I. **Announcements** Poster comments update. Q?

References: Peer-reviewed, accurate, reliable!

*NB*: 10 total, ≤ 5 web-based, .edu, .org, .gov

II. **Review of Anatomy Lab 3 Open Exploration**

III. **Weight Training Exercise Systems Overview**

IV. **Olympic Lifting**
   A. Clean & jerk
   B. Snatch

V. **Information Cards + Discussion**
• **Femoral triangle** is 1st aid pressure point

• List in order from **lateral to medial**: arteries, empty, lymphatics, nerves, veins

• Does **1st letter** of each structure **spell a word**?

• **Nerve or artery** injured what **muscles** affected?
Which *side*? *Mnemonic*? Which *muscles* affected?

Gr. of memory!

**NAVEL**

Thigh Muscles – 1° Anterior

Hip Flexion & Knee Extension Weakness! + Sensory Loss

http://www.dartmouth.edu/~anatomy/Lower extremity/nerves/tutorial/femoral.htm
L thigh anterior

**Quadriceps**

1. Rectus femoris
2. Vastus intermedius
3. Vastus lateralis
4. Vastus medialis

Sartorius

**NB:** worked last 10-15° of knee extension
L thigh anterior & medial

Sartorius

Gracilis adductor

Vastus medialis

Rectus femoris

Patella/kneecap
Which *sport* or *activity* uses this *muscle* extensively?
Abdominal muscle layers?

External oblique

Internal oblique

Rectus abdominis

External oblique → Internal oblique

Hands in pockets!
Counter-clockwise motion?
Hip flexors? Iliopsoas? Why flex hips & bend knees?
**Iliopsoas** with **Knees Straight** vs. **Bent**?

- **Knees Straight**: Taut & tugs on lower back!

- **Knees Bent**: Collapsed & relieves stress!

**Hip Flexors?** *Iliopsoas, rectus femoris, sartorius*

**Feet Anchored vs. Unanchored?** *Unanchored*
Contract abdominals, bend knees, widen stance to reduce back stress!
ID + what bones make up AC, SC joints?

Normal Acromioclavicular Joint

Acromioclavicular Tear

Clavicle ≡ Collar bone

Scapula ≡ Shoulder blade

AC Separation: X-ray & Combined Surface Anatomy

Sternoclavicular or SL Joint

Which weight training, sports, activities?
Sciatic nerve, distal muscles, proximal joints, L. name?

Sciatica

Most common cause!

Piriformis

Sciatic n.

Piriformis ≡ L. pear-shaped

Bulging disc

Pain areas

Herniated disc

Spinal cord
Deeper Gluteal Muscles Look Like Pizza Slices!!
Superficial to Deep: *Maximus, Medius, Minimus!*


Which weight training, sports, activities?
Weight Training is Non-competitive
Goal: Improve Life Time Fitness!

- Cardiorespiratory Endurance
- Muscular Strength/Endurance
- + \( \downarrow \) % Fat
- Flexibility
- Neuromuscular Relaxation
Teres Minor above the Major!
### Table H.1  Sample Exercises for Major-Minor, Agonistic-Antagonistic, and Superior-Inferior Programs

<table>
<thead>
<tr>
<th>Program Type</th>
<th>Muscular Regions</th>
<th>Sample Exercises</th>
</tr>
</thead>
<tbody>
<tr>
<td>Major-Minor (M-M)&lt;sup&gt;a&lt;/sup&gt;</td>
<td>Chest and lower extremity</td>
<td>Bench press and accessory chest; squat and accessory thigh and leg exercises.</td>
</tr>
<tr>
<td></td>
<td>Back, shoulder, and arm</td>
<td>Lat pull, military press, biceps curl, triceps extension, and accessory SJA exercises&lt;sup&gt;d&lt;/sup&gt;</td>
</tr>
<tr>
<td>Agonistic-Antagonistic (A-A)&lt;sup&gt;b&lt;/sup&gt;</td>
<td>Chest, shoulder, and triceps</td>
<td>Bench press and accessory chest; military press, triceps extension, and accessory SJA exercises</td>
</tr>
<tr>
<td></td>
<td>Lower extremity, back, and biceps</td>
<td>Squat and accessory thigh and leg exercises; lat pull and accessory back exercises</td>
</tr>
<tr>
<td>Superior-Inferior (S-I)&lt;sup&gt;c&lt;/sup&gt;</td>
<td>Chest, shoulder, back, and arm</td>
<td>Bench press and accessory chest; military press, lat pull, biceps curl, triceps extension, and accessory SJA exercises</td>
</tr>
<tr>
<td></td>
<td>Lower extremity</td>
<td>Squat and accessory thigh and leg exercises</td>
</tr>
</tbody>
</table>

*NB:* Some bodybuilding routines push-pull over separate days.
Weight Training Like Life Is About Balance! Squat – Push – Pull!
Inferior – Superior & Posterior – Anterior Balance
Multi-Joint-Action vs. Single-Joint-Action
Center of Gravity vs. Periphery
Free Weight vs. Machine Emphasis

Front/Back Squat\(^1\) – Bench Press\(^5\) – Bent-Over Row\(^6\)

Leg Press\(^1\) – Chest Fly\(^5\) (db) – Lat Pull\(^6\)/Pull Up\(^6\)

Lunge\(^2\) – Military Press\(^7\) – Pull Up/Rowing Variations\(^6\)

Leg (Knee) Extension\(^2\)/Leg Curl\(^3\) – Dip\(^8\) – Upright Row\(^8\)

Calf Raise\(^4\) (Straight/Bent-Knee) – Triceps\(^9\) – Biceps\(^10\)

Back Extensions\(^11\)/Abdominals\(^12\)

Squat – Push – Pull in 1 exercise! Clean & Jerk & Snatch!

\(^1-12\) The Basic Dozen Beginning Weight Training Exercises. VP Lombardi,
*Beginning Weight Training: The Safe & Effective Way.* Dubuque, IA: Wm. C.
### Table 3.1 Characteristics of Weight Training Exercises and Systems

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Isometric</th>
<th>Isotonic</th>
<th>Isokinetic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type of Contraction/Synonym</td>
<td>Static</td>
<td>Dynamic</td>
<td>Dynamic(^a)</td>
</tr>
<tr>
<td>Relative Expense</td>
<td>None or low</td>
<td>Low(^b) to high(^c)</td>
<td>High</td>
</tr>
<tr>
<td>Maintenance</td>
<td>None or low</td>
<td>Low(^b) to moderate(^c)</td>
<td>Moderate to high</td>
</tr>
<tr>
<td>Portability</td>
<td>Not required</td>
<td>Easy(^b) to difficult(^c)</td>
<td>Moderate to difficult</td>
</tr>
<tr>
<td>Concentric loading</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Eccentric loading</td>
<td>No</td>
<td>Yes</td>
<td>No(^d)</td>
</tr>
<tr>
<td>Accommodation</td>
<td>No</td>
<td>No(^b)/Yes(^c)</td>
<td>Yes</td>
</tr>
<tr>
<td>Intramuscular tension</td>
<td>Low to high(^?)</td>
<td>Moderate(^b) to high(^c)</td>
<td>Moderate to high</td>
</tr>
<tr>
<td>Potential for delayed muscle soreness</td>
<td>Low</td>
<td>High</td>
<td>Low</td>
</tr>
<tr>
<td>Potential for rehabilitation</td>
<td>Limited</td>
<td>Moderate to high</td>
<td>High</td>
</tr>
</tbody>
</table>

\(^a\)Since the velocity on isokinetic devices may be set to zero, static contractions are also possible.

\(^b\)For free-weight barbells, dumbbells, and most other constant load devices.

\(^c\)For isotonic dynamic accommodating resistance (DAR) devices.

\(^d\)New isokinetic devices by Chattecx (Kincom) and Loredan (Lido) have built-in options for constant velocity eccentric loading. These are exceptions to typical isokinetic machines.
Isometric Squat Works Very Limited Range, But Can Help with Sticking Points

\[ NB: \approx 5-10^\circ \text{ around set } <, \rightarrow \text{ limited functionality!} \]
Functional isometrics at an early age!
Isotonic Barbells & Dumbbells
Most CWT Machines & WT Equipment Isotonic
Force x Force Arm = Weight x Weight Arm

\[ F \times FA = W \times WA \]

\[ F = \frac{W \times WA}{FA} \]

\[ F = \frac{10 \text{ lb.} \times 8''}{3''} \]

\[ F = 26.67 \text{ lb.} \]
Isokinetic Omni-tron: Concentric-Concentric

Velocity = C

NB: Relatively constant!
Can these also evolve into Isometric?

Yes, if you handle more weight than you can overcome or set $\vec{v} = 0$!
Dynamic Accommodating Resistance (DAR)

*NB*: Nautilus machine from 1980s!
Simplified Cam System

A. Start

W = 100 lb.

F_A = W x WA = 100 x 1d = 100d

B. Finish

W = 100 lb.

F_B = W x WA = 100 x \frac{1}{2} d = 50d
Olympic Lifts

1. Clean & Jerk
2. Snatch
Clean & Jerk

Hip
Thigh
   front
   back
   (inside)
Back
   lower
   upper
Neck
Shoulder
Arm
   front
   back
Forearm
   front
   back

Gluteal group
Quadriceps
Hamstrings
(Adductors)
Erector spinae
Quadratus l+
Trapezius
Rhomboids
Levator s
Splenius c+
Deltoid
Biceps brachii
Triceps brachii
Brachioradialis+
Flexor digit+
The snatch works nearly identical muscles, but is a more continuous movement of the bar from the floor to a point directly overhead! Wow!
Discussion

+ Q?