FLEXIBILITY AND POWER

USA Gymnastics National Congress 2018

How we get flexible, stay flexible, fix those who aren't, and use flexibility to prevent injuries…. And More!

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BACKGROUND

- Athlete, sport lover, understand”er” of art, choreographer, coach, personal trainer, PT, research, educate, expand!
- A little knowledge goes…..
  - A little way, in actual progress
  - A long way- in danger, and a long way from being open

OUR KNOWLEDGE BASE

- Comes from-
  - Good athlete
    - Strongest was methods of how you were coached
    - Legacy of identity
      - Country, gym, coach, etc.
  - Poor athlete
    - Strongest is Either
      - The best when you were not
      - The opposite of what you got
- Change
  - Personal experience
  - Athlete experience
  - Really good reasoning that gets at base morals and values
- How this relates to flexibility?
  - “old country” methods of overpressure
  - And… need to think of flexibility as injury prevention as much as performance enhancement

WHAT IS FLEXIBILITY?

1. The **ability** for the muscle to lengthen
2. Total length available (**AvROM)**
3. **Joint motion** to allow the muscles to lengthen
4. The lack of ability of the muscle to fight back, **resting tension**, low = good
5. The lack of **trigger points** (which are reactive, and not flexible)
6. The ability to recover from day before, with flushing lymphatics, to allow the body to ***utilize*** the flexibility that it has
7. **Activation of the opposite** muscle to move the joint, and the passive muscle to allow it
8. Body understanding of simply how to **attain the positions**
9. H-I wave overlay- body lack of fear of being at the end of its rope, per se' (**absence of guarding/apprehension)**

HOW IS THIS RELATED TO POWER/STRENGTH?

1. Theories of how the more flexible you are, the less power you can have
2. If you increase flexibility in the muscle (Remember this means… length, lack of tension, lack of guarding, increased joint motion, decreased tension and trigger points) then…
    1. You must educate the body on how to maintain stability since there is more available range
    2. You must educate the body how to *use* this new available range
    3. Example: shoulder flexion vs intercostals, abs and lats
    4. Example: spine extension vs abs

BREAKOUT

- Types of flexibility-
  - How do you stretch

OUTLINE

- Why
  - Flexibility
  - Recovery
  - Injury prevention
  - rehabilitation
- When
  - Before
  - After
  - mid
- How
- Types and Theories… (the good stuff!)

FLEXIBILITY- WHY

Flexibility

- Simple attainment of positions
- Joints, muscles, ligaments, nerves

Recovery

- After blood flow, body is open to new ranges
- Encourages lymphatic drain and recovery
- Flush out potential lactic acid, prevent or lessen DOMS,

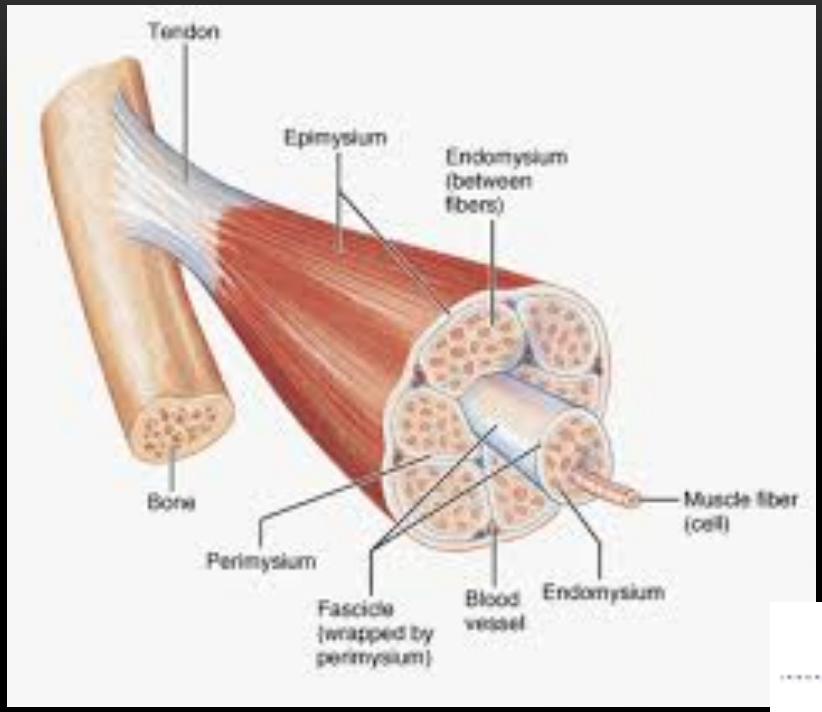
(CONT.)

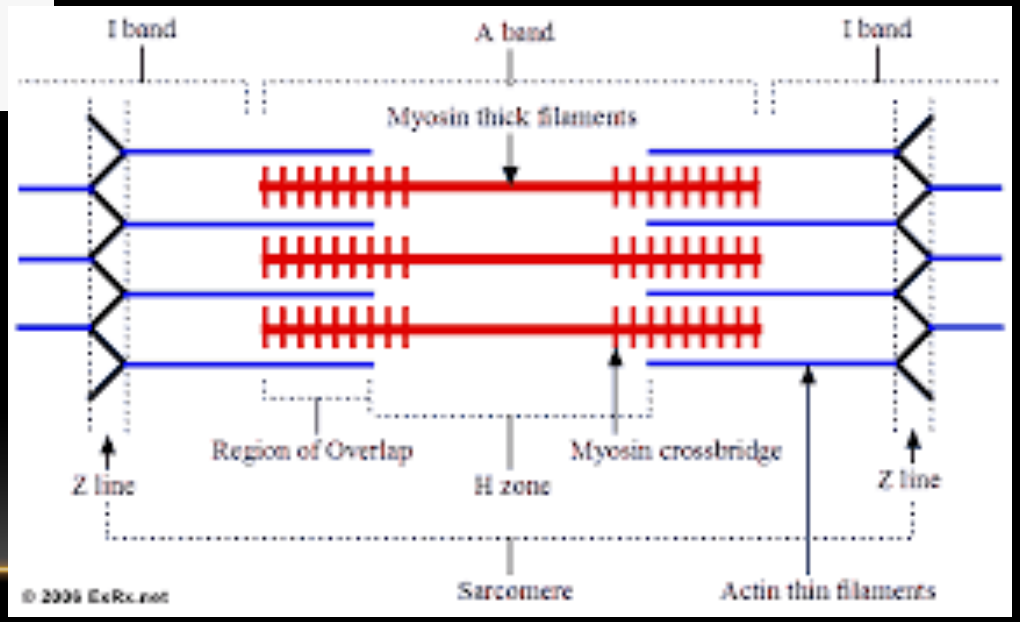
Injury Prevention

- Dynamic
  - Teaching the body that end range is OK (80%)
  - Protective mechanisms
  - Strength at mid range as well as end range

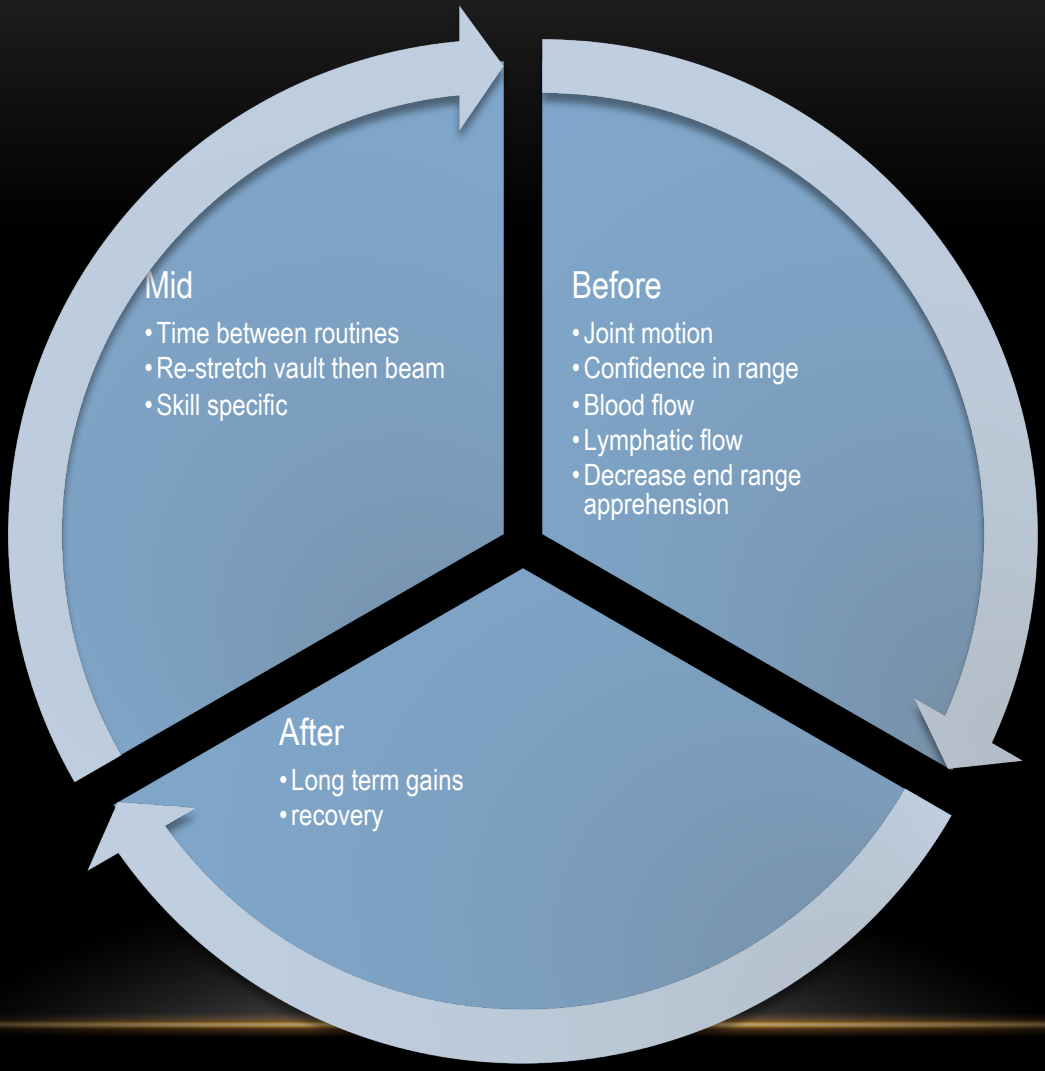
Rehabilitation

- Strains
  - Tendon
  - No not want to stretch a strain or a tear with simple lengthening
  - Roller, fascial, ART, TP, Dry Needling
- Sprains
  - Ligaments
  - Muscles are simply guarding
  - Immobilization requires re-entry tinto range use


Tendon
Epimysium
Endomysium (between fibers)
Bone
Muscle fiber (cell)
Perimysium
Fascicle (wrapped by perimysium)
Blood vessel
Endomysium


I band
A band
I band
Myosin thick filaments
Region of Overlap
H zone
Myosin crossbridge
Z line
Z line
Sarcomere
Actin thin filaments

FLEXIBILITY - WHEN



FLEXIBILITY- HOW- THE CONTROVERSY

- Heat vs Ice
  - Ice makes you cold, non flexible, but good (like Cryo, cold tub) for recovery of tissue, which will eventually be more flexible!
  - Heat- increases blood flow. Decreases resting tone. Increases flex.
- Push or not
  - Effects- if muscles are pushed, strained, they become guarded and 'disallow' end range while starting protection. Power effected (see research on presence of TP and power)
- How long to hold
- Alignment vs just get range
- How does all of this effect power?

FLEXIBILITY- TYPES AND THEORY

1. Static
2. Dynamic
3. Neuro
4. Joint
5. Tool Assisted
6. Manual, health care professional, assisted

For ALL of these, we will be using Hamstring, and calves as examples to maintain continuity

① FLEXIBILITY- STATIC

- Hold
  - 45 seconds
- Position
  - Perfect alignment
  - OR purposeful alignment (i.e. turned out, flexed foot, etc.)
- Breath cycle
- Blood flow
- Core temperature
  - Risen for increase blood flow
- Hamstring- Leg on chair, hold
- Calves- bent and straight knee hold

② FLEXIBILITY- DYNAMIC

- Stretch with motion- controlled
- Purposeful- in gymnastics – to mimic function of goal (i.e. kicks for switch leaps)
- Stretch with motion- with weight or extra velocity assisted
  - Weight vs. band conversation
- End range, inhibition of end-range protective upchain feedback

- Hamstring- tight pike, reach for toes, or starter stretch
- Calves- push up position heel bounces

③ FLEXIBILITY- NEURO (SEE NEXT SLIDES)

- Contract- Relax
- Reciprocal Inhibition
- Muscle Energy Technique (MET)
- Proprioceptive Neuromuscular Facilitation (PNF)
- Nerve Based patterns and tension
  - Nerve glides
  - ART release
  - Other techniques

- Hamstring- nerve glides- with knee straight and then bent, or calv pumping
- Calves- hamstring stretch, with end range ankle pump and rotation

(CONTRACT- RELAX, NEURO)

- Tighten the muscle you are trying to stretch, 7 seconds, isometric hold
- Non maximal force
- Relax as quickly as possible on cue
- Take up slack while muscles are in weakest point of non-protective state
- Hold 7-10 seconds
- contract again in same end range state, don’t lose new gained degrees of motion
- Also teaches muscle how to fire at the end ranges IF needed

(RECIPROCAL INHIBITION- NEURO)

- Opposite in the joint
- Use quad to stretch the hamstring
- Use shin to pull up to stretch the calves
- Add resistance to the muscle use, then relax, then take up the slack
- Similar to C/R
- Specifically with open arch…superman to stretch the abs!

(MUSCLE ENERGY TECHNIQUE- NEURO)

- MET- contracting muscles in order to encourage joint realignment
- Shotgun- public symphysis
- Leg length difference or ilium rotation- pull up with one hip, down with other
- Done mostly by PT and Chiro, but can be taught at home as well to fix ongoing issues

(PNF- NEURO)

- PNF patterns
- Based on human development patterns
- Idea that in 3 planes of motion, joint move in patterns together
- Using this for overflow to encourage a muscle that is not firing or working to capacity to be a part of a “Team”
- Need to watch mechanics carefully, so as to not encourage bad ones
- Reversing this is very difficult
- EXAMPLE: arms of switch leap, leg of switch side

(NERVE BASED- NEURO)

- “stretching” a nerve is never any good, pain, injury, traction
- Encouraging the nerve to be able to move through the fascial tissues, muscles, compartments, and other tissues is VERY important
- If it is “Stuck”, it may send signals back to the brain that a body part is an more of an end range than it really is, leading to protective mechanisms, decreased in end range, and potential injury
- Manually- ART
- Manually- fascial tensioning
- Teaching the Home exercise program (HEP) to assist athlete in including this as a part of the warm up, cool down process

④ FLEXIBILITY- JOINT

- Joint mobilization, hands on
  - Decreases restrictions in other soft tissue
  - Inhibits protective mechanism
- Direct pressures to the musculo-tendinous junction
- Hamstring- Hip mobilization, distraction for labral motion, SIJ mobs
- Calves- proximal fib head mobility, sacral mobility, talar, calc, and general ankle mobilization
- Power balance: with new joint motion comes the “gift” of instability as well
  - Combination of
    1. concentric muscle use (eversion of ankle)
    2. eccentric muscle control for end range (landing soft surface, allow some supination)
    3. ligament health (lateral ligs)
    4. Proprioception (awareness of position)

⑤ FLEXIBILITY- DEVICE- ASSISTED

- Trigger Point Roller
- Balls
- TheraCane, self trigger point release
- Heel Rocker
- Sticks, Dowel Rods
- Other Rollers

- Hamstring- wheel in hamstring or ball in gluteals, attachment to the ischial tuberosity
- Calves- Double ball for posterior tib, roller for hamstring, heel rocker for range

⑥ FLEXIBILITY- MANUAL, HANDS ON

- Active Release Techniques (ART)
- Graston (GT)
- Trigger Point Dry Needling (TPDN)
- Soft Tissue Mobilization (STM)
- MyoFascial Release (MFR)
- Cupping- assist
- Nerve Traction, Tension
- Other

- Hamstring- ART to hamstring, adductor border, Dry Needling to all, STM to gastroc-hamstring overlay at pop fossa, fascial release at the canal, nerve release ART to lateral sacral
- Calves- Dry needle to calves, compartment, fascial release to the pop fossa, ringing of the post tib and T-D-H complex (inv/Pflexors), release of retinacular tissue behind malleolus, nerve release to CPN and so much more

SUMMARY

- Can a kid become more flexible? Yes.
- Will it take extra work outside of the gym? Yes.
- Will they do it? If you show them. And if it is part of the culture of the gym. And if they can see that it matter. Test them and show them.
- Position, quality, and awareness. Key.

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