혈압의 이해

울산의대 강릉아산병원
정 상 식

혈압 측정의 역사

In 1733, Reverend Stephen Hales

: 말의 동맥에 a brass pipe 를 집어 넣어 압력 측정.

혈압 측정의 역사

In 1896, Riva-Rocci

:수은 혈압기 발명

-단지 수축기 압력만 측정 가능

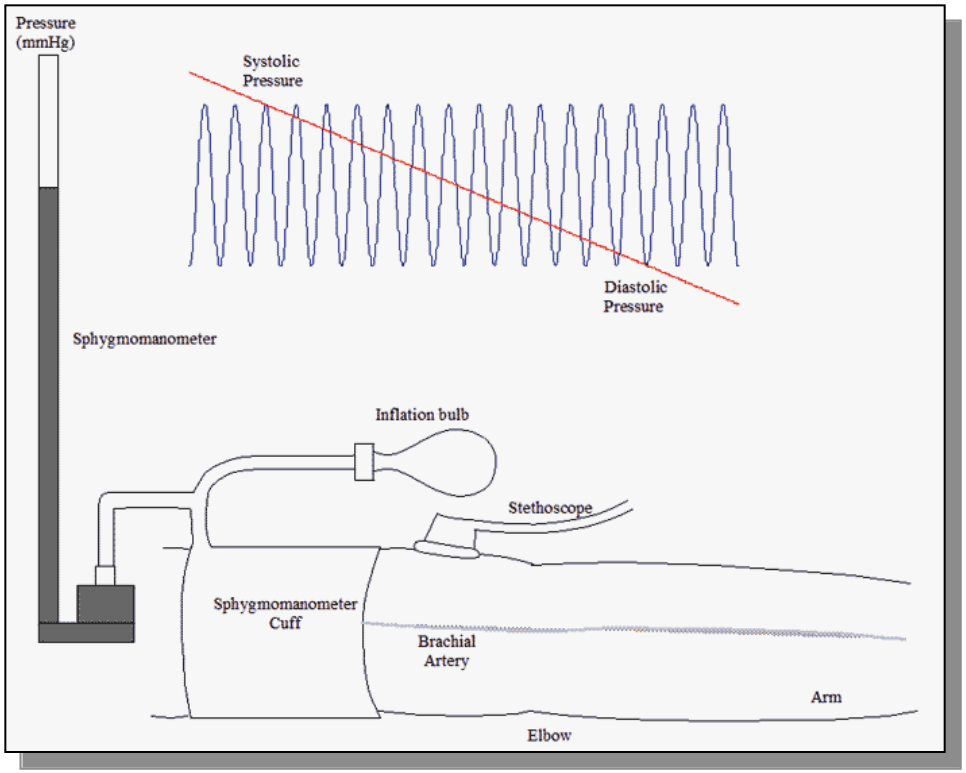
혈압 측정의 역사

In 1905, Nikolai Korotkoff

:최초로 청진기를 이용하여 동맥이 압축될 때 발생하는 소리를 관찰함.

- Korotkoff sounds :이 소리를 이용하면 수축기/이완기 혈압과 매우 일치함..

-태생적인 검사자간의 측정 오류의 가능성을 가지고 있음.


Pressure
(mmHg)
Systolic
Pressure
Diastolic
Pressure
Sphygmomanometer
Inflation bulb
Stethoscope
Sphygmomanometer
Cuff
Brachial
Artery
Arm
Elbow

자동혈압측정기Oscillometric Method

-’Oscillometric’ refers to any measurement of the oscillations caused by the arterial pressure pulse.

-움직임에 민감

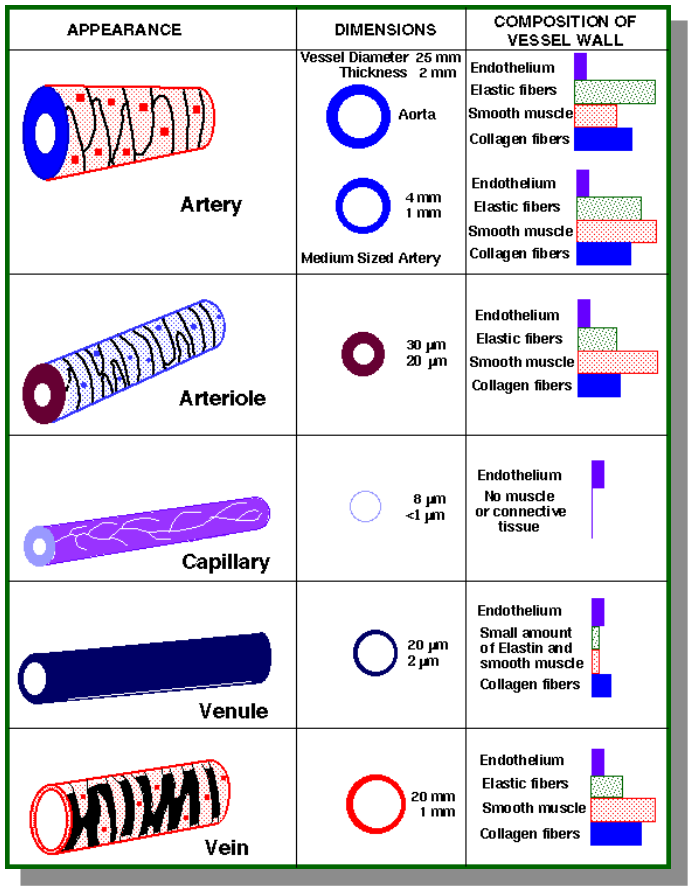
-평균 혈압을 측정함으로써 수축기/이완기 혈압을 추정하는 방법

혈압의 결정 인자

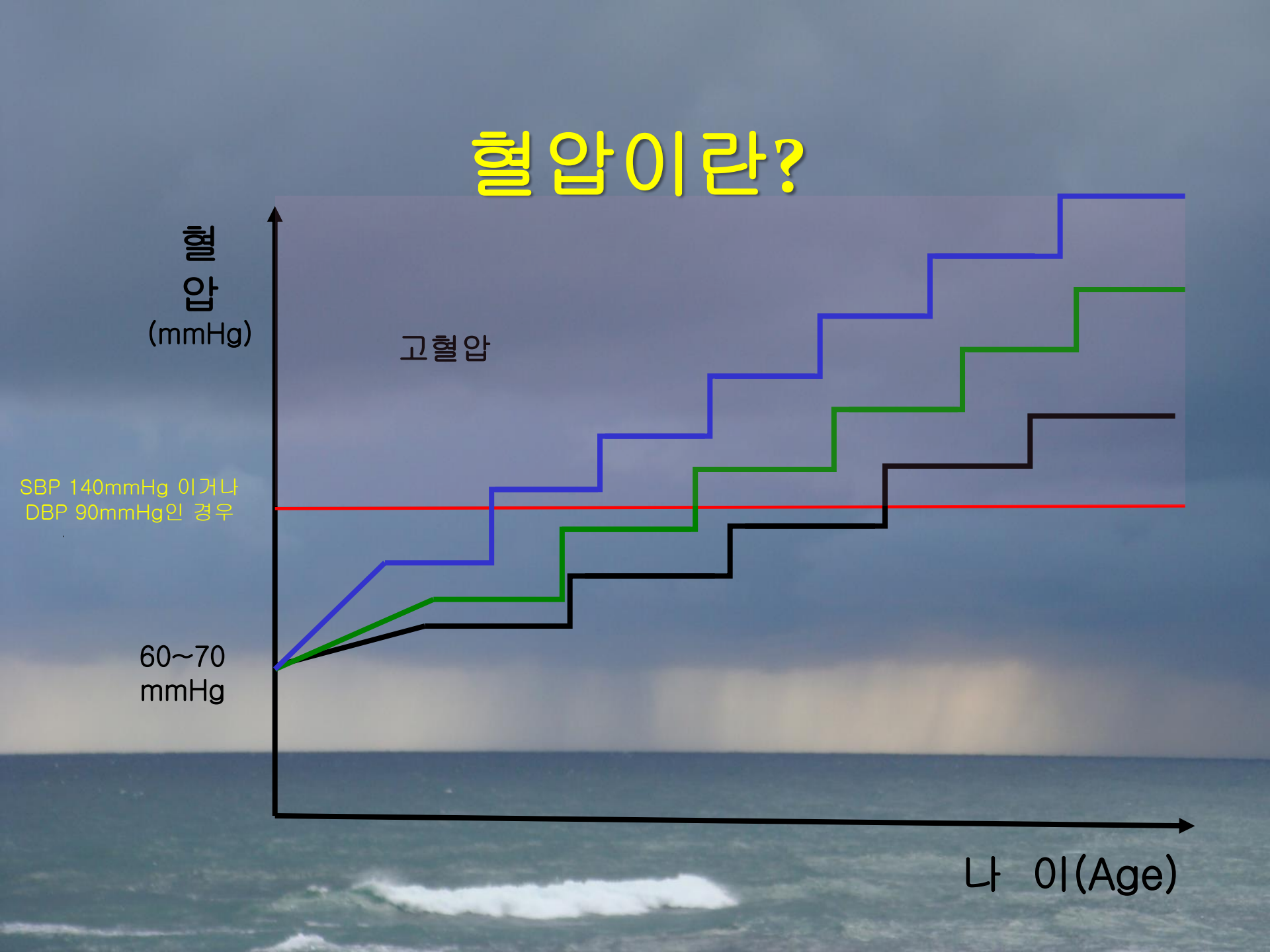
1.전부하(혈액량)

2.심근 수축력 (심박출량)

3.후부하(말초혈관저항)



혈압이란?



고혈압 정의(기준)의 변천사

Year	BP Level
1964	DBP≥120
1967	DBP≥105
1972	DBP≥95
1991	SBP≥160 +/- DBP≥90
1997	SBP≥140 +/- DBP≥90 (JNC-VI)
2003	JNC-VII

JNC - VII Report

Classification of Blood Pressure (BP)*			
Category	SBP mm Hg		DBP mm Hg
Normal	<120	and	<80
Prehypertension	120–139	or	80–89
Hypertension, Stage 1	140–159	or	90–99
Hypertension, Stage 2	≥160	or	≥100

* See *Blood Pressure Measurement Techniques* (reverse side)

Key: SBP = systolic blood pressure DBP = diastolic blood pressure

진료실 혈압과 활동 중 혈압의 관계

TABLE 2. Corresponding Values of Clinic and Ambulatory Blood Pressure

Systolic CBP, mm Hg	Systolic ABP, mm Hg	Diastolic CBP, mm Hg	Diastolic ABP, mm Hg
135	130	85	78
140*	132	90*	81
159	140	99	87
160†	140	100†	88
179	148	109	93
180‡	148	110‡	94

*Stage1, JNC-VI; †Stage2, JNC-VI; ‡Stage 3, JNC-VI.

Hypertension2002;40(6):817-822

고혈압 치료의 실제

Table 2. Trends in awareness, treatment, and control of high blood pressure in adults ages 18–74*

	National Health and Nutrition Examination Survey, Percent			
	II (1976–80)	III (Phase 1 1988–91)	III (Phase 2 1991–94)	1999–2000
Awareness	51	73	68	70
Treatment	31	55	54	59
Control†	10	29	27	34

* High blood pressure is systolic blood pressure (SBP) ≥140 mmHg or diastolic blood pressure (DBP) ≥90 mmHg or taking antihypertensive medication.

† SBP <140 mmHg and DBP <90 mmHg.

Sources: Unpublished data for 1999–2000 computed by M. Wolz, National Heart, Lung, and Blood Institute; JNC 6.[1]

고혈압을 조절하면?

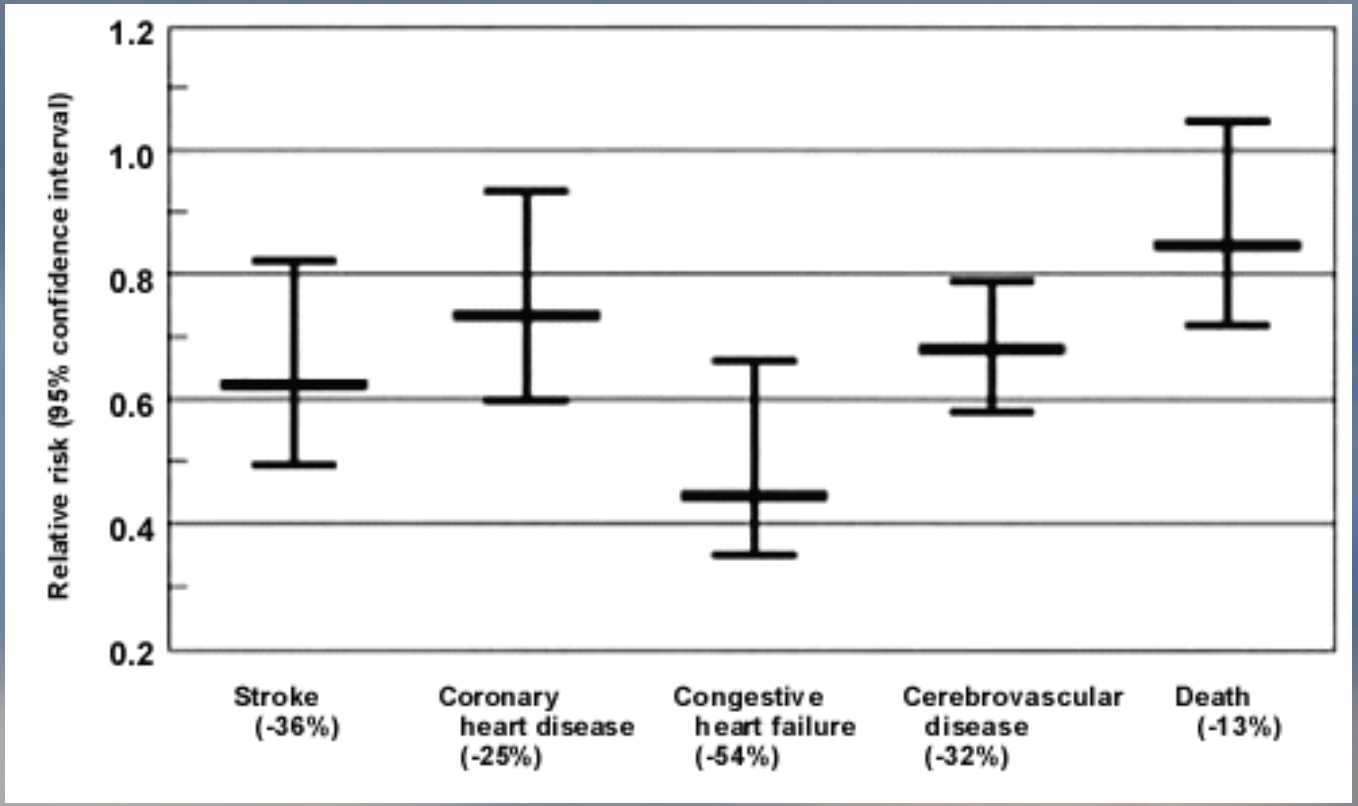


FIGURE 1. Systolic Hypertension in the Elderly Program (SHEP) trial: comparative reductions in cardiovascular events. The percentage given in parentheses for each event represents the risk reduction experienced by treated patients compared with those who received placebo. Decreases in all events except death are statistically significant. Treated patients received a diuretic as initial therapy; a beta blocker was added to achieve goal blood pressure. Average baseline blood pressure was 171/77 mm Hg in the treated group and 170/76 mm Hg in the placebo group. Average final blood pressure was 144/68 mm Hg in the treated group and 155/71 mm Hg in the placebo group. T hus, average blood pressure was 12/4 mm Hg lower in the treated groups than in the placebo groups

혈압 관련 잘못된 상식

- 조금 높은 고혈압은 치료하지 않아도 된다?
- 혈압약은 한번 먹으면 평생 먹어야 한다?
- 약을 오래 먹으면 부작용이 발생한다?
- 혈압약을 먹으면 발기 장애가 생긴다?
- 나는 원래 저혈압이다?
- 저혈압이 고혈압보다 더 위험하다?

Arrhythmia (不整脈)

치료할 것인가?

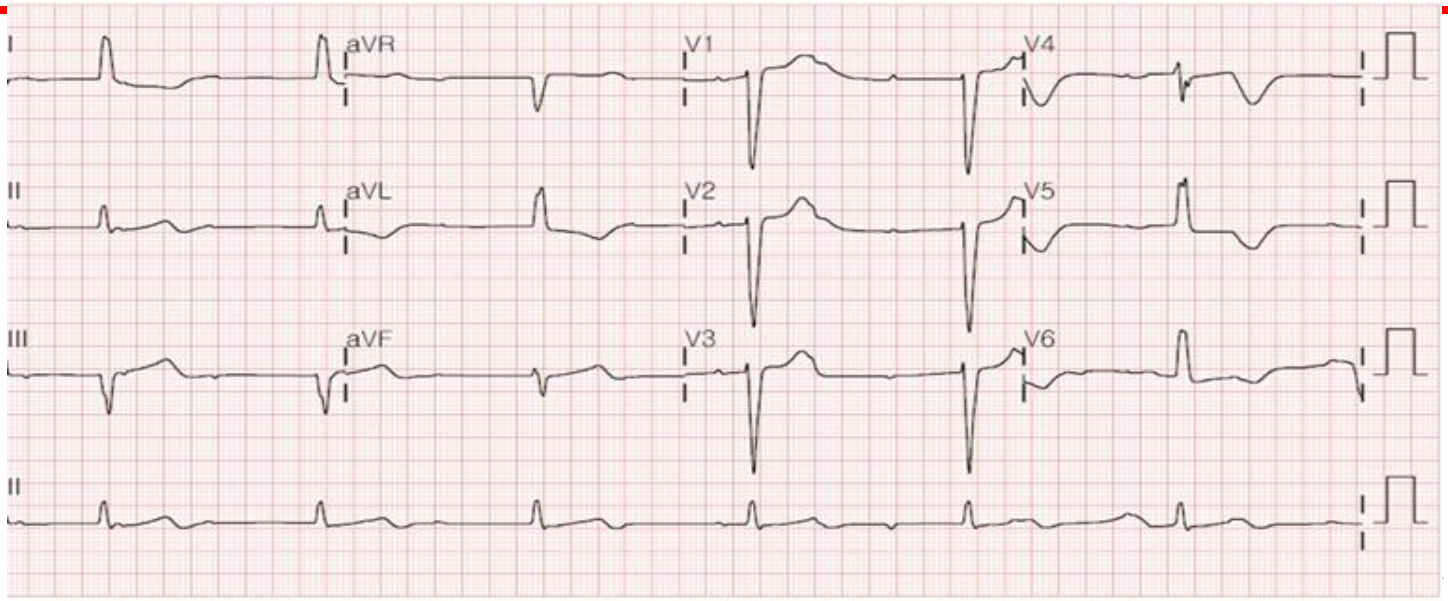
부정맥(不整脈) 이란?

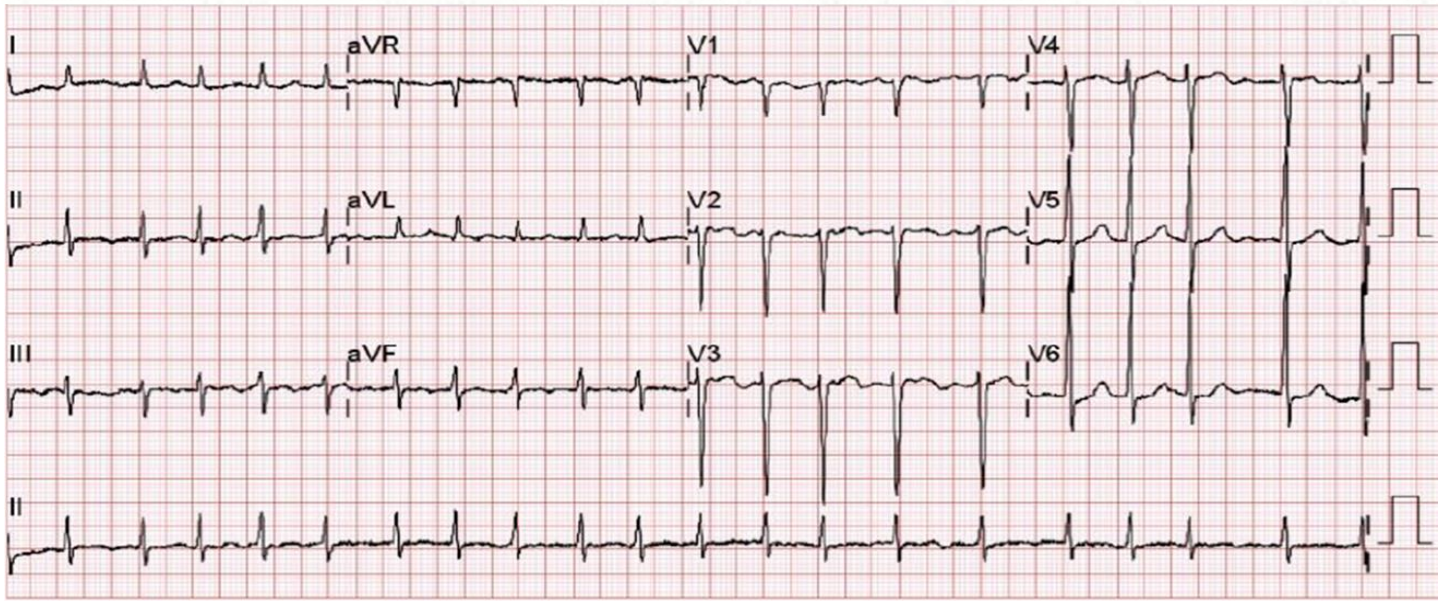
Any change from the normal rhythm of the heart beat

不整脈 : 고르지 않은 맥박 ?

부정맥 = 병 ?

정맥(?) 부정맥(?)


I
aVR
V1
V4
II
aVL
V2
V5
III
aVF
V3
V6
II


I
aVR
V1
V4
II
aVL
V2
V5
III
aVF
V3
V6
II

심장의 기능(혈액 펌프)

- **Blood Pumping (Cardiac Output)**

  심방과 심실의 sequential contraction(연속 박동)

  Ventricular synchronicity(심실의 동시성)

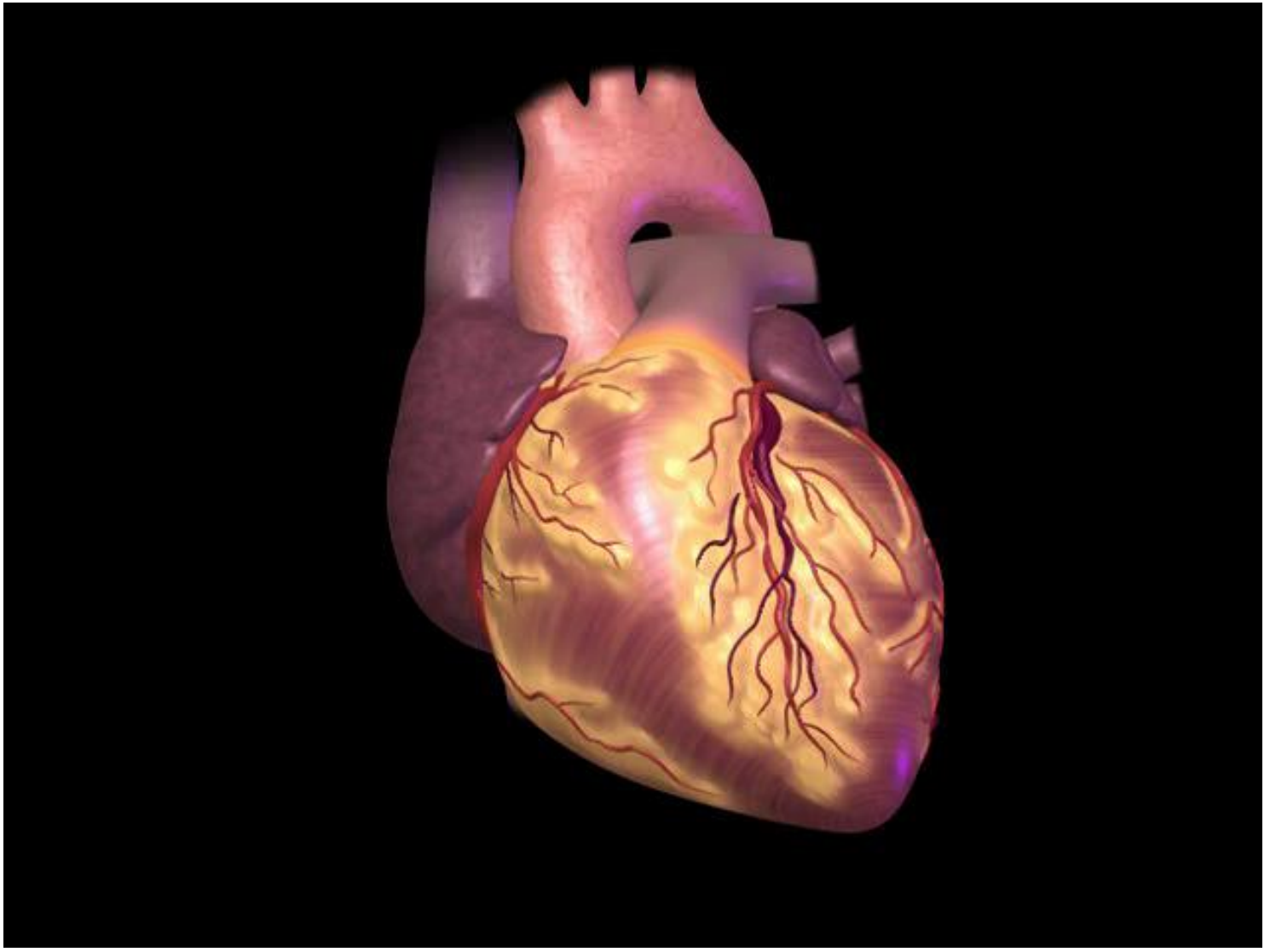
  Heart Rate(심박수)

- **Cardiac Output(분당 심박출량)**

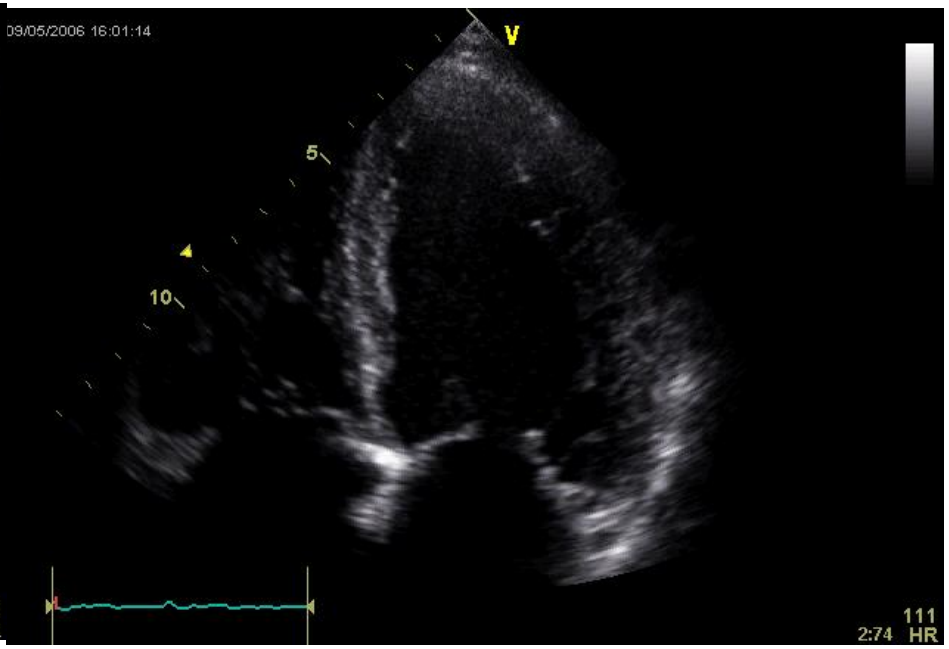
  = S.V(1회 심박출량) x H.R(심박수)

  :4-6 L/분, 운동시 **5**배까지 증가

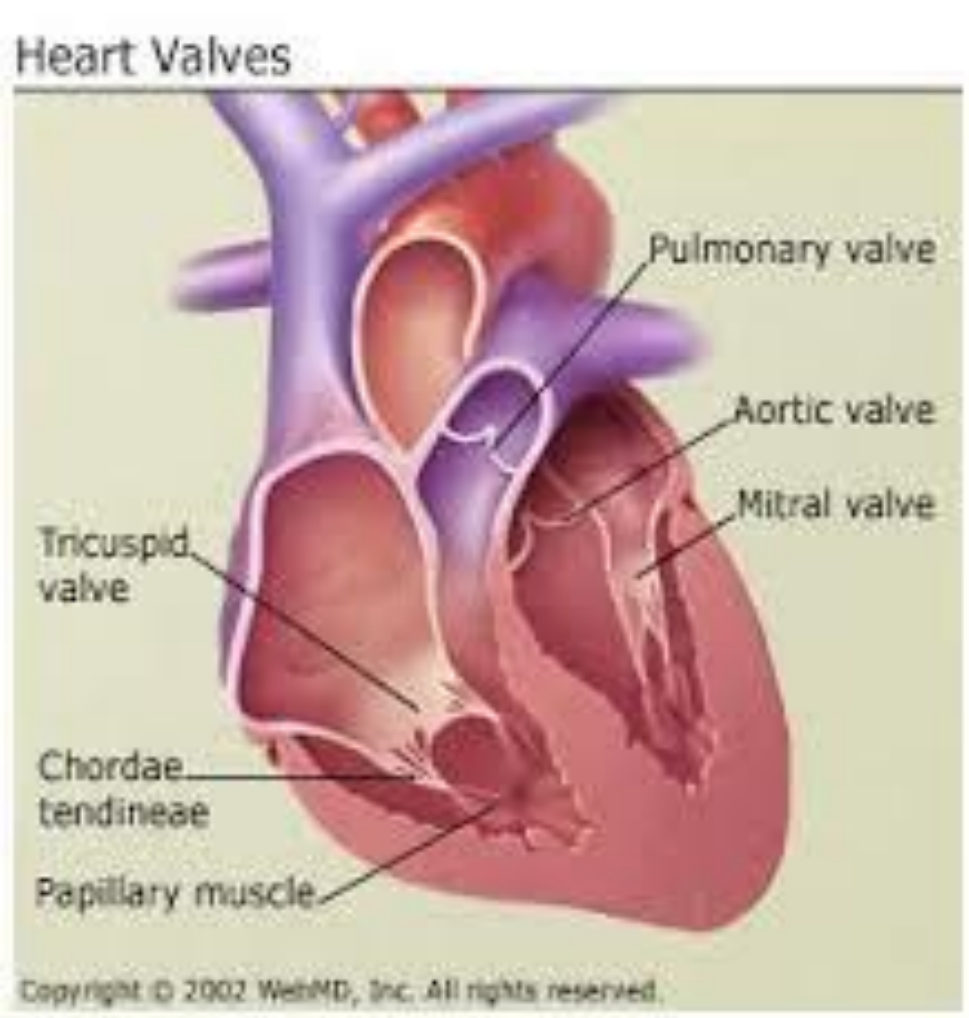
Normal Heart Rhythm



Synchrony vs. Dys-synchrony



심장의 구조


Heart Valves
Pulmonary valve
Aortic valve
Mitral valve
Tricuspid valve
Chordae tendineae
Papillary muscle
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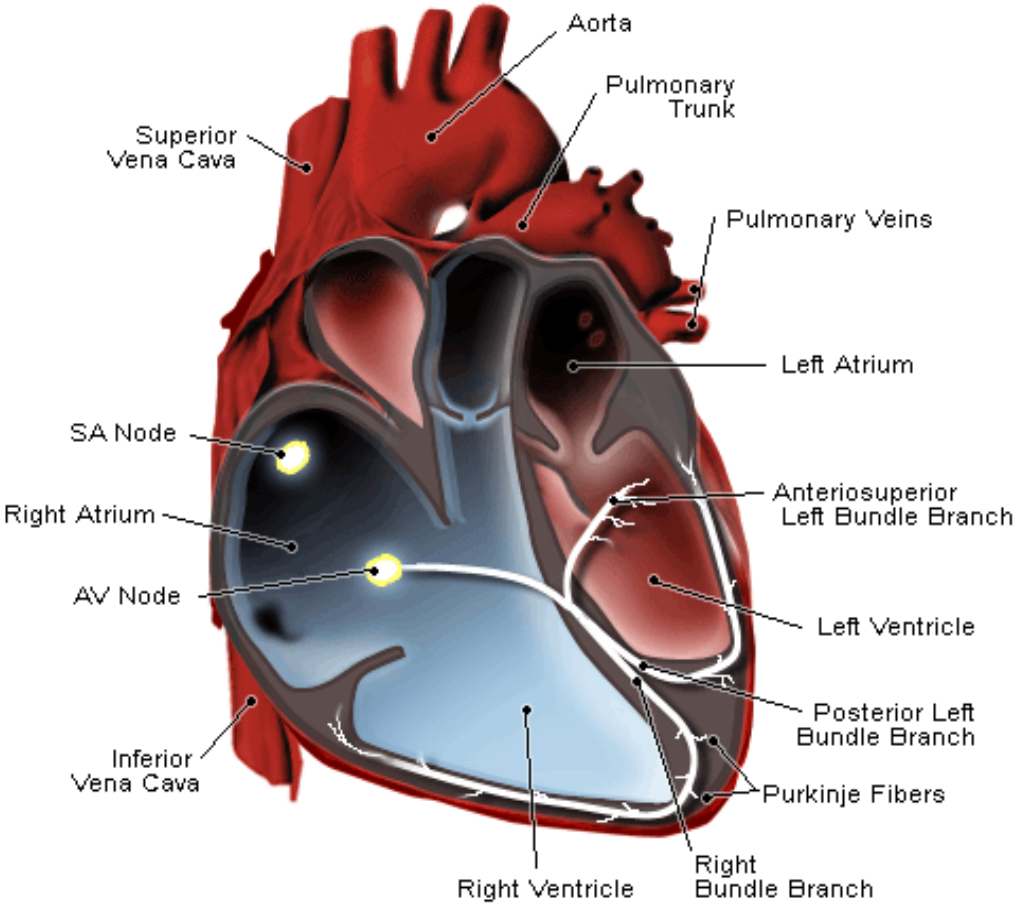
삼장의 전기전도로


Aorta
Pulmonary Trunk
Superior Vena Cava
Pulmonary Veins
Left Atrium
SA Node
Anteriosuperior Left Bundle Branch
Right Atrium
AV Node
Left Ventricle
Posterior Left Bundle Branch
Inferior Vena Cava
Purkinje Fibers
Right Ventricle
Right Bundle Branch

부정맥의 주증상

- **Palpitation (두근거린다)**
  : *percussion test !*
- **Dyspnea or chest pain**
  (숨차다, 가슴이 아프다)
- **Dizziness or Syncope**
  (어지럽다, 실신)

부정맥의 진단 방법

ECG: by Einthoven (1903)-심전도

12 lead ECG : by Goldberger (1942)

Ambulatory ECG : by Holter (1961)-홀터 검사

the incidence/mechanisms of arrhythmia

effect of therapy

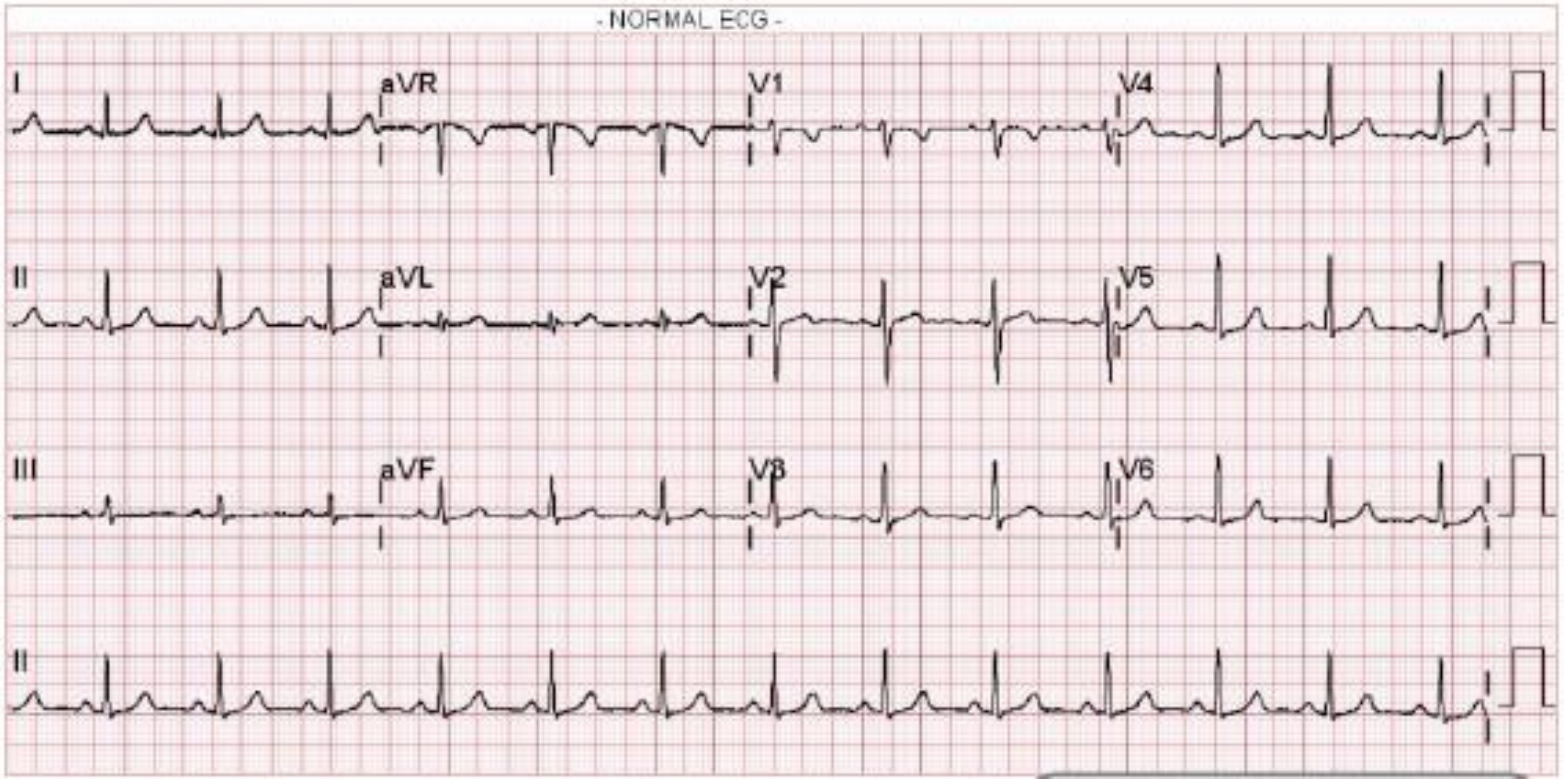
the electrical activity at the time of cardiac death

Event Recorder (1970s)-1주간 검사 가능

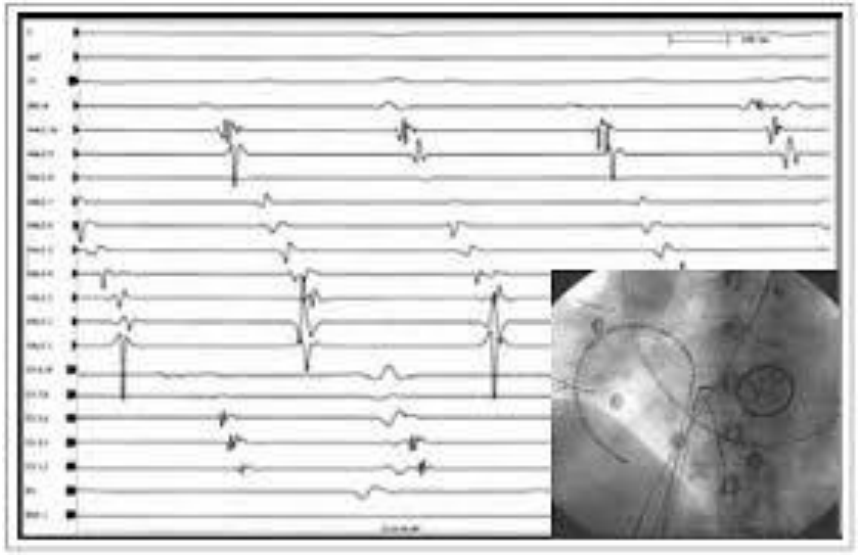
Exercise treadmill test (1950s)-운동부하검사

Electrophysiologic study (1980s)-전기생리검사

정상 동율동 심전도



홀터 검사/Event recorder/운동부하 검사/전기생리검사



부정맥의 종류

Tachyarrhythmia(빈맥)

심실 상성 빈맥

2)심실 빈맥

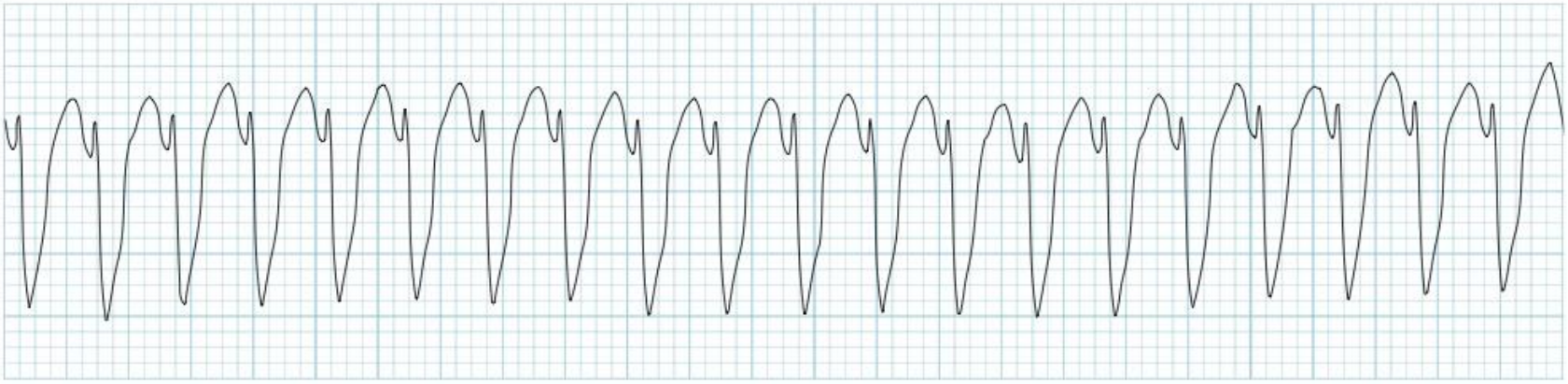
Bradyarrhythmia(서맥)

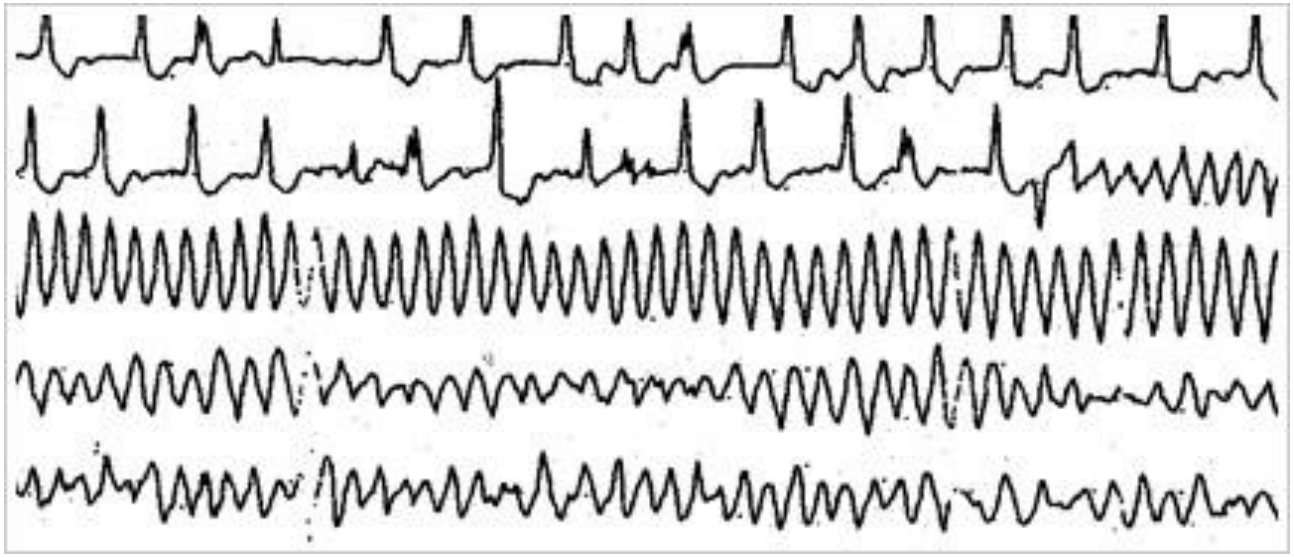
동방결절 기능 부전

방실 결절 차단

figure 1

돌연사-심실빈맥/세동



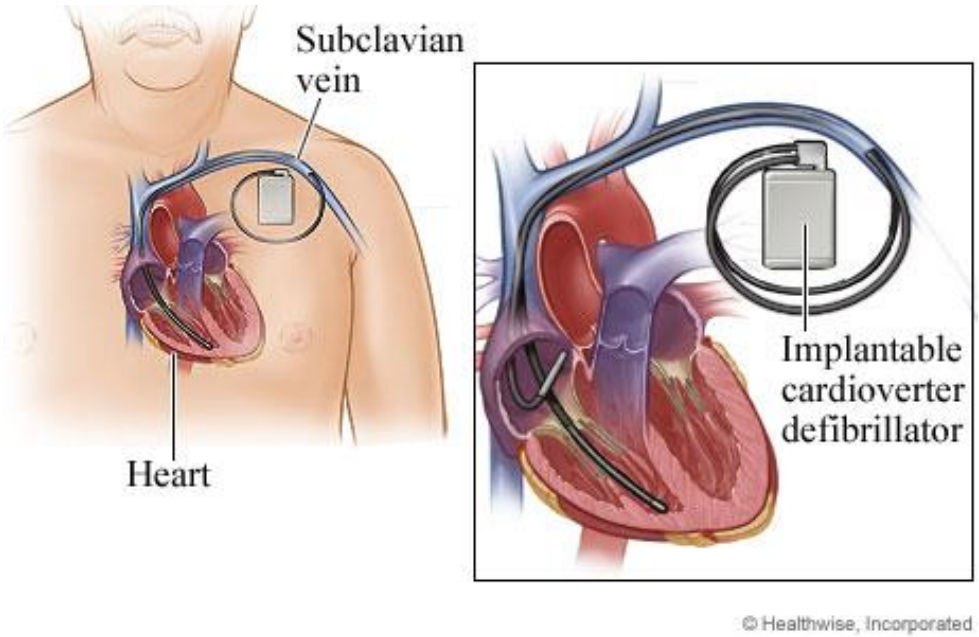


심실 빈맥/세동의 원인

- 허혈성 심질환(급성심근경색증,불안정형협심증)
  : 가장 흔한 원인(>80%)
- 심부전증
- 서맥성 부정맥
- 구조적 심장질환:비후성심근증 등
- 대사장애, 전해질 이상,약물중독
- 유전적 부정맥 질환
  :부르가다 증후군, Long QT 증후군…

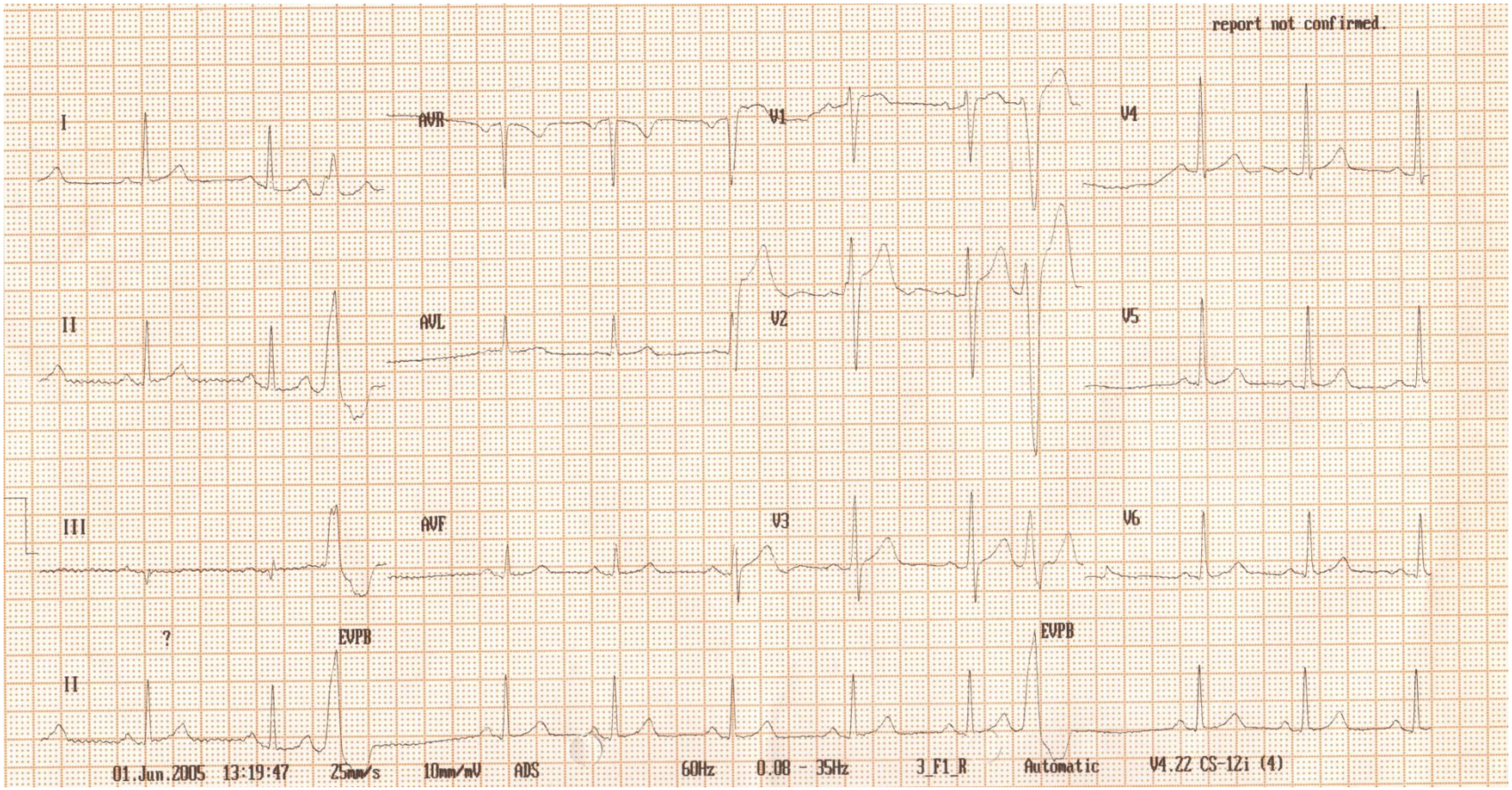
심실빈맥/세동의 치료

- 항부정맥 약물
- 절제도자술 치료
- 삽입형제세동기
  (ICD:Implatable Cardioverter Defibrillator)



42Yr Male: palpitation

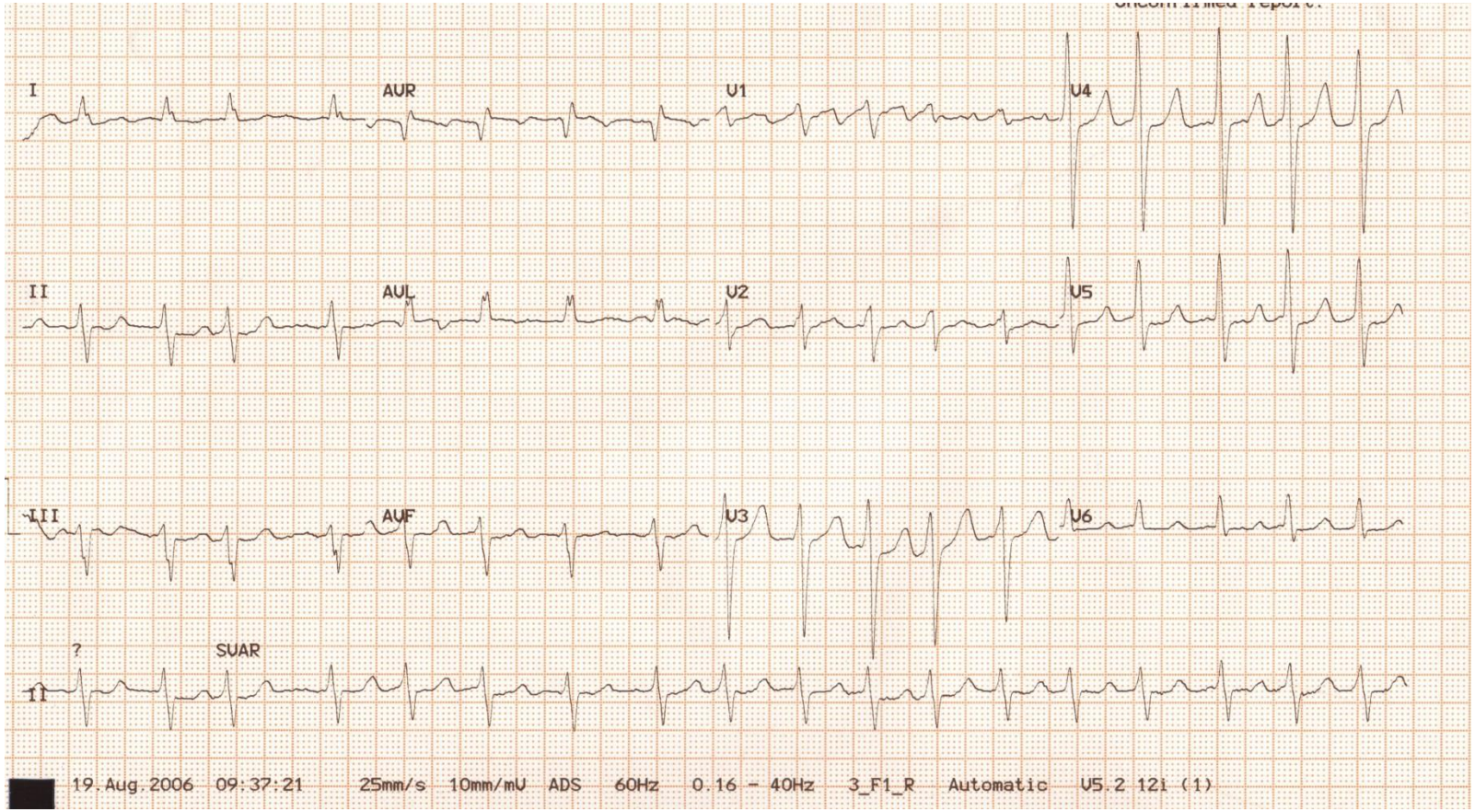
- V/S : 130/100 mmHg, 68/min, 20/min
- ECG :



58Yr Female: palpitation

-V/S : 140/95 mmHg,110/min,22/min

-ECG :



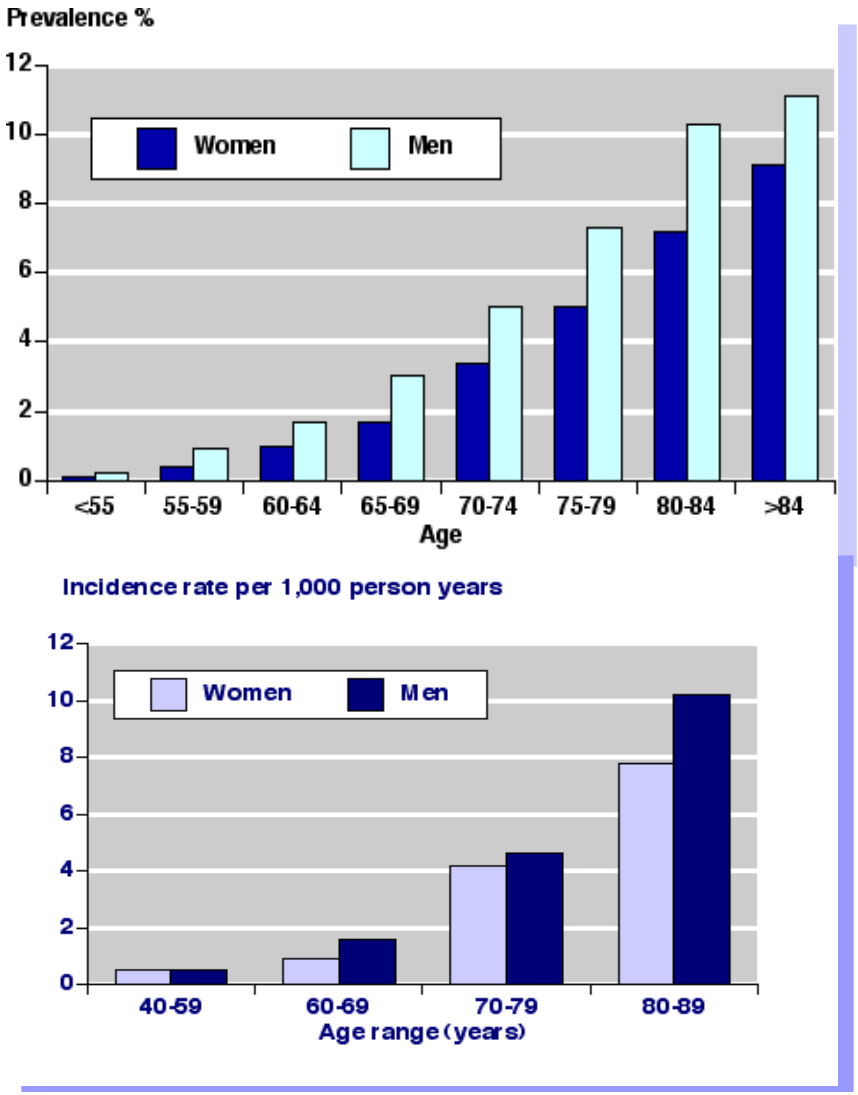
심방세동이란?

Atrial fibrillation (AF) is the most common, abnormal rhythm of the heart(가장 흔한 부정맥**)**

Atrial rate >350/min

(심방 박동수**>350/**분**)**

Irregularly irregular heart beats(매우 불규칙한 맥박**)**



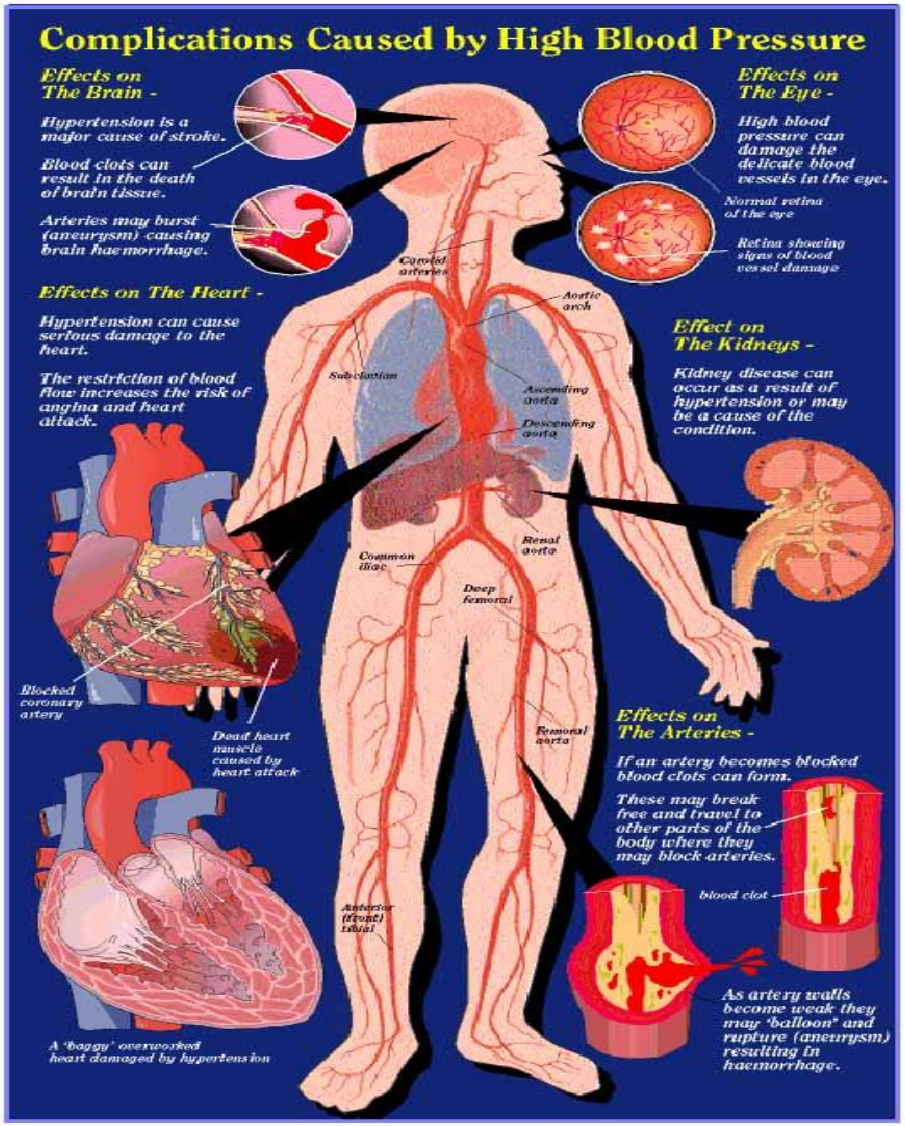
심방세동을 치료하지 않으면?

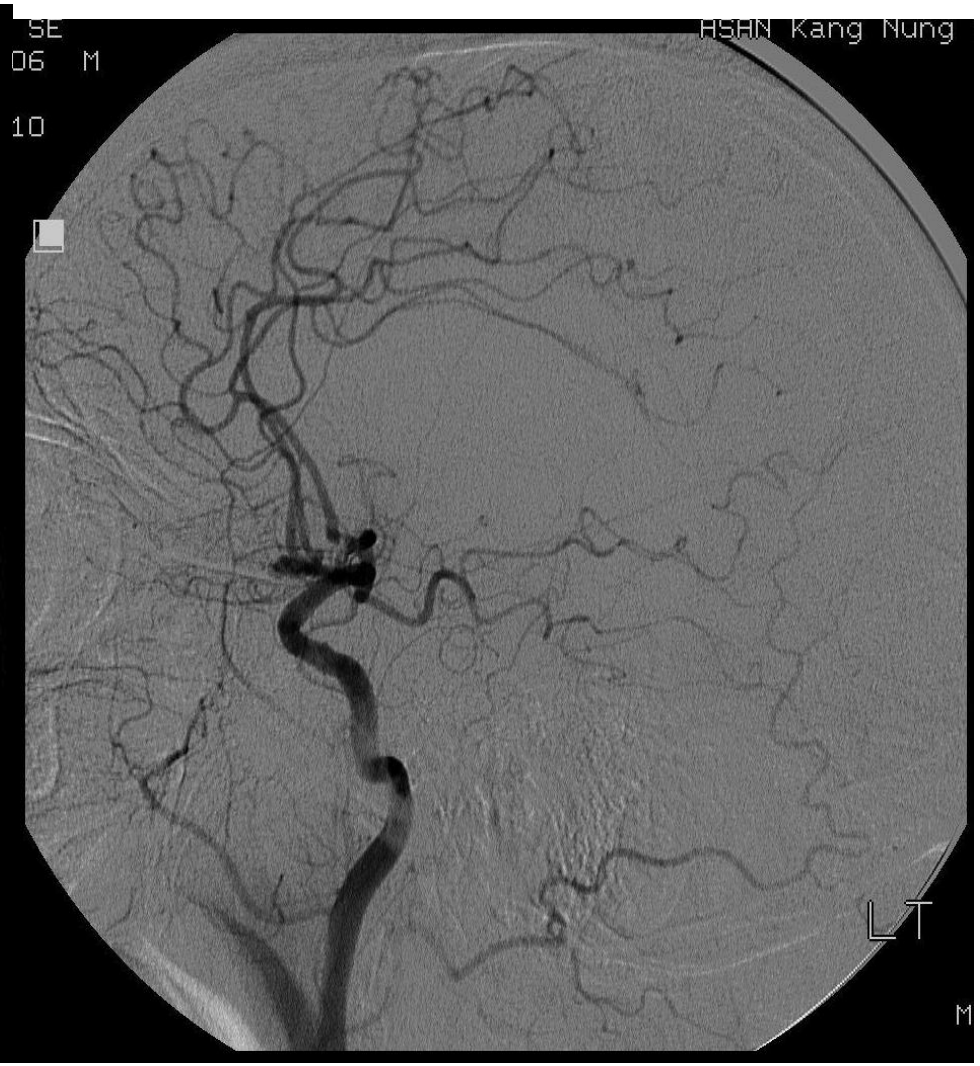
Heart Failure(심부전증)

Thromboembolism(혈전색전증)

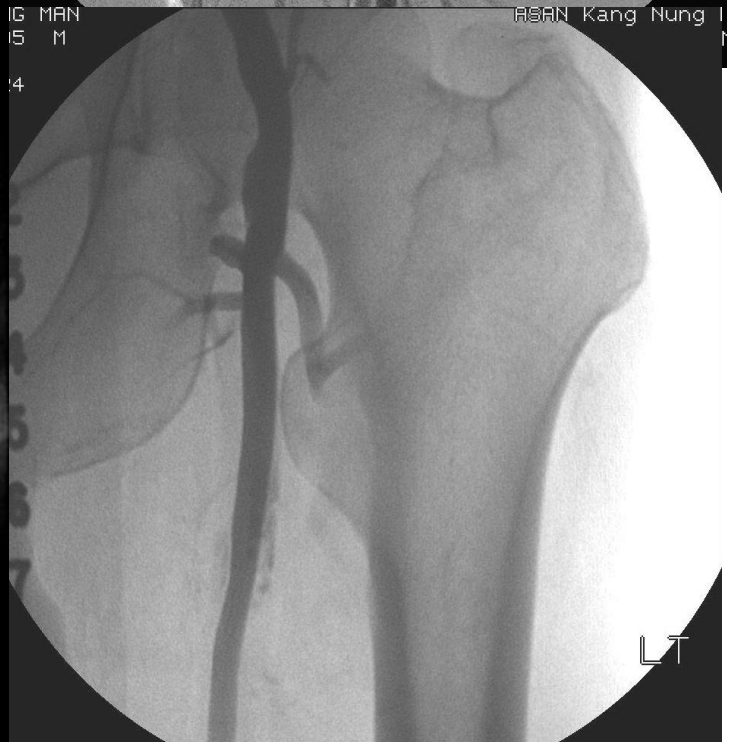
- *Stroke(뇌경색-중풍)*
- *Pulmonary embolism(폐동맥색전증)*
- *Renal, mesenteric infarction(내장동맥 색전증)*
- *Extremity embolism(급성사지동맥허혈증)*

전신 혈관과 관련 질환


Complications Caused by High Blood Pressure
Effects on The Brain -
Hypertension is a major cause of stroke.
Blood clots can result in the death of brain tissue.
Arteries may burst (aneurysm) causing brain haemorrhage.
Effects on The Heart -
Hypertension can cause serious damage to the heart.
The restriction of blood flow increases the risk of angina and heart attack.
Blocked coronary artery
Dead heart muscle caused by heart attack
A 'baggy' overworked heart damaged by hypertension
Effects on The Eye -
High blood pressure can damage the delicate blood vessels in the eye.
Normal retina of the eye
Retina showing signs of blood vessel damage
Carotid arteries
Aortic arch
Subclavian
Ascending aorta
Descending aorta
Renal aorta
Common iliac
Deep femoral
Femoral aorta
Anterior (front) tibial
Effect on The Kidneys -
Kidney disease can occur as a result of hypertension or may be a cause of the condition.
Effects on The Arteries -
If an artery becomes blocked blood clots can form.
These may break free and travel to other parts of the body where they may block arteries.
blood clot
As artery walls become weak they may 'balloon' and rupture (aneurysm) resulting in haemorrhage.


SE
06 M
10
ASAN Kang Nung
LT
M


LT


LT

심방 세동의 치료

- 동율동 전환

  1.항부정맥 약물 요법

  2.전극절제도자술 치료

- 심박수 조절

  1.심부전증의 예방 및 기저 질환 치료

  2. 동맥색전증 예방 치료(항응고제)

  가)쿠마딘(와파린)

  나)새로운 혈액응고 억제제

CHADS2 Risk Stratification Scheme, Relationship between the CHADS2 score and the risk of stroke

Table 3. $CHADS_2$ Risk Stratification Scheme (14)

Risk Factors	Score
C Recent congestive heart failure	1
H Hypertension	1
A Age ≥75 yrs	1
D Diabetes mellitus	1
S_2 History of stroke or transient ischemic attack	2

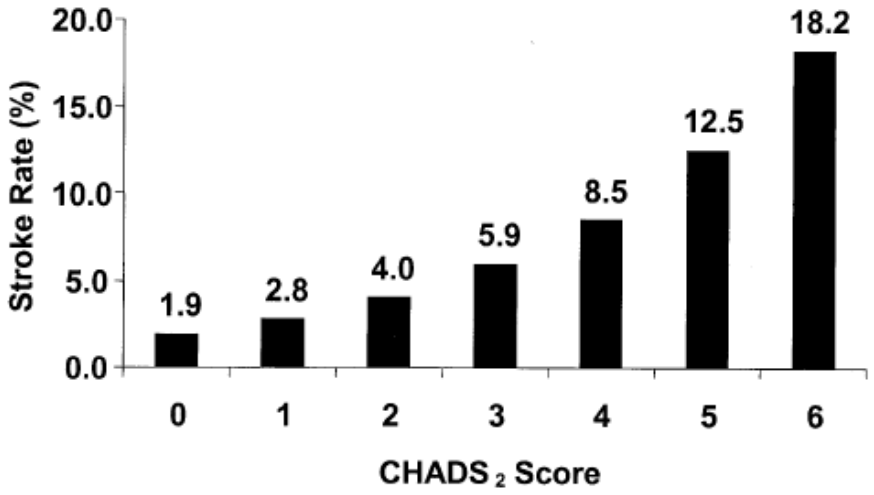


Figure 2. Relationship between the $CHADS_2$ score and the risk of stroke

JAMA 2001;285:2864-70

서맥 (Bradyarrhythmia)

Sinus Node Dysfunction

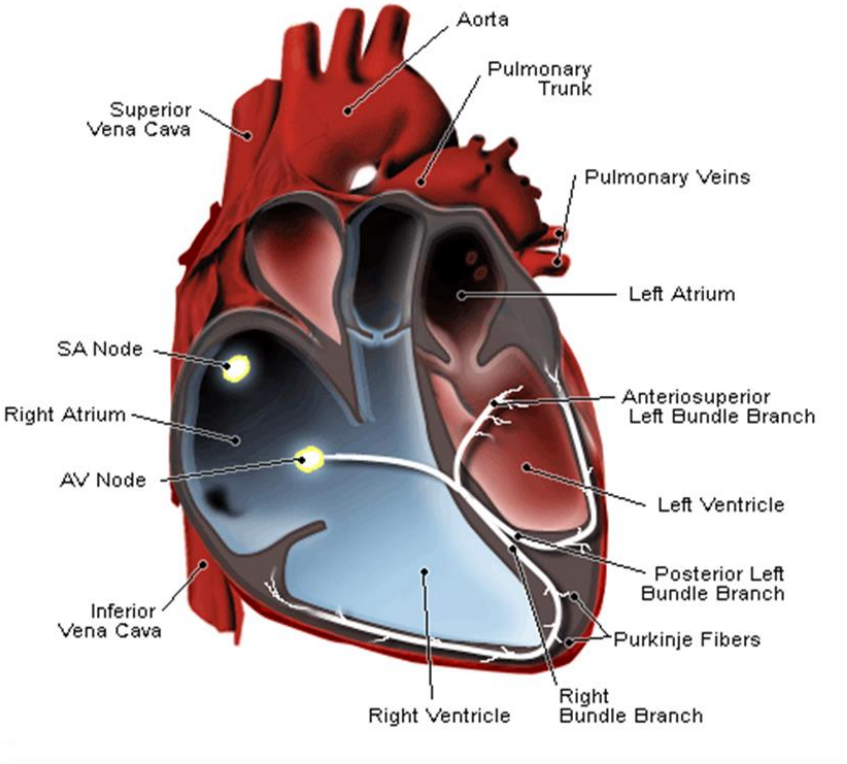
(동방결절 기능부전증)

Atrioventricular Block

(방실결절 차단)

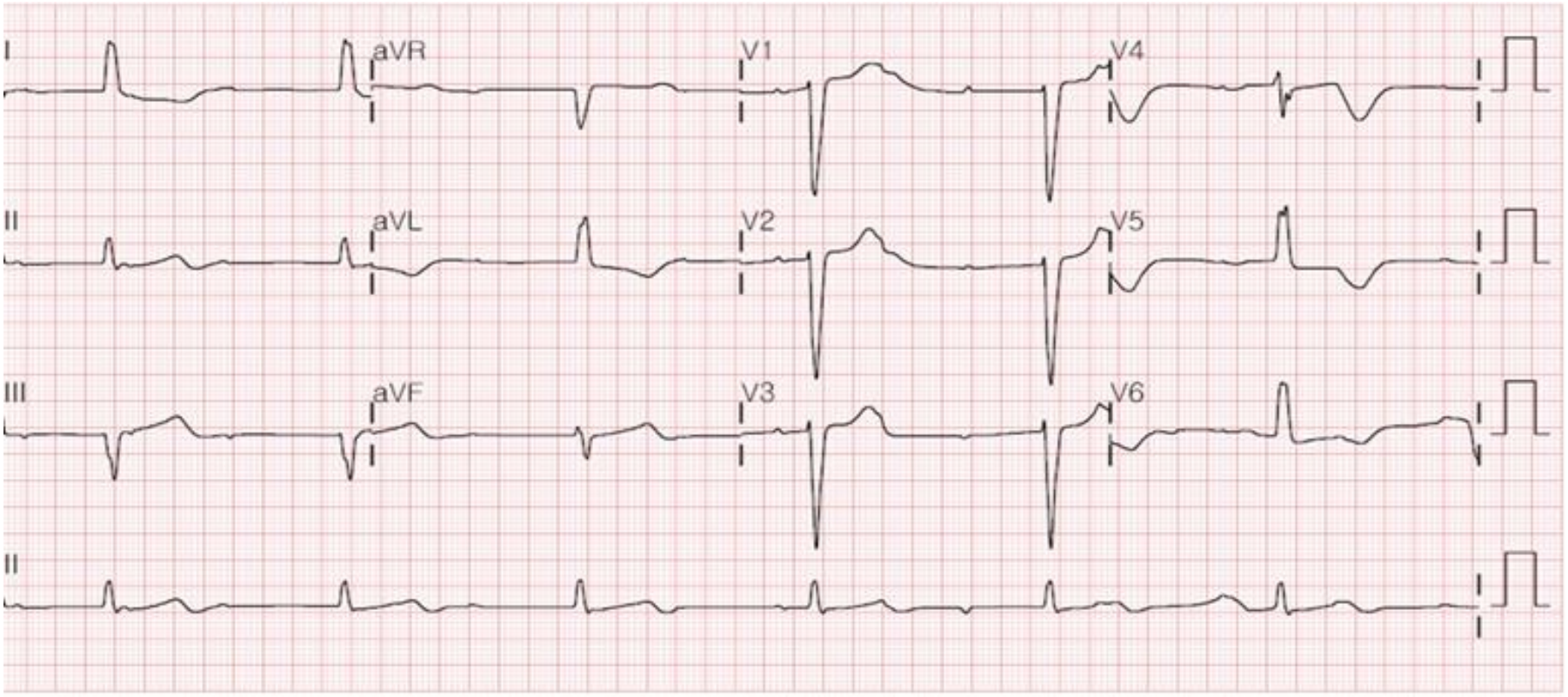
심장의 자동능

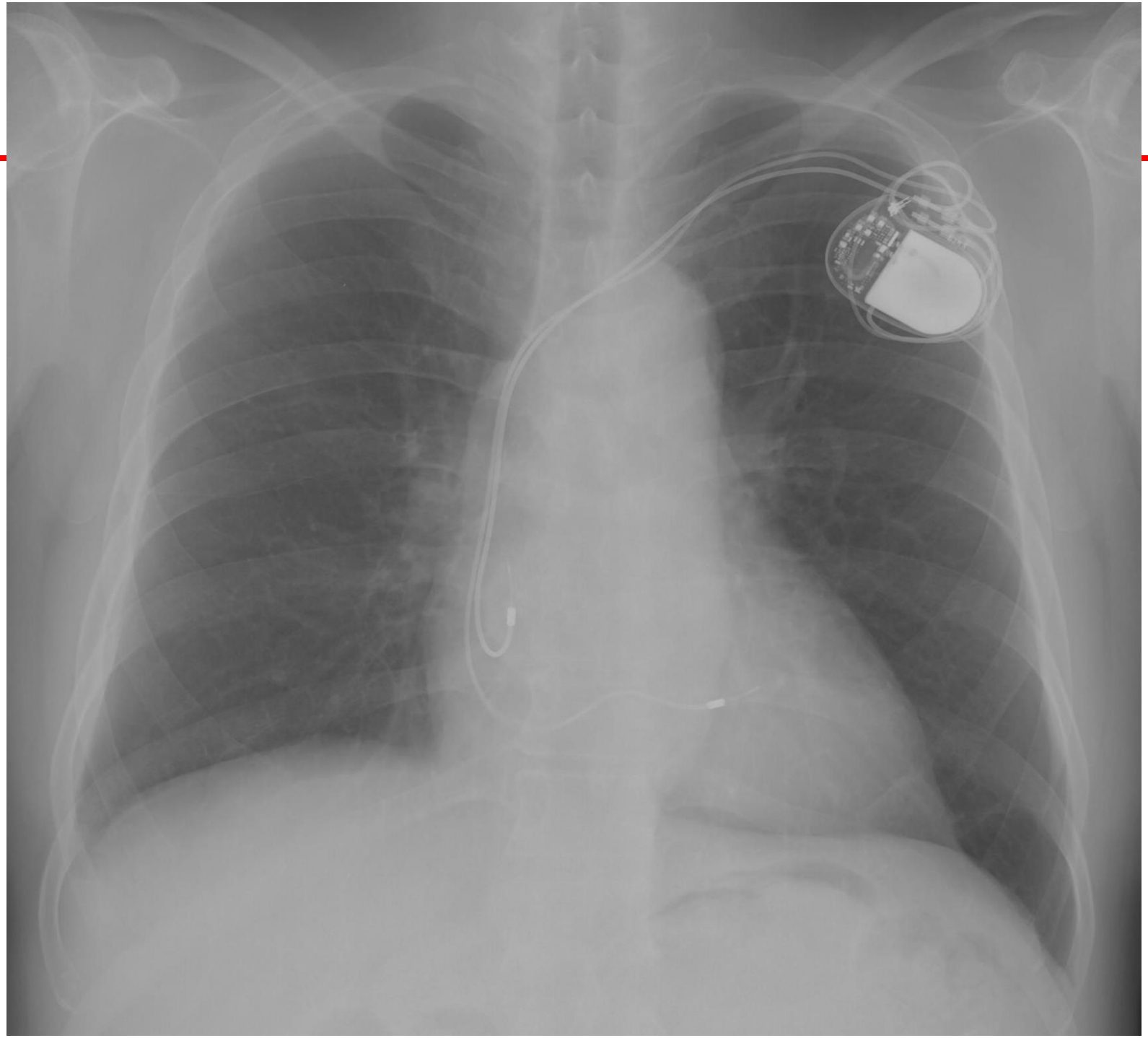
- 동방결절:60-100/분
- 방실결절:40-60/분
- 심근세포:<40/분



72Yr Male: recurrent syncope

ECG :





Post-Pacemaker ECG