EKG Workshop

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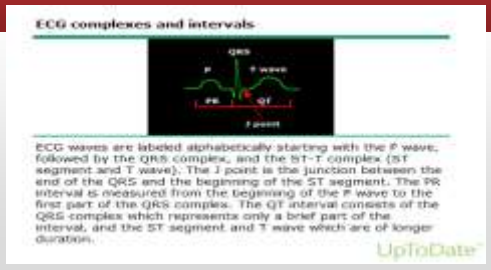
ECG Workshop

- Initial approach to ECG Reading
  - Shamelessly stolen (simplified) from Dubin
- Special Clinical Situations
  - RBBB and LBBB
  - Heart blocks
  - Abnormal rhythms
  - Pericarditis/Electrolyte abnormalities
- ECG Jeopardy
- Practice ECGs



Initial approach to ECG Reading

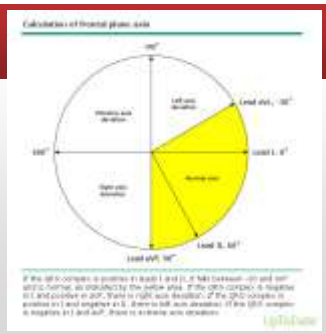
Rate
    intervals
Rhythm
Axis
Hypertrophy
Injury
    T waves
    ST segments
    Q waves

Rate

- <60 bpm bradycardia
- >100 bpm tachycardia
- Intervals
  - PR <.14 junctional, WPW >.20 1st degree AV block
  - QRS >.12 RBBB, LBBB, NSIVCD
  - QT correct for rate .40 +/- .04

Rhythm

- Check for P waves
- Are P waves related to QRS complexes
- Regular or irregular

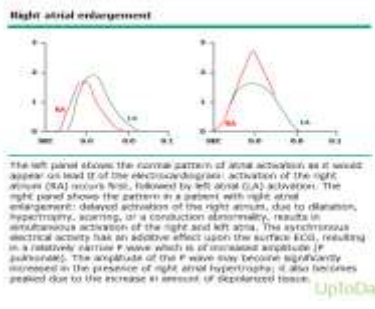


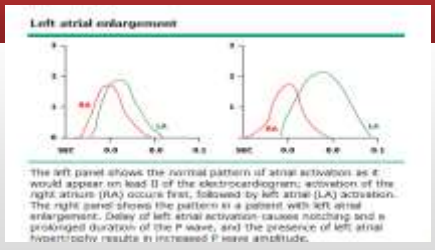
Axis

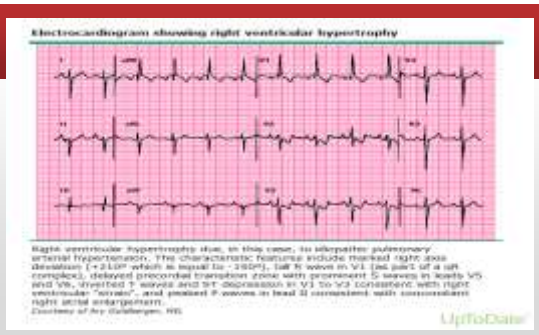
1.	Down in lead 1	right axis deviation
2.	Up in 1, up in avF	normal axis
3.	Up in 1, down in avF	check lead 2
4.	Up in 2	normal axis
5.	Down in 2	left axis

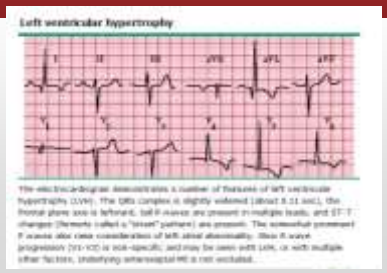
Hypertrophy

- Use Leads V1 and inferior leads (2,3,F)
- Atrial hypertrophy
  - Right atrium V1 biphasic, peaked Ps 2,3,F
  - Left atrium V1 biphasic, m shaped Ps 2,3,F
- Ventricular hypertrophy
  - Right ventricle check V1 is R> S? If yes then hypertrophy
  - Left ventricle add V2 + V5 >7 boxes is hypertrophy



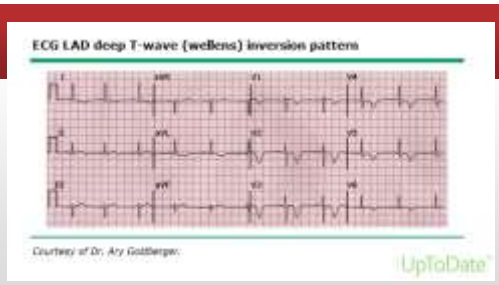






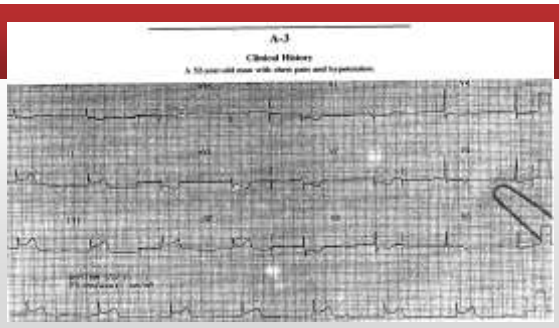
Injury

- T waves non-specific
- ST segments
- Q waves



ST segments

- ST elevation
  - Acute MI (STEMI)
  - Spasm/variant/Printzmetals
  - Aneurysm
  - Pericarditis
  - Early repolarization



Electrocardiogram (ECG) in an evolving anterior myocardial infarction

Electrocardiogram shows findings typical of an evolving Q-wave anterior MI: loss of R waves in leads V1 to V3, ST segment elevations in V2 to V4, and T wave inversions in leads I, AVL, and V2 to V6. Sinus bradycardia (55 beats/min) is present due to concurrent therapy with a beta blocker.
Courtesy of Ary Goldberger, MD

UpToDate

Electrocardiogram (ECG) in early repolarization

J point and ST segment elevation is most prominent in V4 to V6. The ST segment maintains its normal configuration and is slightly concave.

UpToDate

Electrocardiogram (ECG) in pericarditis

Electrocardiogram in acute pericarditis showing diffuse upsloping ST segment elevations seen best here in leads II, III, aVF, and V2 to V6. There is also subtle PR segment deviation (positive in aVR, negative in most other leads). ST segment elevation is due to a ventricular current of injury associated with epicardial inflammation; similarly, the PR segment changes are due to an atrial current of injury which, in pericarditis, typically displaces the PR segment upward in lead aVR and downward in most other leads.
Courtesy of Ary Goldberger, MD.

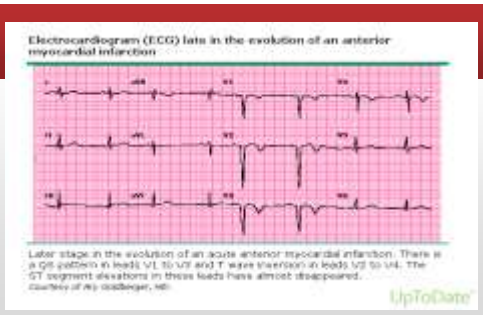
UpToDate

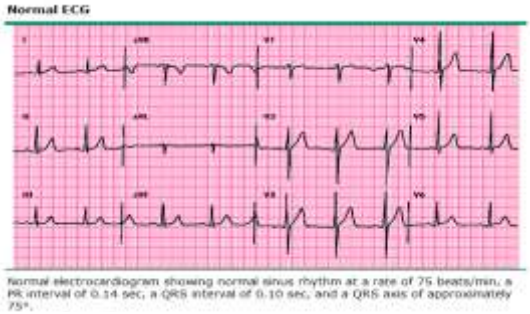
ST segments

- ST depressions
  - Ischemia
  - Digoxin
  - LVH with strain
  - Non-specific

Q waves—old MI

Leads	Region	Coronary artery
2,3,F	Inferior	RCA (right coronary artery)
1, avL, V5,6	Lateral	Cx (circumflex)
V1,2	Septal	LAD (left anterior descending)
V1-4	Anterior-septal	LAD
V4-6	Anterior-lateral	LAD

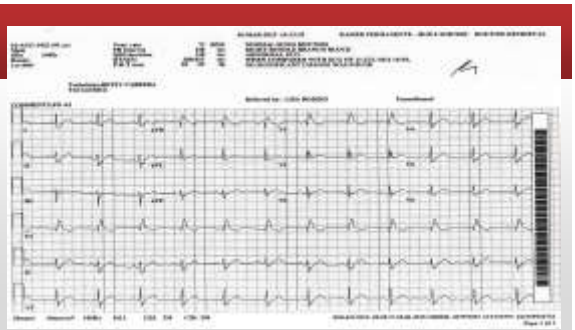


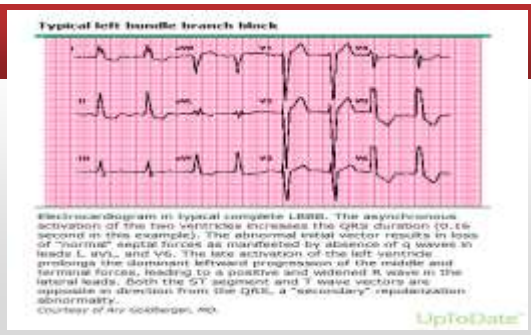


Normal electrocardiogram showing normal sinus rhythm at a rate of 75 beats/min, a PR interval of 0.14 sec, a QRS interval of 0.10 sec, and a QRS axis of approximately 75°.

Special Clinical Situations RBBB and LBBB

- RBBB
  - Bunny ears on the right
  - No need to work up
- LBBB
  - Bunny ears on the left
  - New onset needs to be worked up
    - Echo to exclude cardiomyopathy
    - Nuclear stress test to exclude multi-vessel coronary disease





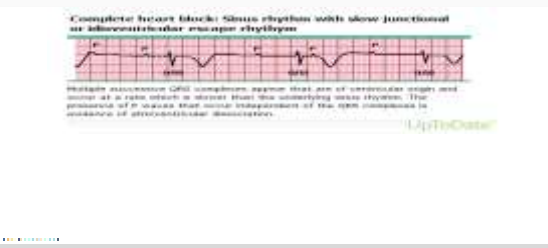
Living Arrhythmias

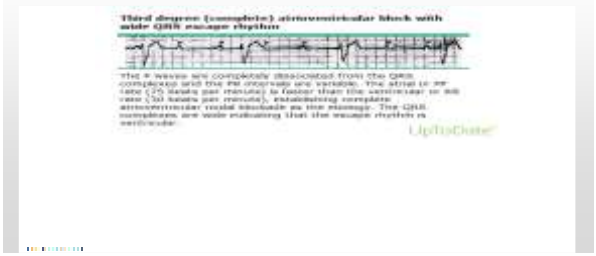
1st degree AV block

2nd degree AV block

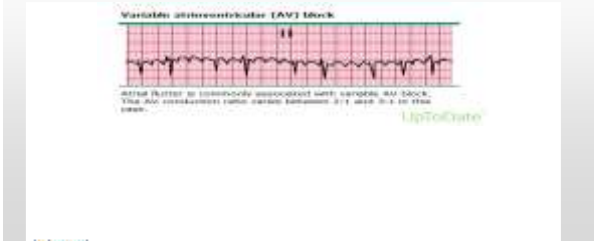
3rd degree AV block

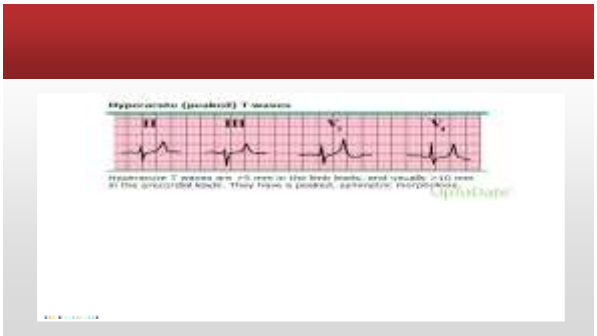
Complete heart block

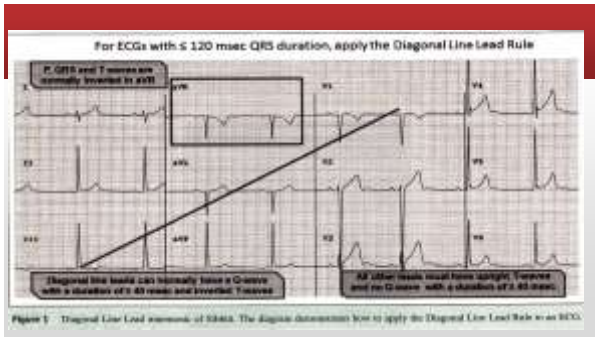




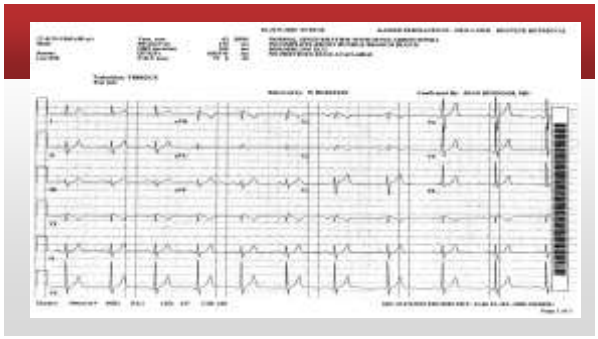
Variable AV block

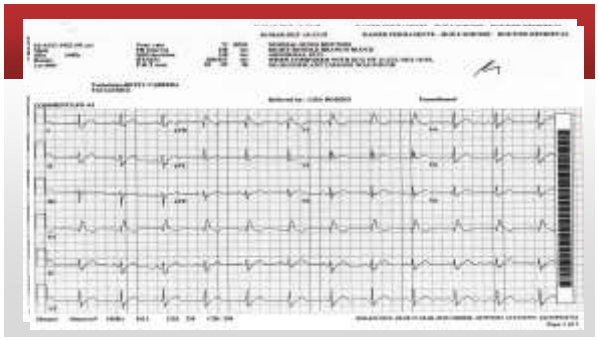


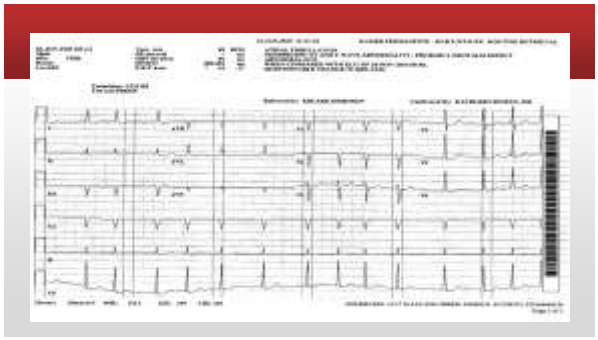


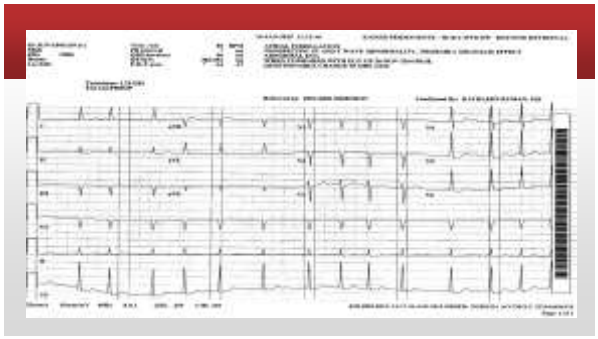

For ECGs with ≤ 120 msec QRS duration, apply the Diagonal Line Lead Rule

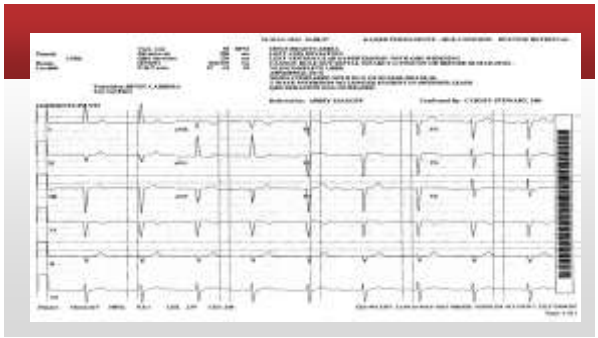
EKG

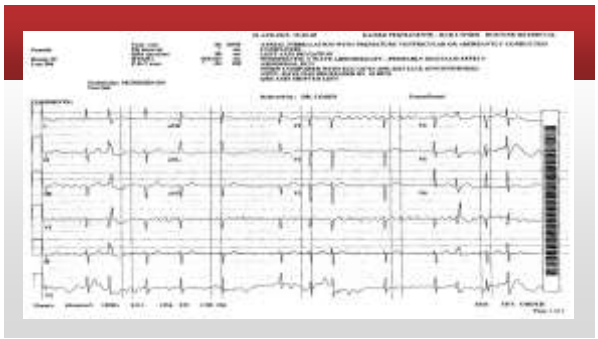


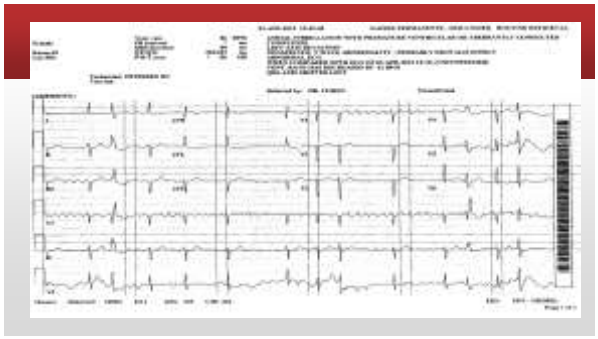


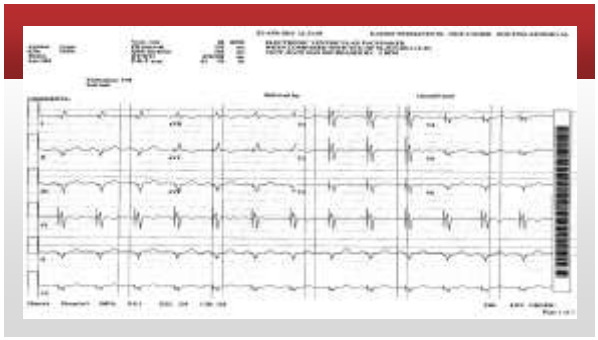


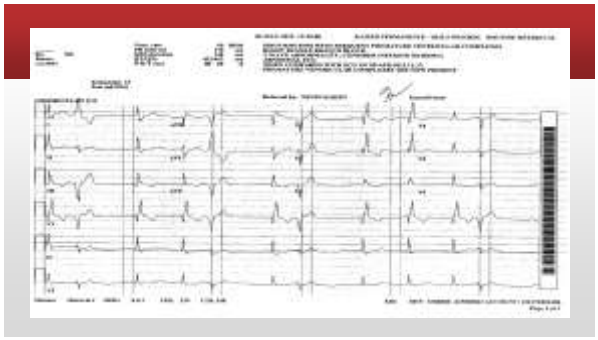


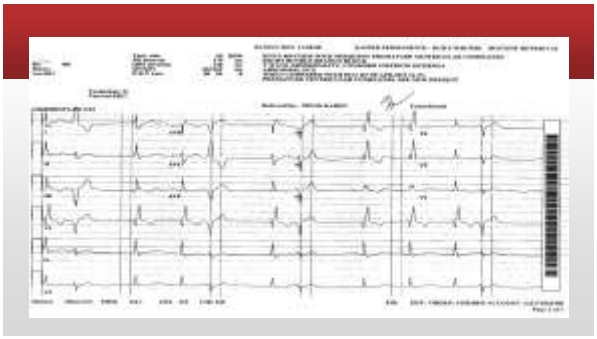


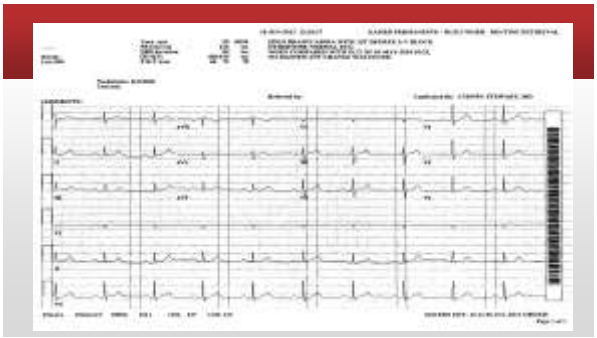






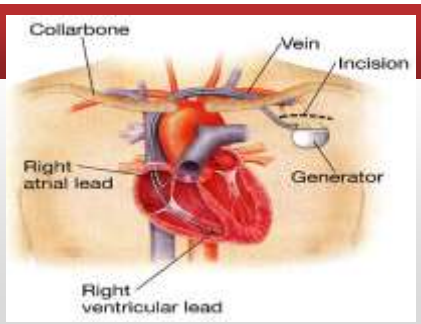






TAVR

Lariat



Leadless Cardiac PAcemaker