

Alignment & Ease of Movement: Core Connections
An Exploration of the Soma Sutras

1. Welcome **Slide #1 What is Fascia & Why Do We Care**

Students arrive. Sitting arrangement with mats, bolsters, blocks and straps. Today we'll be exploring pathways of connective tissue pathways in the body. These pathways are formed by fascia.

Does anyone know what fascia is?

Fascia is the web of connective tissue that weaves throughout the body surrounding every muscle fiber, bone, organ, nerve and blood vessel. In some places it binds some structures together while in other places it allows structures to glide across each other. It's organized in layers. Superficially it lies right underneath the skin. Deep fascia is more dense. It interpenetrates and surrounds the muscles, bones, nerves and blood vessels of the body. As you get even deeper, you have visceral fascia which suspends the organs within their cavities and wraps them in layers of connective tissue.

Today we'll be exploring myo-fascia: the layers of connecting tissues that interpenetrate and surround our muscles. These tissues are organized in ways that both support and protect structures in the body – they form a web. When you stretch one part of the web you will be affecting the body in other areas.

Think about a pair of nylons - when you pull on one end it affects the other - also gets stretched out.

2. **The Core Sutra: Alignment & Ease Slide #2**

Today we're going to focus on the core. We'll be defining the core more broadly than what you might commonly think of as "core". We're going to explore the connective tissue pathway - that interweaving web - through the center of the body at the deepest levels. We'll look at the key muscles that are considered "core" and how they relate to centering and aligning the body relative to the core.

We will use movement practices and yoga poses to reveal how these Core Connections relate to posture and ease of movement through the feet, legs, pelvis and trunk. We will also address specific imbalances that are often the cause of discomfort and/or restricted movement, and practice adapted poses to increase freedom and safety.

First I'll give you an overview of what we mean by the "Core" of the body including the key muscles that contribute to the stability of our torso.

Then I'll describe the pathways of the Core Connections – this is the connected structure or the web of the core.

We can have an experiential exploration of these pathways - by directly palpating them - tracing over them with our hands & sensing into them with movement.

We'll do some movement practices that I hope will illustrate how the muscles work in relation to the core. As you practice I'll be asking you to pay attention to how the movements feel locally - the area where you initiate the movement - and also globally - how the feeling radiates out to the entire body. For example when you lift your big toe – you'll feel it around your toe and you'll also feel it up your leg – if we're standing you may feel it all the way up your thigh to your pelvis.

So we'll be improving kinesthetic awareness and also investigating physical imbalances. Imbalances might be reflected in poor posture or limited range of motion. Postural imbalances and movement limitations might be due to combinations of muscles weakness and/or tightness.

We can use our kinesthetic awareness and our knowledge of our Core Connections to work with key muscles to bring ourselves into healthier postural alignment and more ease in movement.

Does anyone have any questions so far?

3. Posture: Harmony of Pull Among Supporting Muscles Slide #3

We'll look at centering posture around the core or the gravitational center of the body - through the spine & pelvis. The relative strength & weakness of muscles & fascia can create shifts & tilts in the pelvis. A shift will pull the pelvis forward or back relative to your feet. A tilt will tip the top of the pelvis forward & back. Your body compensates for imbalances which you can see in various postures.

We'll look at the imbalances that where the lumbar curve is decreased or exaggerated. We'll also explore yoga sequences to help balance the body.

4. Pathways of Core Connection Slide #4

- a. Structural problems begin with an imbalance in the pull or support of the body's muscles. To understand structure we can think of a moving weave of threads formed by connective tissue. Connective tissue includes muscles and the membranes that interpenetrate, wrap around or connect them. The connective tissue is organized in an intelligent way – according to function – like a myo-fascial meridian.

- b. Today we're studying the Core Sutra or Thread. Core generally means the deepest layers of muscle closest to the bones. Our main concern with the Core Sutra is with centering or aligning the body relative to its core. These are support muscles rather than movement muscles. To understand posture we have to look at the functional relationship between the Core muscles and the Supporting muscles, which are more superficial. So before we get into posture let's look at the Core Sutra as it is the most central thread of our physical being. It runs from the bottom of our feet to the top of the head.

The Core Sutra begins on the sole of the foot. It continues around the inner ankle up through the muscles up the back of the leg, including the muscle behind the knee. Feeling: let's just trace that line - from the base of the big toe along the arch, behind the medial malleolus up the back of the calf to the back of the knee.

The knee is a transition point - from behind the knee the CS continues up along the inner thigh through the pelvic floor over face of pelvis to low back. Feeling: reach behind your knee & draw your fingers up your inner thigh to the pelvic floor. Trace along the inside of your groins up to the top of your pelvis.

An alternative track runs up the back of the thigh to the pelvic floor across face of pelvis up to low back.

As CS enters the trunk it branches out through upper body through the chest. It runs along your spine all the way up to your neck & it also branches out to form an inner container within the rib cage & even around the heart. It follows the back of the diaphragm, its central tendon & crura & runs up to the deep muscles of the sides of your

neck. It follows the front of the diaphragm up to the infrahyoid muscles - the deep muscles in the front of your neck. The lines inside & around your chest are harder to track but you can feel them with a full yogic breath. You can trace the lines up the sides & front of your neck with your fingers.

5. Moving & Feeling the Inner Lines Foot & Calf Slide #5

- a. The Core Sutra begins deep in the underside of the foot, passes up just behind the bones of the lower leg and behind the knee to the inside of the thigh. Begins deep in the sole of the foot w/3 mms. that support medial arch: Flexor hallucus longus (Big Toe), Flexor digitorum longus (phalanges II-V), Tibialis posterior (most connections to sole of the foot - provides essential support for inner arch of the foot). This complex as a whole provides support to inner arch especially during “push-off” phase of walking. TP contracts to create strong lift at inner arch when you come to tip toes.

- i. Feeling the arches: Sitting & standing

1. Start by sitting feet hip width apart knees flexed flat on the ground. Pick up & spread your toes, ground mound of big toe & press heels down. Draw mound of big toe to heel - then lengthen out toes. Keep lifting arches. Try the same thing with a block between feet with hips out to side.

2. Standing do SAA

- ii. Feeling the line along the back of calves to knee

1. Come to wall engage feet SAA, inner & outer spiral as you “sit” back in space. Return to standing & lift heels & repeat “sitting” & spiraling then press all the way up to balls of feet with hands at wall for balance.

6. Moving & Feeling the Inner Lines Inner Thigh Slide #6

- a. From the back of the knee this line acts strongly on the inner thighs - also called the adductors which have a direct impact on the health of your hip joints and sacrum - as well as the tone of your pelvic floor & the support for your knees.

i. Feeling Inner Thighs

1. Standing up & putting a block between the thighs.
Without gripping the block, draw inner thighs back as if taking the block up & back - you’ll feel the sit bones draw back & apart. Now try drawing your tail bone down & forward toward your pubic bone.
2. “Sitting” at wall. Spiral AA. Sitting on floor with legs extended feel sit bones widen & spiral AA.

7. Moving & Feeling the Inner Lines Psoas Slide #7

- a. From here it branches out: the main track passes in front of the hip joint, pelvis and lumbar spine; an alternate track passes up the back of the thigh to the pelvic floor, branching backward, and then rejoining the main track at the lumbar spine.

Through the pelvis the line goes from your upper inner thigh across the face of your pelvic bowl up to you lumbar spine in the form of

the iliopsoas muscle - which has a dramatic impact on your posture, the health of your back even the rhythm of your breathing. It plays a role in every action of your body but it has most to do with the core extension of your body through your sacrum & spine. If the psoas is tight it could be pulling you into a rounded posture & contributing to a collapsed chest.

- i.* To feel the psoas engage - lie on your back with your knees bent feet on the floor & take a few deep breaths - sense the natural curve in your low back & don't try to flatten it. Maintain this natural arch as you begin to slide your right heel out along the floor with your foot slightly flexed. Keep your knee & toes pointing straight up to ceiling as you extend your leg smoothly & slowly. A release should start deep inside your pelvis & continue down from inside of your hip bone to the inner edge of the top thigh. (If at any point you feel a tug that pulls the pelvis forward into greater lumbar arch pause & back up.) Try the other side.
- ii.* Now with your leg straight & firm - exhale as you lift your heel off the floor 3-4". Hold for 3 breaths then lower. (Repeat 3X) Change sides.
- iii.* To feel the psoas release: stand at wall R foot on block & let L leg hang. Change sides.
- iv.* It's important that the psoas be toned before we try to stretch it. When stretching it's important that the muscles be engaged, aligned then stretched.

Try walking around the room to get a sense & feeling of how you're moving. Now we'll try the block sequence of low lunge & engaged psoas stretching. Repeat walking & feeling.

8. Moving & Feeling the Inner Lines Trunk Slide #8

- a. As the Core Sutra enters the trunk it permeates the upper body through the chest, ending at the base of the head. In the trunk the CS is again thru the psoas a means of communication between our mental/emotional body (NS) & the functioning of life supporting organs. As it branches up through the chest it supports the space of the heart & breath. So you can see while we are using the metaphor of a thread - really we're talking about the space of the inner body!
 - i. To feel this let's just try sitting legs straight on the floor, back curved forward over the legs & shallow breathing for a few moments. Our trunk movements are anchored from below & inhibited by the weight & curve of the spine. Now stand - let's free the restrictions on the spine & chest & practice deep diaphragmatic breathing for a few moments. Notice how you feel.
- b. In the neck the deepest muscles are key to the alignment of the head & neck. The CS muscles create an upward extension through the crown of the head. You can feel them engage by focusing on the orientation of the hyoid bone.
 - i. To feel this place your fingers under your jaw line & draw them back toward your ears as if you were tracing a smile.

- ii.* Slide the top of the throat back, without tucking the chin, so that the front and back of the neck stay long. The top of the throat is home to the hyoid bone, a floating bone that is connected via various muscles through the core and especially into the digestive system. When the hyoid bone slides back, it draws the neck and head in line over the spine, gently toning the muscles.

9. Influence of Core Sutra: Legs & Pelvis Slide #9

- a. In the **legs**, the Core Sutra includes many of the deeper supporting muscles, particularly the deepest muscles in the arch of the foot and running behind the knee, which resist hyper extension in the knee. In the thighs, it governs the inner thighs (the adductors which interact with the hamstrings) and provides the contact and path of communication through the pelvic floor.
 - i.* Let's feel this again with movement. While standing in mountain - lift & spread your toes as widely as you can. Feel the four corners of your feet & arches lifting. Lift your heels, balance, breathe & lower. Activate your arches again - first lift toes then let them down while keeping arches up. Fold forward & step back to in downward dog. Slightly flex your knees - feel as though you were taking your inner thighs in & back, sit bones spreading; hold that orientation then feel tail bone lengthening & pelvic floor lifting. Stay for a few breaths.
- b. In the **pelvis**, the Core Sutra intimately relates with the hip joint and the root of the diaphragm in the form of the psoas. The psoas

deeply influences posture, the rhythm of breathing and how it is coordinated with movement. The psoas has everything to do with the core extension of the body through the sacrum and the spine.

- i.* Come to all fours shift into a modified form of pigeon or swan pose. Use the blocks to help you extend the spine upward & the leg back. Stay for a few breaths, change sides.

10. Influence of Core Sutra: Legs & Pelvis Slide #10

- a. In the **trunk**, the Core Sutra, through the psoas and other chest muscles, affects our nervous system. It fans into a three dimensional field that supports the space of the heart and lungs and then rejoins to support the alignment of the neck and head

- i.* Another way to feel this expansive space in the heart & lungs through the psoas is with bridge pose. First let's counter the extension of pigeon with child's pose. Here we feel symmetry across the low back, hips & pelvis & also a sense of compression - we're losing space in the torso. Let's expand it by using bridge pose. Come onto your backs. Let's use low bridge to explore how we open the front & sense the deep connections - from your lower abdomen, groins & inner thighs. Breathe as expansively as you can.

- b. In the **neck**, it provides the central lift and support of the head.

- i.* To feel action in your neck - simply draw your chin down to your chest, then lift it to exaggerate the curve in your neck - see if you can find the neutral curve.

11. Major Postural Functions of the Core Sutra Slide #11:

- a. Lifting the arch at the very center or keystone of the foot
 - i. *Common failures: chronic plantarflexion; high or fallen arches*
- b. Stabilizing each segment of the leg, particularly at the ankle and knee
 - i. *Genu valgus (knocked knees) or Genu varus (bow legs)*
- c. Supporting the lumbar spine from the front, while strongly influencing its curves through the psoas
 - i. *Anterior pelvic tilt; disorders of pelvic floor; lumbar misalignment; general collapse of core*
- d. Stabilizing the chest while supporting the undulating movement of the breath
 - i. *Breathing restrictions*
- e. Balancing the head on top of the neck and aligning them both with the energetic core of the body
 - i. *Flat neck or hyper extended neck*

12. Key Muscles of Core Alignment Pelvic Floor Slide #12

- a. The Pelvic Floor: the muscular network of the perineum

The pelvic floor is a hammock of muscles that connect the pubis bone at the front to the tailbone and 'sit' bones at the back of your pelvis.

The pelvic floor supports the weight of the inner organs & regulates the passageways for elimination & childbirth.

13. Mulabandha & the Sit Bones Slide #13

- a. The yoga practice of Mulabandha is most concerned with the tone of the pelvic floor.
 - i. Seated on block in Baddhakonasana with legs passive, knees supported by hands. Draw sit bones toward each other as if a string (without gripping buttocks or hips) At same time draw lower abs just above pubic bone, “hollowing” pit of abdomen.

14. Key Muscles of Core Alignment Psoas Slide #14

- a. The Psoas: the bridge between the upper & lower body

The psoas is the centermost muscles of the body. Though it functions primarily as a hip flexor - it is involved in nearly all our movements. The tone of the psoas has a strong influence on the tilt of the pelvis, health of the low back and freedom of movement in the hips.

- i. Step L leg back lean forward on R knee as it bends. Turn back foot out 30-45 to plant heel on floor. Spiral L hip in bring hip points even with each other. Keep arches lifted & refine actions of abs with rotating ball of energy.

15. The Pelvis: Nutation (Spiral In) & Counternutation (Spiral Out) Slide # 15

- a. Anterior pelvic tilt: waist narrows, pelvic floor opens, lumbar curve increases - think of spiraling into core & engaging TA
- b. Posterior pelvic tilt: upper bowl expands, pelvic floor closes, lumbar curve decreases

16. The Problem at the Center: Psoas Slide #16

- a. Psoas flexes at hip (lifts leg), flexes trunk (bends torso forward), helps us stay erect, balancing low back muscles. Critical for moving & stabilizing low back & pelvis

17. The Iliopsoas Bridge Slide #17

- a. Outer upper psoas helps extend upper spine bending it back to start thoracic curve. *Feel this standing with peach fingers inside hip lights; keep legs & pelvis anchored while lifting rib cage up & drawing back*
- b. Inner of lower psoas affect lumbar: flexes lower spine, bending it forward at start of lumbar curve. *Same anchoring as above & fold forward or draw knee up.*
- c. Problems arise when psoas exerts imbalanced pull either forward & back. Accompanying compensations create postural stress, ligament, joint strain. Address by enlisting Core.

18. Key Muscles of Core Alignment: The Inner Corset Slide #18

- a. The deeper abdominals provide postural support (rather than flexing or twisting the spine). They are capable of remaining lightly toned for long periods of time without fatigue. Toning the Transversus Abdominis (TA) along the front of your spine activates the lumbar multifidus which supports the back of your spine.
 - i. *Isolating the TA - Train before strengthening. Lie on back with spine in neutral. Place peach fingers inside hip points. Lift vaginal walls up to belly. Imagine line drawing hip points to midline. No movement of hip, pelvis or spine. (Should not feel contraction that pushes fingers out.)*

- ii. Strengthen Co-activated Core - a) Slowly let R knee move to right, keeping low back & pelvis level. Change sides. b) Right foot on blanket to slide R foot along floor straightening knee; slide back. Change sides. c) Lift R foot off floor then extend leg only as far as you can control core. Change sides.

1. Exercises

19. Transverse Abdominals #Slide 19

- a. TAs act as stabilizers; they don't produce significant movement of spine. At lower end fibers contract to support low belly. You can feel action from inside hip lights down to inguinal ligament.
- b. Mid section between ribs & pelvis narrows waist, squeezing ab contents both up & down. This narrowing action is weak - needs to recruit other abs.
- c. Upper section can pull ribs closer together - with support of obliques.

20. Key Muscles of Core Alignment: The Multifidus Slide #20

- a. The deep muscles lie on either side of the lumbar spine. They work with the psoas to protect against disk herniation. They help prevent pinching at the point where the lowest spinal vertebra meets the sacrum. The deep fibers of the multifidi also work with the TA to stabilize the Sacro-Iliac joints (where the sacrum and the ilium bone of the pelvis joint).
- b. They act in standing, bending forward, twisting, lifting heavy objects & walking. Active in back bending when spine is lifting against gravity. (Cobra, locust, etc.)

21. Lumbar Multifidus Muscles as Stabilizers Slide #21

- a. Originate on transverse processes of vertebrae & insert superiorly on the vertebral body of the vertebra below - they stabilize by resisting rotation. They have a bowstring effect on the back of the spine supporting the lumbar curve. They keep torso upright when twisting.

22. The TA & Multifidus Work Together Slide #22

- a. They co-contract when Transversus Abdominis (TAs) activate to stabilize the trunk - especially below the navel. Their combined action helps vertebrae stack firmly against each other. If TA works unevenly or if there is a failure in one or two segments of multifidus the segment is vulnerable to disk slide.
- b. At L5 the multifidus must produce enough tension to ensure that L5 does not slide forward on sacral plateau.
- c. Failure of particular segment is most common cause of chronic back pain.

23. TA & Multifidus Study Results Slide #23

- a. Only 10% of those with low back pain could activate TA, while 82% without pain could.
- b. Multifidus segment failure not due to muscular weakness but a disconnect in brain nerve muscle organization.
- c. These two sets of muscles: Core System of Stabilizers

24. How To Get Them to Work Together Slide #24

- a. Don't go out of neutral zone (spine) or you'll recruit other muscles.

- b. Multifidi work best with small extension movements. When you challenge body to maintain balance body is forced to recruit TA to stabilize the trunk while spine is extended
 - i. Come to all fours for a few rounds of alternate arm & leg extension sequence.

25. TA & Multifidi Stabilizers Slide #25

- a. Multifidi work to support inward curve of lumbar. They continue to work as you bend forward. Work is made harder when low back rounds in bending from actions of abs pull rib cage down.
 - i. Bend forward with neutral spine & lifting action of bandhas
- b. In ab exercises flattening low back against floor denies multifidus their proper function - so while strengthening the abs these exercises don't truly integrate the core.
 - i. Uddiyana B. pulling navel back to spine - goes along with maintaining neutral curve in spine so multifidi can co-contract.
- c. TA's are less effective as stabilizers as you go beyond neutral zone of stabilization & into deeper back bend - then it's up to ligaments to protect spine in back bending.

26. Key Muscles of Core Support: The Diaphragm Slide #26

- a. The Diaphragm offers 3 dimensional support. True diaphragmatic breathing is a 3 dimensional expansion especially around the lower ribs. This provides symmetrical postural support by centering the

upper torso and while supporting the spine. Fullest expression of D breath comes when both belly & chest move.

- i.* D inhalation when ribs are fixed: Central tendon moves down, belly & lower ribs expand. Ab cavity changes shape as contents & lower ribs displaced. Feel expansion encircling lower ribs.
- ii.* D breathing when abs held firm: Central tendon can't move so contraction of D pulls upward on lower ribs - lower ribs expand outwardly. D initiates breath in chest.

27. The Core System of Local Muscles (the inner 'Container') Slide #27

- a. The 'local' system is a subset or "container" of core muscles that provides stability within the pelvic & low back region itself.
- b. The purpose of the local system is to stabilize the joints of the spine and pelvic girdle as a preparation for an increased load on the joints.
- c. There is a significant difference between the local and global sets of muscles:
 - i.* When the load about to be placed on the body is predictable, the muscles of the local system contract before movement actually takes place regardless of which direction the body moves.
 - ii.* The muscles of the global system contract later upon initiating actual movement and how they act depends on the direction in which the body is moving.

iii. The actions of the local system happen in coordination with the breath (due to the diaphragm's movement). Ideally they should be working at all times (they increase their activity before any action involving a load occurs.)

28. The Local Subset of the inner 'Container' Slide #28

- a. The TA is the deepest layer of abdominal muscle. It lies up against organs and viscera, separated only by fascia. The upper end attaches to the inferior surface of the rib cage. At its bottom, it attaches to the iliac crest of the pelvis (the spot where you would place your hands on your hips) and extends along the inguinal ligament of the groin. At the front of the abdomen, the fibers of the TA join the anterior aponeuroses. This aponeurosis (a form of myofascia) is a flat, fibrous sheet of connective tissue that extends the contractile reach of the muscles.
 - i. The TA acts on the by narrowing the waist, primarily between the ribs and the pelvis (pushing viscera up toward thorax or down toward pelvis.)
 - ii. The TA has a specific and subtle action at its lower end, where its fibers run along the inguinal ligament. When contracted the muscle helps support the lower abdomen (complementing the action of the internal oblique.)
- b. The multifidus muscles (multifidi) perform both local and global actions. At the deepest (local) layer when contracted, the multifidi, broaden or swell, pumping up the tissues at the back of the sacrum like air bags. This action helps to stabilize the sacro-iliac joints.

- c. The diaphragm is the primary muscle of respiration and serves to stabilize the trunk. The sections of the diaphragm at the ribs and 'root' (crura) reflexively tone simultaneously with the TA in anticipation of movements, especially raising the arms overhead. An effective diaphragmatic breath generally consists of 60% expansion of the lower ribs and 40% expansion of the upper belly. You can think of the diaphragm muscle as the 'roof' of the core 'container'.
- d. The pelvic floor array of muscles extending from the pubic bone back to the tail bone and 'sit' bones affect the SI joints by acting on the tailbone and sit bones in all movements of the hips and pelvis. You can think of the pelvic floor as the bottom of the core container.

29. Transverse Abdominals as Stabilizers Slide #29

- a. Finding Uddiyana Bandha for Postural Support
 - i. **Key Actions:** Hip points narrow & draw toward each other (TA) & Draw lower ab in & up (RA). Tightening the draw string & zipping up. Can do standing or on back.
 1. *Without producing any movement in the spine or changing the tilt of your pelvis, slowly and gently draw the pit of your abdomen (below the navel) in and up as you exhale.*
 2. *As you do this become aware of your 'hip points' (anterior superior iliac spine or ASIS), imagine squeezing them together as your lower belly firms. This is the action of the TA.*

3. *The hip points actually do draw towards each other, slightly opening the space of the SI joints.*

30. Tightening the Drawstring Slide #30

31. Engaging the Core Along Latitudes Slide #31

- a. Zipping up from bottom to top rounding from vertebra by vertebra. Initiate movement from tailbone, but let movement come from lower belly. Press hands into earth to help engage abs. Sense feeling of “wrapping around” through abs along latitudes of spine to lift up.

32. Narrowing Hip Points: TA & Obliques Slide #32

- a. Lie on back legs extended on floor. Engage TA work with legs as if trying lift them. Squeeze hip points toward each other. Firm thighs & spiral them in - feel sit bones spreading.
- b. Notice relationship between Big Toe Mounds & Hip Points. When big toe mounds press toward each other so do hip points. Turn toes out & hip points flare.
- c. Notice relationship between Heels & Sit Bones. When heels move toward each other so do sit bones; pelvic floor closes to tail bone, sacrum tips back. When heels move apart, sit bones spread opening low back allowing low back to arch.

33. Example of Core Work Slide #33

- a. Start all fours neutral spine. Extend L leg back toes curled under. To integrate core lift R knee slight up off floor. Press L foot, engage quads (psoas); draw energy up to hip point. Press hands into floor

engage lower abs narrow hip points. Step R leg back into plank, working core evenly. Repeat other side

34. Sagging Plank is Counterproductive! Slide #34

- a. Better to lift hips higher to better engage abs between hip points - creating length & tone in low back without rounding or tucking pelvis.

Let's take a break!

35. Alignment and the Pelvic Floor: the Three "Diaphragms" Slide #35

- a. There is a close relationship between diaphragmatic breath and the tone and movement of the pelvic floor. As the diaphragm lowers, contracting and pulling downward upon inhaling, the fibers of the pelvic floor and abdominal muscles have to release and elongate to make space for the displacement of the internal organs. During exhalation the pelvic floor and abdominals contract to push the organs upward again as the diaphragm releases and moves upward.
- b. Among the abdominal muscles the internal and external oblique muscles are most closely involved with the movements of the abdomen during the breath cycle. The TA plays more of a supportive role in postural integrity, pressurizing the abdominal cavity to support the lumbar spine. (The rectus abdominis is used most for flexing the spine.)
- c. Good posture supports breathing. We can think of good posture as the healthy alignment of 3 diaphragms involved in the overall process of breathing. (Poor posture adversely affects the shape of the inner

container. We can tell when our posture is “off” by the fact that our breathing process feels blocked, incomplete or shallow.)

- d. The pelvic diaphragm (PFM) release downward with the initiation of breath and gently tone and press upward with the out breath. The tone of these muscles increases when the TA muscles are engaged just above the pubic bone. The tone of these two sets of muscles greatly assists the respiratory diaphragm. When they are lax, the upper body collapses and there is a downward tug on the respiratory diaphragm that limits its movement.
 - i. Sway back/Lordosis over arched back; diaphragms tilted forward limiting full diaphragmatic breath
 - ii. Flat back: diaphragms tilted back limiting full breath
- e. The vocal diaphragm is the root of the palate: with proper alignment of the **hyoid**, this network at the back of the throat lifts upward with the in breath (like when we yawn), opening the upper body to a full diaphragmatic breath; and releases downward with the out breath. (Slide the top of the throat back, without tucking the chin, so that the front and back of the neck stay long. The top of the throat is home to the hyoid bone, a floating bone that is connected via various muscles through the core and especially into the digestive system. When the hyoid bone slides back, it draws the neck and head in line over the spine, gently toning the muscles.)

36. Alignment & the 3 Diaphragms Slide #36

- a. To imagine **balanced posture**, visualize:

- i. the arches of the feet as “overturned bowls” the tops demonstrating a toned lift at the arches below the pelvic floor
- ii. the pelvic floor as an “upturned bowl” balanced at the floor of the core container demonstrating a slight forward rotation of the pelvis and a natural lumbar curve
- iii. the “dome” of the respiratory diaphragm as an overturned bowl aligned over the pelvic floor
- iv. the vocal diaphragm as an “upturned bowl” balanced over the respiratory diaphragm

37. Zeroing the Postural Balance Slide #37

- a. The most important thing to do is align the pelvic floor with our center of gravity. Various types of misaligned postures involve shifts and tilts in the pelvis that are largely the result of the body compensating for misalignment of the hips in relation to gravity. Successful realignment of the pelvis should be accompanied by a tangible feeling of release, flexibility and alignment of the pelvic floor with the process of breathing.

38. Working with Postural Shifts Slide #38

- a. Most of all postural misalignments involve a fundamental forward shift of the pelvis. A number of things follow that shift:
 - i. *the groins harden (the muscles you can feel at the hip creases)*
 - ii. *the lower back tends to compress at the sacrum*
 - iii. *the hamstrings shorten and*

iv. the calves and arches of the feet tighten

- b. When the forward shift of the pelvis is corrected all these forms of tension release and the muscles of the legs, hips and pelvis find a more harmonious tone. This exercise is meant to correct the shift and tile of the pelvis and to feel the transformation in muscle tone that results:
- i.* Stand with your feet parallel, hip distance apart. Place fingertips at the hip creases (the V where your thighs meet your hips) to feel the tone of the muscles at the front of the hip joints. Notice that the more you shift your hips forward in space the more these muscles harden.
 - ii.* Bend your knees slightly – about 20 ° releasing your inner knees forward to “unlock” them. Your thighs and knees should be parallel with each other and your kneecaps should point forward like headlights.
 - iii.* Lift your toes to draw energy from the arches up through the muscles of your legs into your hips.
 - iv.* Shift your hips back so that more weight comes into your heels. Tip your hip points slightly forward, as if you were beginning to sit back onto a stool – bringing an inward curve to the lower back. Tip your pelvis forward so that your sit bones move back and apart. The muscles at your hip crease will soften.

- v. Let your inner thighs “melt” back toward your sit bones and feel a softening or broadening in your sacrum just below the waistline at your back.
- vi. The muscles of the pelvic floor will release and open and your breath may feel much deeper as more space is made for the movement of the diaphragm. Try enhancing this affect by placing a block between your upper inner thighs. Keep your knees parallel and draw the block back by arching your lower back so that your sit bones move back and apart.

39. Posture as a Harmony of Pull Among Supporting Muscles Slide #39

- a. This centering of posture at the core or ‘inner body’ is the starting point for exploring the shifts of tone that take place in the muscles of the ‘outer body’. Greater demands are placed on some muscles while other muscles remain either lax or placed in a chronic stretched or stressed position. These imbalances in muscle tone can be either a cause or effect of postural deviation – or both. Our postural habits can easily become a vicious cycle of misalignment. The differences in muscle tone can be understood in terms of opposing sets of muscles. The relationship between opposing sets of muscles are primarily determined by:
 - i. *The degree to which the pelvis is shifted out of alignment with our gravitational center – either anterior/posterior or side to side.*
 - ii. *The tilt of the pelvis – whether anterior/posterior or side to side. Rotations or twists can occur when the two sides or*

'wheels' of pelvic bones are tilted or rotated differently from one another

b. In healthy posture there is a balanced posture between the back and front body in the muscles above and below the lumbosacral junction (L5-S1). The overall balance is between:

i. *The Back Body, which is largely made up of Extensors: the Back Extensors and the Hip Extensors*

1. *Extensors in the back work to hold us upright. They take the body 'back' into a back bend or take the leg back behind us as we walk.*

ii. *The Front Body, which is largely made up of Flexors, which either Bend us forward or which lift our thighs: the Abdominals and the Hip Flexors*

1. *Flexors in the front body work to bend us forward or to lift the leg toward the body, flexing or bending at the hip.*

c. **The Pull of Pairs of Muscles Supporting Posture (*illustration*)**

i. The normal tone of muscles exert a steady pull, like wires stabilizing a pole. The principle of this postural pull is this: in a neutral standing posture the balanced action of the Extensors (back) and Flexors (front) exert a steady pull in the opposite direction of their normal action:

1. *The hip flexors which usually pull up to lift the leg will draw down on the pelvis when the leg is fixed, especially if they are tight.*

2. *The abdominals which usually pull down to bend us forward will draw up when the spine is held upright.*
 3. *The hip extensors usually pull up to take the leg back (extending the hip) will draw down if the leg is fixed.*
 4. *The back extensors which usually draw down to take us into a back bend, will draw up holding us upright when we don't take the spine back past vertical.*
- ii. The pelvis is the center of these lines of pull. When the tilt and shift of the pelvis is affected it influences the curvature of the spine.
1. *The pull of the hip flexors and hip extensors affect and determine the tilt of the pelvis through the hip bones.*
 - a. *Key hip flexors include the iliopsoas, tensor fasciae latae, rectus femoris*
 - b. *Key hip extensors include the gluteus maximus, hamstrings*
 2. *The pull of the front flexors – the abdominals – and the back extensors affect the curvature of the spine as well as the tilt of the sacrum.*
 - a. *Key front flexors include rectus abdominis, transversus abdominis, internal and external obliques*
 - b. *Key back extensors include erector spinae*

40. Abdominal Tone Gets Lost in Postural Shifts Slide #40

- a. Postural habits in one part of body such as slumped shoulders or overly opened shoulders cause shifts & pulls in low back, pelvis, legs.
- b. With forward shift of hips rib cage can collapse down as it tilts forward pressing belly out. Compresses abs & pelvic floor.
- c. With chest shifted forward & forward tilt of pelvis there is a back tilt to chest. Tightness in low back & hip flexors/psoas inhibit abs & distends belly.

41. Patterns of Compensation: Head and Hips Slide #41

- a. When evaluating your posture:
 - i. *Check whether and how far the hip joints of the pelvis are shifted forward relative to the line of gravity through the spine*
 - ii. *Check the two 'hip points' and the position of the two heads of the arm bones to determine whether one hip is tilted or shifted forward of the other (the forward side will appear lower than the side shifted back)*
 - iii. *Check how far the head (specifically the base of the head where it rests on the top of the spine) is shifted forward relative to the line of gravity through the spine itself.*
- b. The shifts and tilts of the pelvis that affect the lower back are usually matched by compensating shifts and tilts to the head which affect the upper back.

- i. *Most often the head shifts forward. This increases the backward tilt to the head compressing the neck bones as the muscles 'lock short'. This most often comes with a collapsed chest and weaker abdominal tone and a more lax posture associated with a sedentary lifestyle.*
- ii. *When the head is shifted back, the chin appears tucked. This extends the back of the neck and hardens the neck muscles as they are locked long. This most often comes with a lifted chest and greater tone at the front body and is associated with more active performance oriented lifestyles such as military or dance.*

42. Postural Effects of Tight Psoas Slide #42

- a. Tight Lower Psoas/Tight Low Back Muscles: can increase lumbar curve.
- b. Tight Upper PSoas can reverse lumbar curve if low back muscles are weak.
- c. Deep Work with Pelvic Tilt - can help to refine pelvic tilt.
 - i. In standing imagine weights attached to tail bone & pubic bone. Alternate subtly lifting & dropping the two weights while minimizing effect on curve of spine.

43. Types of Posture Decreased Lumbar Curve Slide #43

- a. **Postures with Decreased Lumbar Curve: Sway Back and Flat Back.** Both cases reflect hip joints – and the line of gravity through the thigh bones and legs – are shifted forward of the line of gravity

through the spine. The lower back is 'flat' because of the backward tilt of the pelvis, 'tucking' the pelvis while thrusting the hips forward causing the muscles at the front to extend.

i. In a Sway Back posture, the upper chest drops, the head shifts forward and the upper back sways to accommodate the load. The cervical curve increases compressing neck bones. As the curve in the lower back decreases, the curves of the upper back increase.

1. Short and Strong Muscles: hamstrings, upper fibers of internal obliques; lower back muscles are strong but not short

2. Long and Weak Muscles: hip flexors, external obliques, upper back extensors, neck flexors

ii. In a Flat Back posture, the drop in the chest is not as prominent, the head is drawn back, flattening the neck as well. There is less of a forward shift to the hips and the upper chest begins to tilt forward relative to the lower back, flattening the lower back.

1. Short and Strong Muscles: hamstrings

2. Long and Weak Muscles: hip flexors, abdominals are long but often strong, back muscles are also long and strong

44. Types of Posture - Increased Lumbar Curve Slide #44

a. Postures with Increased Lumbar Curve: Kyphosis-Lordosis and Military. In these two postures the hip joints and the line of gravity through the thighbones and legs are not shifted forward so much, while the curvature of the lower back is increased due to a forward tilt of the pelvis.

i. *In a Kyphosis-Lordosis posture the chest is collapsed giving a strong backward tilt to the rib cage relative to the lumbar spine. The pelvis tilts strongly forward which is usually worsened by a lack of abdominal engagement. The head shifts forward to compensate for the backward tilt of the chest. The hips shift forward relative to the center line of gravity, but far less than in the prior two postures. The weight of the spine is more directly over the line of gravity through the legs.*

1. *Strong and Short Muscles: Hip flexors and neck extensors. The low back is strong and may or may not be short.*

2. *Long and Weak Muscles: Upper back spinal muscles, neck flexors, external obliques. Hamstrings are slightly long and may or may not be weak. The rectus abdominis is not necessarily long due to the drop in the chest. The abdominals don't have much tone.*

ii. *In a Military posture the chest is strongly lifted and slightly tilted back relative to the lumbar spine while the pelvis is tilted forward relative to the thigh bones. The hips shift forward only slightly; the exaggerated lift of the chest*

compensates for the forward tilt of the pelvis. The head is shifted back flattening the neck more than in the Kyphosis-Lordosis posture. The two tilts – the pelvis and chest – cause compression in the lumbar spine, which is usually moderated by tightly held abdominal muscles.

- 1. Short and Strong Muscles: low back and hip flexors.*
- 2. Long and Weak Muscles: Abdominals in the front body. Hamstrings are somewhat lengthened but may or may not be weak.*

45. Working with Posture Through Yoga Posterior Tilt Slide #45

- a. Yoga practice works specifically with these pairings of muscles to bring about balance, integrity and freedom from unnecessary postural stress. Generally those with flat backed or sway backed postures would benefit from emphasizing back bending postures. Those of us with arched or lordotic lower backs benefit from emphasizing forward bending postures.
 - i. *In a backward tilting pelvis (flat backed posture) the tightness of the hamstrings (which presses the thigh bones and even the hips forward, inhibiting forward bends) is paired with weak quadriceps. Work with forward bending postures should emphasize strengthening the inner thighs by taking the tops of the thighs back while stretching hamstrings. Lift the abdominals to open the space between the hip points and tops of thighs*

ii. *In a forward tilting pelvis (arched back posture) the hamstrings tend to be longer, more flexible and also weaker. The thigh bones are back, making forward bends easier. Tightness in the quadriceps and possibly the lower psoas tilts the pelvis forward. In the back body the hamstrings need to be properly strengthened . The back muscle should also be strengthened to provide greater lift to the spine.*

- b. Standing poses are effective for both stretching and strengthening because they are weight bearing. The fundamental principles of action and alignment pit the forces of the front and back body in dynamic opposition.
- c. This posture arises mainly from weakness in the back muscles (locked long) arising especially from collapse in front body (locked short). Focus on strengthening the back body through back bending poses and stretches while opening up the front body.

46. Yoga Sequence for a Flat Back & Tucked Posture Slide #46

- a. Arm Circles
 - i. *To warm up, strengthen upper back, balance the downward pull of collapsed chest*
 - ii. *Up level: Shoulder alignment in standing poses*
- b. Cat & Dog Tilt Variations & Leg Extensions
 - i. *To work back muscles, shoulders & increase arch in low back*
 - ii. *Up level: Down Dog variations with leg lifted, V-3*

- c. Low Bridge Lifts with Lower Back Curved; Baby Back Bends
 - i. *To work back line in a way that encourages restoration of spinal curves*
 - ii. *Up level: Shalabasana; Dhanurasana*
- d. Groin Stretch/Knee Squeeze
 - i. *To stretch & release inner thigh (groin) with leg at anatomically neutral and arch in low back*
 - ii. *Up level: Supta Padangusthasana, Lunges, V-1*
- e. Foot Circles/Point & Flex
 - i. *To loosen, tone & increase range of motion in ankles*
- f. Chair Pose/Variation at Wall
 - i. *To strengthen quadriceps as postural support for trunk (as opposed to the hip flexor)*
 - ii. *Up level: Full chair; Eagle Legs*
- g. Standing Quadriceps Stretch
 - i. *To release pull of quadriceps as hip flexors & stretch abdominals & open chest*
 - ii. *Up level: Pigeon with quad stretch*
- h. Downward Dog
 - i. *To stretch back line of the body while maintaining tone in the front body; attention to level of hips and rotation of pelvis*

47. Yoga Sequence for a Forward Tilted Posture Slide #47

- a. This posture arises from the pull of the hip flexors against relatively weak abdominal muscles. The lower back muscles (extensors) are locked short in a tight position, while the abdominals are locked long in a weakened position. The hip flexors, including the psoas are locked short, while the hamstrings are locked long (they may still be tight). Focus on the relationship between the hip flexors (the ‘groins’) and the abdominals.

48. Yoga Sequence for a Forward Tilted Posture Slide #48

- a. Arm Circles
 - i. *To warm up, strengthen upper back, balance the downward pull of collapsed chest*
 - ii. *Up level: Shoulder alignment in standing poses*
- b. Elbow Curls/Eagle Arm Variations
 - i. *To awaken the shoulders to full range of motion, relieve stress in slumped shoulders & forward head*
 - ii. *Up level: Gomukhasana, Wall Chaturanga, Dolphin*
- c. Static Back Press/ Knees on Chair
 - i. *To release lower back & psoas contraction from forward pelvic tilt, relieve lower pack pain*
 - ii. *Up level: Constructive Rest Pose/Psoas release & Toning, Supta Padangusthasana with heel at the wall*

- d. Groin Stretch/Knee Squeeze
 - i. *To stretch & release inner thigh (groin) with leg at anatomically neutral and arch in low back*
 - ii. *Up level: Supta Padangusthasana, Lunges*
- e. Abdominals Feet to Wall Crunches or Variations
 - i. *Strengthen & support abdominals while isolating them from hip flexors*
 - ii. *Up level: Navasana variations*
- f. Foot Circles/Point & Flex
 - i. *To loosen, tone & increase range of motion in ankles*
- g. Cat Cow Tilt & Variations
 - i. *To balance tone of postural muscles, shoulders low back, hips*
- h. Downward Dog
 - i. *To stretch back line of the body while maintaining tone in the front body; attention to level of hips and rotation of pelvis*
 - ii. *Up level: Standing forward bend - Uttanasana*
- i. Lunge/Pyramid Variations
 - i. *To target hamstring stretch, tone quadriceps, focus on knee alignment & balanced action of inner quadricep (vastus medialis)*
 - ii. *Up level: full Parsvottanasana, Hasta Padangusthasana*

j. Chair Pose/Variation at Wall

- i. *To strengthen quadriceps as postural support for trunk (as opposed to the hip flexor)*
- ii. *Up level: Utkatasana, V poses with longer holds. Plank with neutral spine, Eka Pada Setu Bandha*