

BI 199 APWT Discussion 9



... **Thursday 1st Annual Group Activity Anatomy & Physiology Quiz Bowl!** Next Tuesday, Olympic Lifting technique + J-MAK kits!!

I. Announcements Update on poster outline feedback!

II. Lower Back & Hip Exercise Anatomy

A. Back extension

B. Lower back & hip anatomy

C. Russian dead lift vs. good morning?

III. Advantages of Dumbbells

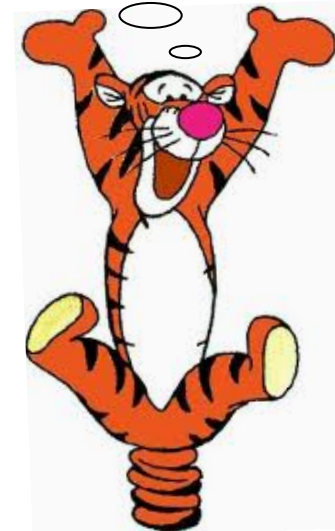
IV. Abdominal Exercise Anatomy (Review)

V. Exercise Classification Systems

Isometric, isotonic, DAR, isokinetic

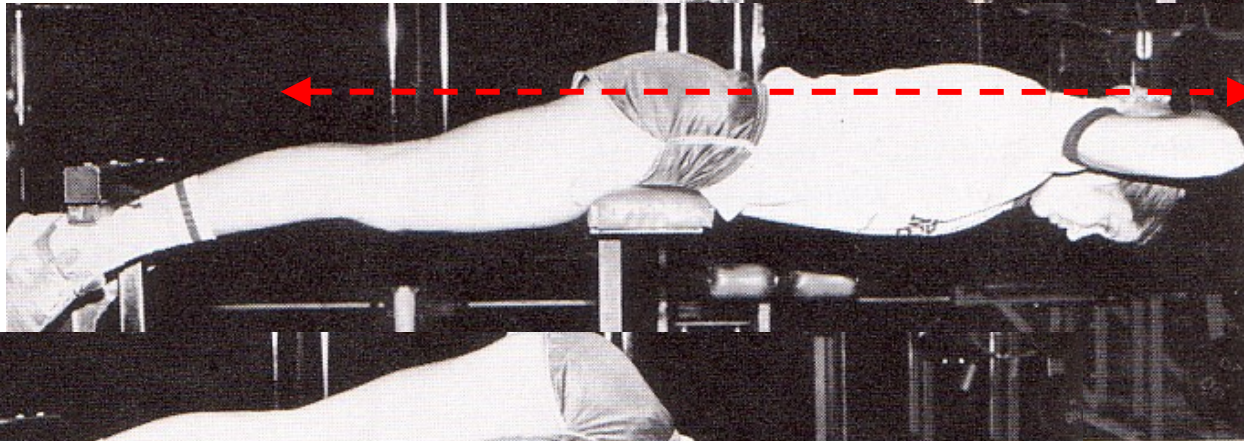
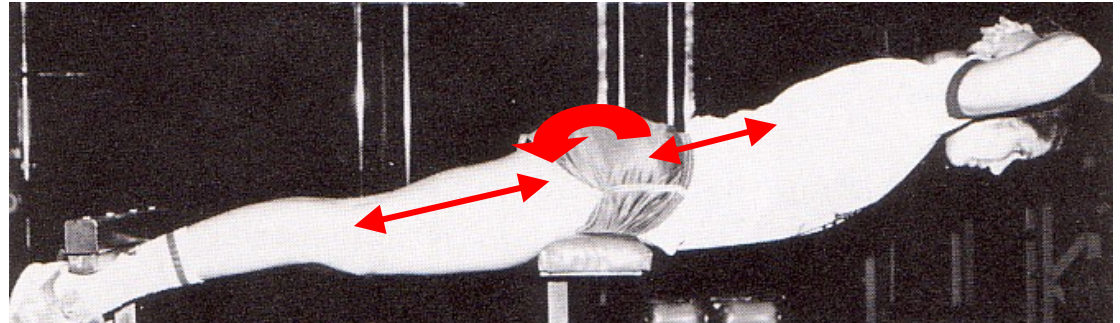
VI. Group Overview of Presentations

Tiggr just loves Anatomy! Fun! Fun!! Fun!!!

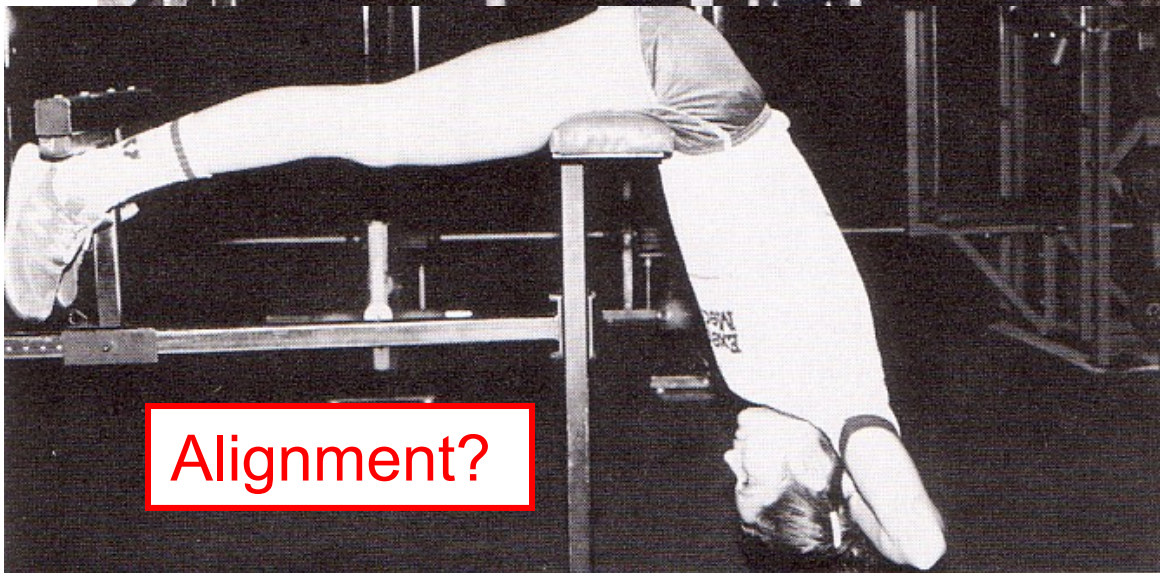


Back Extension

Lower back
Hip
Back of thigh



Beginners
beyond here?



Alignment?

Erector spinae
Gluteal group
Hamstring group

Russian/Straight Leg (Knee) Dead Lift (RDL)

NB: Best bent or soft knee!



Use Dumbbells to:

1. Start w/↓ weight
2. ↑ control, *cf.* COG
3. ↑ balance
4. ↑ small incremental resistance



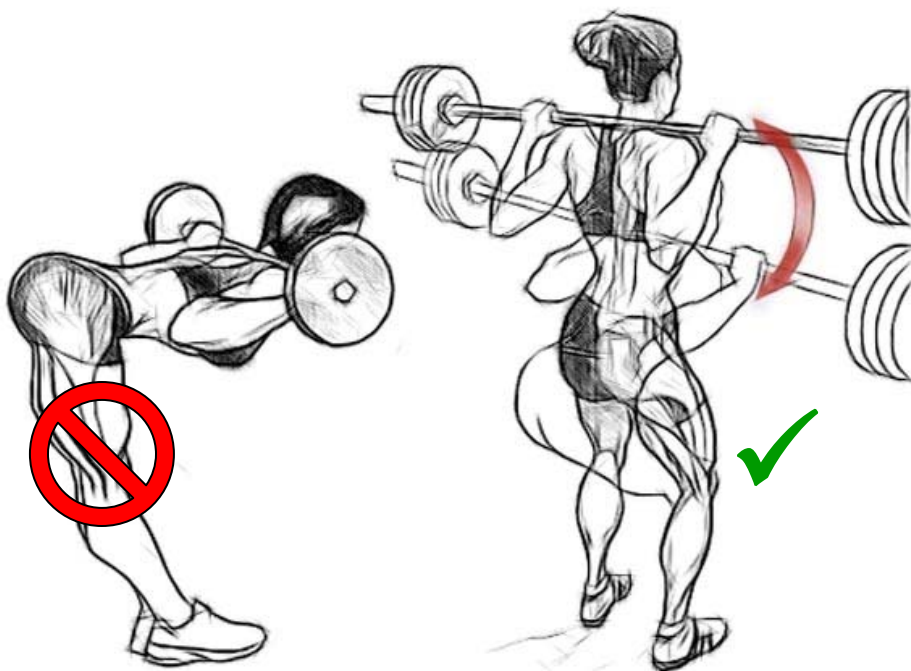
**NB: Want curved
or tip up!**

SOURCE: www.fitworkz.com

Dumbbells enable independent, unilateral, multi-planar, resistance exercise, more akin to daily life movements!



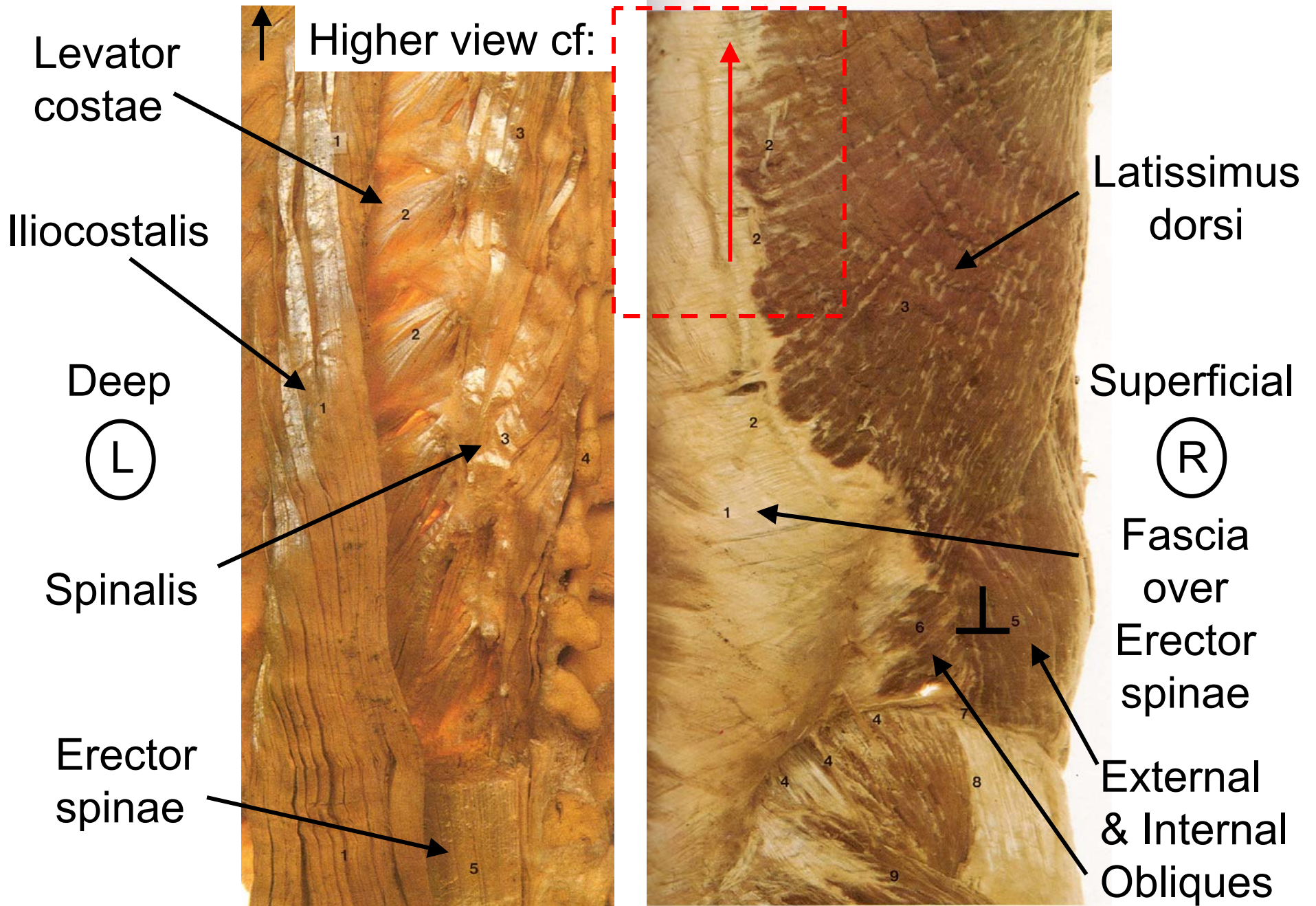
Good morning?



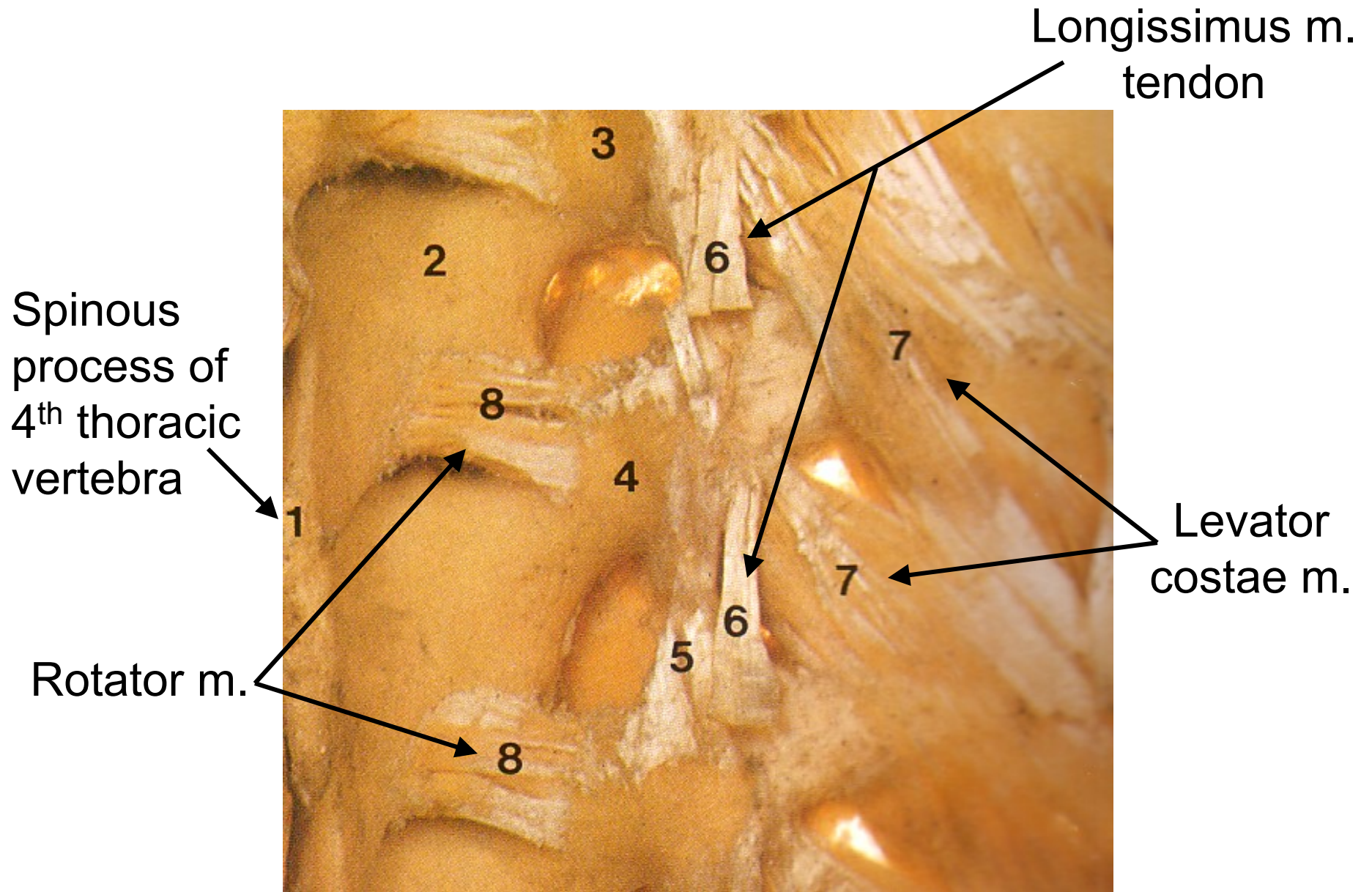
Always soft knees!



Lower Back Muscles

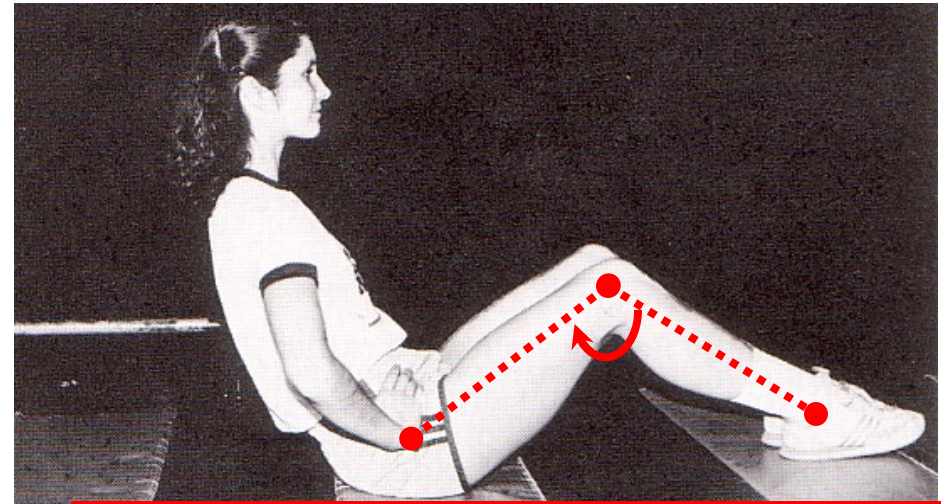


Deep Upper Back Muscles, (R) Thorax/Chest



Sit up or Curl up

1. Feet unanchored
2. Chin to chest (gently)
3. Trunk up to only 35-45°, otherwise activate iliopsoas
4. To keep feet down, activate hamstrings so inhibit quadriceps, thus ↑ abdominal activation!

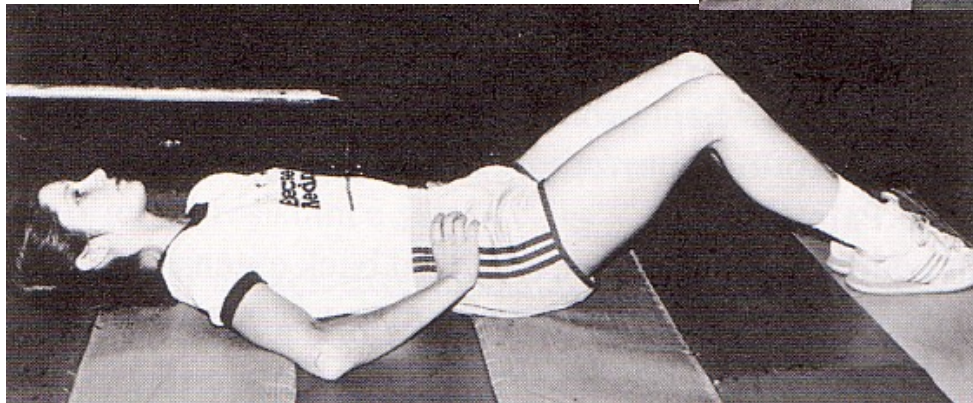


Optimal Knee Joint $\leq 110^\circ$

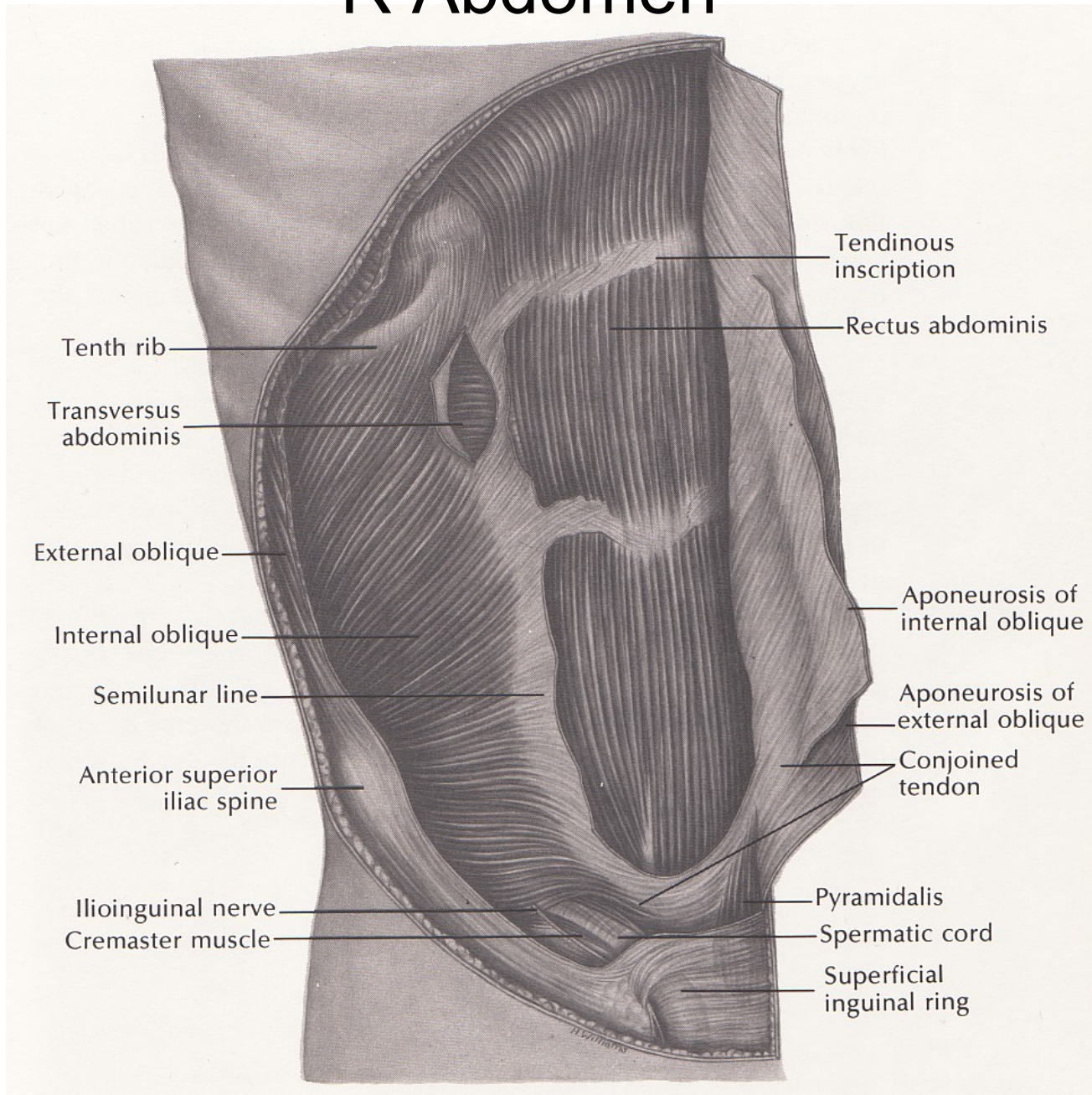


Hands @ side
to ↓ resistance.

Hands overhead
to ↑ resistance!

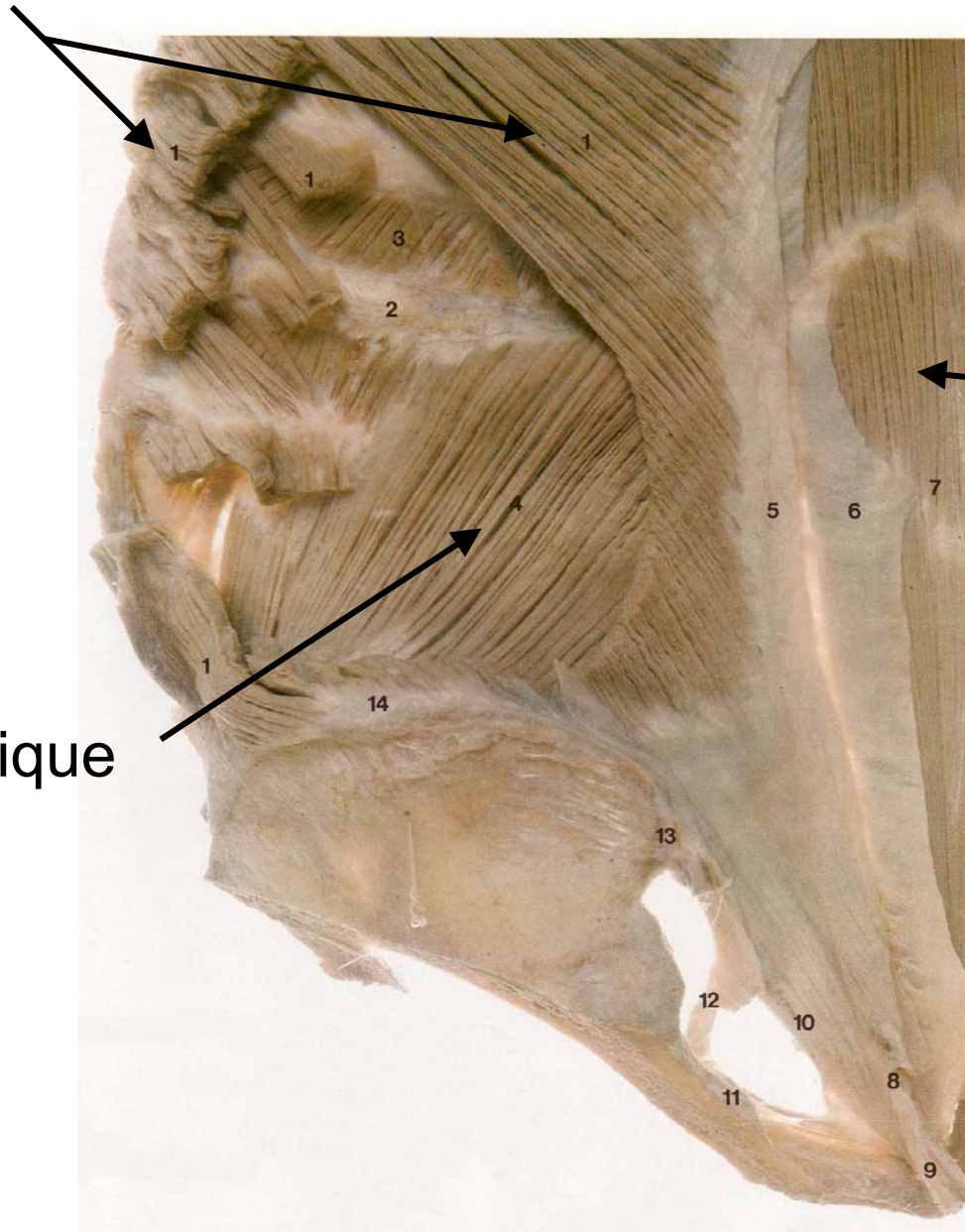


R Abdomen



R Lower Abdomen

External oblique



Rectus abdominis

Internal oblique

Discussion

+ Q?

Table 3.1 Characteristics of Weight Training Exercises and Systems

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

^aSince the velocity on isokinetic devices may be set to zero, static contractions are also possible.

^bFor free-weight barbells, dumbbells, and most other constant load devices.

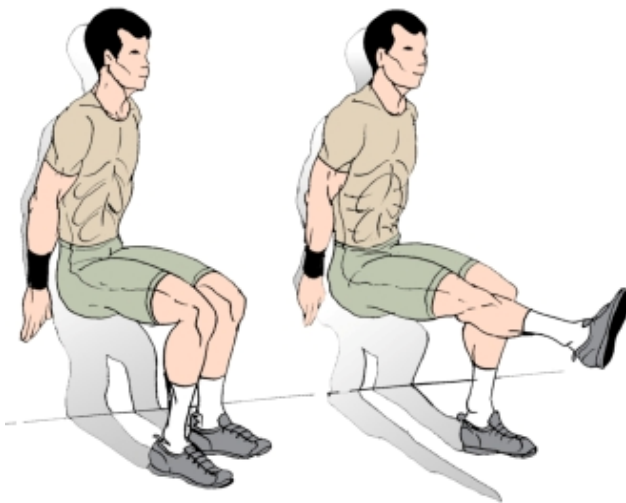
^cFor isotonic dynamic accommodating resistance (DAR) devices.

^dNew 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



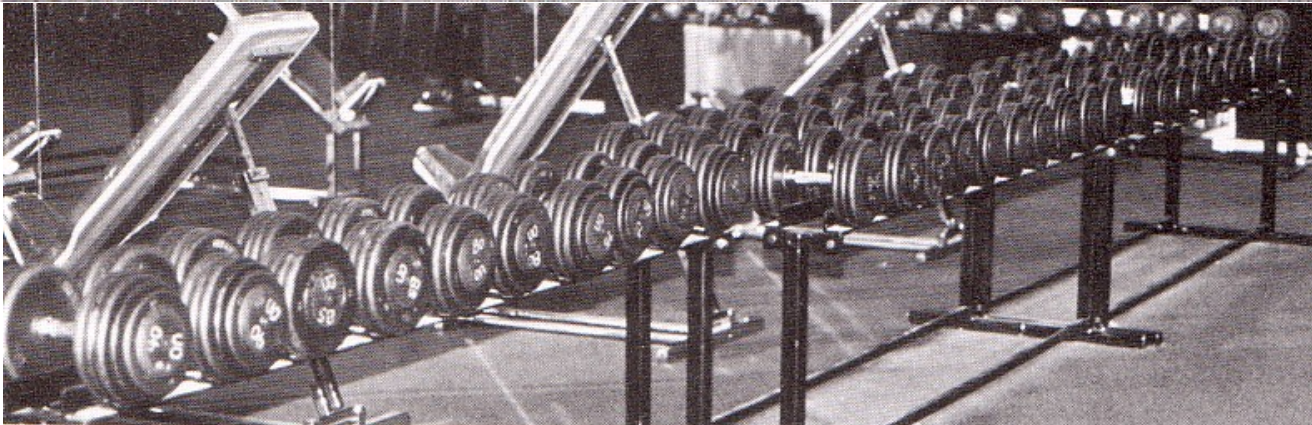
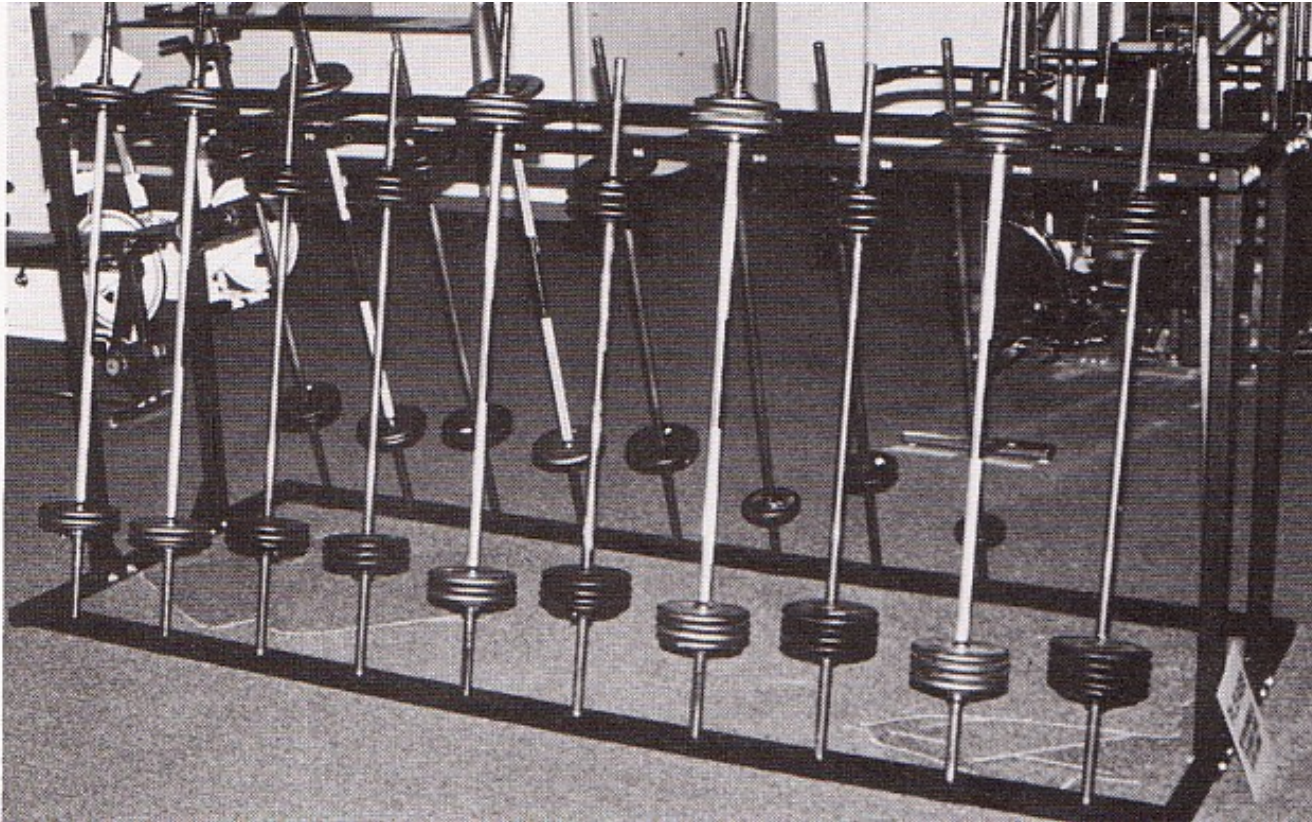
NB: $\approx 5-10^\circ$
around set \leftarrow ,
 \rightarrow limited
functionality!



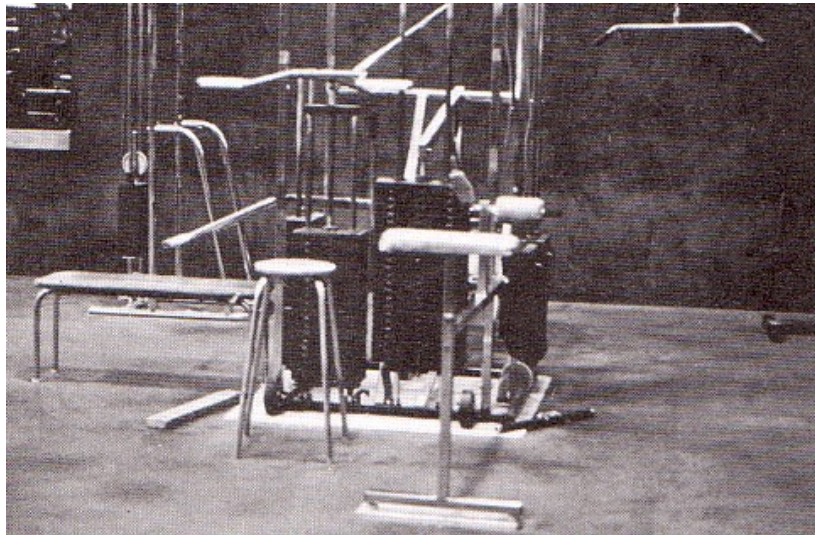
Functional isometrics at an early age!



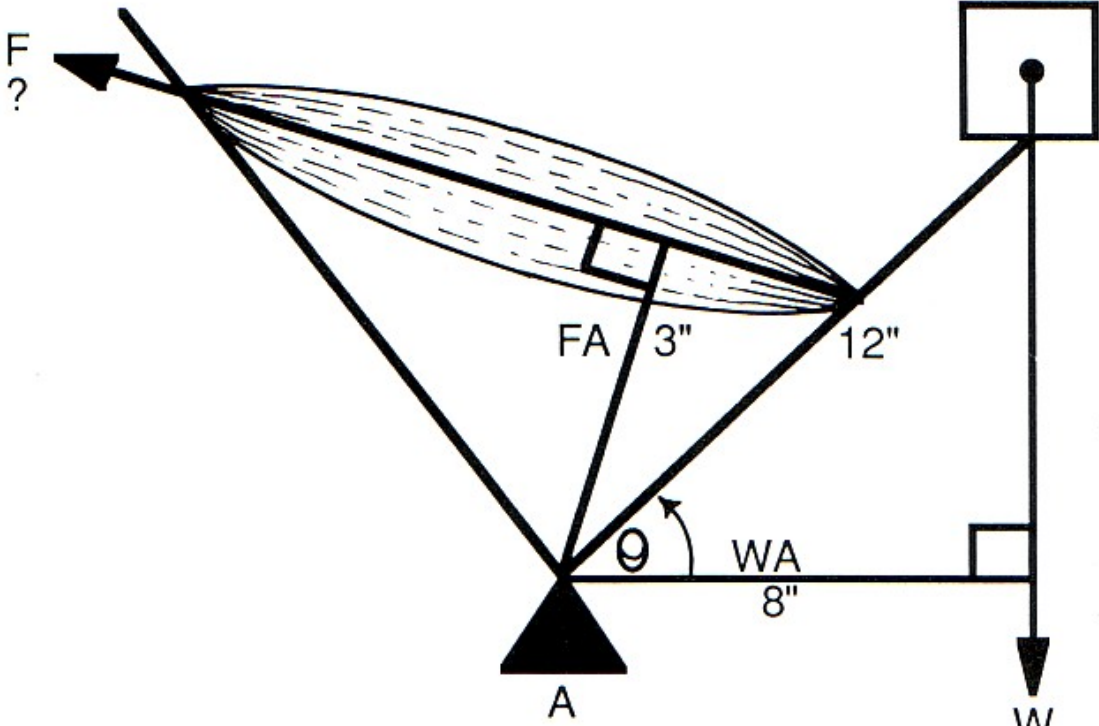
Isotonic Barbells & Dumbbells



Most CWT Machines & WT Equipment Isotonic



Force x Force Arm = Weight x Weight Arm



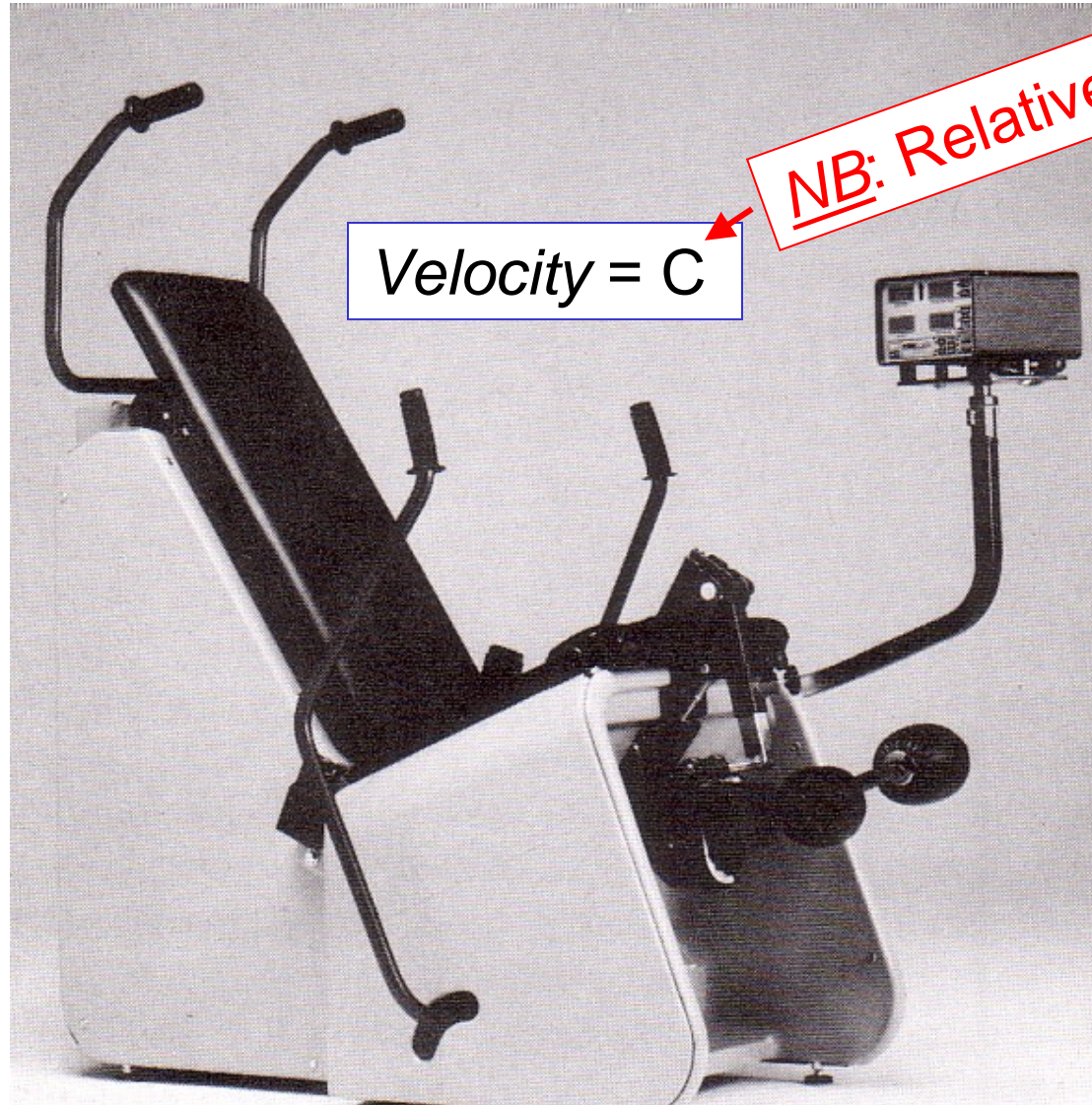
$$F \times FA = W \times WA$$

$$F = \frac{W \times WA}{FA}$$

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

$$F = 26.67 \text{ lb.}$$

Isokinetic Omni-tron: Concentric-Concentric



NB: Relatively constant!

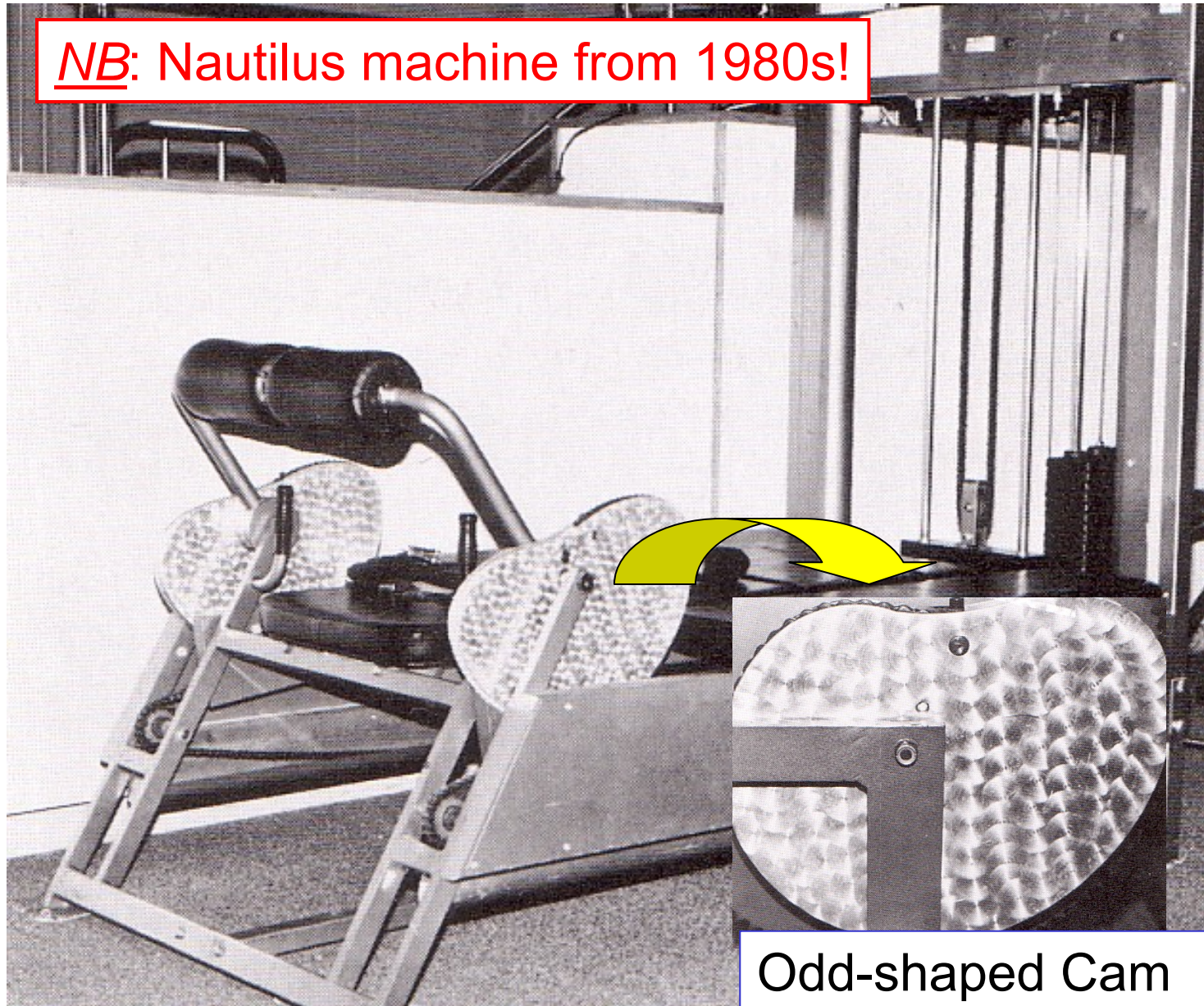
Velocity = C

**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)

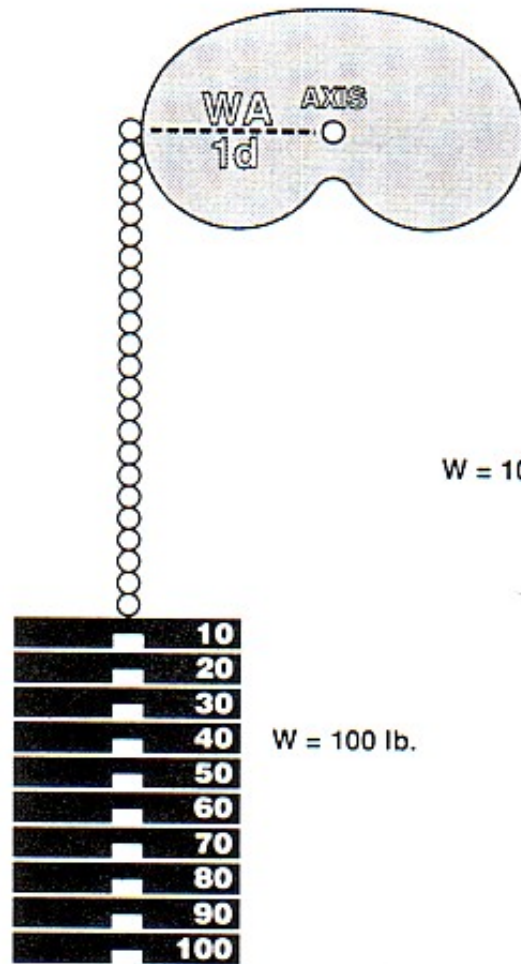
NB: Nautilus machine from 1980s!



Odd-shaped Cam

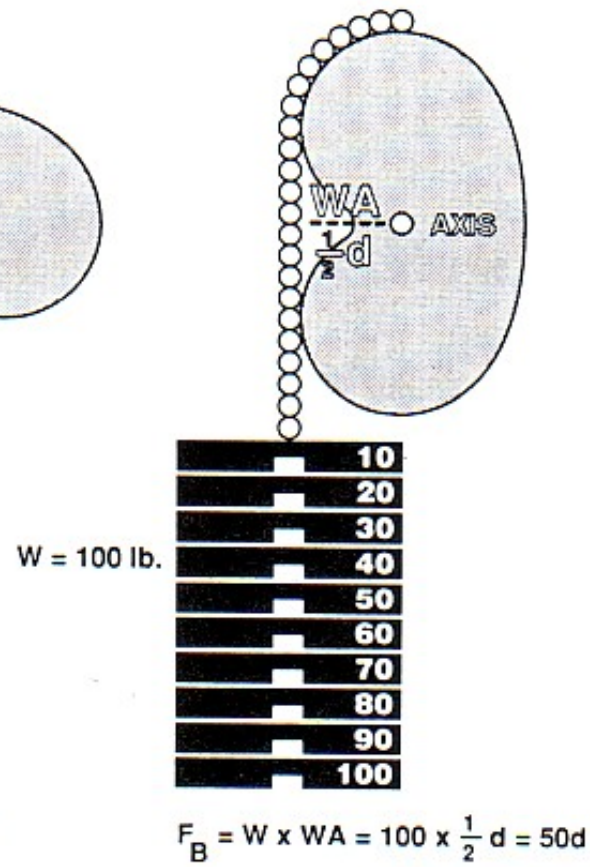
Simplified Cam System

A. Start



$$F_A = W \times WA = 100 \times 1d = 100d$$

B. Finish



$$F_B = W \times WA = 100 \times \frac{1}{2} d = 50d$$

Group Overview of Presentations

