# BACKBENDS ANATOMY

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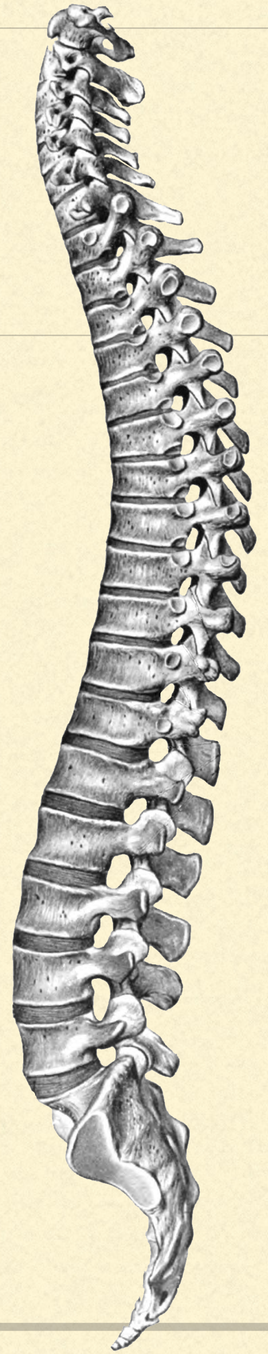
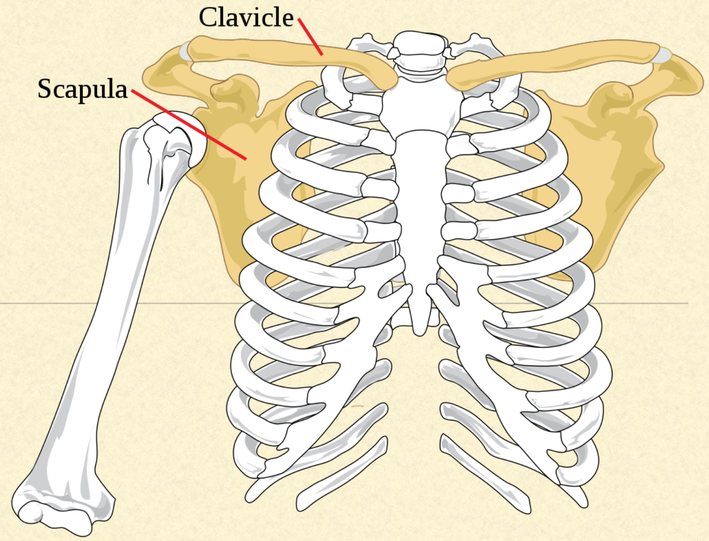
Ask questions in the chat!!!

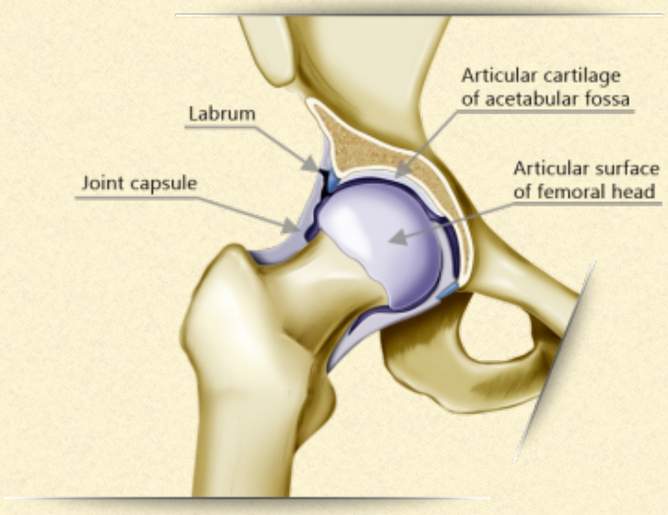
# BONES & JOINTS

- bone difference - asanas will look differently
- quadruped to plantigrade
  - affects how the skeleton is built
- Stability vs. Mobility joints - alternating pattern






Front view



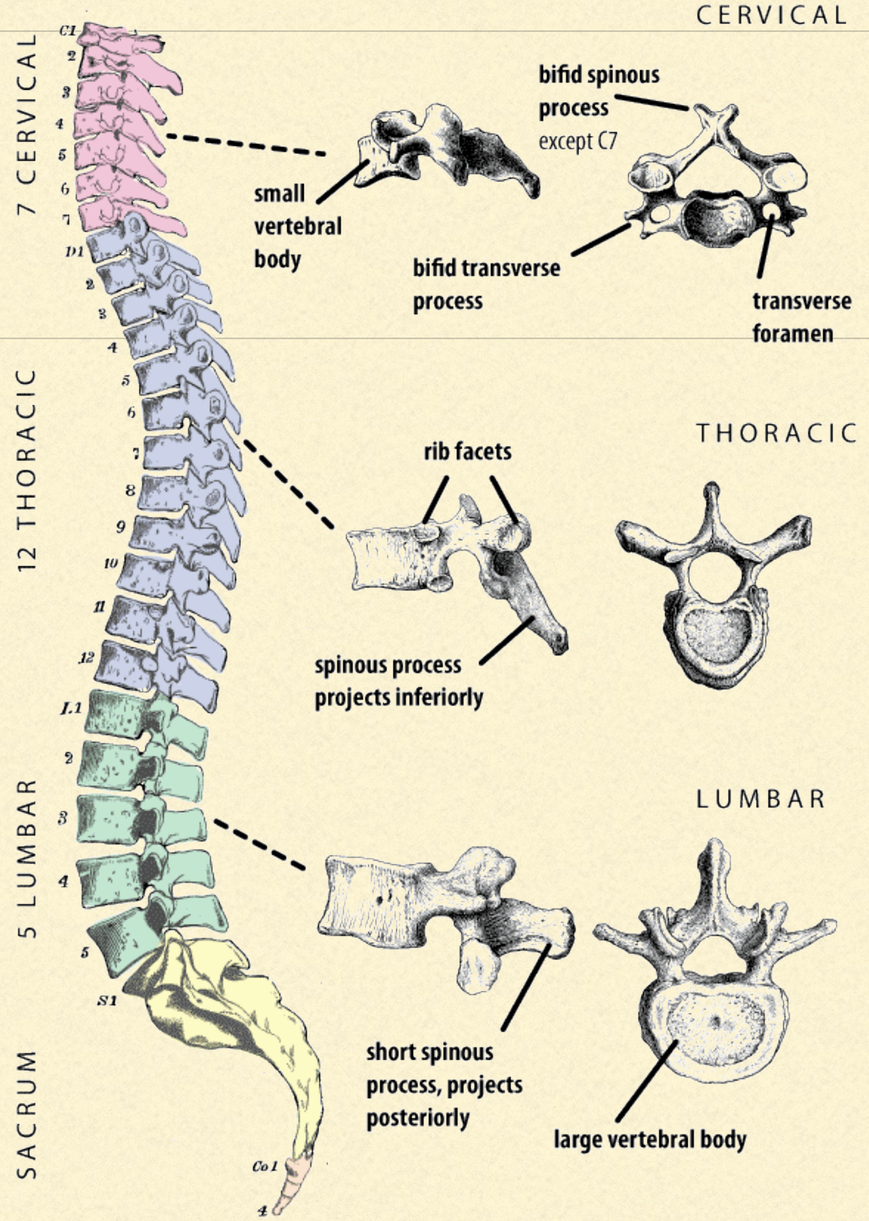
# WEAK POINTS

- the path of least resistance
  - naturally bending backwards: lumbar spine (+ neck)
  - hips, shoulders and thoracic spine bend forward
- Common trouble points:
  - low back pain
  - shoulder (impingement)
  - SI joint pain
  - knee pain, wrist pain

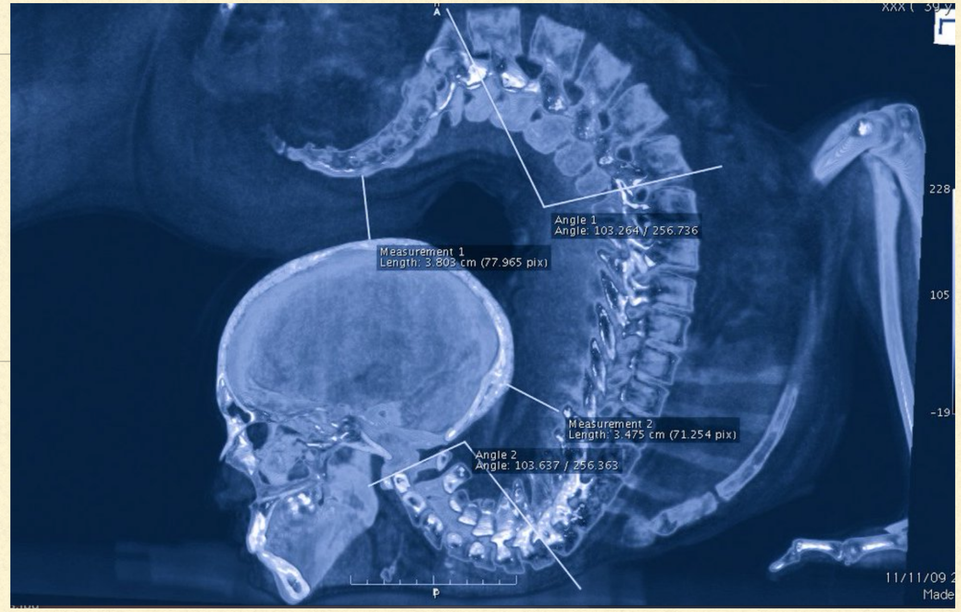
# SPINE/VERTEBRA

- cervical (neck), thoracic, lumbar (low back), sacrum, coccyx (tailbone)
- natural S curve - spring action to absorb walking/running/jumping thuds
- kyphosis - we are born in, lordosis develops early in life
- discs - dampen the steps/jumps too

- Vertebra:
  - body
  - facet joints - affect the movement direction, can cause pain too
  - nerve roots exits (disc can bulge and press into them)



# SPINE




Figures: contortionists spine on MRI lying down and on X-ray in a deep backbend

- cervical - neck
  - movement - rotation in first two vertebrae, flexion, extension, lateral flexion
  - stabilizers: deep neck flexors
- thoracic - ribs - connected to chest bone via cartilage
  - 1-5 - more fixed
  - 6-10 - more free, but still attached
  - 11-12 - free ribs
- movement - flexion, lateral flexion (minimal), extension, rotation

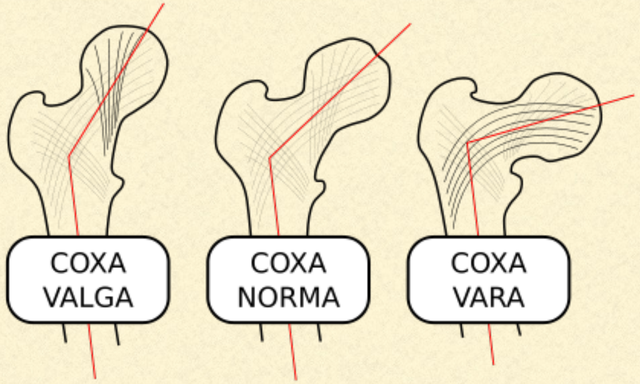
# LUMBAR SPINE & PELVIS

- Lumbar spine:
  - movement - flexion, lateral flexion, extension
  - lordosis
  - affected by pelvis position - anterior/posterior tilt
  - hinge - most of the bending in one weak spot

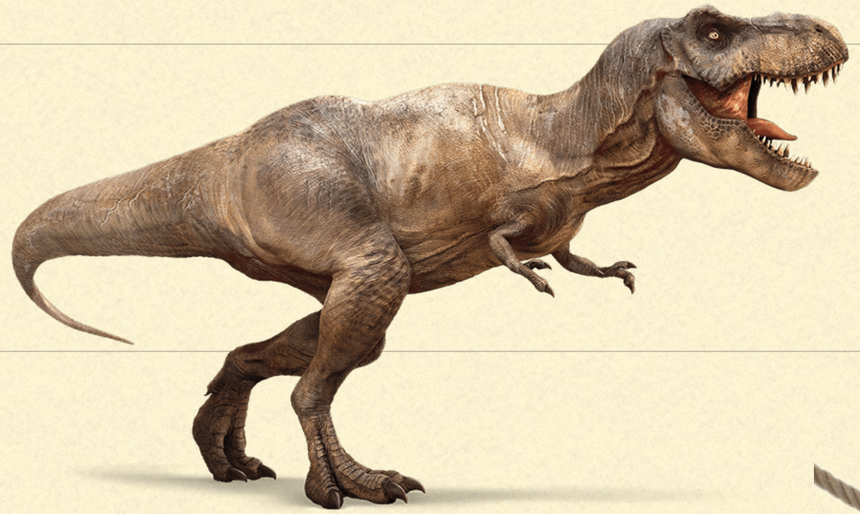
- Pelvis:
  - SI joint problems - mostly caused by asymmetry - sitting with legs in asymmetry, sleeping on the side, weak stabilizing muscles (TVA, psoas, gluteus medius)

# HIP JOINT

- biggest joints, biggest muscles
- femoral head sits deep
- movements: flexion, <u>extension</u>, external, internal rotation, aBduction, aDduction
- close relationship to
  - pelvis/sacrum => to low back!
  - to knees and feet too



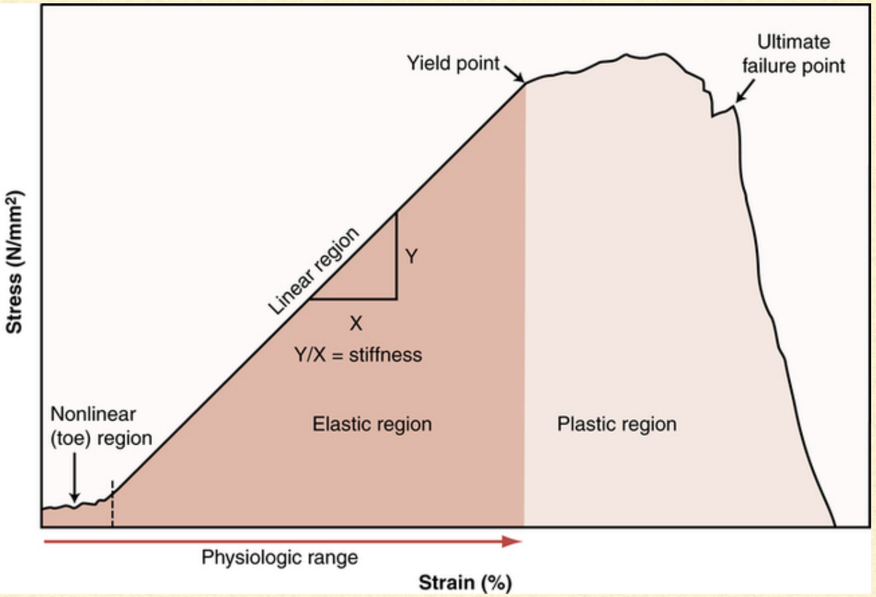
# SHOULDERS



- designed for hanging & pulling
- most mobile joint - shallow fossa
- In backbends:
  - max flexion = over head movement =>
    - gleno-humeral - external rotation + flexion (120 degrees)
      - int rotation = impingement of supraspinatus (flipping the grip - elbow stays close = ext. rotation)
    - thoraco-scapular - upwards rotation (30 no shoulder lift + 30 degrees shoulder starts lifting)
  - max (hyper)extension - shoulder blades together to orient the fossa in direction of humeral movement

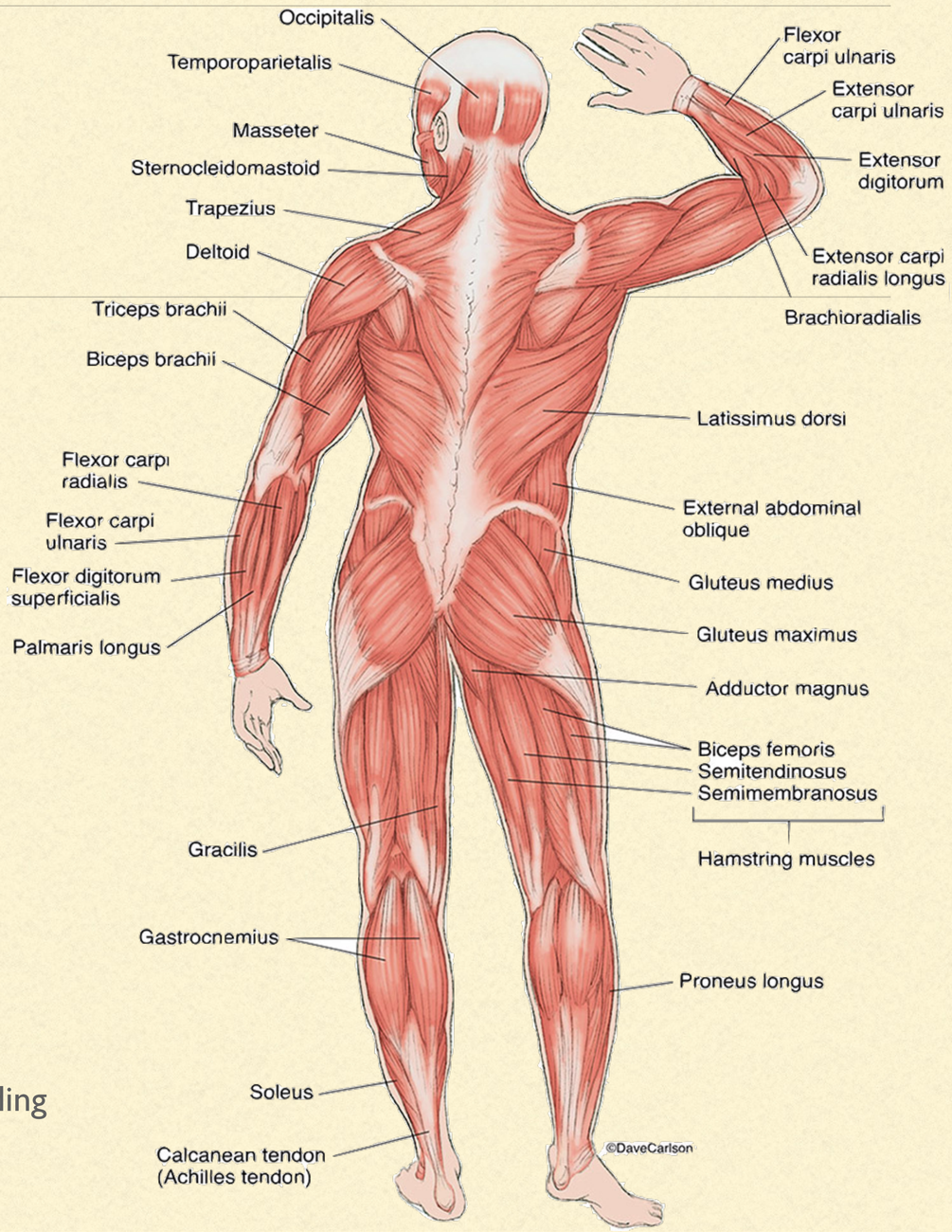
# CONNECTIVE TISSUE (FIBROUS)

- collagenous fibers, substance & cells
- myofibroblasts - shortens the fascia - governed by chemical environment, long term contraction, mostly in the low back, or after a injury (frozen shoulder), protect where there is damage, but might limit movement
- stretching while not engaging the muscles
  - yin yoga - long holds, but only 60-70% of full range
- hypermobility - more stretchy collagen fibers - affects gut, brain (anxiety) too!

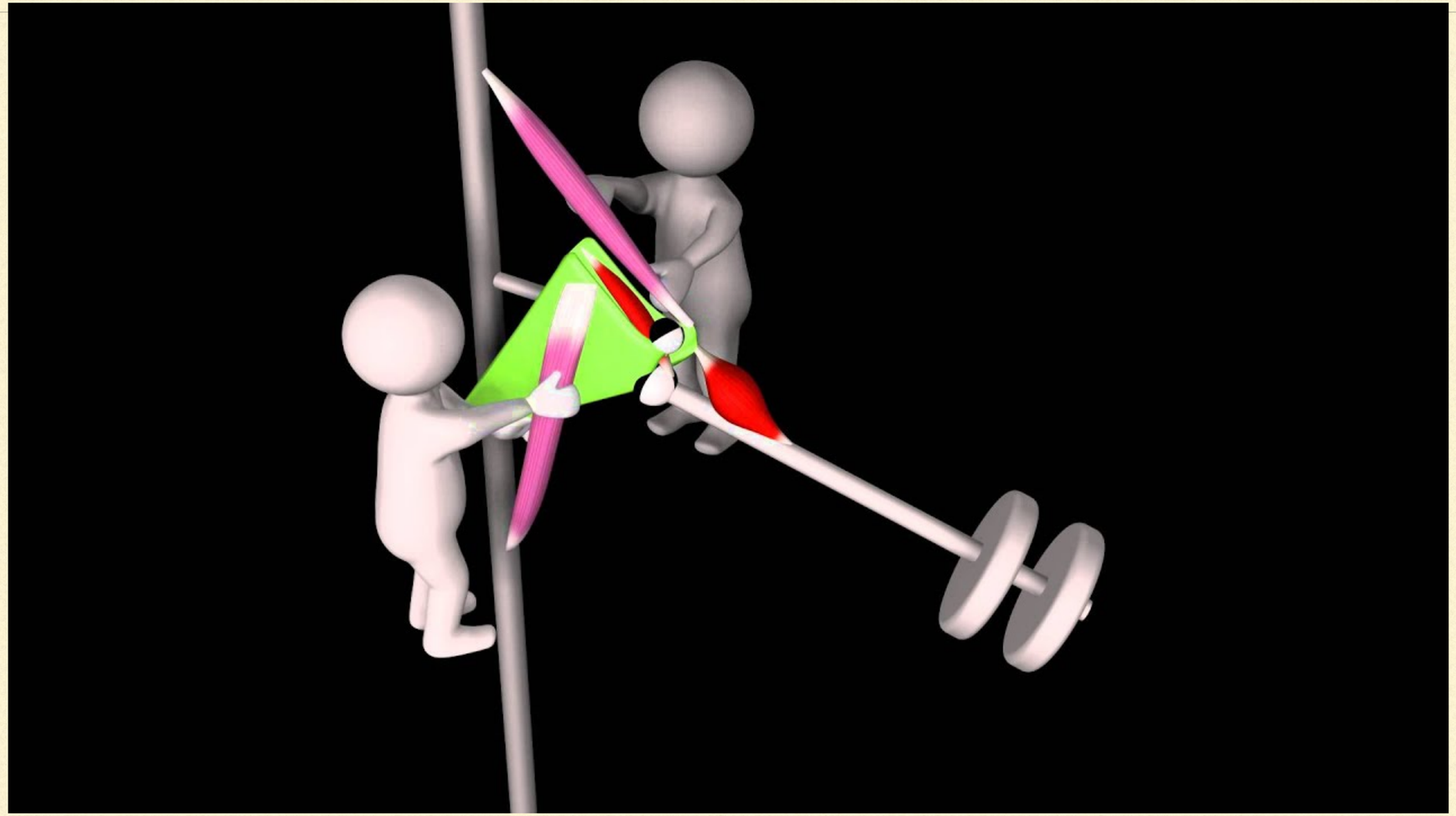


# MUSCLES

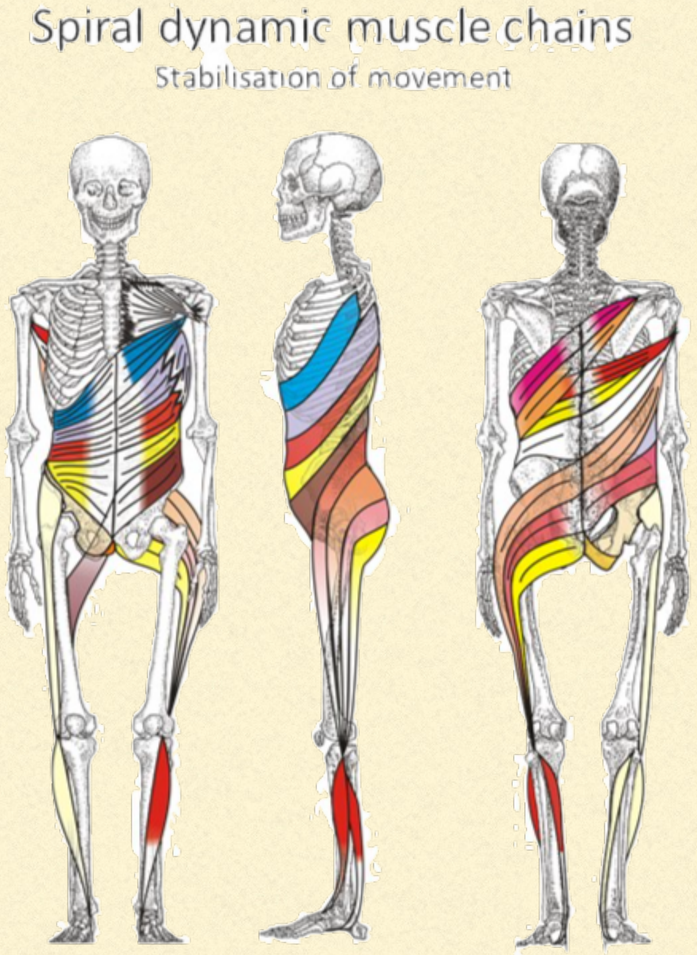
- governed by the brain (full anesthesia - full range of motion)
- brain protects from the unknown! doesn't relax the muscle if it's new length, place
- agonist vs. antagonist, synergists
- orchestrated collaboration
- stretching while engaging - the tension will be distributed and not only on the weak spot
  - strengthens the muscle in end range of motion
  - PNF - going deeper by engaging and releasing
- superficial vs. deep but also long vs. short = movement vs. stability
- biarticular muscles - going through two joints - i.e. hamstrings (extending the hip and bending the knee) - can't do both actions properly

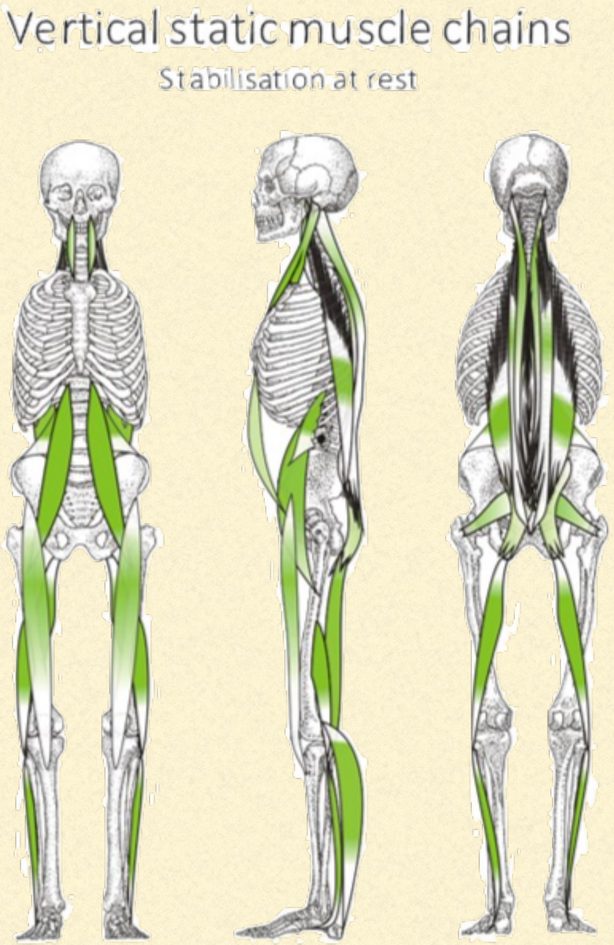


# THE COMPLEXITY



# SPIRAL STABILITY

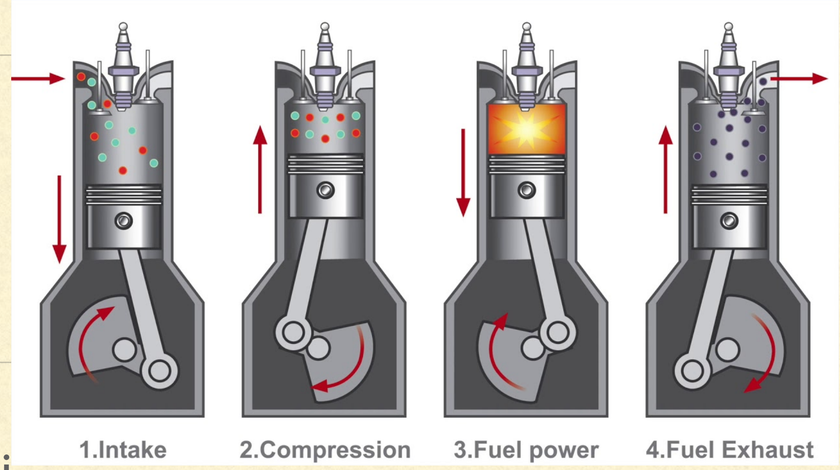


# KEY MUSCLES IN BACKBENDS

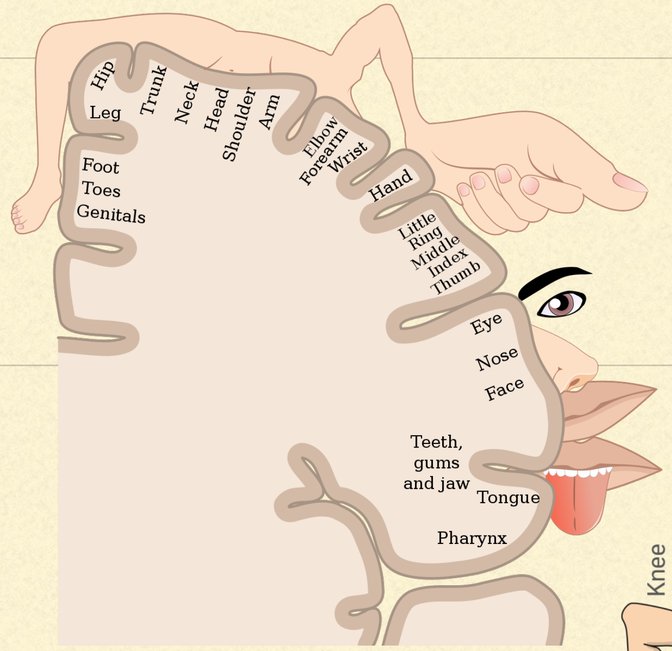
- Shoulder
  - movers: deltoid, latissimus, trapezius
  - stabilizers: serratus anterior, rotator cuff
- Hip + Spine
  - movers:
    - long back muscles - create side bending too
    - gluteus MAX - also works as ext rotator
    - hamstrings + adductor magnus
  - stabilizers: TVA, psoas major (also works as ext rotator), gluteus MED
- The role of Iliopsoas
  - iliacus tilts pelvis forward - low back issues
  - psoas major muscle
    - flexes the hip and externally rotates - long muscle fibers
    - stabilizes lumbar spine - short muscle fibers in upper part
- connects through fascia with pelvic floor AND with diaphragm, it doesn't slide through
- why do hollowbacks feel good?

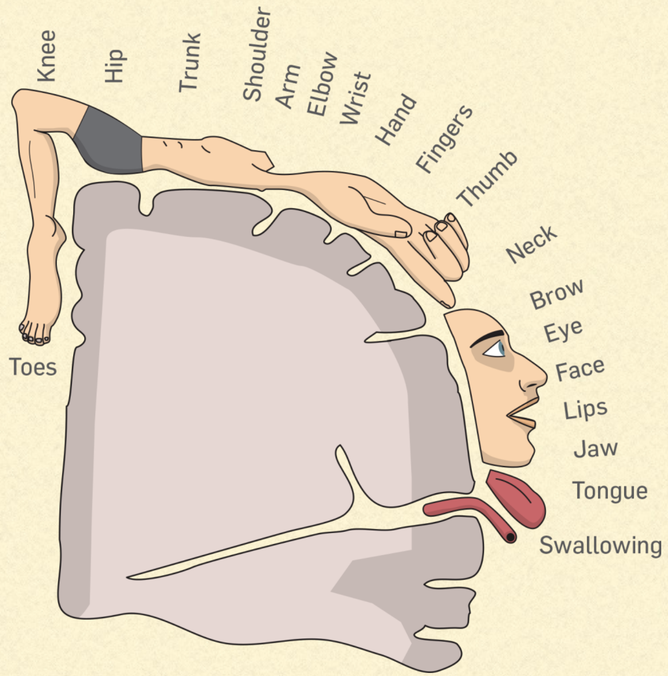
# BREATH & ROLE OF CORE




- THE core: diaphraghm, transversus abdominis (TVA), pelvic floor, multifidi
  - psoas major works as a connecting rod inside the cylinder of our core?
- Inhale - fills the trunk - pressure increases = support for lumbar spine
- Exhale - pelvic floor and abs engage to help stabilizing spine
- Cues:
  - ribs in vs. ribs out?
  - => inhale going deeper, exhale stay and focus on engaging and lenghtening

# NEUROSCIENCE

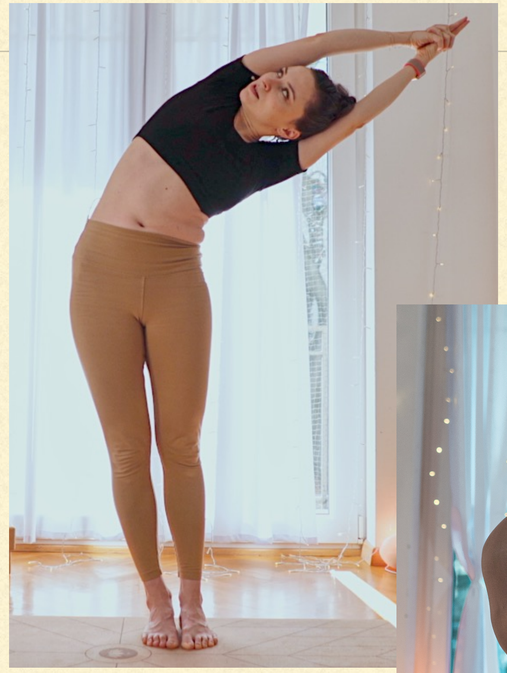



- "brain map" - motor vs. somatosensory
- neural endings distribution low on the back
- pain, emotions, stress - paniiiik, affects the muscles immediately, connective tissue over the time
- breath as a tool - to relax = long exhales, physiologic sigh (twice inhale, long exhale through the mouth)

# BIOMECHANICS - TIPS

- stacking the joints => stability
- spiral stability in legs and shoulders
- using wall, elevated surface (stable sofa/chair)
- gravity assisted easier than using only pure muscle strength
- hanging body parts - the further away, the more weight (dropbacks, sitting first in camel, moving hips back first when coming away from standing backbend)
- one hip flexed - psoas partially working = stabilizing the spine
- one arm pigeon/dancer - more focus on the one
- one side spine bends - side bends instead of full backbend, to prepare
- prolonging holds, working on single joint at a time (strength too)
- passive end range stretching - what is it good for?



# THANK YOU SO MUCH!

# QUESTIONS AND ANSWERS? FEEDBACK?