

## IDEA PTI22 #305 Back to Basics: Understanding POM, KC, & Joint Actions

Friday, Feb. 25, 2022, 5PM – 6PM

Shalaine McLaughlin, NASM CPT, AFAA Master Instructor

### Back to Basics: Understanding:

- Planes of Motion
- Kinetic Chain (KC) Checkpoints
- Joint Actions

Let's investigate how they interconnect:

- 1) *What* type of exercises to choose?
- 2) *Where* should our clients be?
- 3) *How* they should be moving?
- 4) ...and *why* planes of motion, KC, & joint actions interconnect and are important.

### Human movement occurs in three planes of motion:

1. Sagittal Plane (think Sagittarius/bow & arrow)
  - Divides the body into a right half and a left half
  - Movements are forward and backward
2. Frontal Plane (think storefront)
  - Divides the body into a front half and a back half
  - Movements occur from side to side
3. Transverse Plane (think rotational)
  - Divides the body into a top half and a bottom half
  - Movements are mostly rotational

However most daily motions happen in **all three planes**. BEST results for your clients involve multi-planar training.

**It's WHAT we want them to move.**

Some plane of movement takeaways:

- Transverse plane is often neglected in programming.
- Planes of motion are a training variable, along with resistance, load, speed, range, frequency, reps, and time to progress or regress movement.
- Large movement in one plane may have basis or control in the other two planes.

### Five Kinetic Chain Checkpoints (KC):

1. Cervical Spine: Neutral
2. Shoulders: Neutral (For most, shoulders back and down)
3. LPHC (Core): Neutral, abs and glutes engaged
4. Knees: In line 2<sup>nd</sup> and 3<sup>rd</sup> toes. Soft and extended
5. Feet: Point ahead
  - What happens with poor posture/KC?
    - ⇒ Loss of power
    - ⇒ Acute pain & injuries
    - ⇒ Postural distortion(s)
    - ⇒ Chronic pain & disability

BEST results for your clients involve proper form/KC. KC alignment is the base from which the body can effectively generate and accept force.

**It's WHERE they need to be!**

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Some KC takeaways:

- Keep head in line with spine, shoulders back & down, abs engaged, knees in line with toes.
- Before movement can effectively and safely occur, it is important to consider the role of proper kinetic chain alignment when standing, sitting, hinging, laying down, and moving.
- Lack of KC may lead to muscle imbalances, postural distortions, pain, and disability.
- KC force is usually generated from the ground up, engage extremities for more stability.
- Consider closed vs open KC exercises factoring in client injuries.

### Joint Actions:

We have different joint actions (and joint ranges) based on the type of synovial joint.

Synovial=Produces synovial fluid, has a joint cavity and fibrous connective tissue.

Six most common synovial joints:

1. **Plane** (Gliding or arthrodial): Ankles  
Sagittal, frontal; slides side-to-side or back and forth. Flexion, extension, inversion, eversion.
2. **Condylloid**: Wrist  
Fitting of two condyle bones; moves in multiple planes, predominately in sagittal plane.  
Allows for circular motion, flexion, and extension.
3. **Hinge**: Elbow  
Uniaxial; moves in one plane of motion (sagittal). Allows for flexion and extension.
4. **Saddle**: Carpometacarpal  
One bone fits like a saddle on another bone; moves predominantly in two planes (sagittal, joint of thumb frontal). Allows for flexion, extension, and other movements, but no rotation.
5. **Pivot**: Neck  
Only one axis; moves predominantly in one plane of motion (transverse/rotation).
6. **Ball-and-socket**: Shoulder  
Most mobile; moves in all three planes of motion. Flexion, extension, abduction, adduction, rotation, circumduction
7. **Facet** (zygapophysial, or Z-joints): Spine  
They interlink for stability and to limit rotation, one row face up zygapophyseal, apophyseal  
Allow for flexion, extension, rotation  
**Cervical Region** 45 degrees; frontal plane; all movements are possible such as flexion, extension, lateral flexion, and rotation.  
**Thoracic Region** 60 degrees; frontal plane; lateral flexion and rotation; no flexion/extension  
**Lumbar Region** 90 degrees; sagittal plane; flexion and extension.

If a joint moves in a different direction than intended?

- ⇒ Loss of power
- ⇒ Acute pain
- ⇒ Postural distortion(s)
- ⇒ Severe joint injuries
- ⇒ Chronic pain & disability

BEST results for your clients involve proper joint actions.

**It's the HOW they need to move!**

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Some joint action takeaways:

- Avoid hyper joint movement, especially without proper warm up.
- Start movements small and slow, increase range and speed to progress.
- Avoid (for the most part) in locking joints.
- Engage in neutral spine (for the most part)
- Lumbar spine is meant to be sagittal.
- Pressure on joints past comfortable range repeatedly leads to compression, inflammation, and possible damage.

They're all interconnected! Why is this important?

**Certain joint movements only happen in certain planes.**

- Sagittal
  - Flexion, Extension, Scapular protraction/retraction
- Frontal
  - Abduction, Adduction, Lateral flexion, Eversion, Inversion, Scapular elevation/depression/rotation
- Transverse
  - Internal/External rotation, Horizontal adduction/abduction, Pronation, Supination,

**Keeping joints stacked (using KC) keeps your joint actions in certain planes & within range of motions.**

Sample joint actions ignoring planes of motion & KC:

- Squats/cycling with knee vargus
- Behind the neck press/pulldowns
- Full upright row
- Neck rolls/circles
- Hurdler's stretch
- Press with bent wrists or "W" arms

Example of movements happening outside of 3 planes/KC because of joint actions/range of motions:

- Lateral arm raise
- Wide legged/goblet squat
- Split squat

**More gains, no pains! Slow & steady wins the race.**

Long-term adherence and exercise execution on a regular basis for the win.

**Thank YOU for spending an hour with me!!!!**

***Please fill out the survey ASAP.***

Post about what you learned #IDEAPTI #CertifiedPersonalTrainer & tag me!

IG: @ShalaineMac or my FB Page: ShalaineFit

Link to my handouts, pdf, & cheat sheets: [www.pti22.shalainefit.com](http://www.pti22.shalainefit.com)

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