

심전도 핵심정리

서울대학교 의과대학 내과학교실

오 일 영

Contents

- History of ECG
- Ventricular action potential
- Cardiac conduction system
- V1 lead
- RBBB vs. LBBB
- Axis
- SND vs. AV block

SNUH 분당서울대학교병원

History of ECG



Willem Einthoven
(May 1860 – Sep 1927)

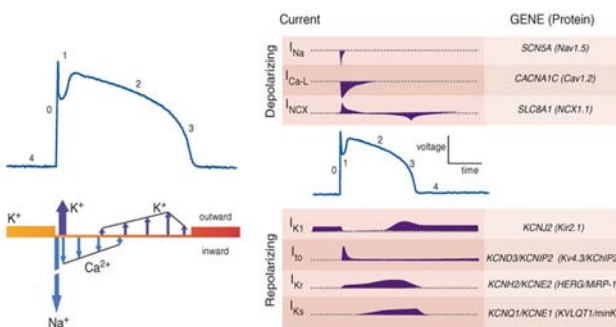


PHOTOGRAPH OF A COMPLETE ELECTROCARDIOGRAPH, SHOWING THE MANNER IN WHICH THE ELECTRODES ARE ATTACHED TO THE PATIENT. IN THIS CASE THE HANDS AND ONE FOOT BEING IMMERSED IN JARS OF SALT SOLUTION

SNUH 분당서울대학교병원

Pfüger's Arch. F. d. ges. Physiol. 150:275-315, 1913

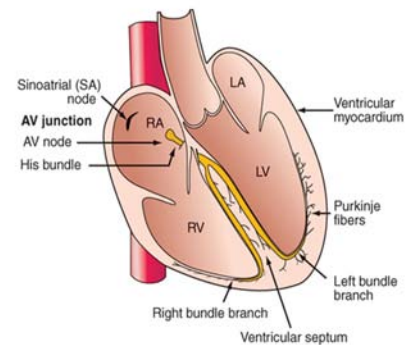
Ventricular action potential



SNUH 분당서울대학교병원

Longo DL. Harrison's principles of internal medicine. 18th ed. New York: McGraw-Hill; 2012.

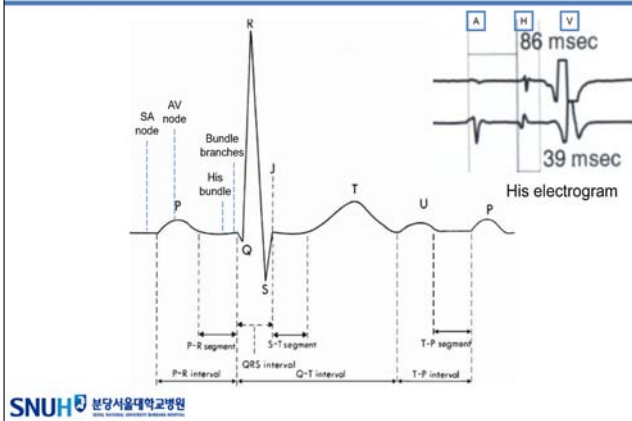
Cardiac conduction system



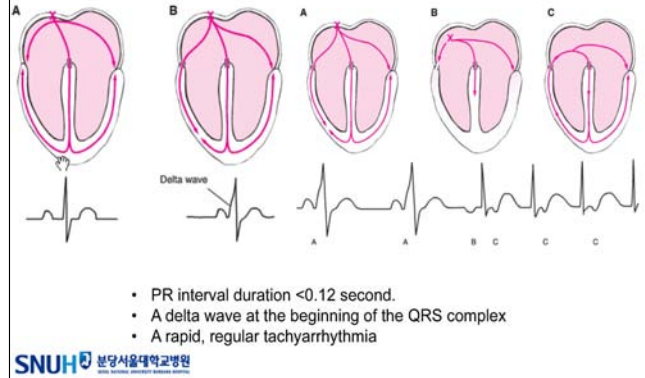
SNUH 분당서울대학교병원

Longo DL. Harrison's principles of internal medicine. 18th ed. New York: McGraw-Hill; 2012.

PR interval



WPW syndrome

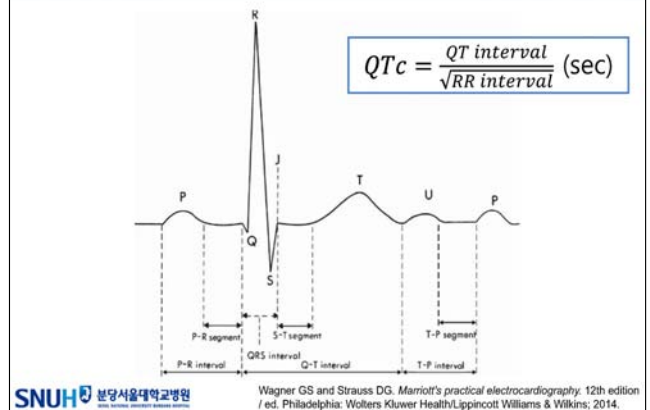


QRS interval

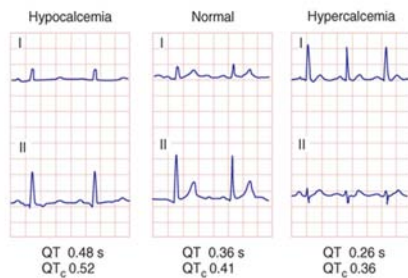
- Narrow QRS
 - Supraventricular origin
- Wide QRS
 - Ventricular origin
 - Preexcitation (WPW syndrome)
 - Aberrancy
 - Bundle branch block

SNUH 분당서울대학교병원

QT interval



Calcium



- Hypocalcemia typically prolongs the QT interval (ST portion), whereas hypercalcemia shortens it.

SNUH 분당서울대학교병원

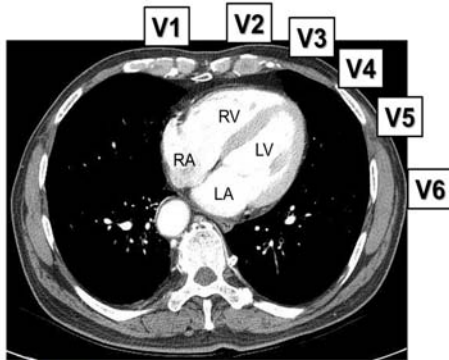
Longo DL. *Harrison's principles of internal medicine*. 18th ed. New York: McGraw-Hill;

V1 lead

- P wave
 - Biphasic
- QRS complex
 - Negative, rS
- R/S > 1
 - RBBB
 - RVH
 - AMI, posterior wall

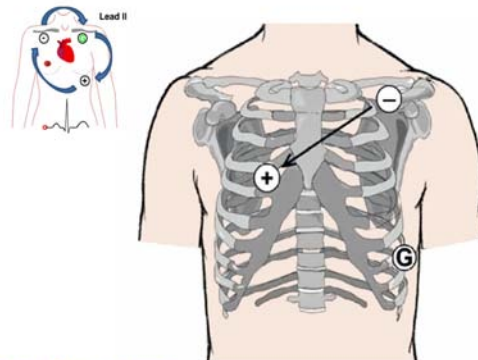
SNUH 분당서울대학교병원

Precordial leads



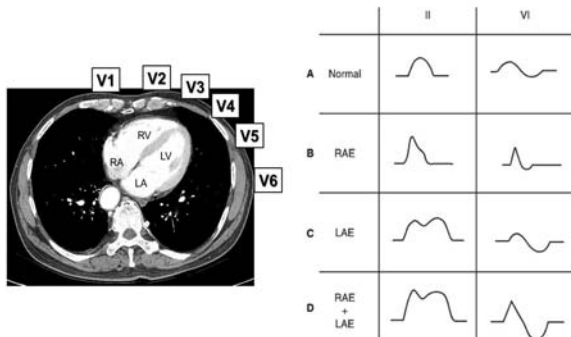
SNUH 분당서울대학교병원

Modified lead, MCL1



SNUH 분당서울대학교병원

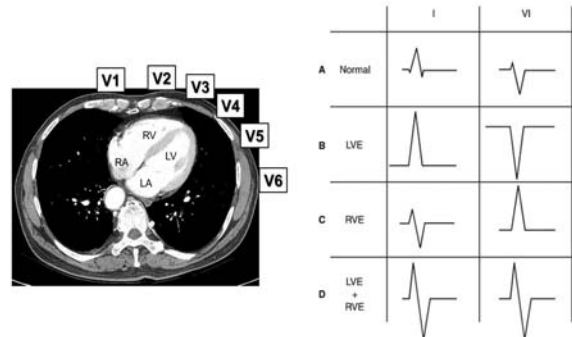
Atrial enlargement



SNUH 분당서울대학교병원

Wagner GS and Strauss DG. Marriot's practical electrocardiography, 12th edition / ed. Philadelphia: Wolters Kluwer Health/Lippincott Williams & Wilkins; 2014.

Ventricular enlargement



SNUH 분당서울대학교병원

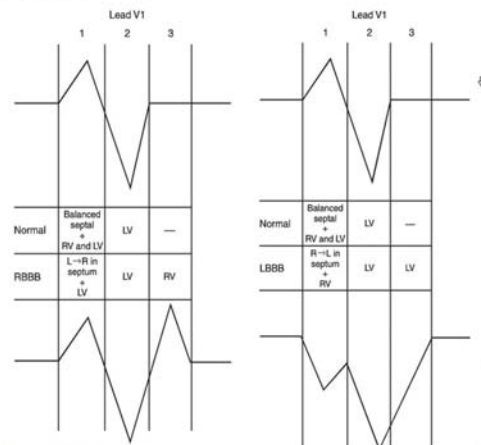
Wagner GS and Strauss DG. Marriot's practical electrocardiography, 12th edition / ed. Philadelphia: Wolters Kluwer Health/Lippincott Williams & Wilkins; 2014.

RBBB vs. LBBB

	RBBB	LBBB
QRS duration	≥0.12 s	
Lead V1	Late intrinsicoid (R' peak or late R peak), M-shaped QRS (RSR'); sometimes wide R or qR	QS or rS
Lead V6	Early intrinsicoid (R peak), wide S wave	Late intrinsicoid (R or R' peak), no Q waves, monophasic R
Lead I	Wide S wave	Monophasic R wave, no Q

SNUH 분당서울대학교병원

RBBB vs. LBBB



SNUH 분당서울대학교병원

Wagner GS and Strauss DG. Marriot's practical electrocardiography, 12th edition / ed. Philadelphia: Wolters Kluwer Health/Lippincott Williams & Wilkins; 2014.

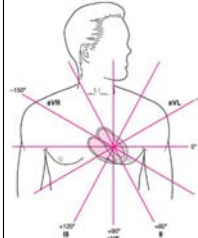
Abnormal Q waves

Limb leads		Precordial leads	
Lead	Criteria for abnormal	Lead	Criteria for abnormal
I	≥ 0.03 sec	V1	Any Q
II	≥ 0.03 sec	V2	Any Q
III	None	V3	Any Q
aVR	None	V4	≥ 0.02 sec
aVL	≥ 0.03 sec	V5	≥ 0.03 sec
aVF	≥ 0.03 sec	V6	≥ 0.03 sec

- The absence of small Q waves in leads V5 and V6 should be considered abnormal.
- A Q wave of any size is normal in lead III and lead aVR because of their rightward orientations.

Normally, the interventricular septum is activated from left to right, producing an initial R wave in the right precordial leads and Q wave in lead I, aVL, and the left precordial leads.

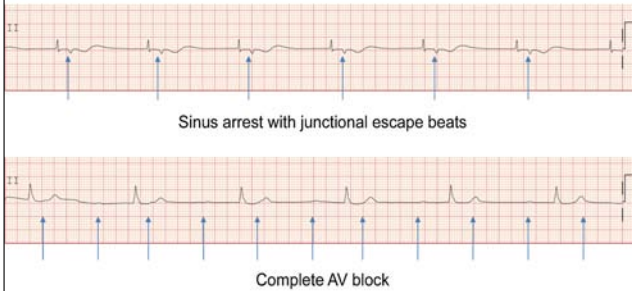
Axis



LAFB	LPFB
<ol style="list-style-type: none"> 1. Left-axis deviation (usually ≥ -60 degrees) 2. Small Q in leads I and aVL; small R in II, III, and aVF 3. Minimal QRS prolongation (0.020 s) from baseline 4. Late intrinsicoid (R wave peak) deflection in aVL (>0.045 s) 5. Increased QRS voltage in limb leads 	<ol style="list-style-type: none"> 1. Right-axis deviation (usually $\geq +120$ degrees) 2. Small R in leads I and aVL; small Q in II, III, and aVF 3. Usually normal QRS duration 4. Late intrinsicoid deflection in aVF (>0.045 s) 5. Increased QRS voltage in limb leads 6. No evidence of RVH

Sinus node dysfunction vs. AV block

SND – morbidity / AV block - mortality



AV block

- First degree AV block
- Second degree AV block
 - Mobitz type 1
 - Mobitz type 2
 - High grade AV block
- Third degree AV block (complete AV block)
- AV dissociation

Normal ECG

