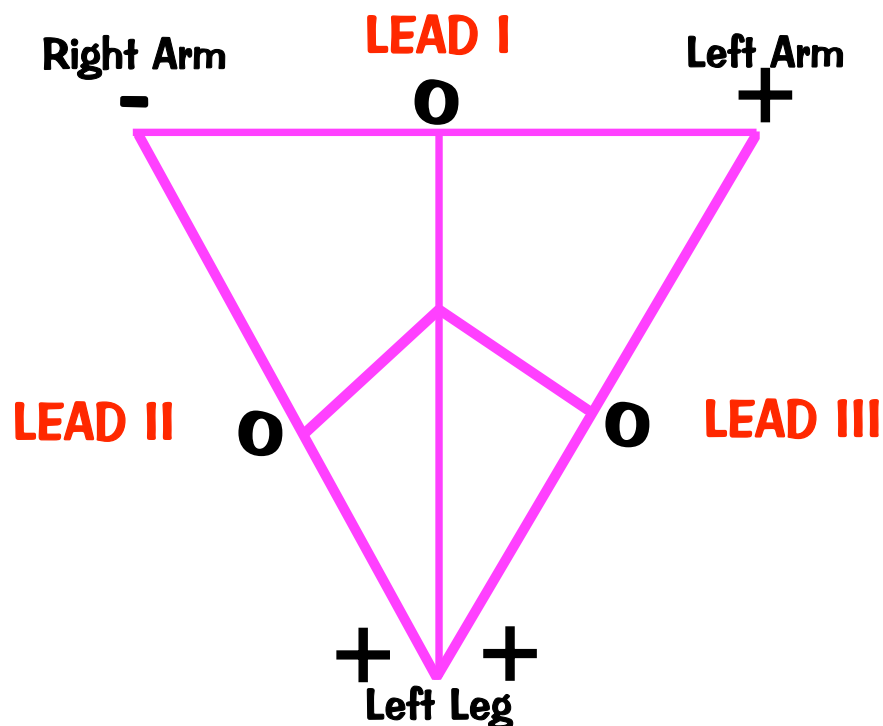
LEAD 3

(LEFT SIDE OF HEART)

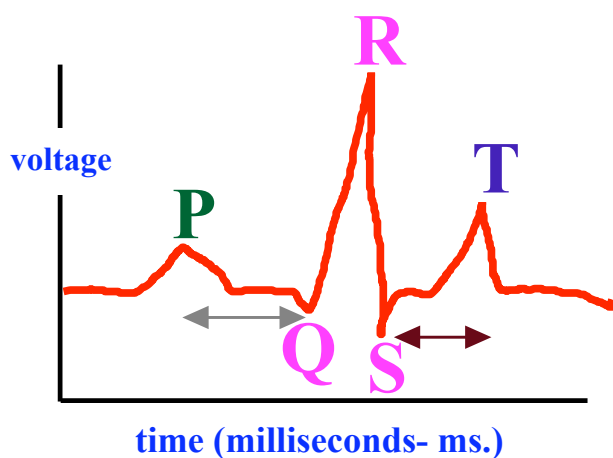
left wrist, left ankle

right wrist

EINTHOVEN TRIANGLE



EKG/ECG



P = atrial depolarization
(conduction through atria)

QRS complex =
ventricular depolarization

T = ventricular repolarization

S-T line = refractory state of
the ventricular myocardium

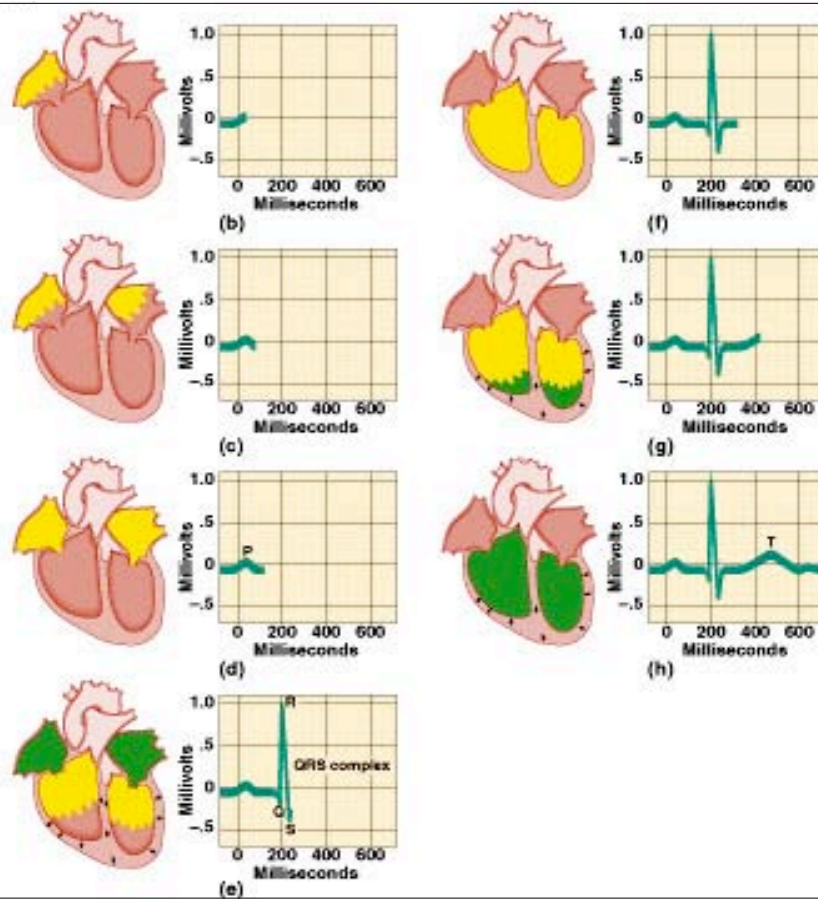
P-Q line = nonconductive
state of AV during which
atrial systole can be
completed.

EKG/ECG

Summary

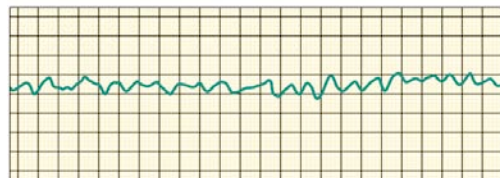
- P** atrial depolarization; time for the impulse to travel from the sinoatrial node (SA) throughout the atria.
- PR** interval time for the impulse to travel from the atria ----> bundle of His ----> bundle branches of Purkinje's fibers
- QRS** complex ventricular depolarization; time varies with sex/age
- QT** interval time necessary for ventricular depolarization AND repolarization. time varies with sex/age/heartbeat
- T** wave repolarization of the ventricles. sometimes followed by a U wave (His/Purkinje's fibers repolarization)...not shown.
- ST** line indicates: end of ventricular depolarization AND beginning of ventricular repolarization

EKG

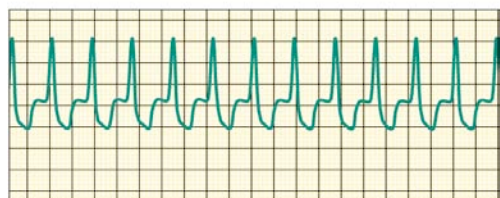


Arrhythmias

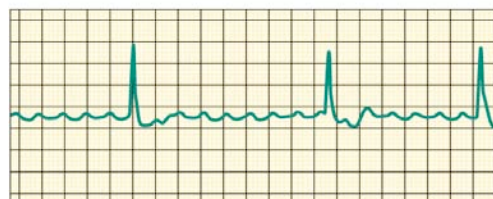
Ventricular fibrillation
rapid, uncoordinated
depolarization of ventricles



Tachycardia
rapid heartbeat



Atrial flutter
rapid rate of atrial
depolarization



Bradycardia



Excellent EKG Exercise: Link at our Lab website!

Sample EKG (ECG) Interpretations

Normal Heart:

P wave always followed by a QRS wave.

Damage to Coronary Circulation:

Waves may widen (contractions are slower).

Also, wave shape changes:

Example- ST segment depression

Distance between two successive QRS waves:

Too close together- Heart beating too fast.

Too far apart- Heart beating too slowly.

BLOOD PRESSURE

measured with sphygmomanometer

1st Korotkoff Sound: systolic pressure
artery has opened enough for blood to squirt through.

Last Korotkoff Sound: diastolic pressure
artery completely opened; no more turbulence in blood.

Systolic BP - Diastolic BP = PULSE PRESSURE
(actual working or driving pressure of the blood)

END

