



**Department of Anesthesia
Techniques
Electrocardiogram**



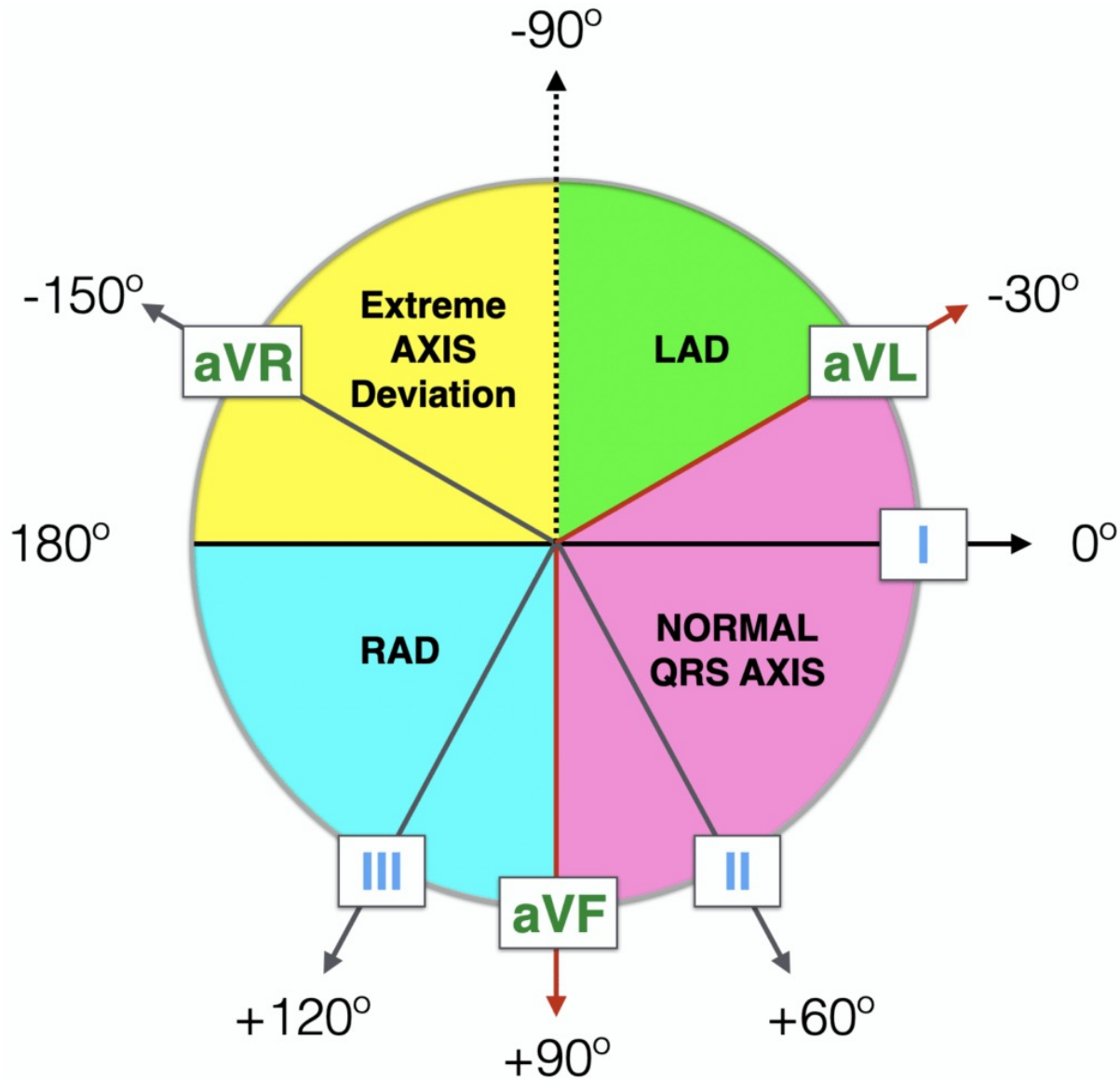
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Axis

- **QRS complex axis:** is the general direction of the ventricular depolarization
- three types:
 - normal
 - left deviated
 - right deviated.

Population data shows that normal QRS axis is from -30° to 105° with 0° being along lead I and positive being inferior and negative being superior



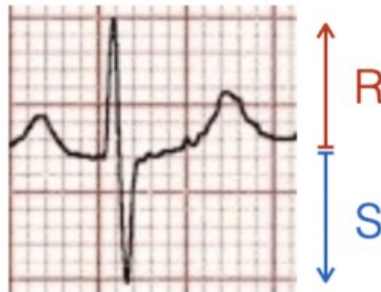
Axis estimation

- look at **LEAD I** and **LEAD aVF**.
- Examine the QRS complex in each lead and determine if it is Positive, Isoelectric or Negative:



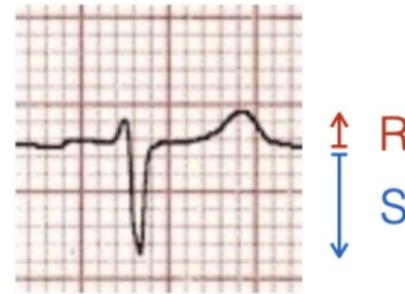
POSITIVE

$$[R > S]$$



EQUIPHASIC

$$[R = S]$$



NEGATIVE

$$[R < S]$$

Lead 1	Lead aVF	Quadrant	Axis
POSITIVE	POSITIVE		Normal Axis (0 to +90°)
POSITIVE	NEGATIVE		**Possible LAD (0 to -90°)
NEGATIVE	POSITIVE		RAD (+90° to 180°)
NEGATIVE	NEGATIVE		Extreme Axis (-90° to 180°)

WHAT YOU NEED TO LOOK FOR

- Are the limb leads set up correctly?
- Are the chest leads set up correctly?
- Is the ECG free of artifact.

IS the ECG SET UP CORRECTLY?

LIMB LEADS

- aVR – always negative
- Lead I – always positive

CHEST LEADS

- R wave progression
- Small to Tall



PROBLEMS WITH THE ECG

- Artifact
- Electrical interference
- Muscle tremor
- Wandering baseline

artifacts

- ECG alterations, not related to cardiac electrical activity.
- the components of the (ECG) such as the baseline and waves can be distorted.
- Motion artifacts are due to movement.

FIND THE ARTEFACT

07/10/2002 10:33:56
65 years Female

89 kgs 152 cms

MDS Metro, Ingram

Rx:
Dx:

Oper: RH

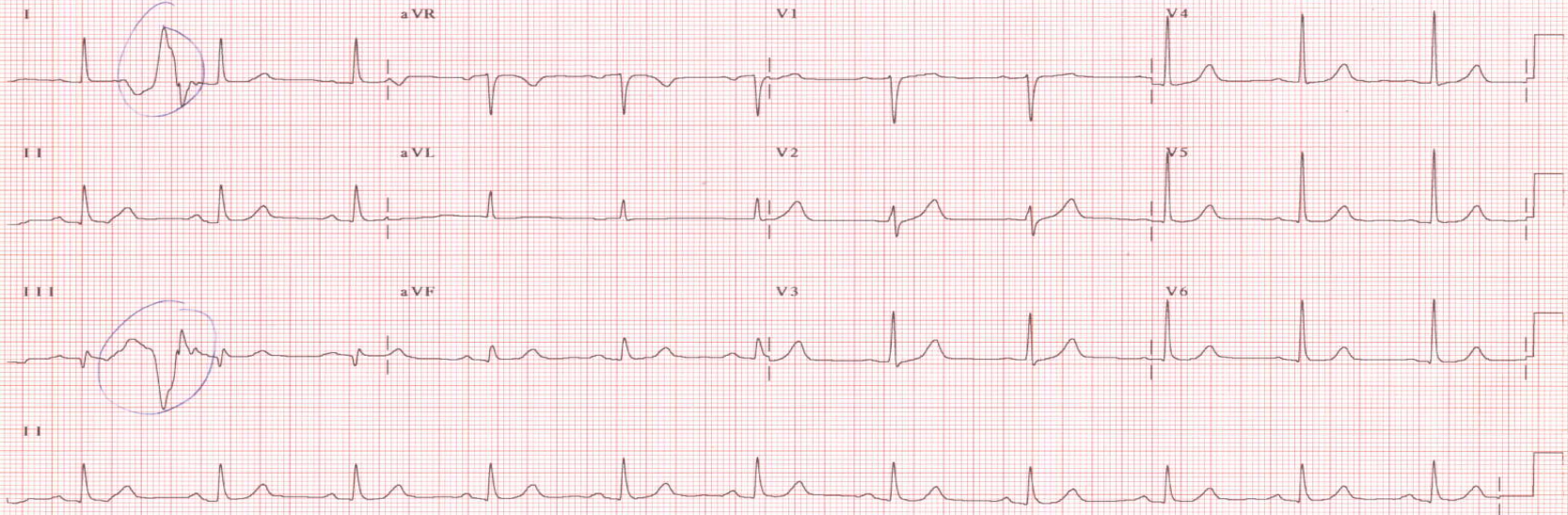
Rate 78 No interpretive report, criteria version
PR 186
QRSD 79
QT 380
QTc 433

D of B
01/JUL/37
COMMENTS

Requested by:

--AXIS--
P 83
QRS 32
T 57

PRELIMINARY-MD MUST REVIEW



LOC 14-0000 Speed: 25 mm/sec Limb: 10 mm/mV Ches 0 mm/mV

F 60v 0.5-40 Hz W HP7 11391

Agilent

REORDER # M1707A

MUSCLE TREMOR

40 years

Female 59 kg 165 cm

STANLEY GREENBERG, M.D.

Rate 71
PR 165
QRSD 92
QT 398
QTc 432

3
3
RE

QC

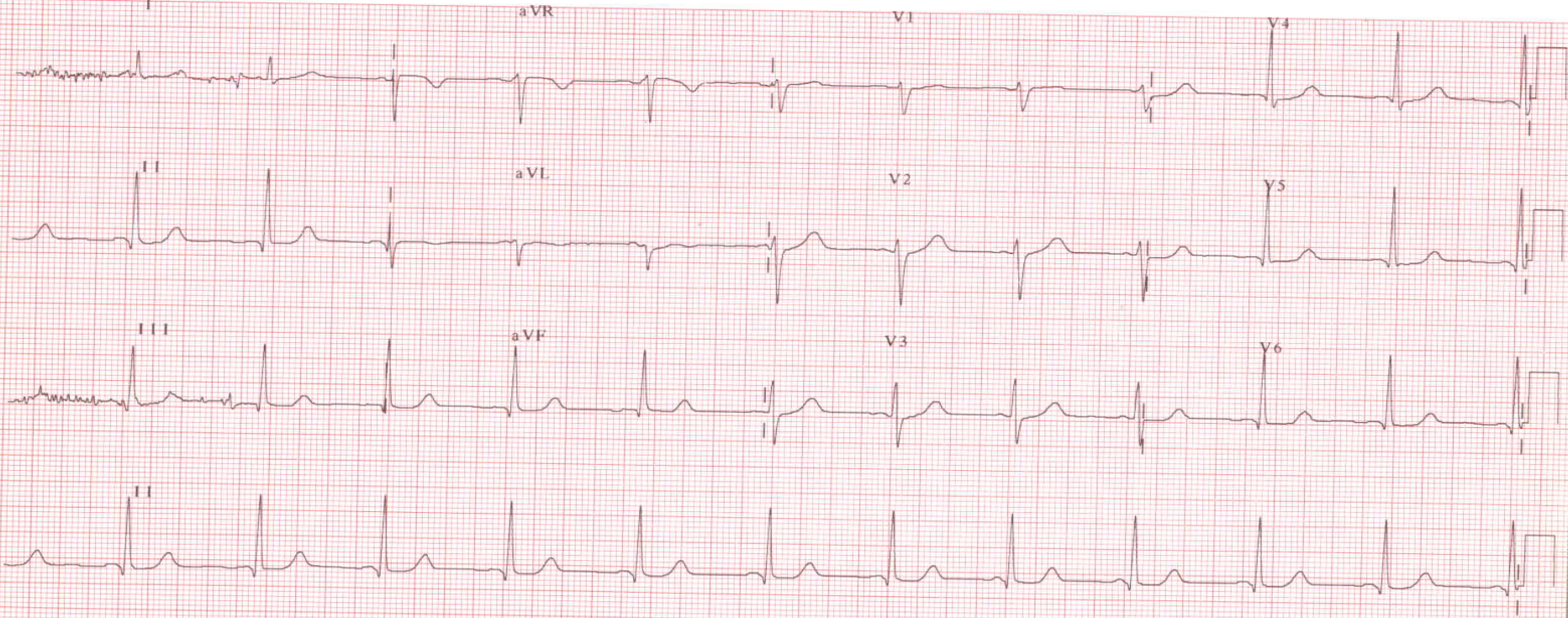
artifact

Operator: AR

MEDICATION
NO RX

Requested by:

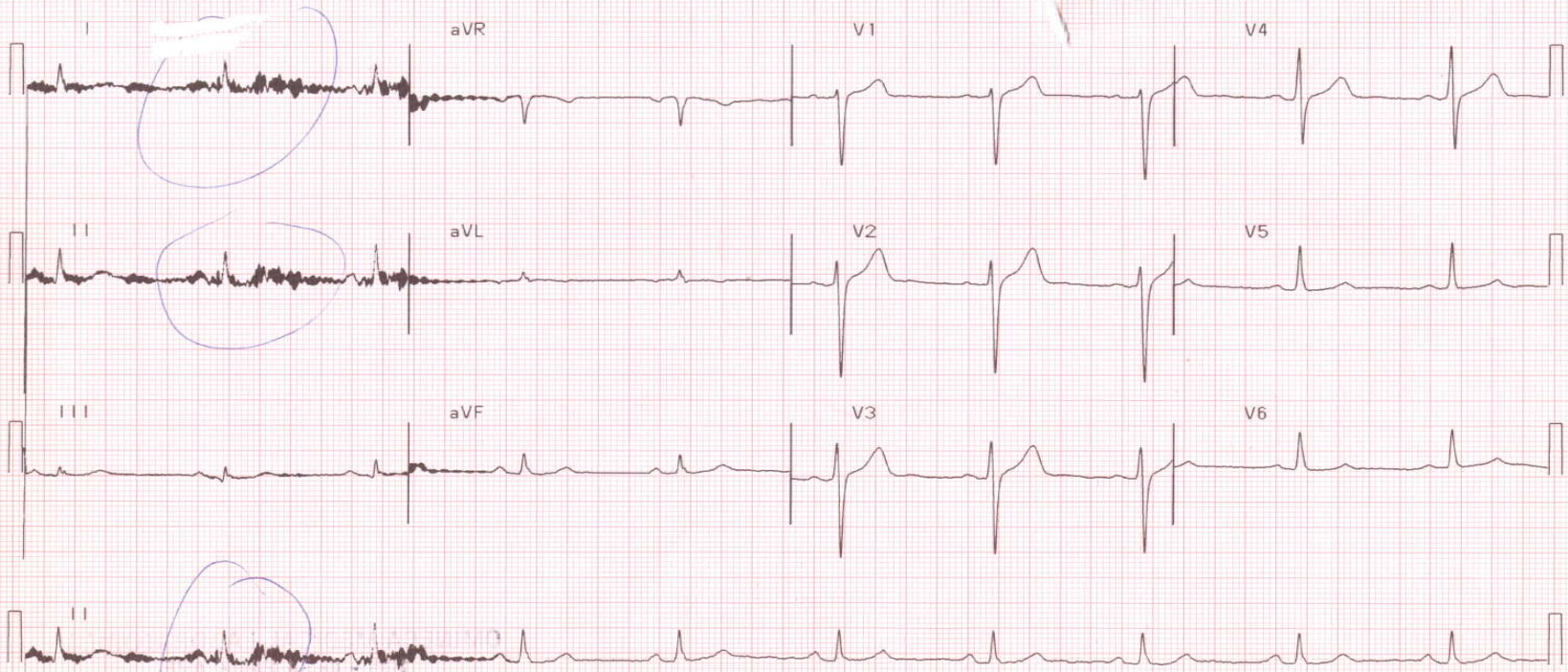
--Axis--
P Ind.
QRS 88
T 74



ELECTRICAL INTERFERENCE

Name: [REDACTED]
ID: [REDACTED]
Date: 09/24/02 Time: 11:22
Age: 51 Sex: MALE
Hgt: 72 IN Wgt: 215 LBS
Med1:
Med2:
Ccl1:
Ccl2:
Cmnt:

Vent rate: 59	SINUS BRADYCARDIA
	DEMAND VENTRICULAR PACING
--Durations--	ST-T changes in inferior leads
P : 108	MAY BE RELATED TO THE ELECTRONIC PACEMAKER ACTIVITY
QRS: 114	
--Intervals--	SUMMARY: ABNORMAL ** UNCONFIRMED ANALYSIS **
PR : 164	
QT : 422	
QTc : 421	
--Axes--	
P : 65	
QRS: 45	
T : 54	



Speed: 25 mm/s Freq: 60~ .05 - 30Hz
Gain: Limb 10 Chest 10 mm/mv

E350i Rev.1.15 GP1 10.1

BASIC OBSERVATIONS

- Heart Rate
- Rhythm: regular? sinus?
- Intervals: PR, QRS
- ST segment

Ectopic beat

- "Ectopic" means something that is in an odd place or position
- **Types of Ectopic Beats**
- **Premature atrial contractions (PACs)**
- **Premature ventricular contractions**

ECTOPIC BEATS

Multifocal PVC's: more than one shape



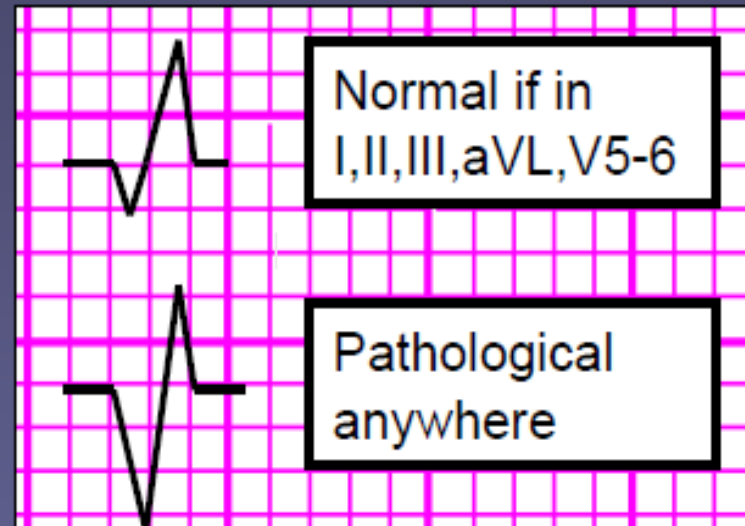
The PR interval

- The PR interval is measured between the start of the P wave to the start of the QRS complex
- (therefore if there is a Q wave before the R wave the PR interval is measured from the start of the P wave to the start of the Q wave, not the start of the R wave)

The Q wave

Are there any pathological Q waves?

- A Q wave can be pathological if it is:
 - Deeper than 2 small squares (0.2mV)and/or
 - Wider than 1 small square (0.04s)



The QRS height

- If the complexes in the chest leads look very tall, consider left ventricular hypertrophy (LVH)
- If the depth of the S wave in V_1 added to the height of the R wave in V_6 comes to more than 35mm, LVH is present

QRS width

- The width of the QRS complex should be less than 0.12 seconds (3 small squares)
- Some texts say less than 0.10 seconds (2.5 small squares)
- If the QRS is wider than this, it suggests a ventricular conduction problem – usually right or left bundle branch block (RBBB or LBBB)