

# Preventive Cardiology

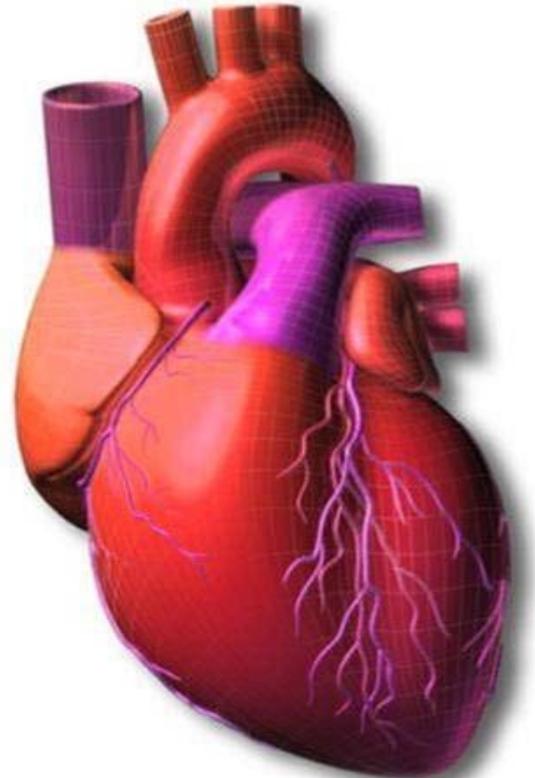
## How and Why

R.L.Morrissey,MD  
FACC,FACP,FASE



# Objectives

- Review the mechanisms of chest pain caused by coronary artery disease.
- Review key concepts in preventive cardiology.
- Review important steps of resuscitation.





# A Public Health Problem



- Cardiovascular disease (CVD) remains the number one health threat to most adult Americans.
- Each year, 1.25 million people experience an acute myocardial infarction (MI).
  - Nearly 500,000 die from coronary heart disease (CHD) each year.
  - Over half of acute MI deaths occur suddenly and outside a hospital.

# The AHA Chain of Survival

1. Early access to the emergency medical services (EMS) system
2. Early CPR either by bystanders or first-responder rescuers
3. Early defibrillation by first responders, emergency medical technicians (EMTs), paramedics, or nurses and physicians if they are on the scene
4. Early ACLS



# Resuscitation Success vs. Time\*

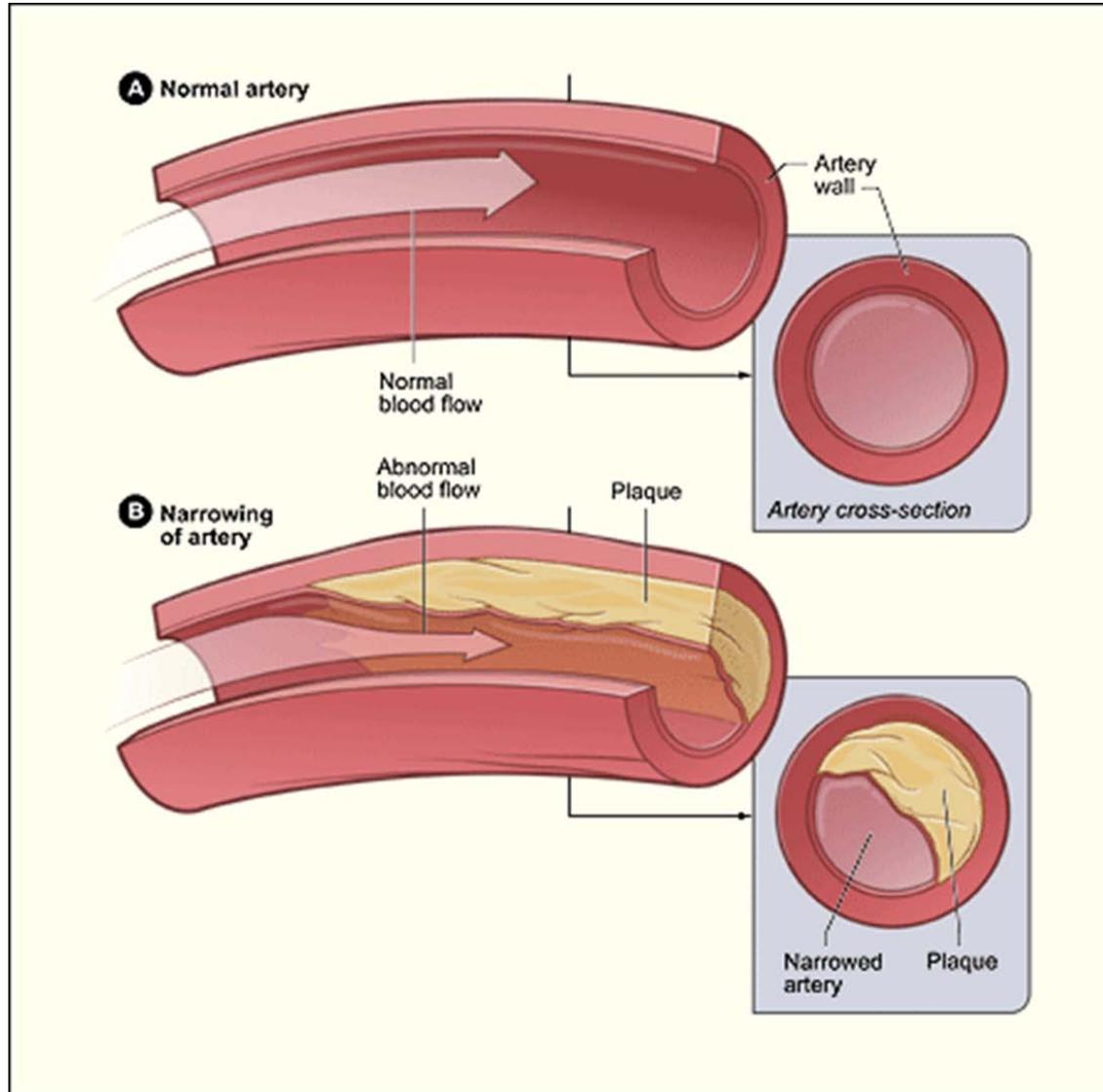
\* Non-linear

- Recognition/Decision
- 9-1-1 Call
- Time to Unit
- Travel Time
- Time to Patient
- Time to First Shock



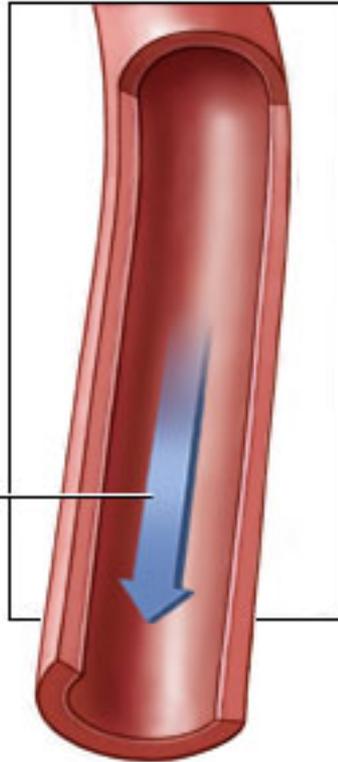
Adapted from text: Cummins  
KO, Annals of Emergency Medicine, 1992,  
18:1269-1275.

# Mechanisms of Disease



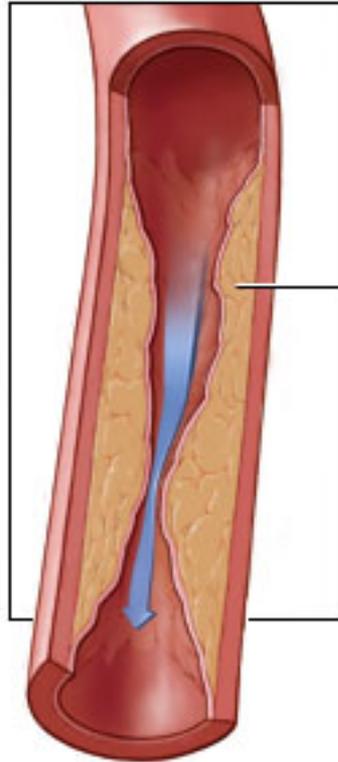
Normal artery

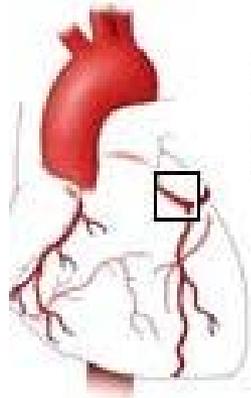
Blood flow



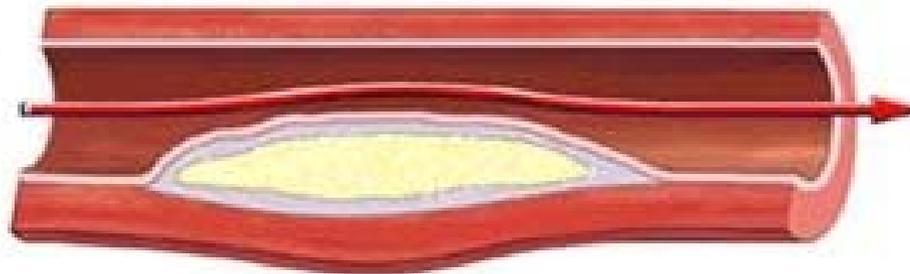
Artery narrowed by atherosclerosis

Plaque

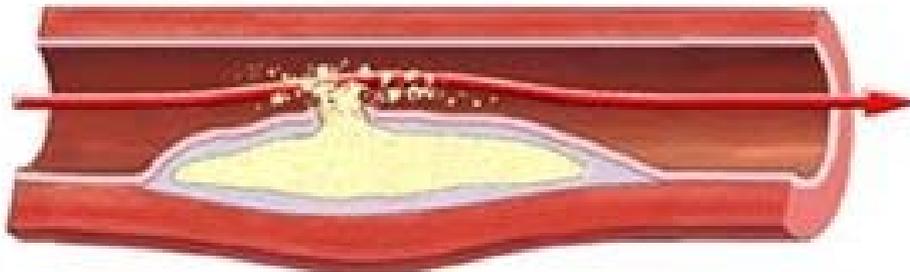




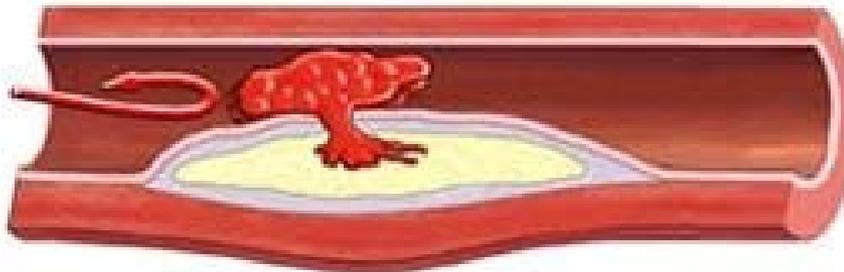
Plaque with  
fibrous cap



Cap  
ruptures

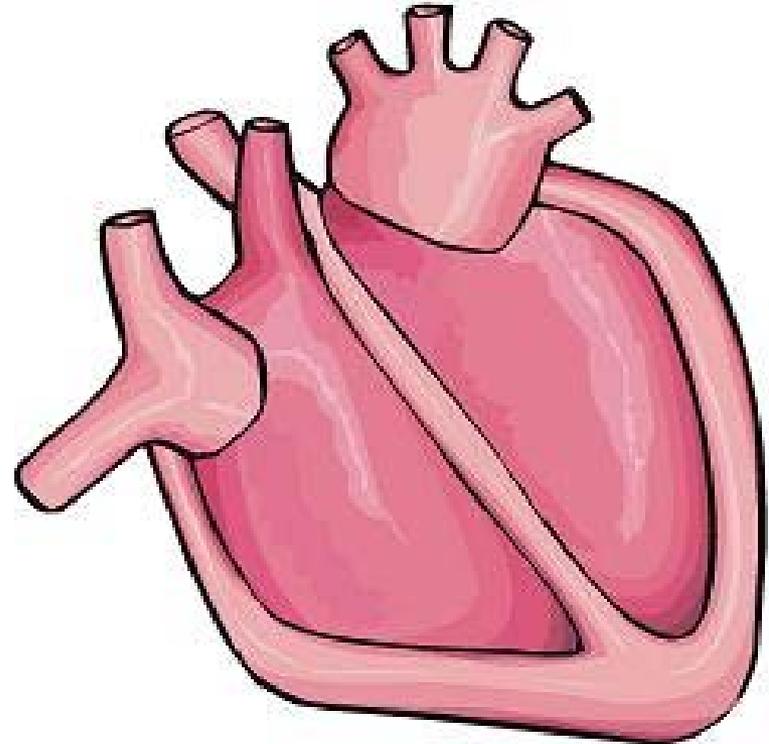


Blood clot forms  
around the rupture,  
blocking the artery



# Your Heart Health

Risk Factors  
and  
Prevention



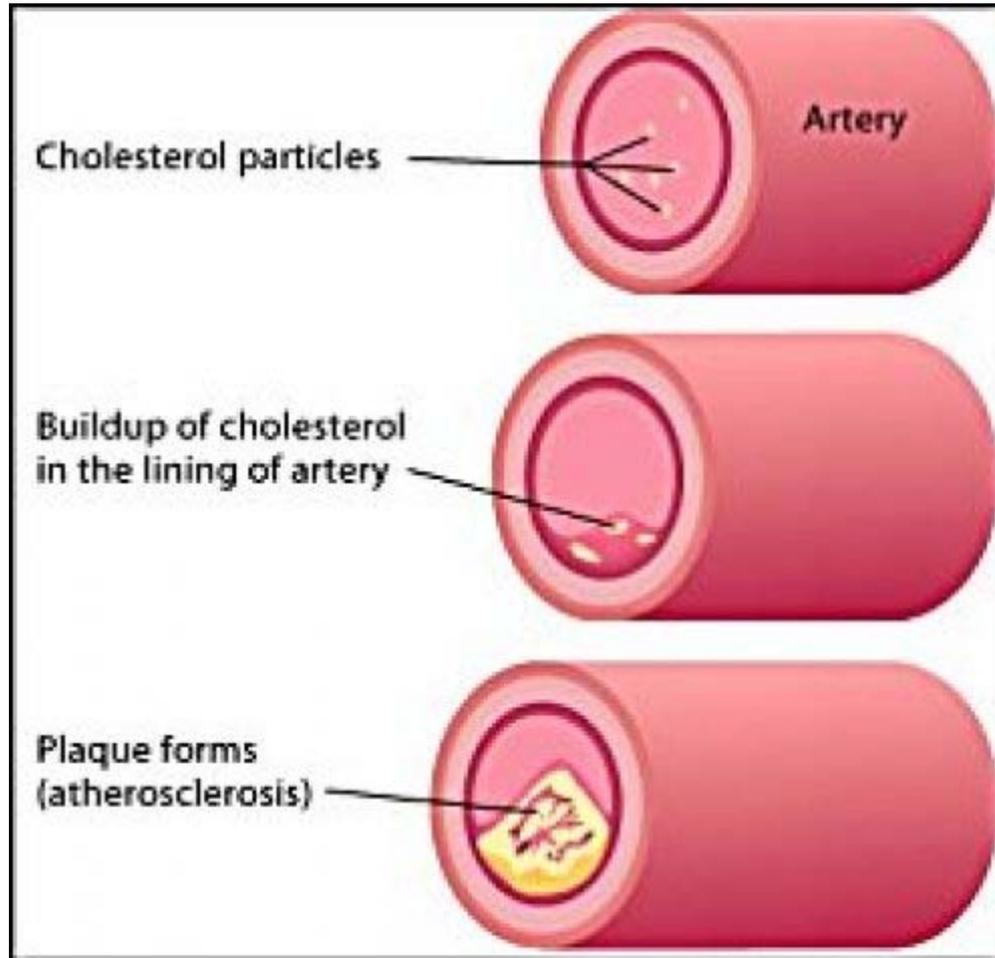
RISK  
FACTORS

BP  
CHOL  
DM  
OBESITY

GENETICS  
GENDER  
AGE

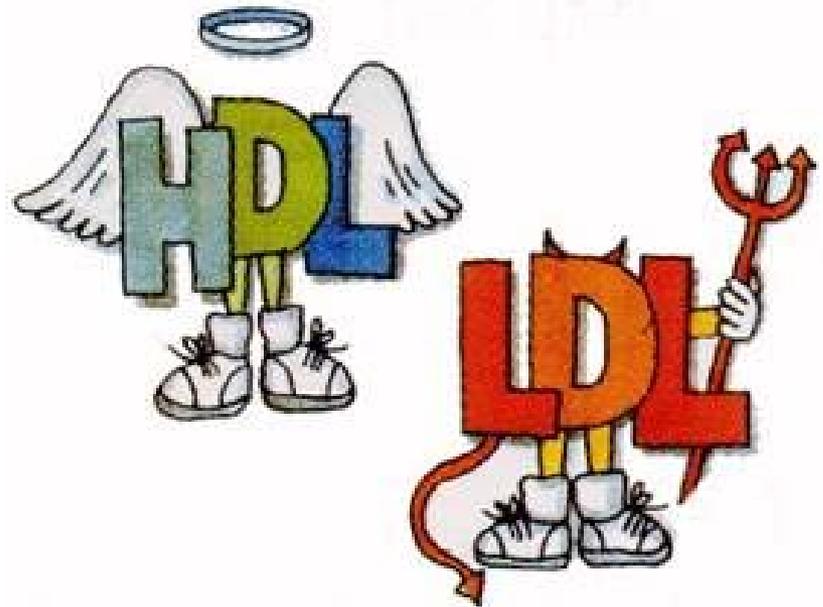
STRESS  
SMOKING  
SEDENTARY

# Disease Progression



# Cholesterol Goals

- LDL less than 100
- HDL greater than 40
- HDL greater than 60 is protective

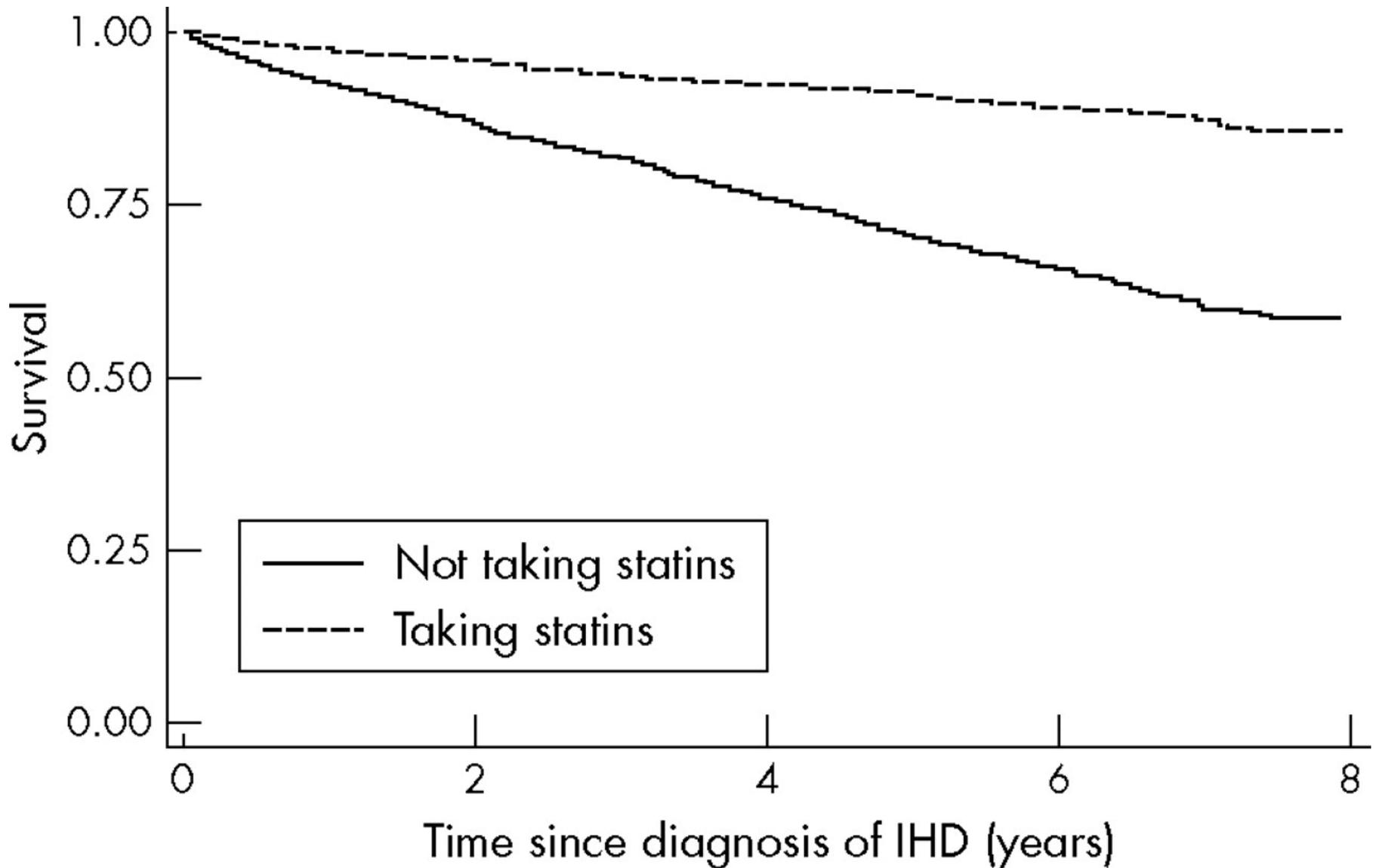


# Cholesterol

Medscape® www.medscape.com

HDL		LDL	
Raise	Lower	Raise	Lower
Alcohol Niacin Fibrates Statins	Certain Drugs		Niacin Fibrates Statins
Smoking Cessation Estrogen Weight loss	Smoking Progesterone Diabetes Obesity Metabolic Syndrome	Dietary Fats	Fat Reduction Estrogen
Exercise	No Exercise High Triglycerides	Diabetes Obesity Thyroid Disease Renal Disease Liver Disease Genetics	Weight Loss Resins Bile Acid Sequestrants

# Cholesterol Treatment





# Diet

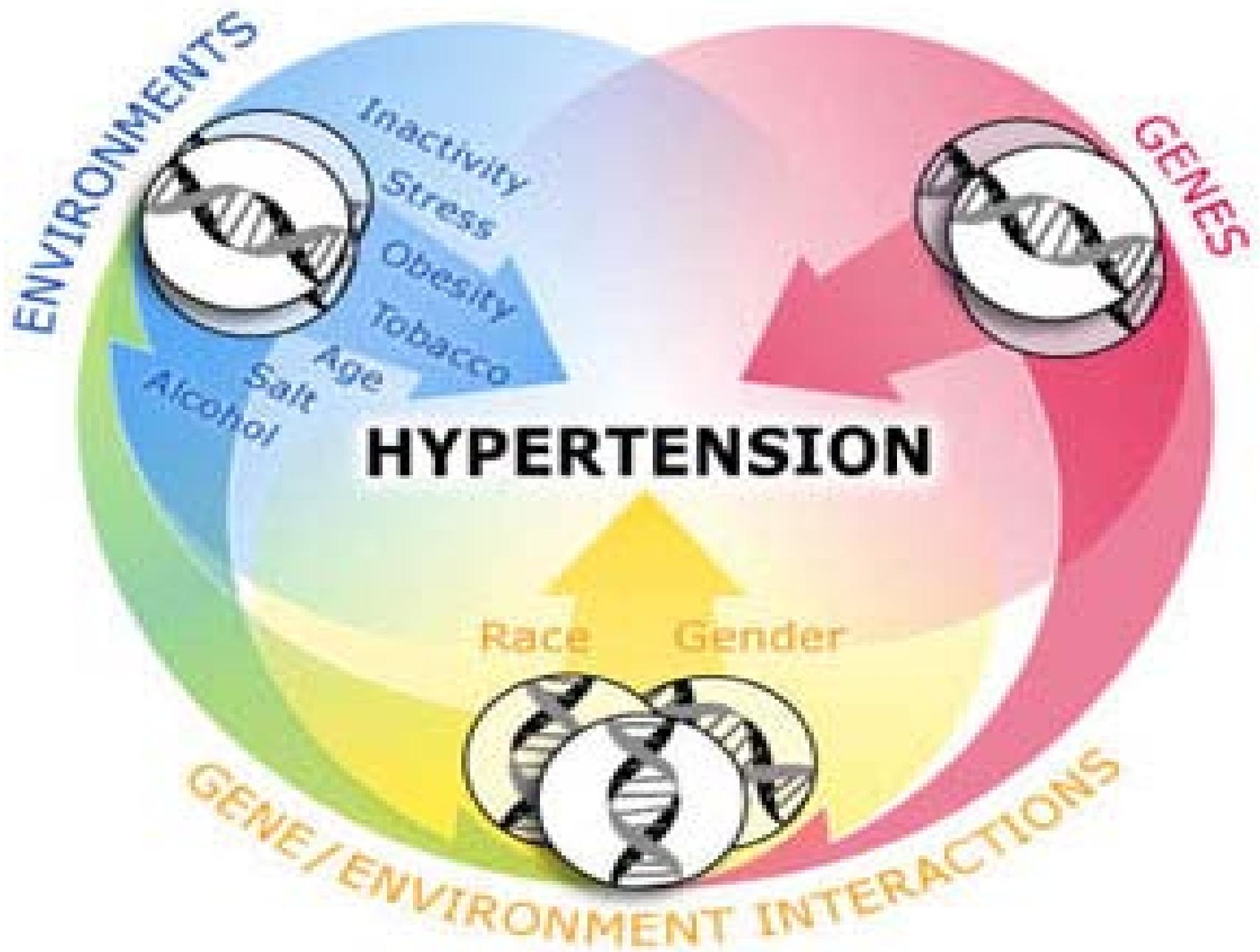
- Reduce intake of saturated fat (<7% total calories) and cholesterol (< 200 mg/day)
- Add plant stanols/sterols and whole grain/high fiber
- Diet rich in fruits, vegetables, low fat dairy



# Blood Pressure - JNC VII



- Normal <120 Systolic and <80 Diastolic
- Prehypertension 120-139 Systolic and/or 80-89 Diastolic – Lifestyle Modification. (start medications if Diabetes or Kidney Disease).
- >140/90 start medications



# Main complications of persistent High blood pressure

## Brain:

- Cerebrovascular accident (*strokes*)
- Hypertensive encephalopathy:
  - confusion*
  - headache*
  - convulsion*

## Blood:

- Elevated sugar levels

## Retina of eye:

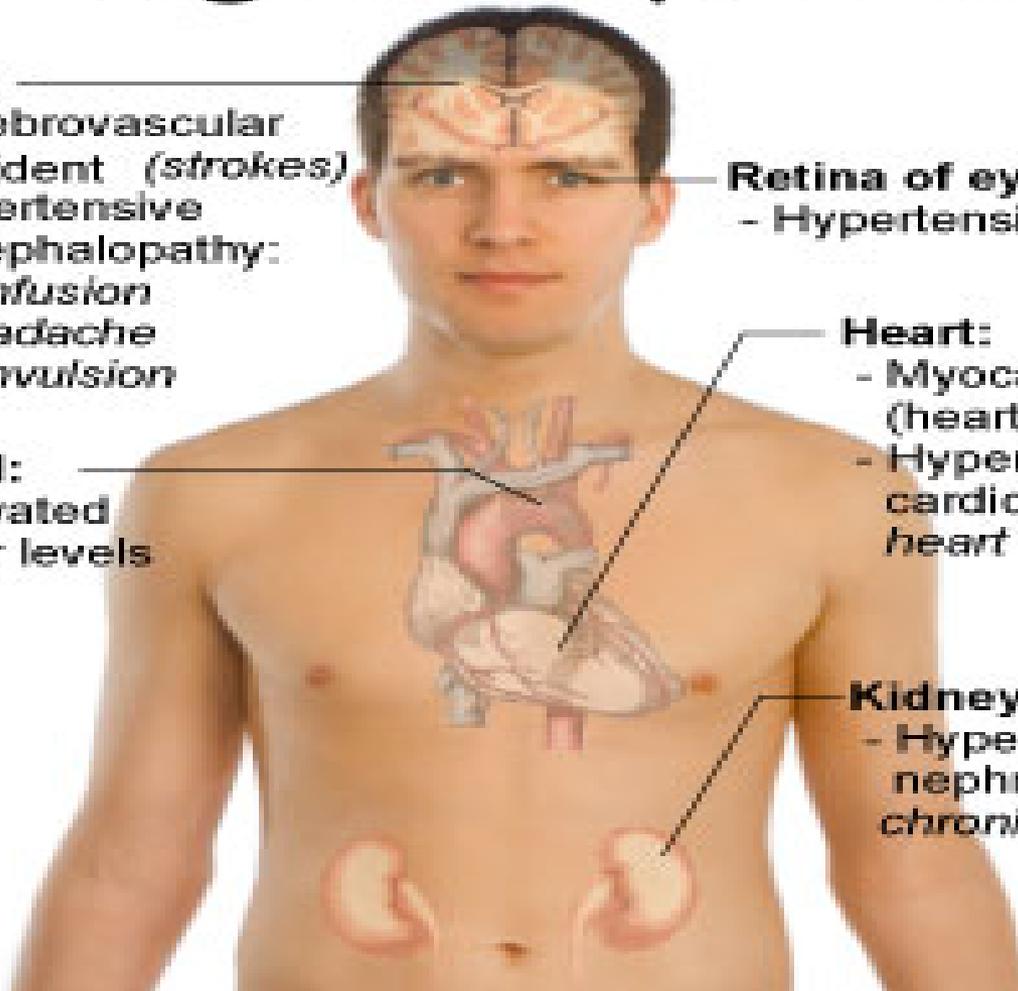
- Hypertensive retinopathy

## Heart:

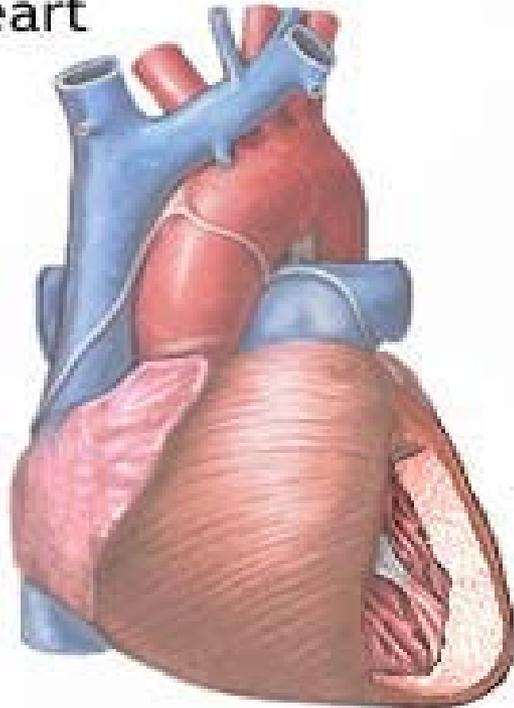
- Myocardial infarction (*heart attack*)
- Hypertensive cardiomyopathy:  
*heart failure*

## Kidneys:

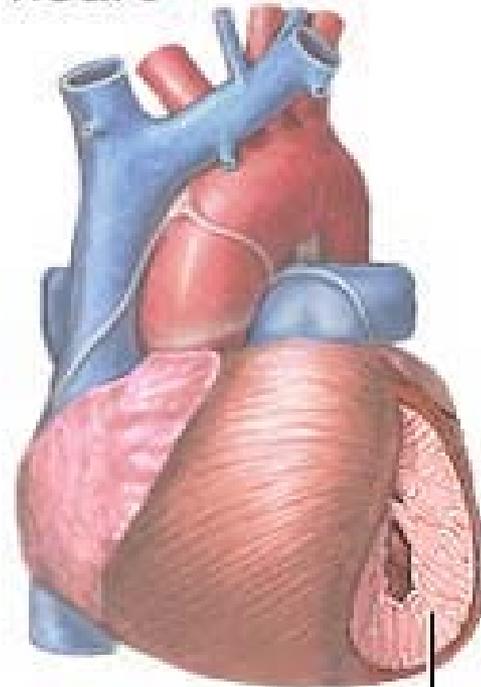
- Hypertensive nephropathy:  
*chronic renal failure*



Normal heart



Hypertensive heart



Thickening in walls of ventricles

# Lifestyle Modifications for Prevention and Treatment of Hypertension

Medscape®

[www.medscape.com](http://www.medscape.com)

Lose weight, if possible

Limit alcohol intake

Increase aerobic physical activity

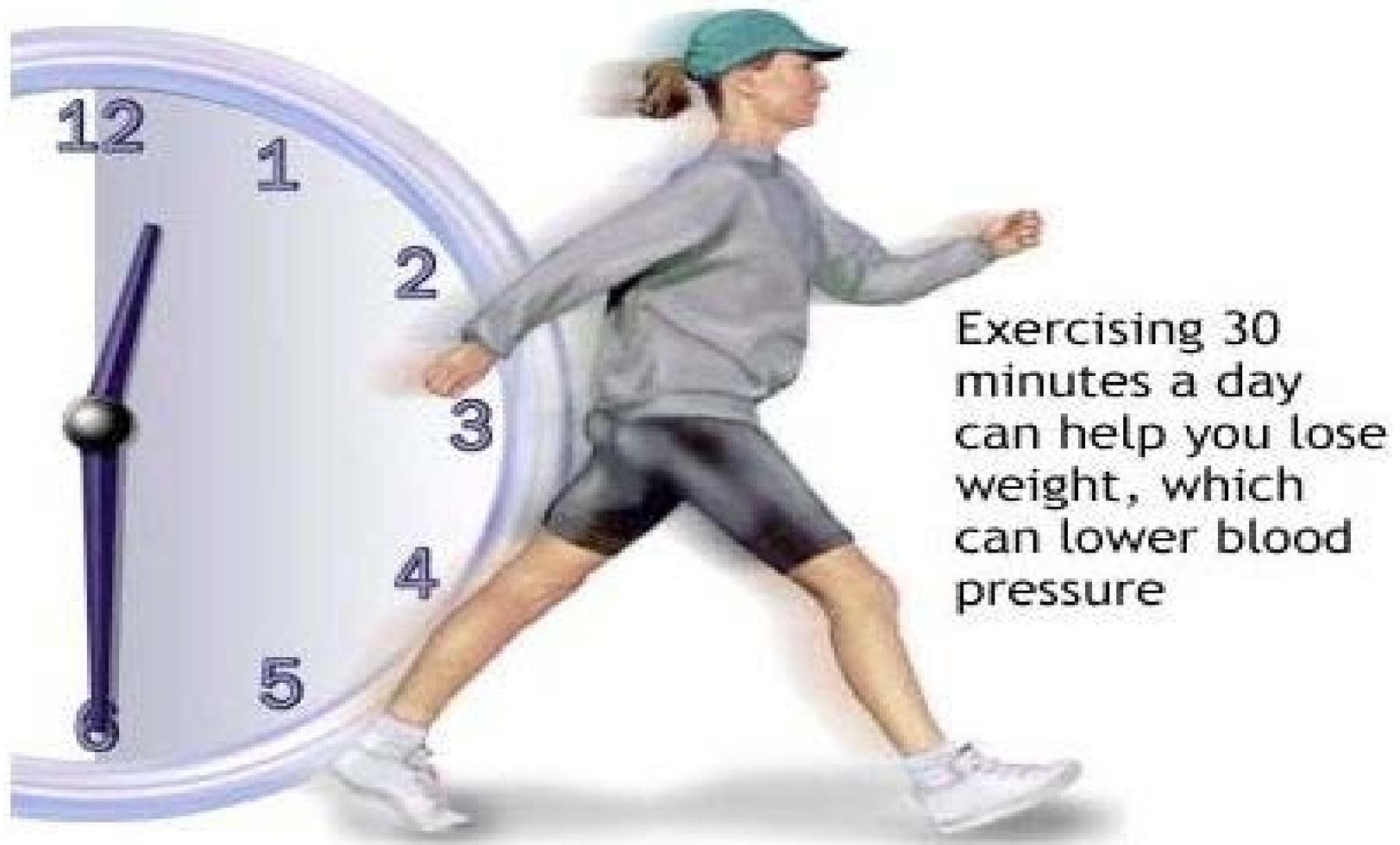
Reduce sodium intake to no more than 100 mmol/d

Maintain adequate dietary calcium, potassium, and magnesium

Stop smoking and reduce intake of dietary saturated fat and cholesterol

Source: J Clin Hypertens © 2004 Le Jacq Communications, Inc.

# Exercise can lower blood pressure

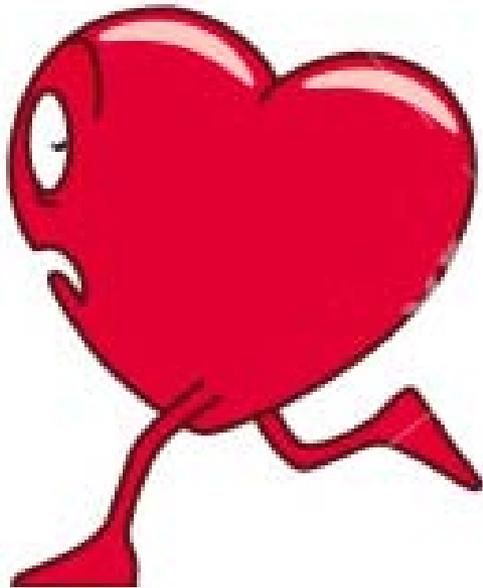


Exercising 30 minutes a day can help you lose weight, which can lower blood pressure

# Smoking Dangers



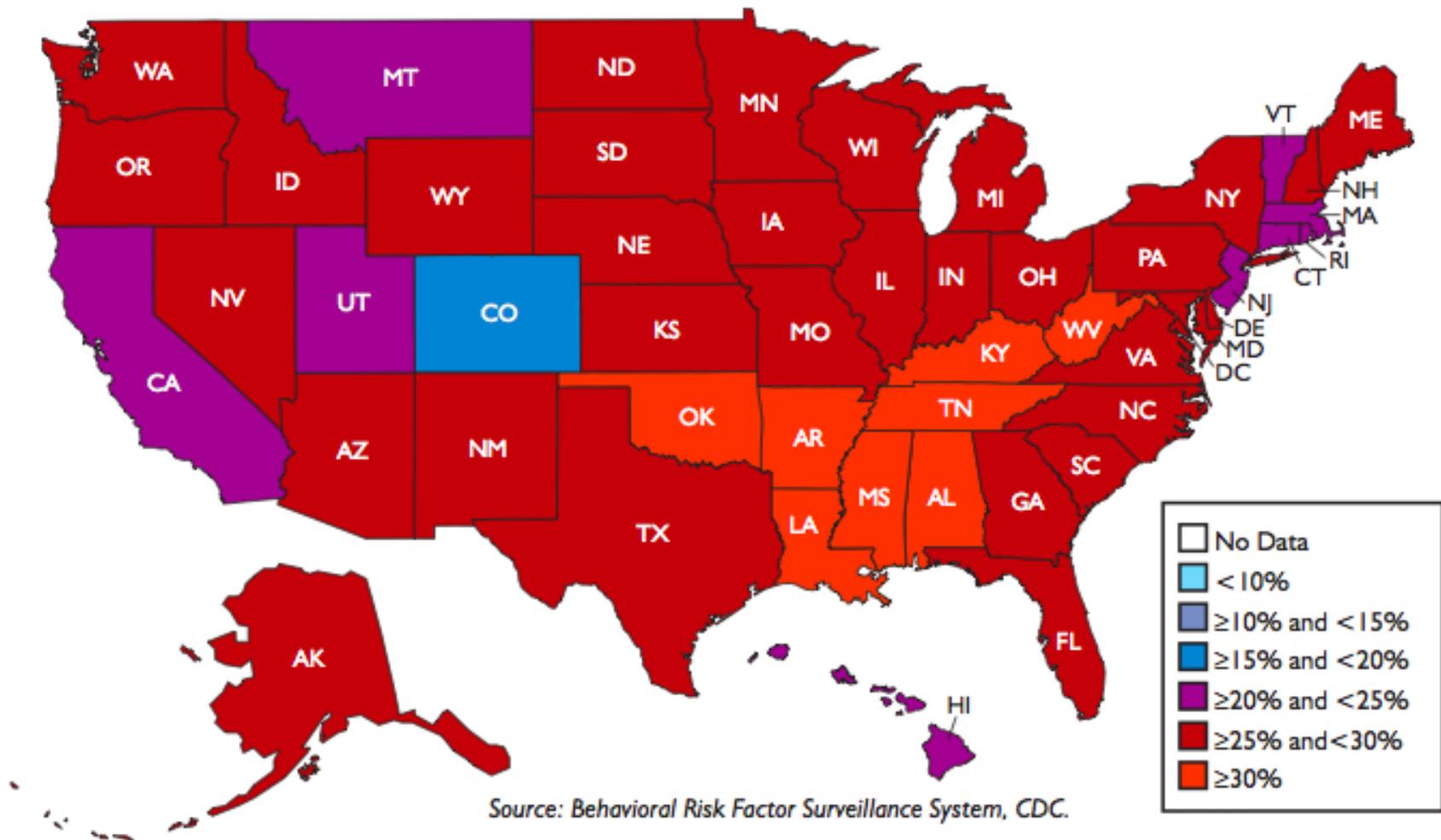
# Beat the Habit



# Obesity



## OBESITY TRENDS AMONG U.S. ADULTS (2007-2009)



# Waist Circumference Matters

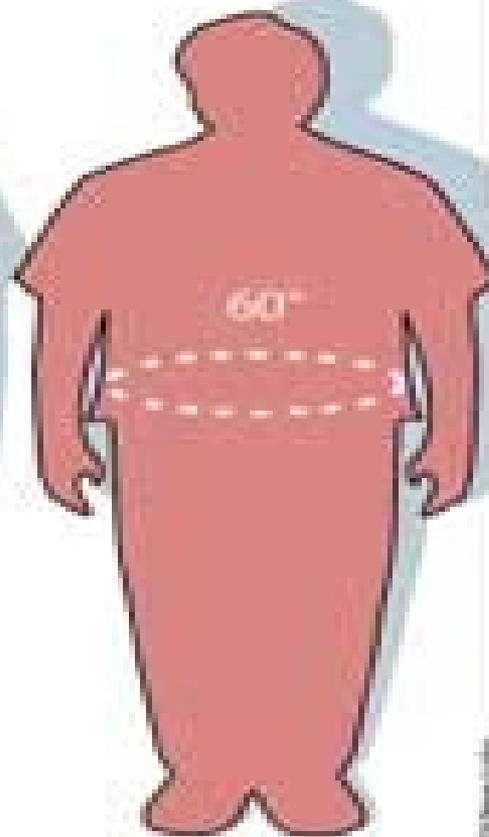
Healthy



Overweight



Obese

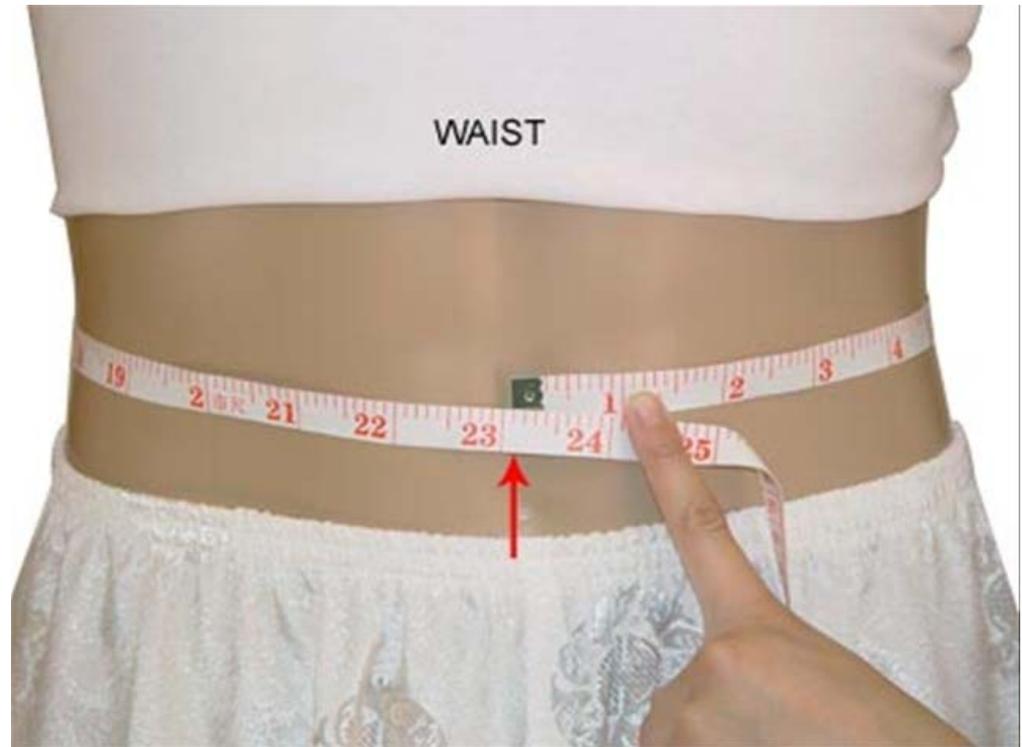


Source: National Center for Chronic Disease Prevention and Control. Guidelines for the use of waist circumference measurements. 2008.

© 2010 American Heart Association

# Waist Measurements

- Women < 35 inches
- Men < 40 inches



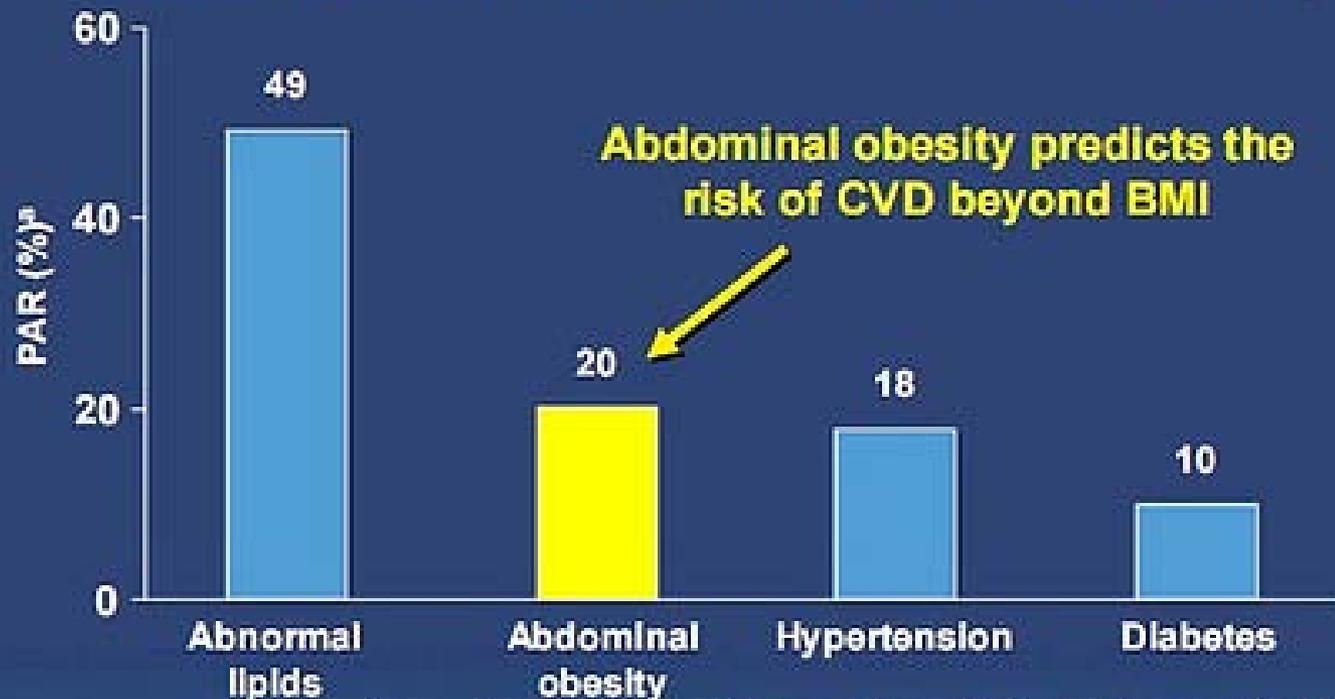
# BMI

- Body Mass Index
- BMI is calculated as the weight in kilograms divided by the body surface area in meters squared
- Overweight BMI 25-30 kg/m<sup>2</sup>



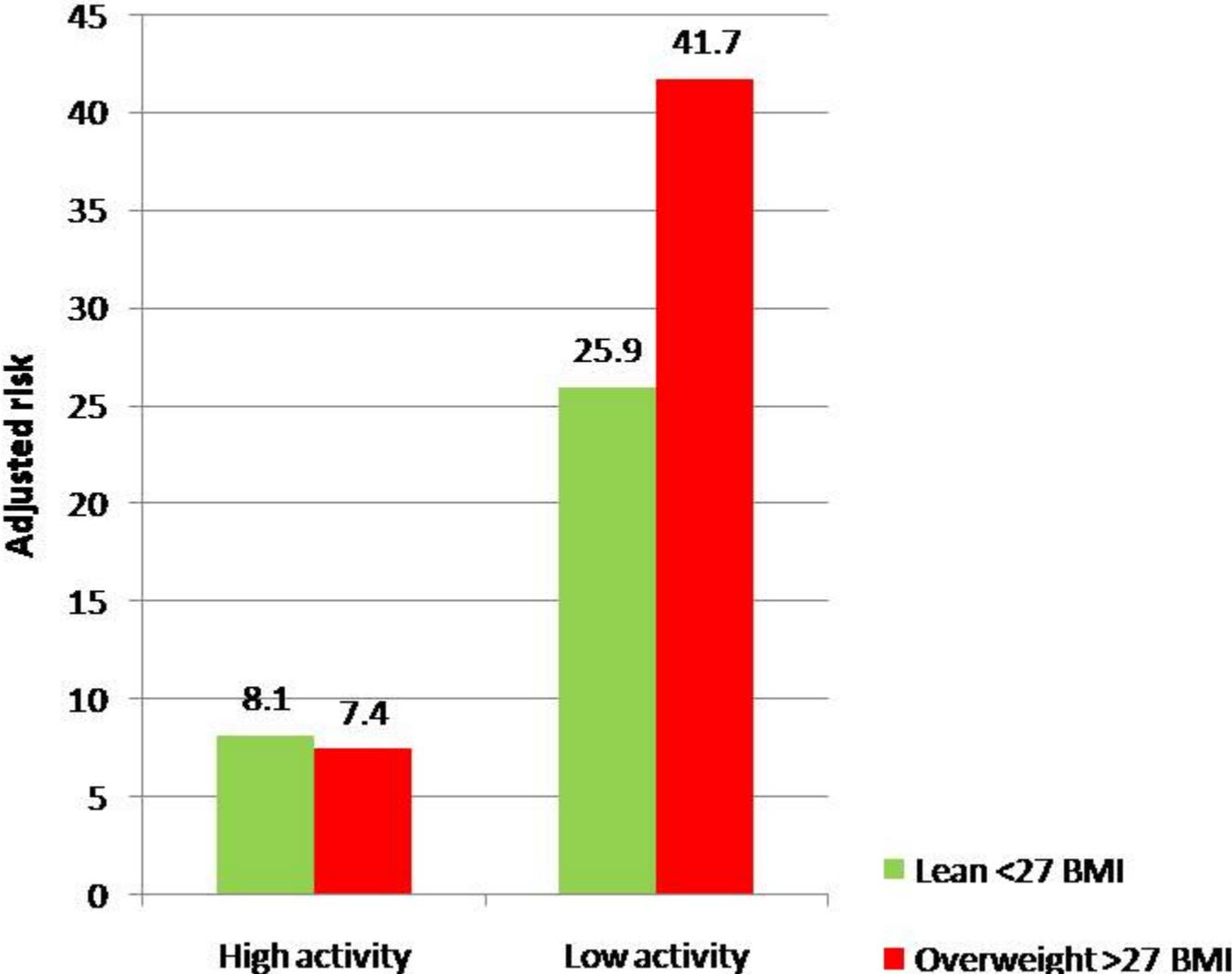
# Abdominal obesity: a major underlying cause of acute myocardial infarction

Cardiometabolic risk factors in the INTERHEART Study

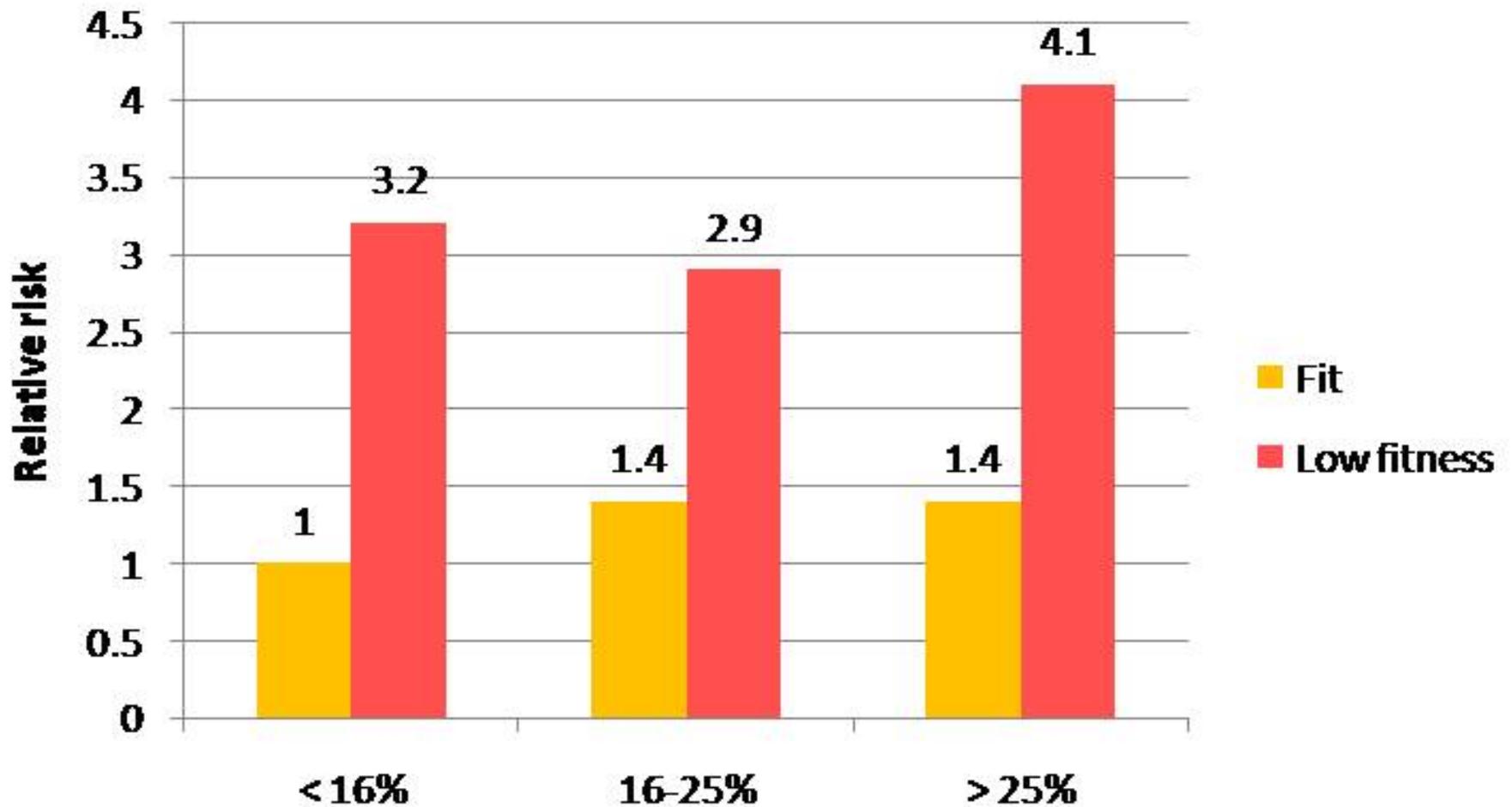


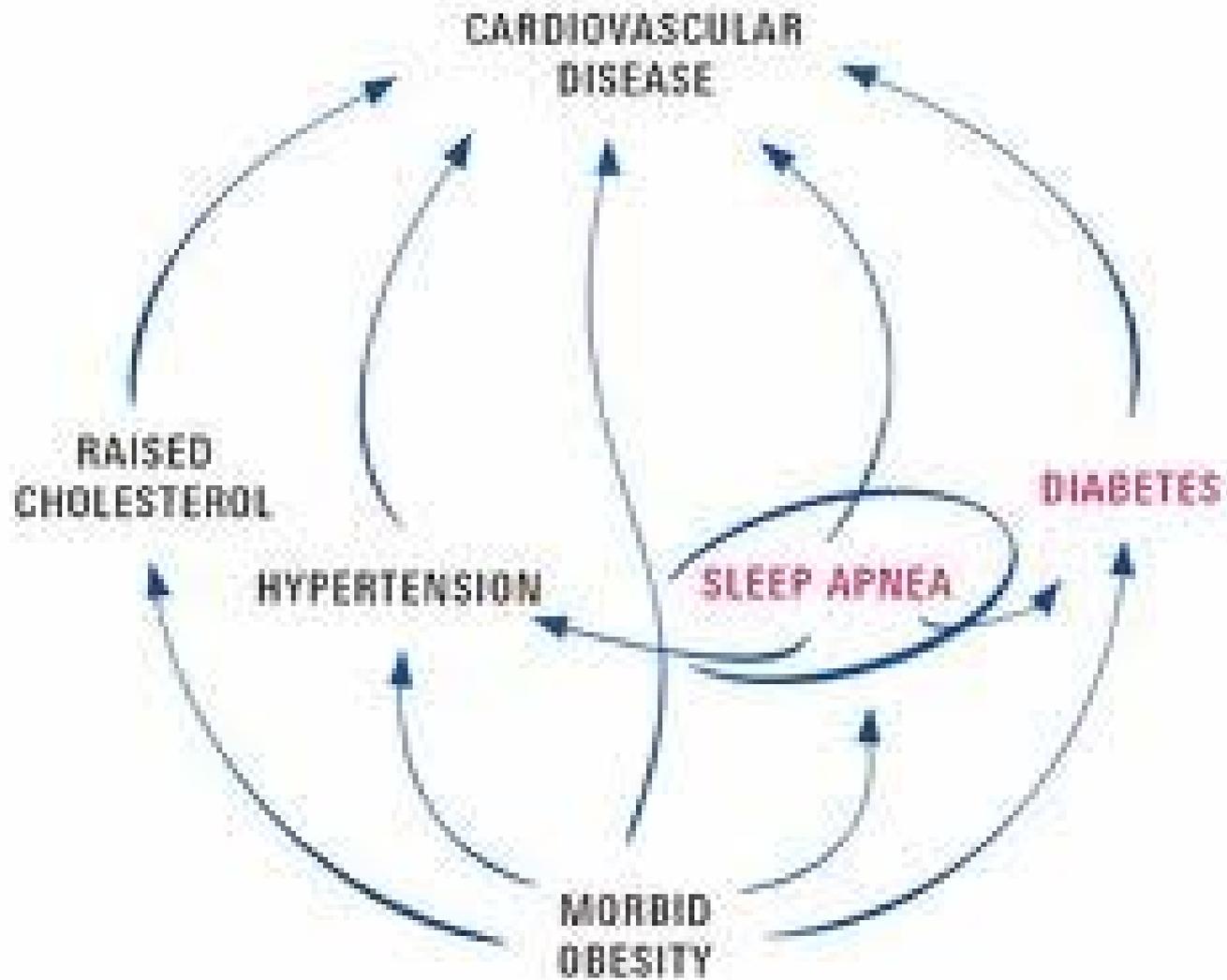
<sup>a</sup>Proportion of MI in the total population attributable to a specific risk factor; CVD: cardiovascular disease; BMI: body mass index; PAR: population attributable risk;

# Mortality, Activity Level and BMI in Finnish Men



## Heart disease risk & fitness in men by % body fat





# Diabetes

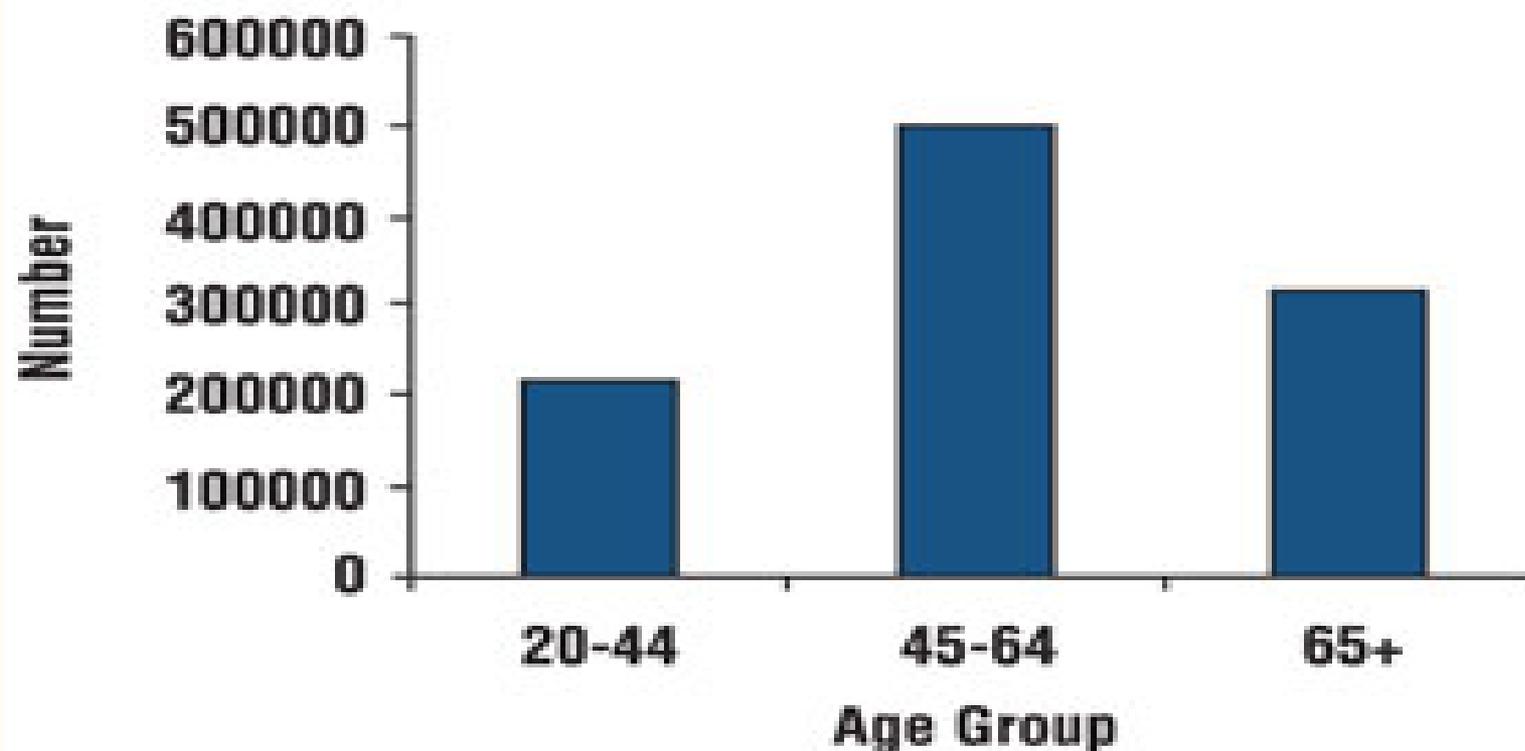


# *Type 2 Diabetes Mellitus (T2DM)*



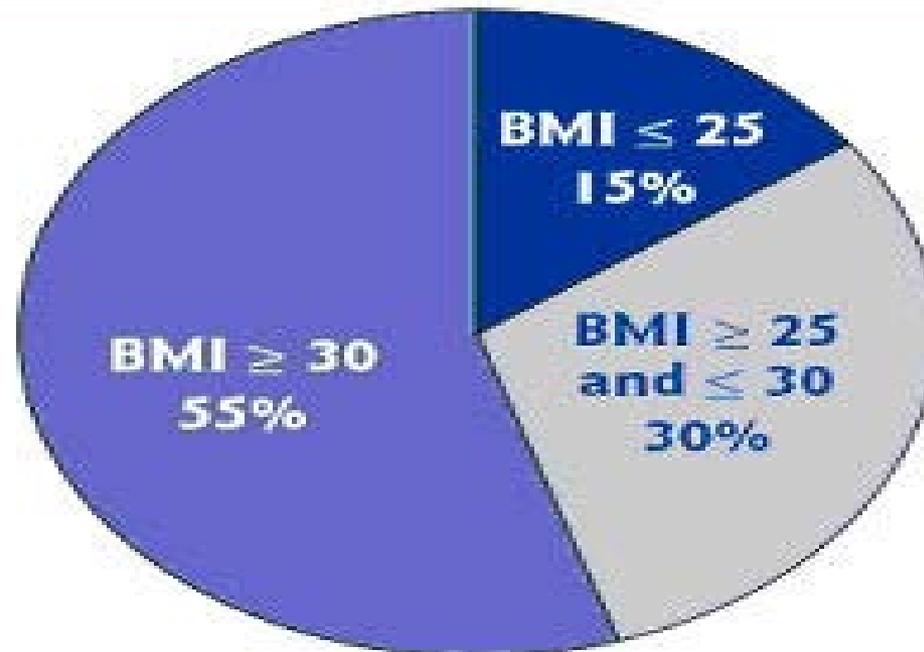
- 20.8 Million Americans (7% of the population) have diabetes
- 5th Leading cause of death listed on US death certificates in 2002
- Leading cause of blindness in adults 20-74 y
- Primary cause of end-stage renal disease
- >60% of nontraumatic amputations occur in diabetics

## Number of new cases of diagnosed diabetes in people aged 20 years or older, by age group—United States, 2000

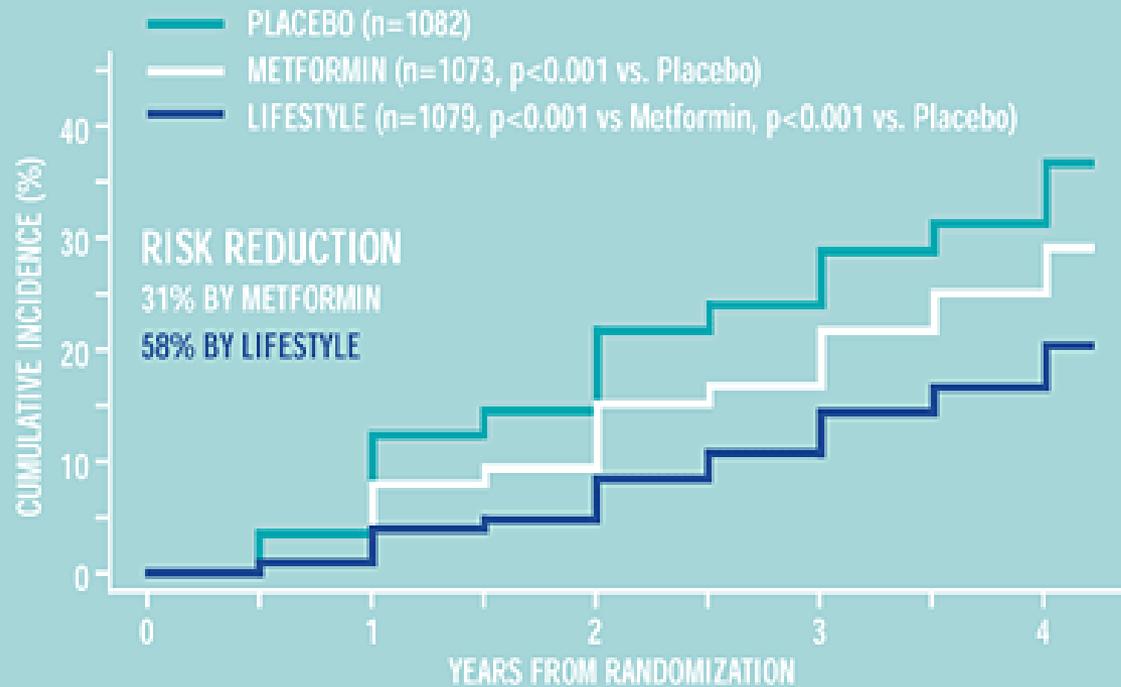


Source: 1997-1999 National Health Interview Survey estimates projected to year 2000

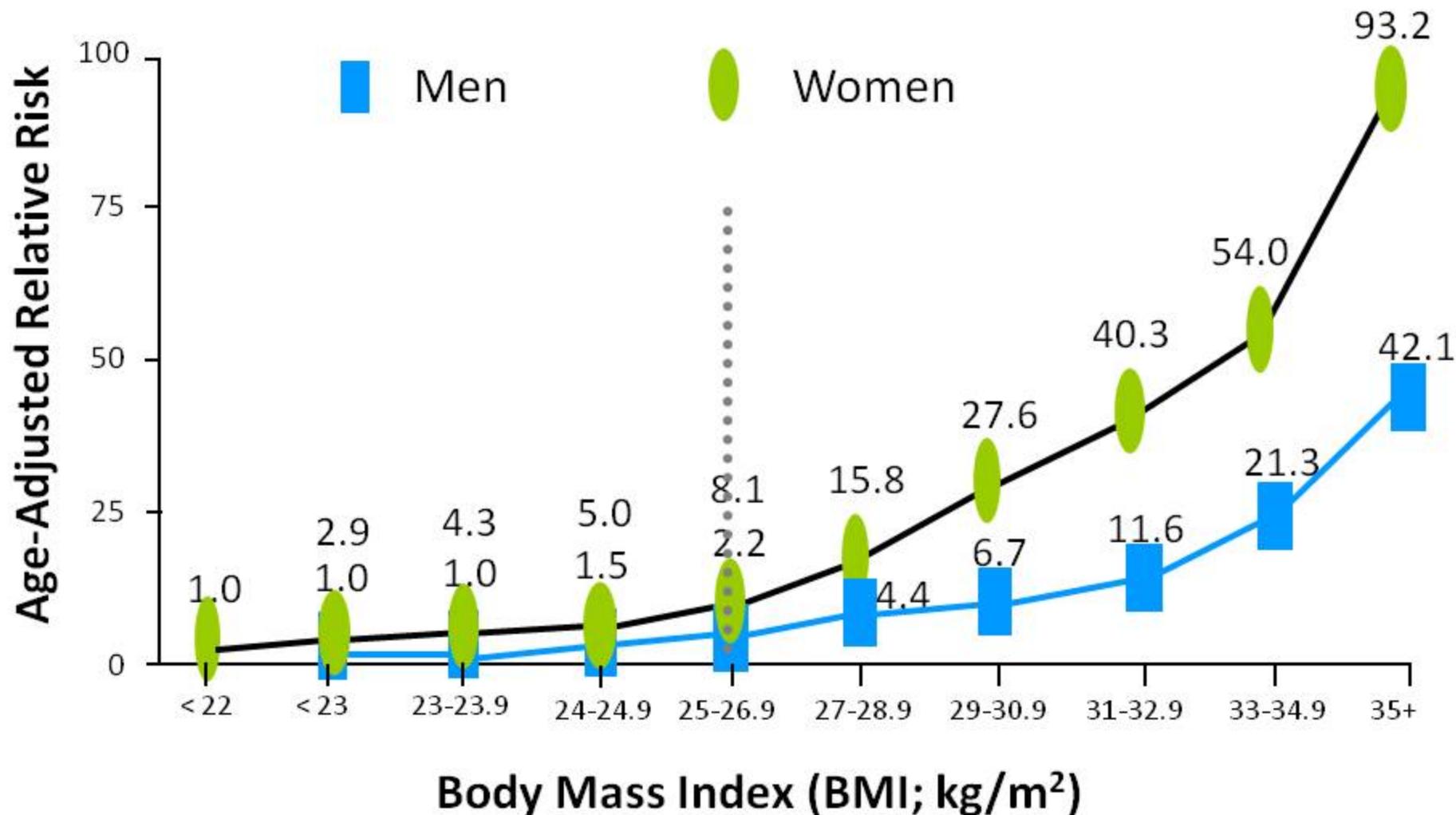
**Among people diagnosed  
with Type 2 diabetes**



## INCIDENCE OF DIABETES\*



# Relationship Between BMI and Risk for Type 2 Diabetes Mellitus



Chan J, et al. *Diabetes Care*. 1994;17:961-969.

Colditz G, et al. *Ann Intern Med*. 1995;122:481-486.

# Metabolic Syndrome

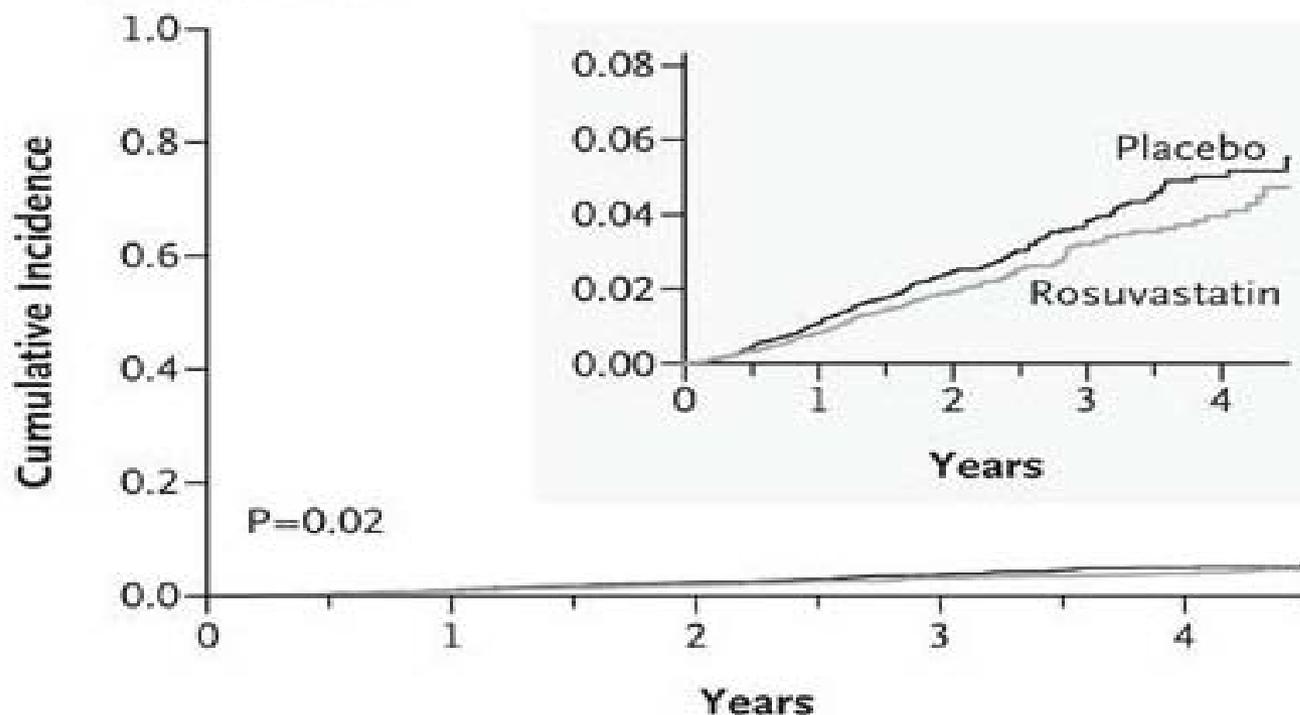


# ATP III Criteria for Metabolic Syndrome

- Central obesity
  - Men  $>$  40 inches waist circumference
  - Women  $>$ 35 inches waist circumference
- Fasting triglycerides  $\geq$  150 mg/dl
- HDL cholesterol
  - Men  $<$  40 mg/dl
  - Women  $<$  50 mg/dl
- Blood pressure  $\geq$  130/85 mm Hg
- Fasting glucose  $\geq$  110 mg/dl

# High Sensitivity CRP

## D Death from Any Cause



### No. at Risk

Rosuvastatin	8901	8847	8787	6999	4312	2268	1602	1192	676	227
Placebo	8901	8852	8775	6987	4319	2295	1614	1196	681	246

# Framingham Risk Score

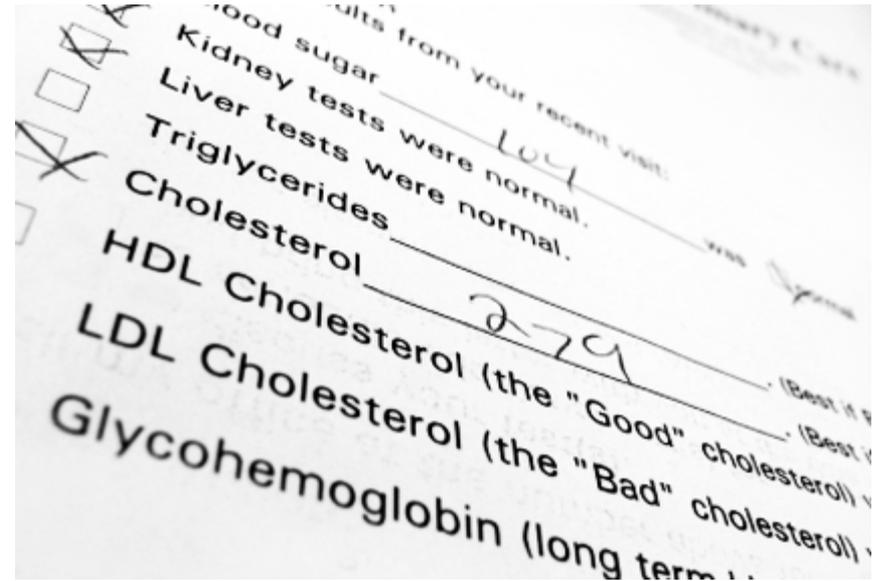
## Factors

- Smoking status
- Total Cholesterol
- HDL Cholesterol
- Blood Pressure
- Age
- Gender



# HDL Cholesterol

<u>HDL</u>	<u>Points</u>
>59	-1
50-59	0
40-49	1
<40	2

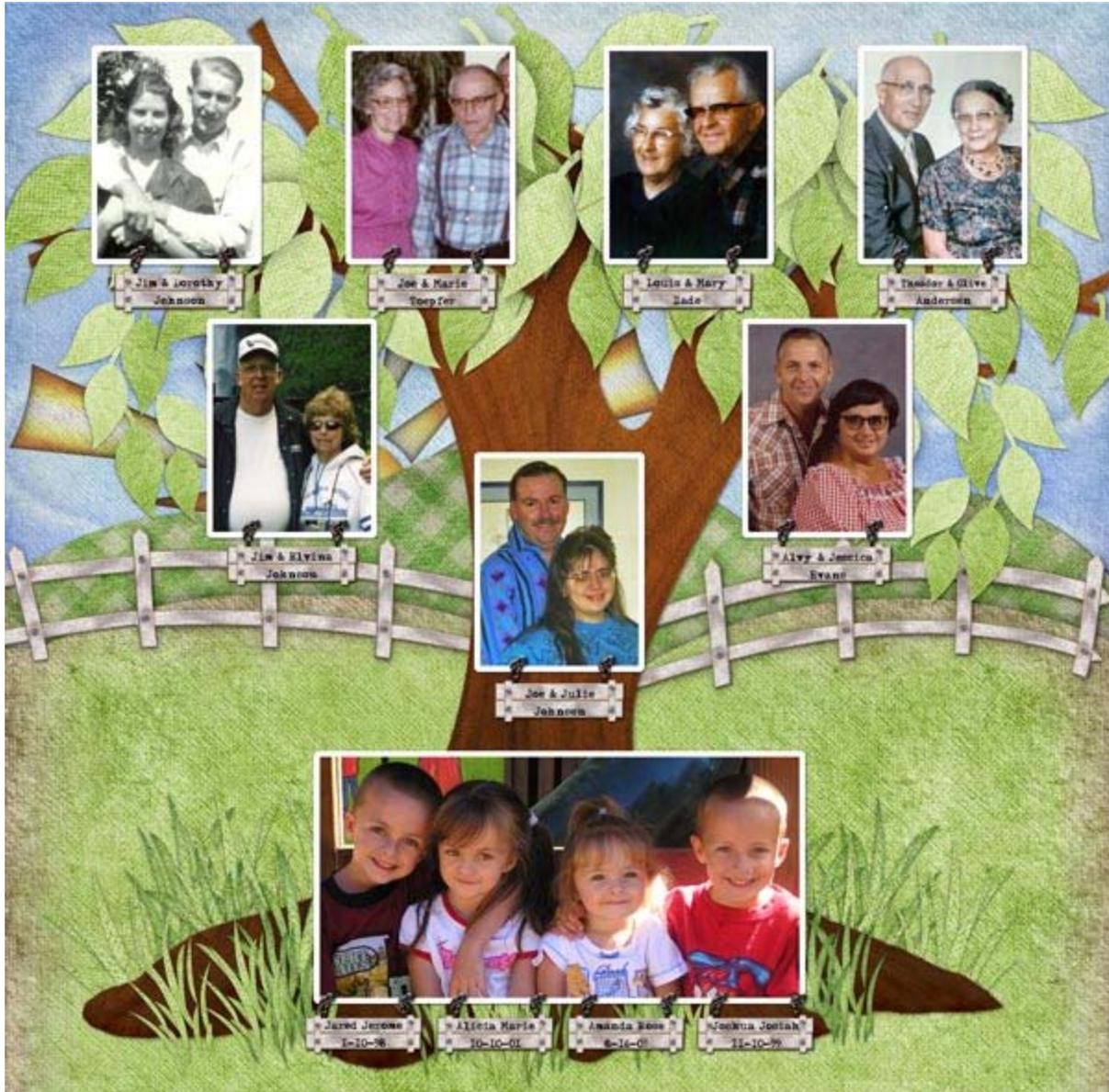


# National Heart Lung Blood Institute

Calculator available on the NHLBI website.

<http://hp2010.nhlbihin.net/atpiii/calculator.asp?usertype=pub>

NATIONAL CHOLESTEROL EDUCATION PROGRAM Third Report of the Expert Panel on Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults (Adult Treatment Panel III)	
<b>Risk Assessment Tool for Estimating Your 10-year Risk of Having a Heart Attack</b>	
The risk assessment tool below uses information from the Framingham Heart Study to predict a person's chance of having a heart attack in the next 10 years. This tool is designed for adults aged 20 and older who do not have heart disease or diabetes. To find your risk score, enter your information in the calculator below.	
Age:	years
Gender:	Female Male
Total Cholesterol: mg/dL	
<a href="#">HDL Cholesterol:</a> mg/dL	
<a href="#">Smoker:</a> No Yes	
<a href="#">Systolic Blood Pressure:</a> mm/Hg	
Are you currently on any medication to treat high blood pressure.	No Yes



Jim & Dorothy  
Johnson



Joe & Marie  
Toepfer



Louis & Mary  
Eads



Theodor & Olive  
Anderson



Jim & Elvina  
Johnson



Joe & Julie  
Johnson



Alvy & Jessica  
Evans



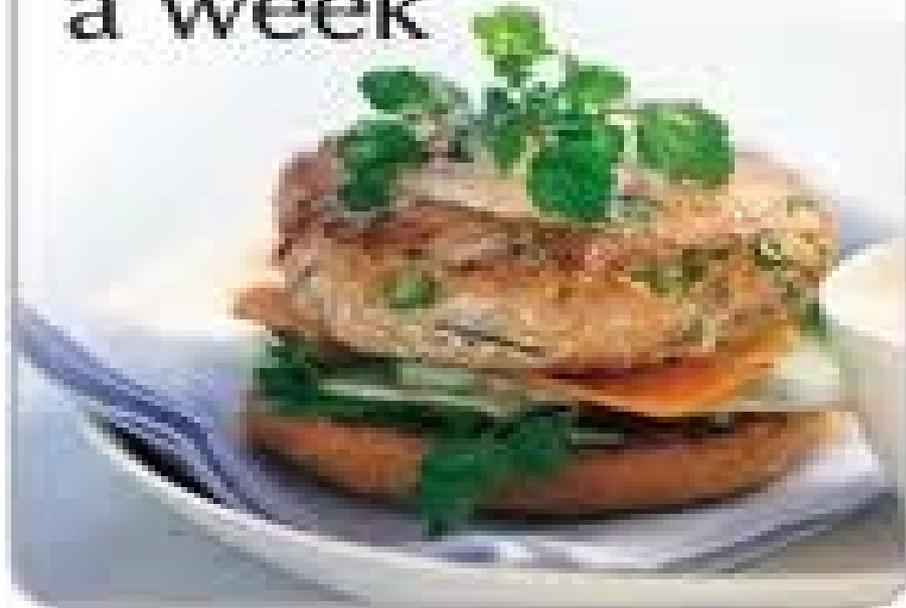
Jared Jerome 1-20-98  
Alicia Maria 10-10-01  
Amanda Rose 8-16-01  
Joshua Joseph 11-10-99

# 30 MINUTE RULE



**Heart health tip  
of the month:**

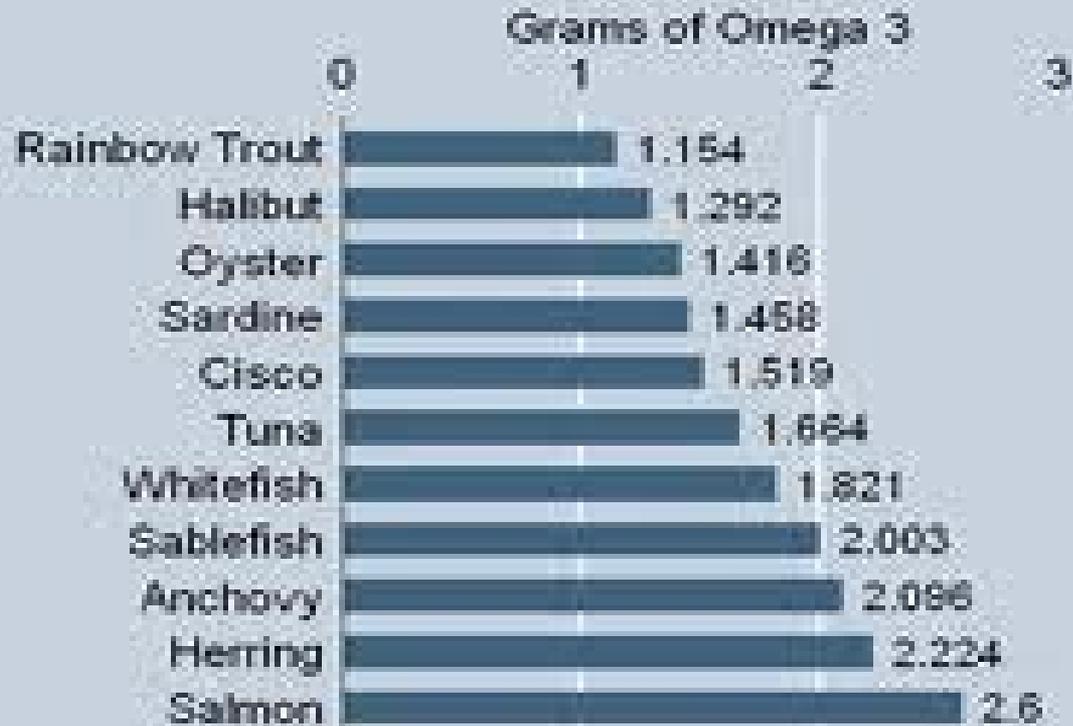
Have fish at  
least twice  
a week





# High Omega 3 Seafood

for 100 gram serving (about 3.5 oz.)





# Risks vs benefits of low-dose aspirin

Clinical setting	Benefit*	Risk**
Men at low IC high cardiovascular risk	1-2	1-2
Essential hypertension	1-2	1-2
Chronic stable angina	10	1-2
Prior myocardial infarction	20	1-2
Unstable angina	50	1-2

**Absolute benefits outweigh risks of major GI bleeding in moderate- to high-risk occlusive disease**

\* Number of patients in whom a major vascular event is avoided per 1,000/year

\*\* Number of patients in whom a major GI bleeding event is caused per 1,000/year

***Patrono et al, Chest 2001; 119: 39S***

# Aspirin

- 75mg - (81mg) - 162 mg each day
- Recommended if at moderate risk of a coronary event (> 10% in 10 years)
- risk of major bleeding



# USPSTF Recommendations

For Women

Women 55-79 when the benefit of preventing ischemic stroke outweighs the risk of GI bleeding.

For Men

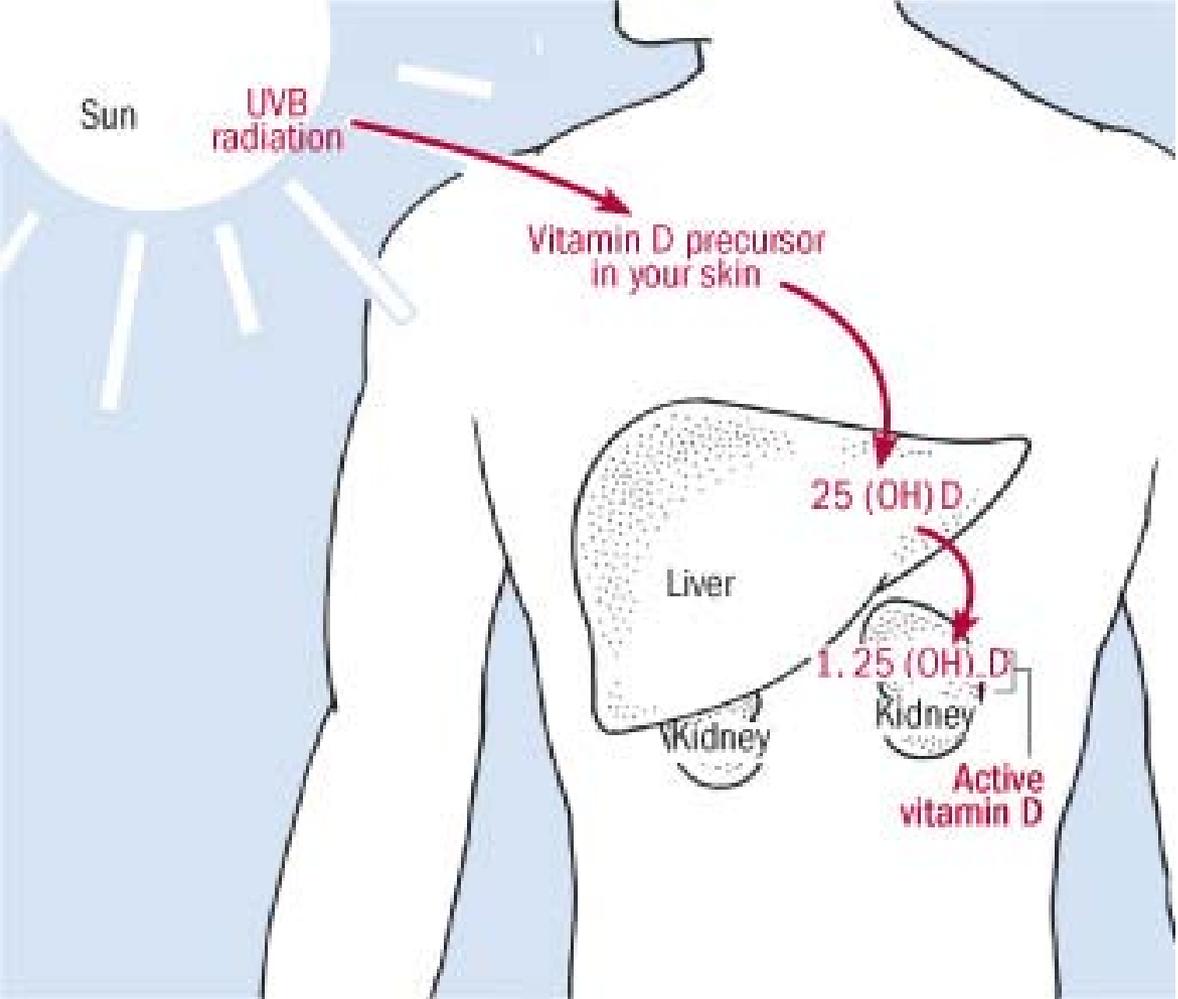
Men 45-79 when the benefit of reducing myocardial infarction outweighs the risk of GI bleeding.



# Vitamin D



# Vitamin D



# PREVENTION GOALS

- Modify risk factors in order to prevent or delay the onset of Coronary Heart Disease
- Know your numbers
- Blood Pressure
- Cholesterol HDL & LDL
- Glucose
- Diet and exercise

# Symptoms of a Heart Attack



Chest discomfort



Arm or back discomfort



Neck or jaw discomfort



Trouble breathing,  
with or without  
chest discomfort



Feeling light-  
headed or breaking  
into a cold sweat



Feeling sick or  
discomfort in  
your stomach

Sweating

Grey Complexion

Shortness of breath

Pain can spread to the jaw, neck, arms, back and stomach

Rapid, weak or irregular pulse

Persistent, vice-like central chest pain

Feeling sick or vomiting



# Heart Attack Symptoms

Men and women may experience some common symptoms. But there are differences.

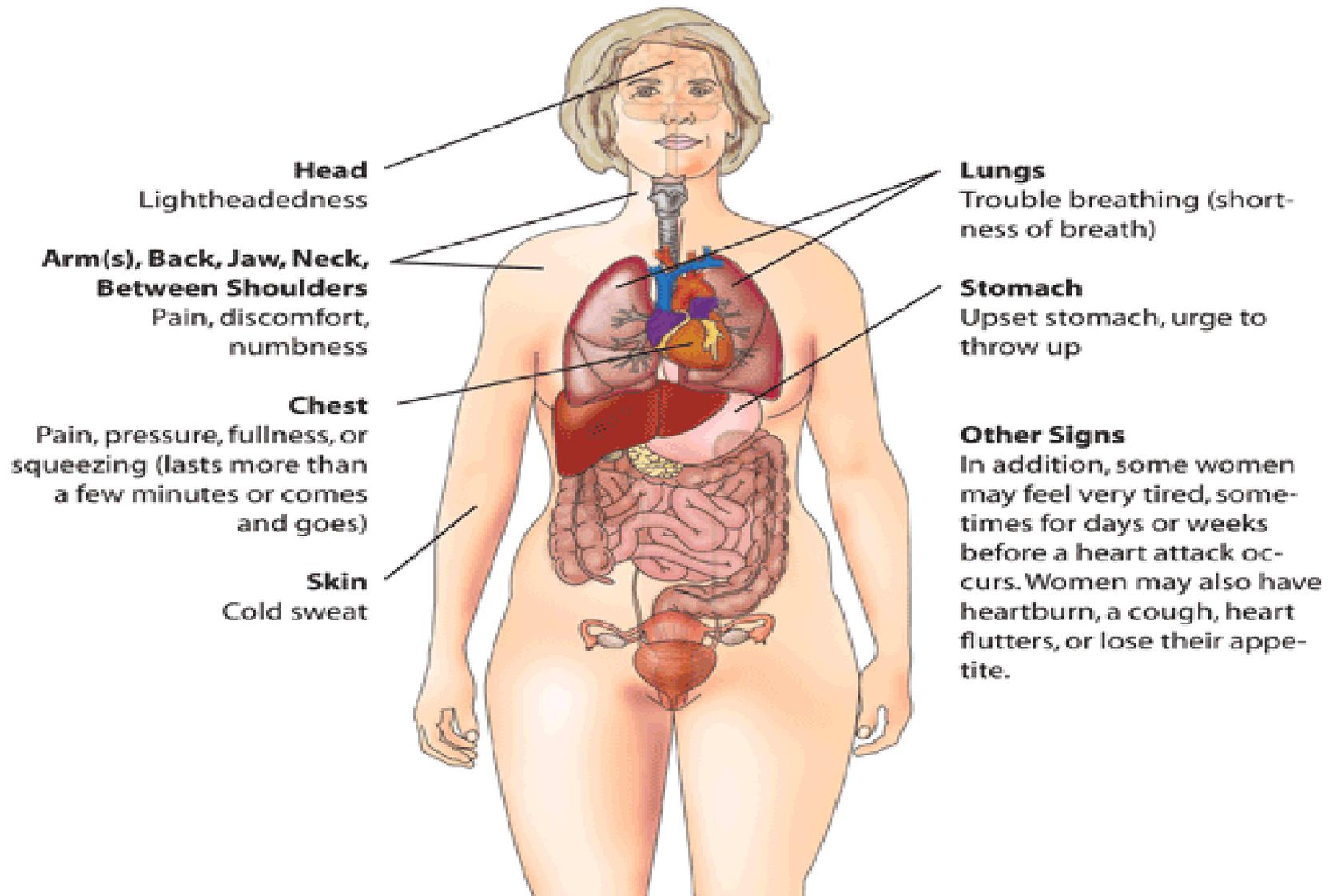


- Nausea/vomiting
- Jaw pain
- Back pain

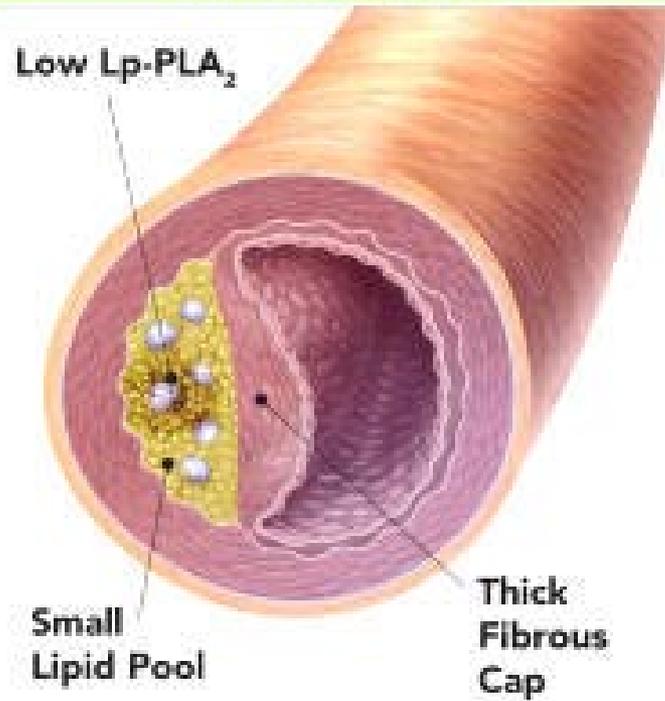


- Chest discomfort
- Arm pain
- Shortness of breath

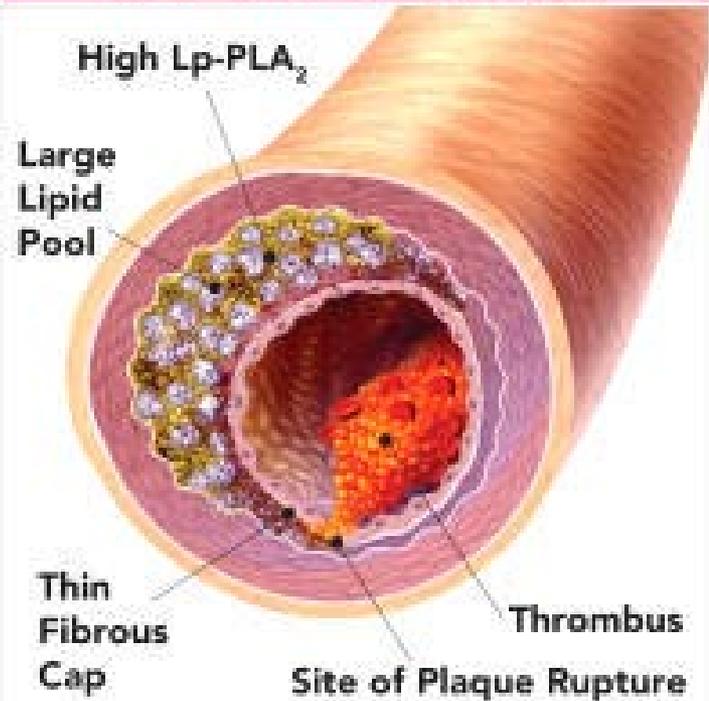
# Signs of a Heart Attack



**STABLE PLAQUE**

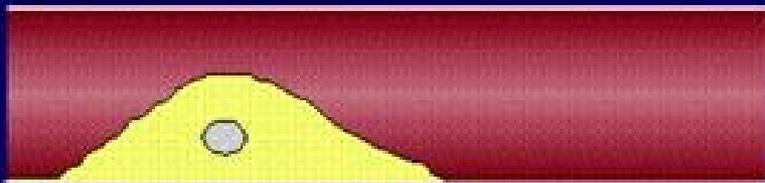


**RUPTURED PLAQUE**



# Microvascular Obstruction with Troponin Elevation Following Plaque Rupture

Quiescent plaque



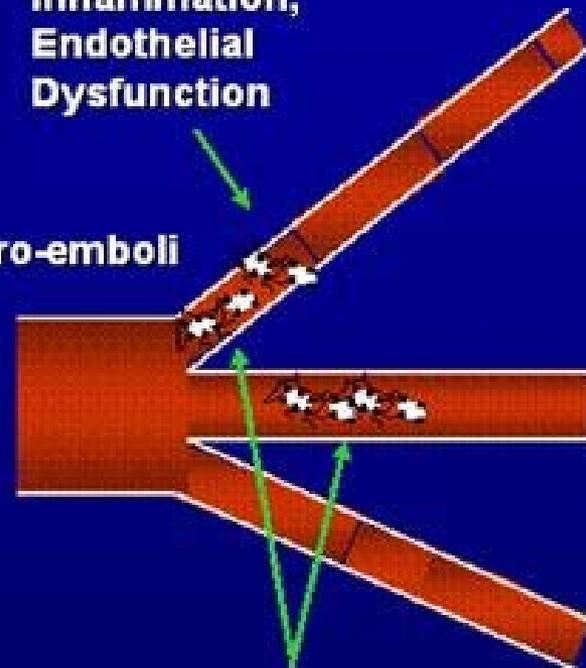
Inflammation,  
Endothelial  
Dysfunction

Plaque rupture



Platelet-thrombin micro-emboli

Occlusive thrombus



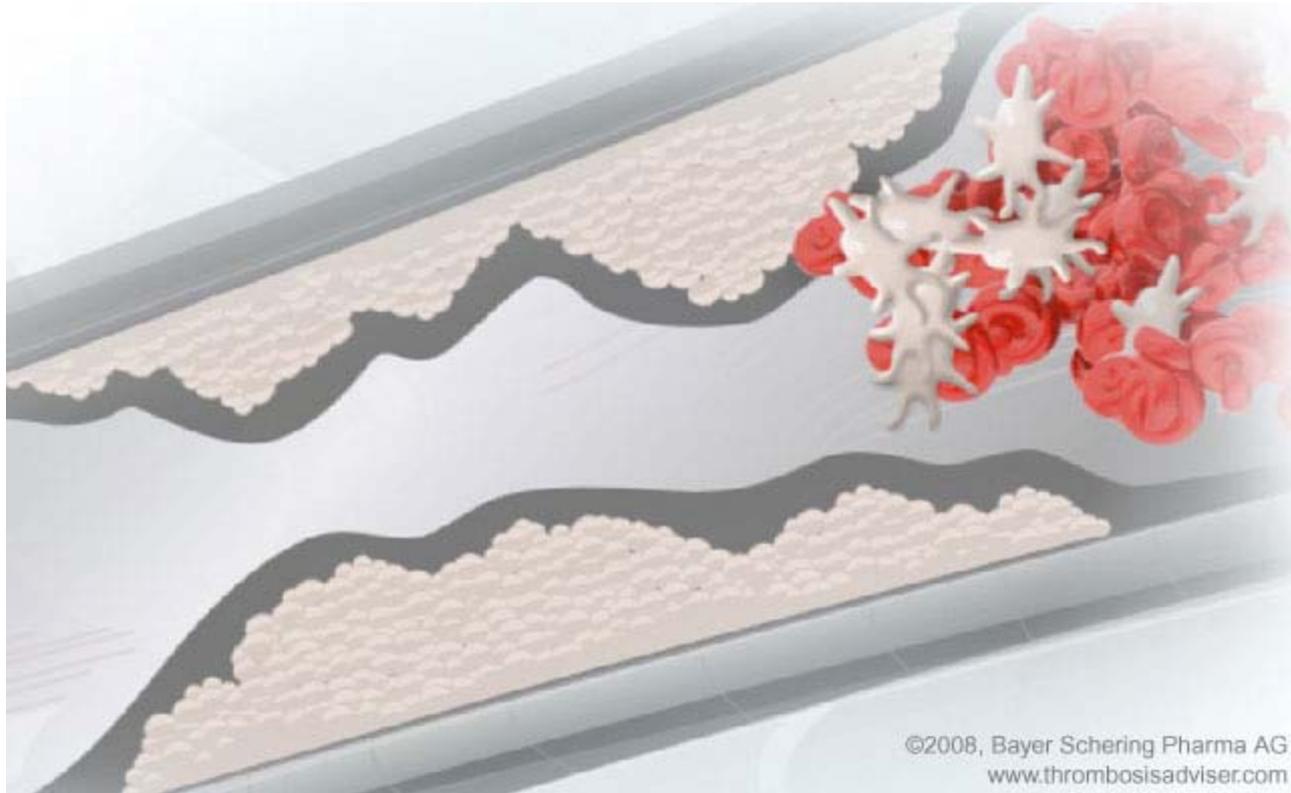
Microvascular  
Obstruction



Duke Clinical Research Institute  
DUKE UNIVERSITY MEDICAL CENTER

- Newby & Ohman, JACC 2003

# Platelet Activation



# Resuscitation Success vs. Time\*

\* Non-linear

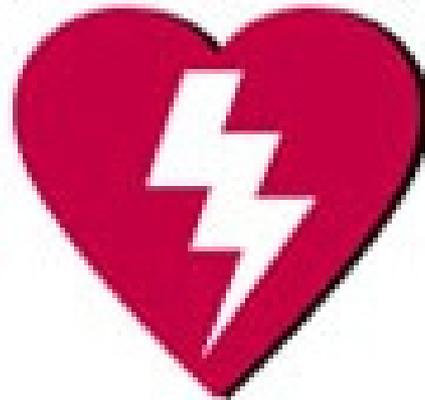
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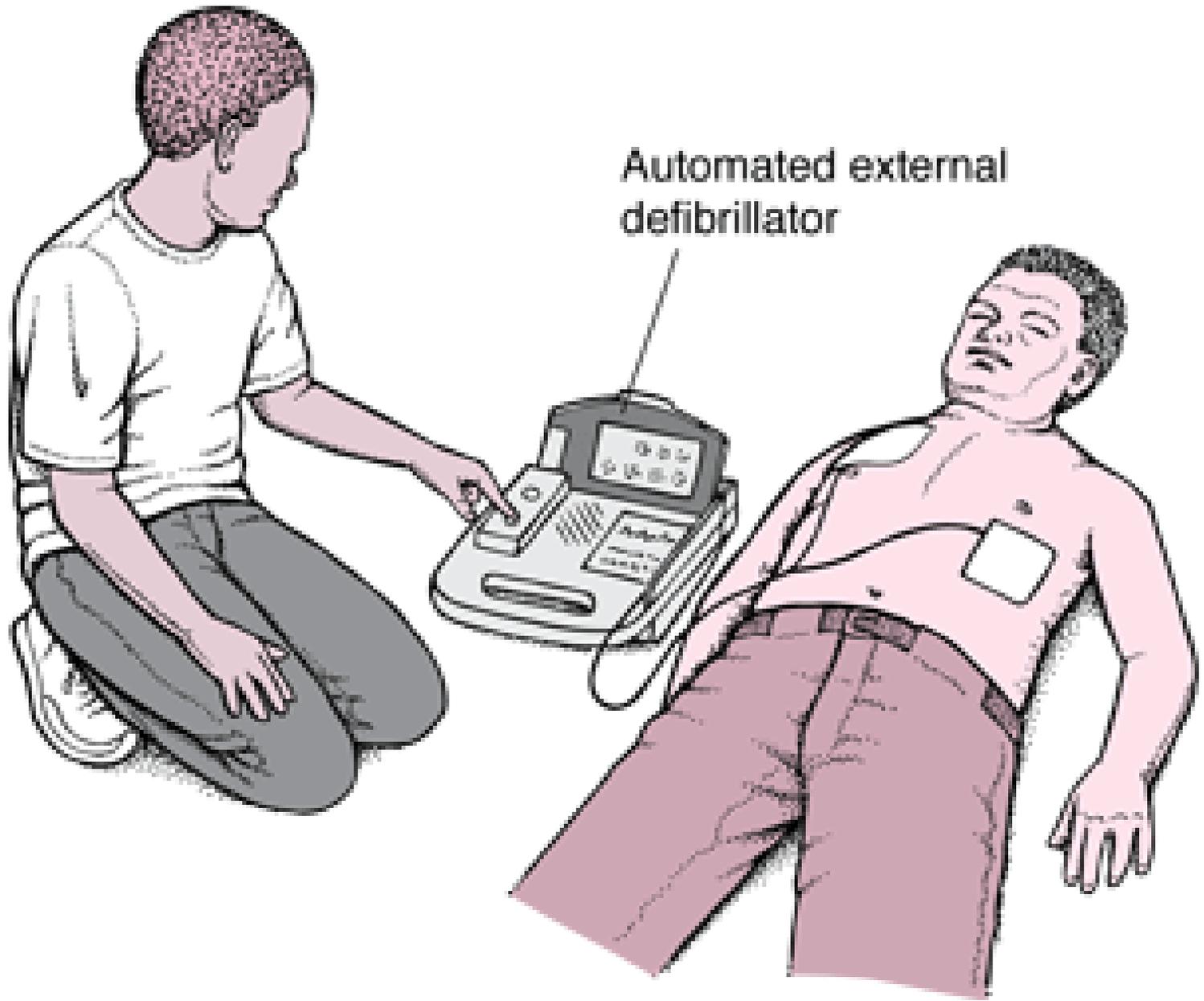
Adapted from Text: Cummins RO, Annals of Emergency Medicine. 1989, 18:1269-1275.

# AED

Automated External Defibrillator



**“Saving A Life is as easy as A-E-D.”**



Automated external  
defibrillator

Thank you

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