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
  - ↑ Tissue sensitivity to <u>insulin</u>

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

15%

Healthy, non-runners

34%

Sedentary People

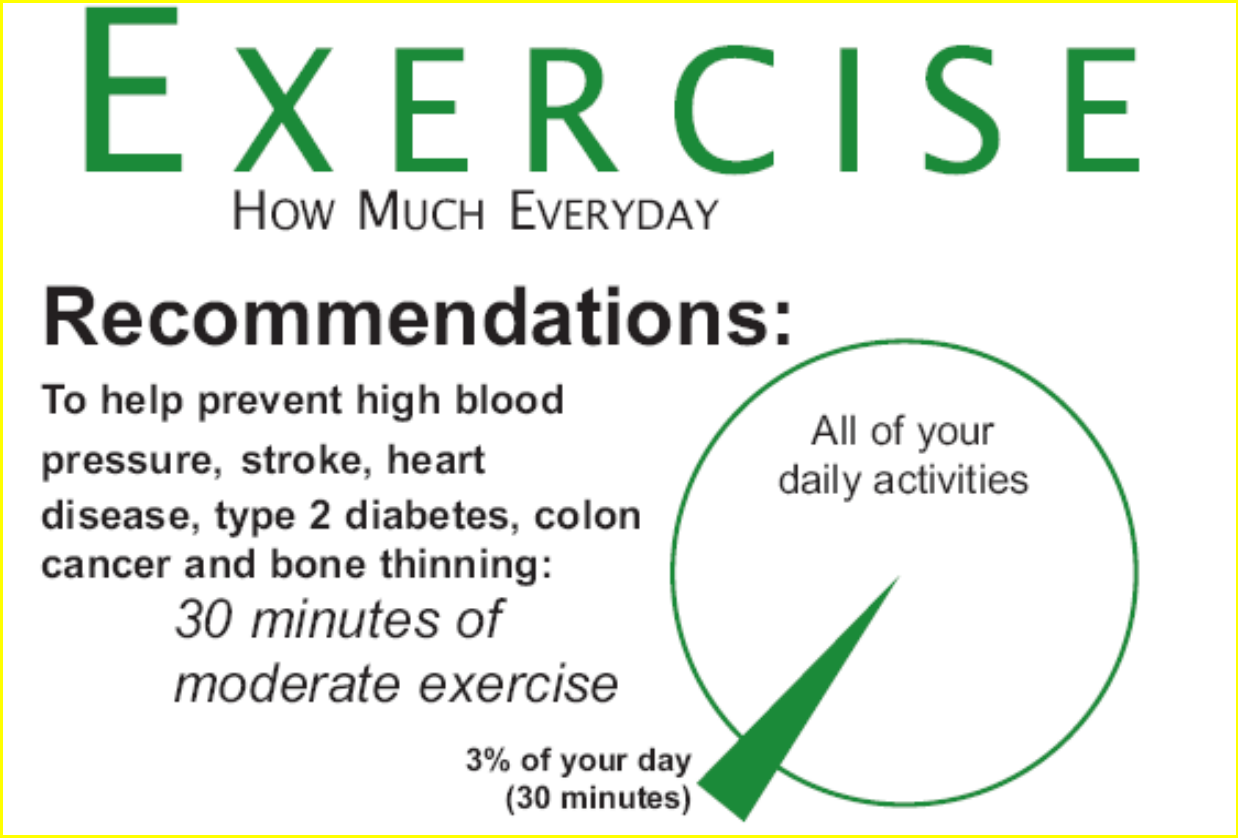
↑ Chronic diseases

↑ Overweight/obesity

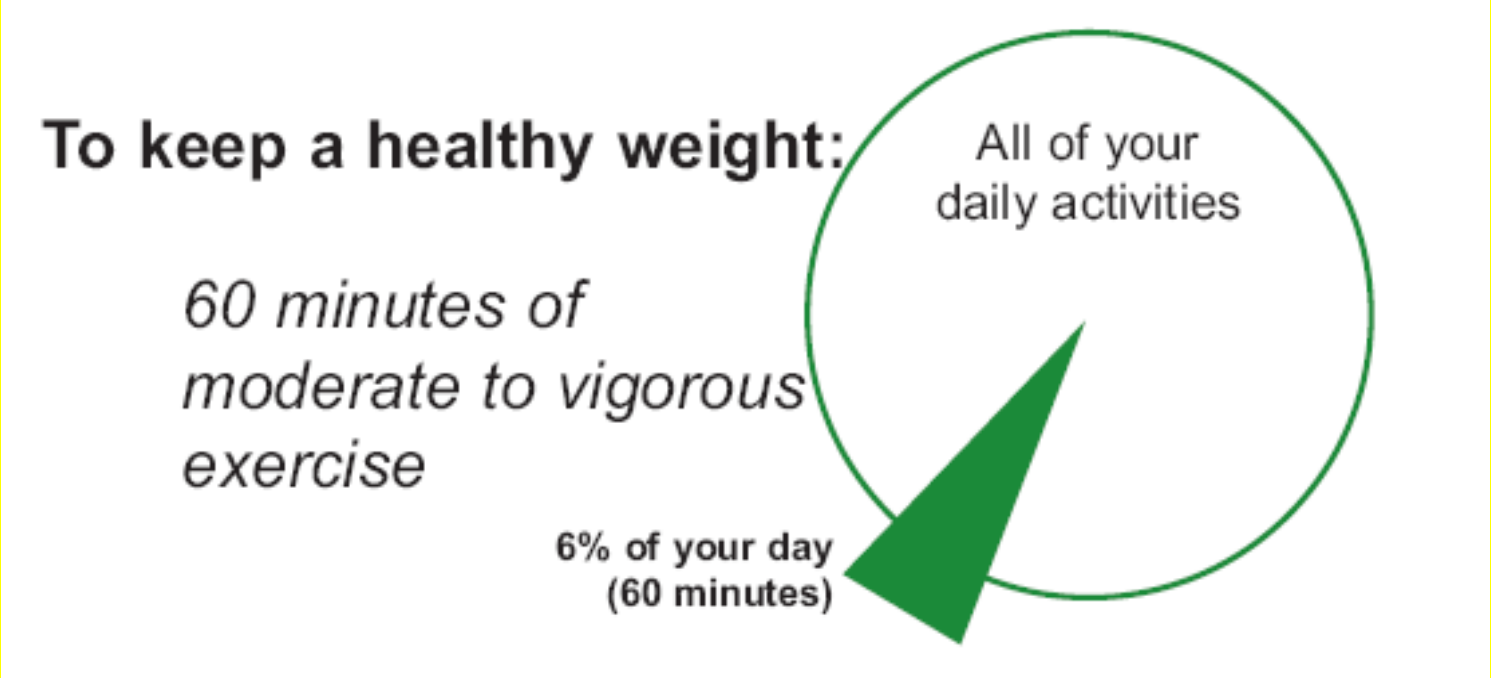
"Doing **something** is better than doing nothing for inactive people"

Nutrition & MD (2005)

Recommendations: Dietary Guidelines: **30 minutes**



Recommendations: Dietary Guidelines: **60 minutes**



Recommendations: Dietary Guidelines: **90 minutes**

Recommendations: Dietary Guidelines

What's most important?

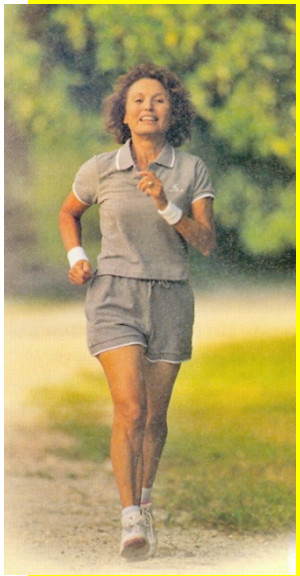
Answer: the **"total"** amount of exercise everyday

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

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

EXERCISE

TYPES OF GOOD EXERCISE



Recommendations:

AEROBIC, VIGOROUS

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

RESISTANCE:

Weight (strength) Training, Callisthenics
Stength - 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

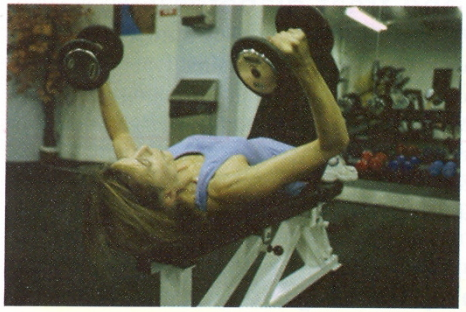


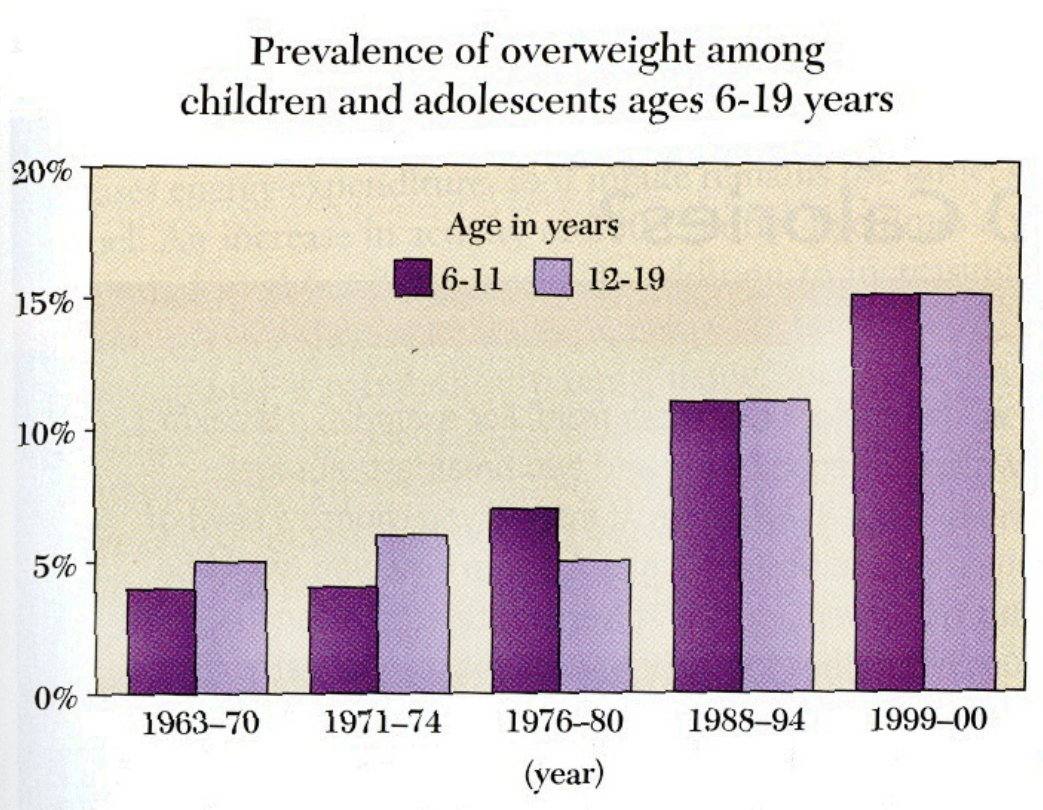
FIGURE 11.2

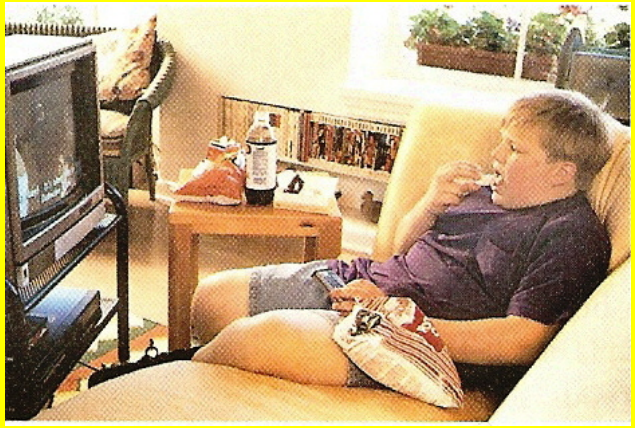
Increasing muscle strength requires hard work. It is accomplished by using your muscles to push and pull against a resistance such as a heavy weight. (© LWA-Dann Tardif/ Corbis Images)

FIGURE 11.3

Stretching muscles to increase and maintain flexibility can make movements easier and reduce the risk of injury. (David Madison/ Stone/Getty Images)

Special Populations: Children





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

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)

Nurses' Health Study: 120,000 nurses

Burn 2000 calories/week: ↓ breast cancer risk

2000 calories =

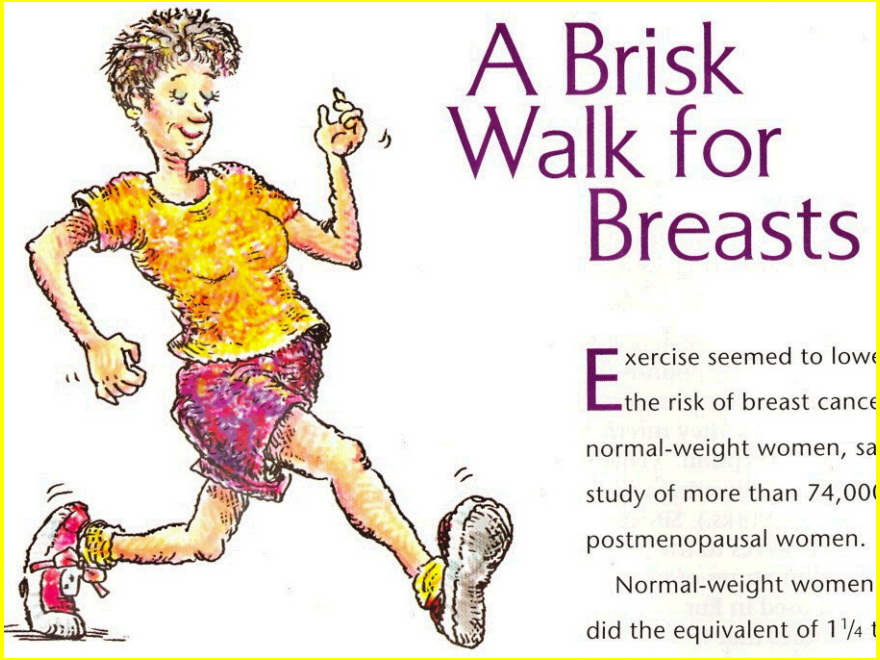
- Walking briskly **3-5** hours
- Housework **10** hours
- Bowling **8** hours
- Raking leaves **7** hours
- Leisure Biking **5** hours

2003 study

- Normal weight women
- 1.25-2.50 hr/week

Brisk Walking

- **↓ 30%** risk breast cancer



Bernyce Edwards' daughter died- breast cancer at age 42 in 1997

Peter Yates for The New York Times

ZEALOUS RUNNER Bernyce Edwards, 73, near her home in Bellingham, Wash. She began running regularly after her daughter died of breast cancer.

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

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

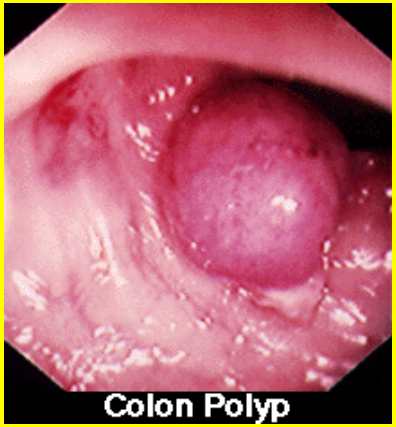
- Many studies

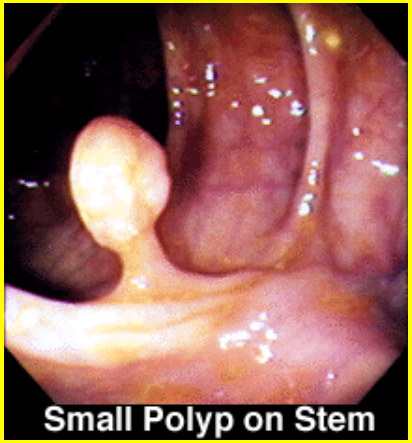
  ↑ exercise ↓ colon cancer

- Major problem: getting people to start exercising/sticking with it

Exercise & Colon Cancer

- After colonoscopy: **polyps** (pre-cancerous) 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:

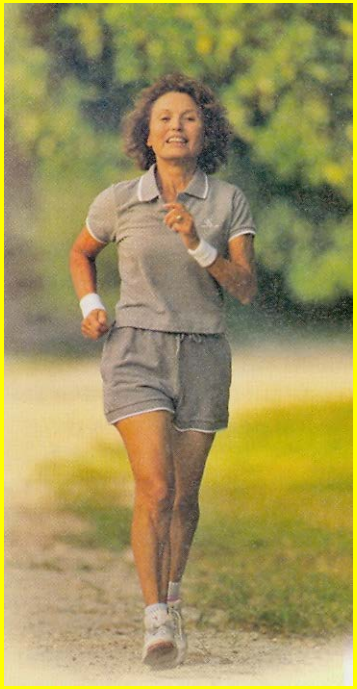
↓ **total food** ↑ **fruits/veggies**

↓ **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) <u>without</u> exercise
- ↓ Bone density
- <u>Exercising</u> to lose weight: no loss bone density

Exercise to build strong bones

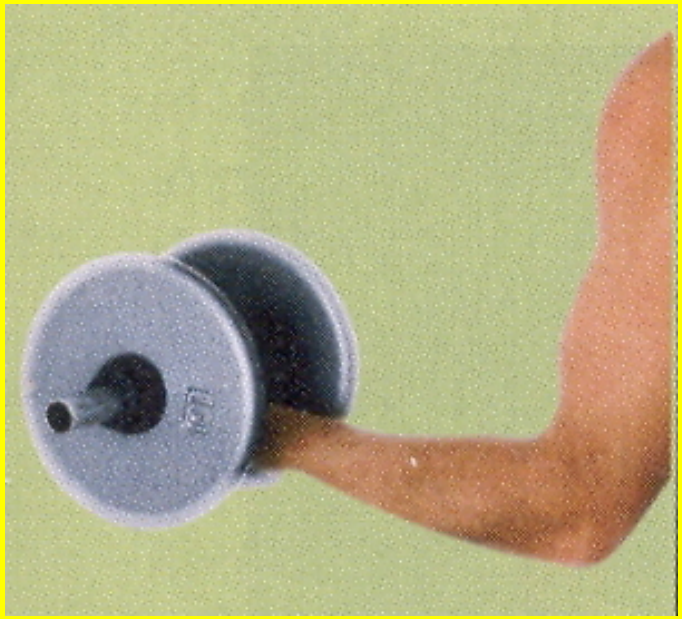
- Bones get bigger/healthier: <u>weight bearing & resistance exercises</u>
- Critical time: childhood → teens to reach peak bone mass
- Bone loss: lack of use

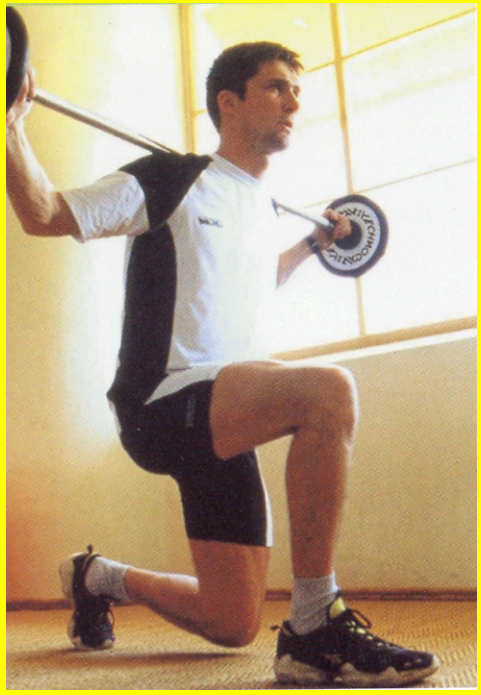
Build strong bones

- 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

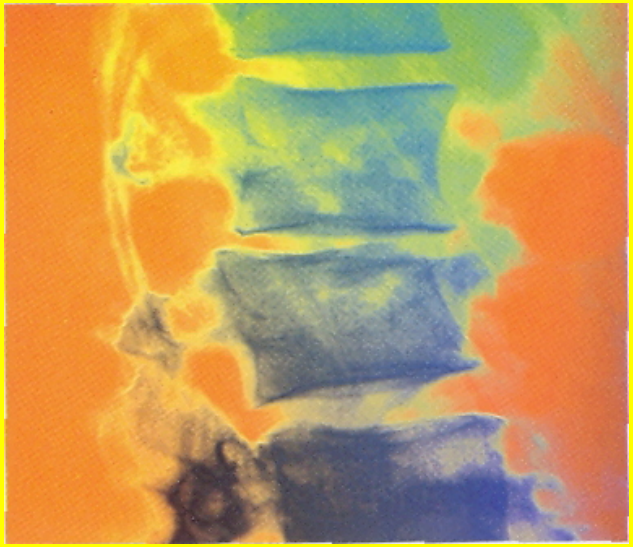
  Men > Women

  ↓ Smoking ↓ alcohol

  ↑ Weight bearing exercises, calcium intake

Osteoporosis

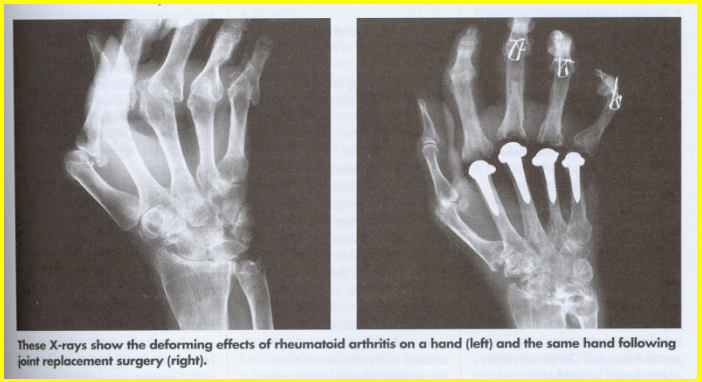
- Reduction in bone mass
- ↑ Bone fragility
- ↑ Bone fractures



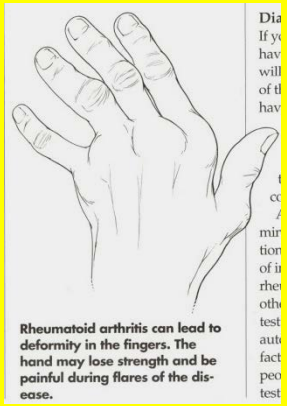
Exercise & Arthritis

Heberden's nodes are bony lumps at the ends of fingers. They occur most often in women and may be a sign of osteoarthritis. Although initially painful, Heberden's nodes often are of little more than cosmetic concern.

- Northwestern University 2006 study
- People 53-63 with osteoarthritis
- Exercised **30** minutes- moderately or **20** minutes-vigorously most days



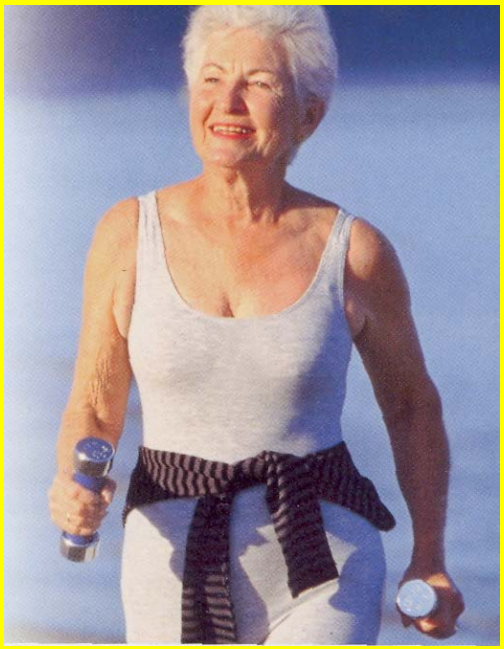
These X-rays show the deforming effects of rheumatoid arthritis on a hand (left) and the same hand following joint replacement surgery (right).



Rheumatoid arthritis can lead to deformity in the fingers. The hand may lose strength and be painful during flares of the disease.

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

- 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

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

- 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: ↑ dramatic blood flow

Carry **"growth factors"** → brain

↑ New neurons & connections

Weight lifting: growth factors stay in **muscles**

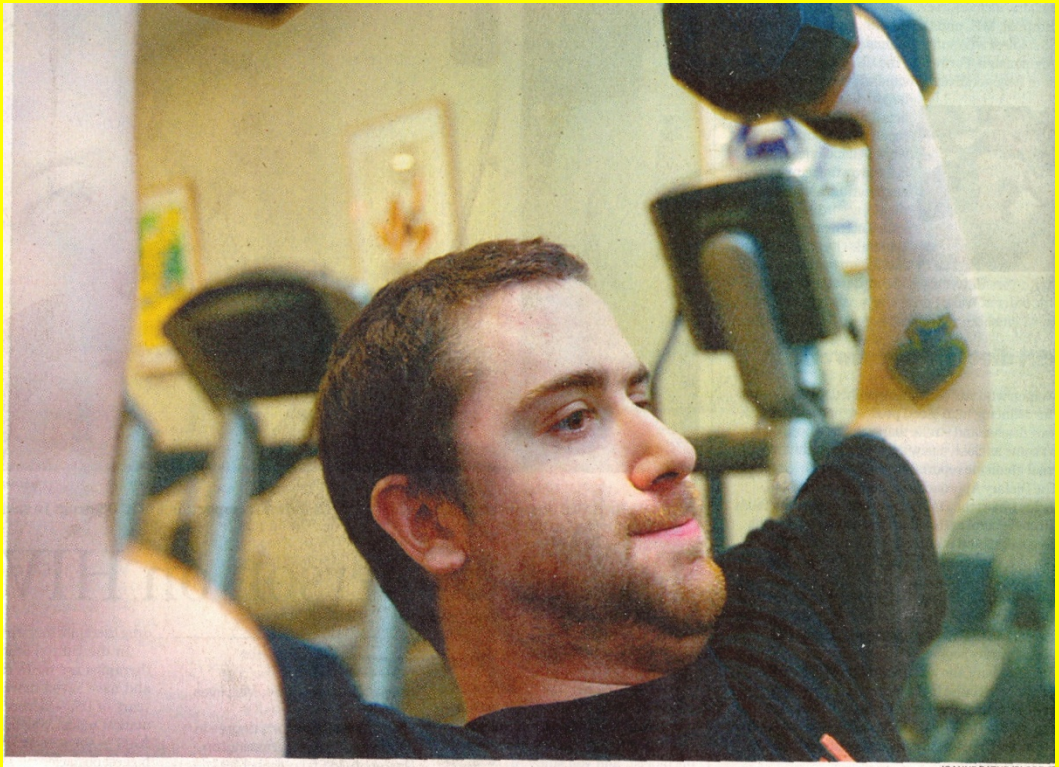
Exercise and Alzheimer's Disease

- 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



JOANNE RATHE/GLOBE ST

Theo Baars uses weights in the exercise room at the recreation center as part of his treatment for depression at McLean Hospital in Belmont.

Mood lifting

Growing evidence suggests that exercise is as good for your mental health as it is for your physical well-being

Exercise and Depression (↓)

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

How does exercise help?

- Brain **serotonin** (neurotransmitter)- **mood**
- Stress-reducing hormone- from heart muscle

Children's Brains and Exercise

University Illinois

2010 Study

- 2 groups:

  same BMI
- Based on

  treadmill test:
- **High fit vs. low fit kids**

High fitness kids

- Better test scores
- Large brain basal ganglia (measured by MRI)
- Better coordination of action & thoughts (Executive Control)

Children's Brains and Exercise

Second study

Unfit or overweight children

20 minutes walking

Before cognitive test

TEST SCORES

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’ & 50’s**
- Women less muscle, live longer than men, show effects weaker muscles- daily activities

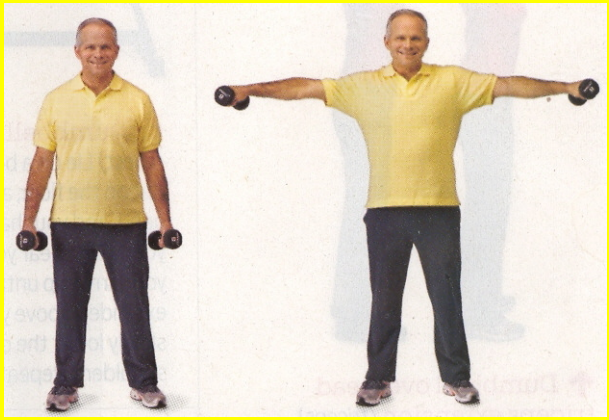
- ↓ muscles ↓ metabolism → burn fewer calories

- 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



Today major emphasis

Geriatric Medicine

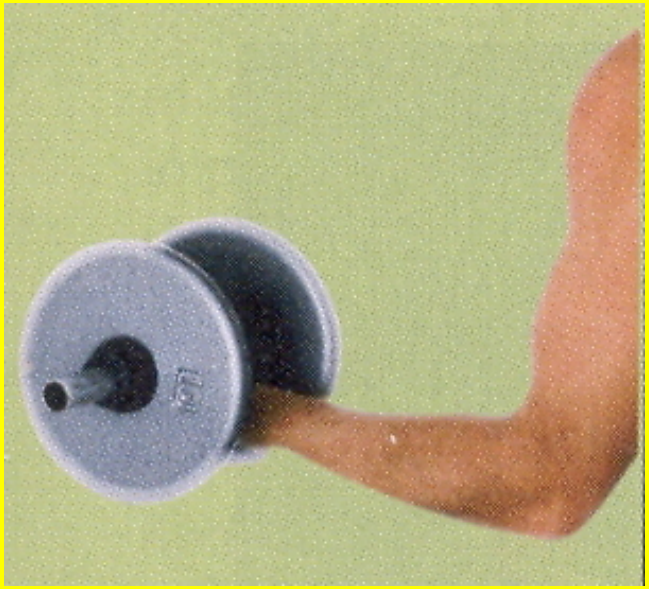
- **Muscle loss**
- Why older people:

1) Lose mobility

2) Can't live independently

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):

  ½ 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**

Recalibration of women's maximum heart rate: new formula

206- 88% of women's age

Ex. 20 yr X .88= 17.6

206-17.6= **188.4**

Target rate- exercise

188.4 X (range) .60 to .85

Regular Aerobic Exercise

- Become more fit ↑ endurance
- Heart pumps more blood ↘
  ATP's ← greater use O_2 ← muscles
- ↓ Resting heart rate: rate needed to supply tissues at rest
  (measured in morning before getting up)

Measure your heart rate

FIGURE 11.1

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)

Stretching should be included in the warm-up and the cool-down for exercise.

Is stretching good before you exercise?

Yoga and Pitchers

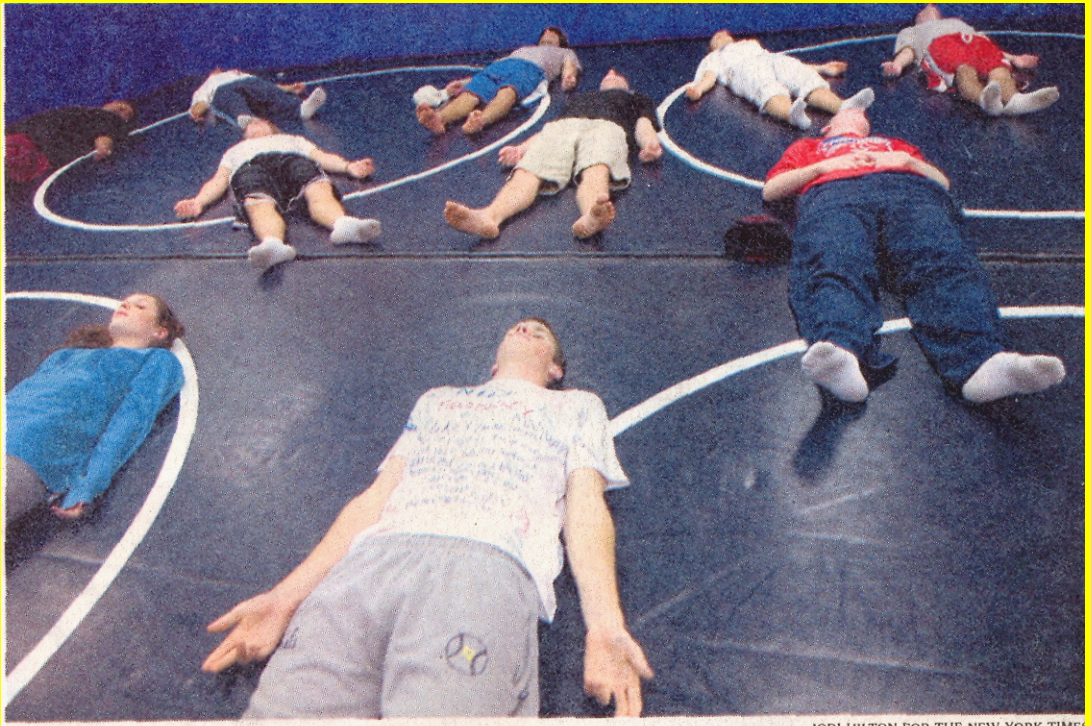
- Training in California: meditate, stretch, **yoga**, music, visualize being on mound
- Block out distractions
- Improve balance, ↓ anxiety, deep breathing
- Arm stretching: rubber tube

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)

Needham High School

Yoga required all seniors: Principal emphasis: **stress reduction**



JODI HILTON FOR THE NEW YORK TIMES

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"

United States, Australia, Norway

www.usatf.org/news/view

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

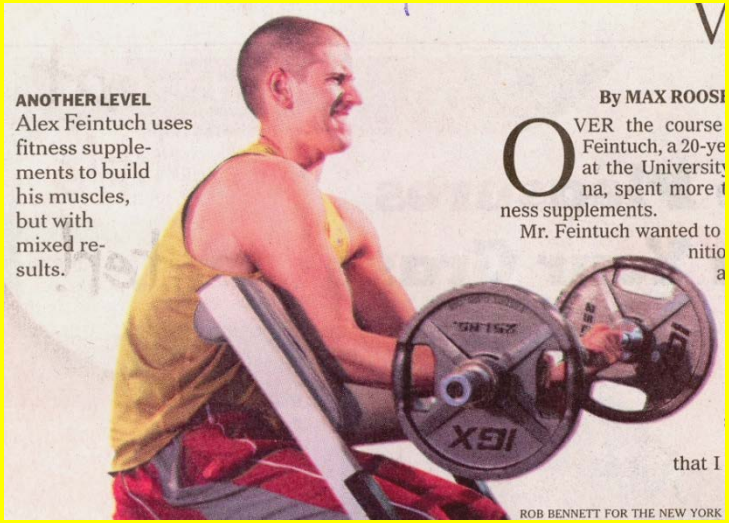
"You don't have to be good at it to get good work out" (Times 4/30/07)

“When gym isn’t enough”

Fitness Supplements

- $2.7 billion industry
- Focus- young men
- Supplements:

1. Poorly regulated FDA
2. Ingredients not uniform
3. Caffeine-often main ingredient



Alex Feintuch- wanted more size/definition muscles- quick results

Spends **$1000** supplements

Gunnar Peterson: trainer- Jennifer Lopez, Tom Brady: “Real food is the way to go”

Docs: Athletes-normal diet don’t need supplements

Tai Chi: Slow gentle graceful movements, deep breathing, relaxation

Tai Chi

- ↓ **Stress Reduction**
- ↓ **Osteoarthritis pain**
- ↓ **Depression**
- **Fibromyalgia:** mostly women- **chronic pain**
- **Tai Chi:** Reduces pain, fatigue, sleeplessness, depression

  (2010 Tufts University Study)