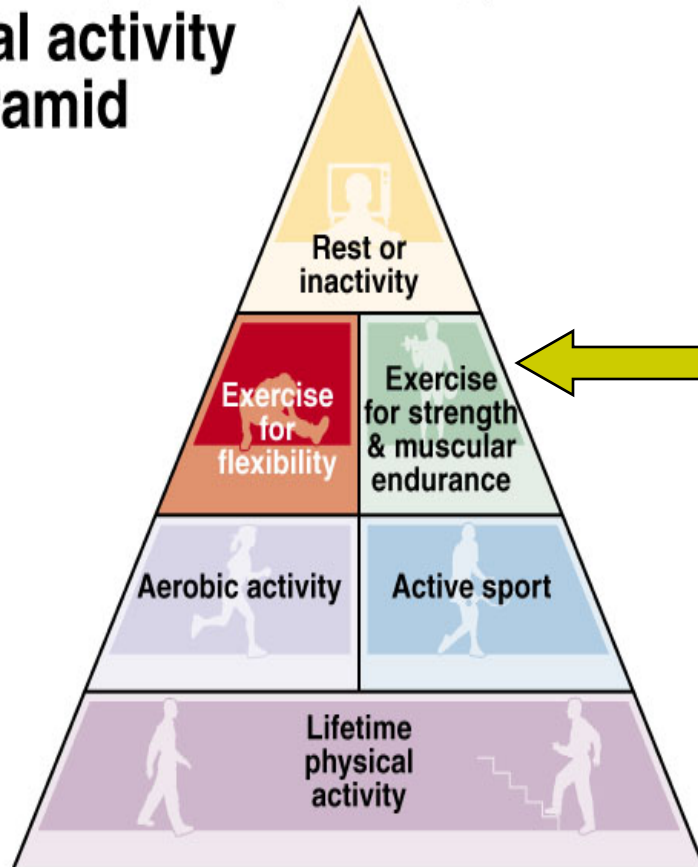


Muscle Fitness

Dr. Tia Lillie

Health Benefits of Muscular Fitness

Physical activity pyramid



- 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



Definitions

- **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.



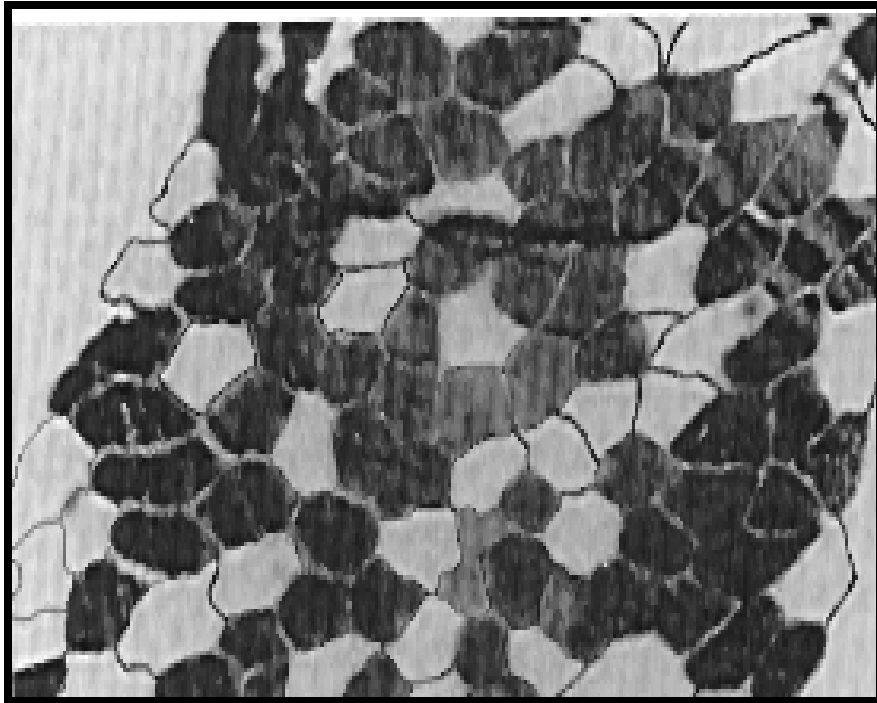
Factors Influencing Strength

- 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

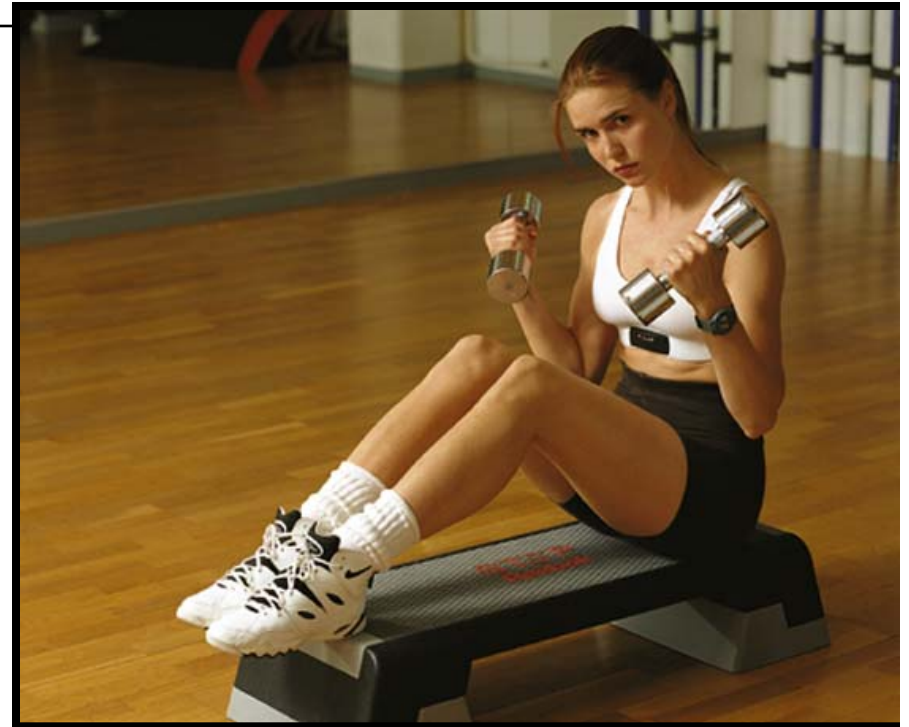
- Stain light in color
- More anaerobic
- Suited to strength and speed activity

□ Slow Twitch Fibers

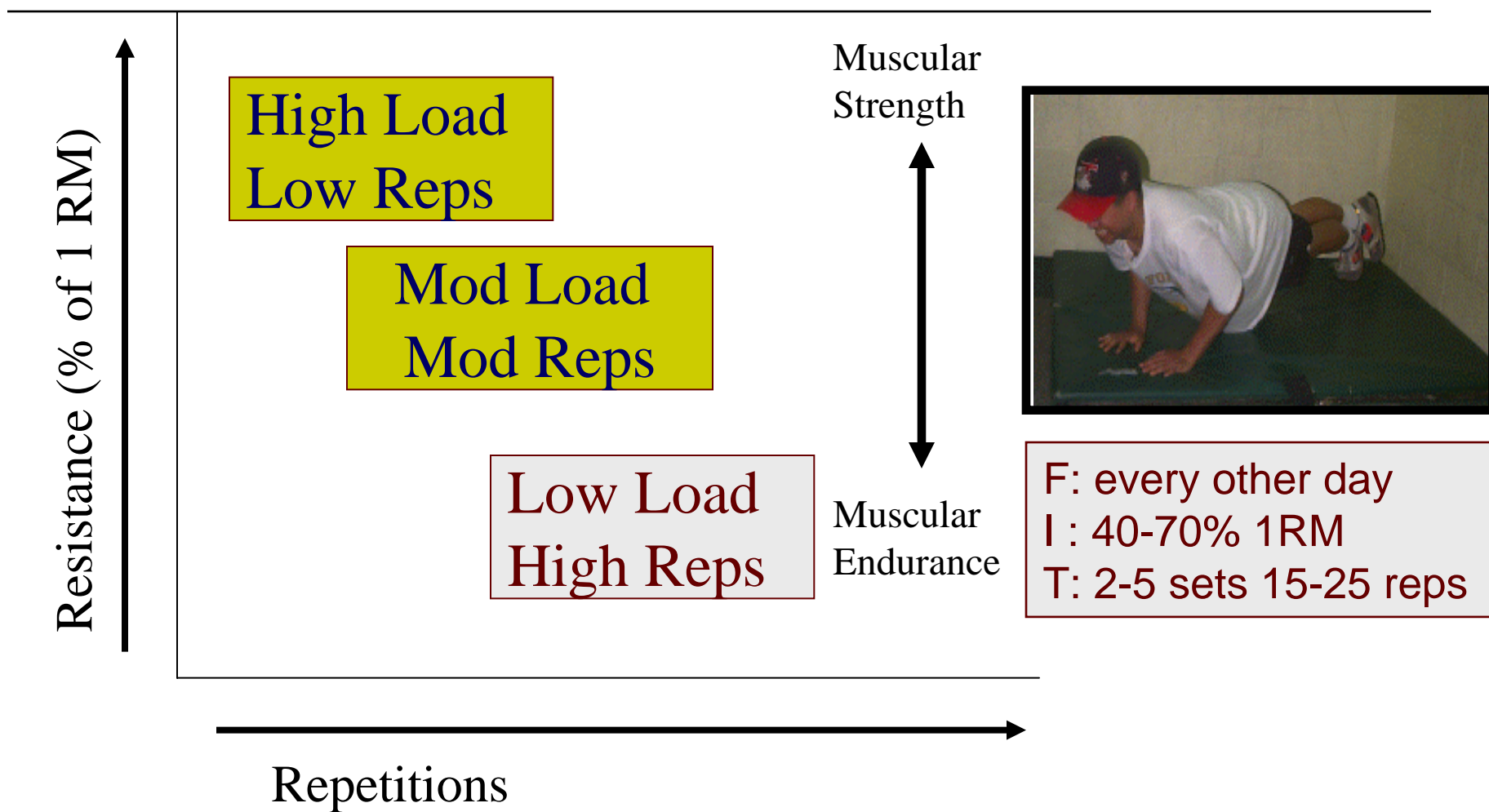
- Stain dark
- More aerobic
- Suited to endurance activity

Myths about Resistance Training

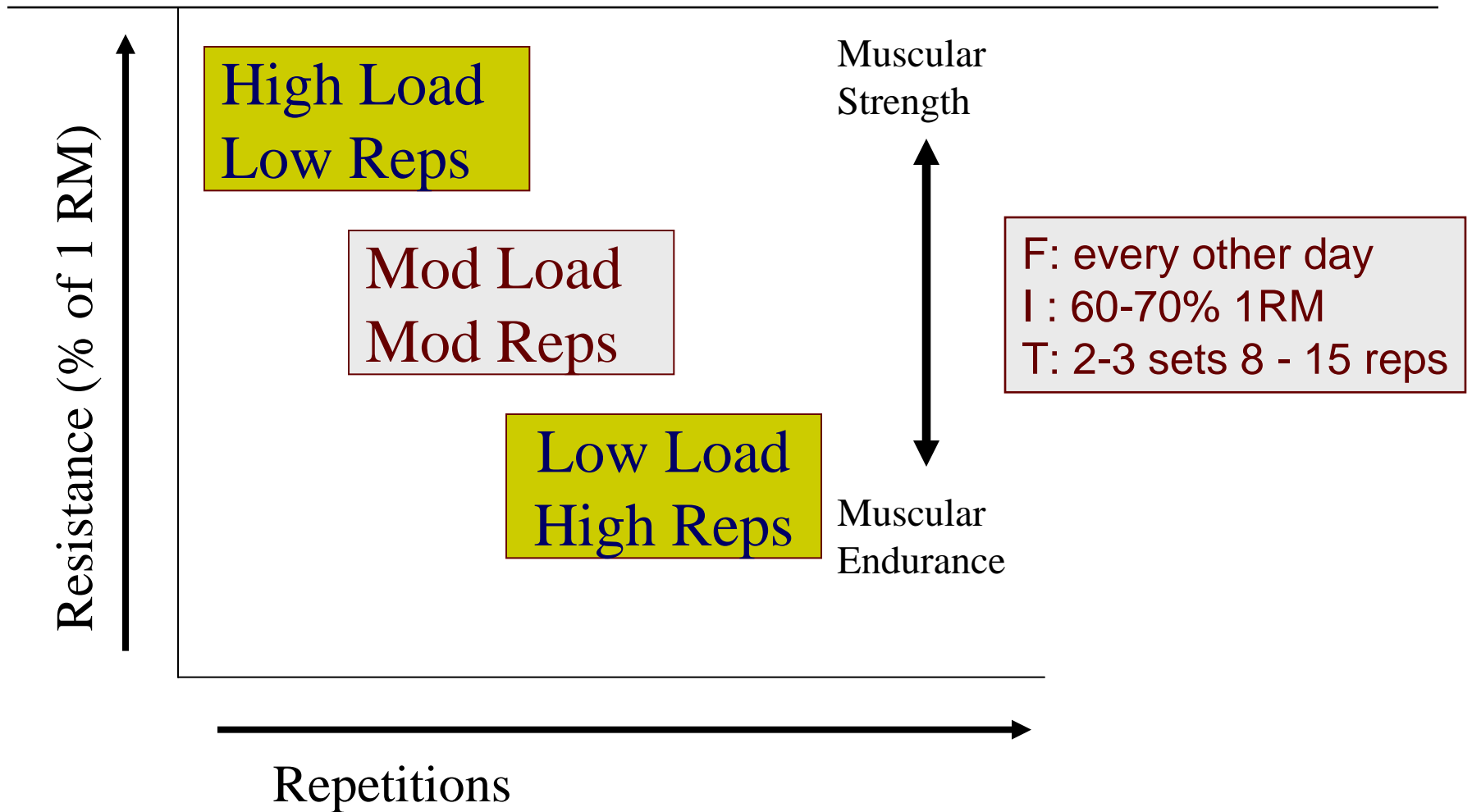
- ❑ No pain - no gain
- ❑ Makes you “muscle bound”
- ❑ Fat can be converted into muscle
- ❑ Extra muscle turns to fat if not used
- ❑ Has masculinizing effect on women



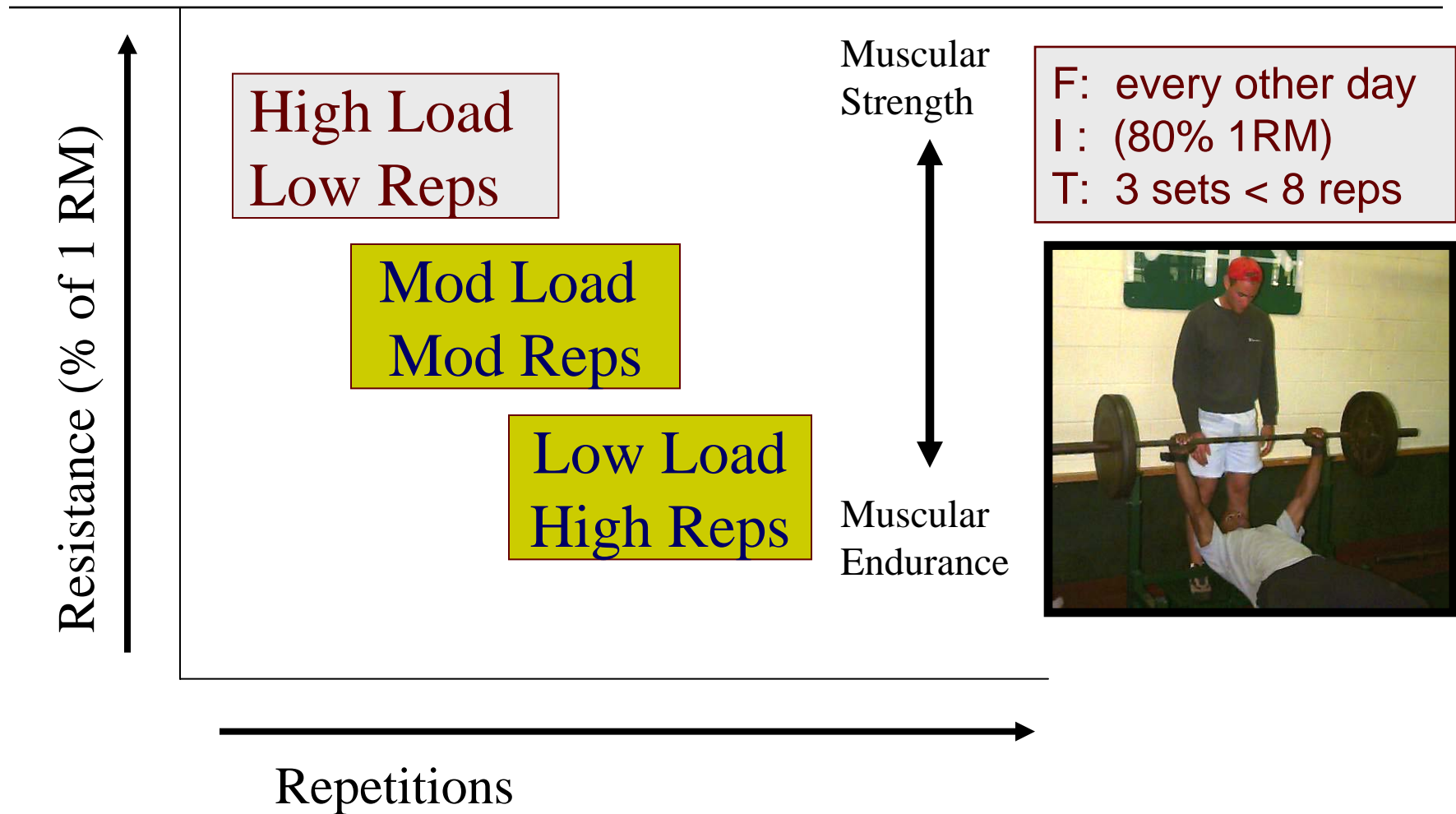
Stimulus for Endurance



Stimulus for Overall Muscle Fitness



Stimulus for Strength





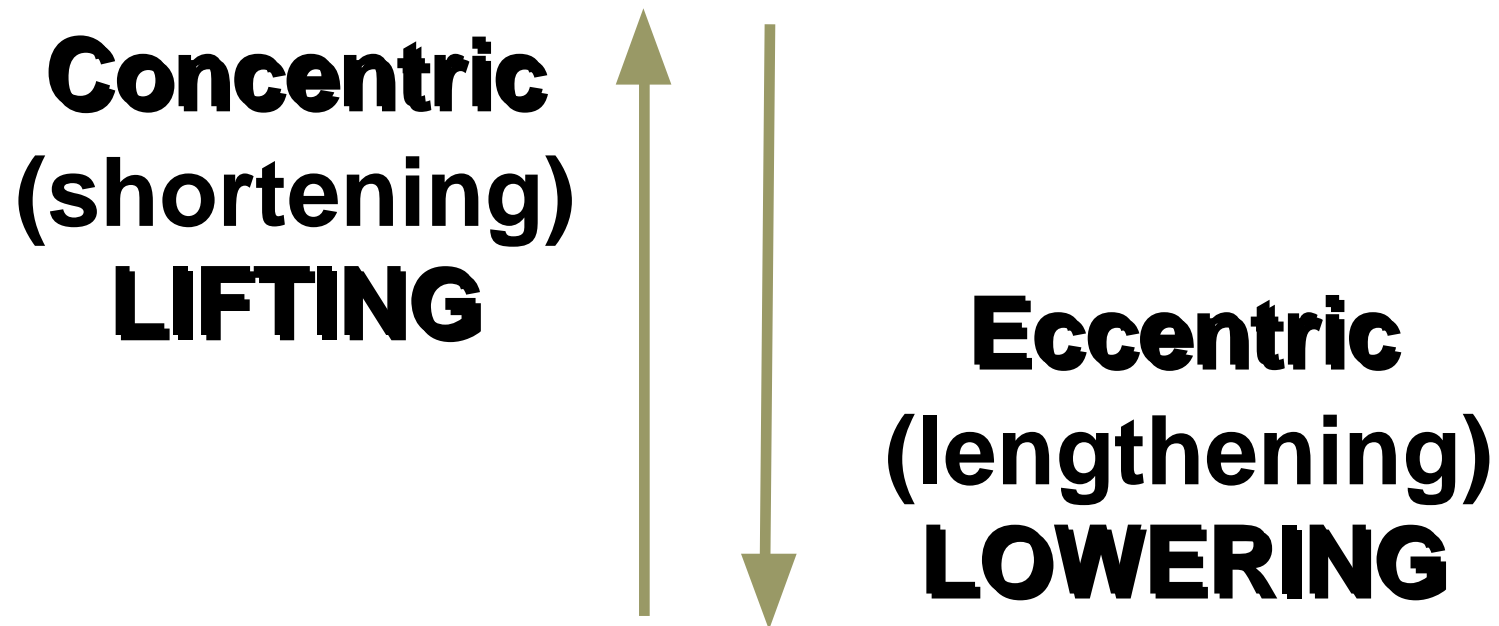
Training Considerations

- 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



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

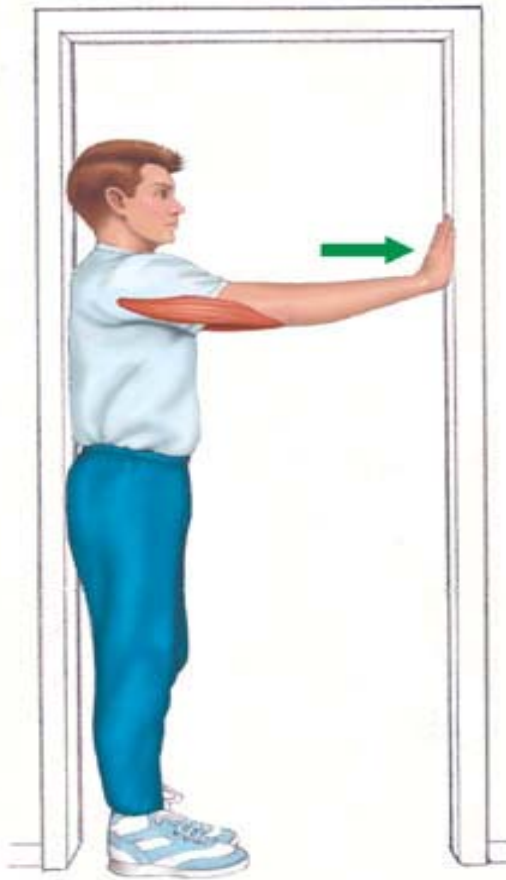
- Sport-specific training
- Overall muscle balance

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

Isotonic



Isometric



Isokinetic





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.
- Baechle, T.R., & Earle, R.W. (Eds.). (2008). *Essentials of Strength Training and Conditioning*. Champaign, IL: Human Kinetics