EXERCISE
DIETARY GUIDELINES
EXERCISE: Do you need it?
**Why Exercise is Important**

Regular daily exercise:
- ↓ Heart disease (↑ HDL, ↓ LDL)
- ↓ Stroke (blood clots)
- ↓ High Blood Pressure
- ↓ Diabetes
  - ↓ Excess body fat
  - ↑ Tissues sensitivity to insulin
Why Exercise is Important

• ↓ Bone thinning (osteoporosis)
• ↓ Cancer (Breast, colon)
• ↓ Obesity

Exercise: ↑ lean body tissue + energy output (burn calories)

Energy use: Lean tissue > Fat

• Increases- metabolic rate- during & hours after exercise
Why Exercise is Important

• May help you feel better emotionally:
  - energy level
  - self esteem
  - improves symptoms: depression, anxiety, panic disorders

How? Release **endorphins** - natural tranquilizers
20 year study: people >50 % Deaths

Runners non-15%

Healthy, runners 34%
Sedentary (Sitting Around)
Sedentary People

Chronic disease

Overweight/obesity

“Doing something is better than doing nothing for inactive people”

Nutrition & MD (2005)
Recommendations: Dietary Guidelines: 30 minutes
Recommendations: Dietary Guidelines: 60 minutes

To keep a healthy weight:

60 minutes of moderate to vigorous exercise

6% of your day (60 minutes)

All of your daily activities
Recommendations: Dietary Guidelines: **90 minutes**

**To help lose weight:**
(and keep it off)

*60-90 minutes of moderate exercise*

6-9% of your day (60-90 minutes)
Recommendations: Dietary Guidelines

What’s most important?

Answer: the “total” amount of exercise everyday

30 minutes/day: all at once or 3 times for 10 minutes

60 minutes/day: all at once or 6 times for 10 minutes
Recommendations:

AEROBIC, VIGOROUS

Regular Daily - burns most calories
Most Health Benefits - for heart and blood vessels

RESISTANCE:

Weight (strength) Training, Callisthenics
Strength - Endurance - Maintain/Increase Muscle
Reduce risk of falls

WEIGHT BEARING

Jogging - Walking - Aerobics
Stair climbing - Strength training
Keeps bones healthy
Reduces risk of fractures/osteoporosis

STRETCHING

Flexibility
Special Populations: Children

Prevalence of overweight among children and adolescents ages 6-19 years

- 1963-70
- 1971-74
- 1976-80
- 1988-94
- 1999-00

Age in years
- 6-11
- 12-19
Special Populations

• Children and teens: **60** minutes nearly everyday- protect against overweight/obesity

• Pregnant women: OK moderate, safe exercise: **30** minutes/day
Special Populations

• Breast feeding mothers: OK to exercise

• Older Adults:
  Weight-bearing exercise: slows bone loss
  Resistance training: protects against falls
Problem: 2007 studies: > 60% Americans not active enough

CDC 2008 survey: 46.7% US women
49.7% US men
Exercise regularly
Exercise & Breast Cancer

But Will It Stop Cancer?

The effect of exercise is probably small, but for two common types of cancer—breast and colon, studies are promising.
Exercise & Breast Cancer

• Breast cancer: 40,000 women die/year
• 2d leading killer after lung cancer
• Some studies: exercise- small protective effect
• Other studies: no effect
Why these discrepancies?

• 1st problem: **Recall** method: How much did you exercise?

• 2d problem: When is exercise important for protection?
  - Throughout life?
  - Young adults?
  - Middle age? (↑ risk)
2007 University Southern California Study

- Moderate or strenuous exercise: 5 or more hours/week
- 55% risk breast cancer
- Important exercise period: teens → 50’s (lifelong)
2008 Washington University School of Medicine Study

Girls & young women: exercise regularly

Risk - premenopausal breast cancer
Nurses’ Health Study: 120,000 nurses

Burn 2000 calories/week: ↓ breast cancer risk

2000 calories =

• Walking briskly 3-5 hours
• Housework 10 hours
• Bowling 8 hours
• Raking leaves 7 hours
• Leisure Biking 5 hours
Bernyce Edwards’ daughter died of breast cancer at age 42 in 1997

Diagnosis → 69 days → death

Bernyce: 73, runs 1 hour/day in Bellingham, Washington to protect herself
How exercise may prevent breast cancer

• Studies: overweight post-menopausal women

• After menopause: estrogens produced by enzyme in body fat

• ↑ Exercise ↓ Body fat

• ↓ Hormone levels ↓ Breast cancer risk
Preventing cancer from **coming back**

> > 10 million Americans: cancer survivors

Elizabeth Edwards
2007 Harvard Medical Study

- Regular exercise *after* breast cancer diagnosis: walking average pace: 3-5 hours/week
- ↓ Risk- dying from breast cancer
- Why? ↑ exercise ↓ estrogen
- Important: women with hormone sensitive (fed) tumors
Exercise & Colon Cancer

- Many studies

  ↑ exercise ↓ colon cancer

- Major problem: getting people to start exercising/sticking with it
Exercise & Colon Cancer

- After colonoscopy: polyps (precancerous) removed
- Doctor recommends: exercise + aspirin
Dana Farber Cancer Institute

- 2007 study: colon cancer survivors walk 6 or more hours/week- average pace

- ↓ 50% drop- recurrence

- ↓ Death- all causes
Center for Disease Control study 2007: **Exercise & Weight Loss**

- **Survey:** Ask people what works

- **2 groups:** successful & unsuccessful dieters

Both groups:
- ↓ total food  ↑ fruits/ veggies
- ↓ portion size  ↓ fatty foods
- ↓ sweetened drinks
Successful Dieters

- Lost weight & kept it off
- + Exercise: 30 minutes/day
- ↑ energy expended
- ↓ loss body fat
- helps keep **lean tissue**
Exercise, Dieting, Bone Loss

• Dieting alone (↓ calories) without exercise
• ↓ Bone density
• Exercising to lose weight: no loss bone density
Exercise to build strong bones

• Bones get bigger/healthier: **weight bearing & resistance exercises**
• Critical time: childhood → teens to reach **peak bone mass**
• Bone loss: lack of use
Build strong bones

- **Weight bearing exercise**: jogging, walking, dancing, climbing stairs
- ↓ Risk osteoporosis
Build Strong Bones

- **Resistance Training**: weight lifting - free weights or machines
Osteoporosis

• Peak bone mass: ages **16-30**
• After 35-45 bone breakdown > bone formed

**Bone density:**
- African Americans > Caucasians
- Men > Women
- Smoking ↓ alcohol
- Weight bearing exercises, calcium intake
Osteoporosis

- Reduction in bone mass
- ↑ Bone fragility
- ↑ Bone fractures
Exercise & Arthritis

• Northwestern University

2006 study

• People 53-63 with osteoarthritis

• Exercised 30 minutes- moderately or 20 minutes-vigorously most days
Exercise & Arthritis

• Fewer problems: walking, climbing stairs, basic chores

• Key: independent living

Strength & flexibility

Joints move more easily
Exercise & Knee Joint Health

Australian Study: exercise

20 minutes/week (weight bearing)

- Knee cartilage
- Bone marrow lesions
- Knee strength
- Risk- osteoarthritis
Running & Your Knees

Can Running Actually Help Your Knees?
Running & Your Knees

• Older view: knees of runners degenerate

• 2008 Stanford University Study
• Followed Distance Runners for 20 years vs. Control Group

• Runners: less arthritis in knees

• Running may “condition” knee cartilage to load placed on it
Exercise and Diabetes

- 2002 study: overweight middle-aged people **pre-diabetics**
  - **↑** glucose

- Two groups: Low calorie/fat diet + 2.5 hrs brisk walking/week vs. pill to lower glucose

- Exercise group: **↓** development diabetes
Fatness and Fitness
Dallas Cooper Institute Aerobic Research:
22,000 men studied, 8 years

Death Rates:
Lean/ not fit > Overweight but fit (treadmill tests)

Fit lean men = Fit overweight men
Similar results: women. Fitness (not weight) strongest predictor mortality
2008 Study of Americans

1/2 overweight
1/3 obese adults

Normal: blood pressure, cholesterol, triglycerides, glucose

“metabolically healthy”

1/4 adults at “healthy weight”: 2 out of 4 cardiovascular risk factors- unhealthy

Docs? Greater focus exercise vs. weight loss
Your brain on exercise

• In general: ↑ age ↑ memory loss

• Several studies:
  ↑ exercise ↑ memory scores
  brisk walking- older people-
  reverse aging brain shrinkage
  ↑ brain volume (gray & white
  matter- connections)
Exercise and Intelligence

What Sort of Exercise Can Make You Smarter?
Exercise and Intelligence

• 1999 California Salk Institute Study
• Exercise: stimulates creation **new brain cells**
• What type of exercise?
• 2009 University of Illinois Studies:
  • College Students
  1. **Memorize specific letters**
  2. **Later pick out from list: flashed**
Exercise and Intelligence

• Students: Did 1 of 3 things
  A) Sit quietly
  B) Run-treadmill
  C) Lift weights

Cool down period → re-tested

Results: Running: quicker, more accurate responses
Exercise and Intelligence

Similar Study: Stretching vs. Brisk walking

Walking: better cognitive test performance

Aerobic exercise: \( \uparrow \) dramatic blood flow

Carry “growth factors” \( \rightarrow \) brain

\( \uparrow \) New neurons & connections

Weight lifting: growth factors stay in muscles
Exercise and Alzheimer’s Disease

• People 65+ : **normal** mental function: exercise 3X/week

• ▼ Alzheimer’s (▲ blood to brain)

• People with Alzheimer’s
  - weight lifting
  - antidepressant

Similar improvement
2007 study: Exercise almost as good as anti-depressant in reducing depression
Exercise and Depression (↓)

Zoloft   Exercise   Home   Placebo
(drug)   supervised exercise   (pills)
47%     45%     40%     31%

How does exercise help?

• Brain serotonin (neurotransmitter)- mood
• Stress-reducing hormone- from heart muscle
Exercise - sticking with it

Overweight/obese women

iPod + iTunes  no music

Lost more weight/fat

Better adherence
EXERCISE & MENOPAUSE (45-55)

Penn State 2007 study:

↑ Exercise during menopause
(walking or yoga)

↑ Improved: mood, outlook, quality of life
• Men & women lose significant muscle mass (sarcopenia) in 40’s & 50’s

• Women less muscle, live longer than men, show effects weaker muscles- daily activities
• 
  muscles ↓ metabolism → burn fewer calories

• Fat deposits → muscles (marbling)

• Risk heart disease and diabetes
Saving Muscle

- **Aerobic exercise** - good but doesn’t challenge **major muscles** (thighs, arms, shoulders, back)

- So to keep muscles strong: **resistance** (weight) training
Recommended Dietary Allowance

**RDA**: “the average daily dietary intake level to meet nutrient requirements of nearly all (97-98%) people in a life stage or gender group”

Harvey/Champe Biochemistry 2005
To maintain/build muscle: need **protein**

- RDA protein (grams) all adults: 0.36 X your weight
- Calculate your RDA for protein
But suppose you are 50-80 years old. Then what?

• May need **25%** more protein than RDA- **maintain (preserve)** muscle.

• Need **50%** more protein than RDA to **gain** muscle.

• Quick estimate (grams): 
  \[ \frac{1}{2} \text{ of your body weight} \]
Vigorous aerobic exercise: the best

↑ Calories burned

↑ Flexibility to choose wider variety of foods

(discretionary calories)

30-60 minutes most days
Aerobic Exercise

- Increases heart rate & uses O2
- Intensity: “low enough for you to carry on conversation, but high enough that you can’t sing”
- Examples: walking, dancing, jogging, cross-country skiing, cycling, swimming
Aerobic Exercise

• Raises heart rate: 60-85% of maximum (depends on age)

• Maximum heart rate: 220 - age
Regular Aerobic Exercise

- Become more fit \( \uparrow \) endurance
- Heart pumps more blood
  - ATP’s \( \leftrightarrow \) greater use O2 \( \leftrightarrow \) muscles
- Resting heart rate: rate needed to supply tissues at rest
  (measure- morning before getting up)
Measure your heart rate

You can measure your heart rate by feeling your pulse at the carotid artery located on the side of your neck, just below the jawbone. Use your index and middle fingers to count the beats or pulses. The number of pulses per minute equals heart rate. To find your resting heart rate count the beats first thing in the morning before you even get out of bed. If you’re patient, you can count the number of beats in 60 seconds; if you’re not you can use a shortcut by counting the beats in 10 seconds and multiplying by 6. For example, if you count 11 beats in 10 seconds your resting heart rate is 66. (Michael Newman/PhotoEdit)
Resistance (Strength) Training

• 2-3 days/week
• Muscle: “Use it or lose it”
• Astronauts – space zero gravity
• ↑ **Amount of weight** ↑ muscle
  ↓ **strength**  ↓
•  **Repetitions**  endurance (how long you can continue a task)
Stretching: at least 3 days/week

• ↑ Flexibility  Move arms, legs, torso → full range of motion

• ↓ Risk pulled muscles

• ↑ Speed (athletes)
Is stretching good before you exercise?

Barry Zito - Giants Injury Free
Yoga and Pitchers

• Training in California: meditate, stretch, yoga, music, visualize being on mound
• Block out distractions
• Improve balance, ↓ anxiety, deep breathing
• Arm stretching: rubber tube
On field: play catch 350 feet (not usual 120)- arms not babied

- Advocates: Barry Zito Giants- never missed a start
- Tigers’ Joel Zumaya (clocked 103 mph)
Would stretching help the Yankees?


Why?
Yankees: Brought back giant rubber bands
Stretching legs & weight extensions
Tim McCarver suggests Yoga
Needham High School

Yoga required all seniors: Principal emphasis: stress reduction

At Needham High School in Needham, Mass., yoga classes are required for all seniors.
Is Stretching All It’s Cracked Up to Be?

NY Times 8/7/08

3 large “Stretching Studies” underway
United States, Australia, Norway
Soloflex: whole body vibration therapy platforms

Our new contraption beats you into shape!

It works for doggies, too.
What do you think?

- **Claims:** Increases bone density in turkeys, sheep, rats.
- “Like moderate weightlifting.”
- **10 minutes/day:** improves circulation, strength, flexibility, balance, mood, vitality.
- **Relieves:** joint & muscle pain.
- **Application:** frail elderly, people with disabilities.
IS DANCING EXERCISE?

Middle schools- combat obesity

Adopt Dance Dance Revolution (DDR)

Floor mats/Japanese video/electronic music: strenuous, use brain

New P.E.- less competitive vs. team sports

“You don’t have to be good at it to get good work out” (Times 4/30/07)
EXERCISE: Do you need it?