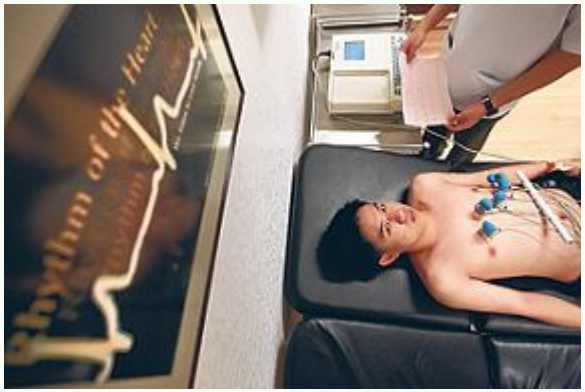
Common Cardiovascular Issues: From Pre-participation Screening to Cardiovascular Emergency



麥耀光 醫生

Dr. Gary Mak

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Specialist in Cardiology

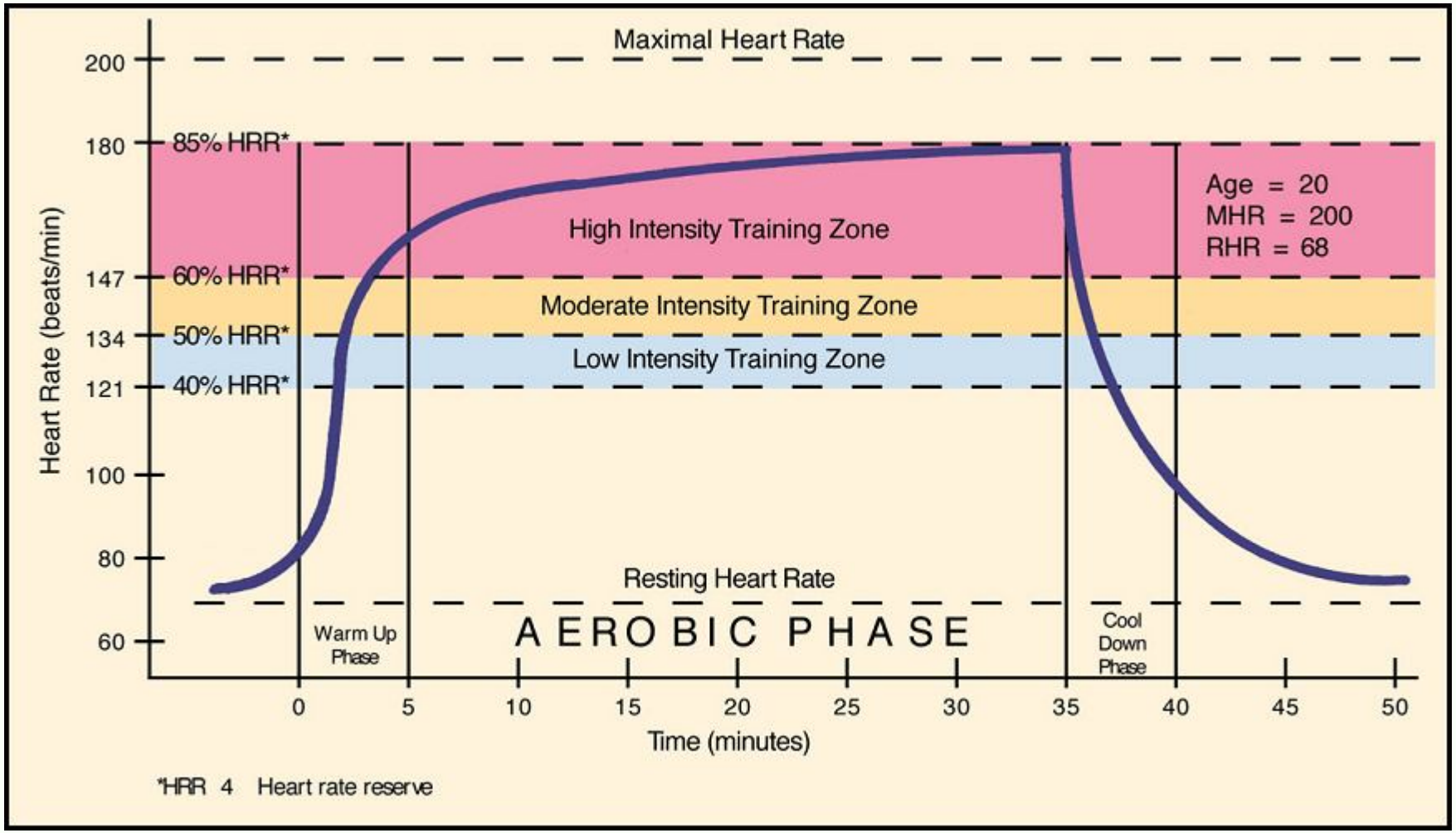
Consultant HK Sports Institute

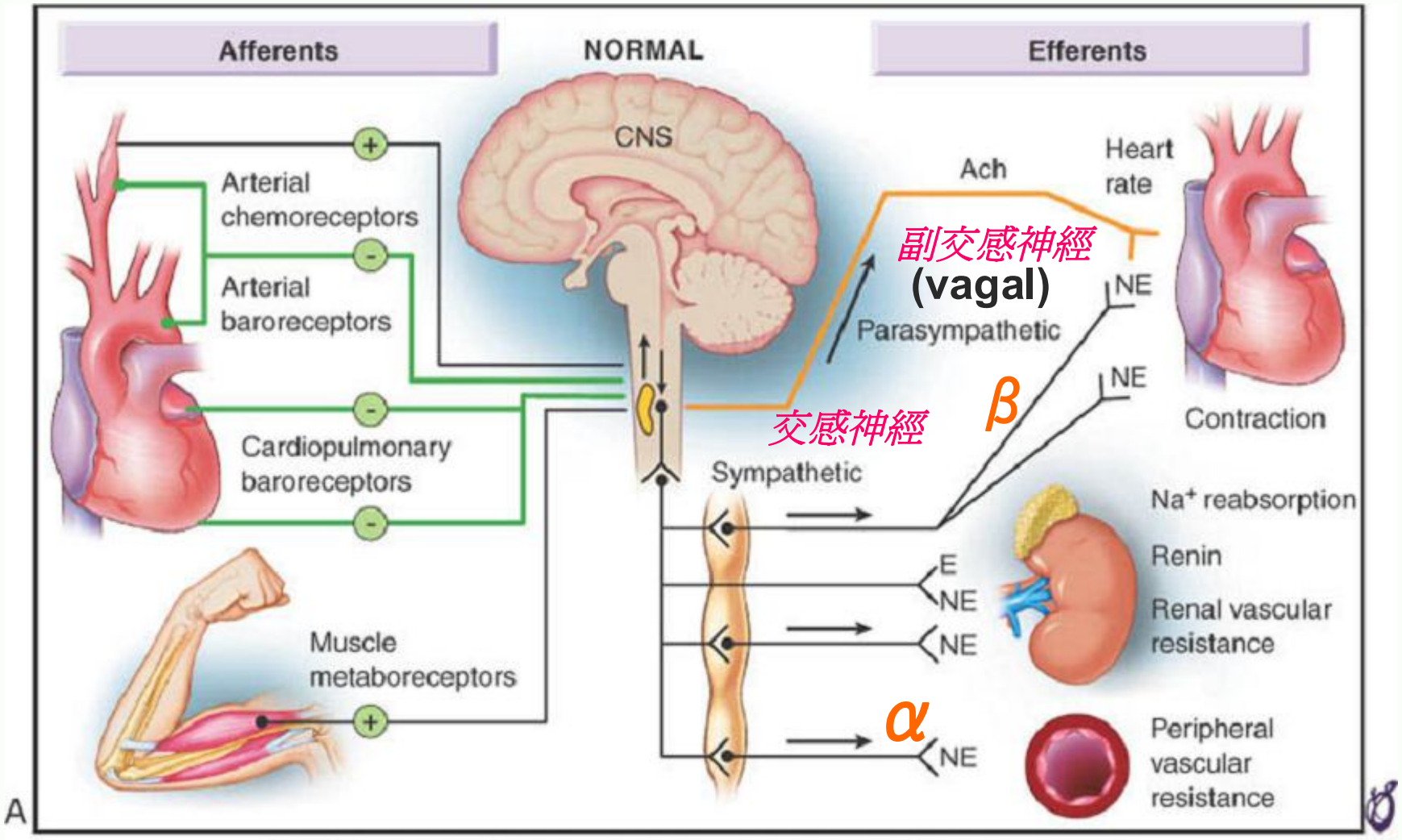
FACC,FCCP,FSCAI,FHKCP, FRCP(E), FRCP(G), FHKAM


OMEGA
NEW WR
9.69


OMEGA
NEW WR
Usain Bolt, Jamaica

HR Responses During Exercise





(From Floras JS: Alterations in the sympathetic and parasympathetic nervous system in HF. In Mann DL [ed]: Heart Failure: A Companion to Braunwald's Heart Disease. Philadelphia, Elsevier, 2004, pp 247-278.)

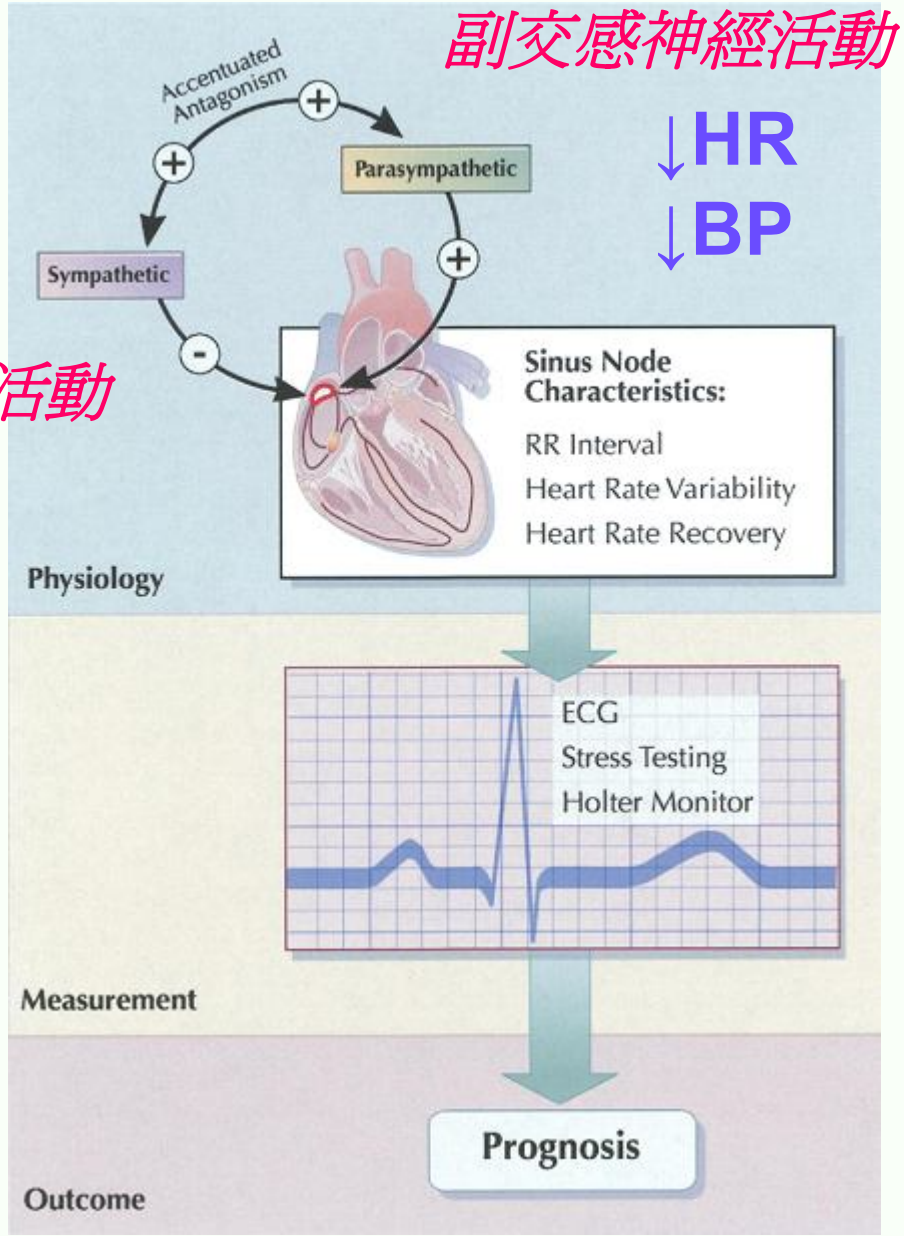
↑HR
↑BP

交感神經活動

副交感神經活動

↓HR
↓BP

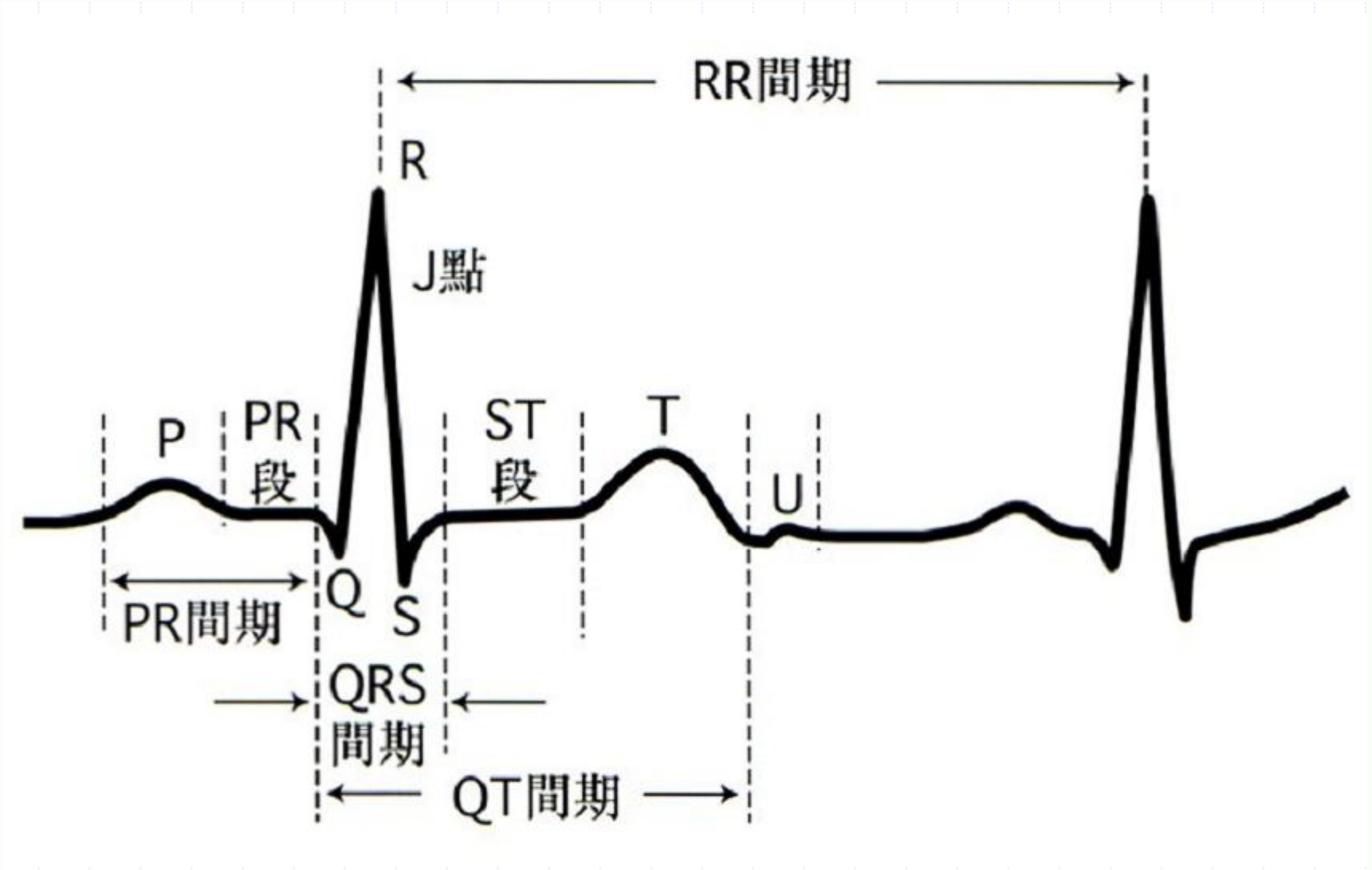
Autonomic Nervous System
&
Cardiovascular Response

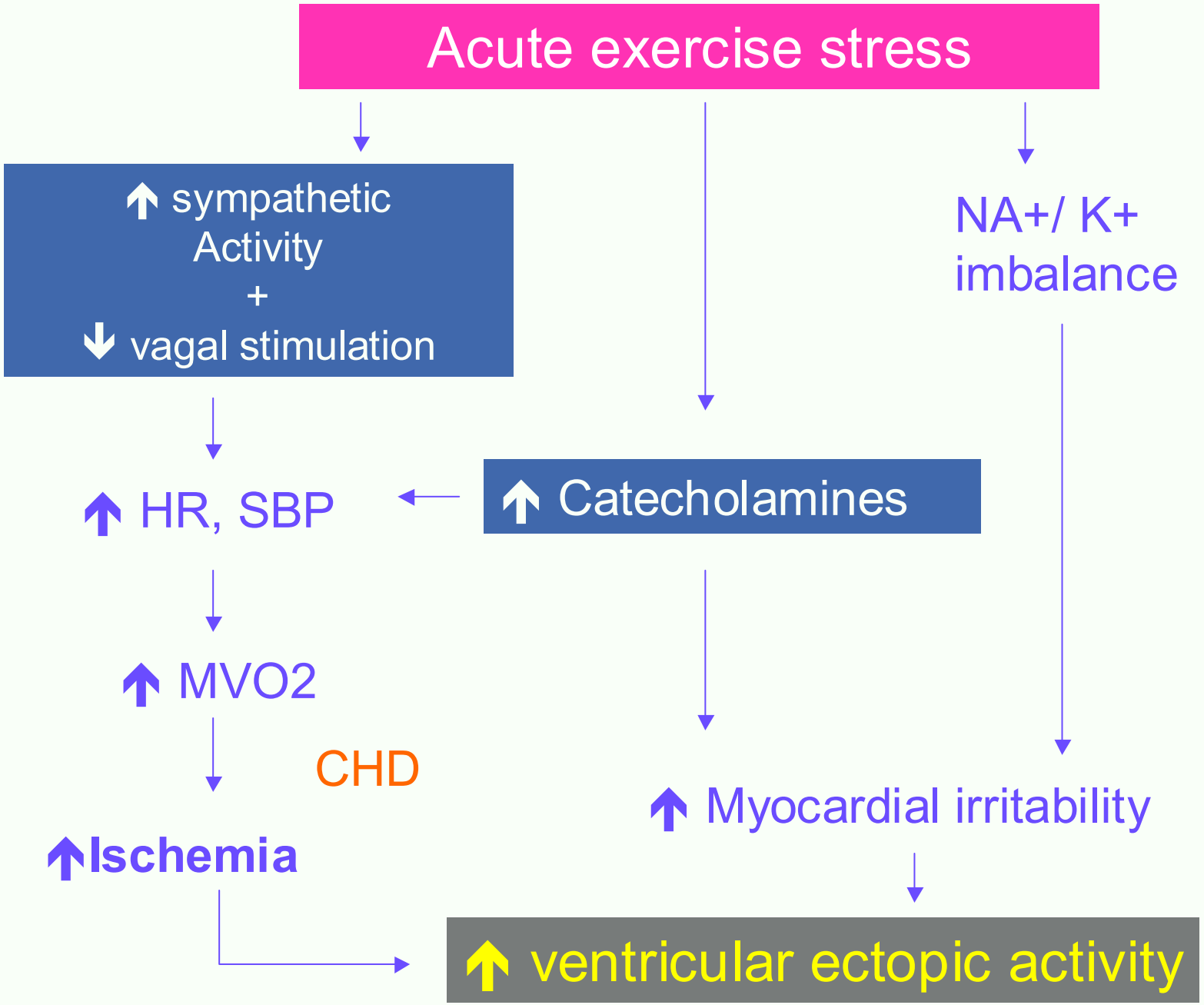


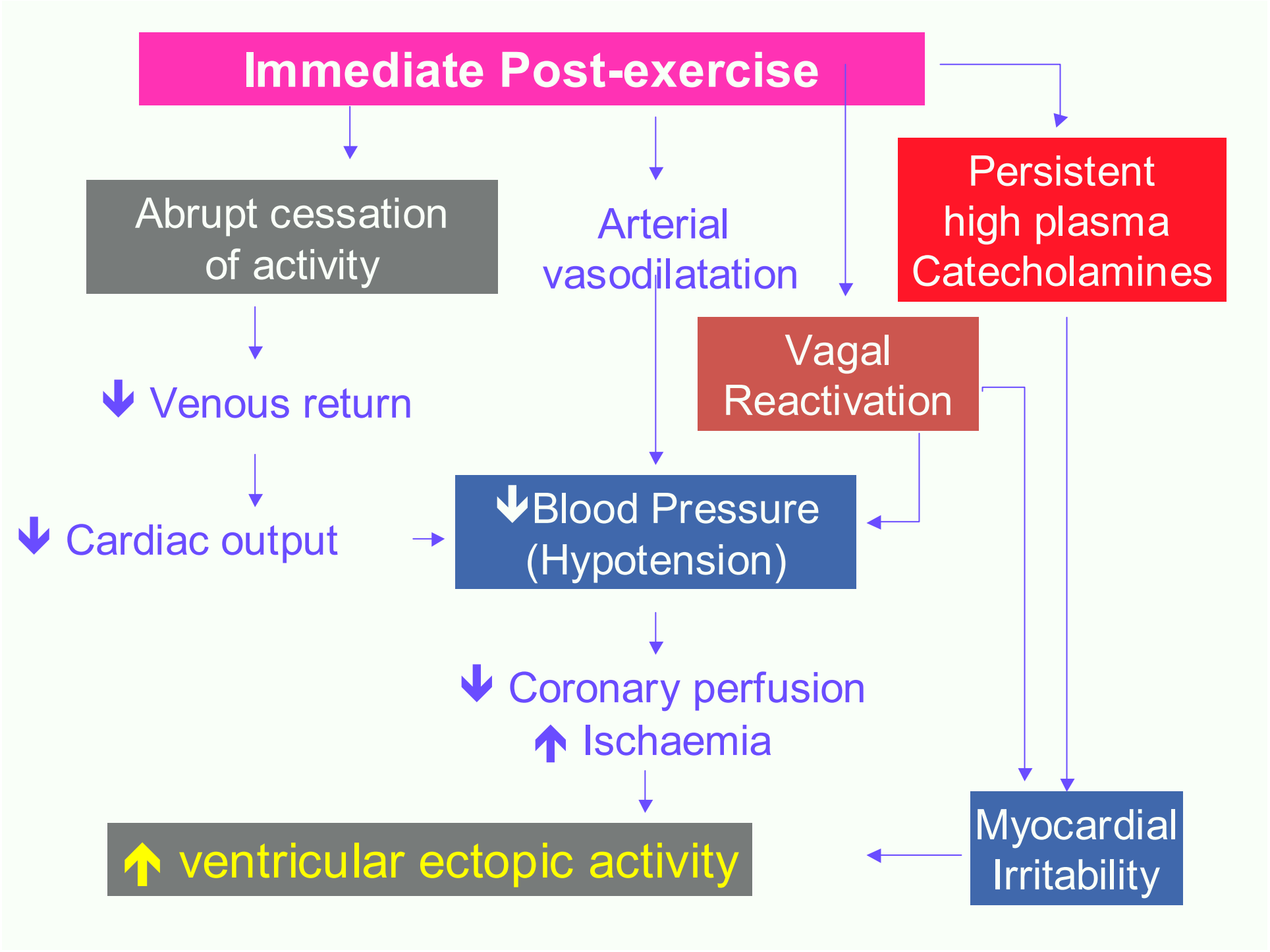
Lahiri, M. K. et al. J Am Coll Cardiol 2008;51:1725-1733

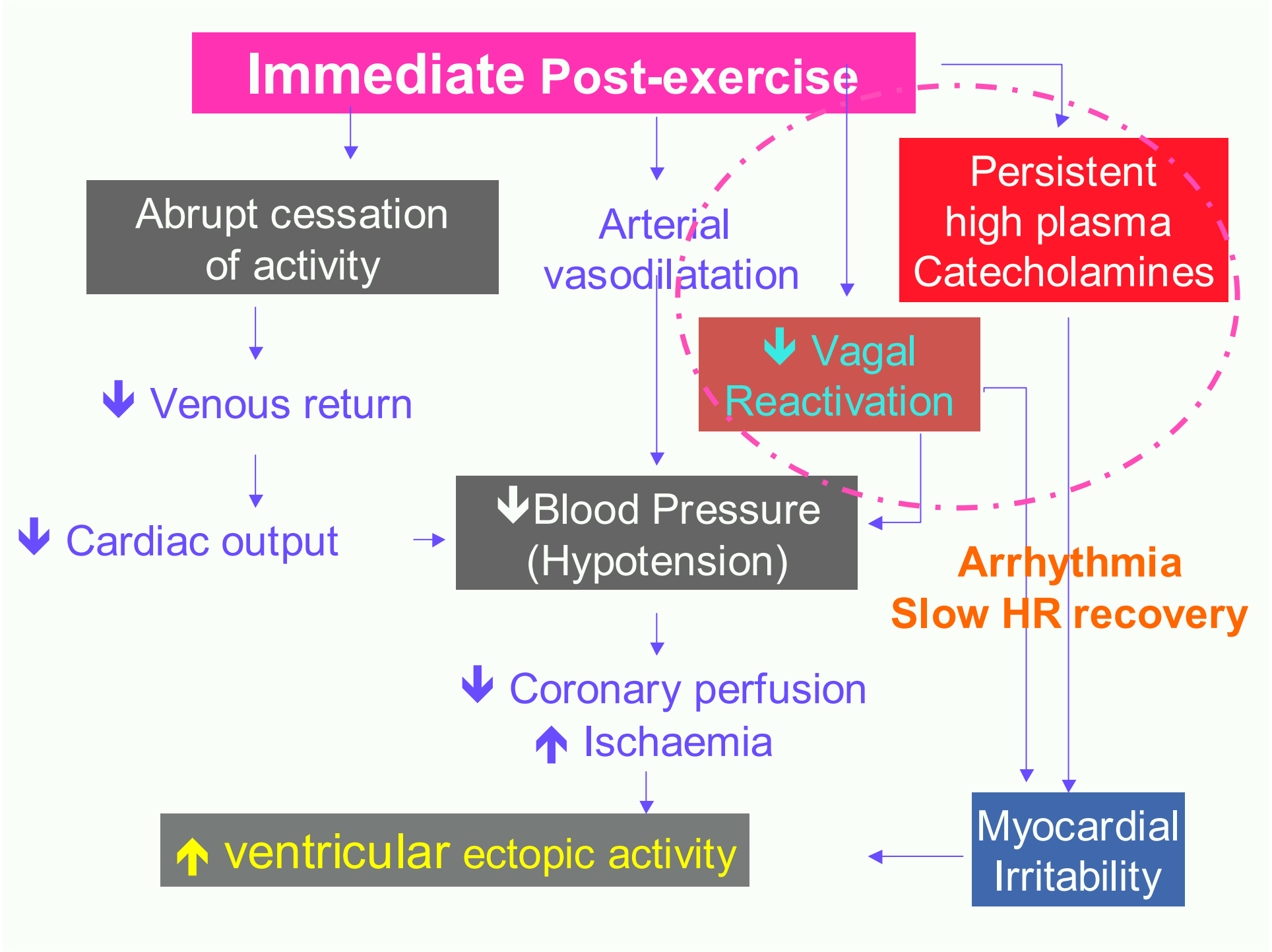
P-QRS-T Intervals in normal ECG:

Normally all would shortened as HR increases

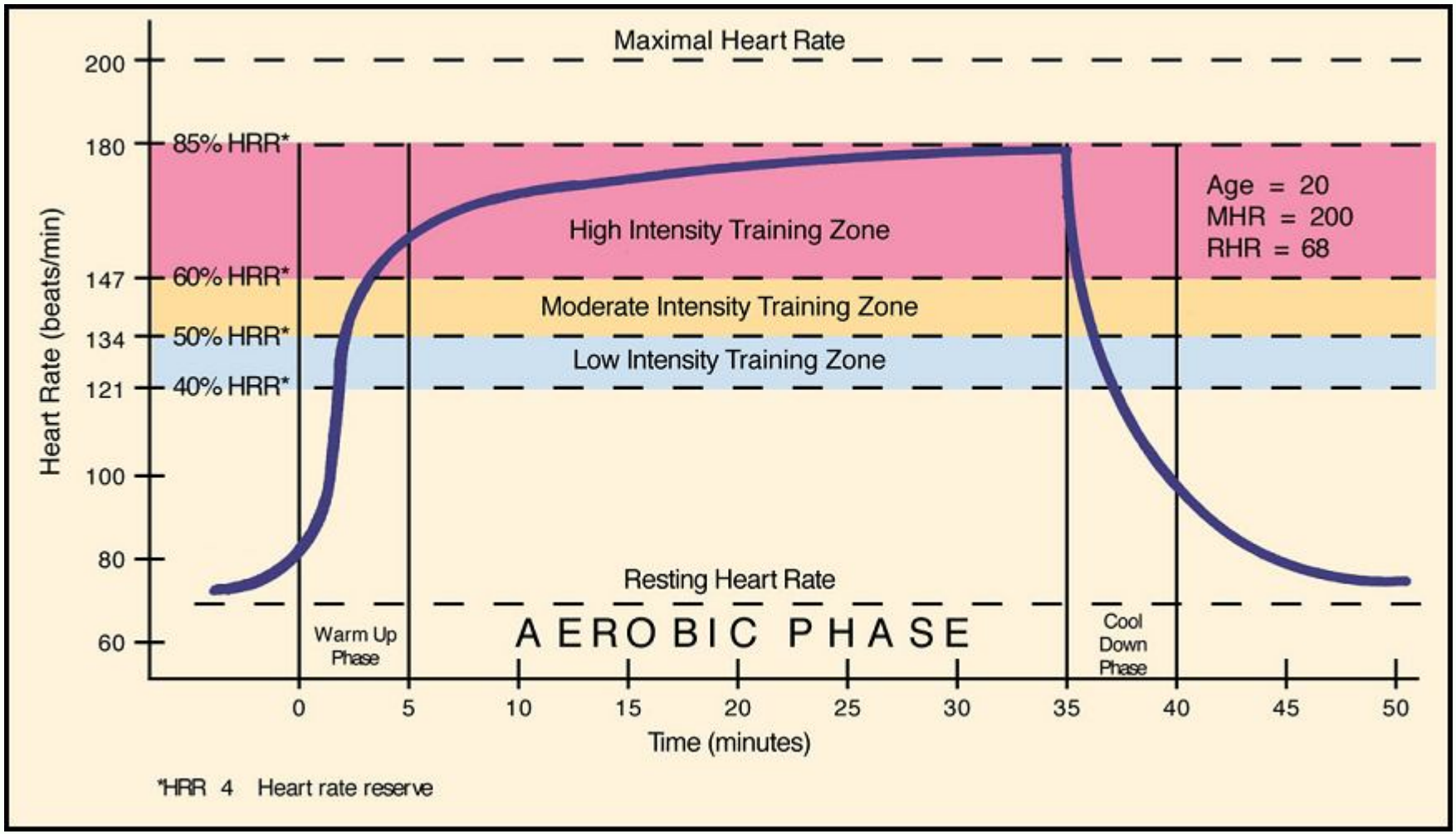



Acute exercise stress
↑ sympathetic Activity + ↓ vagal stimulation
NA+/ K+ imbalance
↑ HR, SBP
↑ Catecholamines
↑ MVO2
CHD
↑ Myocardial irritability
↑Ischemia
↑ ventricular ectopic activity


Immediate Post-exercise
Abrupt cessation of activity
Arterial vasodilatation
Persistent high plasma Catecholamines
Vagal Reactivation
Venous return
Cardiac output
Blood Pressure (Hypotension)
Coronary perfusion
Ischaemia
ventricular ectopic activity
Myocardial Irritability


Immediate Post-exercise
Abrupt cessation of activity
Arterial vasodilatation
Persistent high plasma Catecholamines
↓ Vagal Reactivation
↓ Venous return
↓ Cardiac output
↓Blood Pressure (Hypotension)
Arrhythmia
Slow HR recovery
↓ Coronary perfusion
↑ Ischaemia
↑ ventricular ectopic activity
Myocardial Irritability

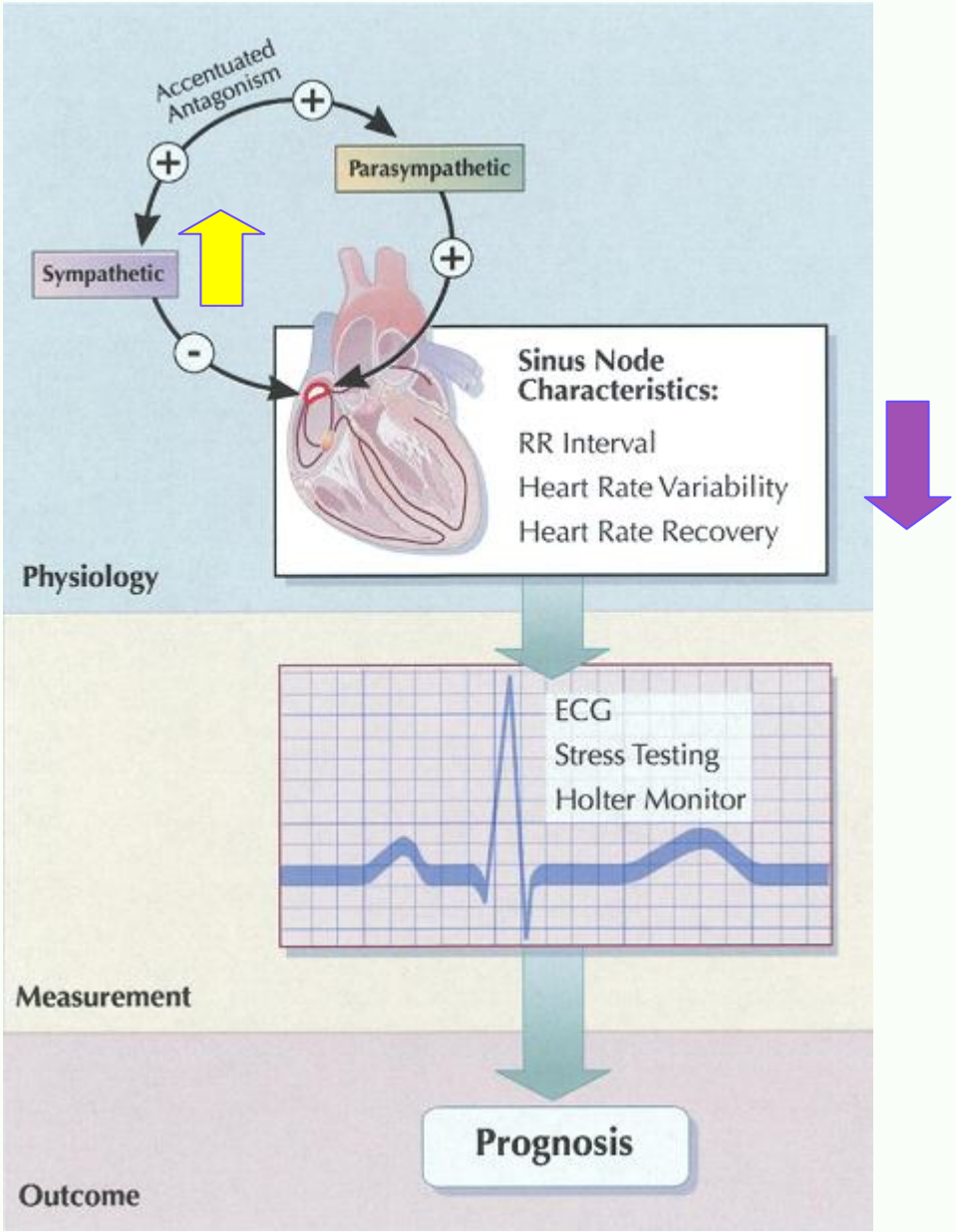
HR Responses During Exercise



↑HR

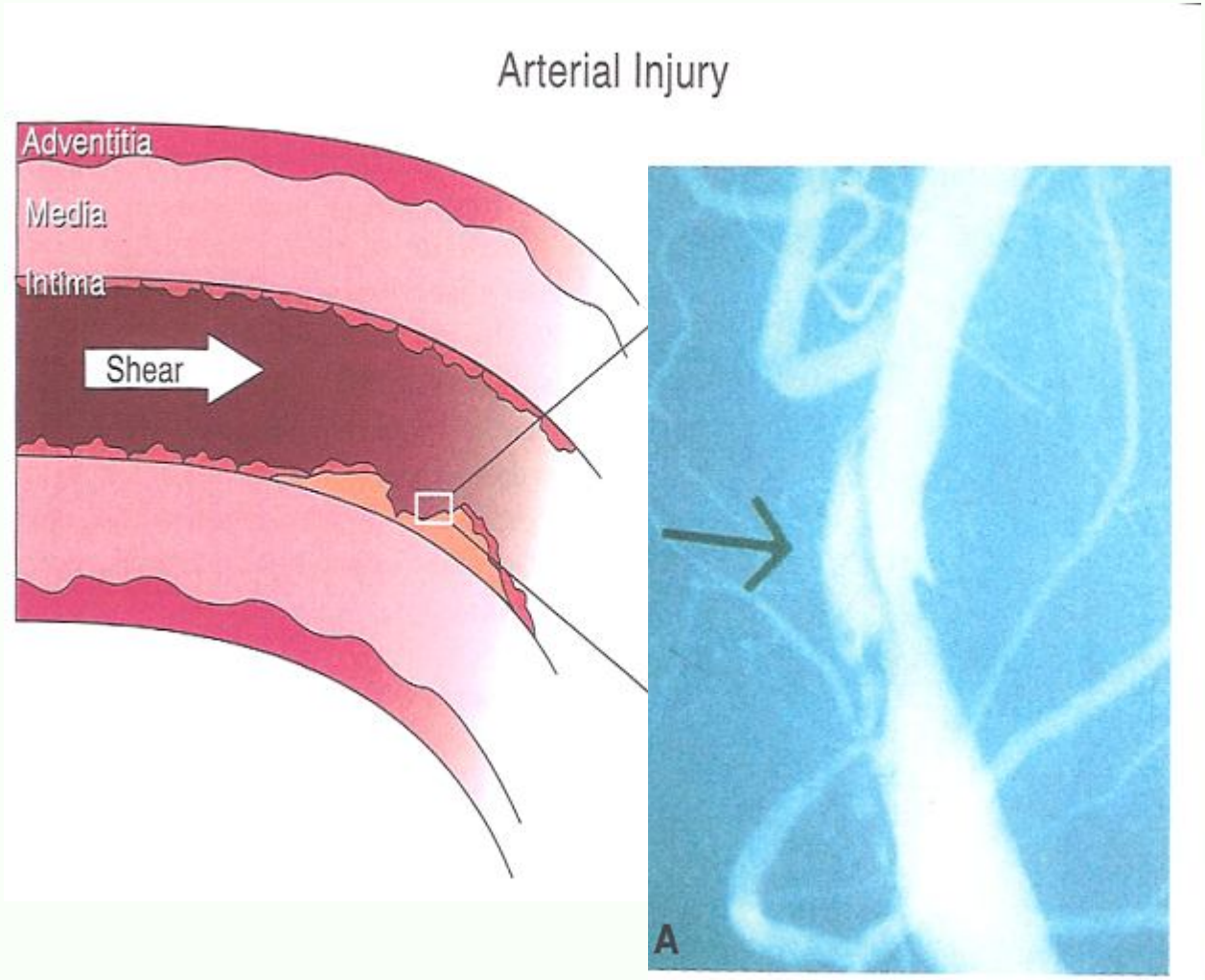
Excessive intensive exercise
Or overtraining =>
Sympathetic predominance

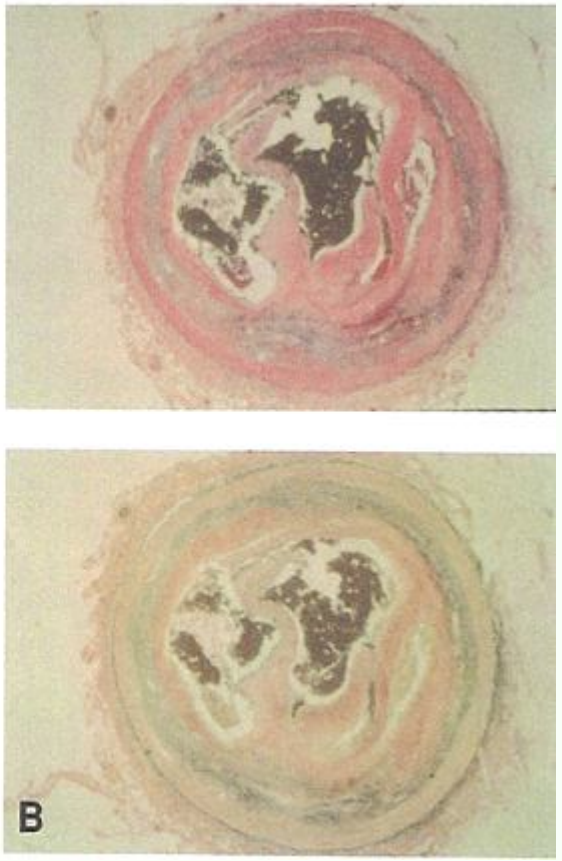
交感神經活動作主導



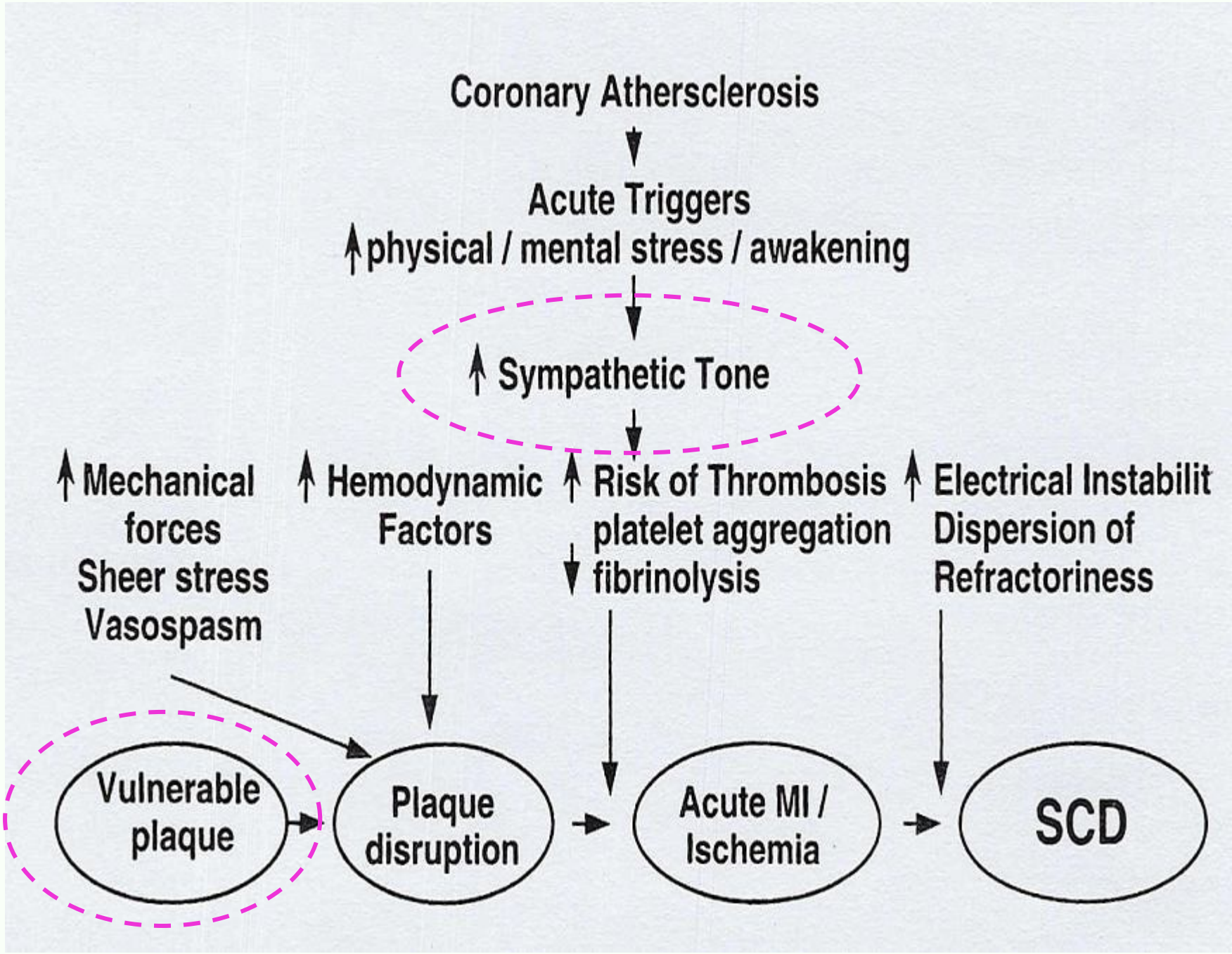
Lahiri, M. K. et al. J Am Coll Cardiol 2008;51:1725-1733

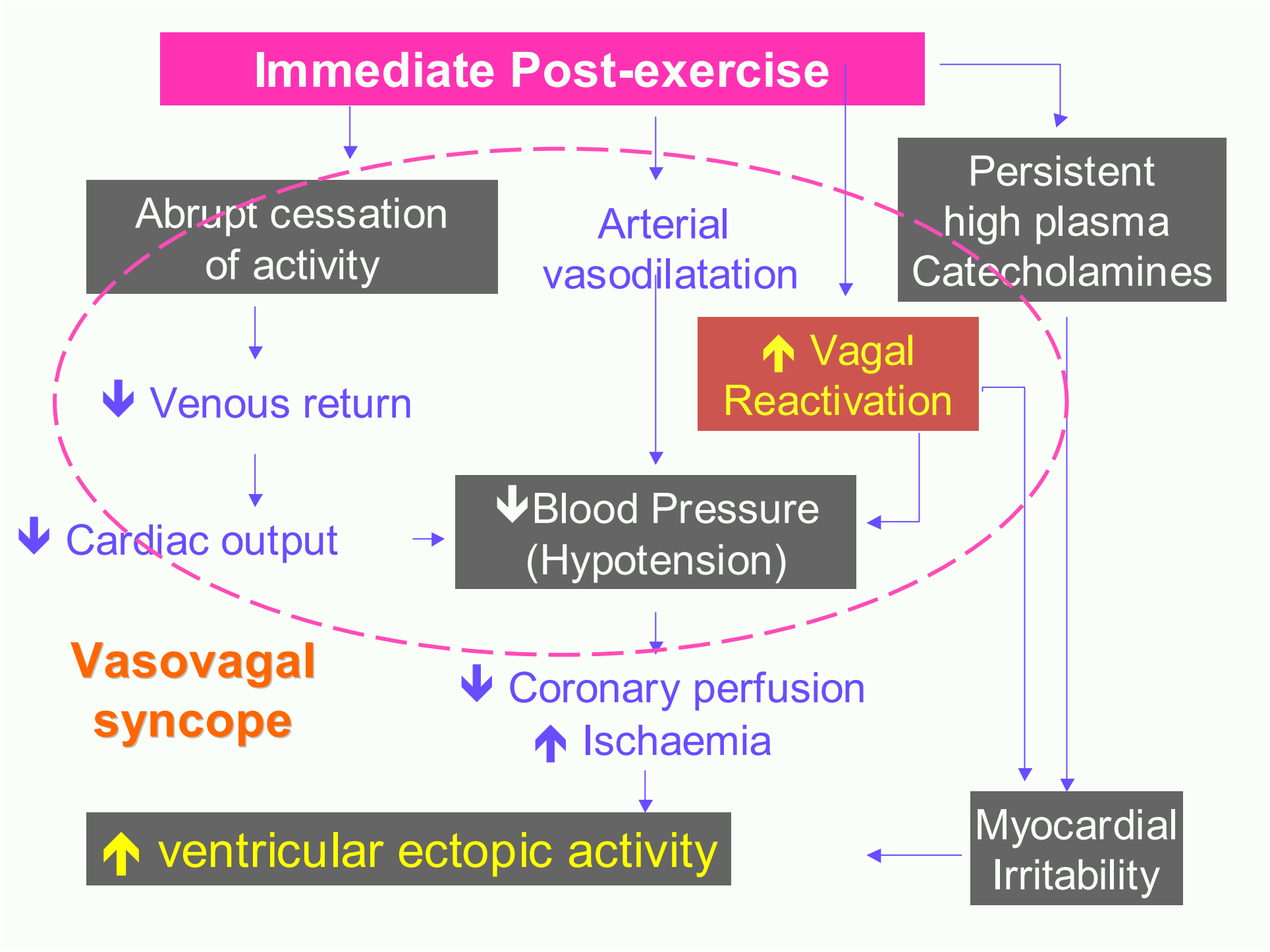
Acute Coronary syndrome due to plaque Rupture





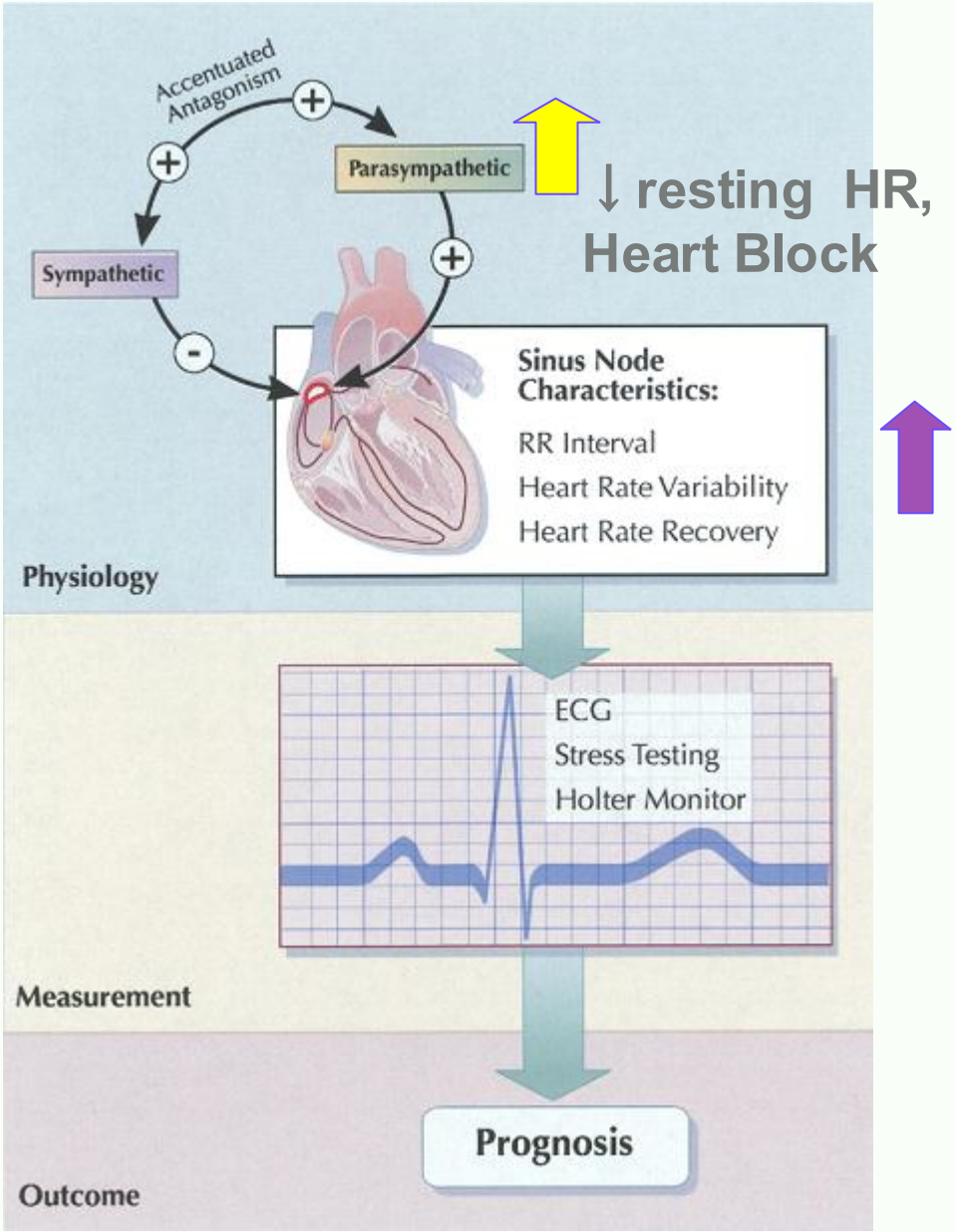
Plaque Ulceration & thrombosis


Coronary Athersclerosis
Acute Triggers
physical / mental stress / awakening
Sympathetic Tone
Mechanical forces
Sheer stress
Vasospasm
Hemodynamic Factors
Risk of Thrombosis
platelet aggregation
fibrinolysis
Electrical Instabilit
Dispersion of Refractoriness
Vulnerable plaque
Plaque disruption
Acute MI / Ischemia
SCD


Immediate Post-exercise
Abrupt cessation of activity
Arterial vasodilatation
Persistent high plasma Catecholamines
↑ Vagal Reactivation
↓ Venous return
↓ Cardiac output
↓Blood Pressure (Hypotension)
Vasovagal syncope
↓ Coronary perfusion
↑ Ischaemia
↑ ventricular ectopic activity
Myocardial Irritability

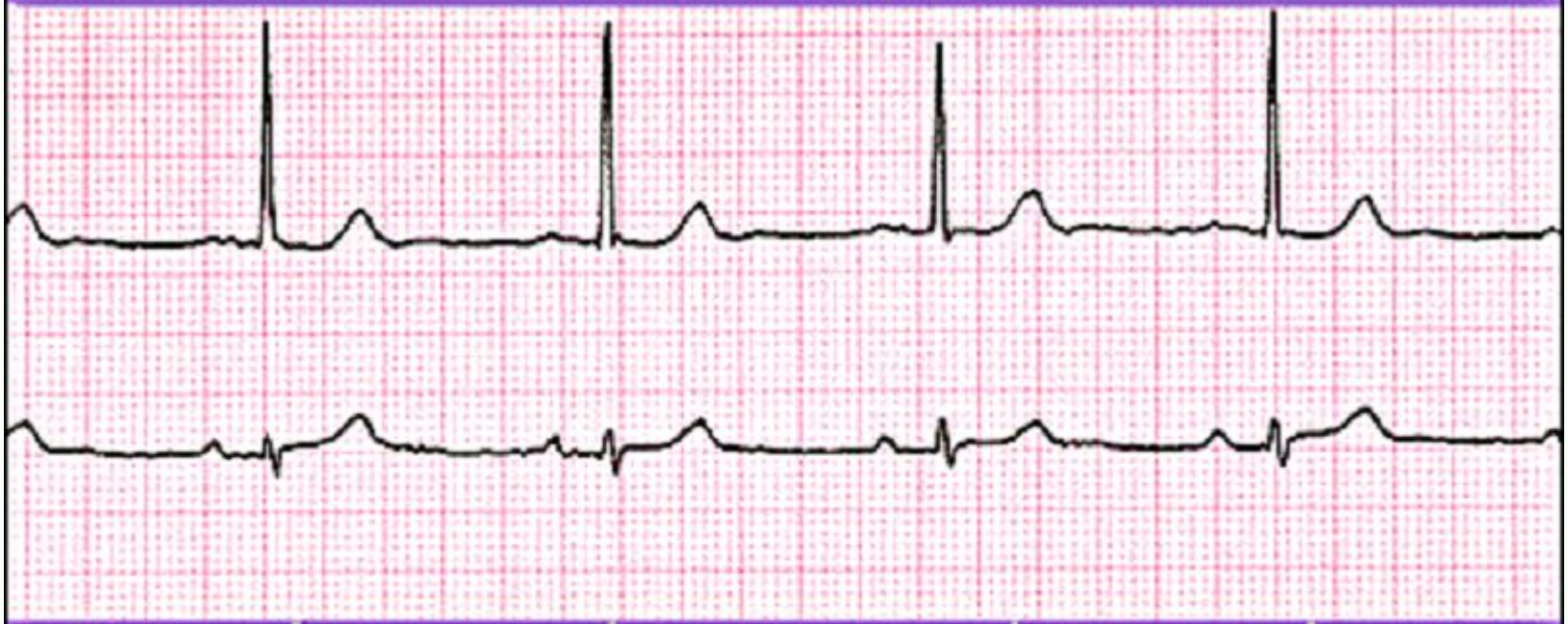
Regular Endurance training=>
Enhanced Vagal Modulation

副交感神經活動作主導

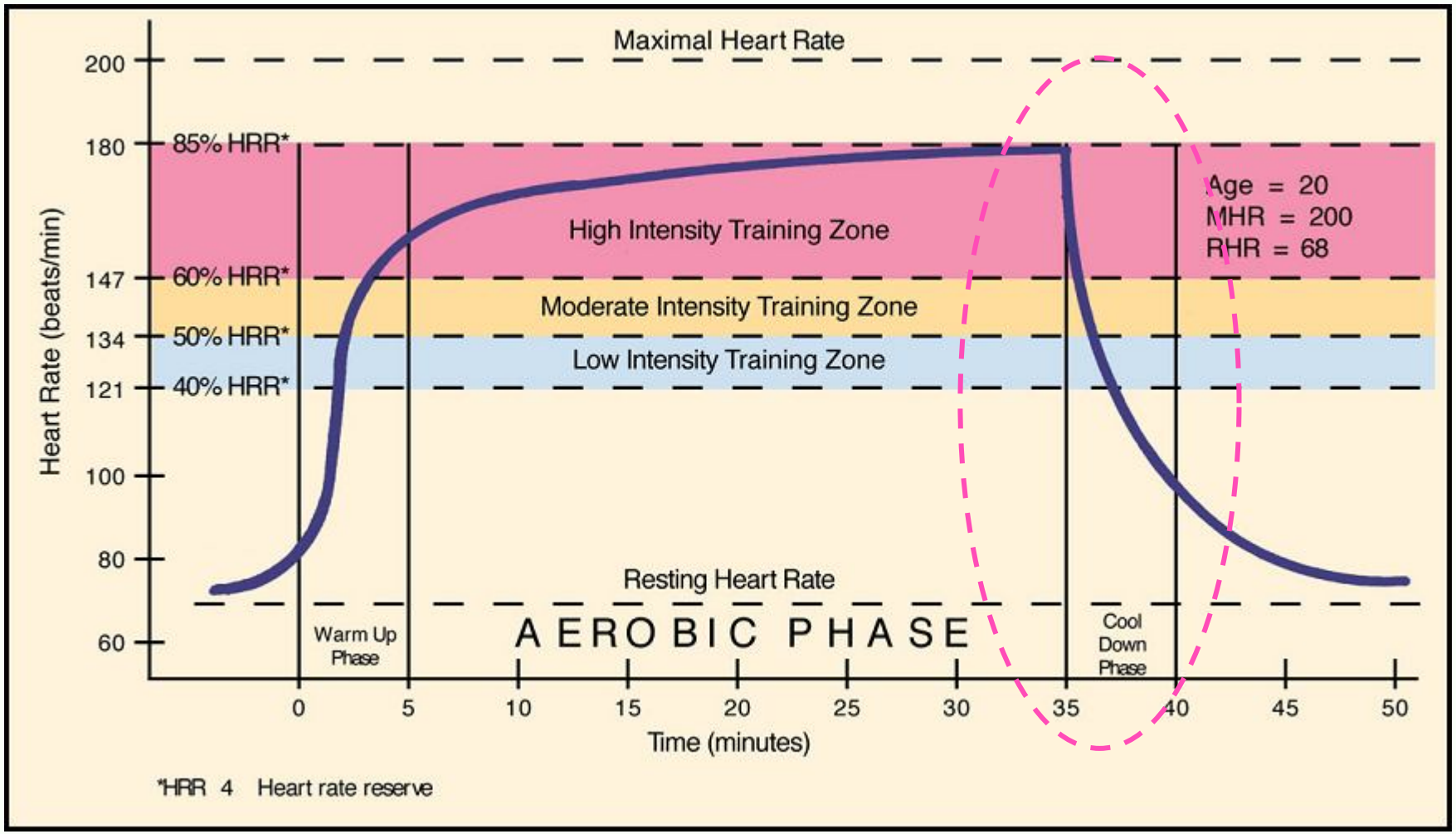


Lahiri, M. K. et al. J Am Coll Cardiol 2008;51:1725-1733

Sinus Bradycardia



Heart Rate	Rhythm	P Wave	PR interval (in seconds)	QRS (in seconds)
<60 bpm	Regular	Before each QRS, identical	.12 to .20	<.12



HR recovery during cool down period:
An indicator of ANS balance

The NEW ENGLAND JOURNAL of MEDICINE

ESTABLISHED IN 1812 MAY 12, 2005 VOL. 352 NO. 19

Heart-Rate Profile during Exercise as a Predictor of Sudden Death

Xavier Jouven, M.D., Ph.D., Jean-Philippe Empana, M.D., Peter J. Schwartz, M.D., Michel Desnos, M.D., Dominique Courbon, M.S.C., and Pierre Ducimetière, Ph.D.

- 5713 asymptomatic man (age 42-53)
- No clinically detectable C V disease
- graded exercise stress test (1967-1972)
- Data on:
  - Resting heart rate
  - Heart rate increase during exercise (rest-peak)
  - Heart rate decrease at one minute recovery
- 23 years follow up
- 81 subjects died suddenly

X Jouven et al N Engl Med 2005;352:1951-8

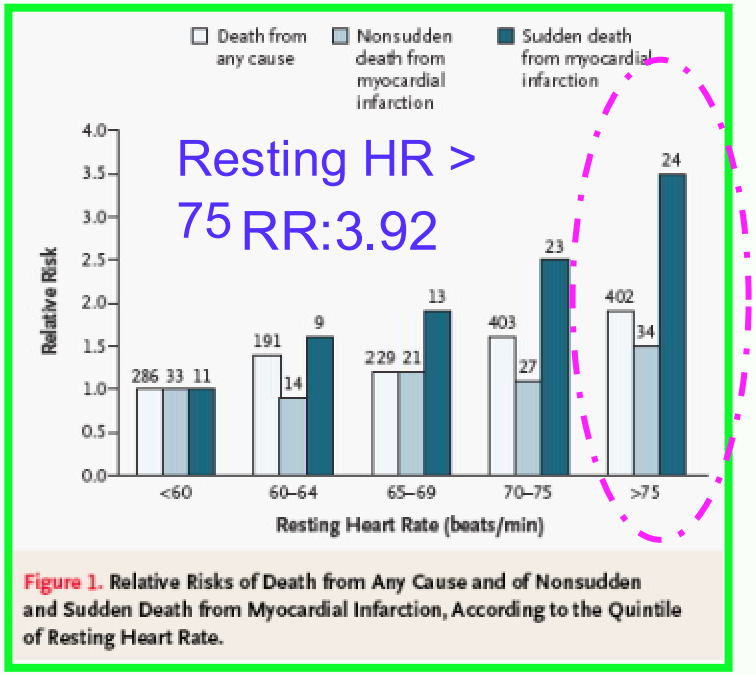
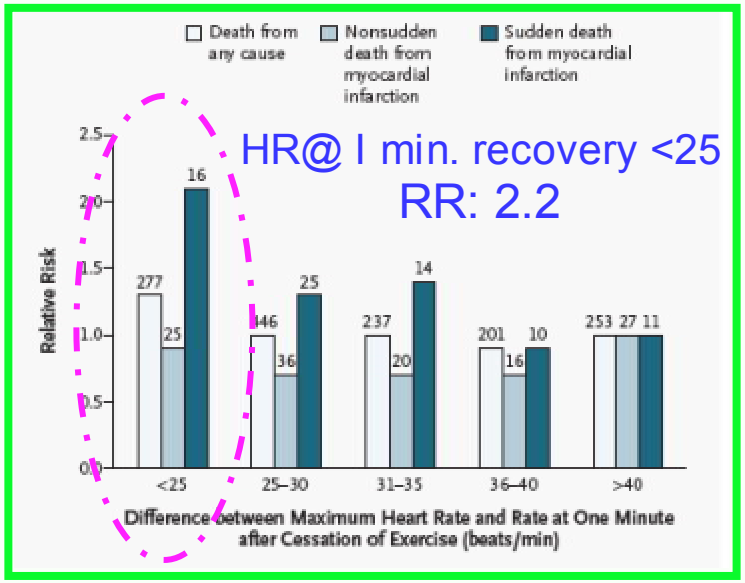
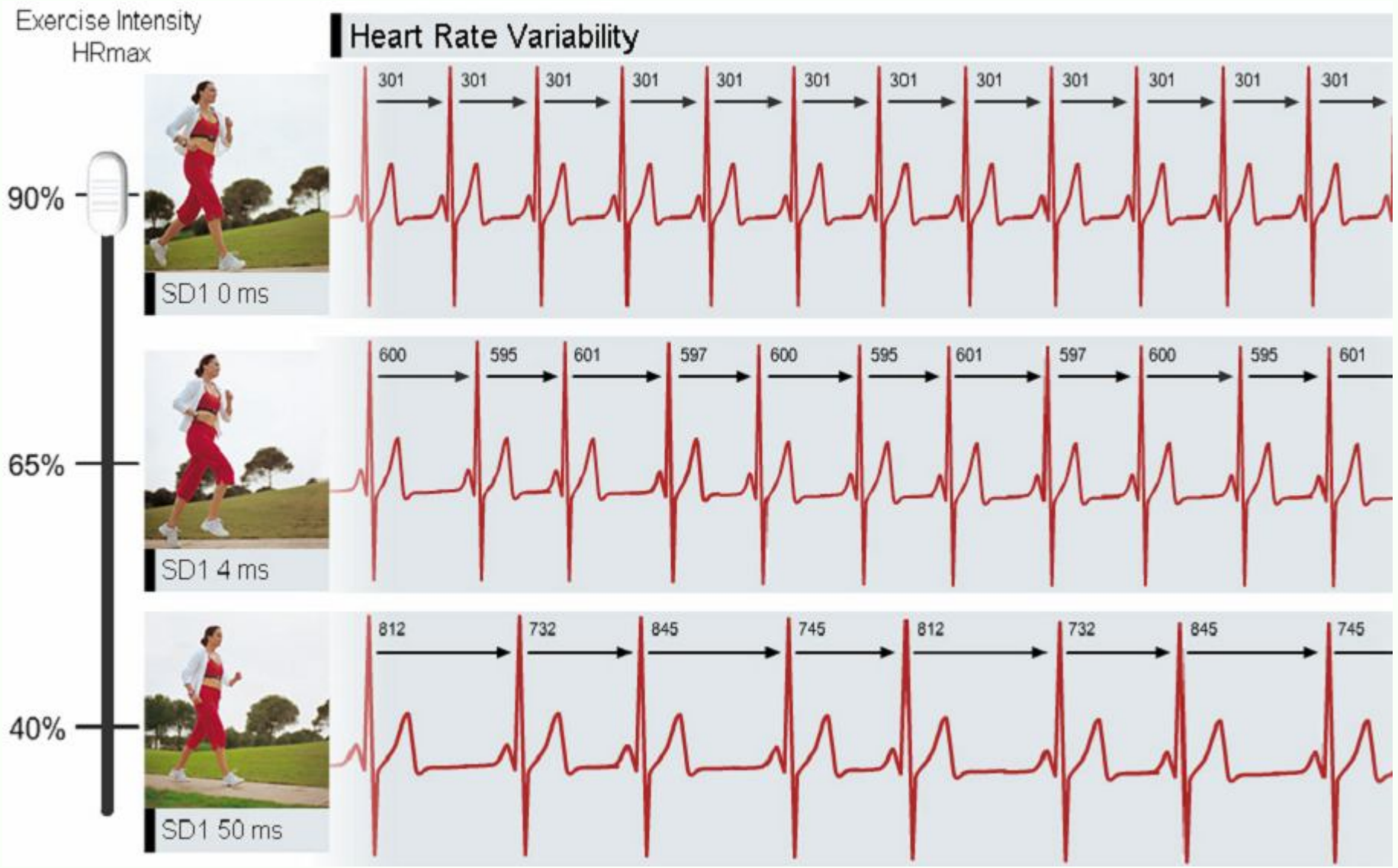


Figure 1. Relative Risks of Death from Any Cause and of Nonsudden and Sudden Death from Myocardial Infarction, According to the Quintile of Resting Heart Rate.



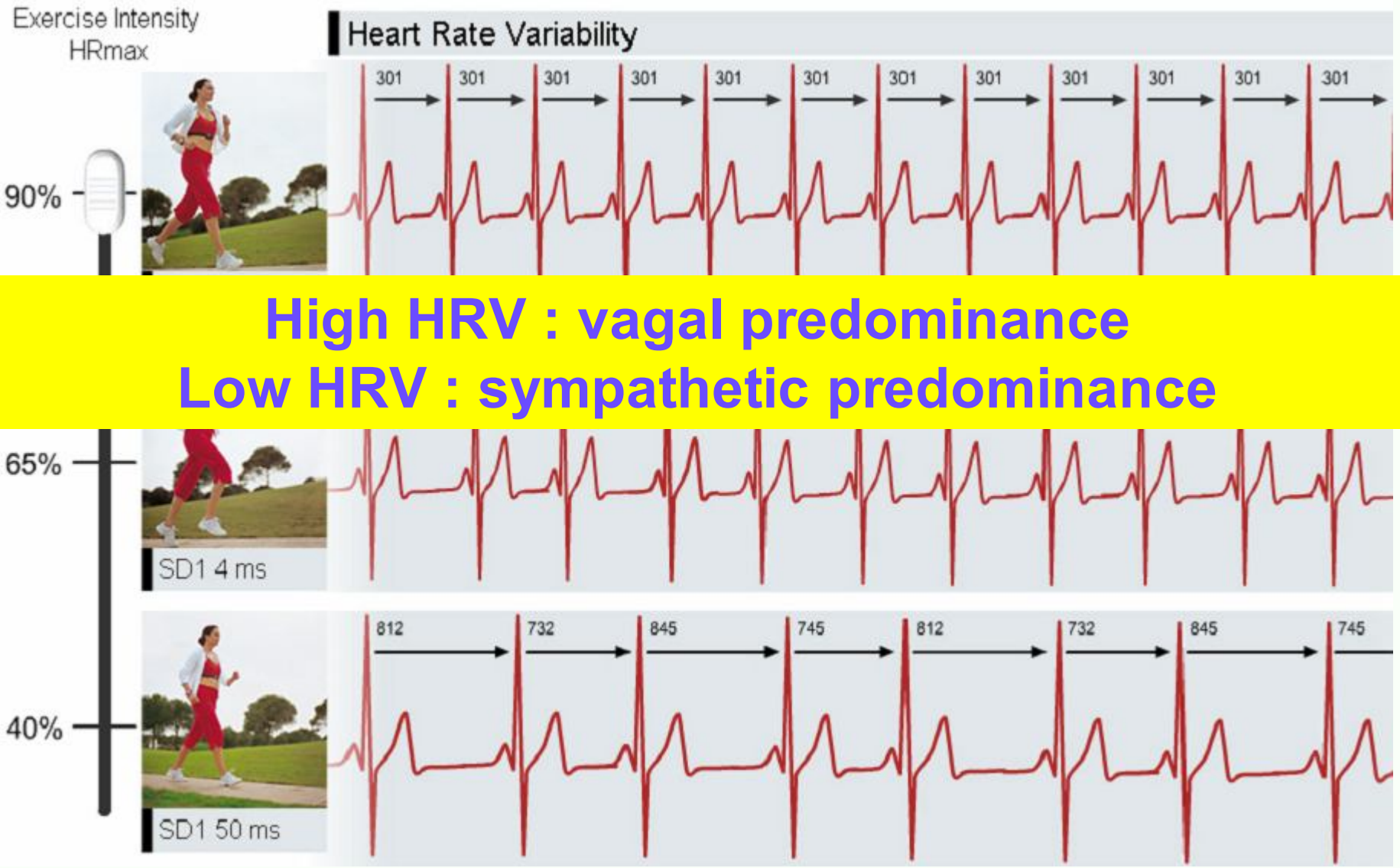
Heart Rate variability (HRV), 心率變異：beat-to-beat variations in HR



Courtesy from Raymond So

Heart Rate variability (HRV) :

Beat-to-beat variations in HR



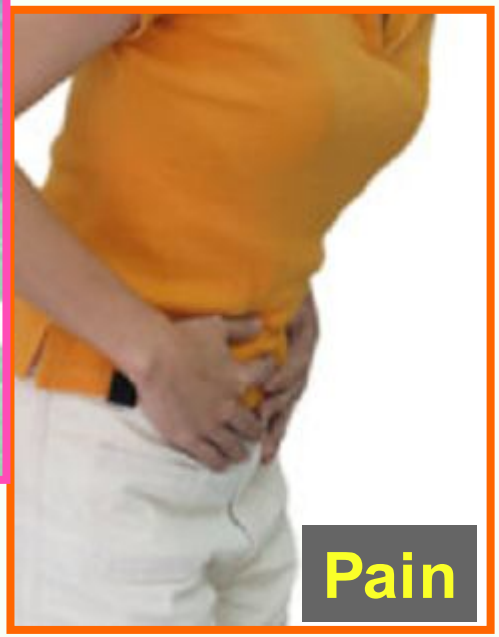
High HRV : vagal predominance

Low HRV : sympathetic predominance

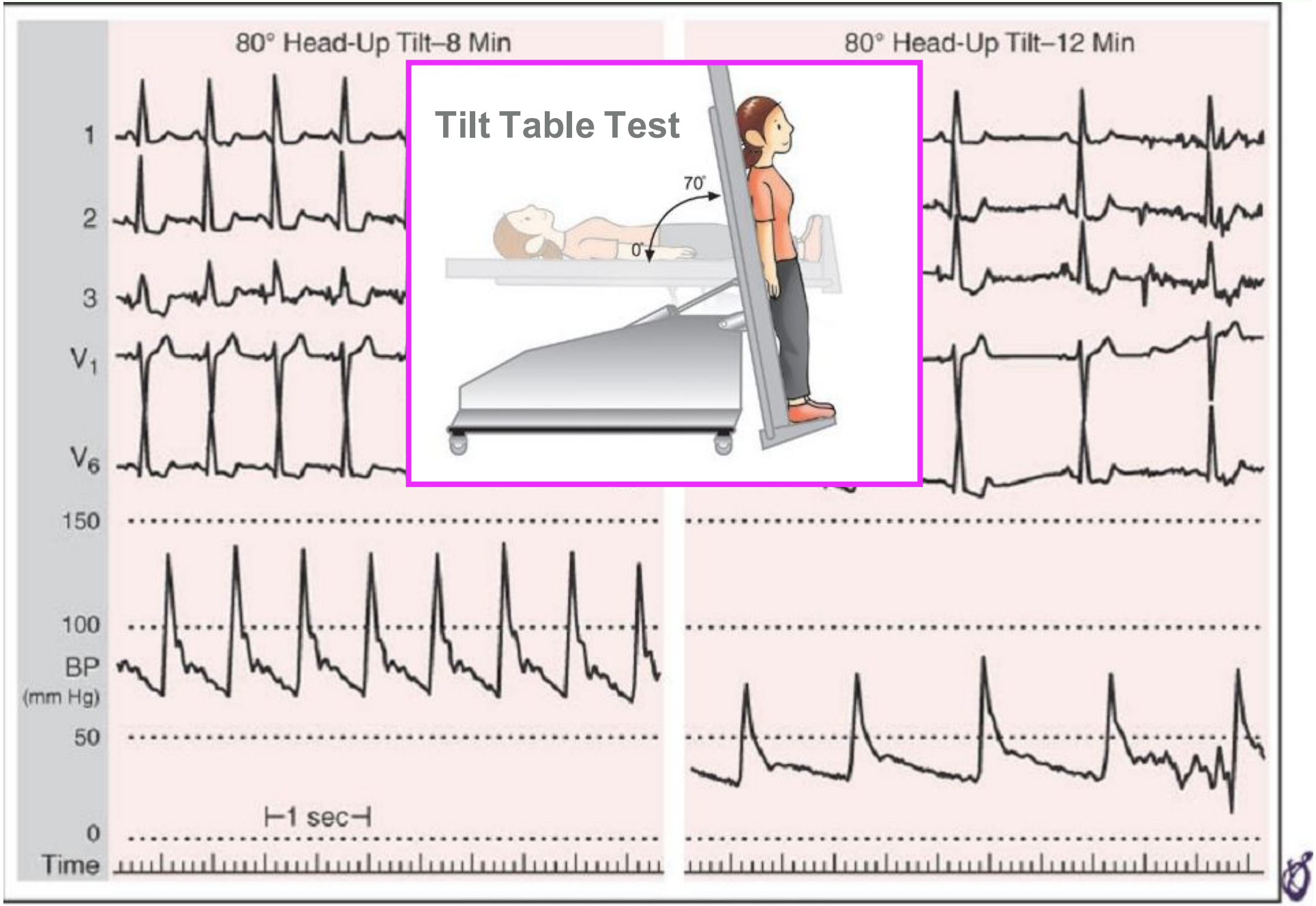
Vasovagal syncope: Triggers

Prolonged standing
Heat + Dehydration

Exercise induced



Pain



Physical Counter-pressure Maneuvers

Leg-Crossing

Arm-Tensing

Lowering head to knee level

HK-IN-PACE 香港心臟電生理醫院聯會

關心您的心 Care For Your Heart

Cool down

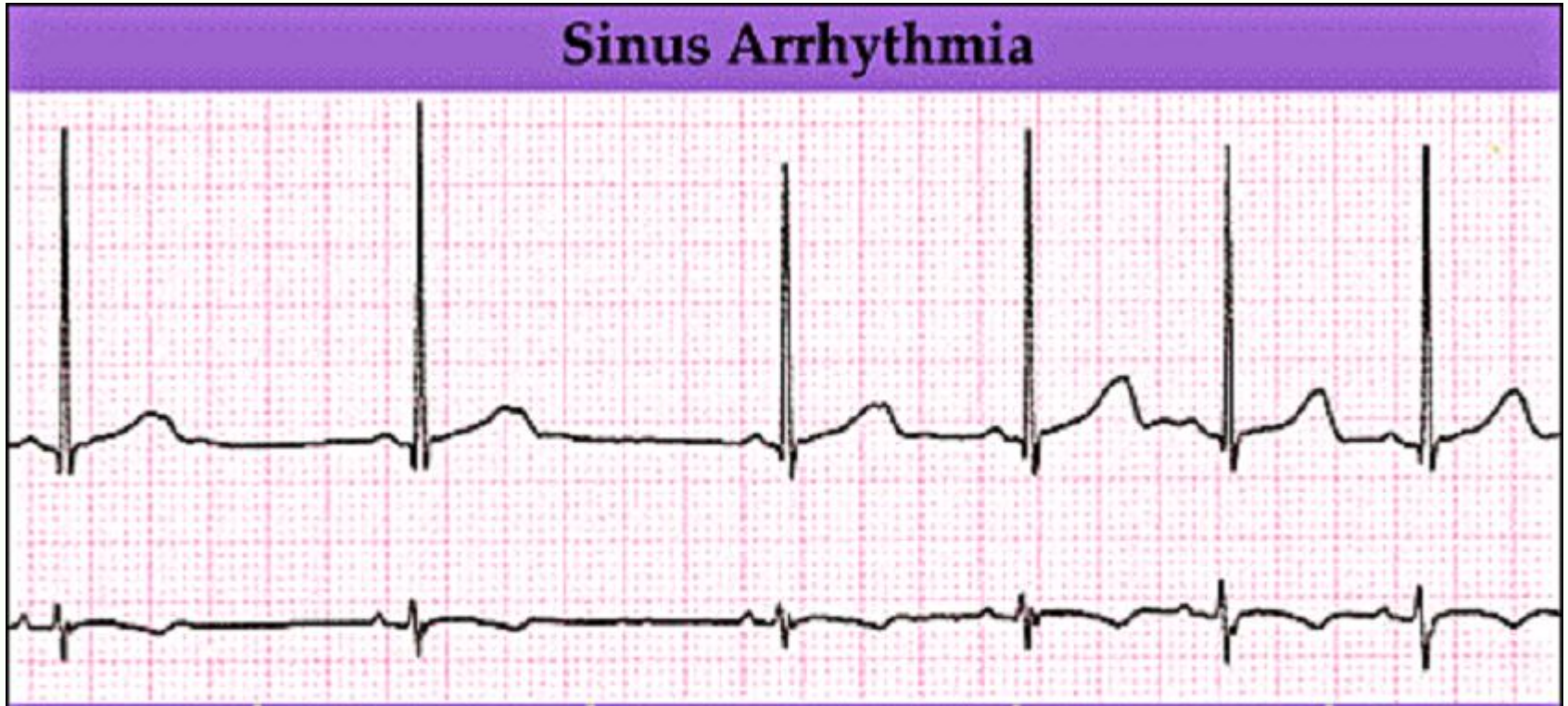
- Gradual HR & BP adjustments
- Enhance venous return
- Slow down vagal reactivation
  - Avoid Vasovagal syncope
  - Reduce arrhythmia
- Removal of lactic acid
- Dissipation of body heat

Athletes' Heart Syndrome

- high vagal tone
- Increase in cardiac mass

Decrease with detraining

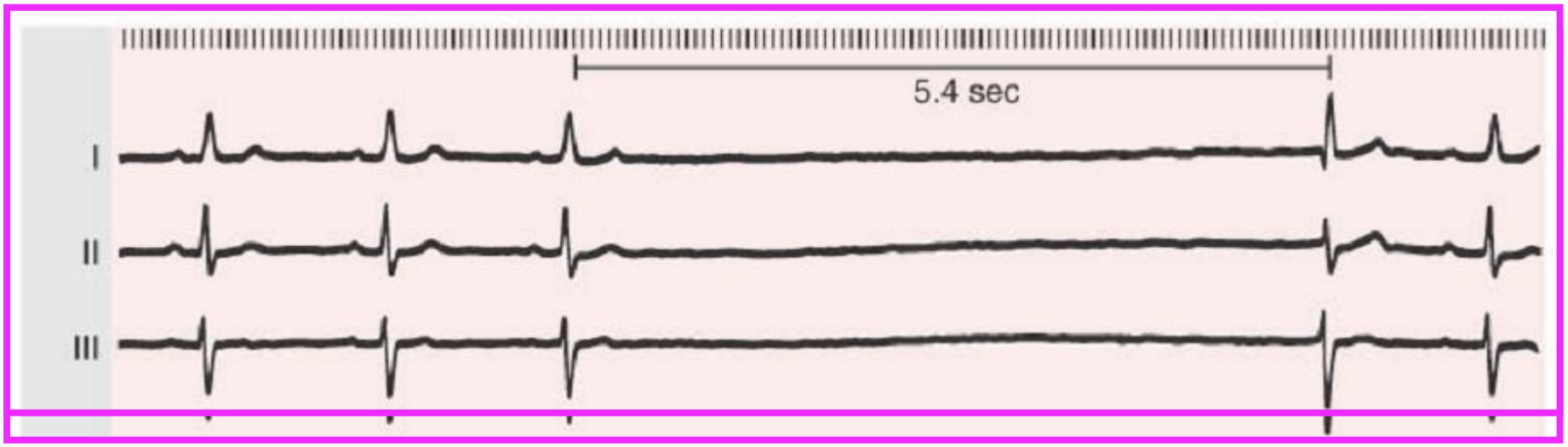
Sinus Arrhythmia:
variation of RR interval due to respiratory effect



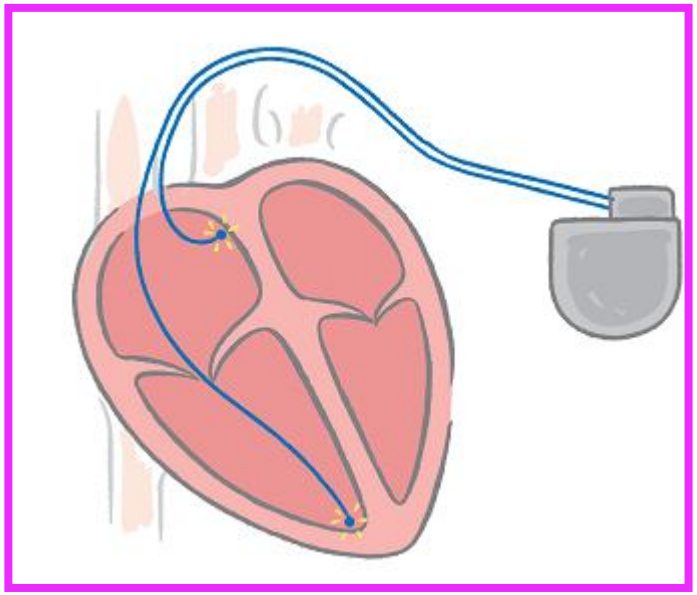
Heart Rate	Rhythm	P Wave	PR interval (in seconds)	QRS (in seconds)
Usually 60-100 bpm	Irregular	Before each QRS, identical	.12 to .20	<.12

Sinus Pause

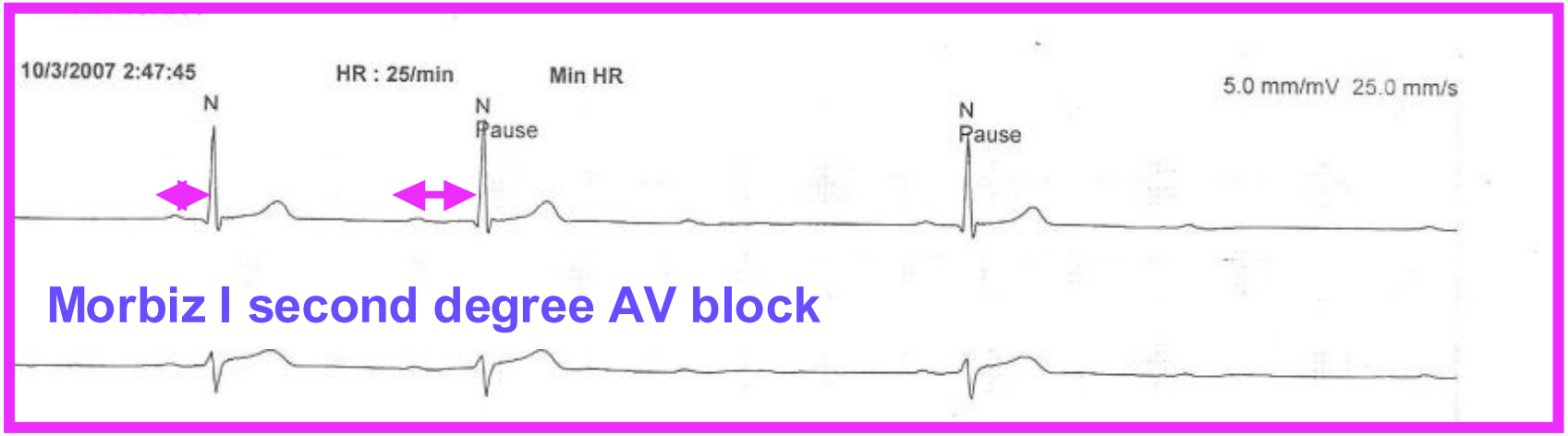
M/35, Marathron Runner, repeated syncope during early recovery phase.



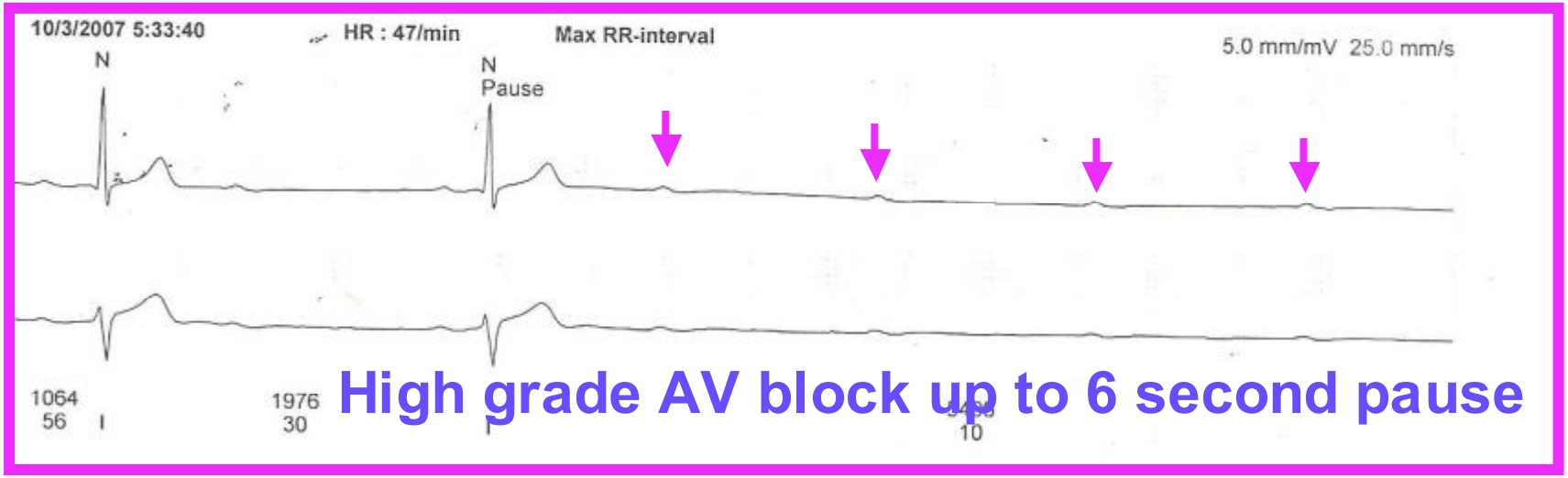
Permanent pacemaker was then implanted



M/25, Police SDU, Triathlon athlete, asymptomatic

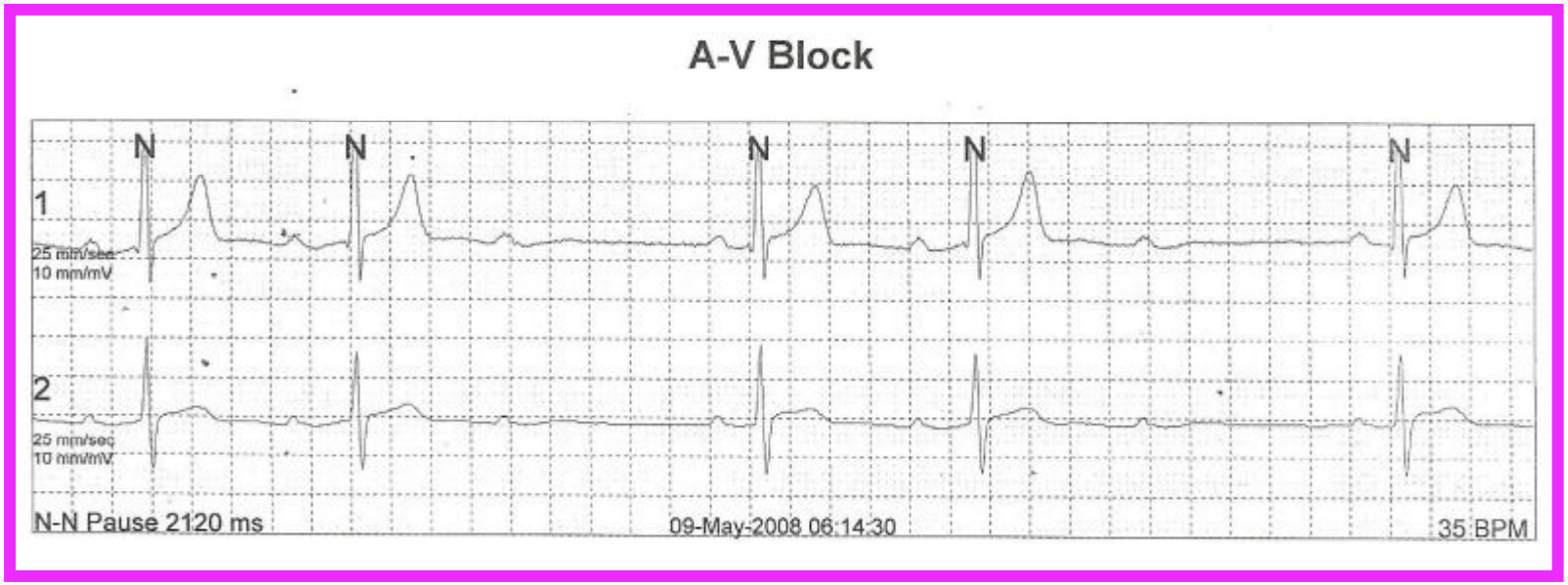


Morbiz I second degree AV block



High grade AV block up to 6 second pause

On exercise



After 6 months de-training

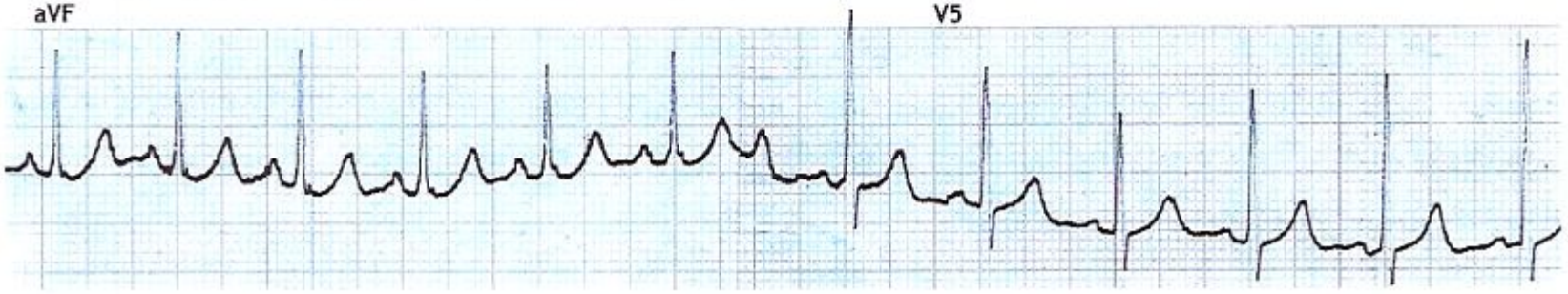
VENTRICULAR BIGEMINY SUPPRESSED BY EXERCISE

5.5.6 圖示: 室早二、三聯律

1978/6/9，男，跨欄，23 歲

A. 安靜時室早二、三聯律

B. 運動後消失，無自覺症狀，訓練狀態良好，查體正常，隨訪 5 年，屬良性早搏。



Effect of deconditioning on arrhythmia

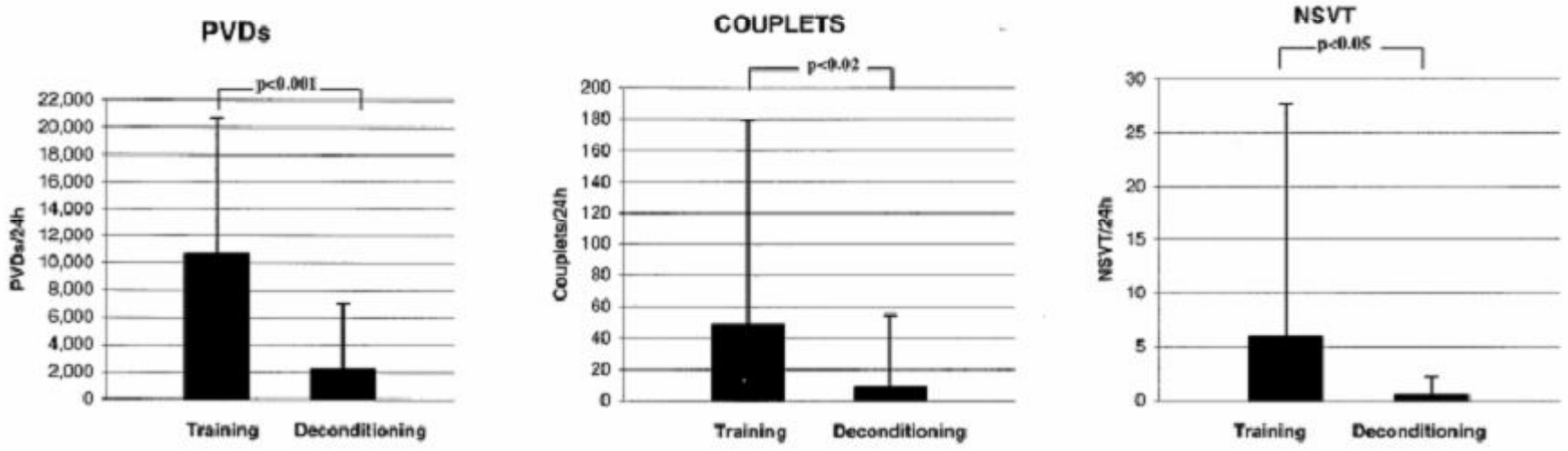
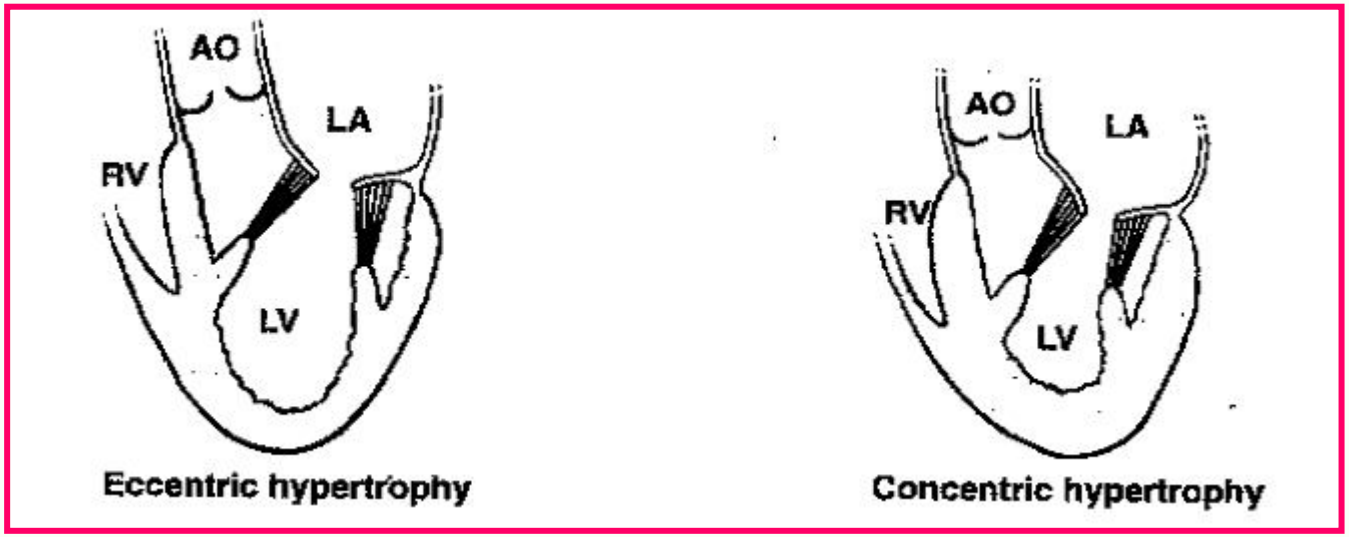
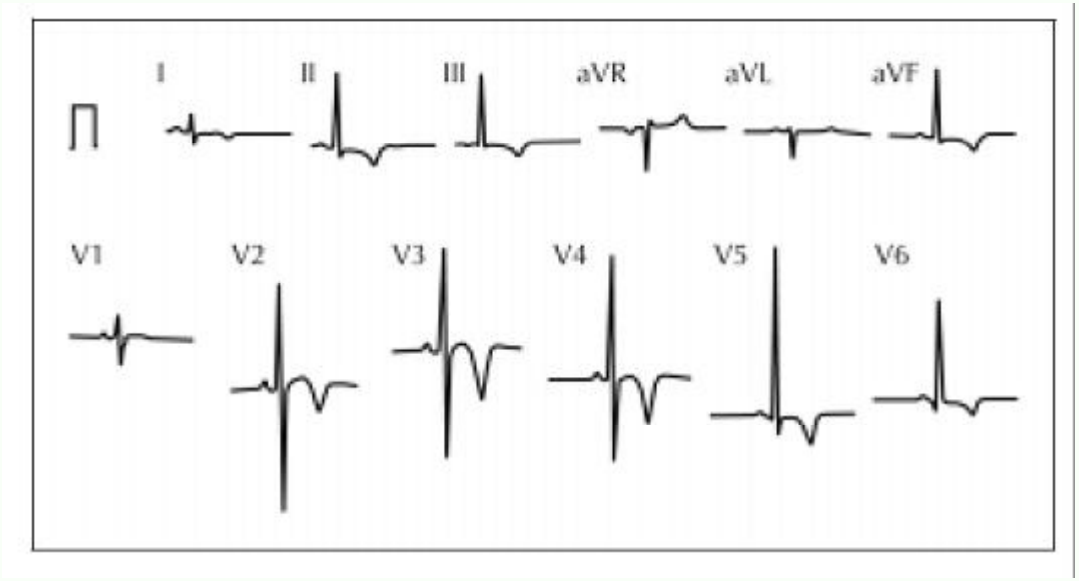


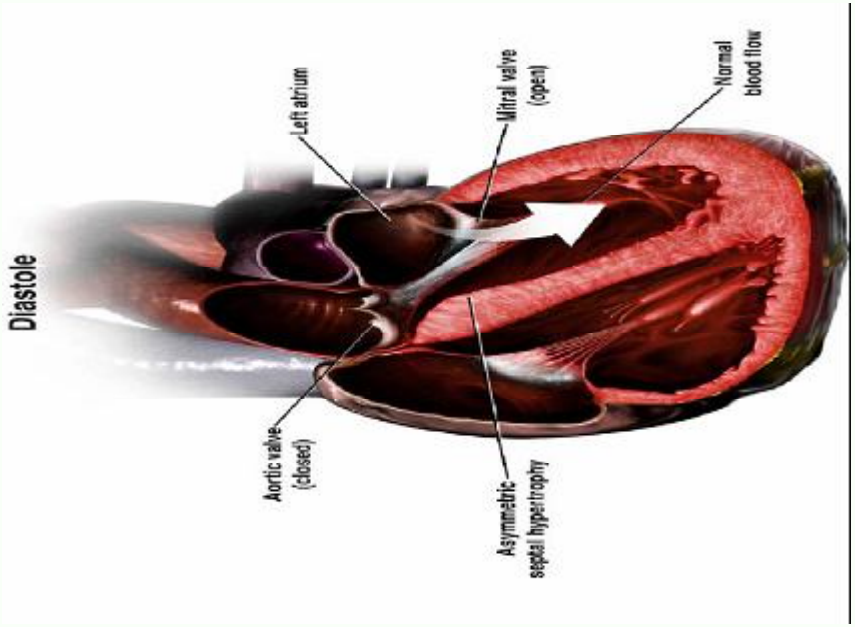
Figure 1. Number of premature ventricular depolarizations (PVD), ventricular couplets, and bursts of non-sustained ventricular tachycardia (NSVT) during 24-h Holter electrocardiogram recording at peak training and after the period of deconditioning in 70 trained athletes.

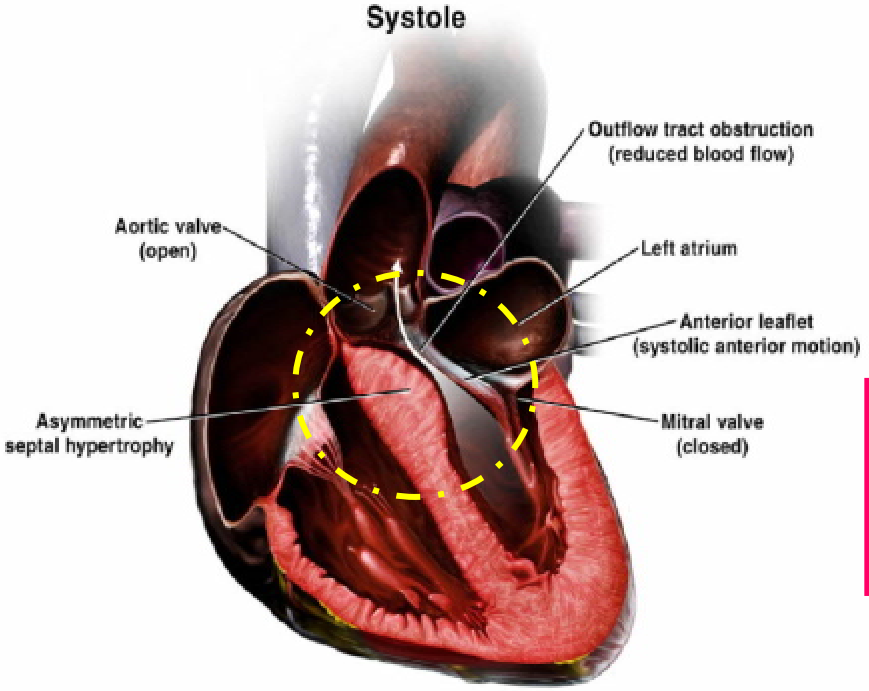


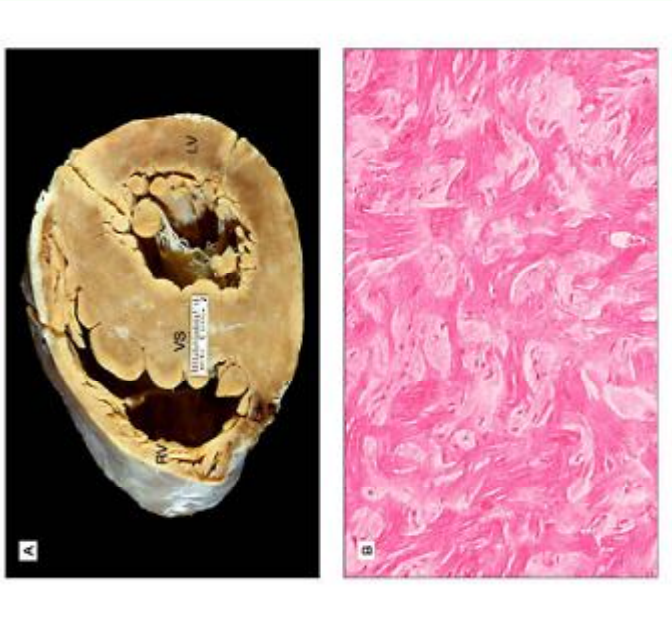


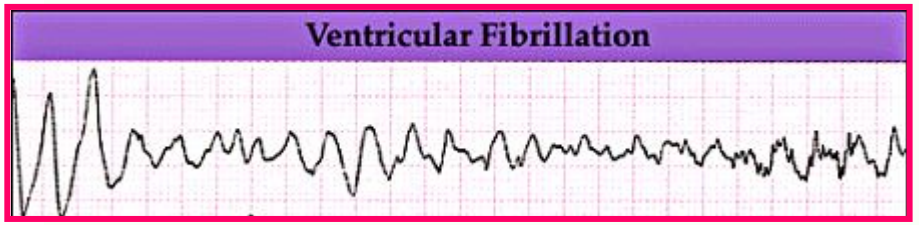
Increased cardiac mass

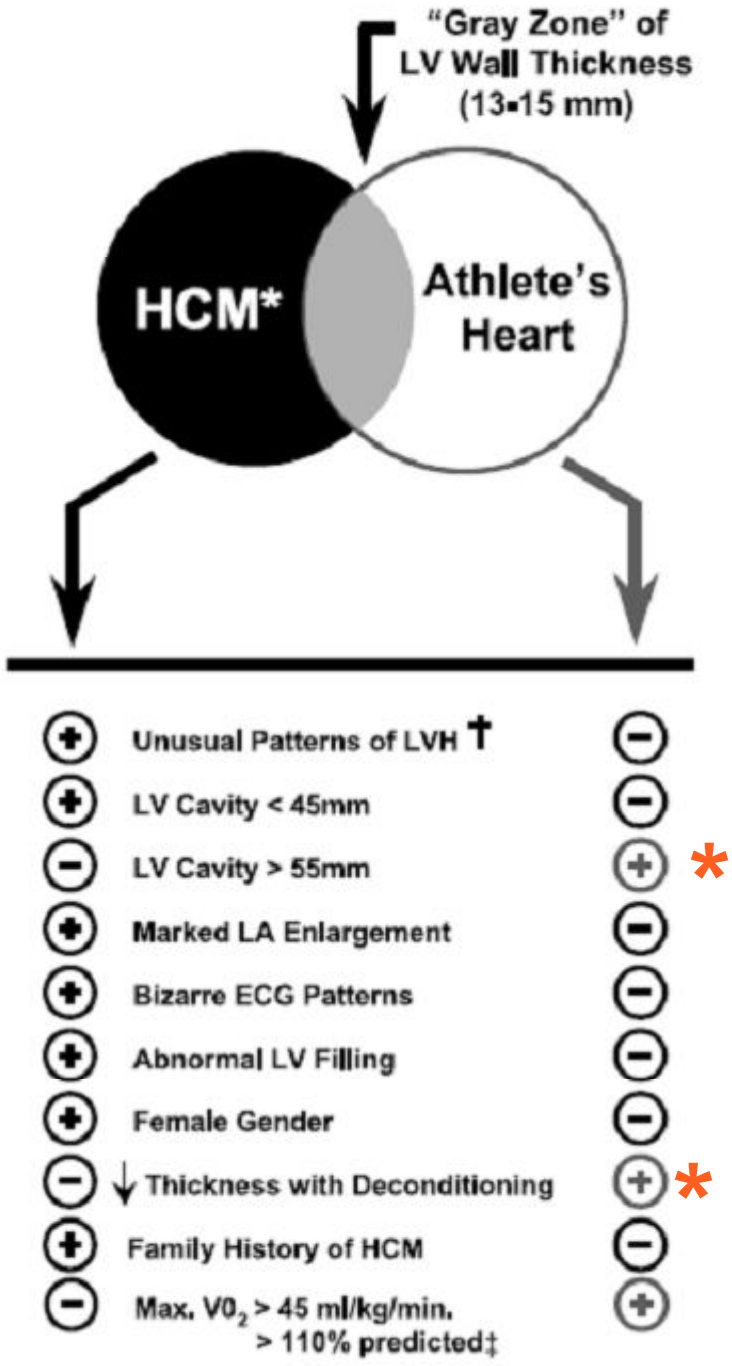
Hypertrophic Cardiomyopathy
心肌肥厚症



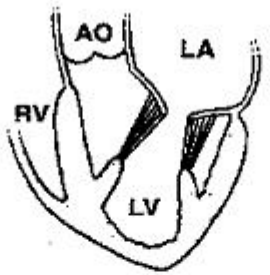




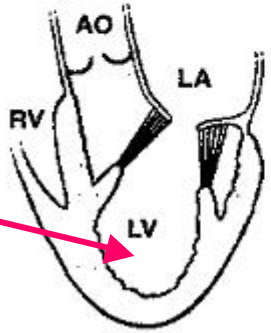




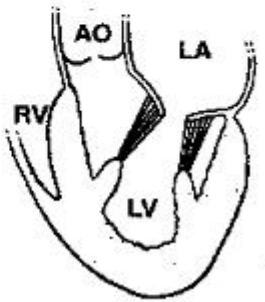
Physiological Adaptation to training



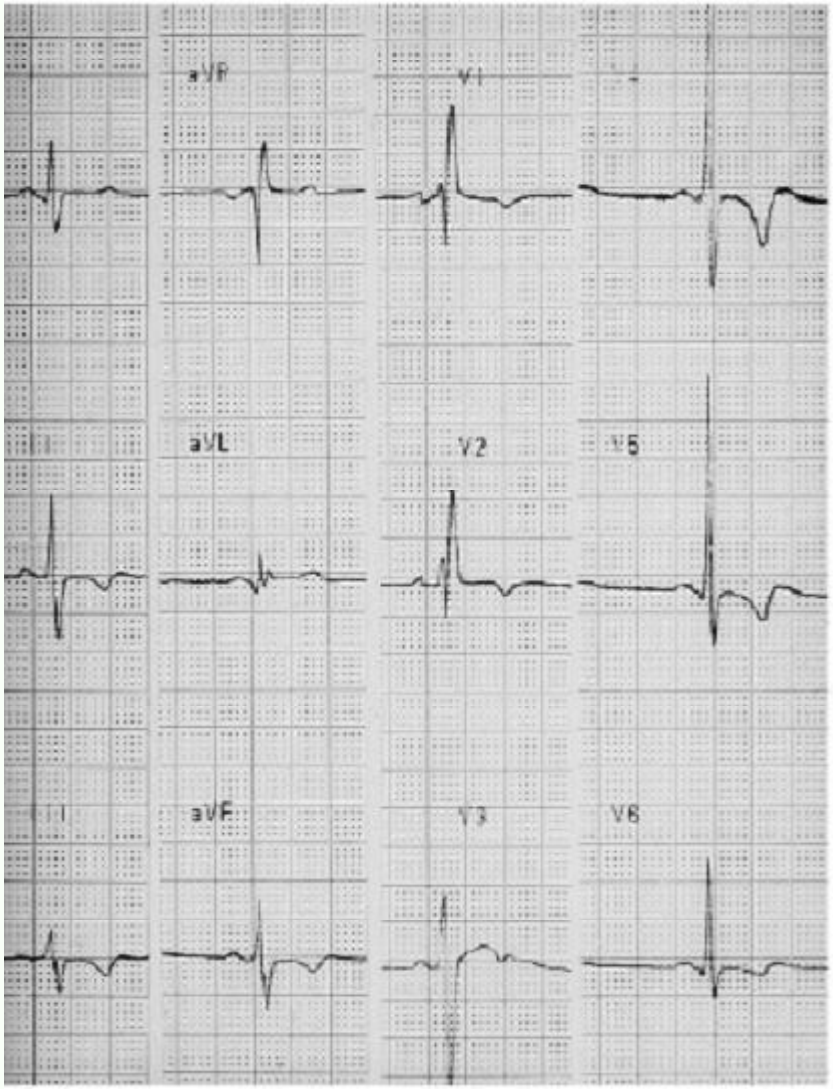
Normal



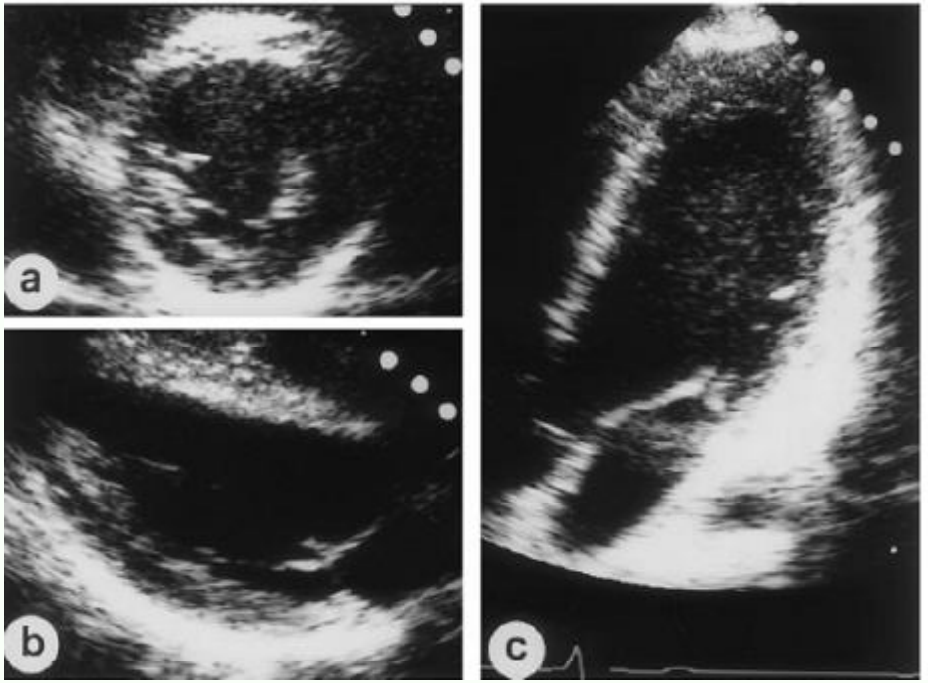
Eccentric hypertrophy



Concentric hypertrophy



M/19, soccer player
Markedly abnormal ECG
Echocardiogram: Normal



RBBB, LVH, Diffuse &
Deep T inversion

Partial resolution of ECG abnormalities on Detraining in patients with athletes' Heart syndrome

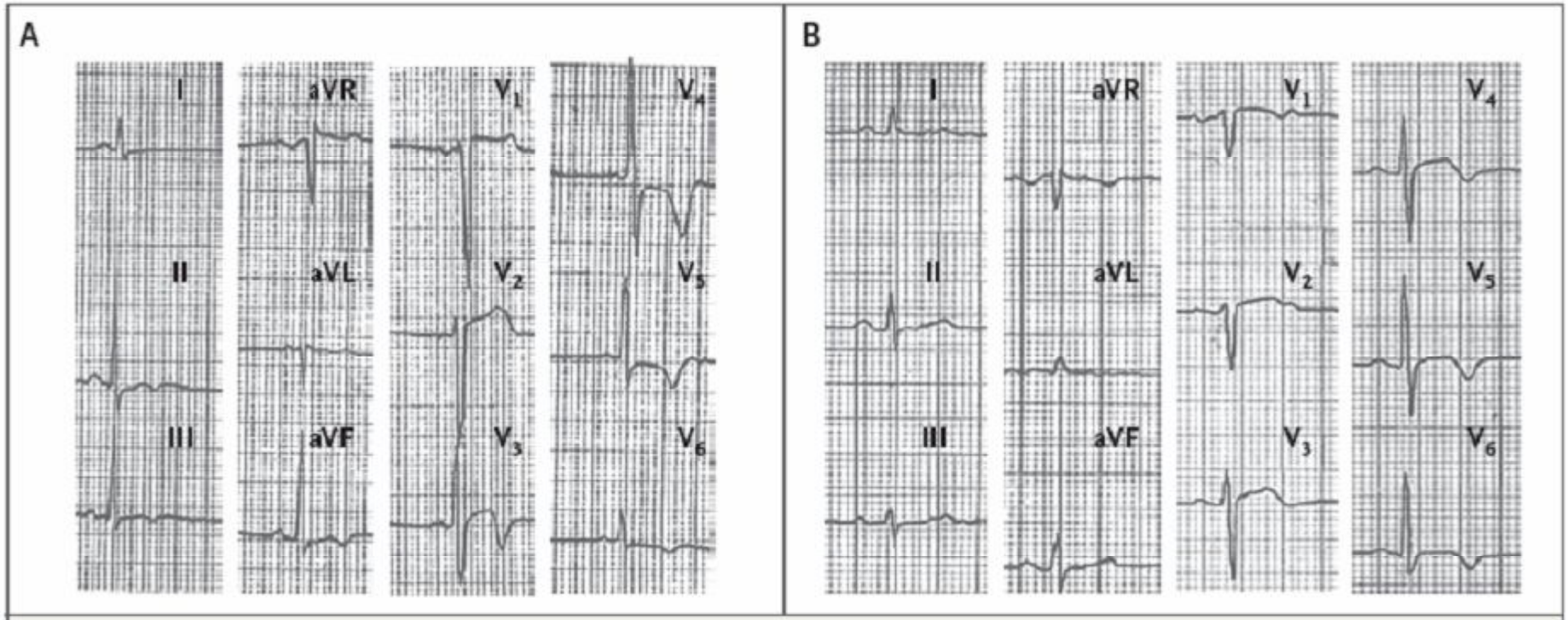


Figure 3. Partial Resolution of Electrocardiographic (ECG) Abnormalities in a National-Level Soccer Player without Evidence of Left Ventricular Hypertrophy or Other Structural Cardiac Abnormalities.

The data are from the same athlete as shown in Figure 1C. The initial ECG, obtained at the age of 29 years, shows marked repolarization abnormalities, including ST-segment depression and T-wave inversion in the lateral precordial and standard inferior leads (Panel A). An ECG obtained at the most recent evaluation, at 56 years of age, shows that these abnormalities have partially resolved, although abnormal anterolateral T-wave inversion persists (Panel B).

Exercise Testing

Common Exercise Protocols

Functional Class	Clinical Status	O_2 Cost ml/kg/min	METs
Normal and I	Healthy dependent on age, activity	56.0	16
		52.5	15
		49.0	14
		45.5	13
		42.0	12
		38.5	11
		35.0	10
	Sedentary healthy	31.5	9
		28.0	8
	Limited	24.5	7
II	Symptomatic	21.0	6
		17.5	5
III		14.0	4
		10.5	3
		7.0	2
IV		3.5	1

Bicycle Ergometer

1 watt = 6 kpds

For 70 kg body weight

KPDS
1500
1350
1200
1050
900
750
600
450
300
150

Treadmill Protocols

Bruce (3-min stages)

MPH	%GR
5.5	20
5.0	18
4.2	16
3.4	14
2.5	12
1.7	10
1.7	5
1.7	0

Cornell (2-min stages)

MPH	%GR
5.0	18
4.6	17
4.2	16
3.8	15
3.4	14
3.0	13
2.5	12
2.1	11
1.7	10
1.7	
1.7	0

Balke-Ware (% grad at 3.3 mph; 1-min stages)

26, 25, 24, 23, 22, 21, 20, 19, 18, 17, 16, 15, 14, 13, 12, 11, 10, 9, 8, 7, 6, 5, 4, 3, 2, 1

ACIP / mACIP (2-min stages; First 2 stages 1 min)

ACIP MPH	ACIP %GR	mACIP MPH	mACIP %GR
3.4	24	3.4	24
3.1	24	3.1	24
3	21	2.7	24
3	17.5	2.3	24
3	14	2	24
3	10.5	2	18.5
3.0	7.0	2	13.5
3.0	3.0	2	7
2.5	2.0	2	3.5
2.0	0	2	0

Naughton (2-min stages)

%GR 2 MPH	%GR 3 MPH	%GR 3.4 MPH
	32.5	
	30	24
	27.5	22
	25	20
	22.5	18
	20	16
	17.5	14
	15	12
	12.5	10
17.5	10	8
14	7.5	6
10.5	5	4
7	2.5	2
3.5	0	
0		

Weber (2-min stages)

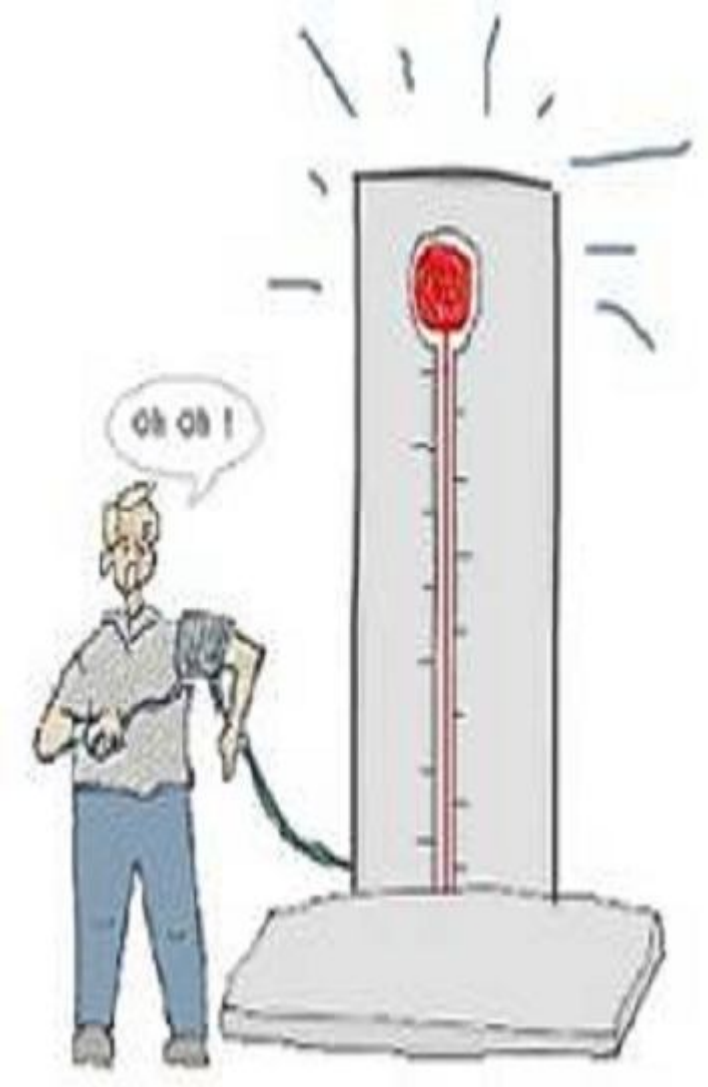
MPH	%GR
3.4	14.0
3.0	15.0
3.0	12.5
3.0	10.0
3.0	7.5
2.0	10.5
2.0	7.0
2.0	3.5
1.5	
1.0	0

(Adapted from Fletcher GF, Balady G, Amsterdam EA, et al: Exercise Standards for Testing and Training. A statement for healthcare professionals from the American Heart Association. Circulation 104:1694, 2001. © 2001 American Heart Association.)

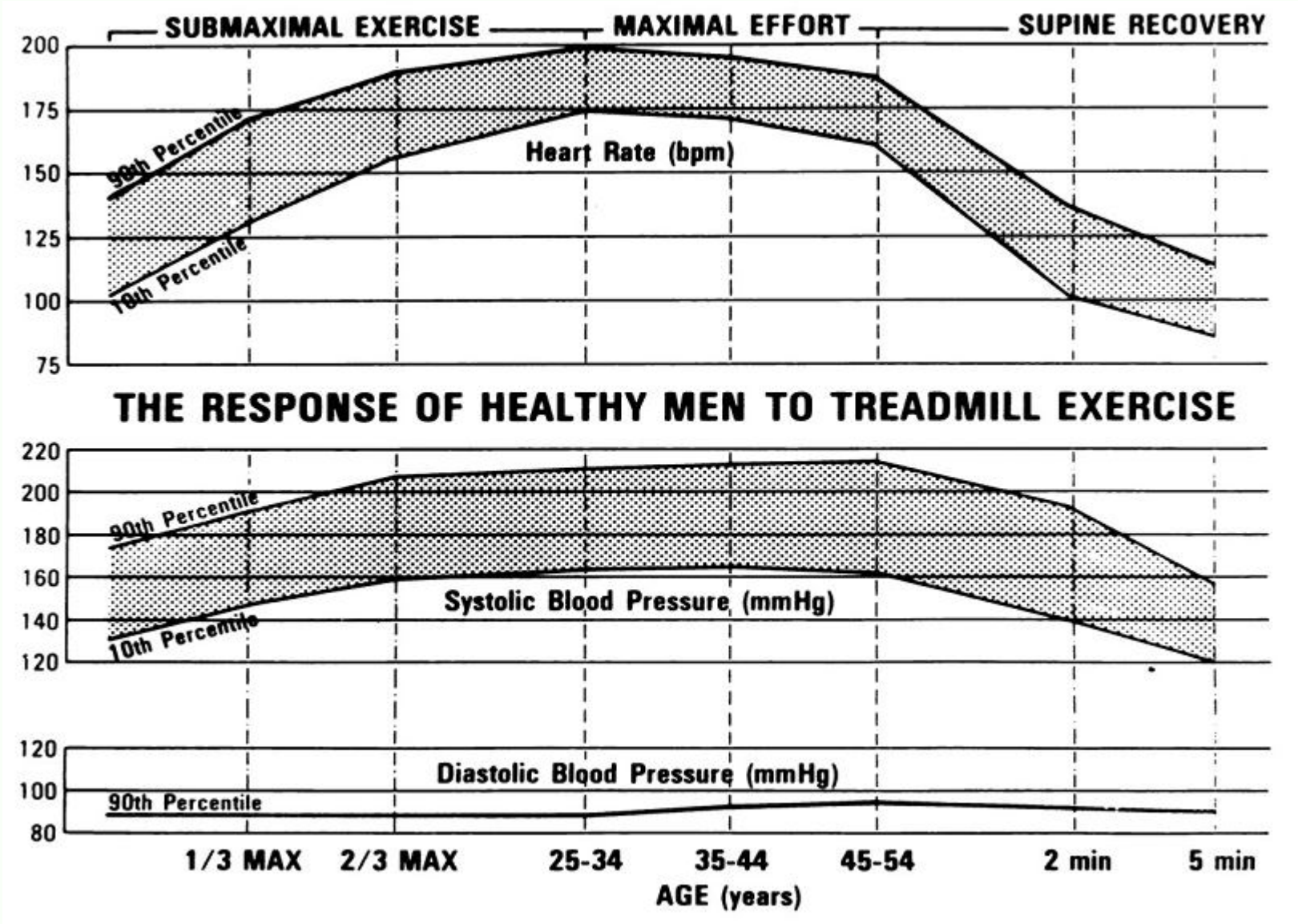
TREADMILL

- **Functional Capacity ***
  - **Men > 9.5 METS**
  - **Women > 7.5 METS**
- **Abnormal HR response:**
  - **Resting HR > 75 bpm**
  - **HR Recovery @ 1 min. :**
    < 25 bpm
- **Systolic BP @ Peak exercise (hypotension =>high risk)**
- **ST depression**
- **Arrhythmia**

HR & BP response



Normal response to progressive treadmill protocol in healthy subjects



Fletcher, G. F. et al. Circulation 1995;91:580-615

The NEW ENGLAND JOURNAL of MEDICINE

ESTABLISHED IN 1812 MAY 12, 2005 VOL. 352 NO. 19

Heart-Rate Profile during Exercise as a Predictor of Sudden Death

Xavier Jouven, M.D., Ph.D., Jean-Philippe Empana, M.D., Peter J. Schwartz, M.D., Michel Desnos, M.D., Dominique Courbon, M.S.C., and Pierre Ducimetière, Ph.D.

- 5713 asymptomatic man (age 42-53)
- No clinically detectable C V disease
- graded exercise stress test (1967-1972)
- Data on:
  - Resting heart rate
  - Heart rate increase during exercise (rest-peak)
  - Heart rate decrease at one minute recovery
- 23 years follow up
- 81 subjects died suddenly

X Jouven et al N Engl Med 2005;352:1951-8

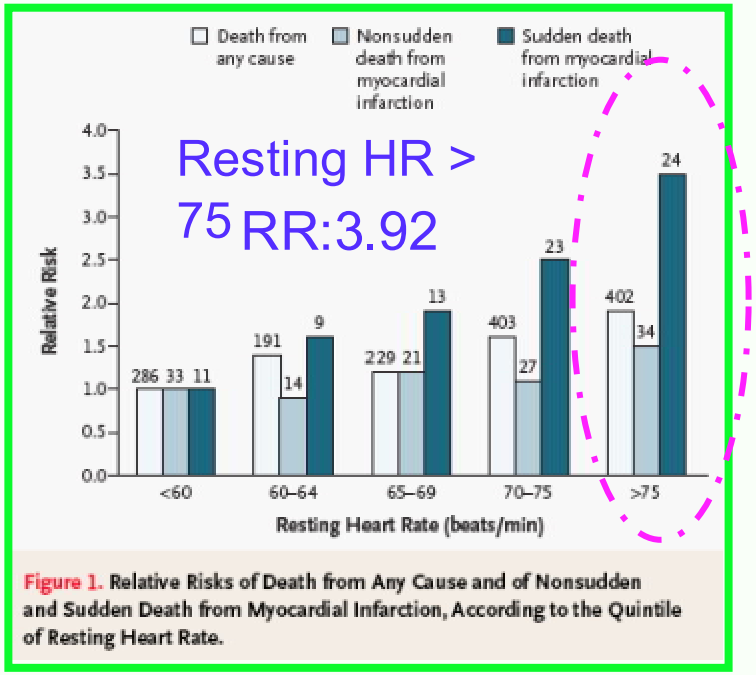
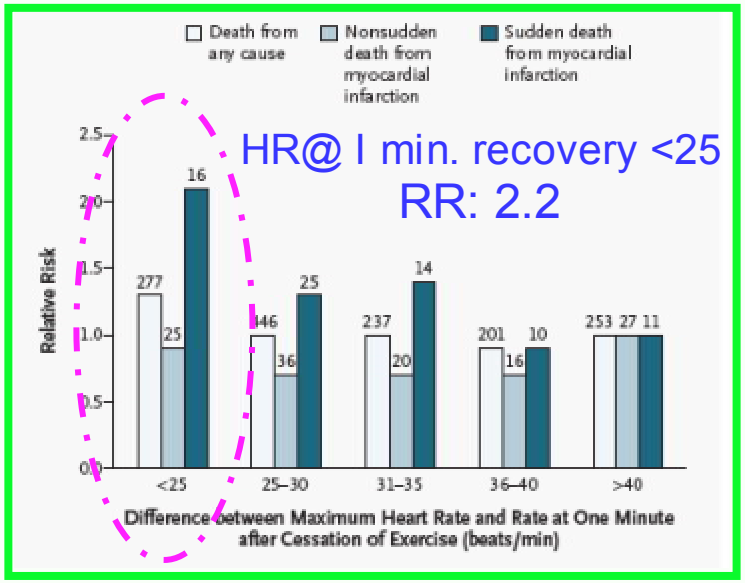
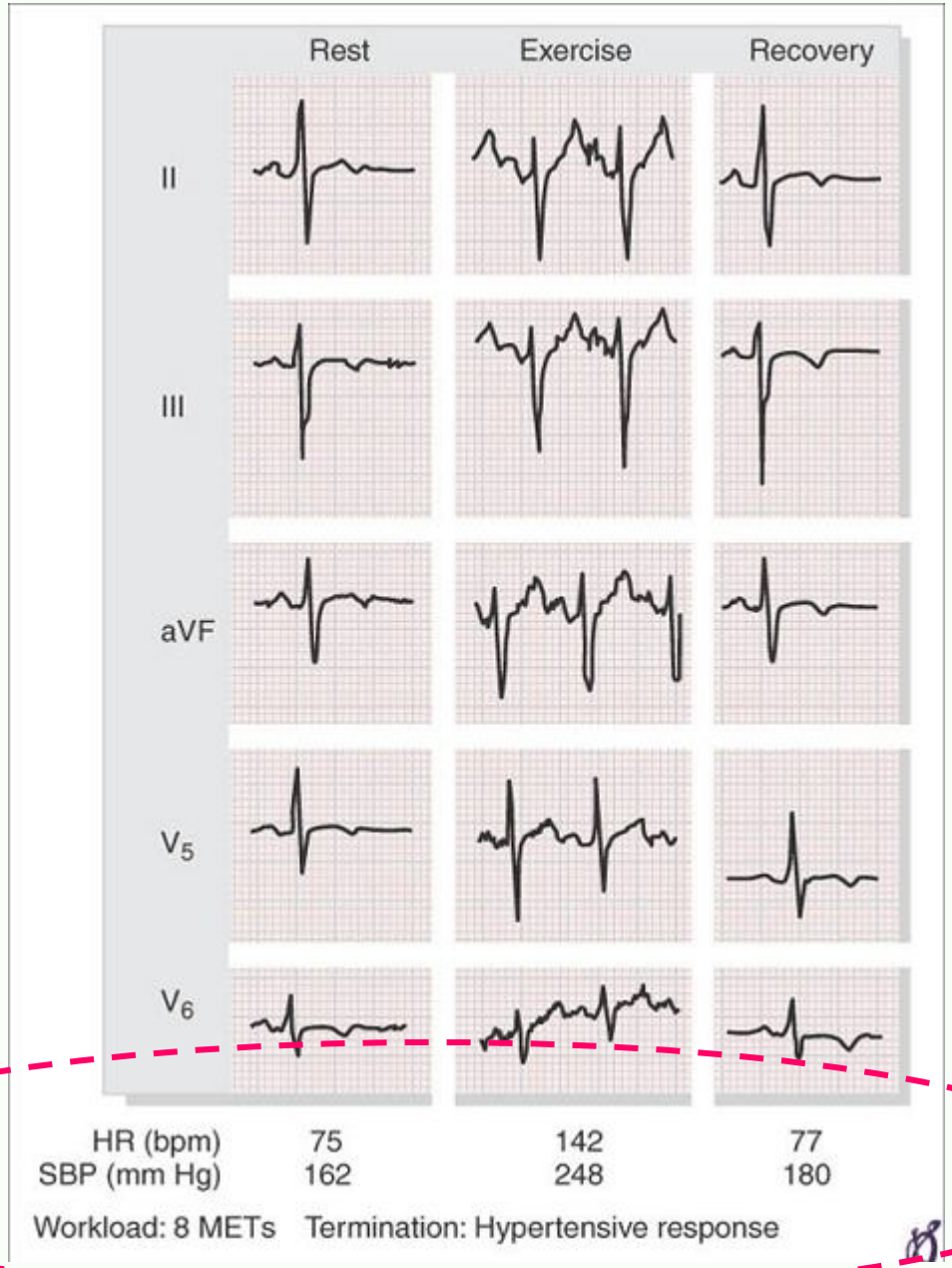


Figure 1. Relative Risks of Death from Any Cause and of Nonsudden and Sudden Death from Myocardial Infarction, According to the Quintile of Resting Heart Rate.



Hypertensive Response

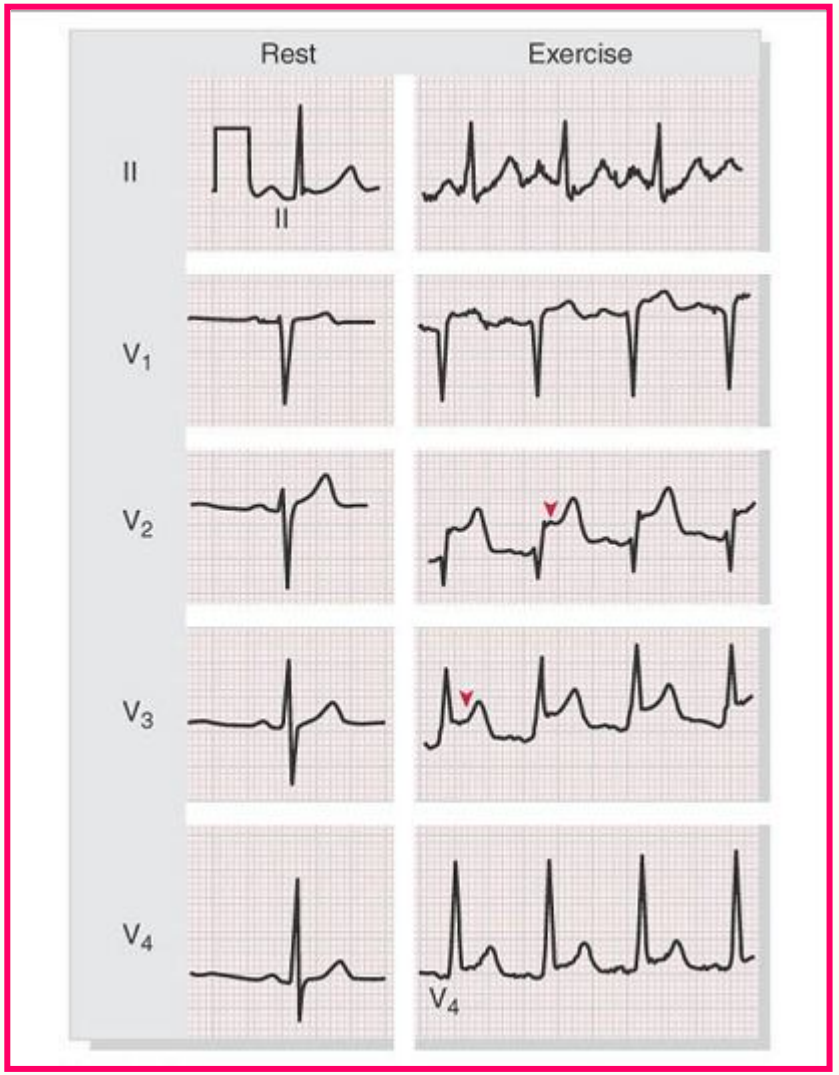


ST Elevation

Angina

↓ SBP on exercise

Strongly Positive



HR:	**65**	**125mmHg**
SBP:	**120**	**100mmHg**
Workload:		**4 METS**

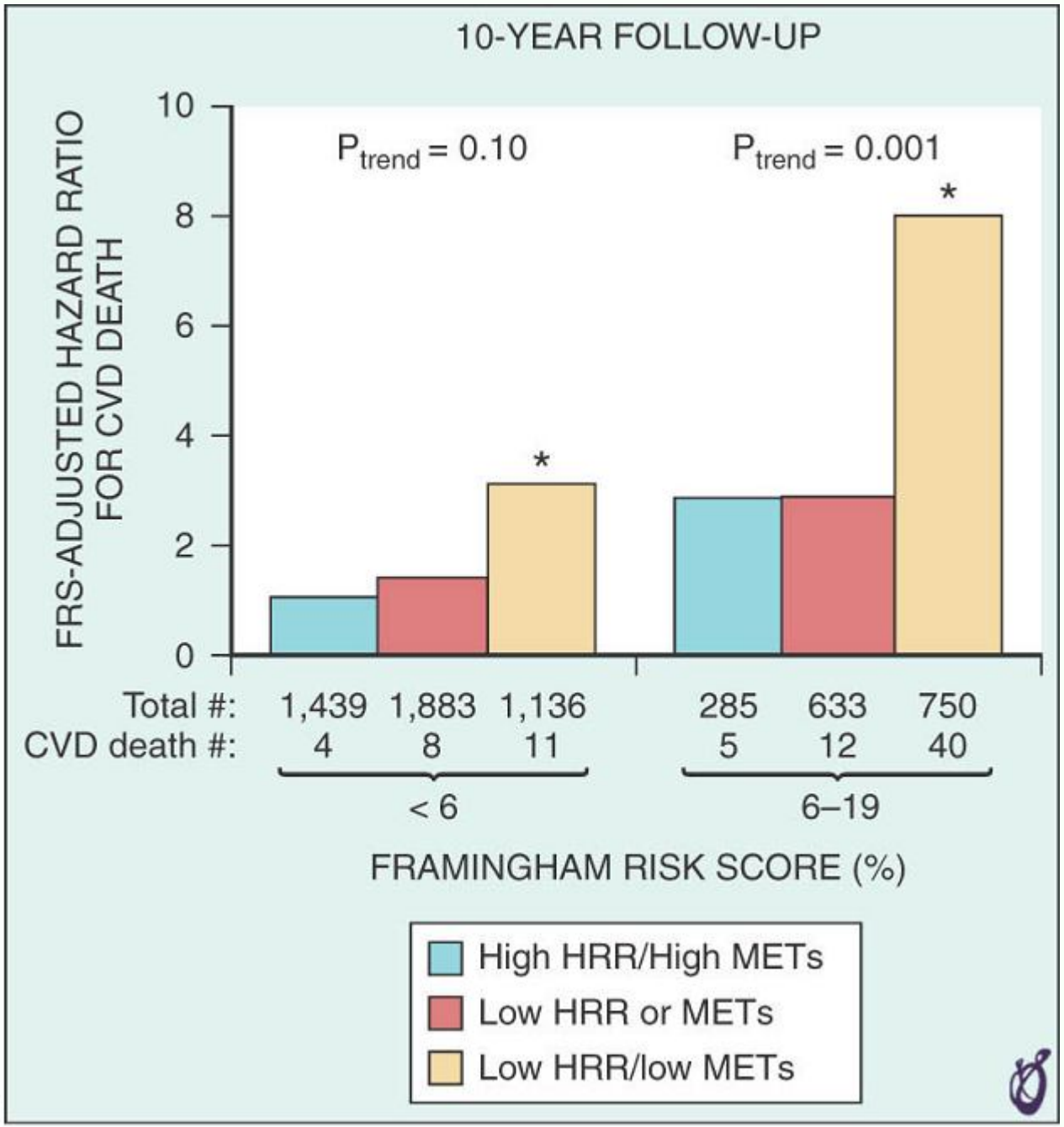
MET or Metabolic Equivalent

Unit of measurement describing the workload a patient achieves on an exercise test

- **1 MET = a VO2 of 3.5 ml/kg/min**

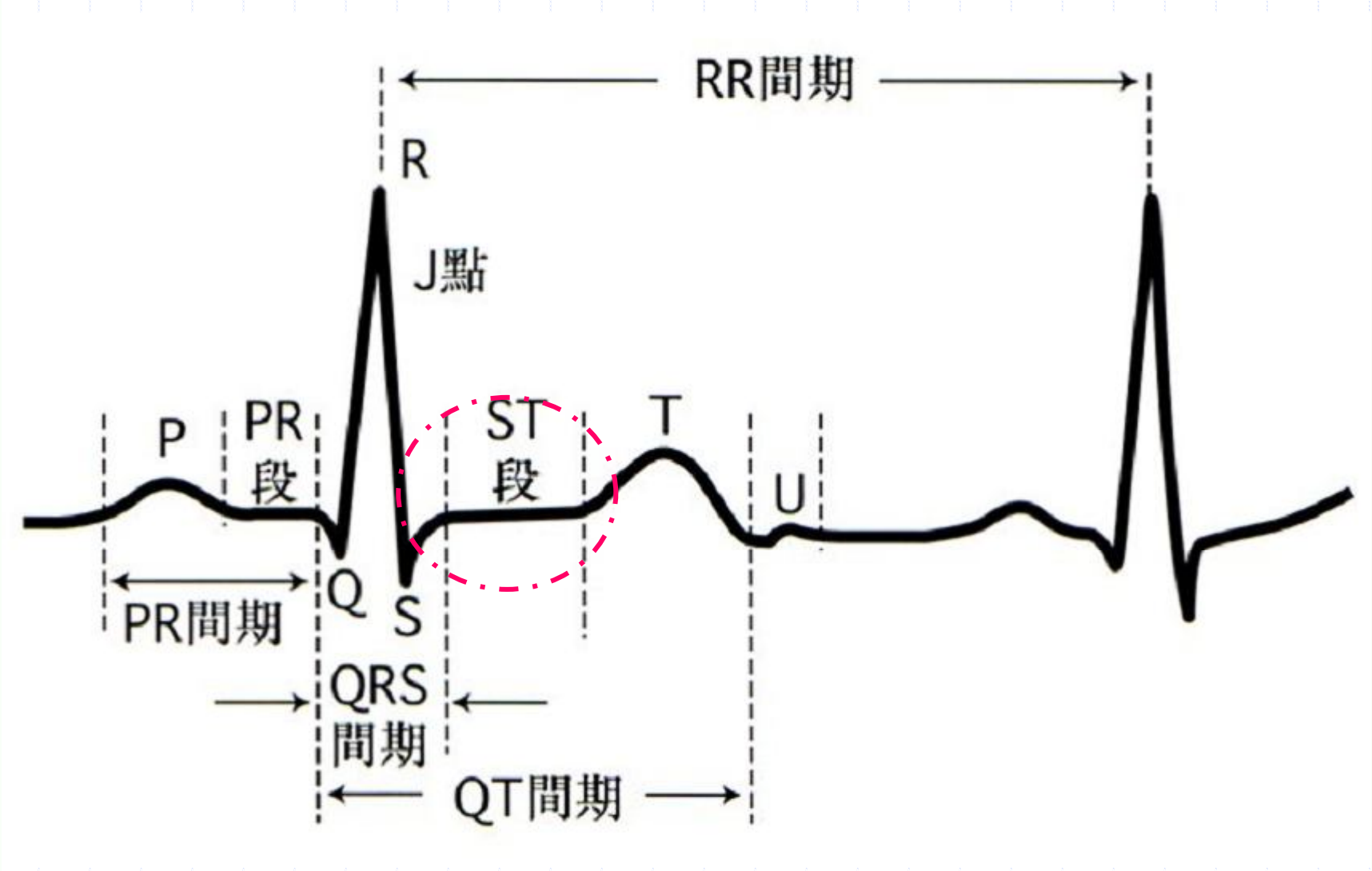
Examples……

- **A MET is a measure of energy cost for a particular activity.**
  - **Fishing In A Stream = 5-6 METs**
  - **Social Dancing = 6-9 METs**
  - **Scuba Diving = 10-12 METs**

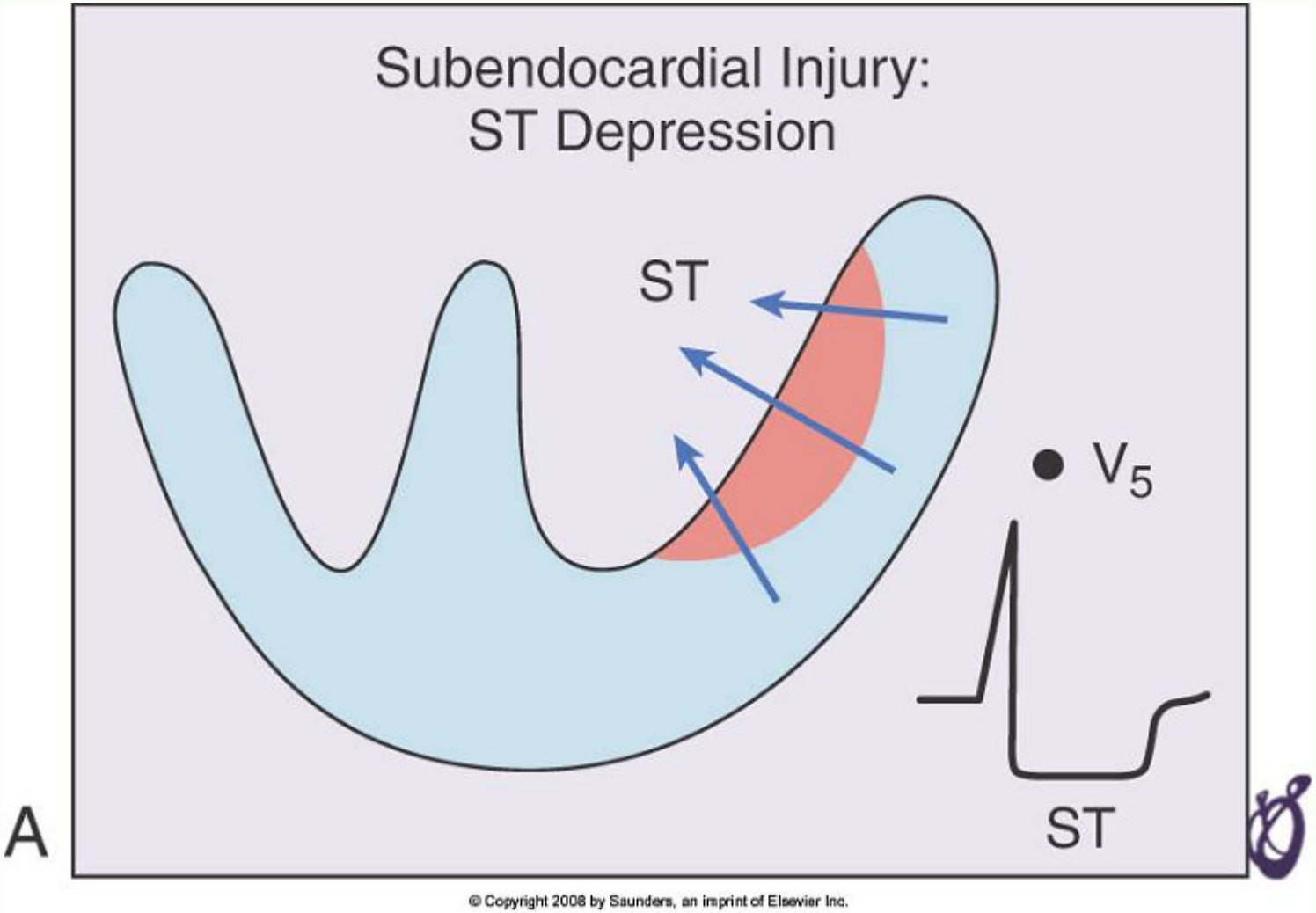


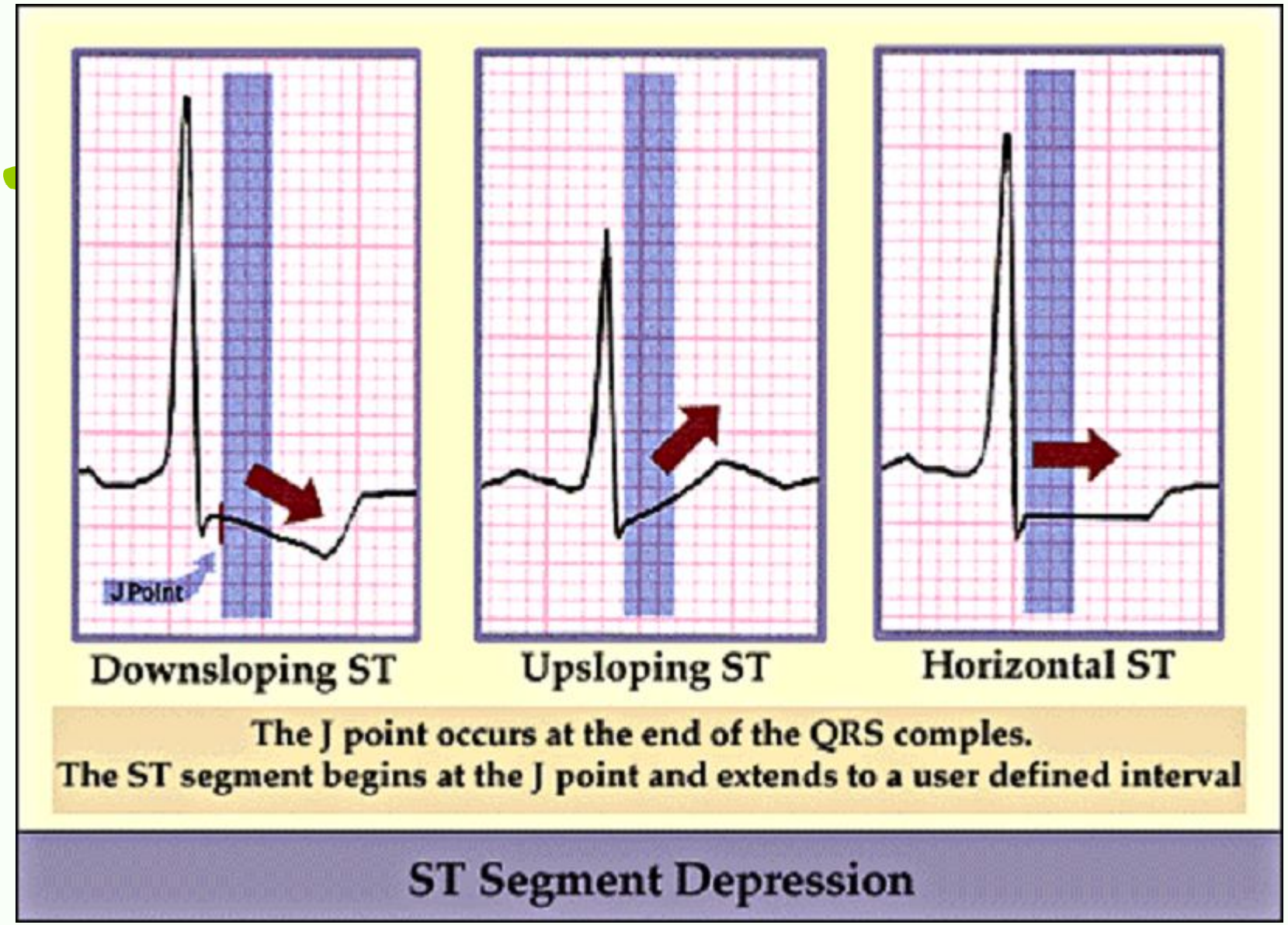
(From Mora S, Redberg RF, Sharrett AR, et al: Enhanced risk assessment in asymptomatic individuals with exercise testing and Framingham risk scores. Circulation 112:1566, 2005.)

ST Segment

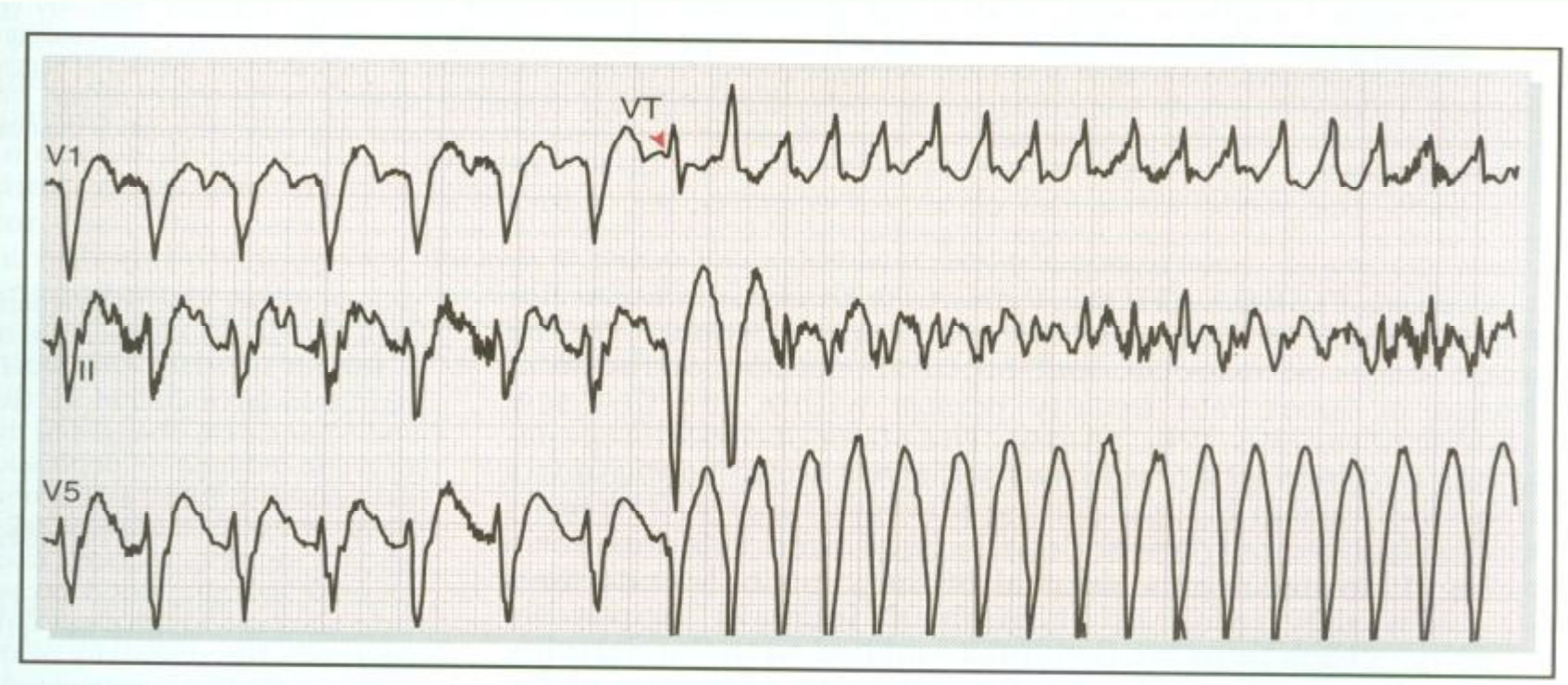


Depressed ST segment: Myocardial ischemia




J Point
Downsloping ST
Upsloping ST
Horizontal ST
The J point occurs at the end of the QRS comples.
The ST segment begins at the J point and extends to a user defined interval
ST Segment Depression

Ventricular Tachycardia developed immediate after exercise



TREADMILL

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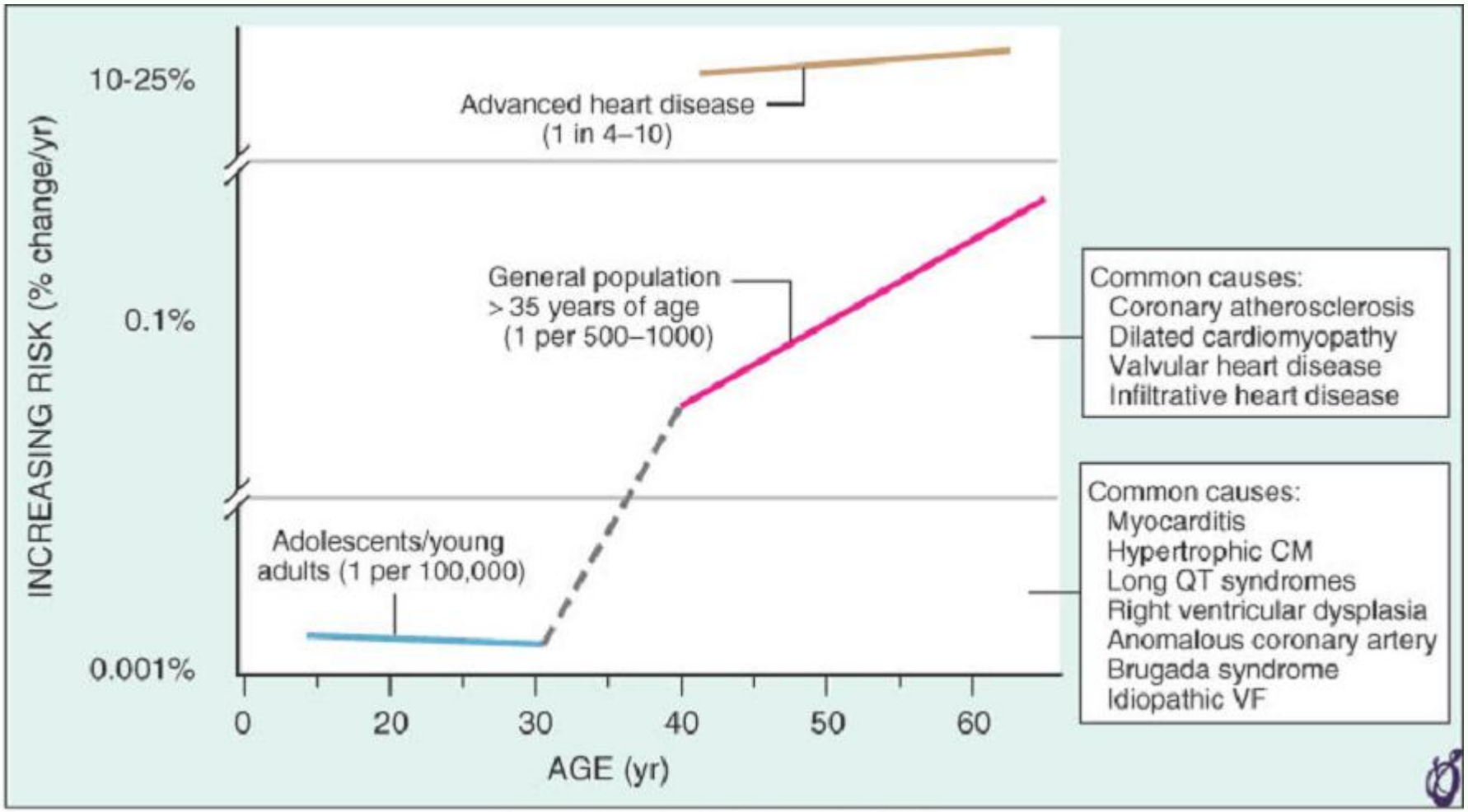
  - **Men > 9.5 METS**
  - **Women > 7.5 METS**
- **Abnormal HR response:**
  - **Resting HR > 75 bpm**
  - **HR Recovery @ 1 min. :**
    < 25 bpm
- **Systolic BP @ Peak exercise (hypotension =>high risk)**
- **ST depression**
- **Arrhythmia**

Limitations of Stress Test

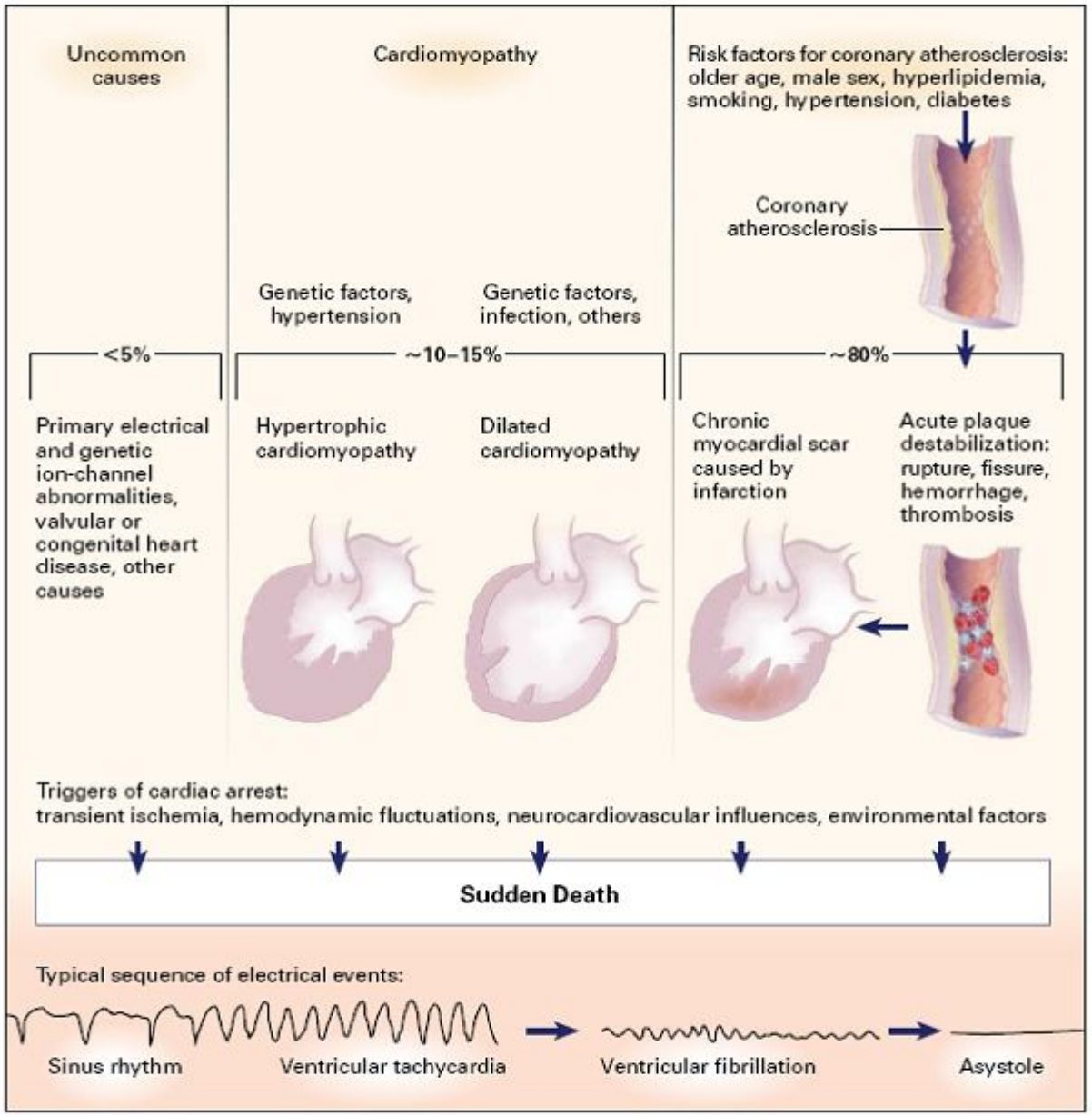
- Highly dependent on pre-test likelihood of disease
- High false positive rate in physically active individual (>10%).
- Often follow by additional costly & Invasive studies.
- A Negative test does not guarantee protection against coronary events (**Plaque Vulnerability**).

Exercise Sudden Cardiac Death

Common Causes of Sudden Cardiac Death



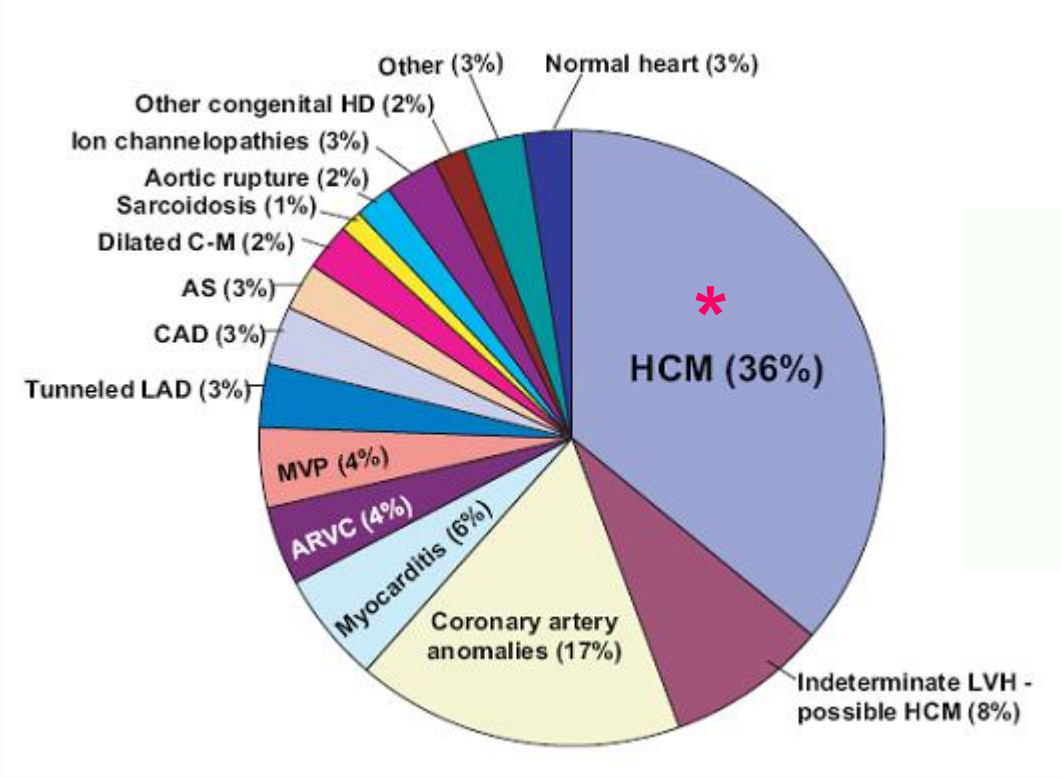
Pathophysiology & Epidemiology of SCD



Huikuri, N Engl J Med, Vol. 345, No. 20, 2001

Sudden Cardiac Death in young athletes:
"Screening for the needle in a haystack"

Minneapolis Heart foundation Registry:
SD in 1435 young competitive athletes (1980-2005)



< 35 years of Age

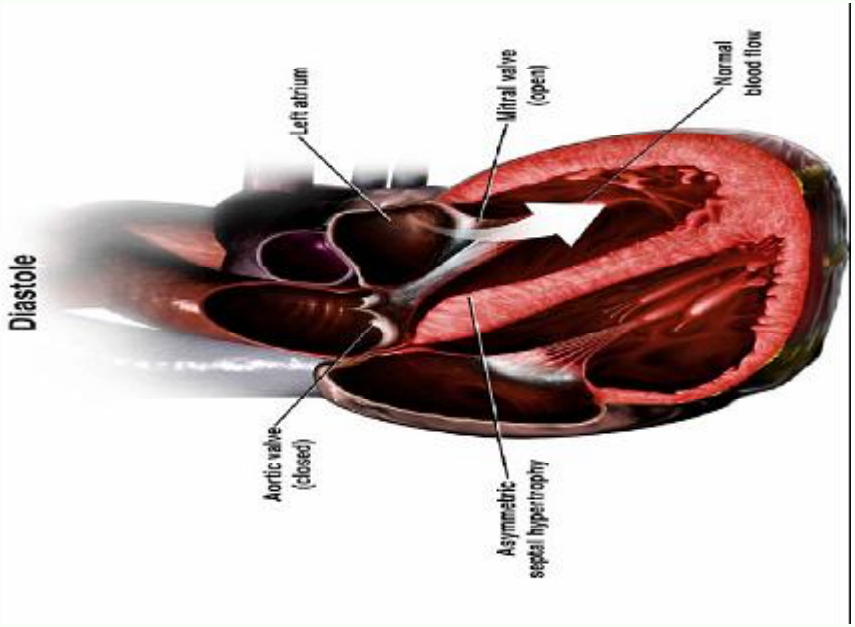
A Rare event!!

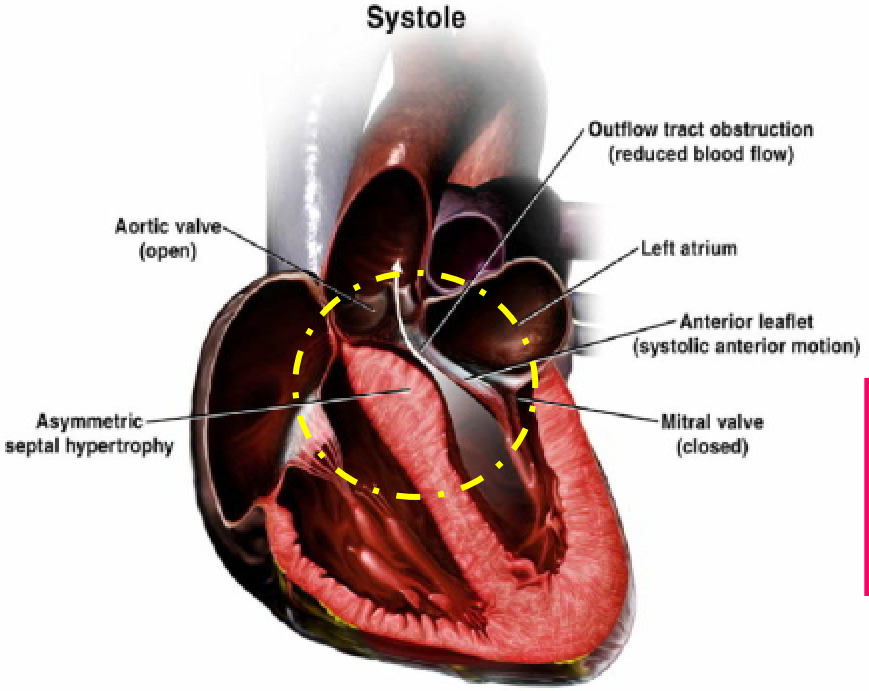
Typically unrecognized prior to death & rather unpreventable.

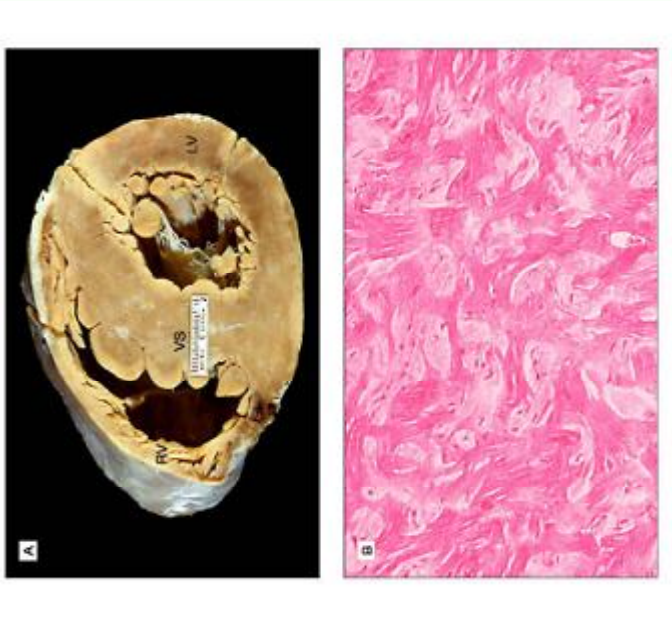
Mostly congenital / Structural defects:

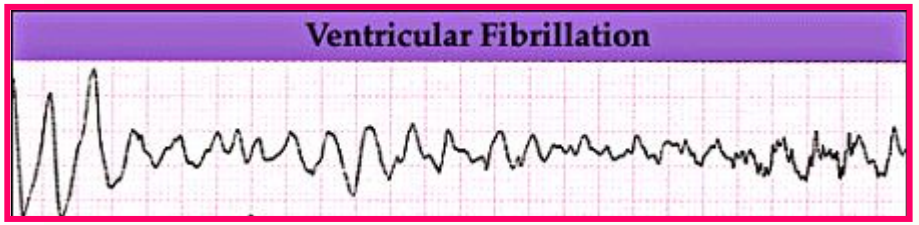
- Cardiomyopathy:
  - Hypertrophic
  - Arrhythmogenic RV
- Coronary anomaly
- Ion channelopathy:
  - Long QT syndrome
  - Brugada syndrome

Hypertrophic Cardiomyopathy
心肌肥厚症

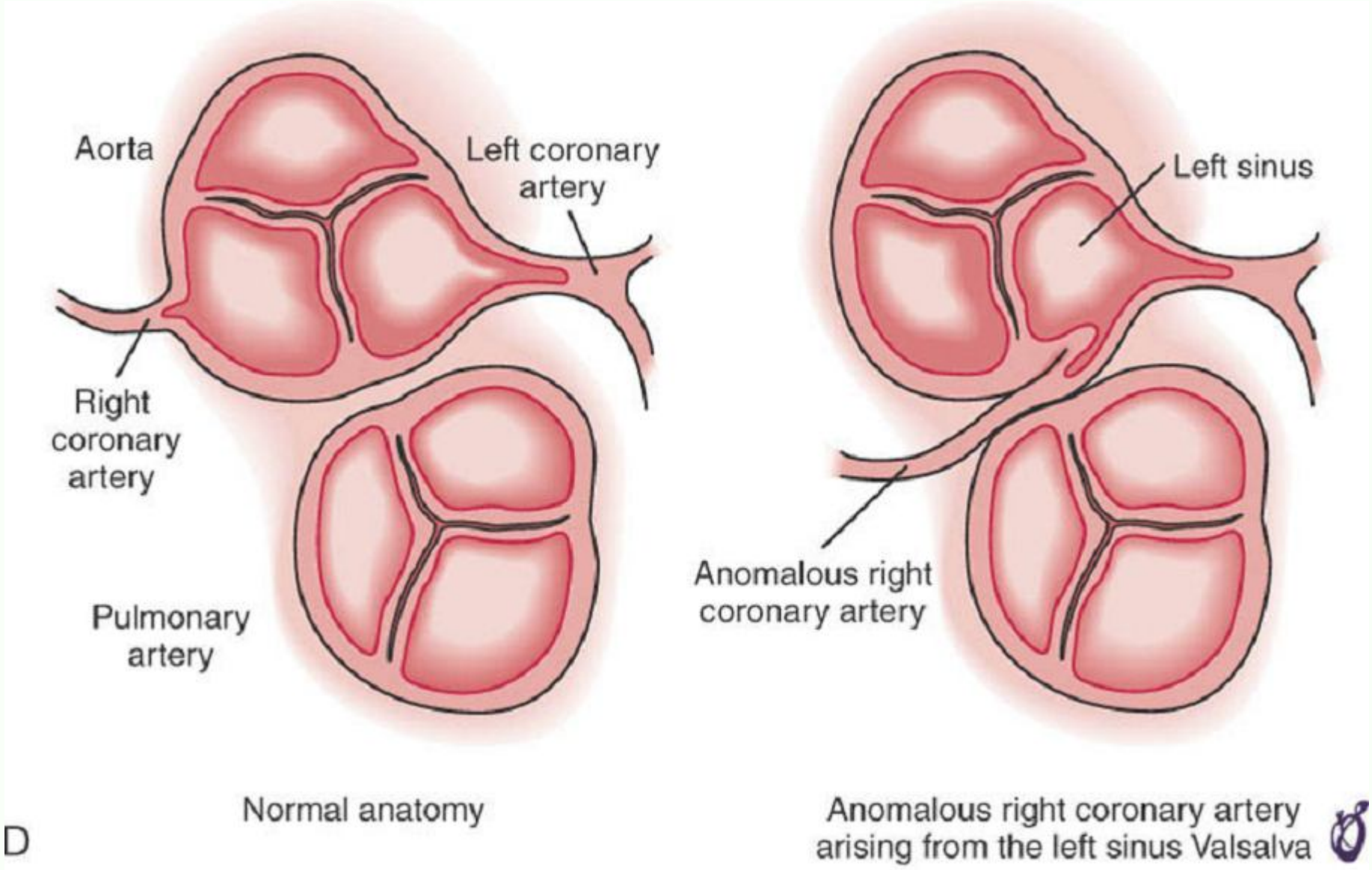




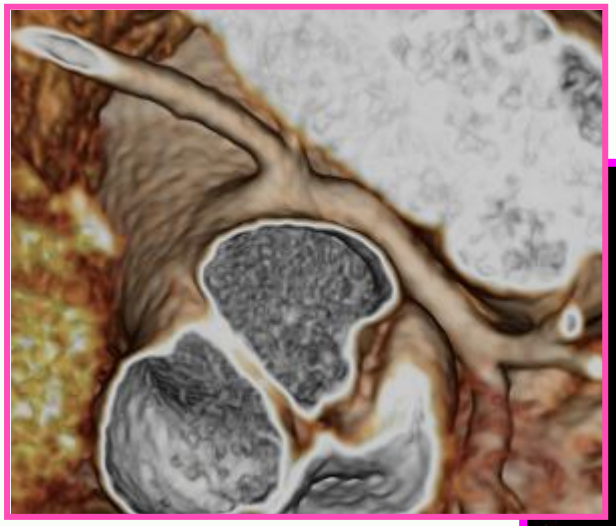




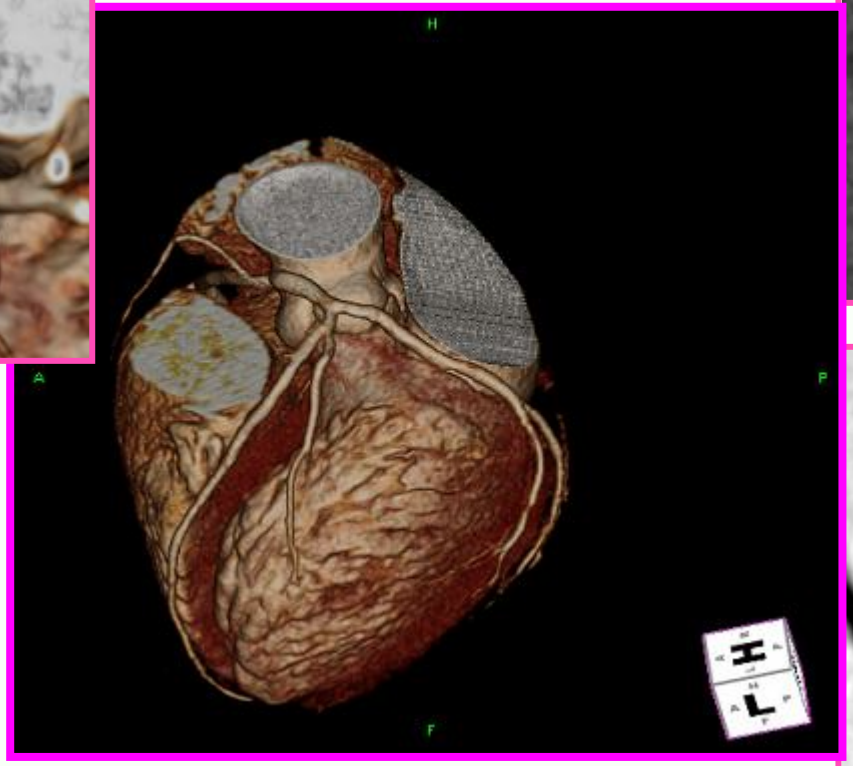
Coronary Anomaly



Anomalous Left Main Stem from Right Coronary Sinus



High Risk Group



Cardiac CT

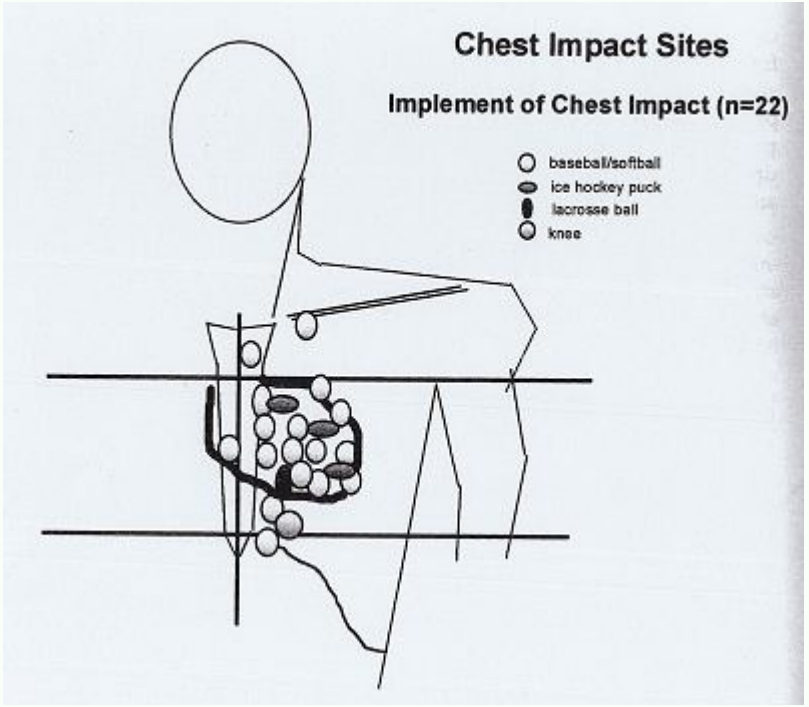
Arrhythmogenic RV Cardiomyopathy
右心室發育異常

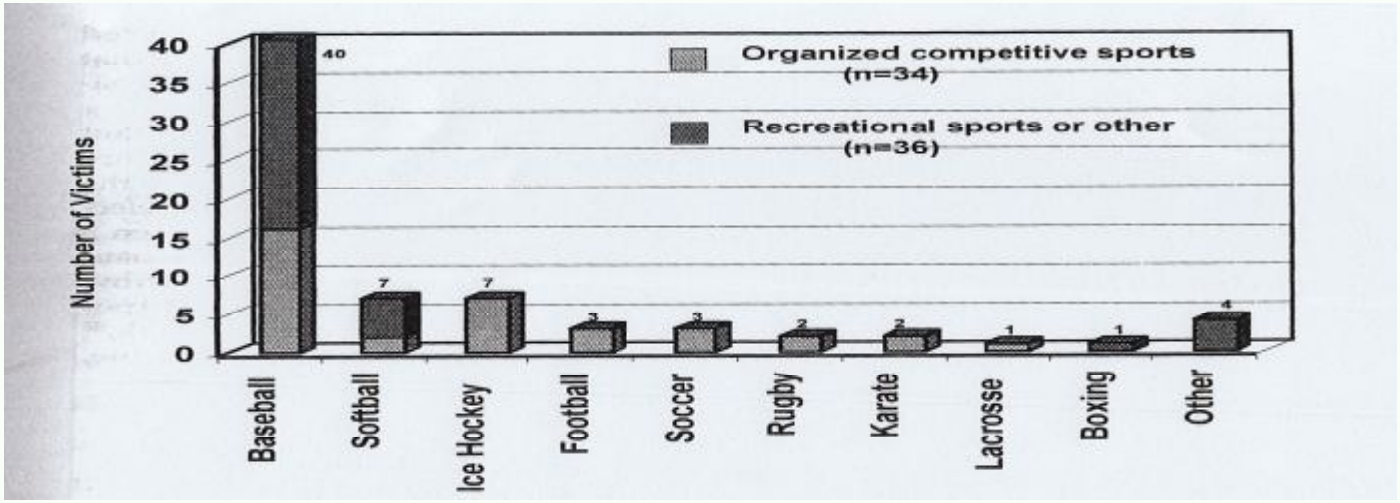
Fibro-fatty infiltration of RV
RV dilatation & dysfunction
lethal Ventricular arrhythmia
ECG : T inversion in V1-5, Epsilon wave in V1
Autosomal Dominant
Disqualify from Sports once identified

RV motion abnormalities

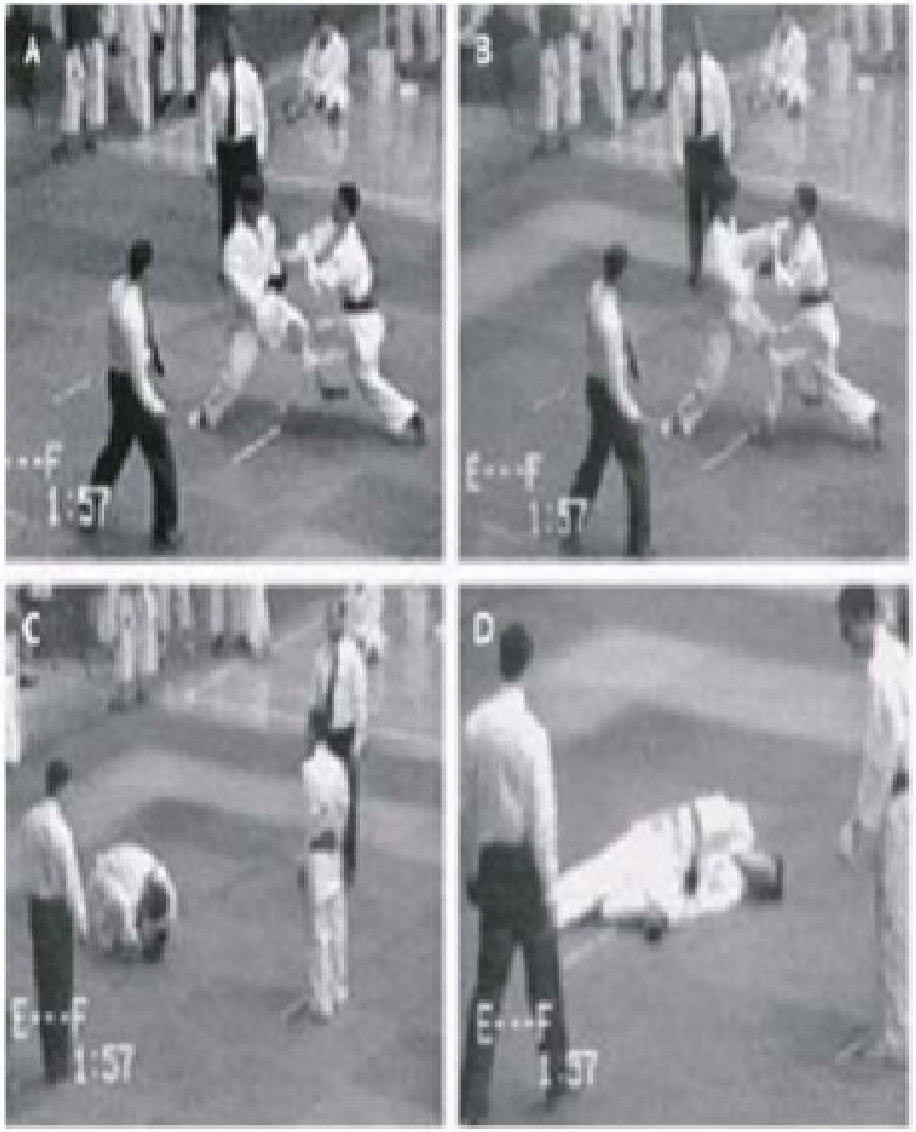
Commotio Cordis

- Chest impact directly over heart
- Precise timing during vulnerable period of Cardiac Cycle (just prior to peak of T wave
- Narrow compliant chest wall (typically small Children)



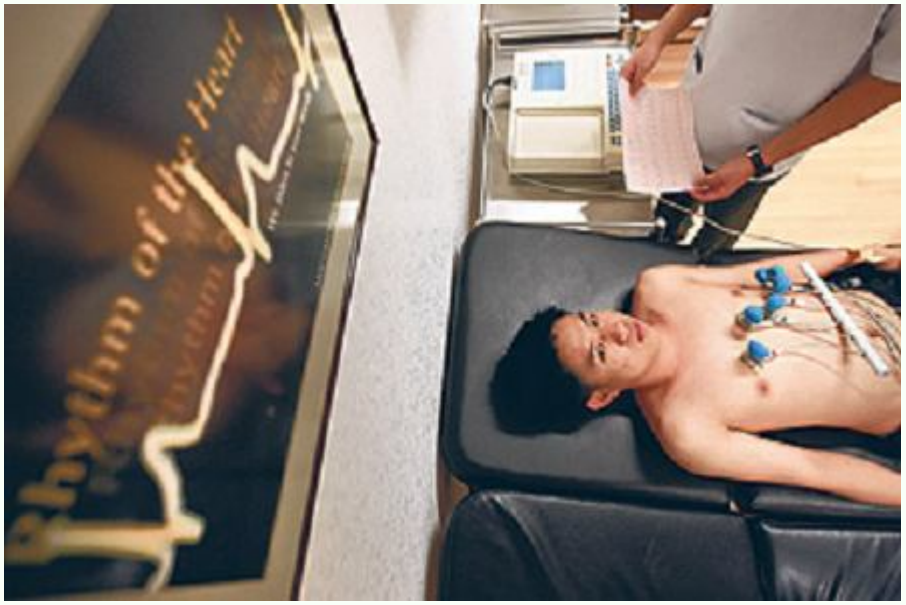


Commotio Cordis



Pre-participation Evaluation

For Young Competitive Athletes



AHA Recommendations to pre-participation Screening For Cardiovascular Abnormalities in Competitive Athletes: 2007 update.

Medical history*

Personal history

1. Exertional chest pain / discomfort
2. Unexplained syncope/near-syncope†
3. Excessive exertional and unexplained dyspnea / fatigue, associated with exercise
4. Prior recognition of a heart murmur
5. Elevated systemic blood pressure

Family history

6. Premature death (sudden and unexpected, or otherwise) before age 50 years due to heart disease, in first degree relative
7. Disability from heart disease in a close relative 50 years of age
8. Specific knowledge of certain cardiac conditions in family members hypertrophic or dilated cardiomyopathy, long-QT syndrome or other ion channelopathies, Marfan syndrome, or clinically important arrhythmias

Physical examination

9. Heart murmur‡
10. Femoral pulses to exclude aortic coarctation
11. Physical stigmata of Marfan syndrome
12. Brachial artery blood pressure (sitting position)

Italian / ESC Protocol

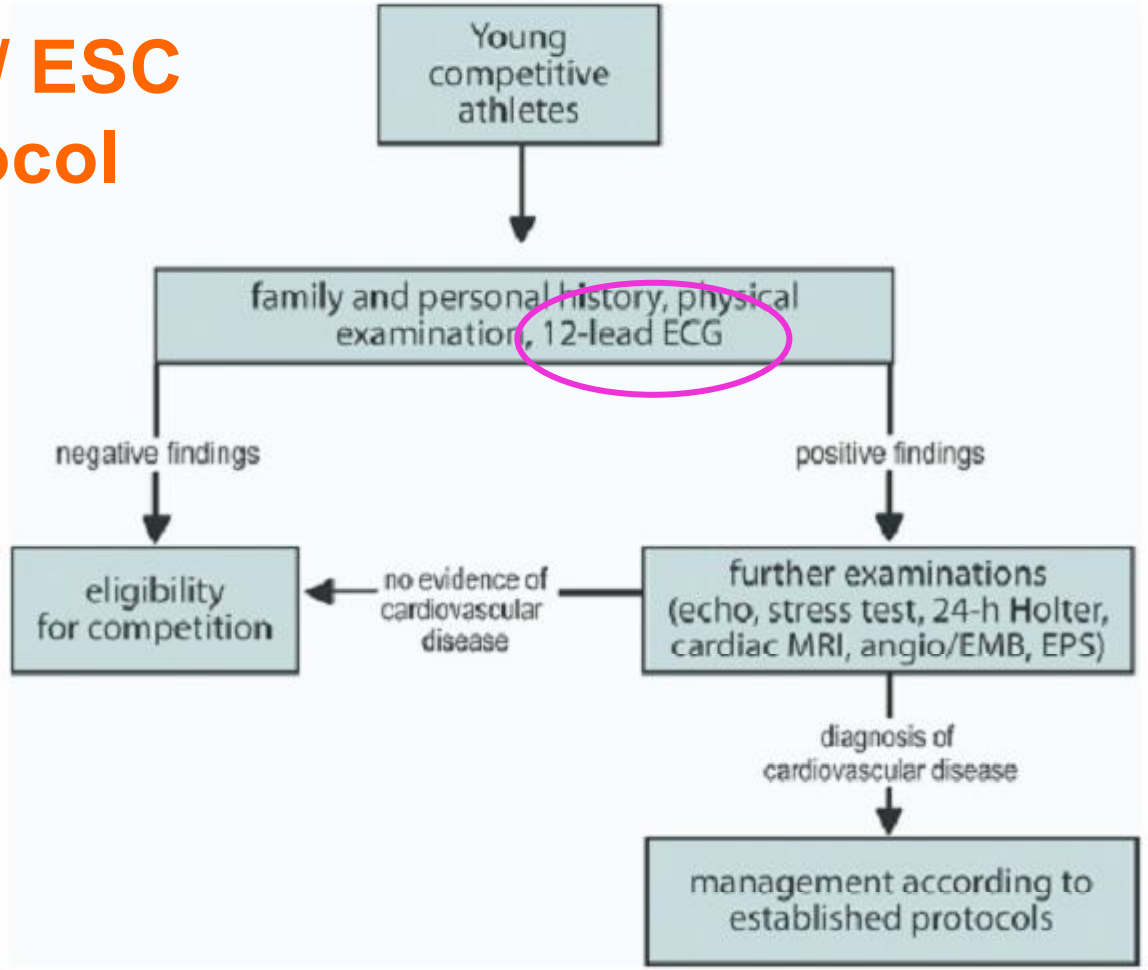


Figure 1 **Flow Chart of the Italian Protocol of Cardiovascular Pre-Participation Screening**

Young competitive athletes are defined as individuals 12 to 35 years of age who are engaged in a regular fashion in exercise training as well as participating in official athletic competitions. First-line examination includes family history, physical examination, and 12-lead electrocardiography (ECG); additional tests are requested only for subjects who have positive findings at the initial evaluation. Angio/EMB = contrast angiography/endomyocardial biopsy; EPS = electrophysiologic study with programmed ventricular stimulation; MRI = magnetic resonance imaging. Reprinted, with permission, from Corrado et al. (3).

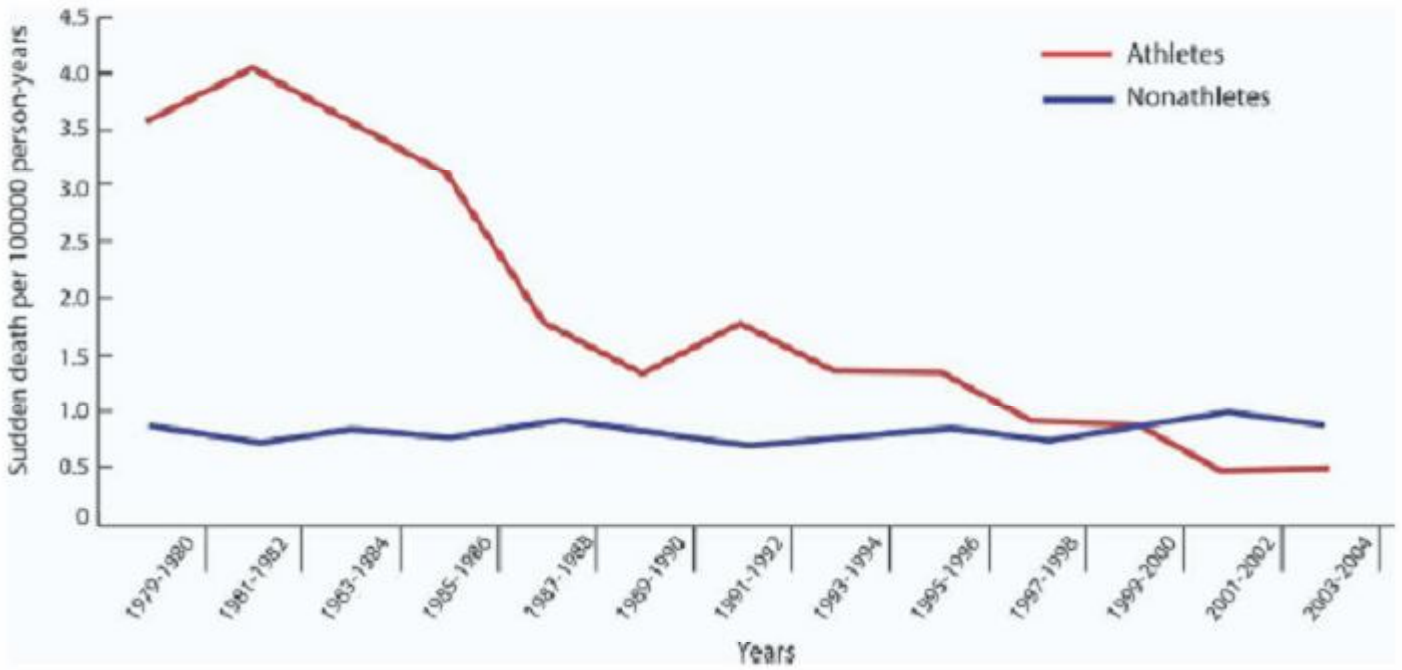


Figure 3 **Annual Incidence Rates of Sudden Cardiac Death Among Screened Competitive Athletes and Unscreened Nonathletes in the Veneto Region of Italy From 1979 to 2004**

Modified from Corrado et al. (23).

Clinical Significance of Abnormal Electrocardiographic Patterns in Trained Athletes

Antonio Pelliccia, Barry J. Maron, Franco Culasso, Fernando M. Di Paolo, Antonio Spataro, Alessandro Biffi, Giovanni Caselli and Paola Piovano

Circulation 2000;102;278-284

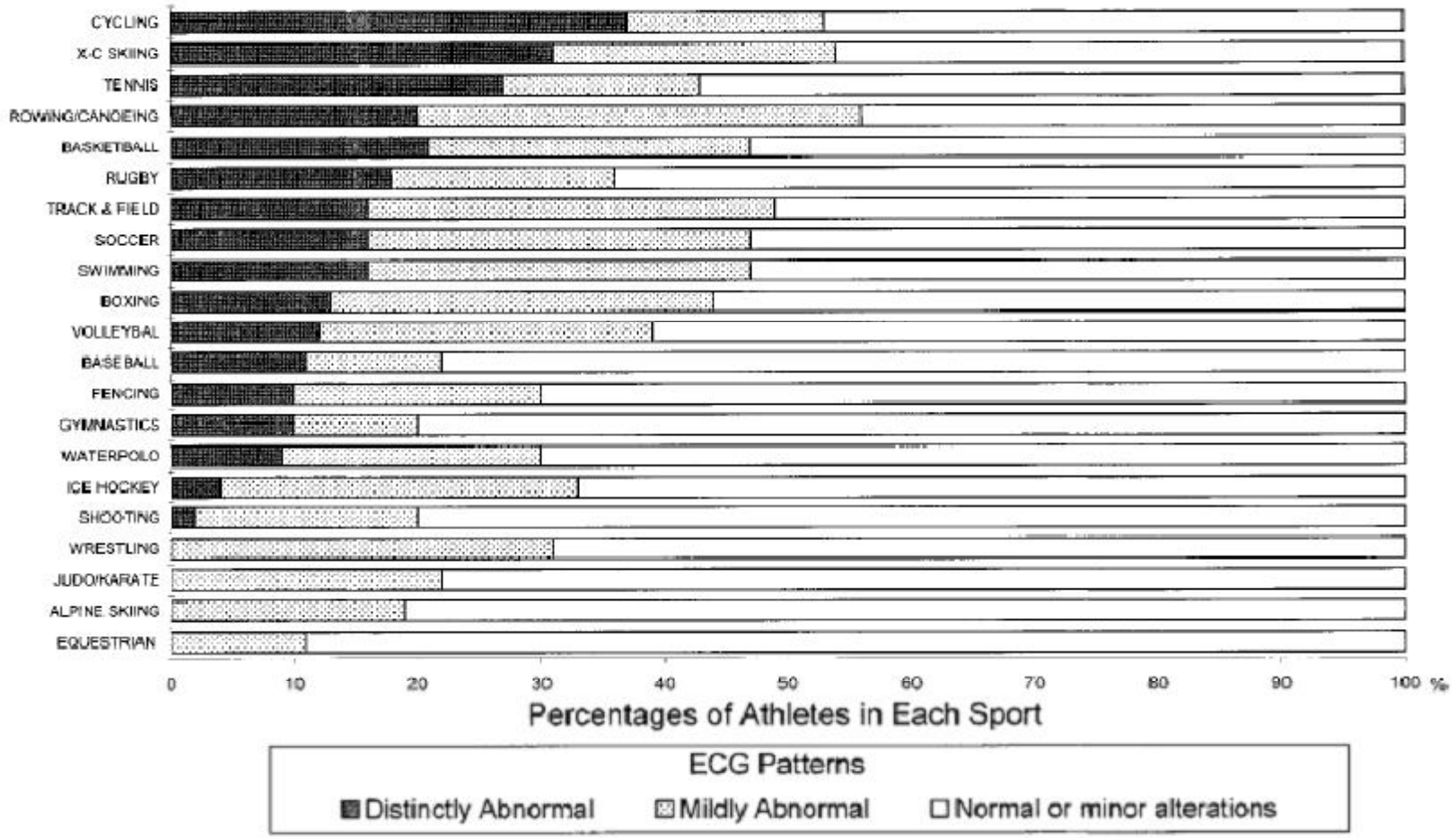


Figure 2. Distribution of 3 ECG categories with respect to sporting disciplines among 1005 athletes. ECGs that were distinctly abnormal (black bars), mildly abnormal (gray bars), and normal or with minor alterations (white bars) are depicted as proportions of all the athletes participating in each sporting discipline. Only sports with ≥12 participants are shown. X-C indicates cross-country.

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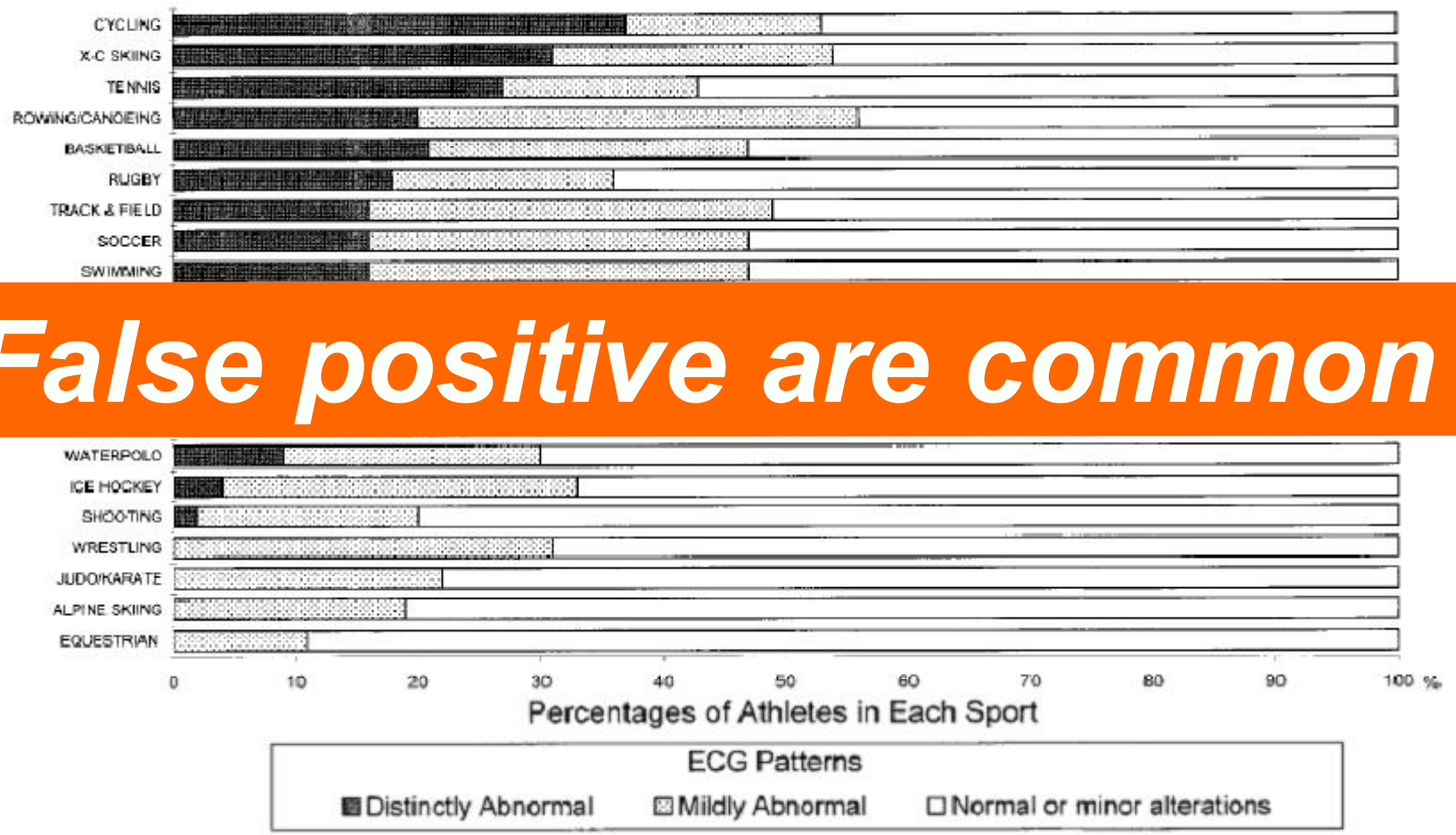
False positive are common



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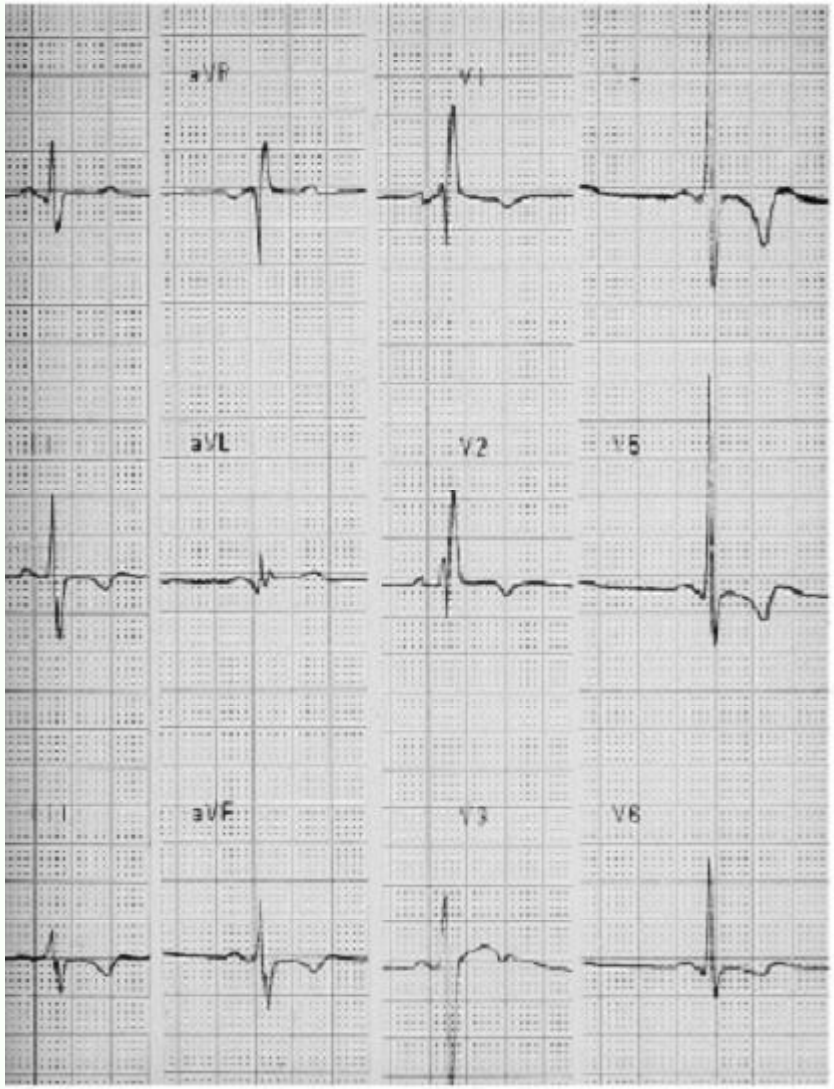
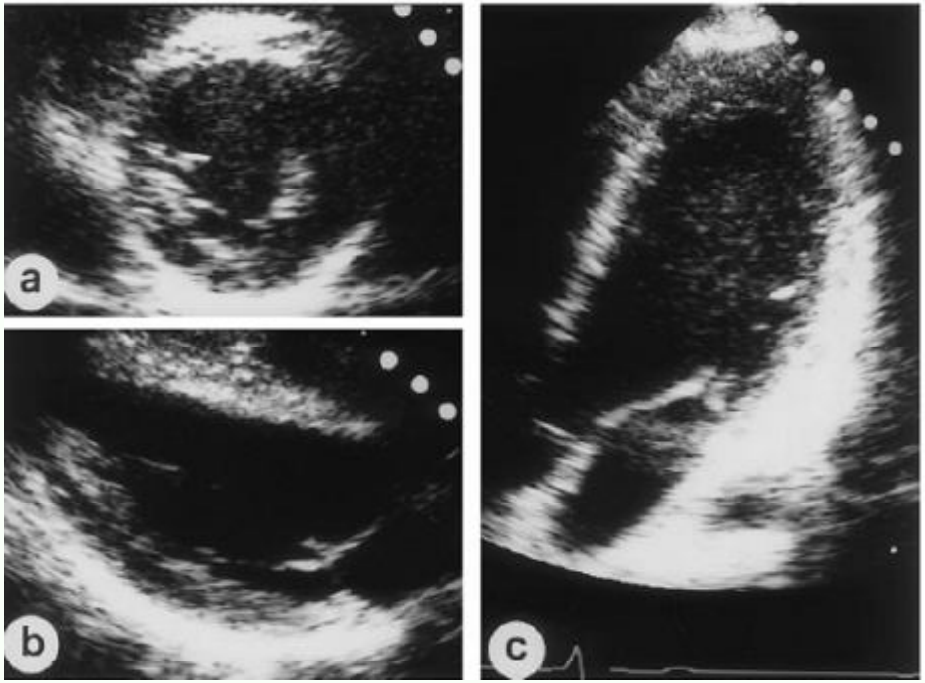


M/19, soccer player
Markedly abnormal ECG
Normal Echo. finding



Recommendations for the Acceptability of Recreational (Noncompetitive) Sports Activities and Exercise in Patients With GCVDs*

Intensity Level	HCM†	LQTS†	Marfan Syndrome‡	ARVC	Brugada Syndrome
High					
Basketball					
Full court	0	0	2	1	2
Half court	0	0	2	1	2
Body building§	1	1	0	1	1
Ice hockey§	0	0	1	0	0
Racquetball/squash	0	2	2	0	2
Rock climbing§	1	1	1	1	1
Running (sprinting)	0	0	2	0	2
Skiing (downhill)§	2	2	2	1	1
Skiing (cross-country)	2	3	2	1	4
Soccer	0	0	2	0	2
Tennis (singles)	0	0	3	0	2
Touch (flag) football	1	1	3	1	3
Windsurfing‖	1	0	1	1	1
Moderate					
Baseball/softball	2	2	2	2	4
Biking	4	4	3	2	5
Modest hiking	4	5	5	2	4
Motorcycling§	3	1	2	2	2
Jogging	3	3	3	2	5
Sailing‖	3	3	2	2	4
Surfing‖	2	0	1	1	1
Swimming (lap)‖	5	0	3	3	4
Tennis (doubles)	4	4	4	3	4
Treadmill/stationary bicycle	5	5	4	3	5
Weightlifting (free weights)§¶	1	1	0	1	1
Hiking	3	3	3	2	4
Low					
Bowling	5	5	5	4	5
Golf	5	5	5	4	5
Horseback riding§	3	3	3	3	3
Scuba diving‖	0	0	0	0	0
Skating#	5	5	5	4	5
Snorkeling‖	5	0	5	4	4
Weights (non–free weights)	4	4	0	4	4
Brisk walking	5	5	5	5	5

Eligibility:

Grade 0: not eligible

Grade 1:Strongly discouraged

Grade 2-3: intermediate, assess individually

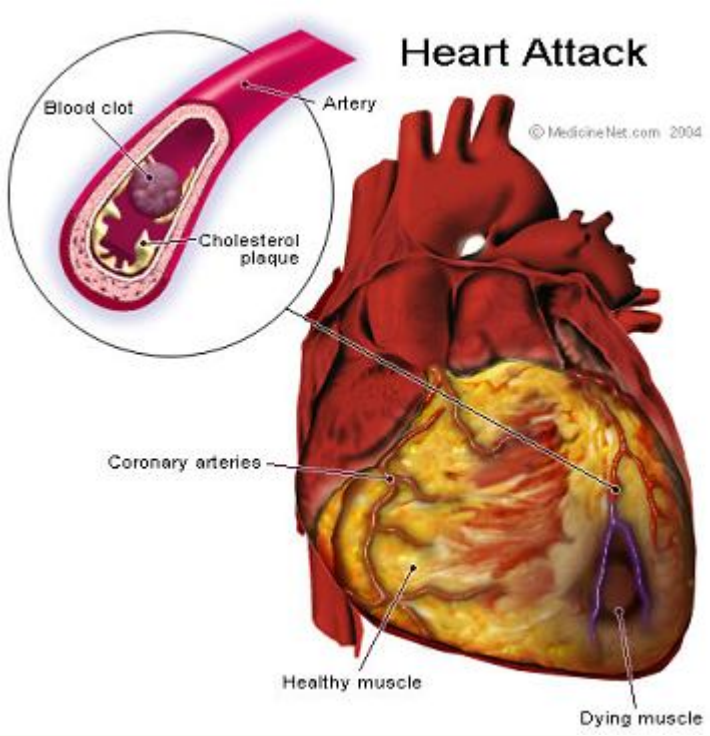
Grade 4-5: probably permitted

26TH BETHESDA CONFERENCE

J Am Coll Cardiol 1994; 24:845-899

Pre-participation Evaluation

For Older Individuals in General



When is diagnostic tests indicated?

American College of Sports Medicine(ACSM) recommendations for ETT

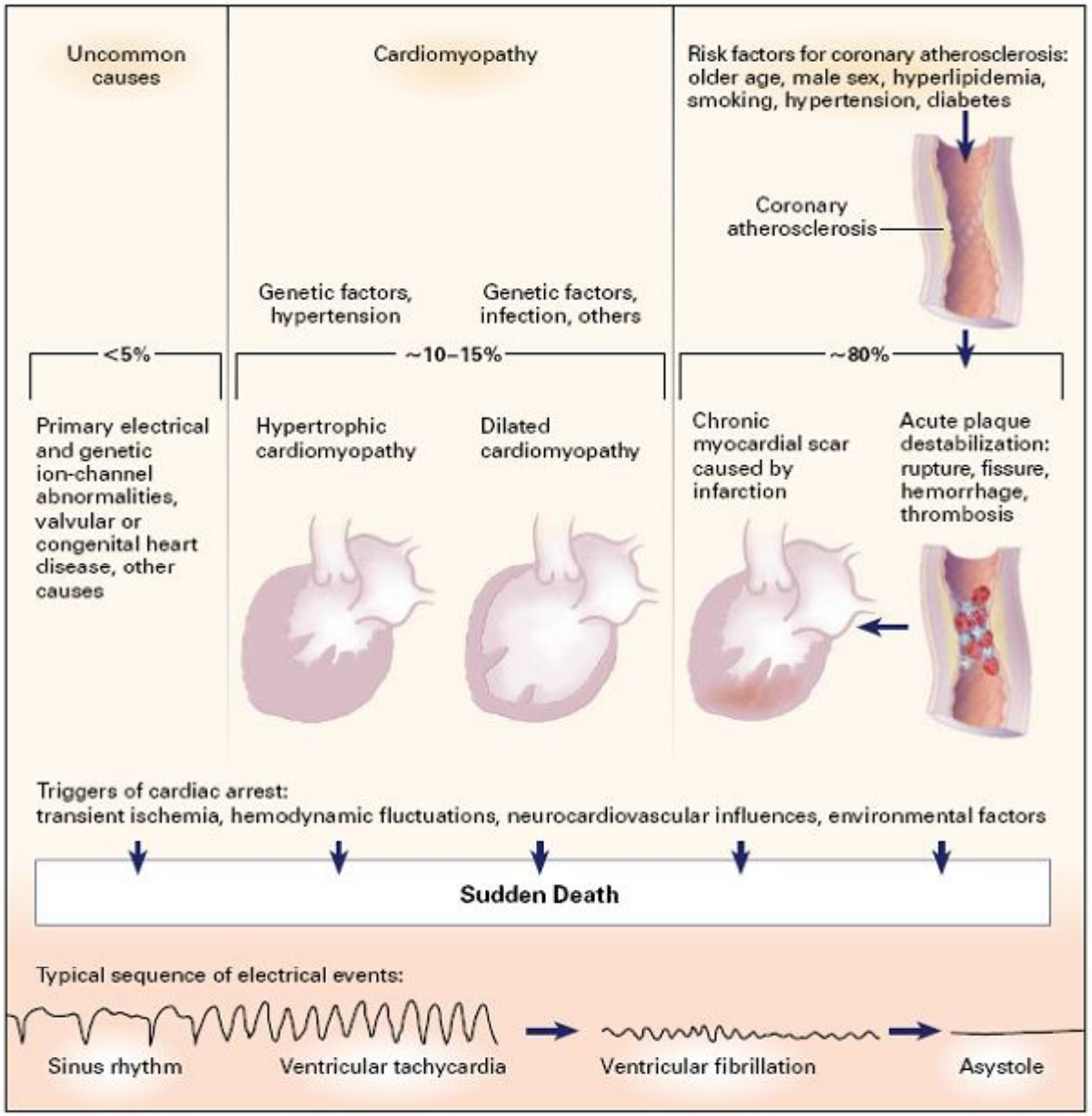
	LOW RISK	MODERATE RISK	HIGH RISK
MODERATE EXERCISE (3-6 METS)	NOT NECESSARY	NOT NECESSARY	RECOMMENDED
VIGOROUS EXERCISE (> 6 METS)	NOT NECESSARY	RECOMMENDED	RECOMMENDED

Personal Risk vs Exercise Intensity

Who should receive pre-participation cardiovascular evaluation?

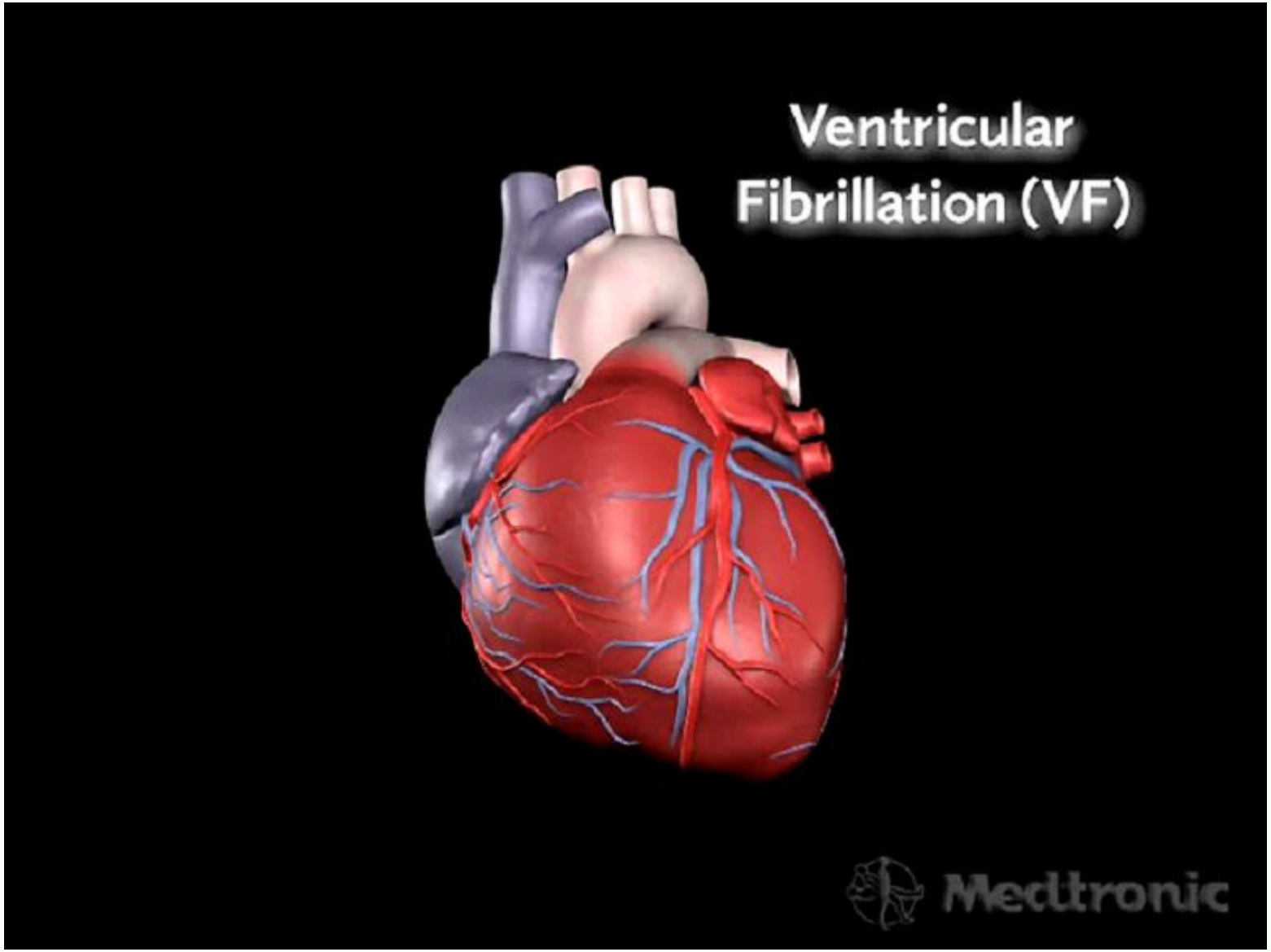
- **All older athletes:**
  - **males > 45 ; females > 55 years**
- **Athletes with symptoms:**
  - **Syncope / near-syncope with exercise**
  - **Chest pain with exercise**
  - **Palpitation**
  - **Heart murmur**
- **Major risk factors (≥2):**
  - **Family history of sudden death / CAD**
  - **Smoker**
  - **Diabetes / Hypertension**
  - **↑ LDL / ↓ HDL**

Pathophysiology & Epidemiology of SCD



Huikuri, N Engl J Med, Vol. 345, No. 20, 2001

Most frequent terminating event



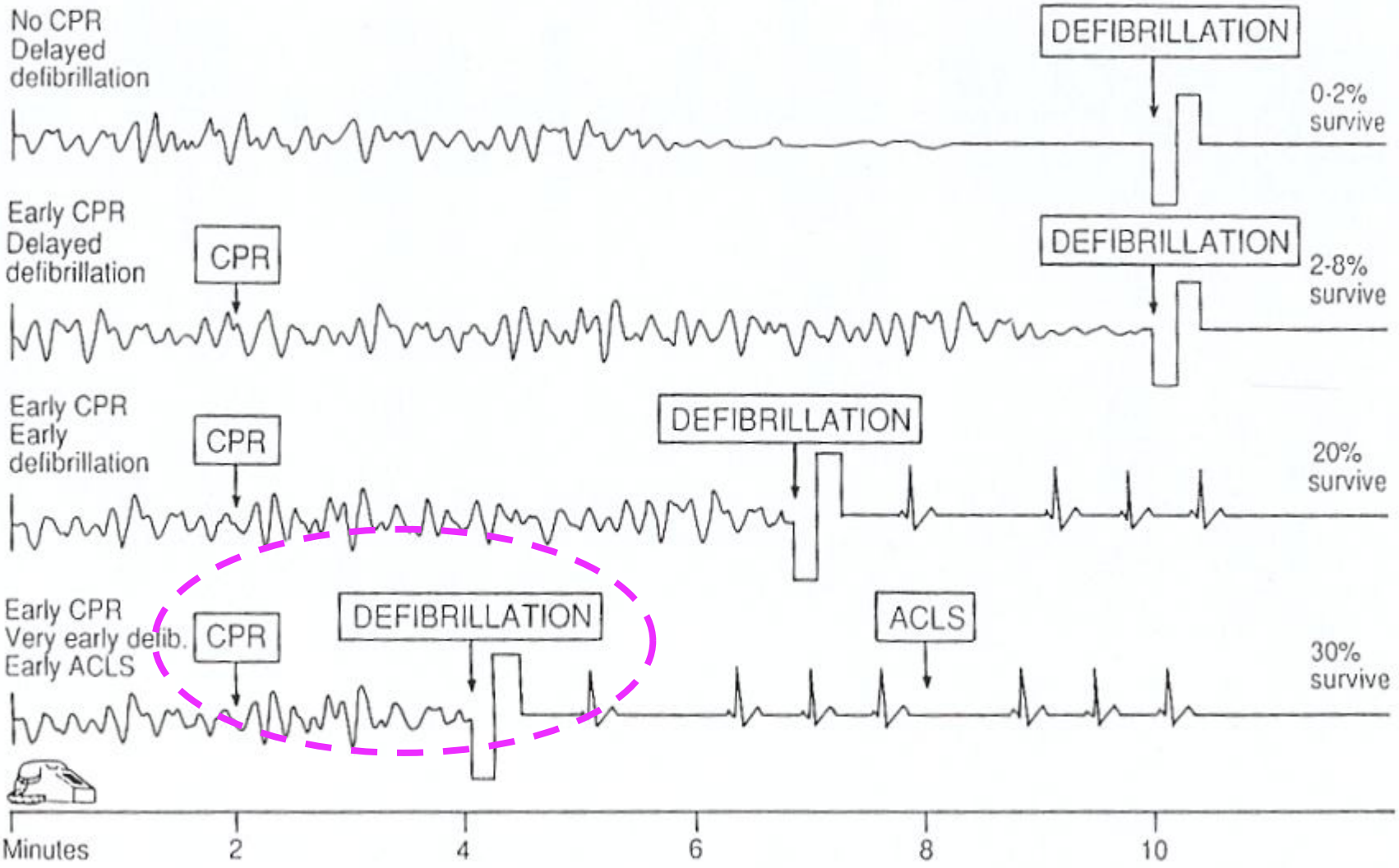
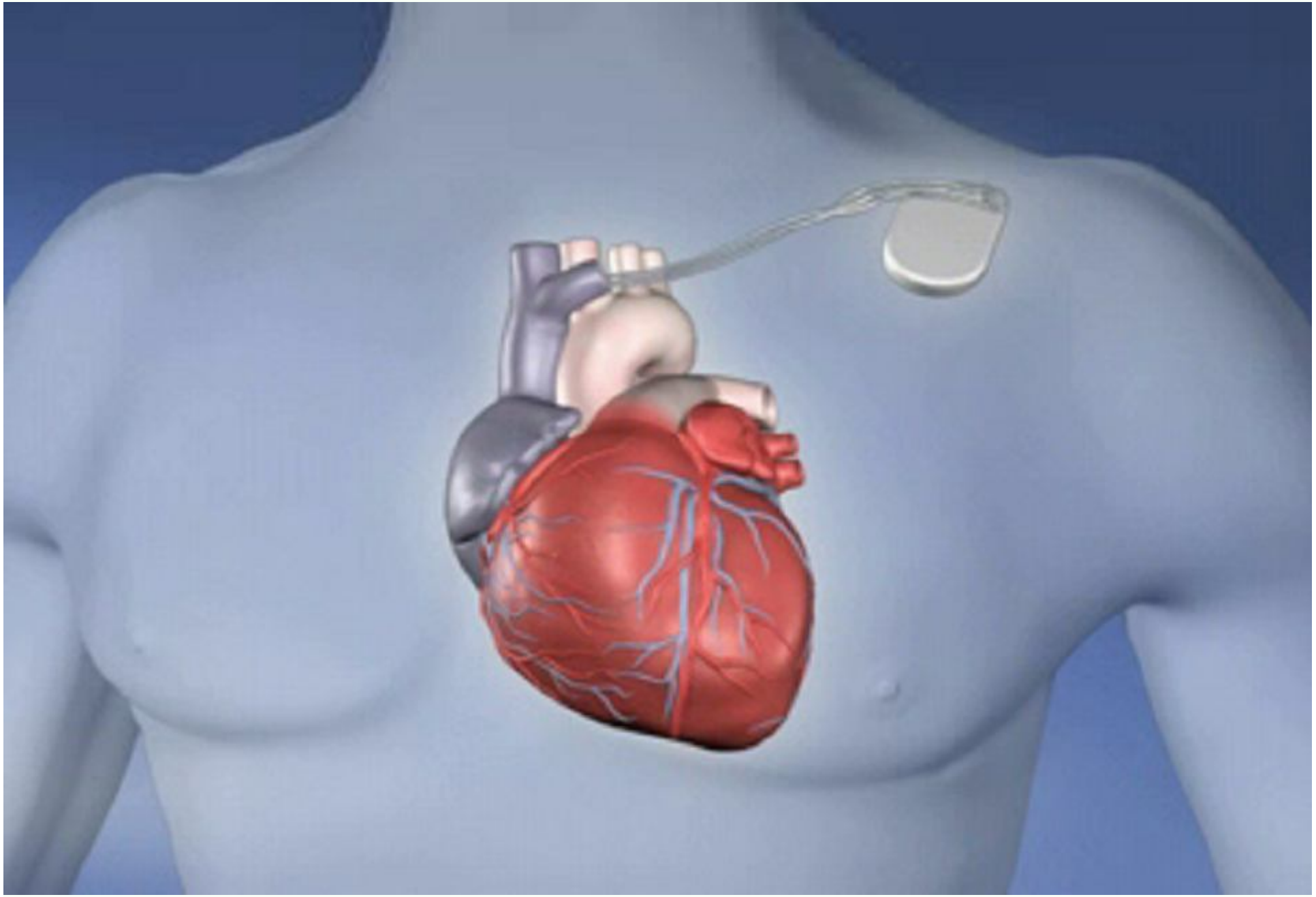
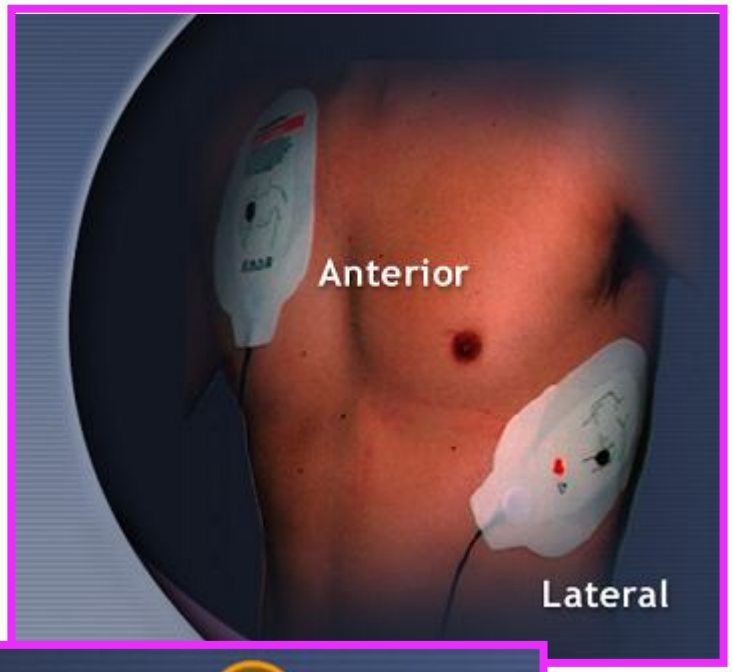
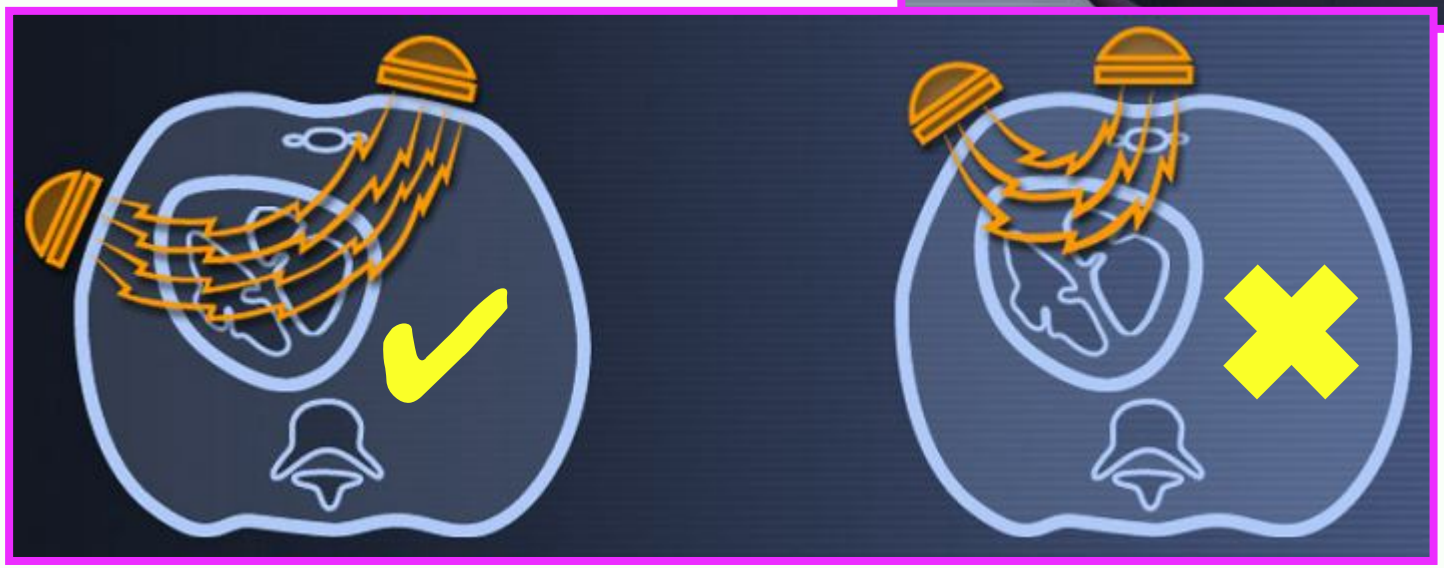


Figure 2. Survival rates are estimates of probability of survival to hospital discharge for patients with witnessed collapse and with ventricular fibrillation as initial rhythm. Estimates are based on a large number of published studies, which are collectively reviewed in References 26 and 27.

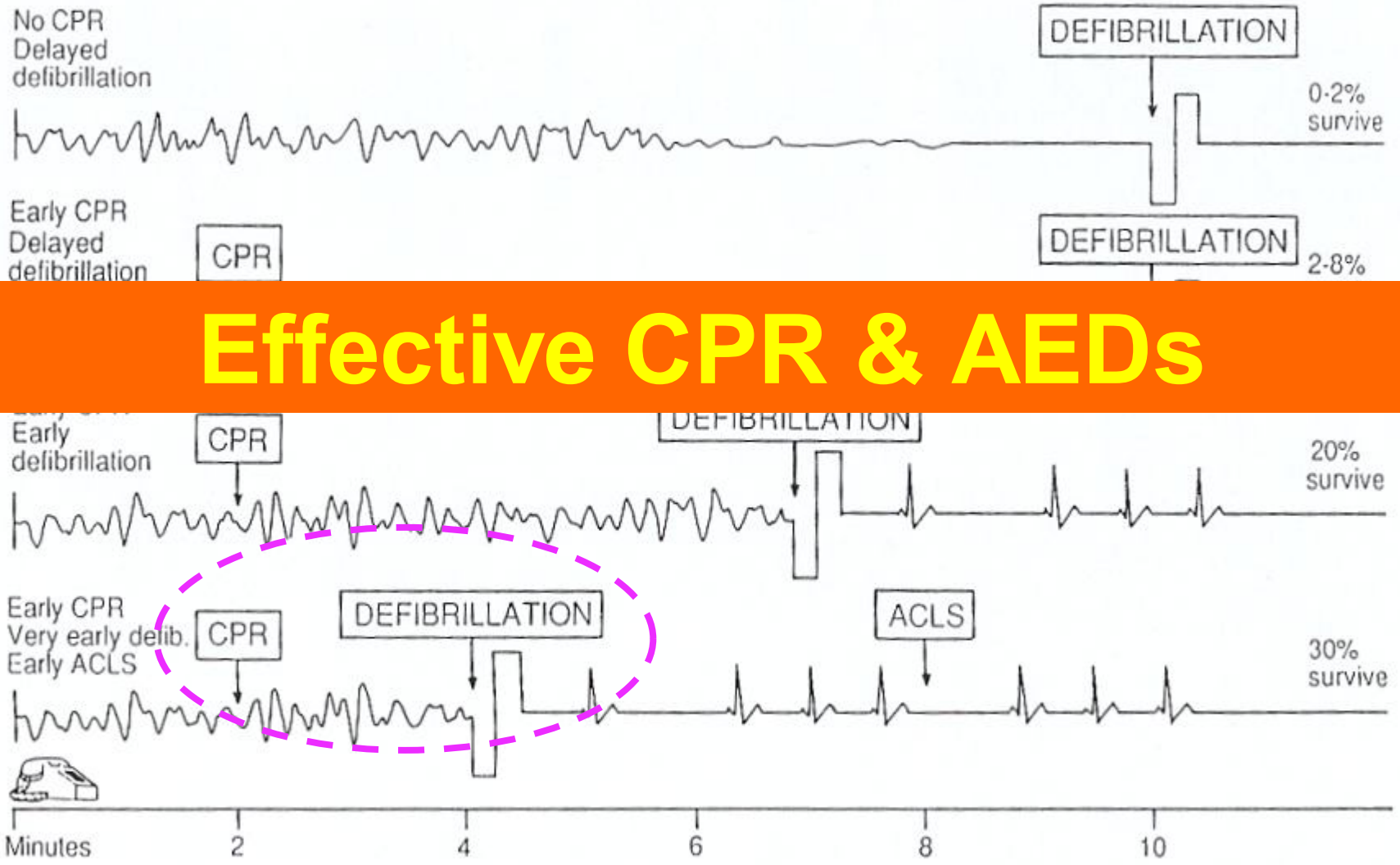


Automatic External Defibrillator (AED)





Effective CPR & AEDs



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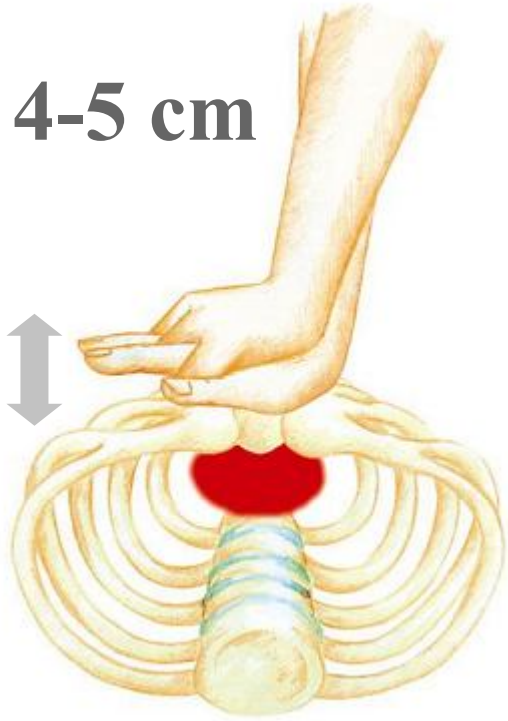


- **Effective chest Compression**
  Push Hard and Push Fast.
  - ***100 compression/minute***
  - Adequate depth
- 1-second Rescue Breaths
- 30:2 Universal compression to ventilation Ratio

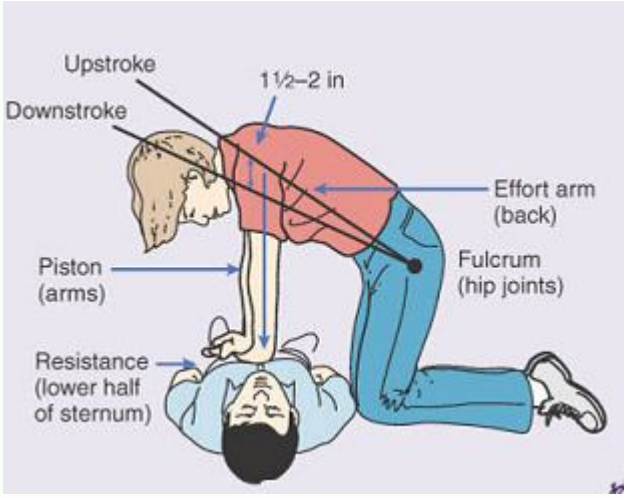
American Heart Association
GUIDELINES
CPR ECC
2005

ACC 2008

Keeping the beat for CPR? Hum 'Stayin' Alive'

At 103 beats per minute, "Stayin' Alive" from Bee Gees has the almost perfect rhythm for performing CPR

New!!!
AHA 2008



"Hand-only" CPR

Bystander reluctance to perform CPR:

- **disease transmission in mouth-to-mouth ventilation**
- **panic and fear of causing harm**
- **Medico-legal concern**

Hands-only (Compression-only) CPR: AHA 2008

- Recommended for
  - **adult**
  - **witnessed, out-of-hospital** arrest
  - **probable of cardiac origin**
    - eg. sudden collapse or collapse after signs consistent with a myocardial infarction.
- **NOT** applicable to:
  - unwitnessed cardiac arrest,
  - cardiac arrest in children,
  - cardiac arrest presumed to be of noncardaic origin

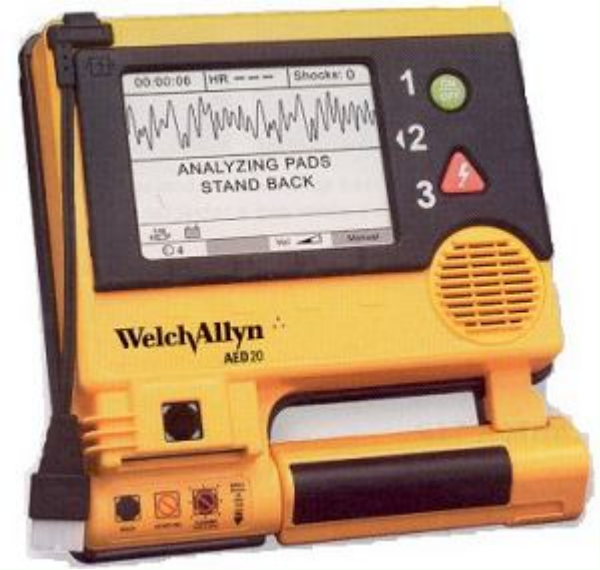
Sayre MR, et al.
Circulation 2008; 117: 2162-2167.

Prepare AED while CPR

One shock followed by immediate CPR

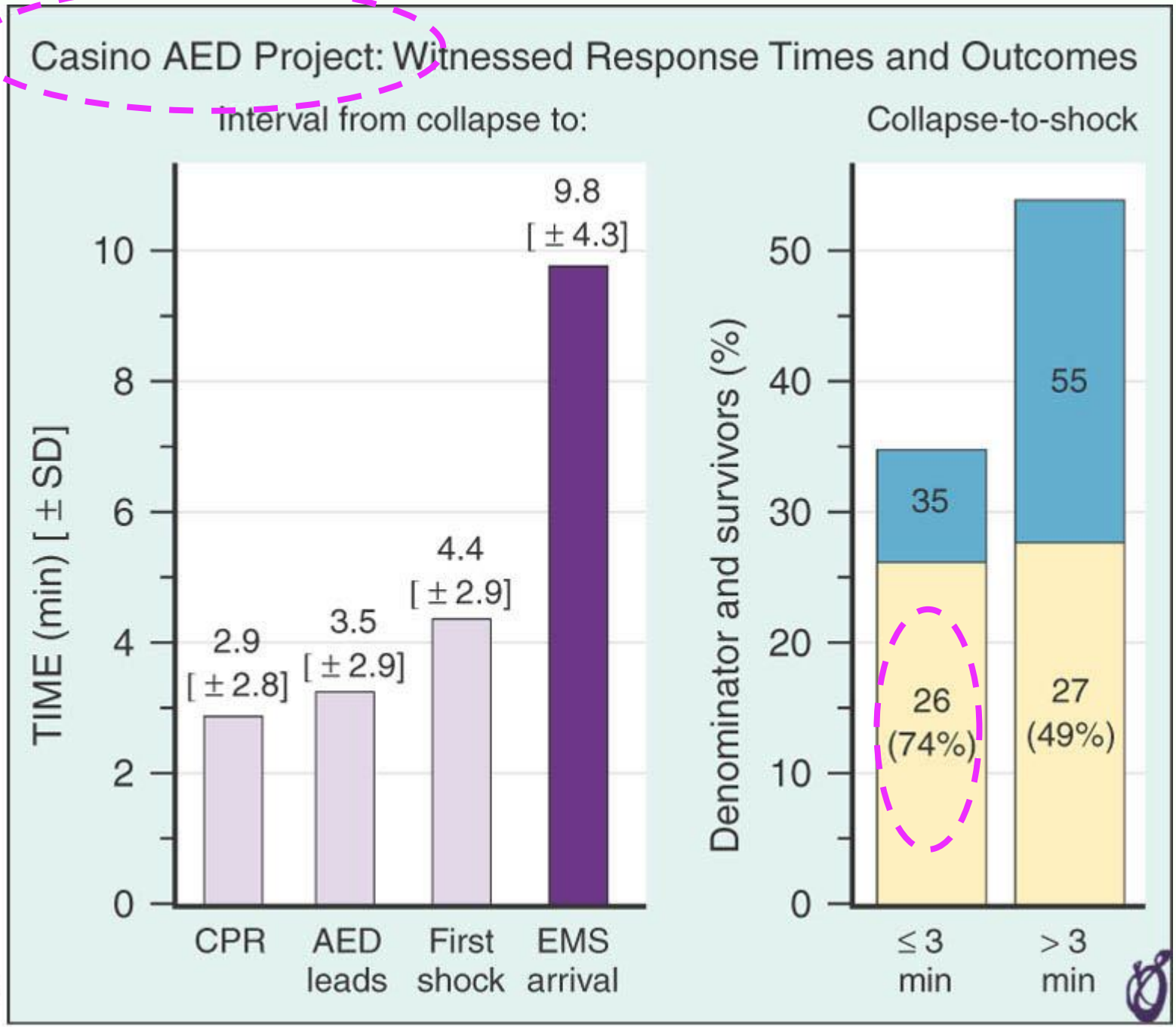
No “stacked” shocks

No circulation checks for 2 minutes (5 Cycles of CPR).

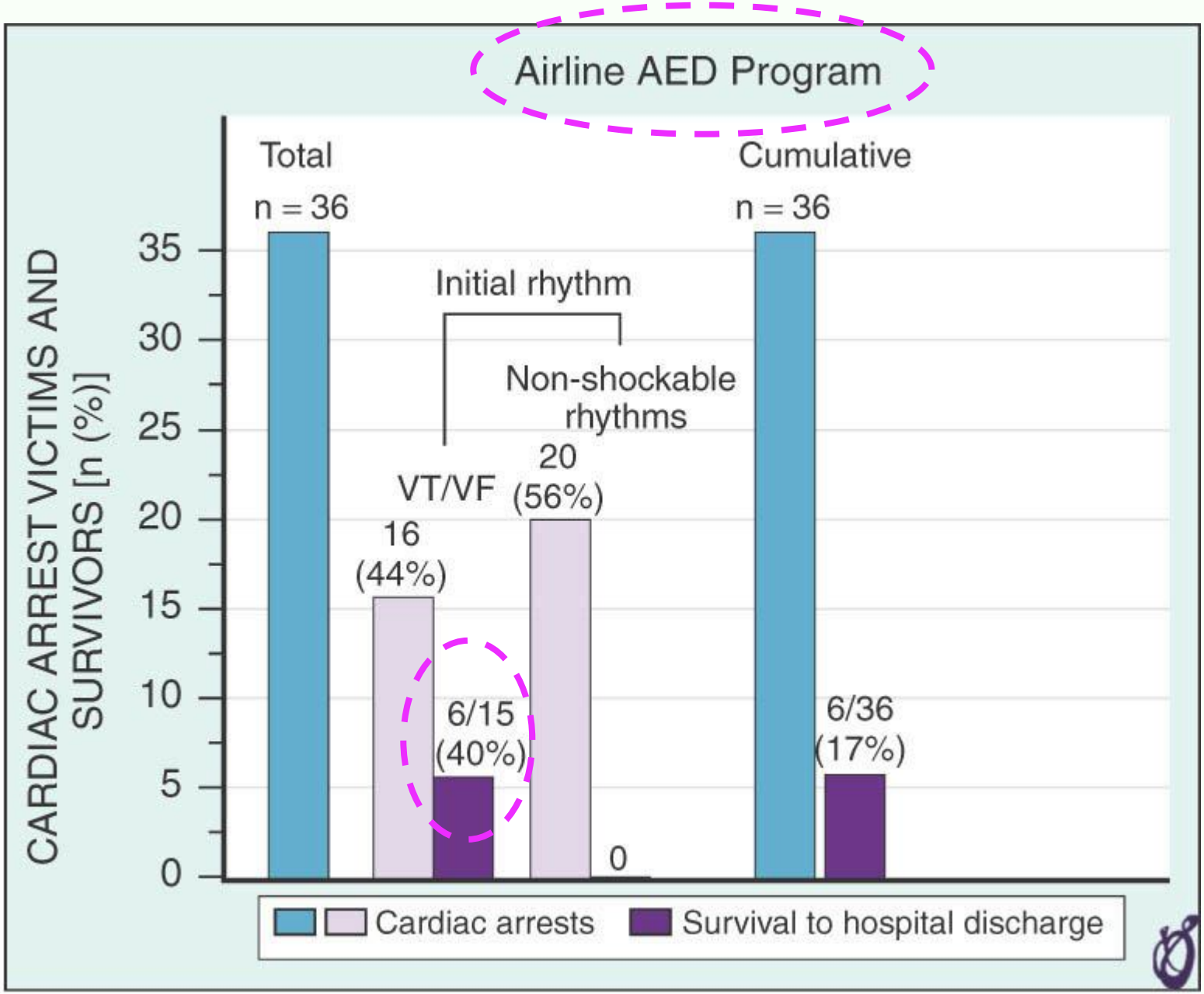


American Heart Association
GUIDELINES CPR ECC 2005

Continue to encourage widespread AED availability

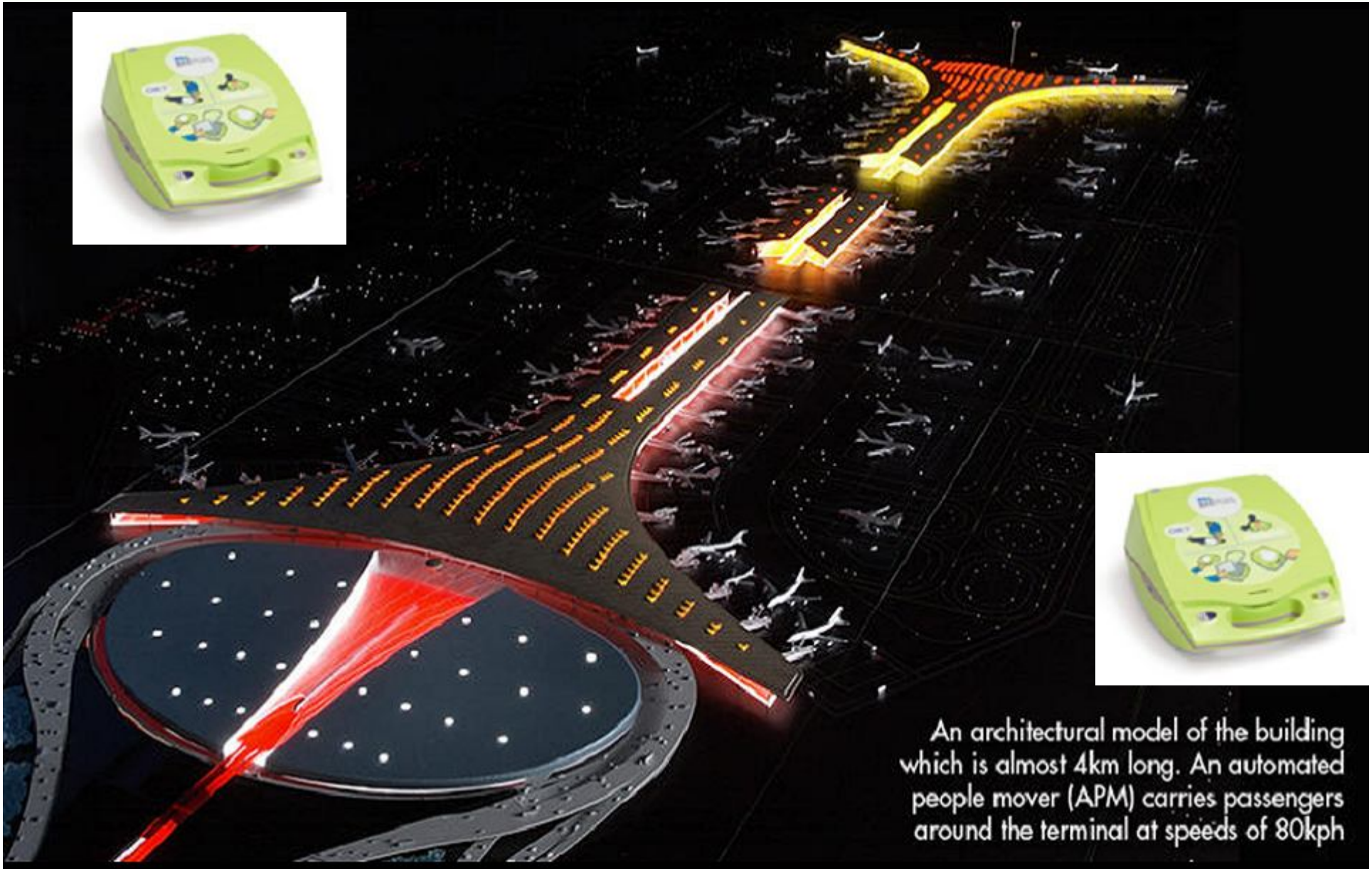


(Modified from Valenzuela TD, Roe DJ, Nichol G, et al: Outcomes of rapid defibrillation by security officers after cardiac arrest in casinos. N Engl J Med 343:1206, 2000.)



(Modified from Page RL, Joglar JA, Kowal RC, et al: Use of automated external defibrillators by a U.S. airline. N Engl J Med 343:1210, 2000.)

Beijing International Airport 2008



Conclusion

- Regular Endurance training leads to Cardiovascular adaptive changes in terms of enhanced vagal modulation and chamber hypertrophy. This is commonly referred as Athlete's heart syndrome. Clinical implications and their patho-physiologically changes are explained with case illustrations.
- People participate in exercise are also exposed to increased risk of sudden cardiac death. The common causes cardiac death in the younger athletes are mostly related to congenital disorder while coronary heart disease are the major causes cardiac sudden death in those older than 35 years old.
- Pre-participation screening in the younger athletes should include detail personal and family history, detail heart examination and a resting ECG. Exercise stress test should be performed for the older athletes, those with symptoms and multiple risk factors if they intend to engaged to moderate or vigorous exercise.
- Cardiac emergency are infrequent. However, a rapid response with persons trained with CPR and access to AED are essential to save life.

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thank you