Fitness for Life

Staying Healthy

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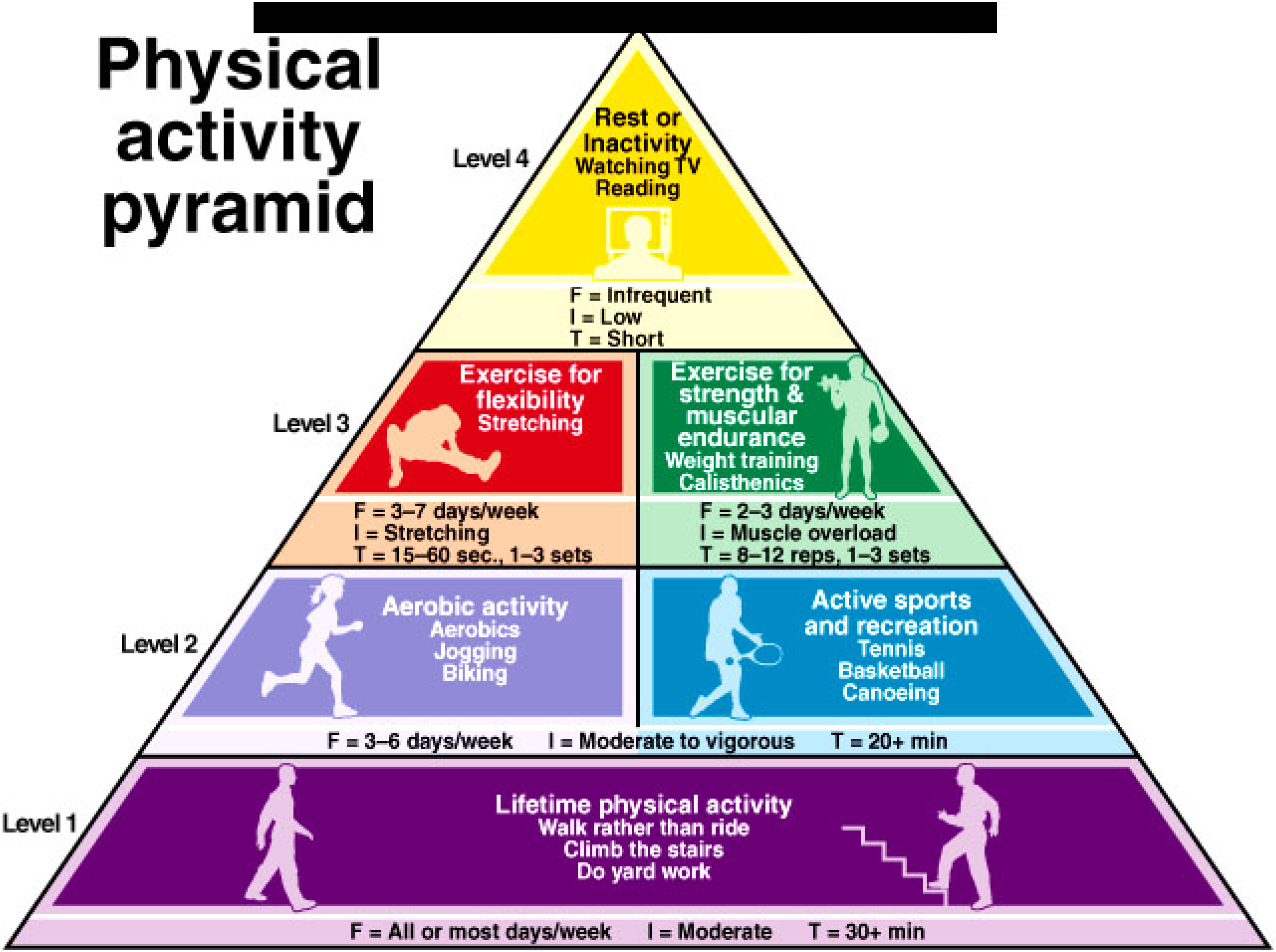
LET’S TALK EXERCISE

EVERYONE KNOWS THEY SHOULD DO IT!

Today's Agenda

- Physical Activity
- Exercise
  - Aerobic
    - Cardiovascular Disease
    - Recommendations
  - Anerobic
  - Flexibility
- Safety

Physical activity pyramid



Aerobic Exercise

- **What do we mean when we say aerobic?**
- FIT / FITT Principle
  - **Frequency** = How often (# days per week)
  - **Intensity** = How hard (% of heart rate)
  - **Time** = How long
  - **Type** = What mode of physical activity

Working Heart Rate

(Sample calculations: 30-year-old; resting HR of 68)

Max HR - Rest HR = Heart Rate Reserve

193 - 68 = 125

40% of HRR = 50

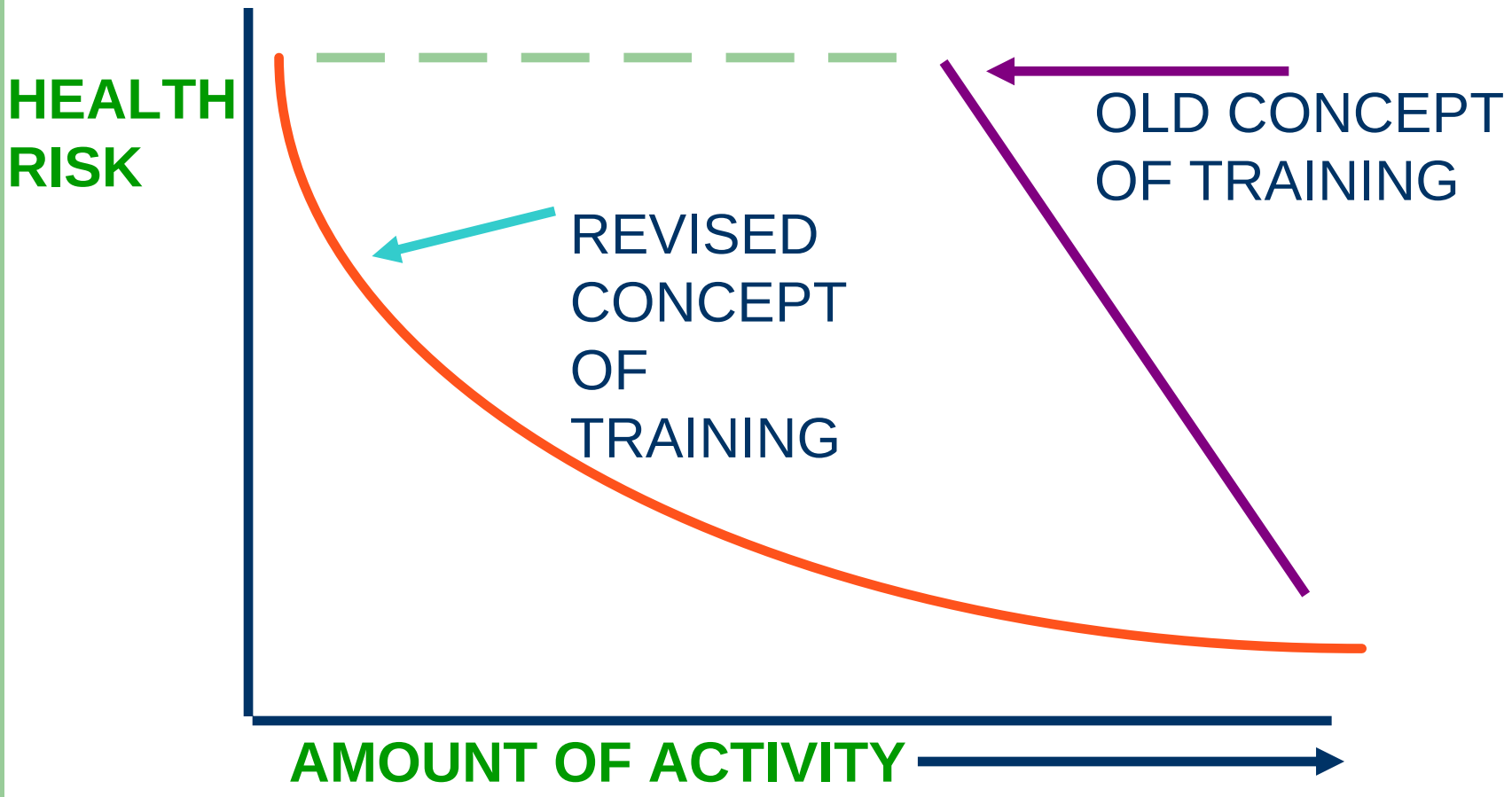
85% of HRR = 106

Lower Limit = 50 + Rest HR (68) = 118

Upper limit = 106 + Rest HR(68) = 174

Exercise Continuum

Some is Better than None



Principles of Physical Activity

- **Overload** = Doing more than normal! Progress @ a steady gradual increase
- **Specificity** = concentration within a specific area skill/health or specific muscle group
- **Reversibility** = Use it or lose it!
- **Dose-Response** = Larger doses of physical activity has greater benefits
- **Diminishing Returns** = The more you gain, the harder additional benefits are to achieve

Current ACSM & CDC Recommendations

- “Every U.S. adult should accumulate 30 minutes or more of moderate-intensity physical activity on most, preferably all, days of the week”
- 150 Kcals.

Surgeon General’s Report on Physical Activity and Health:
http://www.cdc.gov.nccdphp/sgr/sgr.htm

Why Aerobic?

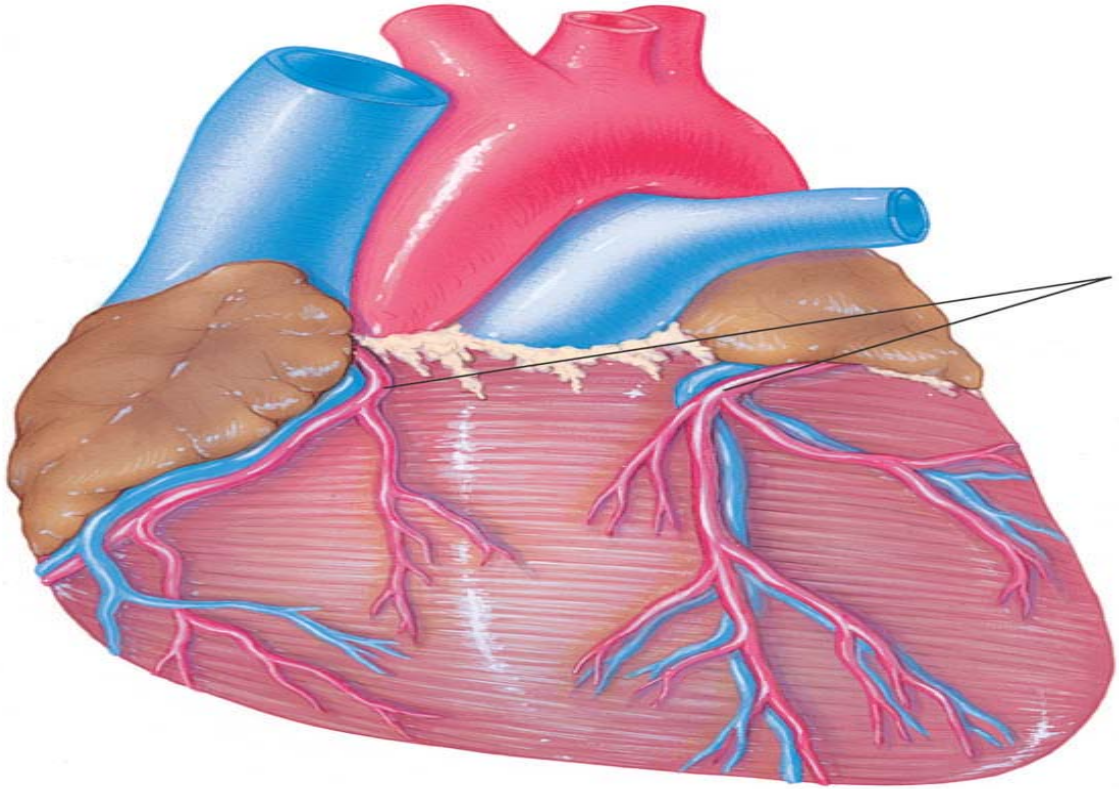
Cardiovascular Disease

#1 Killer of Americans

Definitions

- **Chronic Disease** –associated with lifestyle environmental factors.
- **Sedentary Death Syndrome (SeDS)** – Symptoms associated with sedentary lifestyles.
- **Cardiovascular Disease (CVD)-** disease of the heart and blood vessels (Coronary heart disease, high blood pressure, stroke, peripheral vascular disease

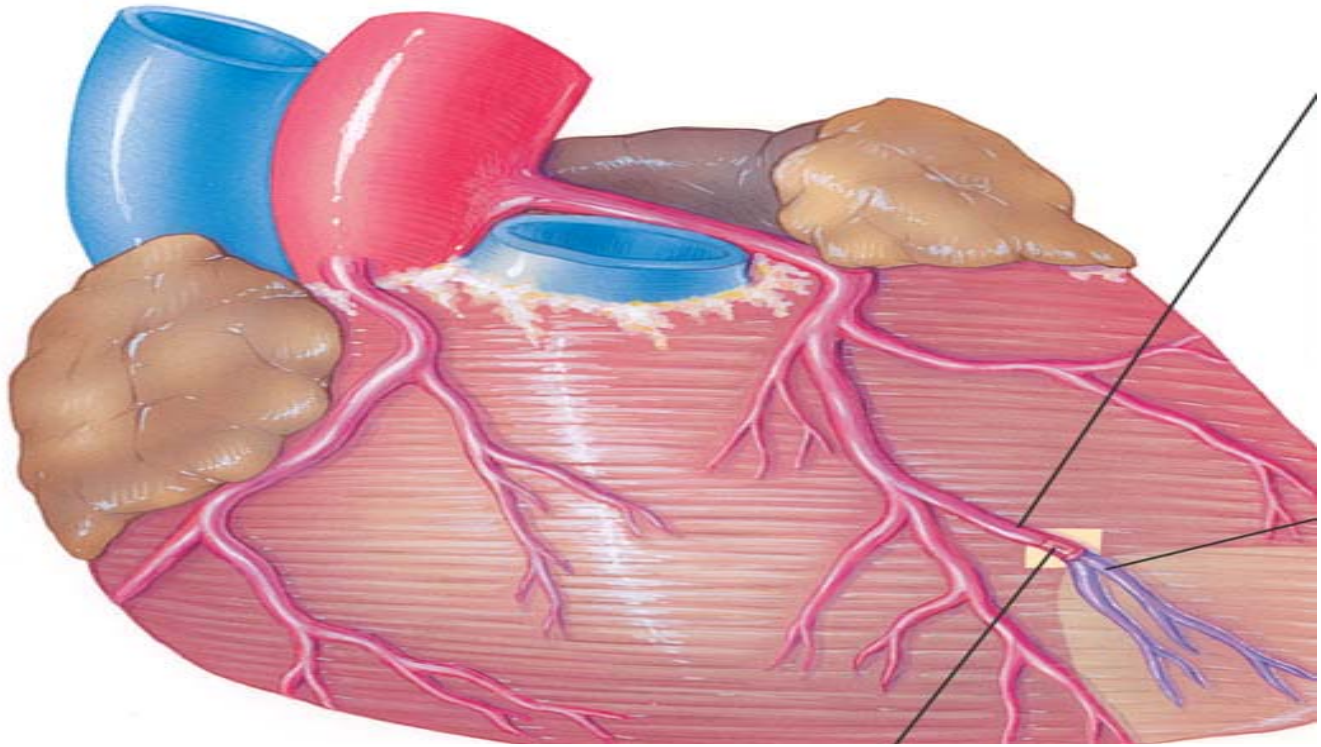
Fit Heart



Open, healthy coronary arteries

Strong Thick Heart Muscle

Unhealthy Heart



Clot & Narrowed Arteries

Clot

Death of Tissues

CVD Positive Risk Factors

- **Family History –** Cardiac event or death before age of 55 years of age in father or other male first-degree relative or female before the age of 65 years

- **Smoking –** current cigarette smoker or those who quit within the previous 6 months

- **Hypertension –** Systolic blood pressure of $\geq$ 140 or diastolic $\geq$ 90

CVD Positive Risk Factors

- **Hypercholesterolemia –** total cholesterol > 200mg/dL – LDL > 130mg/dL or HDL < 40mg/dL
- **Elevated fasting blood glucose -** ≥ 100 mg/dL
- **Obesity –** BMI ≥ 30 or waist girth of >102 cm for men and >88cm for women
- **Sedentary Lifestyle**

Negative Cardiovascular Risk Factor

- HDL – “Good” Cholesterol
- You want HDL levels to be high
  - Above 60 mg/dl – If HDL levels are above 60 it becomes a **negative risk** factor so it cancels out a positive risk factor
- Example – 3 positive risk factors
  - 1. smoking
  - 2.high resting glucose,
  - 3.sedentary
  - Total of 3 positive risks factors

  **but an individual has High HDL levels 3-1 = 2 risk factors

Risk Stratification

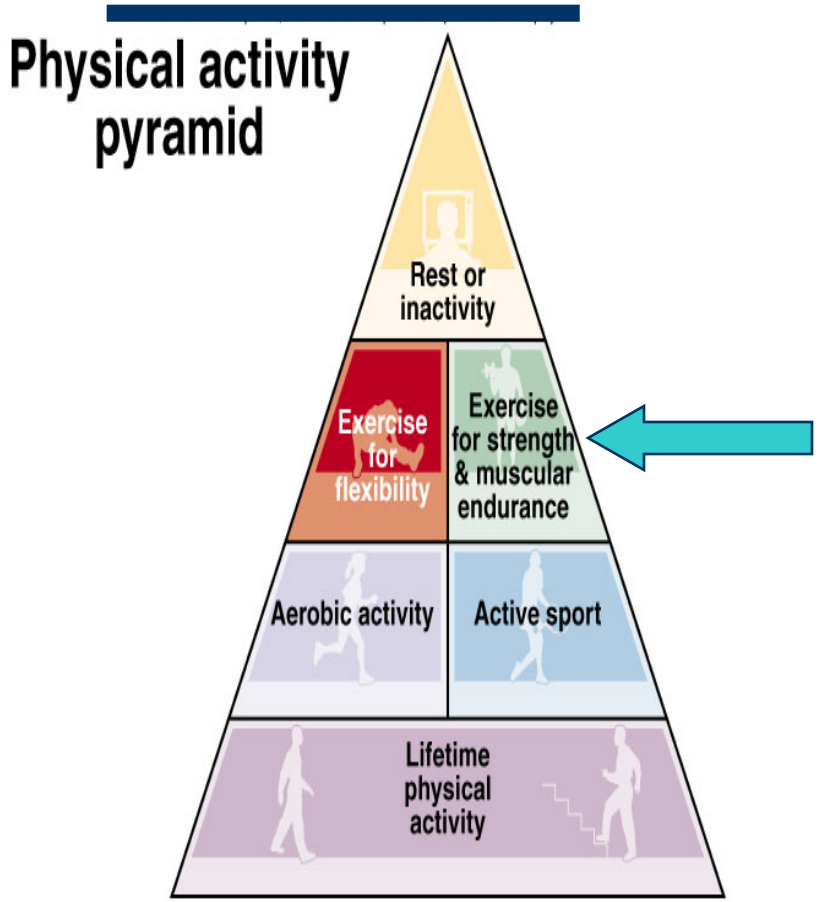
- Low Risk – Young & no more than one risk factor.
- Moderate Risk – Male >45 years
  female > 55 years. OR - if you have two or more risk factors.
- High Risk – Individuals with one or more signs, symptoms OR known cardiovascular, pulmonary, or metabolic disease such as diabetes

Case Study

- Jim is a 30 year old LEK senior associate. Both of his parents died of cardiovascular disease. He quit smoking about 3 years ago. His resting blood pressure is 139/89. His cholesterol is 218mg/dl. His HDL level is 60 mg/dl. His blood sugar level is 110 mg/dl.
- For recreation, he rides his mountain bike & plays tennis. He exercises at least 3x per week for 30 minutes each day. He has type I diabetes.
- What risk category is Jim in given his history?

Anerobic - Muscle Fitness

Health Benefits of Muscular Fitness



- Strength and muscular endurance promote muscular fitness and provide important health benefits
  - Avoiding back problems
  - Reducing risks of injury
  - Reducing risks of osteoporosis

Muscular Strength

- Able to lift a heavy weight
- Able to exert a great force

Muscular Endurance

- The ability to perform repeated muscular contractions

Terminology

- **Hypertrophy** – Increase in the size of the muscles as the result of strength training.
- **Absolute Strength** – The maximum amount of force one can exert
  - Example: the maximum number of pounds or kilograms that can be lifted on one attempt
- **Repetition Maximum (RM)** – The maximum amount of resistance one can move a given number of times

Terminology

- **Sticking Point** – The point in the range of motion where the weight cannot be lifted any farther without extreme effort or assistance

- **Plyometrics** – Training technique to develop explosive power

Relative Strength

- The amount of weight lifted relative to the person's body weight
- Measured as a ratio:

$$\text{Relative Strength} = \frac{\text{weight lifted (lb.)}}{\text{body weight (lb.)}}$$

- When expressed relative to lean body weight, women have similar relative strength as men!

Sample Calculation

- Question: Who's stronger:
  - A: 250 pound person who can lift 200 pounds
  - B: 150 pound person who can lift 175 pounds

- Answer: B
  - A: relative strength = 200/250 = .80
  - B: relative strength = 175/150 = 1.17

Resistance Training Principles

- Overload
- Progression
- Specificity
- Rest / Recovery

Facts about Resistance Training

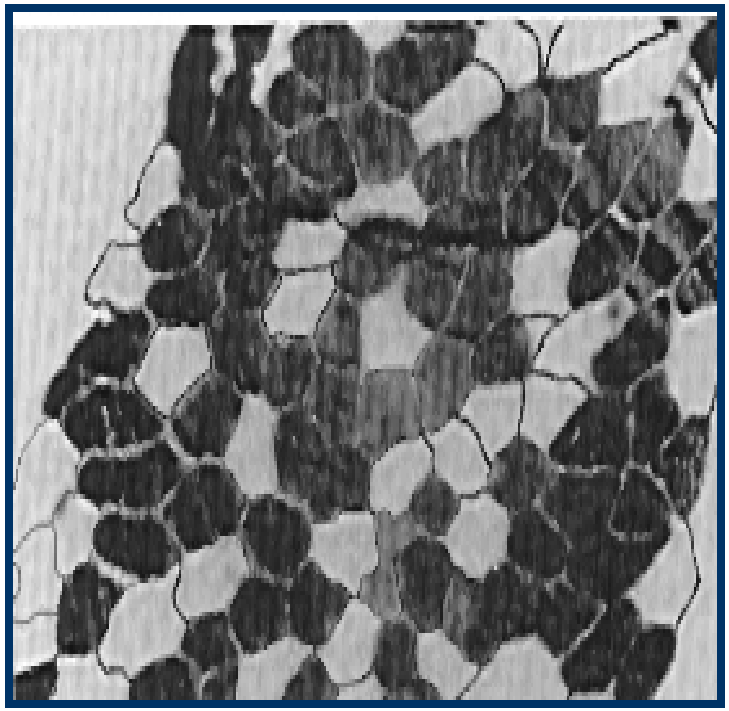
- Everyone can gain strength and endurance
- NOT everyone will improve to the same extent (genetic predisposition)
  - Adaptations depend largely on the muscle fibers type distribution. Fast twitch muscle fibers adapt more readily.

Factors Influencing Strength

- Gender
- Age
- Anatomy
- Genetics – Muscle fiber type
- Drugs
  - Anabolic steroids
  - Human growth hormone

Note: These drugs are highly dangerous and have permanent and life threatening consequences

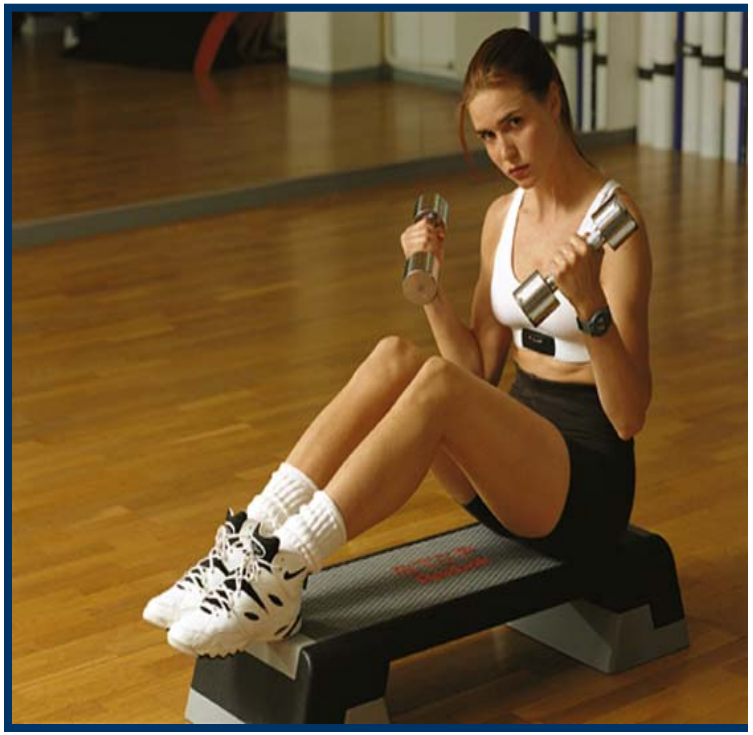
Muscle Fiber Types



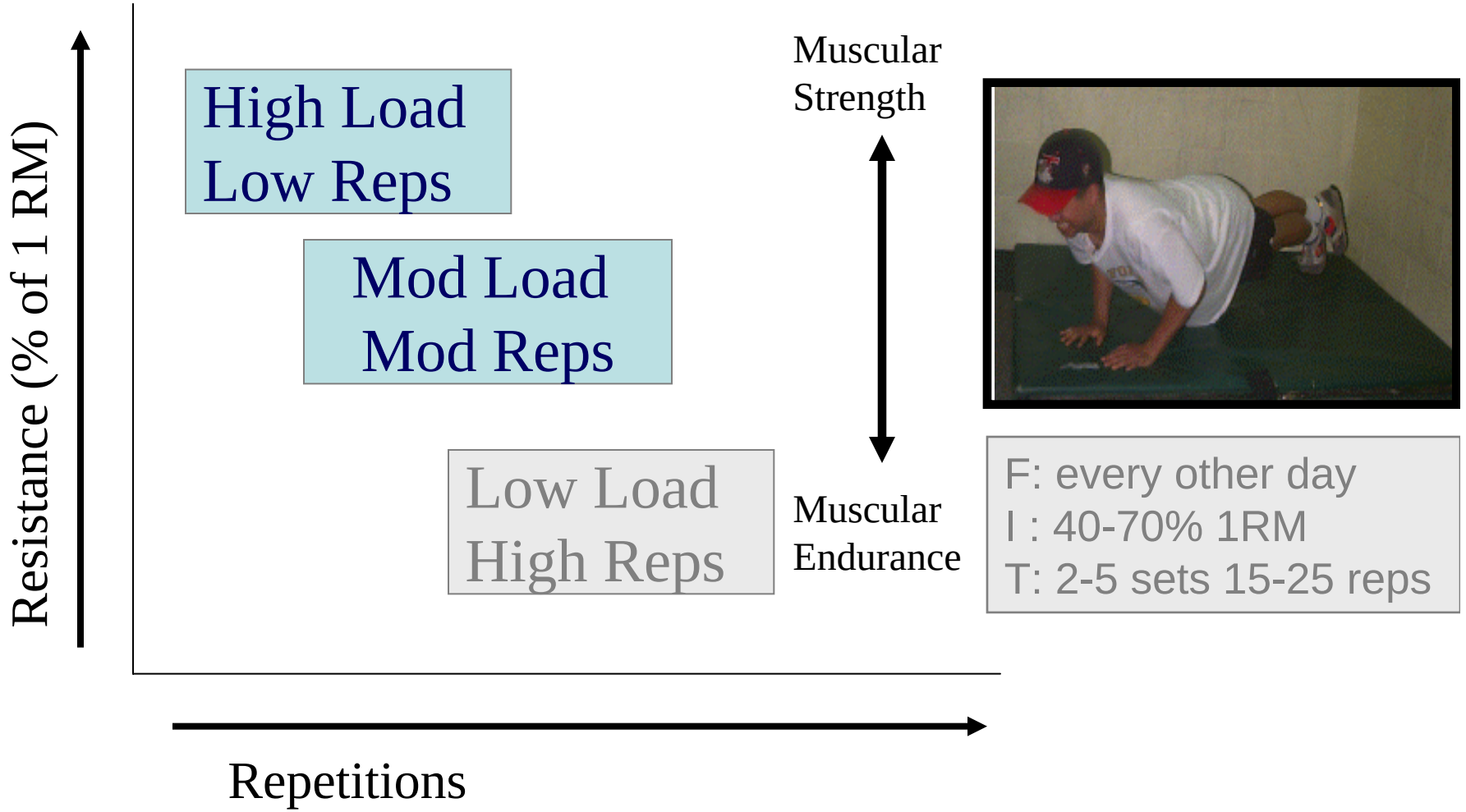
- Fast Twitch Fibers
  - Stain light in color
  - More anaerobic
  - Suited to strength and speed activity
- Slow Twitch Fibers
  - Stain dark
  - More aerobic
  - Suited to endurance activity

Myths about Resistance Training

- No pain - no gain
- Makes you “muscle bound”
- Fat can be converted into muscle
- Extra muscle turns to fat if not used
- Has masculinizing effect on women

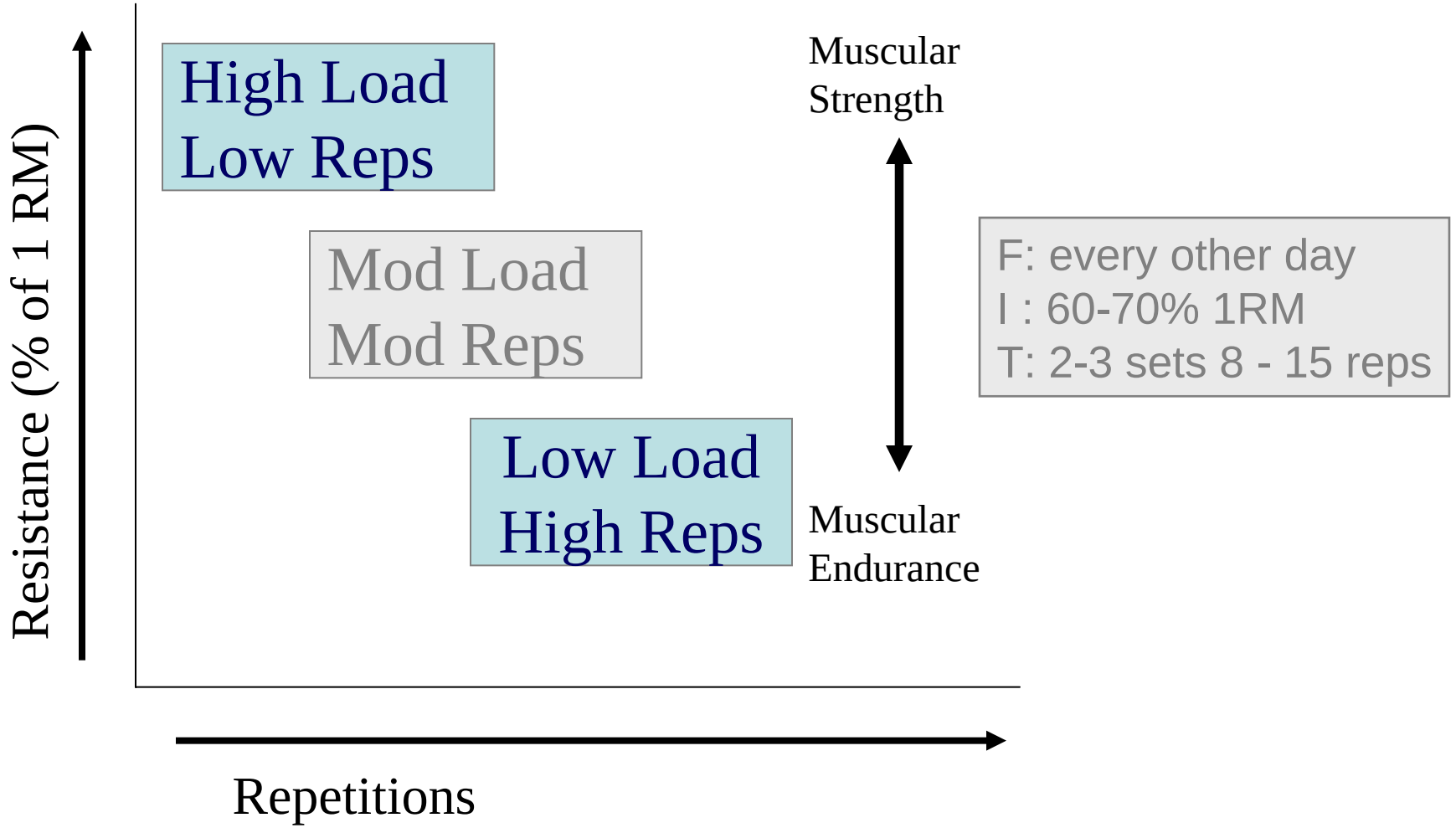


Stimulus for Endurance

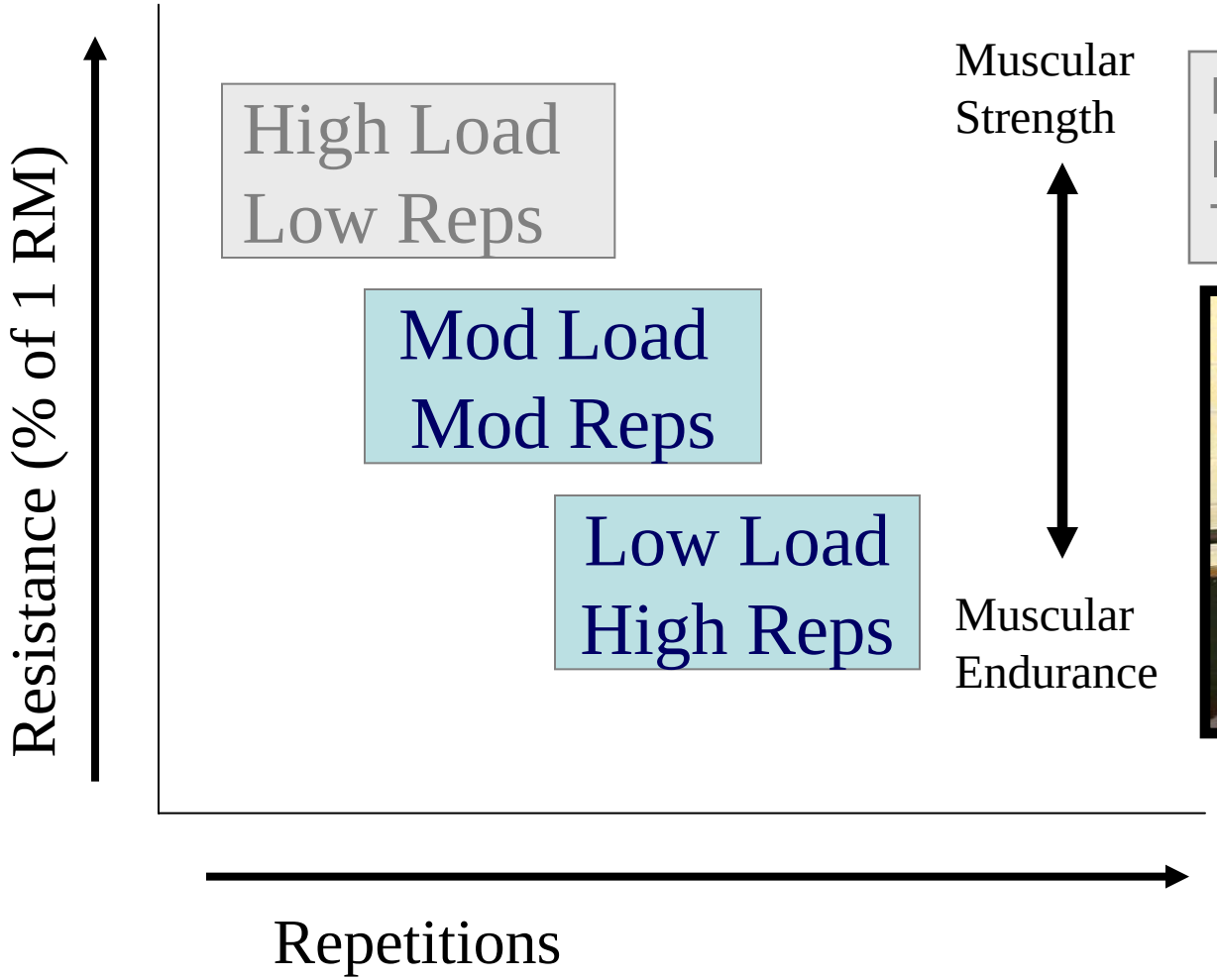


F: every other day
I : 40-70% 1RM
T: 2-5 sets 15-25 reps

Stimulus for Overall Muscle Fitness



Stimulus for Strength



Muscular Strength

Muscular Endurance

F: every other day
I : (80% 1RM)
T: 3 sets < 8 reps

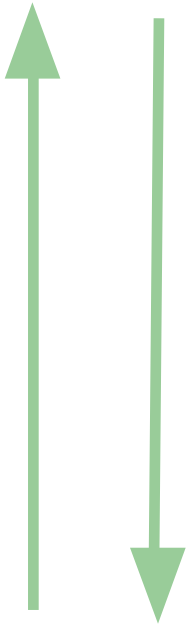
Training Considerations

- Start slowly
- Use good technique
  - Lift in a controlled manner
  - Exhale during effort – Workload
  - Inhale on the non-workload phase
  - Bring weight down slowly
- Allow time for recovery
- Expect plateaus

Types of Contractions

Concentric vs. Eccentric

Concentric
(shortening)
LIFTING



Eccentric
(lengthening)
LOWERING

Both phases can build muscle!

Concentric & Eccentric

- Exhale during the work phase
  - Work phase = Concentric phase (shortening or contraction of the muscle group)
  - Resistant force < Muscle force (Muscle force used to lift the wt.)

- Inhale during the non-work phase
  - Non-work phase = Eccentric phase (lengthening of the muscle group)
  - Resistant force > Muscle force (Gravity helps to lower wt.)

Order of Exercise

- Large muscle groups first
- Small muscle groups first (pre-exhaust)

There are many different ways to order exercises within a workout.

Muscle Groups

- Sport-specific training
- Overall muscle balance

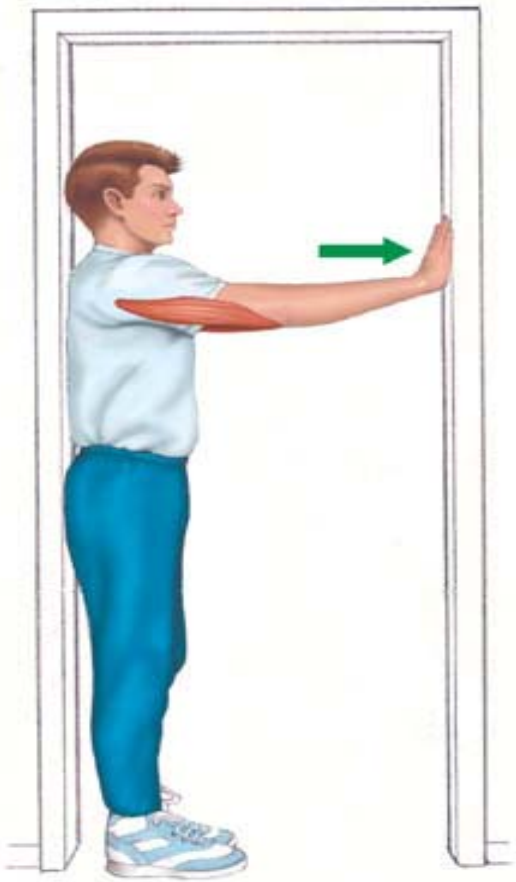
Most resistance training programs should include exercises for all major muscle groups

Choice of Equipment

There are advantages to both types of equipment

Isotonic

Isometric



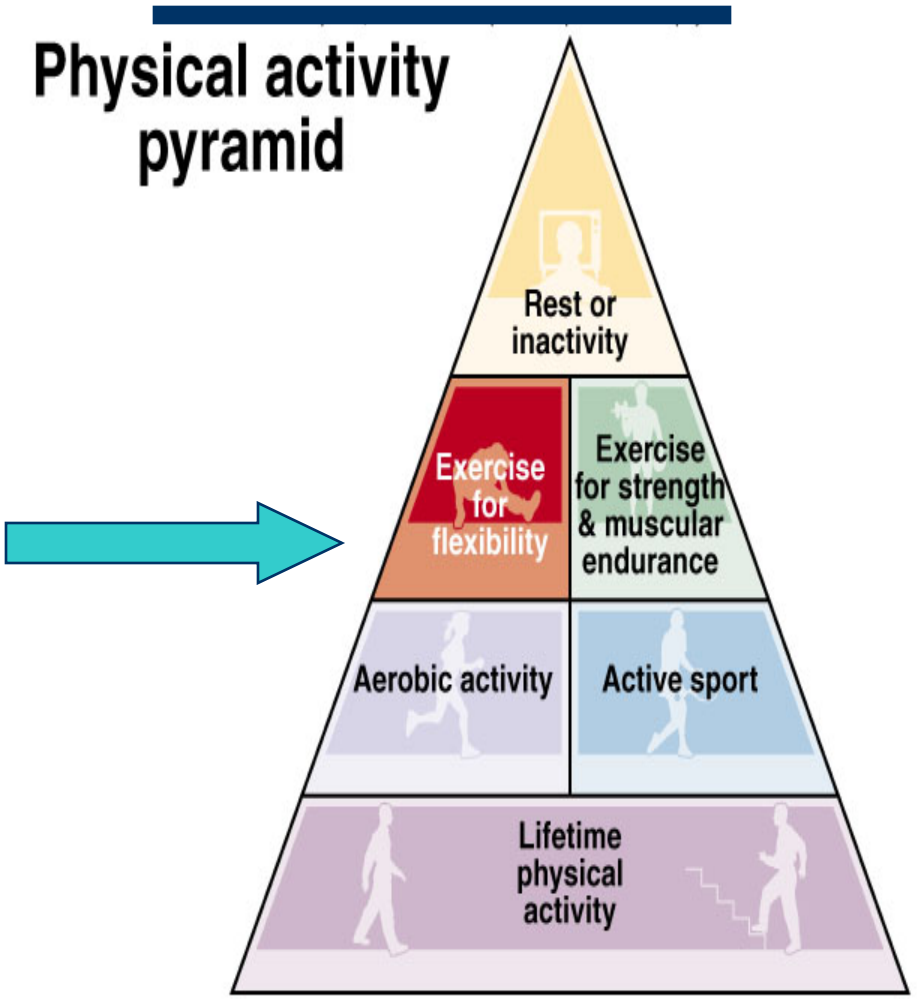
Isokinetic

Importance of Flexibility

Flexibility

- **Range of Motion (ROM)** – Full motion of a joint. Extensibility of ligaments, the surrounding muscles and the tendons that connect the muscles

- Flexibility is an important but often neglected part of an exercise program
- The importance of flexibility for health and well-being becomes more important with age



Benefits of Flexibility

- Decreased risk of back pain
- Decreased risk of injury

Flexibility and Back Pain

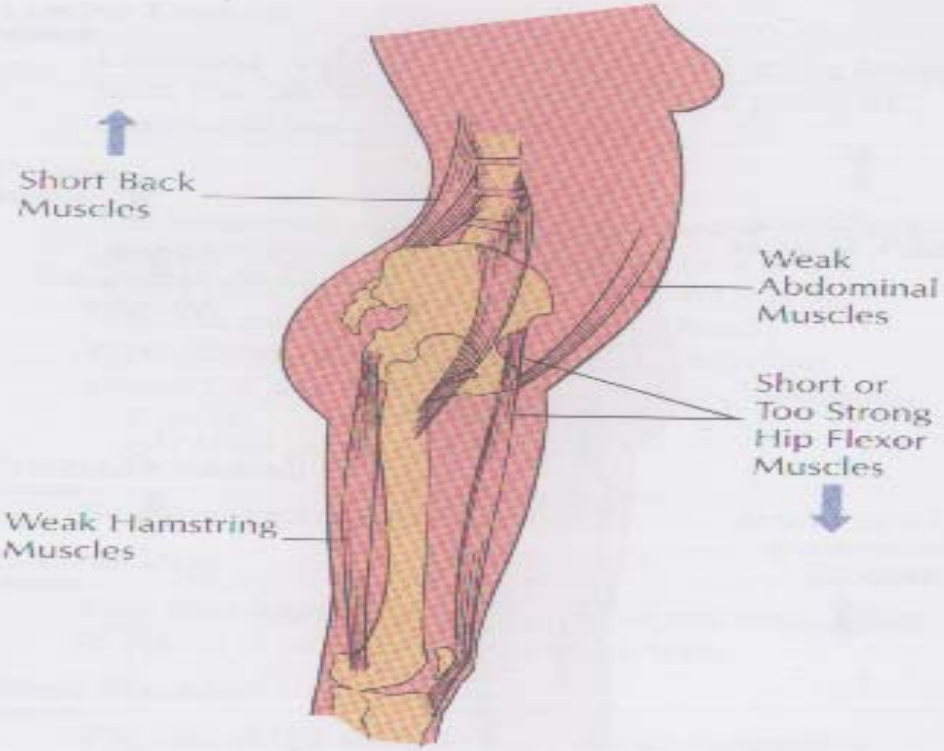


Figure 16.3
Unbalanced muscular development may cause poor posture or back problems.

- Short and tight muscles cause poor posture which leads to back pain

Flexibility and Back Pain

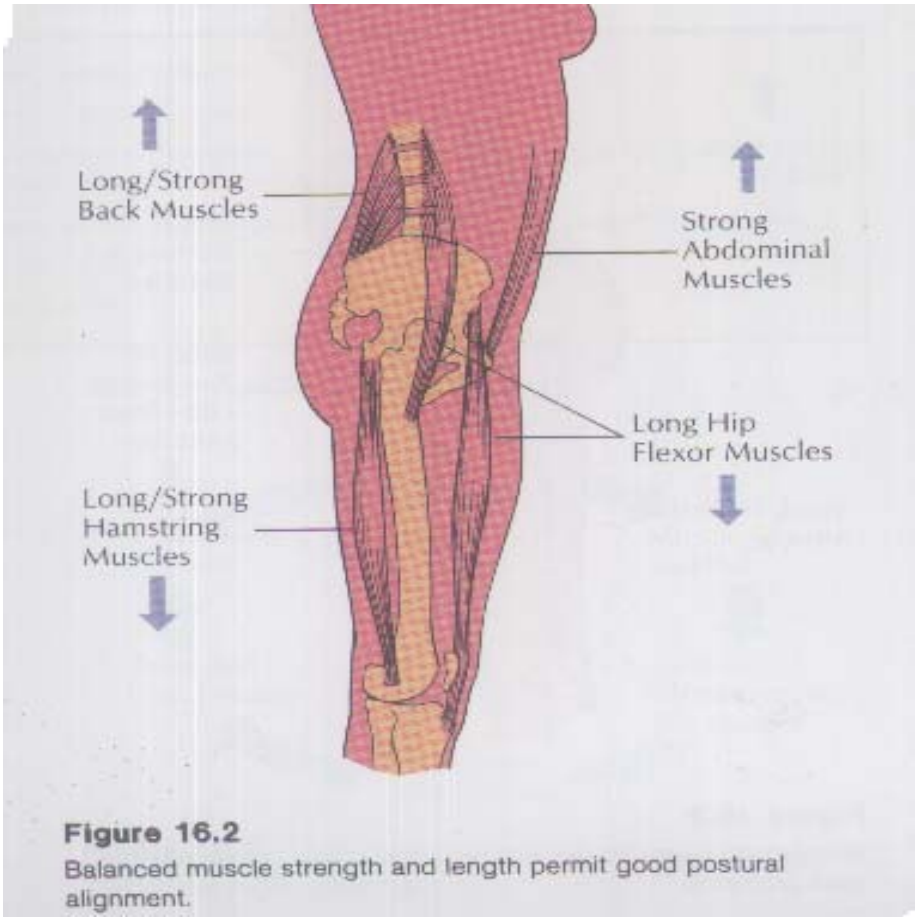


Figure 16.2
Balanced muscle strength and length permit good postural alignment.

- Long and strong muscles keep the body in good alignment and reduce risk of back pain

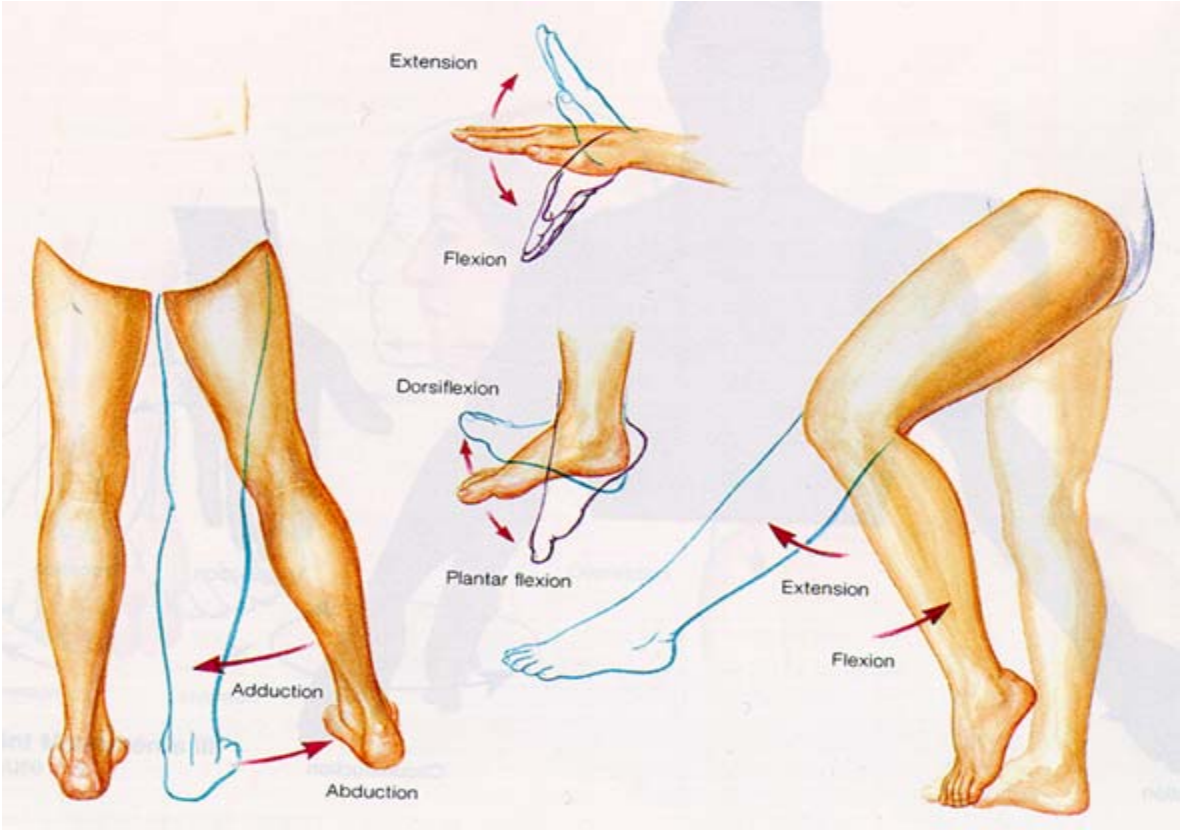
Facts about Flexibility

- Flexibility is joint specific
- Flexibility is enhanced if body is warm

Influence of Age on Flexibility

Common Movements

- Flexion
- Extension
- Abduction
- Adduction
- Rotation



Types of Stretching

- Static
- Ballistic
- Dynamic

Static Stretching

- Stretch slowly until tension
- Hold stretch for 10 - 30 sec.
- Relax the muscle
- Increase stretch a bit more (developmental stretch)

AVOID - Ballistic Stretching

- Muscles are stretch by the force of momentum – bouncing, jerking
- This form of stretching increases ones risk of injury

Methods of Stretching

Active Stretching / Active Assistance

An assist to stretch from an active contraction of the opposing antagonist muscle

An example: Calf stretch – the muscles of the shin are contracted to assist in the stretch of the muscles of the calf

Methods of Stretching

Passive Stretching / Passive Assistance

Stretch imposed on a muscle with the assistance of a force other than the opposing muscle

Example: A partner, another body part or gravity aids you in stretching

Proprioceptive Neuromuscular Facilitation (PNF)

- Combines (active and passive) methods
- Most effective method for improving flexibility
- Promotes increase in strength

PNF Stretching Technique
(C.R.A.C. Method)

- Contract agonist isometrically
- Relax muscle for a few seconds
- Contract the antagonist for 15 seconds
- Relax

FIT Formula
(Static Stretching)

F = 3 - 7 times per week

I = 10% beyond normal length of muscle

T = 10-30 seconds

Areas Needing Stretching

- Hamstrings
- Inner thigh
- Calf
- Hip flexors
- Lower back
- Chest / shoulders

Stretching Precautions

- Don't force stretch to the point of pain
- Choose safe exercises
- Avoid overstretching weak muscles
- Use good technique

Hamstring Stretches

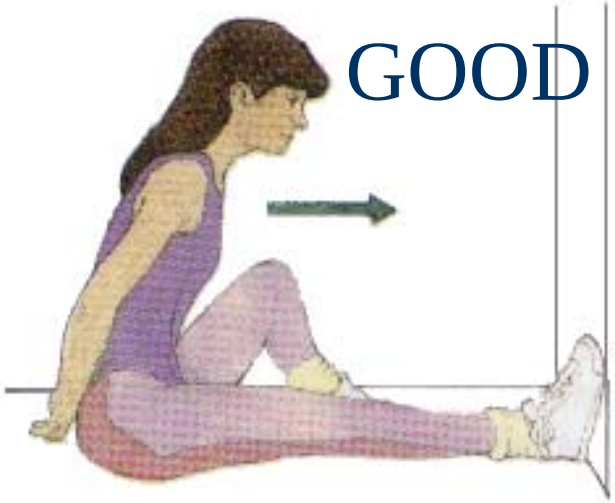
BAD

Standing Toe Touch

BAD

Bar Stretch

GOOD



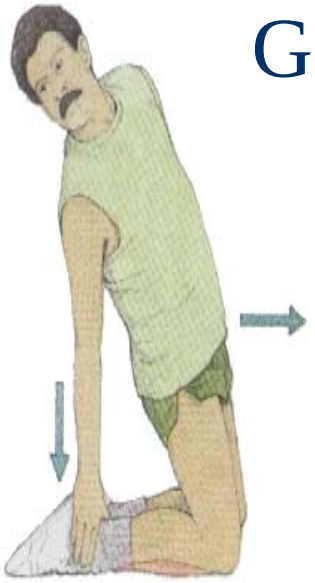
Back Saver Hamstring Stretch

Shin and Quadriceps Stretches

BAD

Standing Stretch

GOOD



Shin Stretch

Quad Stretch

Assessing Flexibility

- Make sure that you are warmed up prior to testing
- Follow the instructions as close as possible since the best use of the results is to compare scores over time

Safety

Microtrauma

- An injury so small it is not detected at the time it occurs
- Injury occurs from chronic repetitive movements
- Later in life, microtrauma becomes apparent = problems of tendonitis, bursitis, arthritis, or nerve compression

Chronic Injury

- Many chronic injuries happen as a result of overtraining. This usually results from violating the law of progression and doing too much exercise or doing additional additional exercise without ample recovery

Acute Injury

- A stress, strain or injury that produces an "ouch" at the time of injury or within several hours

- Common examples:
  - Sprains - ligaments
  - Strains - muscles/tendons
  - Fractures - bones

Treatment of Injuries

R Rest

I Ice

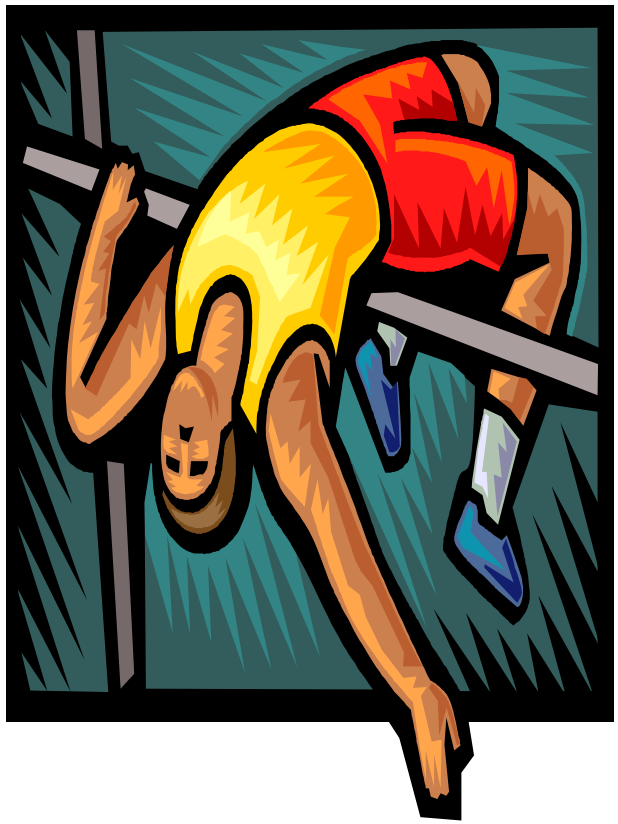
C Compression

E Elevation

Anatomical Terms

- **Hyperflexion:** bending a joint more than normal. Closing the angle at the joint

- **Hyperextension:** opening a joint angle (i.e., returning it past the normal anatomical position)



Valsalva Maneuver

- Increased pressure in the thoracic region with resultant problems associated with subsequent fainting or dizziness

Examples of Bad Exercises and Safer Alternatives

- Neck stretches
- Back stretches
- Abdominal exercises
- Hamstring exercises
- Shin exercises
- Bench press exercises
- Quadriceps exercise

Specific Exercise Guidelines

- Stretch chest muscles, hip flexors, calf and hamstrings, lower back and medial thigh rotators

- Strengthen the abdominals and the shoulder muscles, upper and lower back extensors, shin muscles and lateral hip rotators

General Exercise Guidelines

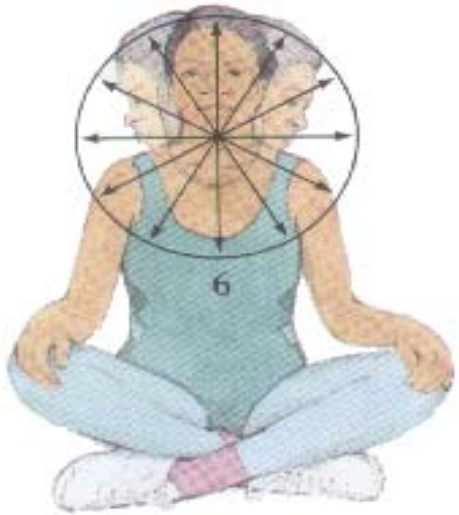
- Avoid
  - Hyperflexion of knee or neck
  - Hyperextension of neck, knee or low back
  - Twisting or lateral force to the knee
  - Holding the breath during exercises
  - Stretching already long / weak muscles
  - Shortening already short /strong muscles
  - Passive neck stretches and any ballistic passive stretches

Neck Stretches

BAD

Full Neck Circling

GOOD



Partial Circling - Head Clock

Back Stretches

BAD

Shoulder Stand Bicycle

GOOD

Leg Hug

Abdominal Exercises

BAD

Double Leg Lifts

GOOD

Reverse Curl

Bench Press Exercise

BAD

Bench Press - Back Arched

GOOD

Bench Press - Knees Bent

References

- Corbin, C.B., Welk, G.J., Corbin, W.R., Welk, K.A. (2008). *Concepts of Physical Fitness: Active Lifestyles for wellness* (14th ed.). New York, NY: McGraw-Hill Publishers.
- Beachle, T.R., & Earle, R.W. (Eds.). (2008). *Essentials of Strength Training and Conditioning*. Champaign, IL: Human Kinetics.