

# “Getting Older and Becoming Healthier”

- Preserving **Heart** Health
- Preserving **Brain** Health
- Preserving **Overall** Health



**Herbert A. Insel, M.D. F.A.C.C.**

# “Thoughts on Preventive Cardiology”

- **Sir William Osler:** “Father of Modern Medicine” - **“You are only as old as your arteries!”**
- The health of your arteries determines the potential for future adverse cardiovascular events

# Endothelium/Endothelial Cell

- Largest “**organ**” in the body
- Not just an inert, passive conduit for blood flow
- Biologically/Metabolically extremely active
- Ultimately determines the development/occurrence of **CVD**

# Cardiovascular Disease (CVD )

- CVD = **Heart attacks** and **strokes**
- **#1** Cause of death and disability in U.S.
- Caused by **atherosclerosis** and **ischemia**

# Atherosclerosis and Ischemia

- **Causes/Contributes to:**
- Chronic Kidney Disease
- Alzheimer's Disease
- Dementia/Cognitive Dysfunction
- Parkinson's Disease
- Macular Degeneration
- Sexual ( Performance ) Dysfunction

# Timeline of Atherosclerosis and Ischemia

- Endothelial Dysfunctional
- Atherosclerosis
- Ischemia
- **Organ Damage**

# “The Great Eight”

- 1. Hypertension
- 2. Hyperlipidemia
- 3. Diabetes
- 4. Cigarette smoking
- 5. Weight
- 6. Diet
- 7. Activity level
- 8. Mental well-being

Classical Risk Factors

Diabetes mellitus  
Dyslipidemia  
Smoking  
Hypertension  
Aging

Novel/Emerging Risk Factors

Infection/Inflammation  
Physical inactivity  
Post-prandial state  
Homocysteine  
Obesity



Intrinsic susceptibility – Genetic and environmental factors

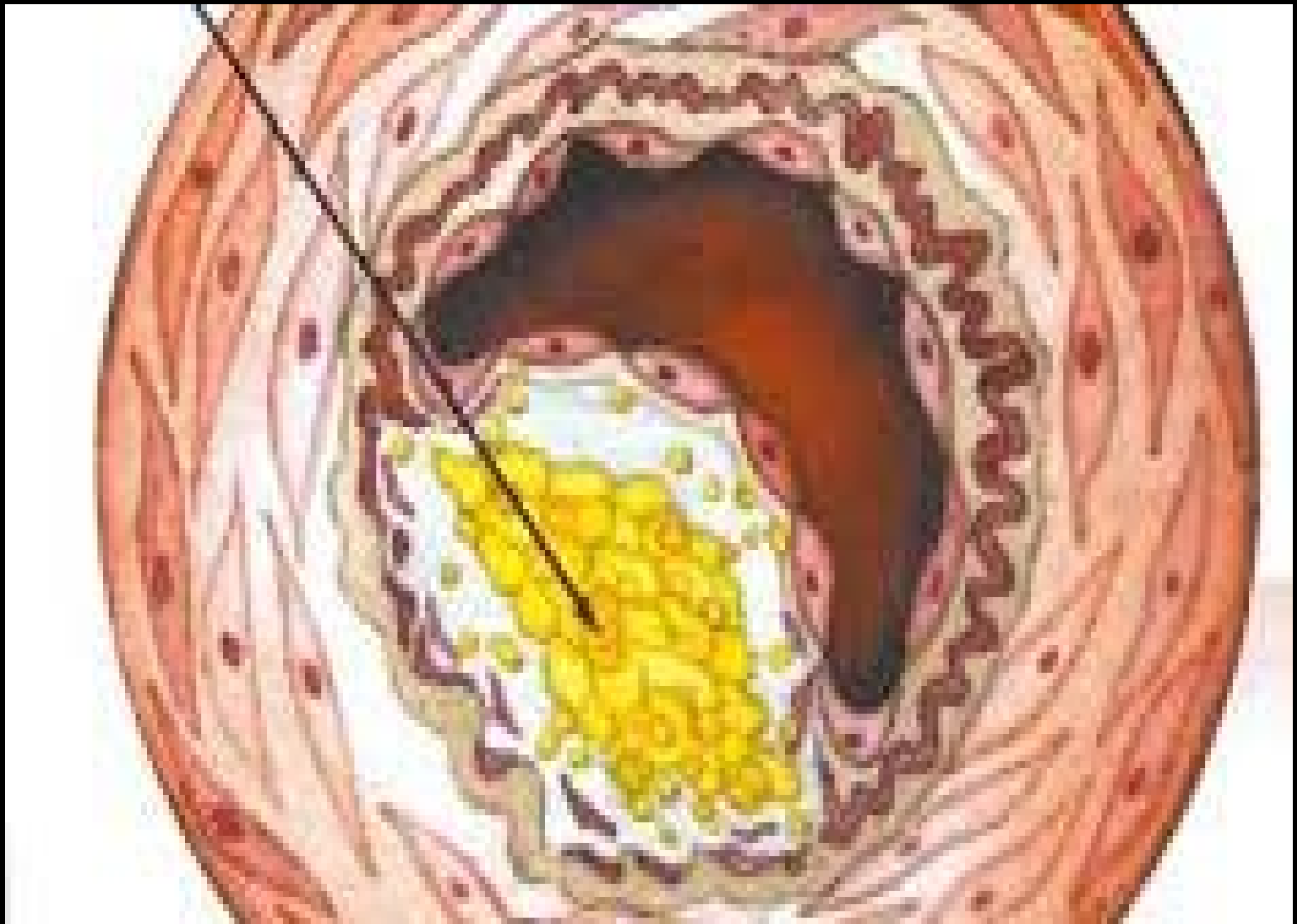
## Endothelial Dysfunction

Impaired vasomotion/tone    Prothrombotic state    Pro-Inflammatory State    Proliferation in arterial wall

Atherosclerotic Lesion Formation and Progression  
Plaque Activation/Rupture  
Decreased Blood Flow due to Thrombosis and Vasospasm

## Cardiovascular Disease Events



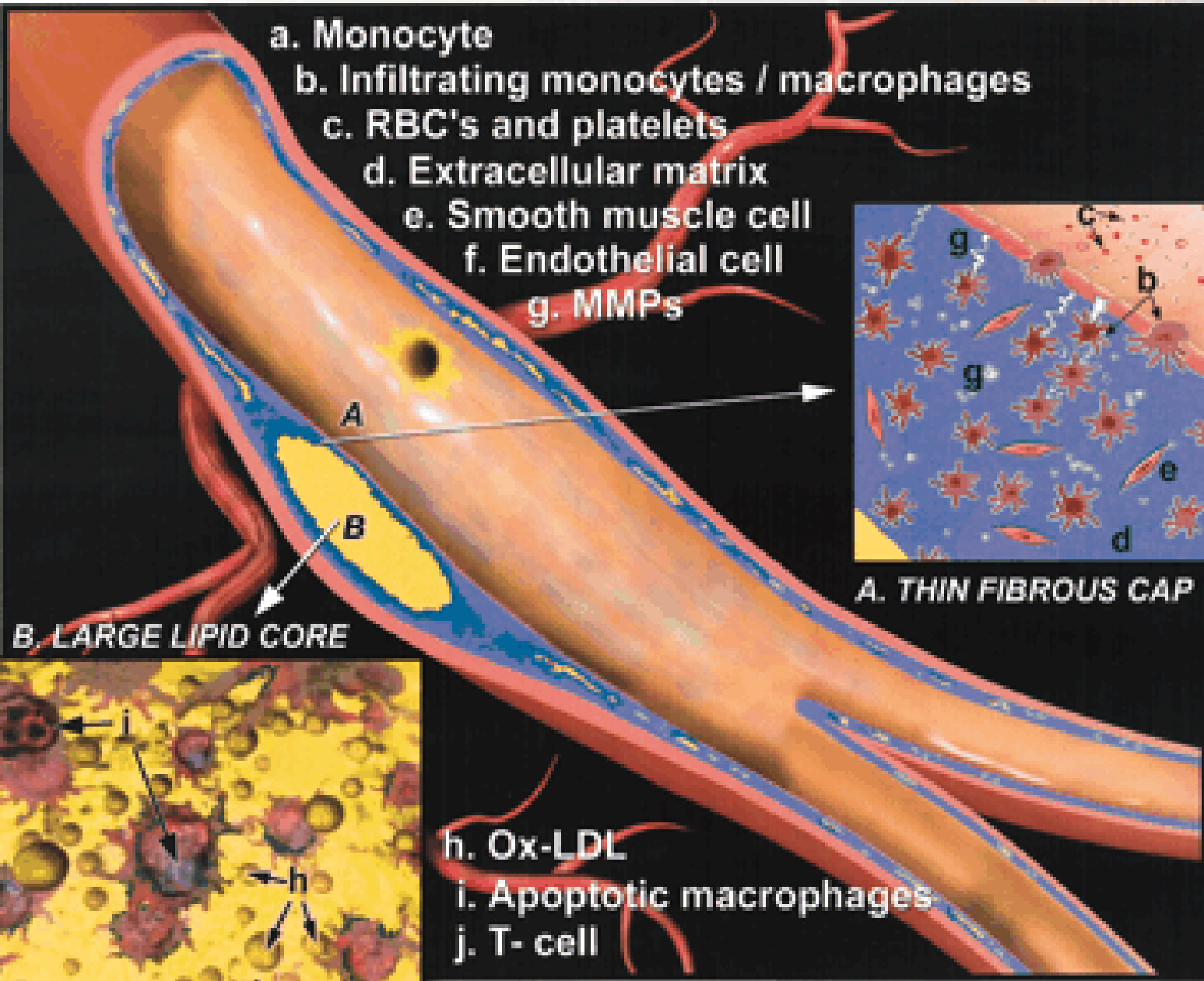
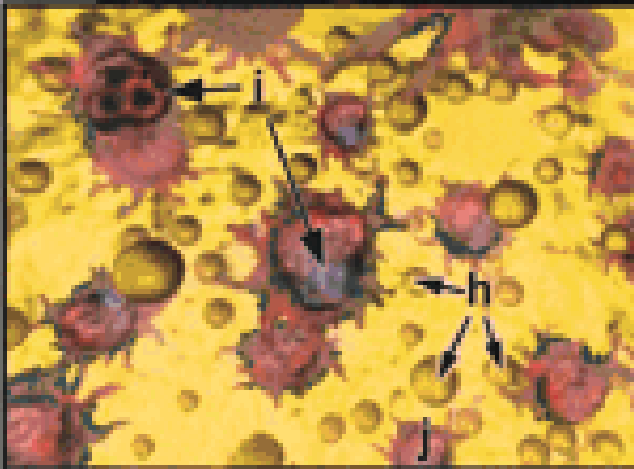
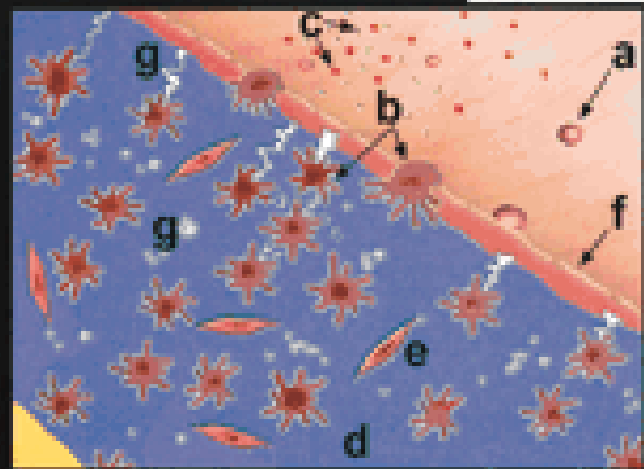


- a. Monocyte
- b. Infiltrating monocytes / macrophages
- c. RBC's and platelets
- d. Extracellular matrix
- e. Smooth muscle cell
- f. Endothelial cell
- g. MMPs

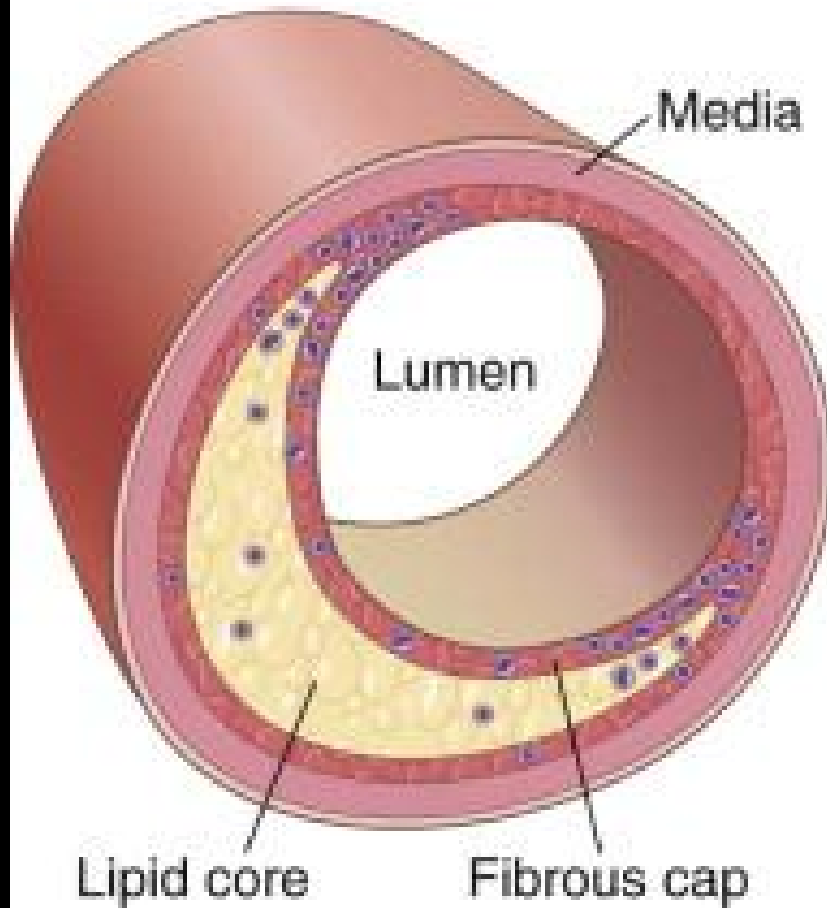
A

B

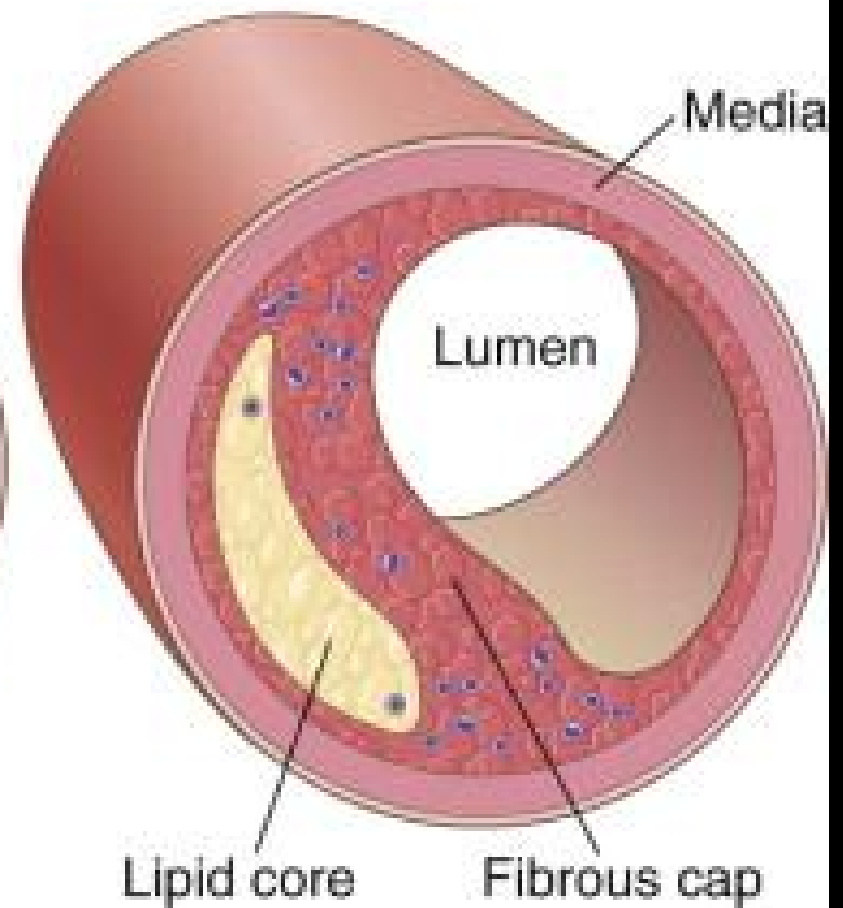
**B. LARGE LIPID CORE**



**Vulnerable plaque**



**Stable plaque**



# Dr. Insel Says:

- Your arteries go by:

**“What have you done for me lately!”**

**“It’s never too late!”**

# Brain Health As You Age: You Can Make a Difference!



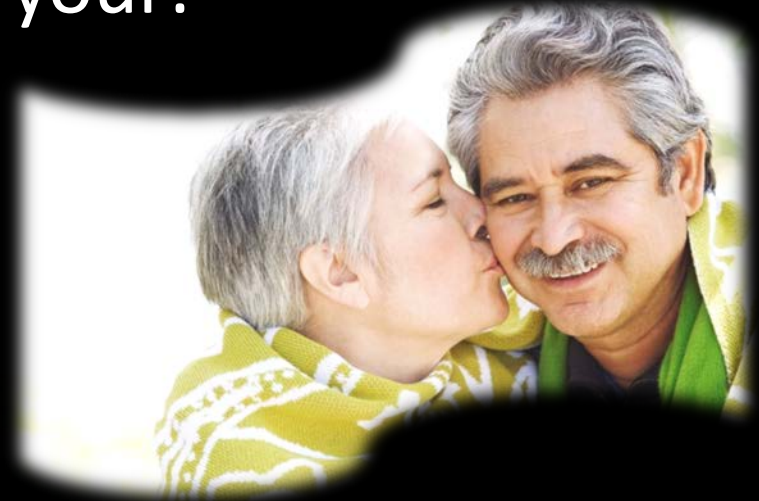
**A Presentation By:**



# Aging and Health

- Aging well depends on your:

- Genes
- Environment
- Lifestyle



- Healthy lifestyle choices may help you maintain a healthy body and brain

# So, What Can You Do to Protect Brain Health?

## Actions that may help:

- Eat healthy foods
- Take care of your health
- Be active
- Learn new things
- Connect with family, friends, and communities



# Eat Healthily

- Fruits and vegetables
- Whole grains
- Lean meats, fish, poultry
- Low-fat or non-fat dairy products
- Less solid fat, sugar and salt
- Proper portion sizes
- Adequate fluids





# Get Moving

- Physical activity may:



- Reduce risks of diabetes, heart disease, depression, and stroke
  - Prevent falls
  - Improve connections among brain cells
- Get at least 150 minutes of exercise each week. Move about 30 minutes on most days. Walking is a good start.
  - Join programs that can help you learn to move safely.
  - Check with your health care provider if you haven't been active and want to start a vigorous exercise program.

# Keep Your Mind Active

- Do mentally stimulating activities
- Read books and magazines
- Play games
- Learn new things
- Take or teach a class
- Be social through work or volunteering



# Exercise Is Good Medicine: *Prescribing Exercise In A Busy Clinical Practice*

Thomas M. Best, MD, PhD, FACSM



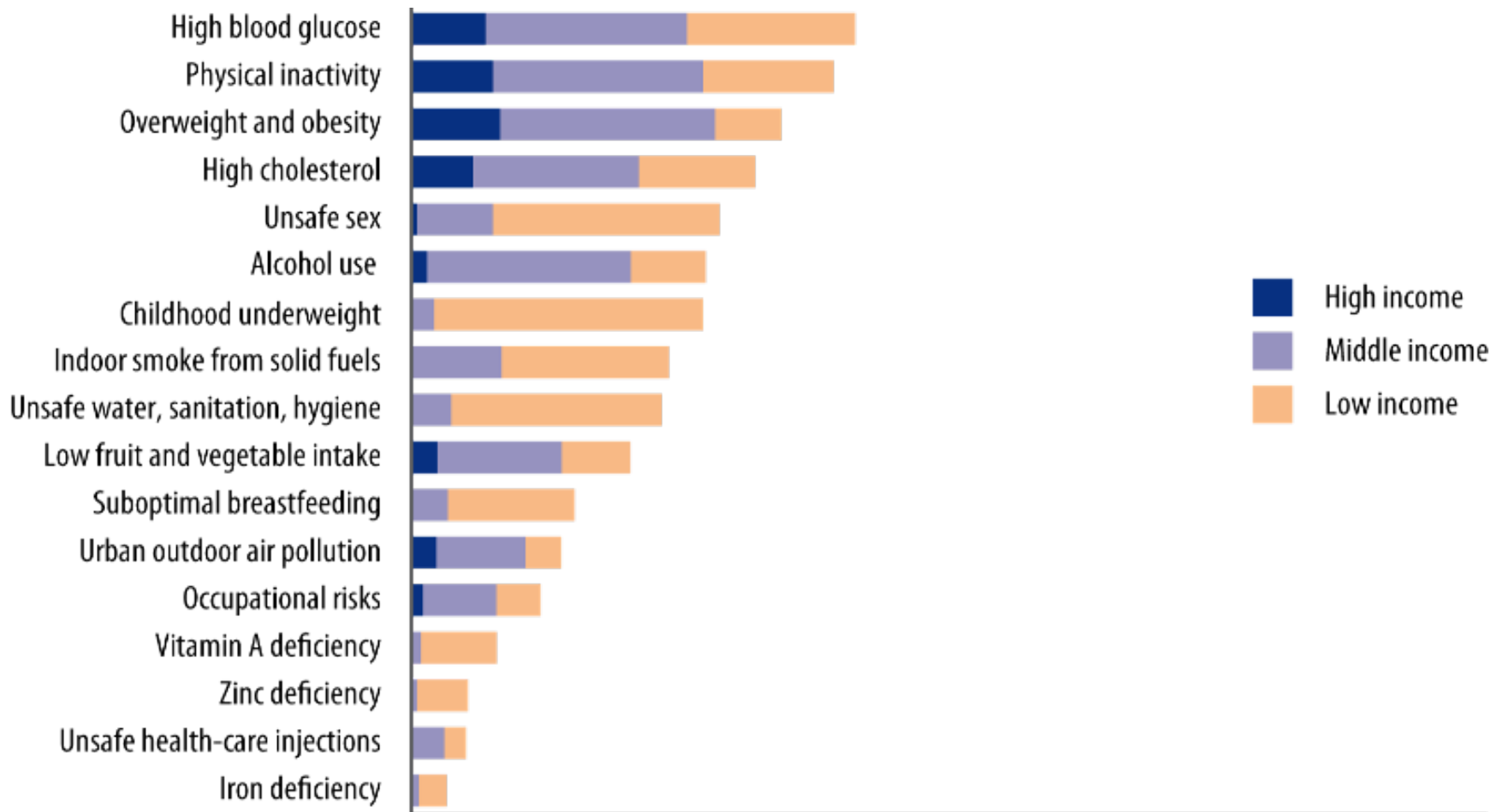
# Exercise and Health



The **benefits of exercise** in the prevention and treatment of disease has been **clearly established**.

- There is a linear relationship between physical activity and health status.
- Inactivity is a powerful and modifiable risk factor for chronic disease and premature death.

# Physical inactivity - 4<sup>th</sup> leading risk factor for global mortality



**60% of global deaths due to physical inactivity**

# Health Burden of Inactivity Vs. Smoking



- One day of being inactive has roughly an equivalent health burden to smoking 3 cigarettes.
- So, being inactive for a whole week has equivalent health burden to smoking a pack of cigarettes.
  - Do you advise your patients not to smoke?



# THE LANCET

“In view of the prevalence, global reach and health effect of physical inactivity, the issue should be appropriately described as Pandemic, with far-reaching health, economic, environmental and social consequences.”

“In view of the prevalence, global reach, and health effect of physical inactivity, the issue should be appropriately described as pandemic, with far-reaching health, economic, environmental, and social consequences.”

# Exercise Is Medicine: *Physicians should prescribe it, Patients should take it!*



- **Exercise** is the long sought **vaccine** to prevent chronic disease and extend life.
- If we had a pill that conferred the proven health benefits of exercise, physicians would prescribe it to every patient and healthcare systems would find a way to make sure every patient had access to this **wonder drug**.





# Common Barriers to Exercise



- Competing demands (work/kids/spouse)
- Not enough time
- Too tired
- Physical limitations
- Too boring
- Sedentary habits



“What fits your busy schedule better, exercising **½ hour** a day or being dead **24 hours** a day?”

# Breaking Down the Barriers



- Make exercise a **habit**, not an **option**.
- 150 min per week is goal – not starting point; so start small:
  - 1-2 days per week
  - Three 10-min bouts
- **Simple recipe for getting your exercise:**
  - AM; park car 10 min from office, walk in
  - Lunch; walk 5 min out, eat, walk back
  - PM; Walk 10 min back to car

# Breaking Down the Barriers



- **Make weekends count!**
  - Change mindset; weekends are for fitness
  - Walk 60 min on Sat or Sun, only need 90 more minutes during week
- **Bump up the intensity!**
  - 25 min of vigorous exercise (jog) done 3x per wk
  - 30 min of moderate (brisk walk) done 5x per wk
- **More ideas:**
  - Find an exercise partner
  - Get good shoes and nice workout clothes
  - Set goals (fun run or walk, sprint triathlon)

# Do You Really Think We have a Chance Without Exercise?

- Obesity
- Coronary artery disease
- Diabetes
- Hypertension
- Cancer
- Depression and anxiety
- Arthritis
- Osteoporosis
- Etc, etc, etc...

NO!

Your Patient

You



# Exercise and Health



- Did you know?
  - Physicians with healthy personal habits are more likely to counsel patients to adopt such habits.
  - Patients find doctors with healthier exercise and diet habits to be more believable and motivating toward healthy patient lifestyles.
  - **Doctors who exercise and eat right are better doctors!**
- Healthy Doc = Healthy Patient
  - Dr. Erica Frank
  - Professor and Canada Research Chair



# Summary



- Physical inactivity is the major public health problem of our time.
- Physicians have a responsibility to assess physical activity habits, inform patients of **risks of not exercising** and prescribe proper exercise.
- **Exercise is Medicine** that we need to take and get patients to take!

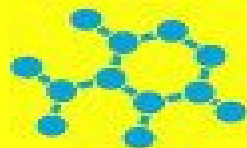


It's not that diabetes,  
heart disease and obesity  
runs in your family. It's  
that no one runs in your  
family.



som<sup>ee</sup>cards  
user card

# THE BRAIN BENEFITS OF EXERCISE



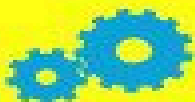
INCREASES PRODUCTION OF  
NEUROCHEMICALS THAT  
PROMOTE BRAIN CELL REPAIR



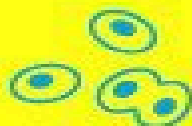
IMPROVES  
MEMORY



LENGTHENS  
ATTENTION SPAN



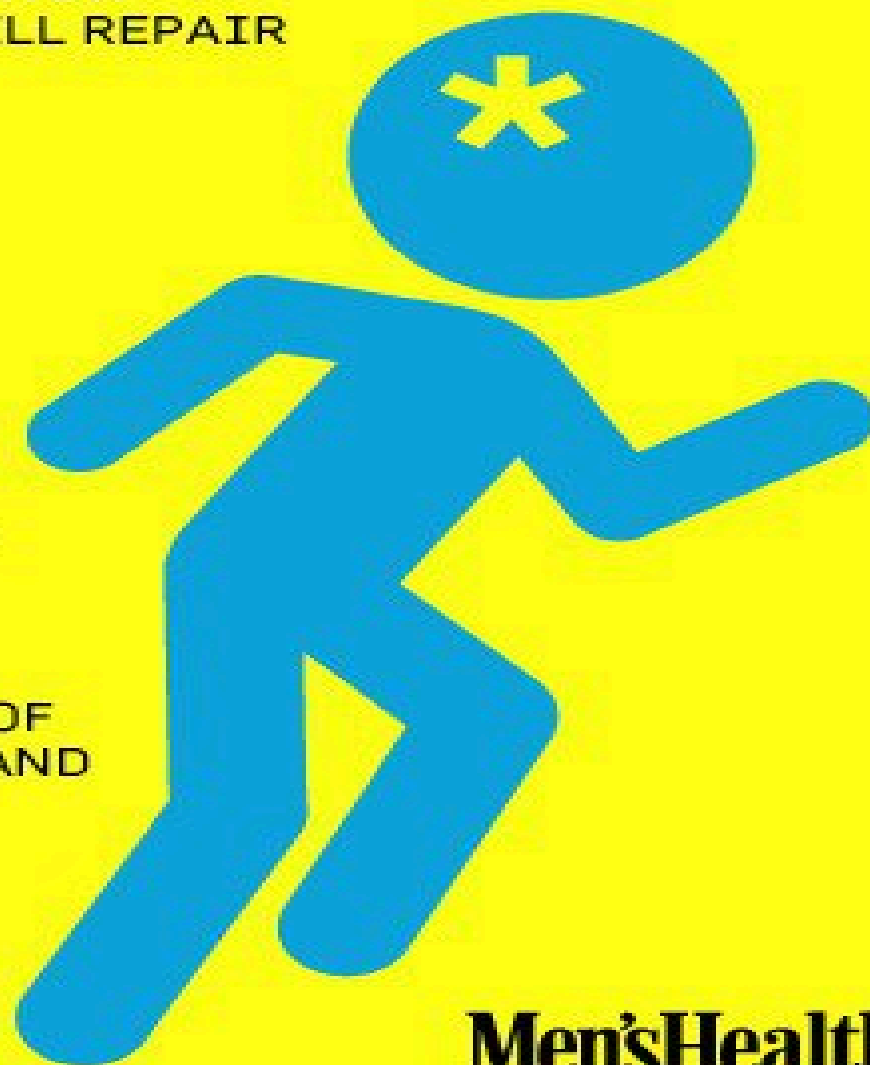
BOOSTS DECISION-  
MAKING SKILLS



PROMPTS GROWTH OF  
NEW NERVE CELLS AND  
BLOOD VESSELS



IMPROVES  
MULTI-TASKING  
AND PLANNING



**Men'sHealth**



# You Can Grow New Brain Cells!



# You Can Grow New Brain Cells!

- **Dietary habits that have positive impact:**
  - Omega – 3 Fatty acids
  - Intake of flavanoids
  - Calorie restriction
- **Dietary habits that have negative impact:**
  - High saturated fat
  - Sugar
  - Alcohol

# “Walk, Jog or Dance; It’s All Good for the Aging Brain”

- **The New York Times (4/16):**  
More people are living longer these days  
Global incidence of dementia will more than triple in the next 35 years
- **The Journal of Alzheimer’s Disease (3/16):**  
“It turns out that regular walking, cycling, swimming and even gardening may substantially reduce the risk of Alzheimer’s”

# Regular Exercise Changes the Brain to Improve Memory & Thinking Skills

- University of British Columbia; 2014:
- Regular aerobic exercise boosts the size of the **hippocampus**, the brain area involved in verbal memory and learning



**Cardio/Aerobic**

**Resistance/Strength**

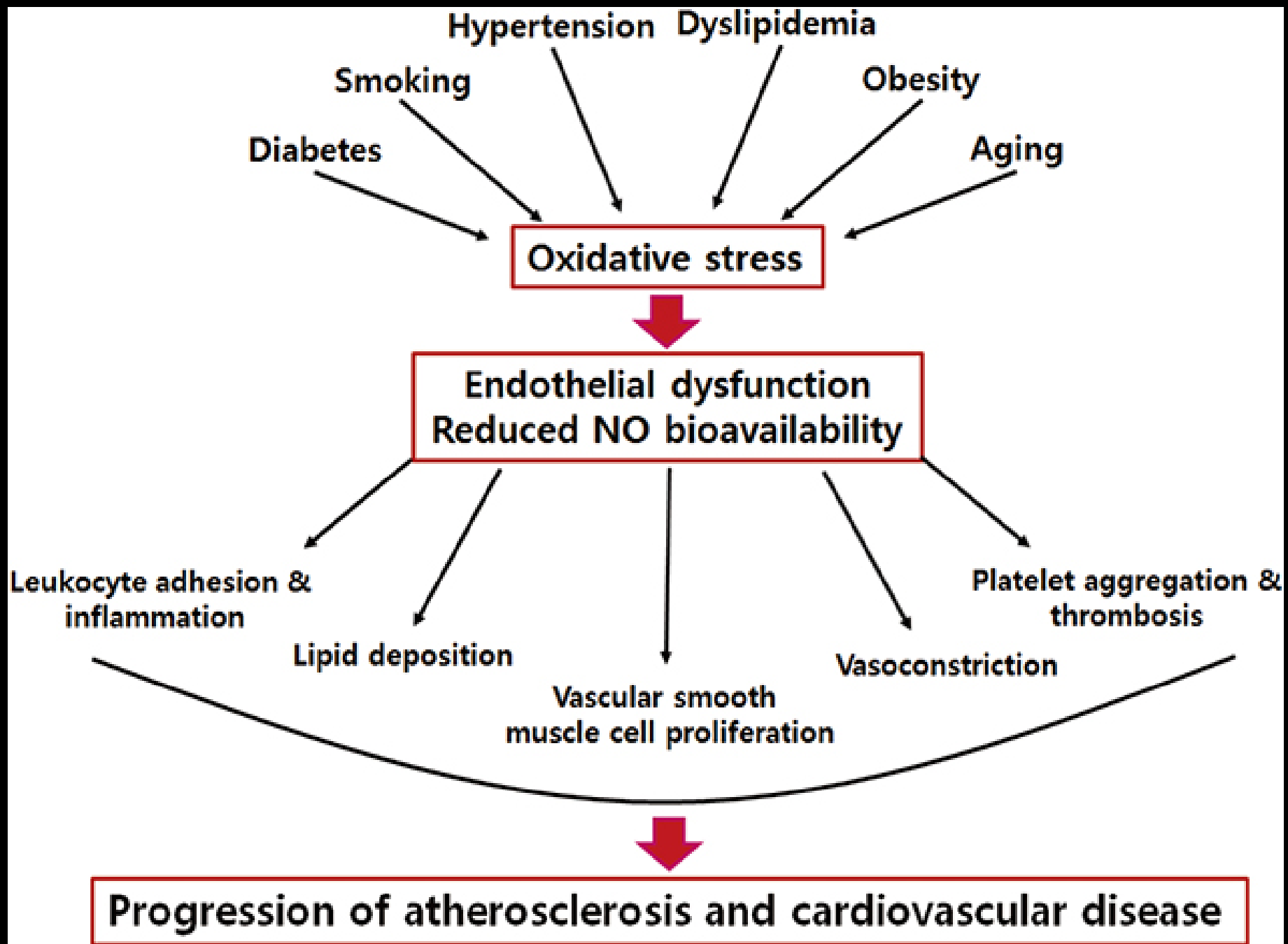


# Beneficial Effects of Eating Healthy and Exercising Routinely

- Minimizes **Oxidative Stress**
- Minimizes **Inflammation**

# Oxidative Stress

- Oxidative stress is an imbalance between the **production of free radicals** and the ability of the body to counteract or detoxify their harmful effects through neutralization by **antioxidants**
- Free radicals are oxygen containing molecules that has one or more unpaired electrons making it highly reactive with other molecules and potentially **injurious to the body's cells**

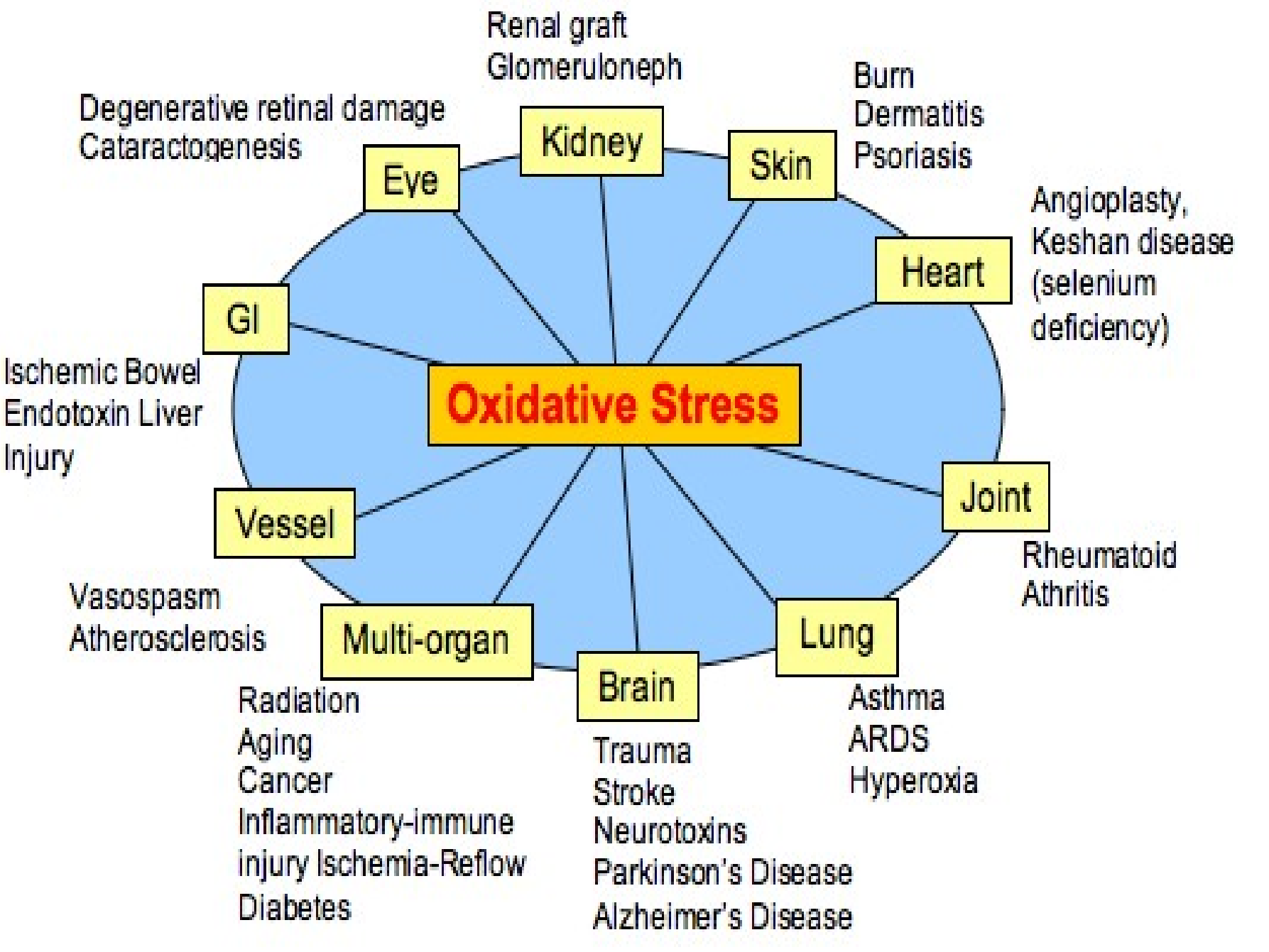




# Inflammation

- Production of cells that fight infection and immune disorders
- Production of small proteins (**cytokines**) can communicate with cells and disrupt their actions and cause them to become dysfunctional







### Endothelial Function

- ↓ eNOS Expression
- ↑ Heme Oxygenase Activation
- ↓ Monocyte Tissue Factor Expression
- ↓ PAI-1 Levels
- ↑ Tissue Plasminogen Activator

### Anti-Oxidant Effects

- ↓ NADPH Oxidase
- ↓ Superoxide Formation
- ↓ Neutrophil Oxidative Burst
- ↓ Oxygen Free Radical Scavenging

## STATIN THERAPY

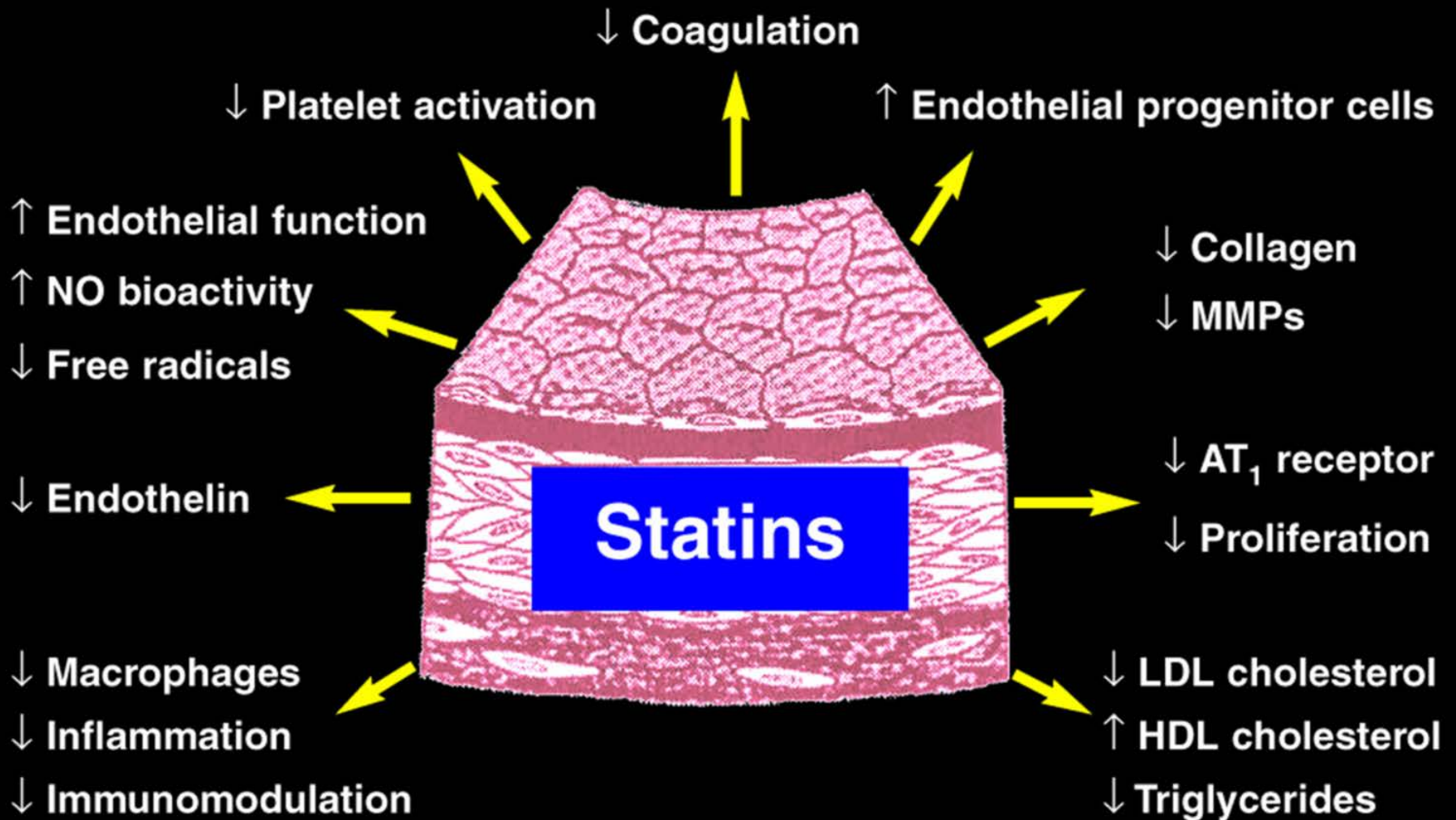
### Anti-Inflammatory Effects

- ↓ C-Reactive Protein Release
- ↓ Chemokine Release (MCP1, RANTES)
- ↓ Adhesion Molecules (P-selectin, VLA4)
- ↓ Cytokines (IL-1B, TNF, IL-6, IL-8)
- ↓ Activity of T-cells via blockade of LFA1

### Immunomodulatory Effects

- ↓ IFN and MHC Class II Activity
- ↓ T Cell Activation via LFA-1 blockade
- ↓ Direct inhibition of MHC II gene product
- ↓ Suppression of CIIA promoter IV
- ↓ Proliferation of monocytes/macrophages

# Pleiotropic effects of statins on the vessel wall



MMPs = matrix metalloproteinases

Wassmann S, Nickenig G. *Endothelium*. 2003;10:23-33.

GLOBAL THREAT  
WAITING AREA



© 2006  
Jeff Baker  
FLORIDA  
TODAY

jrbaker@brevard.gannett.com

# Adipose Tissue/Adipocyte

- Not just an inert, passive fat storage system
- Biologically/metabolically extremely active
- Produces/secretates many substances that **influence other organ systems**, potentiates inflammatory and pro-thrombotic responses that can **affect the endothelium and cause disease**
- **Can affect our mental well-being**



# Adipose Tissue/Adipocyte

- Two Types of Fat (“All fat is not created equal”):
- **Subcutaneous Fat:** (Just under the skin); Better at fat storage
- **Visceral Fat:** (Internal; Around abdominal organs); “Sick Fat”; “Adiposopathy”
- You can be “thin” on the outside and “fat” on the inside!

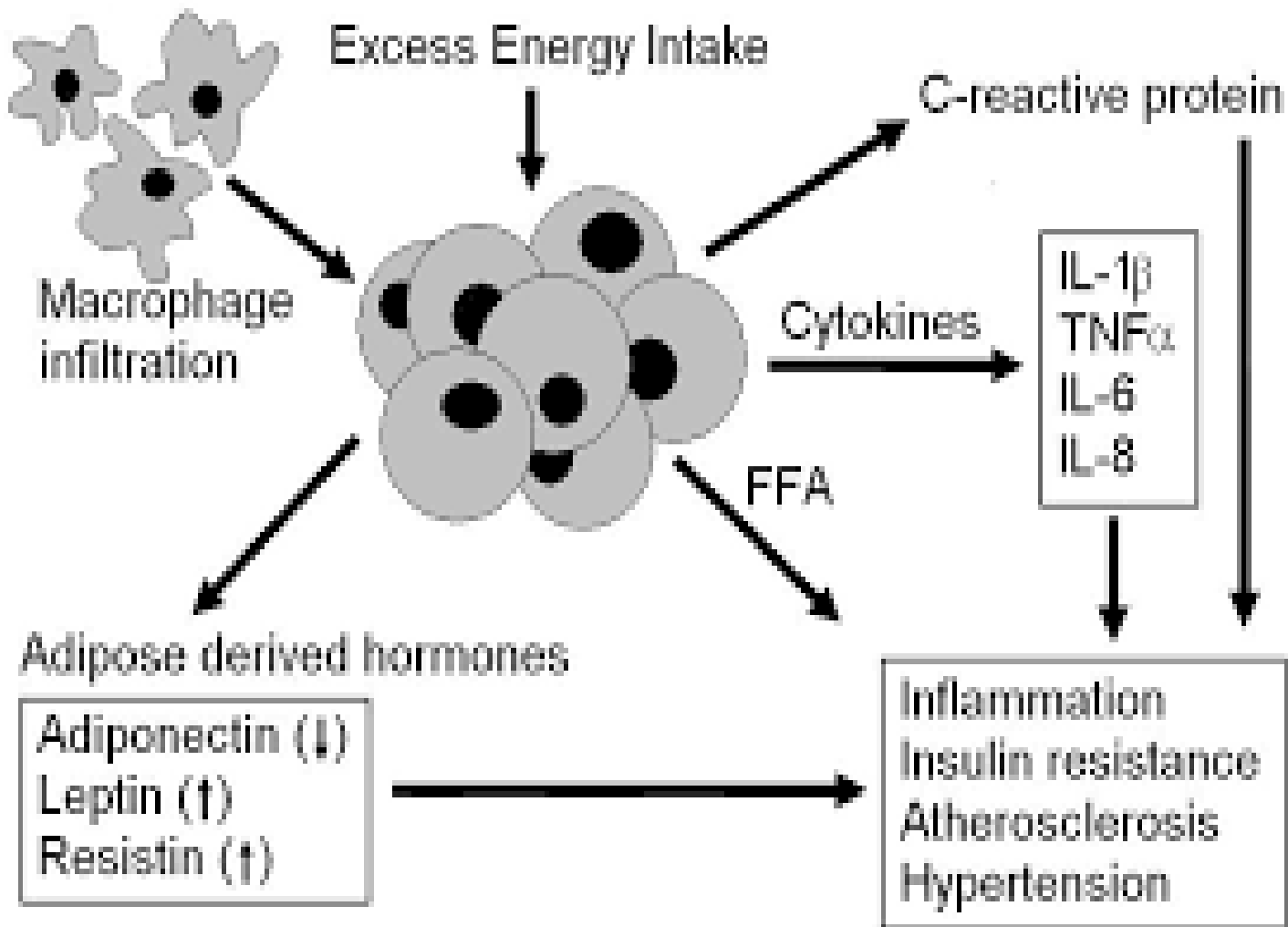
# The two kinds of body fat

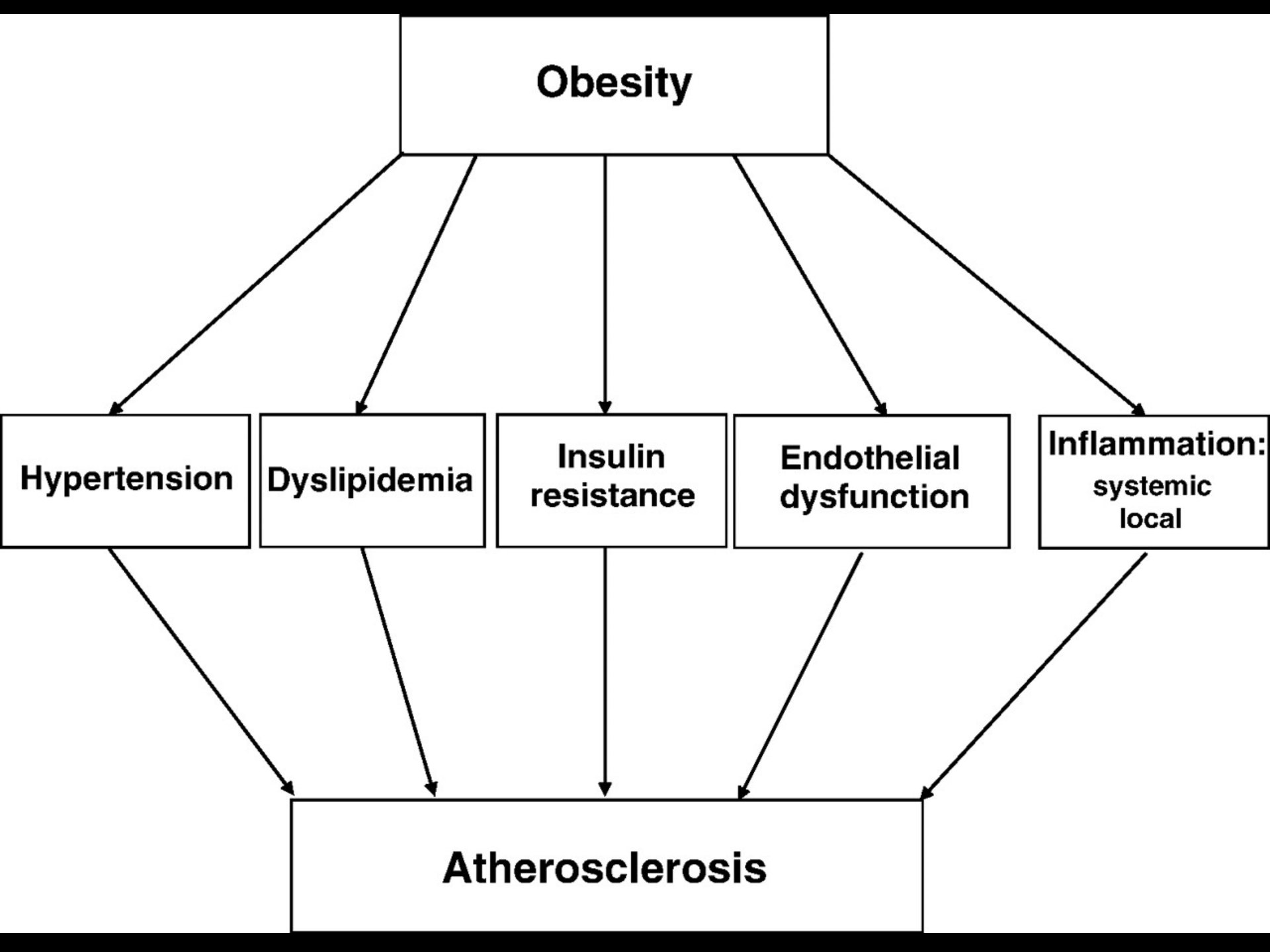


Subcutaneous fat  
(under the skin)

Visceral fat

(around the internal organs)









Obesity in the U.S. has increased from 1/3 of the adult population to closer to 40%!!!

As our TV size has diminished our waist size has increased!!!



# Mediterranean Food Pyramid



**Wine**  
*In moderation*



**Drink Water**



**Meats and Sweets**  
*Less often*



**Poultry, Eggs, Cheese, and Yogurt**  
*Moderate portions, daily to weekly*



**Fish and Seafood**  
*Often, at least two times per week*



**Fruits, Vegetables, and Grains**  
*(mostly whole)*

**Olive Oil, Beans, Nuts, Legumes and Seeds, Herbs and Spices**  
*Base every meal on these foods*



**Daily Physical Activity**



# Dash Diet

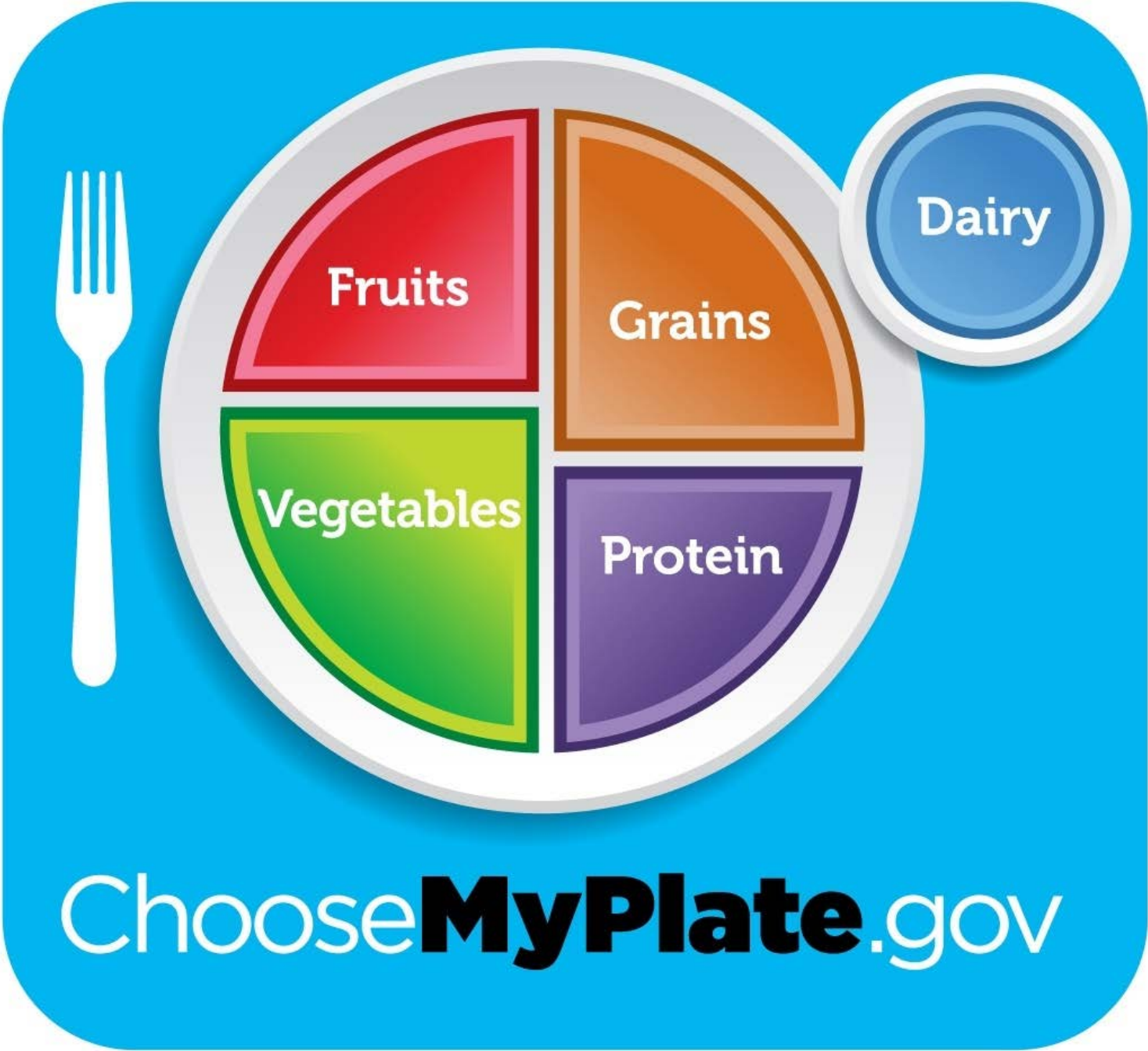
Includes whole grains, fish, poultry, beans, seeds, nuts, and vegetable oils

Limits sodium, sweets, sugary beverages, and red meats

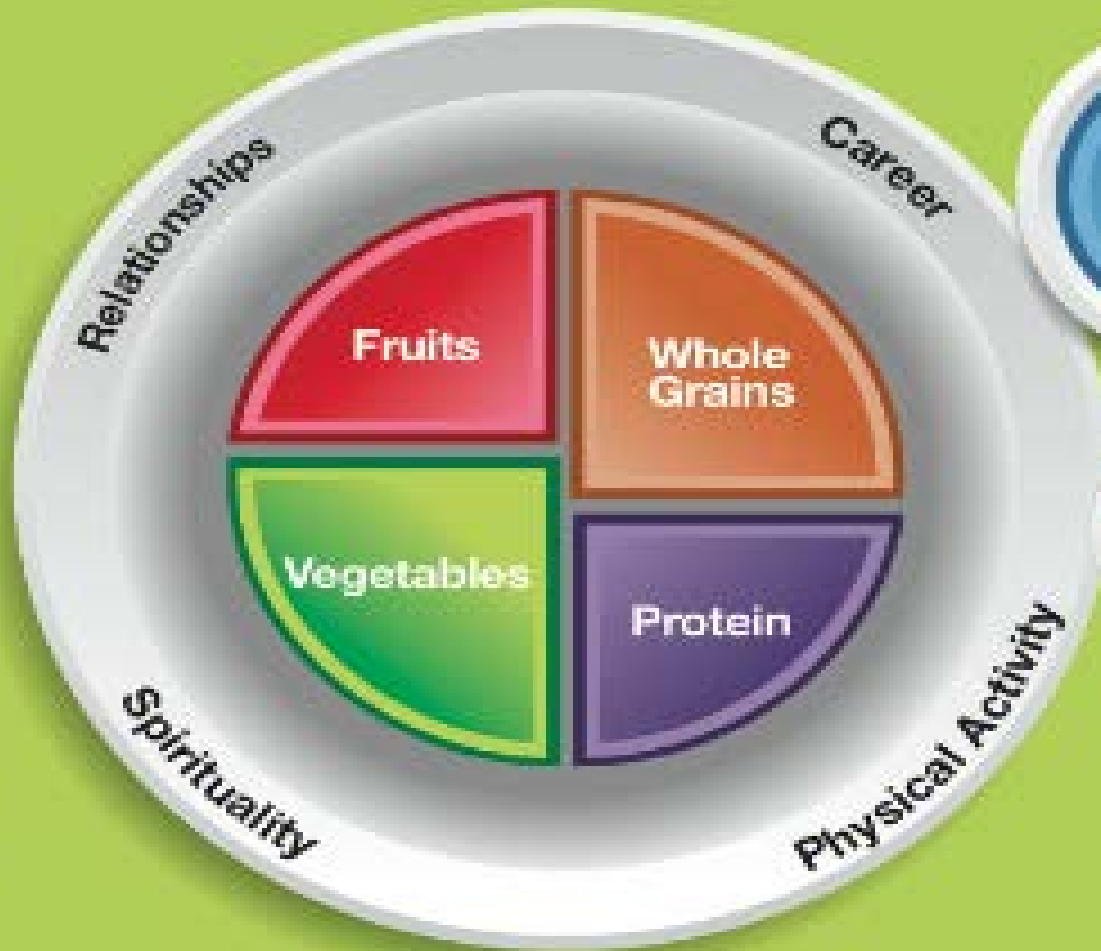
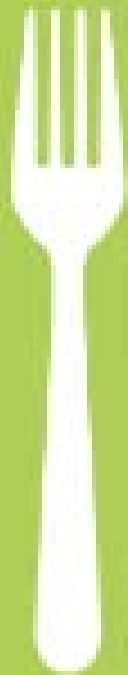
Emphasizes vegetables, fruits, and fat-free or low-fat dairy products

The **DASH Diet** has been scientifically proven to help people lose weight, lower their blood pressure and cholesterol and even improve mood and cognitive function.

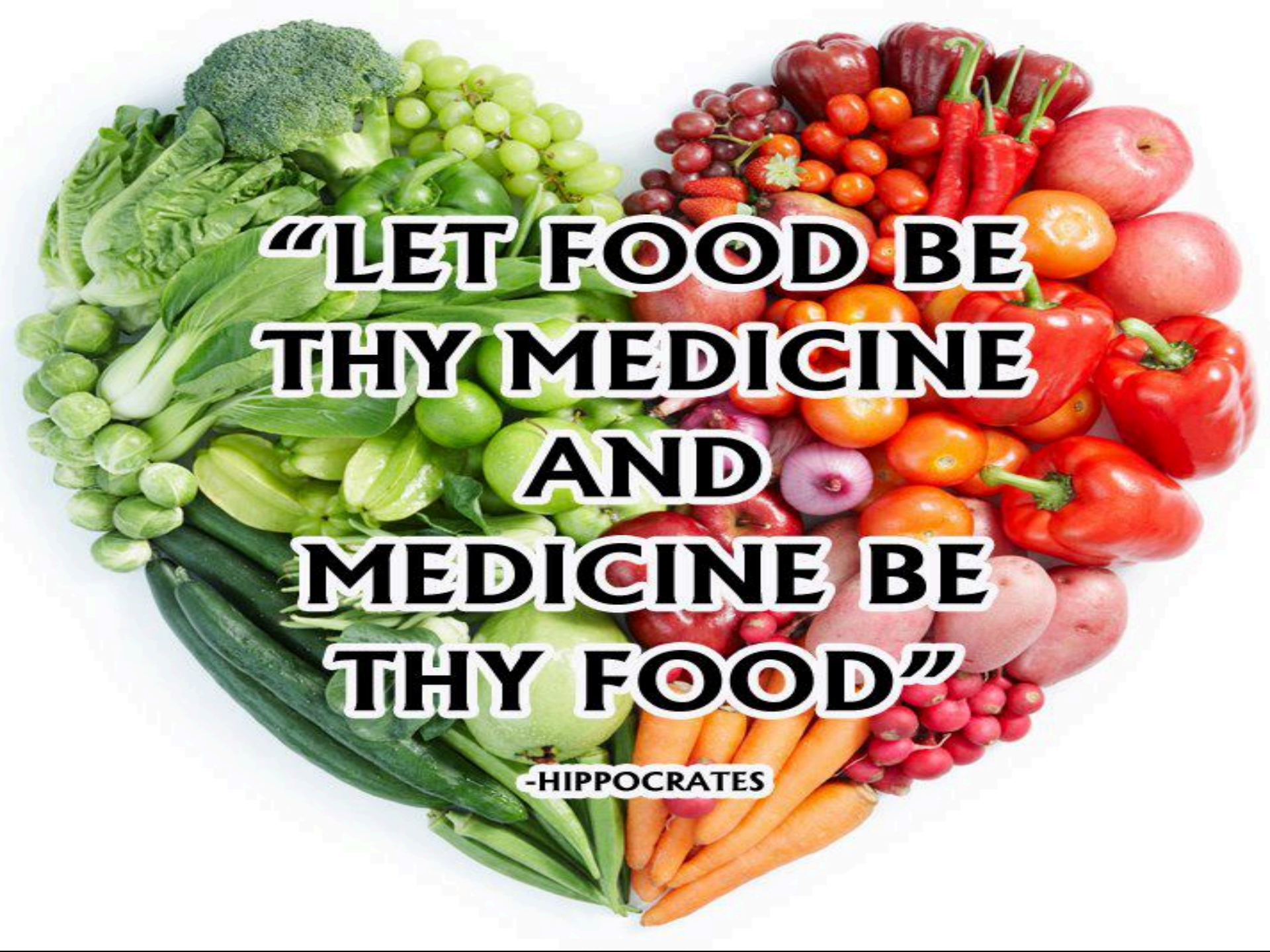




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**“LET FOOD BE  
THY MEDICINE  
AND  
MEDICINE BE  
THY FOOD”**

**-HIPPOCRATES**

# EFFECTS OF STRESS

- Health problems caused by stress:
  - Heart diseases
  - Digestive problems
  - Sleep problems
  - Depression
  - Auto immune diseases





Overtime

**Sick**

Tired

Dread

**Health**

No Time

Headache

**Stress**

**Bills**

Payments

No Sleep

Stress

Debt

Fear

**Work**

Worry

Job

Anxiety

Retirement

Savings

Anxiety

Overdue

Expectations

Insuran

Time Management

**Fear**

**Late Nights**

Late N

ear

## Effects of Stress on the Body



**Brain and Nerves:** Headaches, feelings of despair, lack of energy, sadness, nervousness, anger, irritability, trouble concentrating, memory problems, difficulty sleeping, mental health disorders (anxiety, panic attacks, depression, etc.)

**Heart:** Faster heartbeat or palpitations, rise in blood pressure, increased risk of high cholesterol and heart attack

**Stomach:** Nausea, stomach ache, heartburn, weight gain, increased or decreased appetite

**Pancreas:** Increased risk of diabetes

**Intestines:** Diarrhea, constipation and other digestive problems

**Reproductive Organs:** For women-irregular or painful periods, reduced sexual desire. For men-impotence, low sperm production, reduced sexual desire

**Other:** Acne and other skin problems, muscle aches and tension, increased risk for low bone density and weakened immune system (making it harder to fight off or recover from illnesses)

# “Exercise Reorganizes the Brain to be More Resilient to Stress”

- *Journal of Neuroscience*; 2013
- Regular exercise can help shut off excitement in the ventral **hippocampus**, a brain region shown to regulate anxiety
- **Conclusion:** “Physical activity reorganizes the brain so that its responses to stress is reduced and anxiety is less likely to interfere with normal brain function”





# “Getting Older and Becoming Healthier”

- If you want to “stay” young and healthy:  
**EXERCISE** (body & mind) & eat **healthy** foods
- If you want to lose weight:  
**EXERCISE** self control & eat **less** (calories)

# “Getting Older and Becoming Healthier”

- **“Let food be thy medicine and medicine be thy food”** – Hippocrates: 4<sup>th</sup> century B.C.
- **“Let exercise be thy medicine and be routine as thy food”** – Dr. Insel: 21<sup>st</sup> century A.D.

# “Getting Older and Becoming Healthier”

- Preserving **Heart** Health
- Preserving **Brain** Health
- Preserving **Overall** Health
- Remember the “**Great Eight**”
- **It’s never too late!**
  
- **Herbert A. Insel M.D. F.A.C.C.**