

Osteoporosis & Osteopenia

Structural Yoga Therapy Research Paper

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This paper outlines my work with two women – one with advanced osteoporosis, and one with osteopenia. I am presenting these two case studies because I wish to share with the yoga community the various ways there are for working safely and therapeutically with people at all stages along the osteopenia-osteoporosis continuum. It is my sincere hope that these case studies will help yoga therapists see that if we educate ourselves about this condition and keep our clients' safety foremost in our minds, we can offer highly beneficial yoga programs that address not only the physical condition of bone density loss, but that speak to the whole being who has come to us seeking help, relief, and hope.

1. Case Studies

1.a. Case Study One - Initial Interview - Bea T. – 8/7/05

Bea presented as a slender, somewhat stooped woman, age 68, who worked until recently as a teacher in a private school. Her reason for coming to see me was to do something about her advanced osteoporosis and stooped posture.

Bea misses working with “her kids,” and struggles to find meaning in her life now that she is retired. She often feels worried and scattered. In recent years, she has been the main caregiver for her husband who suffers from MS; this involves helping him move from a bed or chair to a wheelchair, as well as helping him with activities of daily living (ADL). She is also a key support person for her daughter, who recently went through an acrimonious divorce and has been suffering from bouts of depression. She has no grandchildren, a fact she reported with great sadness. She noted that she is the family's “rock,” but has tired of that role and now would like some time for herself. Formerly a devout Christian who visited church and prayed regularly, she has had a rift with God. She says she is angry with “The Man Upstairs,” as she feels God has deserted her and her family. She hasn't been to church in the past few years, and misses the community the church provided.

Bea's issues include worries about her osteoporosis, which has become progressively worse over the past few years, as well as joint pain from osteoarthritis, frequent stumbling, unsteadiness and occasional near-falls, and some indigestion and heartburn. She broke an ankle in a fall a few years ago, and cracked a rib one year ago while leaning over the arm rest of her chair. She was recently put on Fosomax (a medication designed to retard bone loss). She also noted that she has been “overdoing it” to the point of utter exhaustion; she reported that since retiring from her work as a teacher, she has become more involved in caring for her husband, a task she does with love, but that taxes her own strength and is difficult for her. She said that she is often sad these days, and has little to be happy about in her life. Bea is not athletic, but used to enjoy taking walks along the nature trails near her home; she has been nervous about walking because she feels unsteady on her feet and has had a few near-falls. She was eager to begin a yoga program if it could help correct her posture and potentially counteract the osteoporosis.

1. b. Physical Assessment

Bea is a fairly stooped, grey-haired woman who looks sad and worried. During our initial conversation, her shoulders were slumped forward, and her back was rounded. Standing, she had a pronounced Dowager's Hump, forward head, and a defeated, fatigued appearance. She rarely smiled. Bea is 5'1' tall, but said she was once 5'3'; she remarked

with bitterness that she is “the amazing shrinking woman.” Her intake revealed an elevated and forward-rotated right shoulder, elevated right hip, and a forward head with the face turned to the right. There was an S-shaped scoliosis with a left thoracolumbar curve of 8 degrees, apex at L1/T11-12, and a right upper thoracic curve of 15 degrees, apex at T4-5, as measured with a scoliometer. In the sacroiliac joint test, her left SI joint moved down; the right SI joint was immobile. She walked with unsteadiness and a short stride.

A recent bone density scan (DEXA) revealed advanced osteoporosis, especially in her hip (T-score of -2.5 & below = osteoporosis):

Lumbar spine: T-score -2.82
 Hip: T-score -3.85

Given her diagnosis of advanced osteoporosis (especially hips), I did not perform the SYT manual muscle tests on areas where bone safety might be compromised. Instead, for some areas, strength was assessed based on her ability to come into, and hold, positions. Some of the tests were not performed due to her anxiousness about the assessment.

RANGE OF MOTION (ROM) ASSESSMENT:

	ROM L / R 8/7/05	ROM L / R 12/5/05
ANKLES – SUPINE (normal ROM)		
Dorsiflexion (20)	10 / 8	15 / 12
Plantar flexion (50)	45 / 48	50 / 50
Eversion (20)	15 / 15	18 / 18
Inversion (45)	40 / 38	42 / 40
KNEES – SUPINE (normal ROM)		
Flexion (150)	130 / 130	132 / 135
Extension (0)	10 / 8	5 / 5
HIPS (normal ROM)		
Flexion – bent knee (150)	138 / 140	148 / 142
Flexion – straight leg (90)	78 / 72	80 / 78
External rotation (45)	35 / 38	40 / 40
Internal rotation (35)	32 / 35	35 / 38
Adduction (30)	22 / 25	25 / 28
Abduction (45)	38 / 40	40 / 42
Extension (15)	8 / 10	10 / 15
SHOULDERS – PRONE (normal ROM)		
Shoulder extension (50)	38 / 40	40 / 42
SHOULDERS – SUPINE (normal ROM)		
Flexion (180)	165 / 150	170 / 160
External rotation (90)	80 / 75	82 / 85
Internal rotation (80)	80 / 85	80 / 82

SHOULDERS – SEATED (normal ROM)		
Horizontal adduction (130)	120 / 120	122 / 122
Horizontal abduction (40)	30 / 25	35 / 30
NECK (normal ROM)		
Flexion (45)	48	48

Extension (55)	30	45
Lateral flexion (45)	32 / 25	38 / 30
Rotation (70)	65 / 45	68 / 55

MUSCLE STRENGTH ASSESSMENT:

	MUSCLE TESTING L / R 8/7/05	MUSCLE TESTING L / R 12/5/05
ANKLES		
Dorsiflexion	1.5 / 1.5	3.5 / 3.5
Plantar flexion	4 / 4	4.5 / 4.5
Eversion	2.5 / 2.5	3.5 / 3.5
Inversion	2.5 / 2.5	4 / 4
KNEES		
Extension	1.5 / 1.5	3 / 3
Flexion	3 / 3	3 / 3
HIPS – SUPINE		
<i>Hip flexors</i>	1.5	3
<i>Psoas isolation</i>	0 / 0 (could not produce movement)	1.5 / 1.5
<i>Sartorius isolation</i>	1.5 / 1.5	2.5 / 2.5
HIPS – SIDELYING		
<i>Internal rotators</i>	3 / 3	3.5 / 4
<i>Abductors</i>	1.5 / 1.5	2 / 2
<i>Adductors</i>	2 / 2	3 / 3
HIPS – PRONE		
<i>Extension</i>	1.5 / 1.5	3 / 3
<i>Gluteus max. isolation</i>	1 / 1	2.5 / 2
<i>External rotators</i>	1 / 1	3 / 3
<i>Internal rotators</i>	3.5 / 3.5	4 / 4
SPINAL MUSCLES		
<i>Erector spinae</i>	1.5	3
<i>Neck extension</i>	1	3
SHOULDERS		
<i>Adductors</i>	3 / 3	3.5 / 3.5
<i>External rotators</i>	2.5 / 2	3 / 2.5
<i>Internal rotators</i>	2.5 / 2	3 / 3
<i>Flexors</i>	2.5 / 2	3.5 / 3
<i>Extensors</i>	1.5	3
<i>Middle trapezius</i>	1	3.5
<i>Abductors</i>	1	3
NECK		
<i>All neck muscles</i>	1.5	2.5 – 3

1.c. Summary of Findings

The initial assessment showed limited ROM in almost all joints, and weakness in most muscles. Viewed together, the ROM and muscle testing revealed that Bea’s restrictions stem from a combination of weak agonists and weak and tight antagonists.

Together, we identified the following goals, which Bea worked toward over time:

- main goal: to use yoga to address the osteoporosis in her back and hips, and the kyphosis in her upper back (esp. middle trapezius)
- to strengthen the muscles involved in walking and balancing, for the purpose of fall prevention
- to use yoga to enhance ROM in all joints, stretch tight muscles, and reduce joint achiness
- to mobilize and stabilize the SI joints
- to address the scoliosis in order to move toward better alignment
- to use the more esoteric yoga techniques (beyond asana) to give her back the sense of spirituality and joie-de-vivre she feels she has lost

Specifically, the following areas were identified:

<i>Weak – Strengthen</i>	<i>Tight – Stretch / Release</i>
Ankles: Dorsiflexors: Anterior tibialis (<i>these need to be strong in order to lift toes & front of foot, to prevent stubbing toes & falling during walking</i>) Everters: Peroneus longus & brevis Inverters: Anterior Tibialis, Posterior tibialis	Gastrocnemius & soleus
Knees: Extensors: Quadriceps (<i>needed to straighten legs in walking</i>)	Hamstrings (<i>to allow legs to straighten in walking</i>)
Hips: Hip flexors: Psoas, Sartorius Hip extensors: Gluteus maximus & Hamstrings External rotators: “Deep 6,” Quadratus femoris, Sartorius Abductors: Gluteus medius & minimus	Hip flexors Hamstrings Adductors
Back / postural muscles / shoulders / abdominals: Middle trapezius Erector spinae (superficial and deep) Abdominals Shoulder flexors	Pectorals Abdominals Shoulder extensors

1.d. Recommendations Based On Initial Assessment

To get centered, and soothe upset vata: Wave Breath at the start of each practice session (resting supine, in Constructive Rest / “Bent Knee Savasana”)

To strengthen abdominals: Wave Breath focusing on abdominals during exhalation

To alleviate joint achiness and help balance vata: Entire Joint Freeing Series (JFS) modified per M. Stiles DVD, with client supine for many of the movements to decompress the spine (also, client could not kneel comfortably)

To strengthen ankles and stretch calves (gastrocnemius & soleus): JFS # 1, 2, 3

To strengthen hips, where Bea's osteoporosis is most severe:

- JFS # 5
- Bridge, dynamic and static
- Supine Tree, dynamic, bringing foot into Tree position, then placing leg straight down on mat and repeating several times
- "Rolling Tree" *holding onto wall to prevent falling*
- Static Tree *holding onto wall, then attempting to let go briefly as able*
- Long-stride walking (to strengthen gluteus maximus & medius, and hip flexors)

To strengthen postural muscles, abdominals, and counteract kyphosis and osteoporosis:

- Static Bridge, focusing on scapular adduction and retraction
- Reclining Cobbler Pose, pressing knees open toward floor (to strengthen external rotators - per M. Stiles, SYT training & observation of private sessions)
- Sphinx Pose
- Cobra with hands in "W" position (at first, she could only lift her head; later, she was able to lift head & chest; even later, she became strong enough to lift head, chest and arms a few inches off the floor)
- ½ Locust, dynamic and static

To strengthen quadriceps, hip flexors, and hip external rotators:

- Warrior I
- Warrior II (to strengthen external rotators & stretch adductors)
- Gentle Fierce Pose (Utkatasana) (initially, Bea practiced sitting down and getting up from a chair; later, she did a more formal Utkatasana without sitting down, but with a chair placed behind her for safety/fall prevention)

To stretch hip flexors: Bridge (Low Lunge was tried, but could not be done because kneeling was painful)

To strengthen upper back:

- JFS #6 – ONLY the first movement: Spinal Extension (*the second movement, Spinal Flexion, "Cat," is generally regarded as contraindicated for osteoporosis*)
- Side-lying or standing JFS #7 (because Bea had difficulty kneeling)
- SUPINE Isometric Shoulder Presses into the mat

To increase ROM in neck and strengthen neck muscles:

- JFS #19, 20 & 21
- Neck Strengthening, PRONE (SYT p. 180, but *prone*), to counter forward head, strengthen upper trapezius, splenius & semispinalis
- Neck Strengthening, PRONE, with head turned to right/left, holding to ability
- SUPINE: Isometric Head Press into the mat, to strengthen upper erectors

To stretch tight neck muscles (upper traps, SCM, scalenes):

- Neck stretches per JFS, dynamic, then staying in each position for 2-3 breaths

To stretch abdominals:

- Sphinx & Gentle Cobra

To stretch hamstrings:

- Supine - Supta Pada Angustasana, 1 leg up, other leg knee bent, foot on floor, using strap to stretch hamstrings of raised leg

To strengthen, stretch, and develop greater ROM in shoulders:

- JFS # 13 (circles), moving elbows forward, up, back & down ONLY
- JFS # 15 (shoulder flexion and extension)

To develop better balance:

- Mountain Pose, eyes open, eyes closed (near wall/touching wall lightly)
- Tree Pose, eyes open, eyes closed (near/touching wall lightly)
- Tree Pose, rise up onto ball of foot, come down, repeat (near/touching wall)
- 2-legged & 1-legged balancing on Airex Balance Pad (OPTP) (near wall)

To address SI issues and scoliosis:

- SI Mobilization / Stabilization exercises, seated in a chair (SYT Manual, training)
- Dynamic, Modified Side-of-Hip Stretch (SYT p. 200), hands on wall

To stretch tight pectorals, anterior deltoids and biceps:

- Gentle Restorative Fish pose, with blankets under outstretched arms

Additional therapeutic exercises: In addition to the SYT asanas and modifications, Bea learned Sara Meeks's "Realignment Routine" (see Appendix). I also showed Bea safe ways to move during activities of daily living (ADL), and better ways to move when she is helping her wheelchair-bound husband.

1. e. Results of Recommendations

Bea is a very motivated client, and she chose to do the yoga practices we developed together almost daily. She started each practice session with Wave Breath, then focused on the exhalation phase of Wave Breath to strengthen her abdominals. She did the Sara Meeks "Realignment Routine," and the *entire* JFS (mostly supine, per M. Stiles DVD). Approximately 2-3x/week, she also did the more targeted practices we developed together. She ended each session with Savasana (head and outstretched arms supported by blankets, bolster under knees). She was pleased that there was much that she *could* do, rather than feeling immobilized and fearful.

It took a few sessions for Bea to learn the Wave Breath, and how to synchronize moving and breathing; we took things slowly. Once she mastered these concepts, I was able to

teach her how to do some asanas in a gentle, dynamic way (“riding the breath”) that she found beneficial for her joint pain, as well as meditative and calming.

A week after she started yoga therapy, we added the S.I. exercises (seated in a chair).

Later, we added Warrior I & II, Dynamic Bridge Pose, and Restorative Fish.

After a few weeks, we added Gentle Fierce Pose (Utkatasana); at this stage, she practiced sitting down and getting up out of a chair, with the legs of the chair against a wall. We added Tree holding the wall, Sphinx, gentle Cobra, and the “W” exercise. To stretch hamstrings, we added Supta Pada Angustasana using a strap. We added ½ Locust to strengthen the hip extensors.

After a few more weeks, we added Supine Tree and Cobbler, more repetitions and longer holding of Warrior I & II, Mountain, and Tree with open and closed eyes (near wall) to develop balance. I introduced the Airex Balance Pad to enhance balance.

A few months into her practice, Bea started to feel confident enough to walk outdoors again. We sometimes walked outdoors together, playfully adding gentle lunges from time to time, and walking with a long stride.

Later, we added more repetitions of the Cobra variations, holding Cobra for a few breaths, working more strongly with the “W” exercise, and Mukunda’s SYT Head Lifts/Neck Strengtheners (she did them prone) to address the forward head posture and strengthen her upper erectors. More repetitions and longer holding of ½ Locust were added.

As she grew stronger, we replaced some of the easier versions of the poses with the more classical/stronger poses, and she was able to do more repetitions, and hold poses longer.

NOTE: Because Bea is quite frail, I used a very thickly padded mat (available through OPTP physical therapy products) for Bea’s floor practice; standing, she used a ¼” tapas mat near a wall. We used a chair to help her transition from floor to standing, and from standing to floor, and one or two chairs (one on each side) to steady her in some poses.

Bea started with a yoga practice of approximately 15-20 minutes. Over months, her practice grew to an hour or longer, as she came to truly enjoy her practice as a nourishing time for herself. She became receptive to my suggestions for ‘yoga off the mat’ activities, becoming a volunteer reader in the children’s department of the library, and visiting pediatric cancer patients in the hospital once a week. These activities gave her the sense of purpose she had lost with retirement, and helped by giving her week some structure.

Bea started coming to my weekly Yoga for Bone Strength class, and she enjoys the community of yoginis who attend. She has begun to pray again, creating her own affirmations and making peace “with the Man upstairs.” Today, she has improved posture, strength and ROM, and fewer aches and pains, due to her diligent and persistent yoga practice. She walks with more confidence. She is less anxious and scattered, and feels more fulfilled and satisfied with life.

From an ayurvedic perspective, Bea’s constitution is chiefly vata; she is petite and a bit frail, with dry skin and flyaway hair. The osteoporosis, characterized by dry, brittle bones,

is a vata imbalance; this is also seen in her anxiousness and difficulty focusing. Vata was further aggravated when she retired from her job, leaving her with no clear schedule or routine. The JFS is vata-balancing. This practice, done diligently and regularly, at a specific time of day, and paired with additional asanas to build strength and confidence, helped balance Bea's disturbed vata and made her feel more grounded and focused.

1. a-2. Case Study Two - Initial Interview – Joyce T. – 5/9/05

Joyce T. is a 52 year old woman who was diagnosed with osteopenia in February 2005. She came to yoga therapy a few months after diagnosis, seeking a yoga practice that would help keep her active in a safe way and would help reduce her stress level, which she described as an "11 out of 10." Joyce walks vigorously every day, but says she does not like to work out. She enjoys playing tennis. She dabbled with yoga years ago but found it "wimpy" and not enough of a workout. She occasionally attends Pilates classes.

Joyce and her husband are wealthy, and she does not work outside the home. She is very involved in philanthropic organizations, is on several boards and committees, and gives money, time and energy to these charities. She finds her commitments fulfilling but is suffering stress because of the politics and "egos" within these organizations, and because these activities take up so much of her time.

She describes her life as "perfect except for the damn osteopenia." She is happily married, and has a busy social life. She and her husband have two grown children, and one grandchild whom Joyce fondly calls the "crown prince."

Joyce did not mention any physical complaints. While she suffered from tennis elbow (lateral epicondylitis) in the past, she no longer has elbow problems. Her only complaint was the diagnosis of osteopenia, which she found upsetting and confusing. In our first meeting, she angrily stated, "if I can't see it, and I can't feel it, do I really have to bother with this?" This was a question we revisited numerous times in our sessions. For Joyce, dealing with her anger around the diagnosis, and her attachment to a carefree life that was rudely interrupted by this diagnosis, was a recurring theme that forced her to view herself in new ways, sending her on a healing journey on which she embarked with reluctance and resistance – a reaction that is often seen in active people for whom a diagnosis of osteopenia or osteoporosis can be a real emotional struggle.

Joyce initially chose an "if it ain't broke, don't fix it" approach and did nothing about the osteopenia. However, her physician urged her to be proactive in addressing the issue; this is when Joyce decided to explore yoga, which she chose because she did not want to work out in a gym, but learned from her doctor that yoga could provide weight-bearing exercise. She had also heard that yoga can help reduce stress.

1. b-2. Physical Assessment

Joyce presented as an attractive, athletic looking woman of medium build, 5'6" tall, with good posture and muscle tone. She moved with ease, and there was a sense of excitement about her, but also a feeling of impatience; she appeared rushed in her movements and even in her speech. Body reading revealed good symmetry and a strong,

sure gait. She had a slightly flat low back, and a slightly flat cervical curve, but these did not cause any discomfort. Gross motor movements such as forward and side bending, and spinal rotation all appeared well within normal range. Gait and balance were normal.

Her DEXA scan revealed early osteopenia (T-score of -1 to -2.4 = osteopenia):

Lumbar spine: T-score -1.86

Hip: T-score -1.72

RANGE OF MOTION (ROM) ASSESSMENT:

Note: Full ROM and MT were performed; most measures were unremarkable and within normal limits. Significant findings are listed here, with areas of focus in highlighted in bold.

	ROM L / R 5/9/05	ROM L / R 10/27/05
HIPS – SIDELYING (normal ROM)		
Adduction (30)	22 / 25	30 / 28
Abduction (45)	32 / 30	40 / 35
HIPS – PRONE		
Knee flexion (135-150) (normal ROM)	145 / 145	145 / 145
Hip external rotation (45)	45 / 45	45 / 45
Hip internal rotation (35)	32 / 35	35 / 35
Hip extension (15)	10 / 10	15 / 15
SHOULDERS – SEATED (normal ROM)		
Horizontal adduction (130)	128 / 130	130 / 130
Horizontal abduction (40)	20 / 23	30 / 30
NECK (normal ROM)		
Flexion (45)	42	45
Extension (55)	35	45
Lateral flexion (45)	45 / 45	45 / 45
Rotation (70)	68 / 68	70 / 70

MUSCLE STRENGTH ASSESSMENT:

	MUSCLE TESTING L / R 5/9/05	MUSCLE TESTING L / R 10/27/05
HIPS – SUPINE		
Hip flexors	5	5
Psoas isolation	3 / 3	4 / 4
Sartorius isolation	5 / 5	5 / 5
HIPS – SIDELYING		
Internal rotators	5 / 5	5 / 5
Abductors	2.5 / 2.5	4 / 4
Adductors	3 / 3	4 / 4

HIPS – PRONE		
Extension	2.5 / 2.5	4 / 4
Gluteus max. isolation	2.5 / 2.5	4 / 4
External rotators	4.5 / 4.5	4.5 / 4.5
Internal rotators	5 / 5	5 / 5
SPINAL MUSCLES		

<i>Erector spinae – ALL</i>	3	4
SHOULDERS – PRONE		
<i>Extensors</i>	5 / 5	5 / 5
<i>Middle trapezius</i>	3	4.5
<i>Abductors</i>	3 / 3	4 / 4
NECK		
<i>Extensors</i>	3.5	4.5

1.c-2. Summary of Findings

Joyce’s initial evaluation revealed that she has good ROM in almost all her joints, good symmetry, and that she is fairly strong overall. The assessment revealed a few areas of restriction and weakness. Specifically, the following areas were identified:

<i>Weak – Strengthen</i>	<i>Tight – Stretch / Release</i>
Shoulders: Middle trapezius Abductors (deltoids, supraspinatus)	Anterior deltoids Pectorals
Hips: Psoas Abductors (gluteus medius) Adductors Extensors (gluteus max., hamstrings)	TFL / ITB Adductors Abductors Flexors
Back / postural muscles: Erector spinae Neck extensors Middle trapezius	SCM Upper trapezius Scalenes

1.d-2. Recommendations Based On Initial Assessment

Wave Breath – each practice started with Joyce resting supine, feet on the floor (Constructive Rest pose / Bent Knee Savasana), doing Wave Breath.

For overall strengthening, and a challenging, weight-bearing practice that would also be fun for her:

- Surya Namaskar, for as many repetitions as she found satisfying
NOTE: In positions #3 and #10 (Uttanasana/Standing Forward Bend), we adapted the pose to not round the upper back, by doing a “half-lift” Forward Bend with the chest lifted and the back straight, focusing on length of erectors and open-heartedness in the pose.

To strengthen hip extensors and stretch hip flexors and adductors:

- Sunbird (Chakravakasana), dynamic; then static: one leg back & opposite arm forward (with thumb up to encourage scapular adduction and retraction), holding the pose for several breaths ... to Sunbird with Kneeling ½ Bow (e.g., R hand holding L foot)
- ½ Locust and Full Locust
- Bent-Knee Locust variations
- Bow

- Wheel (she became strong enough to do Wheel after a few months)
- Knee-Down Runner Pose/Low Lunge (#4 of Surya Namaskar), adding a deeper stretch by bringing hands inside the forward foot & lowering hips and upper body (per SYT training), with back elongated

To strengthen psoas:

- Legs Up Pose (Urdhva Prasarita Dandasana) w. arms stretched overhead
Variation: (a) keep abdominals engaged; (b) disengage abdominals to feel strengthening of psoas at lumbar segment and enhance lumbar lordosis
- Legs Up Pose w. leg lifting & lowering, noting sensation in low back
Variation: allow low back to arch a bit, to focus on strengthening psoas at lumbar segment and enhance lumbar lordosis
- Stick Pose, w. pelvic tilt & chest lifted, to encourage lumbar lordosis
- Forward Bend (Paschimottanasana), keeping back elongated (used strap)

To strengthen hip adductors and stretch hip abductors/TFL/ITB:

- Side-Lying Half Moon Pose: lying on the side, arms overhead with fingers interlaced, body in straight line, lift arms & upper body, and lift legs, keeping legs together ... stay ... come down ... repeat 2-3x each side
- JFS #8, focusing on adductors engaging and abductors stretching
- Warrior I, and moving from Warrior II (open hips) to Warrior I (closed hips), focusing on engaging adductors
- Runner's Stretch (Parsvottanasana):
 - . dynamic - focus on strengthening erectors (hands on blocks; lift outstretched arms & upper body; return to blocks; repeat)
 - . static - focus on hip adductors, squaring hips, holding the back in elongated position (hands on blocks; later: arms & back parallel to floor)

To strengthen hip abductors and stretch hip adductors:

- Tree
- Triangle
- Warrior II, dynamic & static
- Side Angle Pose (Parsva Konasana)
- Half-Moon (Ardha Chandrasana) initially against wall, then without using wall (1 hand on block)

To stretch TFL/ITB:

- Rotated Stomach Pose (Jathara Parivartanasana), elongating the back
- Seated Twist (Marichyasana), sitting tall, both shoulders back & down, focusing on sensation of stretching outer hip and thigh
- Face of Light (Gomukhasana)

To strengthen back / postural muscles:

- Bridge, dynamic & static, building up to holding for 12 breaths
- Camel, hands on blocks, focus on lifting chest and stretching chest & hips

- Cat Bow (initially weak, she became very strong over time)
- Cobra
- Cobra-Locust “combo”: raising one leg & opposite arm forward
- Parsvottanasana (see above for dynamic strengthening version)

To strengthen shoulder abductors:

- Warrior II, building up to holding for longer period of time (later: added weights)
- Triangle, building up to holding for longer period of time (later: added weights)

To stretch pectorals and anterior deltoids:

- Bridge, focusing on scapular adduction and retraction
- Fish, focusing on lifting chest (also: Restorative Fish w. bolster)
- Camel, focusing on lifting chest separately from lower body
- “Corner”/”Door” pec stretch

To strengthen neck extensors and stretch SCM, upper trapezius & scalenes:

- JFS neck exercises, using light pressure with one hand to deepen stretch
- Head lifts w. arms like “goal posts” (lift head straight up & hold; then look to right, lift head & hold; then look to left, lift head & hold - per M. Stiles)

1. e-2. Results of Recommendations

For Joyce, working with her mind was as important as – and perhaps more important than -- working with her body. While her efforts to learn practices to retard further bone loss were impressive, her inner growth over the months we worked together was even more touching.

It quickly became clear that Joyce needed a practice that would be physically and mentally challenging, in order to keep her motivated. Since she prided herself on being athletic, I taught her Surya Namaskar, making it more challenging by deepening the Cat Bow, and at times, adding Warrior I and additional poses into a vinyasa; this kept her engaged and enjoying the practice. She enjoyed learning the Sun Salutation sequence by heart, and learning how to integrate “her” asanas into a vinyasa.

Over time, we added variations of asanas in increasing degrees of difficulty in terms of strength; after several months, she was able to do Wheel (Chakrasana / Urdhva Dhanurasana), and hold most poses for a long period of time, which she said challenged her physically and mentally, and was deeply satisfying to her.

The deepening of her inner work with yoga was evidenced by the way she assessed her progress. Initially, she judged her yoga practice by observing for how long she could hold the poses, or how many repetitions she could do. After a few months, she developed greater self-awareness by focusing on the degree to which each pose was helping her to feel more nourished and supported, or helping her to feel that she was releasing stress or tension; this became her new standard for evaluating her progress.

I also taught Joyce the Palm Tree Vinyasa (M. Stiles), a vata-calming, meditative vinyasa, modified to keep the back extended in the forward bend segments. She loved this vinyasa and often turned to it at times of high stress; again, learning to do the sequence by heart became a mental challenge she enjoyed. She called this vinyasa her “stress buster.”

Joyce did Restorative Fish, and a brief Savasana with legs outstretched, with a rolled towel under her the neck and low back, no bolster under the knees. I chose this unsupported version of Savasana because of her flat low back and neck – lying flat, with rolls only under the neck and low back, can encourage a return to healthy lordosis.

Initially, Joyce had feared that she would have to live in a world of “don’ts” due to her diagnosis of osteopenia, and this upset and angered her. She was surprised and pleased to learn that yoga could provide her with a physically and mentally challenging practice she could embrace. Joyce liked using her mind to develop discernment, learning to focus on where to feel her muscles while doing asanas to build strength or become more flexible. She reported that having to focus completely on what she was doing while practicing yoga helped to reduce her stress because she “couldn’t be thinking about anything else.”

Already fairly strong and flexible, her weaknesses and restrictions in some areas initially infuriated her, as did the diagnosis of osteopenia; Joyce took the diagnosis as a sign that she was aging, and that her body was betraying her. In fact, anger was her dominant emotion, and dealing with her rage over the diagnosis and its implications, became the central theme in many of our sessions. As she worked to gain strength in areas of weakness, her ability to do more repetitions and hold the more challenging poses increased, and she noted her growing strength with pleasure. She liked having a powerful practice that was demanding and deeply satisfying to her.

Early on, I introduced Joyce to Patanjali Yoga Sutras II.46 and II.47 – these sutras ask the client to practice in a way that is “steady and comfortable,” and require that the client back off to approximately 70% of effort (“by relaxation of effort, yoga pose is mastered” – M. Stiles). I also introduced her to the yama of “ahimsa” (non-harming). These concepts proved difficult for Joyce to accept. Her Type A personality made it challenging for her to do anything with less than “110 %” effort. She is still working to make peace with these concepts in her practice.

An important focus of our work together was for Joyce to learn to distinguish between practices she *had* to do, versus a practice that would give her pleasure. She had been pushing herself for so long to do committee work and live up to her many self-imposed obligations, that everything in her life had begun to feel like a chore. Everything made her angry. I invited her to use her yoga practice as a sadhana that would allow her to gain personal insights and make healthier, more satisfying choices about her practice, and her life. She came to embrace this idea and began to see her commitments in a different light. As she gained physical strength, she also seemed to gain an inner strength that allowed her to extricate herself from many of her stressful obligations. She left most of her committees, choosing to focus on herself, her husband, and her beloved grandchild.

In many of our sessions, she seemed at war with herself, and with me. Modifying *anything*, be it yoga, Pilates (no crunches!), or her high-stress lifestyle, infuriated her, and she was often combative. Often, I used models of the vertebrae, or an anatomy atlas, to explain why I chose certain asanas and modifications, and how these would benefit her. As our work deepened and her trust grew, she became more insightful and less

argumentative. Following the guidelines in the SYT Training Manual, I engaged her intelligence and attempted to work in partnership with her to develop and refine her practice; this approach proved effective, as she felt respected enough to fight less, and began to cope with her feelings of anger and betrayal around her diagnosis and this first sign of aging, and explore her healing journey.

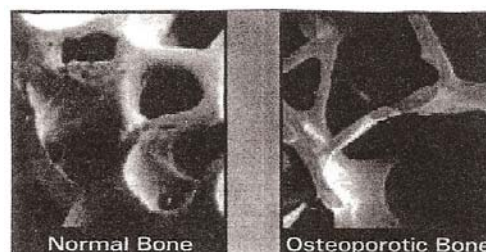
From an ayurvedic perspective, Joyce has a pitta constitution. Her medium body build, piercing eyes, fiery personality, and keen mind, and the intensity at which she functions, all point to a pitta-dominant prakriti. The osteopenia indicates a vata disturbance (vikriti), and this diagnosis “pushed” her already out-of-balance pitta; pitta likes control, and the osteopenia diagnosis was not within her control. In our sessions, it was important to address both the vata and pitta disturbances. The rather athletic practice we developed together pleased her pitta, while the vinyasa-style movements appeased vata. After some time, she was ready to consider a gentler, more contemplative practice, and I introduced the vata-balancing Palm Tree Vinyasa (M. Stiles), which Joyce found engaging and soothing. Over time, as she gained strength and flexibility in areas that had shown restriction or weakness, she felt happier and less stressed, and this seemed key to her further progress. She reported that the strong yoga practice we developed had given her a way to remain athletic without feeling that she was doing “therapy.” She also felt it supported her in dealing with stress in a healthier way that left her feeling less angry, enjoying life more fully.

2. a. Name and Description of Condition

“**Osteo**” means *bone* and “**porosis**” means *porous* – so “**osteoporosis**” is Latin for *porous bone*. Throughout life, we go through cycles of breaking down old bone and forming new bone. When more bone breaks down than is replaced, bone density decreases to the point where the integrity of the bones is compromised.

“Osteoporosis is a disease characterized by a reduction in bone mass and generalized structural deterioration (quantity *and* quality) leading to skeletal fragility and fractures.” (Bernard Roos, M.D., Florida Osteoporosis Coalition Unifying Solutions 2002).

Bone is a living, breathing organism. Healthy bone is dense, strong, and supportive, like the strong struts and beams of a building. Osteoporotic bone is porous, weakened, eroded, and fragile; therefore it is prone to fracture.



Osteoporosis is most frequent in post-menopausal women. Estrogen maintains bone calcium; as estrogen levels decline during menopause, calcium is lost and bones deteriorate, causing osteoporosis. *However, men, and younger women, can also suffer*

from osteoporosis. One in three women, and one in eight men over age 50 are affected by osteoporosis (International Osteoporosis Foundation).

We accumulate approximately 98% of our bone mass by age 18-20; we reach peak bone mass around 30-35 years of age. Aging brings about a decrease in the spongy (*trabecular*) bone that is characteristic of the spine. Therefore, the aging spine is often at risk for osteoporosis and the fractures that are typically seen in this disease.

The DEXA (Dual-energy x-ray absorptiometry) is the most accurate test. It uses a minimal amount of radiation exposure, takes just a few minutes, and measures the lumbar spine and hip, and sometimes, the wrist. Some scans provide three views: an anterior-to-posterior view of the lumbar spine; a lateral view of the lumbar spine (this can reveal wedge fractures and vertebral collapse); and views of one or both hips, with images of the head of the femur, the neck of the femur, and the greater trochanter. The DEXA scan gives a "T-score" that gives information about the presence and severity of the condition.

The World Health Organization has created the following definition of osteoporosis and osteopenia for Caucasian women:

Normal:	T-score at or above -1
Osteopenia:	T-score between -1 and -2.5
Osteoporosis:	T-score at or below -2.5
Established Osteoporosis:	T-Score at or below -2.5 plus fragility fracture

In other words, when you have lost 10% of your bone mass, you have osteopenia. When you have lost 20% of your bone mass, you have osteoporosis.

The National Osteoporosis Foundation (NOF) guidelines recommend initiating therapy to reduce fracture risk in women with BMD (Bone Mineral Density) of:

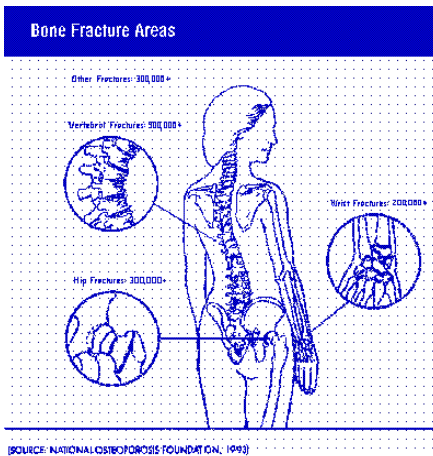
- T-score below -2
- T-score below -1.5 with other risk factors present

It is important to recognize that the DEXA bone density scan does not tell the entire story with regard to the overall bone quality of a client; a range of perspectives factor into the understanding of a person's overall bone health. "Clinicians describe bone strength in a variety of ways. For example, bone quality includes bone mineralization, microarchitecture, and rate of turnover, among other factors. The best known way to characterize bone strength is bone mineral density (BMD). We cannot measure bone quality, so calculating BMD with low-dose x-rays (dual-energy x-ray absorptiometry, or DXA) is the best way of assessing fracture risk in postmenopausal women. ... Keep in mind that a BMD score is only one of several predictors of fracture risk. Others include age, low weight, family history of hip fracture, and personal history of broken bones after age 50." (Harvard Women's Health Watch," August 2004)

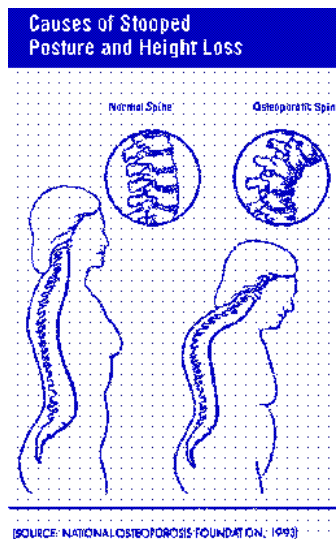
Though the DEXA provides accurate information about bone mineral density (BMD), it does not give insights into the quality of the bone. Matt Taylor, PT, writes, "While density of the bone is important, the other half of the definition is the microarchitectural deterioration, or the construction of the bone tissue within the space measured. Presently this cannot be measured by medicine, though its importance is easily recognized. It is

because of the latter that some people with average BMD suffer osteoporotic fractures, while a few people with low BMD never experience a fracture.” (International Journal of Yoga Therapy, No. 15, 2005, p. 98).

Three types of fractures are common:



- **Spinal vertebrae:** Biconcave shape – the space between two adjacent vertebrae becomes fish-shaped (“codfishing”); eventually, the strain is too much and the anterior side of the vertebra collapses, producing a **wedge fracture**. As the process continues, the posterior side of the vertebra may also collapse, resulting in a totally collapsed vertebra; this is called a **crush fracture**. Wedge and crush fractures occur mostly in the upper lumbar vertebrae and mid- to lower thoracic area, because these parts of the spine bear the most weight. Continued fractures can cause the rib cage to tilt downward toward the hips, in severe cases touching the pelvis, compressing and displacing internal organs.



- **Wrist:** When someone falls, they try to break the fall by stretching out one or both arms. The result for someone with brittle bones is a wrist fracture. This is more common in younger people, who tend to fall forward.

- **Hip:** Hip fractures most often occur at the femoral neck, though fractures at the shaft of the femur, in the intertrochanteric region, or at the pubic ramus are also possible. Women are more likely to break a hip than men because they have lost more bone. The older the woman is, and the more advanced her osteoporosis, the higher the likelihood of sustaining a hip fracture if she falls, since the elderly tend to fall backward rather than forward. Therefore, fall prevention is very important.

2.b. Gross and Subtle Body Common Symptoms

“Osteoporosis. You can’t see it. You can’t feel it. You can only test for it.”
Quote from a poster by G.E. Medical Systems

Osteoporosis is called a “silent disease” because it causes no pain initially, and there are no outward symptoms until (a) the disease has progressed significantly enough to cause bone loss detectable on a bone density scan, (b) there are outwardly visible symptoms such as loss of height, or (c) frequent fractures spark an inquiry into the possible cause.

The initial absence of perceptible symptoms is due to the fact that, in the case of **osteoporosis of the spine**, vertebral fractures occur at the **anterior** spine where there are motor (efferent) nerves, but **no sensory (afferent) nerves** – *afferent nerves are located closer to the periphery of the spine, while vertebral fractures occur more at the front of the backbone.* Therefore, someone suffering from such fractures will feel no pain, or may just feel a momentary sharp pain that disappears and is forgotten until there is visible loss of height, or the fracture and vertebral collapse begin to create a stooped posture that becomes painful over time.

Spinal or vertebral fractures can have serious consequences, including loss of height, back pain (in advanced disease), breathing problems, organ compression, and deformity.

Occasionally, there is persistent back pain; this can be a signal of muscular strain from collapsing vertebrae. However, this is rare. More often, osteoporosis is “silent” and people do not know they have the condition. Therefore, some doctors recommend that women receive bone density scans at approximately age 40, and again at regular intervals throughout menopause when, due to loss of estrogen and progesterone, bone loss can accelerate dramatically. Other doctors feel that it is safe to wait until age 60 or 65, and to begin testing at that time.

Osteoporosis of the hip is also painless; bone loss per se is not painful; only when there is a hip fracture does the disease cause pain and debilitation. A hip fracture almost always requires hospitalization and surgery. It can impair a person’s ability to walk unassisted and may cause disability or even death, due to the risks of surgery and the need for prolonged bed rest, which can make an elderly patient a prime target for blood clots or pneumonia.

Fractures of the wrist are quite common among younger osteoporotic clients, as younger people tend to fall forward, stopping their fall with one hand.

2. c. Related Challenges

Osteoporosis can create significant movement challenges. To date, the medical community does not have sufficient research data to give definitive guidelines for patients

with osteoporosis or osteopenia – the diagnosis is simply too new for such guidelines to have been developed. The diagnosis of *osteopenia* is even more recent, and opinions about how to proceed with such clients vary even more widely, with some practitioners advocating safety and caution early on, and others advocating a less concerned approach.

Still, many physiatrists (rehabilitation specialists), orthopedists, and physical therapists with advanced training and many years of experience treating such patients offer the following guidelines in working with people with osteoporosis and osteopenia.

Two populations: Lower risk, higher risk

In working with osteoporosis and osteopenia, it can be helpful to distinguish between those with an early diagnosis of osteopenia or mild osteoporosis, and those with advanced disease. Sara Meeks, PT, GCS, gives the following guidelines:

Group I is generally younger and is at lower risk for fracture. People in this group have not lost skeletal height, and they have not had a fragility fracture. This group can do flexion, lateral flexion and *rotation as long as they are taught to elongate the spine, and have, or have developed, adequate core strength and postural musculature to support elongation throughout all phases of movement.*

Group II is generally older and has a higher risk for fracture. People in this group have lost skeletal height, their posture has changed (Dowager's Hump, downward-slumped rib cage, or protruding abdomen), or they have suffered one or more fragility fractures. *This group should not be given flexion, lateral flexion, or spinal rotation; pigeon pose should also be avoided, as this pose places too much pressure on the hip.*

Yoga therapy can benefit both groups.

For Group I – clients at lower risk – yoga therapists can design a therapeutic asana practice that strengthens the core muscles and entrains elongation. Therapists need to carefully monitor clients until they are confident that the client has developed the muscular support structures to support elongation throughout the movements of flexion, side bending, and rotation. Intense round-backed forward bends, and Shoulder Stand and Plow pose, should be avoided.

Low-risk clients may be reluctant to give up some movements, behaviors or sports, since they may see no need to take action in the face of a diagnosis of mild/early disease.

No clear cut guidelines have as yet been established by the medical community, and views differ regarding what course of action to take with osteopenic clients. While osteopenic clients are not as high risk as those with advanced disease, *they have been known to incur fractures.* Also, it should be noted that a client with diagnosed osteopenia in the lumbar spine, is often assumed to have some osteoporosis of the thoracic spine, where it cannot be seen or measured with currently available test equipment. Therefore, a yoga therapy program for such clients should include asanas that strengthen the erector spinae, middle trapezius, abdominals, hips and legs, as these may help prevent further bone loss.

Matt Taylor, PT, points out the difficulty of making decisions for clients with osteopenia and mild osteoporosis. He notes in his article in the International Journal of Yoga Therapy (No.

15, 2005) that, “Classifying someone as osteopenic is another area where there is insufficient information to clearly identify risk for fracture. “

Sherri Betz, PT, makes a strong argument for a conservative approach and states, “... all exercise specialists should use the same precautions for clients with osteopenia as for those with osteoporosis.” She notes that there is a dangerous combination of risk resulting from the fact that bone density decreases from the cervical to the lumbar spine, while bone size and ability to distribute force load decreases *in the opposite direction*. (The Osteoporosis Exercise Book. Building Better Bones. Sherri R. Betz, PT. Osteo Physical Therapy, 1999).

As Sara Meeks, PT, GCS, put it in an e-mail in 2004:

“A diagnosis of osteopenia is made on a test performed in the lumbar spine. Sometimes, even with an official diagnosis of osteopenia, if one gets a chance to see the actual report, one will see that there are actually osteoporotic vertebrae present in the lumbar area. So, an ‘extrapolation of information’ or clinical judgment has to be made from this information as to what the condition of the thoracic spine is. We really have no way of knowing exactly. However, we DO know that most fractures occur in the thoracic spine (about T6-T12 or L1) and this is the area of greatest concern. Why do most fractures occur in the thoracic spine? Some people say it is because the thoracic spine, with its normal kyphosis, favors flexion and therefore receives more stress during activities of daily living. We do know that internal silent fractures occur, even in young people, and that these internal fractures, called fatigue fractures, may someday accumulate and result in a full compression fracture. The thoracic spine receives more stress during movement on a daily basis and is thus at increased risk of fracture compared to lumbar or cervical.

“All that being said, is there a way for people with osteopenia to perform flexion movements safely? Not wanting to turn people into fearful ‘robots,’ I have developed some clinical guidelines based not only on bone density but some other factors as well. If a person has been diagnosed with osteopenia or even with osteoporosis but has NOT shown any of what I consider to be the three cardinal signs of the condition of low bone mass: loss of body height, postural change (Dowager’s Hump), and/or fracture, that person can possibly be taught to move into flexion, side bending and rotation with an ELONGATED spine so that the force of the movement is spread out over the entire vertebral column. I, however, would not suggest this until the person has been on a program of back strengthening and stabilization for at least six weeks (and preferably closer to eight weeks) and has learned certain principles of movement, to be used during ADL’s and exercise to protect the back. At that time, I believe that gentle, guided movement could begin. (This is where the yoga therapist comes in.) HOWEVER, one must always err on the side of caution, monitor movement of the client and make certain that the movement is spread throughout the spine so that the forces are distributed as evenly as possible.

“We know that people, in their daily lives, are going to be doing movement that is not safe – it happens even in people who have been well-trained in body mechanics and safe movement. My hope is that, if the exercise program has emphasized

stability and strength first, that the spine will be able to take the stresses and strains of flexion, side-bending and rotation through the muscles, ligaments and other support structures and thus have the bone protected.”

For Group II – clients at higher risk – yoga therapists need to exercise great caution.

For this group, a therapeutic yoga asana program needs to be given in a highly controlled environment where clients are monitored closely, possibly over a period of several months, to encourage safe movement and reduce risk. In giving such clients a home practice, yoga therapists should probably wait until they have observed clients sufficiently in numerous sessions, to ensure that they will be practicing safely at home and avoiding potentially hazardous movements. Educating clients plays a vital role in helping them to take responsibility for their safety while practicing yoga, and in ADL's.

This is important because clients practicing without proper supervision and inadequate follow-up with the yoga therapist could cause silent fractures that will remain undiagnosed until the condition has become more advanced and fractures have occurred, placing the client at far greater risk. Therefore, yoga therapists need to see clients frequently, preferably twice weekly, for several months, if not longer. If a client is not willing to make such a commitment, he or she may not be a good candidate for Structural Yoga Therapy.

While there is not yet a consensus on how to work with people with osteoporosis, a host of physicians and physical therapists with extensive expertise working with such patients, advise against rounding the back (spinal flexion), as this movement may cause undetected crush or wedge fractures of the anterior segments of the vertebral column. These practitioners also advise such patients to avoid deep side bends and twists, unless and until such patients learn to elongate the spine, and develop the strength and support structures to maintain spinal elongation while executing these movements. It is important to understand that not all clients will be able to build the strength to elongate adequately. In cases where bone density is severely compromised – i.e., in advanced osteoporosis -- it is safest to avoid all movements that could cause fracture. These practitioners advise *great* caution with such clients – they recommend keeping things very safe, often for weeks, months, or longer, depending on the client's ability to build the strength needed to build structural support.

Not all doctors and therapists share this view, and each yoga therapist must make up his or her own mind in terms of how to work with their clients. The yama of “ahimsa” must, however, guide us as we work with such clients. The National Osteoporosis Foundation and other organizations are conducting research studies that will hopefully shed more light on this issue in the future.

The restrictions suggested for clients with advanced disease or higher risk, can cause a plethora of difficulties in ADL's: people with advanced osteoporosis need to learn how to safely execute everyday movements most of us take for granted, such as tying shoelaces, twisting to reach for something, bending over to make the bed, or bending and then straightening up when picking up an item from the floor. Osteoporotic clients need to learn new ways to move while maintaining an elongated spine. It is best for them to practice under the watchful eye of a therapist trained to identify inadequate lengthening, and other risky movement patterns.

The yoga therapist has much to offer clients with osteoporosis or osteopenia. A yoga therapist with proper training can use bodyreading, the goniometer, and muscle testing, to assess a client's areas of restriction or weakness, and demonstrate and monitor asanas designed to build structural support, particularly for the spine and hip.

In terms of asanas, clients with osteoporosis need to strengthen their core and postural muscles (abdominals, erectors, hips) in safe ways; this requires adapting yogasanas to avoid "crunching" and rounding the back. Once strength in these areas is established, clients can be taught to perform asanas such as Paschimottanasana (Seated Forward Bend) and Uttanasana (Standing Forward Bend) *with a long, straight back*, as rounding the back is generally regarded as dangerous for people with osteoporosis. *Deep* side bends, and *intense* twists can place a client with advanced osteoporosis at risk for fracture and should be avoided by those with advanced disease and/or a history of fragility fracture.

Asanas such as Shoulderstand (Salamba Sarvangasana) or Plow (Halasana), place the thoracic spine in a position of extreme flexion and put the body's weight on top of a rounded upper back; these asanas could endanger the spine, and should be avoided -- probably even by those with osteopenia. Similarly, asanas that put undue pressure and weight on the hip, such as Pigeon (Raja Kapotasana), should be avoided by clients with advanced disease.

Before giving a therapeutic yoga practice to osteoporotic clients, yoga therapists must learn how to accurately execute elongation using core and postural muscles to create and support an elongated spine. It is important to practice *svadhyaya* and *observe our own posture*, and have an experienced teacher or colleague observe our movements, to ensure that we are executing movements with proper elongation. We also need to learn to observe clients with a keen eye, to ensure that they are indeed elongating and using their postural and core muscles to sustain elongation throughout all phases of movement. Finally, we need to be committed to moving in safe ways when we are working with osteoporotic clients; i.e., we must model correct, safe behavior when we bend, move from the floor to standing or from standing to floor to lying down, lift objects, etc.

Overall, each yoga therapist must make his or her own decision about how much movement to give. Factors such as bone mineral density, "bone quality," a history of fragility fractures, the ability or willingness of a client to follow our instructions with precision and awareness, the amount of monitoring we are able to do in working with clients (how often are they coming in for sessions? how much time between sessions?), the level of the client's commitment to work with us and practice safely, and our own degree of knowledge, competency and observational know-how, will all impact on our decisions regarding the yoga therapy practices we give our clients. With each client, we must do this exploration, as each client is unique, and, depending on their circumstances, and ours, we may need to adapt our approach, truly practicing the foundation of Structural Yoga Therapy, i.e., "adapting to the individual." We need to work closely with the network of health care practitioners involved in our clients' care, so that they can guide us and provide the clinical foundation upon which to build safe, therapeutic practices for our clients, which will lead them to better skeletal health, posture and well-being. Ultimately, "ahimsa" (non-harming), "svadhyaya" (self-study), and "satya" (truthfulness) need to guide the choices we make in working with clients who place their trust in us.

In addition to the movement challenges a diagnosis of osteoporosis presents our clients, a diagnosis of osteoporosis or osteopenia presents **emotional challenges** to which we as yoga therapists need to be sensitive. Clients may be in denial about the seriousness of their diagnosis, or they may experience anger, frustration, grief and loss as practitioners ask them to adapt yoga and/or abandon or modify activities or sports they love. Clients may reject our well-intentioned efforts to keep them safe; they may argue with us, or leave.

In addition, we must understand that information about osteoporosis has yet to make its way into the broader yoga community. Therefore, we may find ourselves challenged by those who are not yet knowledgeable about the condition, and who tell their students that we are being overly cautious. *This is especially true for osteopenia, which many do not take seriously.* The truth is that those who have been found to have osteopenia of the *lumbar* spine are very likely to have osteoporosis of the *thoracic* spine, which cannot be seen. However, as Meeks puts it, we do not want to turn our clients into “fearful robots.” For those with osteoporosis, but perhaps even more so, for those with osteopenia, we have to find the right balance between safe movement that protects and fortifies the skeleton, and finding practices that our clients will accept and embrace, and allow them to move with confidence and joy.

The rejection we may encounter when we work with clients who have osteoporosis or osteopenia can spark feelings of isolation and frustration for us as yoga therapists. We must find ways to come to grips with these feelings. Our clients’ insistence on keeping to a potentially harmful yoga practice, or lack of support within the yoga community, may challenge our commitment to adapt yoga appropriately. A yoga sadhana that encourages “svadhyaya,” continually expanding our horizons through education, and connecting with a sangha that is supportive, can all help us as we practice yoga therapy with osteopenic or osteoporotic clients.

3. Ayurvedic Assessment and Ayurvedic-Based Yoga Recommendations

Ayurvedic assessment

While osteoporosis appears to be an indication of kapha imbalance, there is a deeper-seated issue with vata, which is responsible for the dryness and brittleness that has allowed bone to deteriorate. Thus, attempts to balance vata by eliminating excess ama from the system, and introducing a vata-balancing diet, is a primary goal. A secondary goal would be to balance depleted kapha via a focus on muscle movements that stimulate bone growth.

From a developmental perspective, it is important to understand that *osteoporosis is a pediatric disease that only manifests in adulthood.* The time for optimal bone growth is in utero, youth, and young adulthood; in these stages, we build and optimize the boney structures that support us throughout our lives. *It would be interesting to look more closely at the doshic impact of nutrition and lifestyle during pregnancy, and at the nutritional and lifestyle choices that are made for small children in their bone-building years.*

Pitta and, even more so, vata types, are the most likely to experience bone density problems. Kapha types tend to have the strongest bones; they are naturally blessed with the heaviest bone and body structure, and are generally at lower risk for osteoporosis.

Those who are overweight may have other health issues, but they rarely develop osteoporosis, as they have been “weight-bearing” by carrying extra body weight (a mixed blessing).

Ayurvedic based yoga recommendations

People with osteoporosis benefit from yoga poses that balance vata, while working with spine-decompressing and posture-building poses and weight-bearing (kapha-enhancing) asanas. In addition, nutritional options that include a calcium and Vitamin D-rich diet, and/or nutritional supplements, are recommended by the National Osteoporosis Foundation and the National Institutes of Health (NIH).

Ayurveda offers guidelines for a vata-balancing diet and lifestyle, such as using oils, grounding vegetables (e.g., yams) and herbs. A yoga program that focuses on building strong muscles that stimulate healthy bone growth (kapha), while appeasing the vata disturbance that has caused bone to erode, is recommended.

1. At first, **supine floor poses** should be given. These poses decompress the spine safely (Constructive Rest Pose; JFS adapted for lying on the back – see Mukunda's DVD) and are vata-soothing. Wave Breath, with a focus on engaging the abdominals on the exhalation, is a powerful ally in building core strength that can stabilize the spine without a single "crunch." Physioroller exercises that teach "neutral spine" are excellent.
2. Next, yoga poses can be given that combine *dynamic/rhythmic movements* (vata) with *holding/static poses* (kapha) that are inherently strengthening and allow the client to focus on and identify (pitta) the muscles that are being strengthened, including visualizing how the muscles are building stronger bones.
3. Later, when core stability has been established, adding creative weight-bearing and balance-enhancing concepts can help build stronger muscles and stimulate bone growth (e.g., Virabhadrasana I and II with light weights for weight-bearing; using flex bands for resistance; having the eyes open, then closed, in Mountain or Tree Pose; and additional movements such as walking with a long, strong stride. Some physicians or PT's recommend walking with a weighted vest, though others feel that people walking with improper body mechanics might exacerbate problems by adding weight. The client's physician or physical therapist should be consulted for guidance regarding walking with a weighted vest; yoga therapists are not trained to make such recommendations.

In general, a *brahmana* (stimulating, building) practice is beneficial, as it will tend to increase bone density in the spine, while encouraging backbends (extension), which are therapeutic for those with osteoporosis. Brahmana postures such as Bhujangasana (Cobra) and Salabhasana (Locust), and variations on these poses, are highly recommended. For weaker clients or those new to yoga, these poses can be modified so as to still be beneficial, yet completely safe, e.g., Sphinx; Mini-Cobra with or without using the arms; Ardha Salabhasana; or "Cobra-Locust Combo". Easier variations of these poses, including ways to practice in chairs, can be developed for clients for whom these variations are too challenging.

Ayurveda can also offer nutritional guidelines for balancing vata and creating an environment that eliminates excess ama and combats the dryness that underlies the bone loss of osteoporosis. Such guidelines should be obtained from a trained Ayurvedic practitioner who can perform a thorough evaluation including pulse analysis.

4. Common Body Reading

Body reading: Osteopenia and early osteoporosis will not be detectable on visual examination, as these conditions have not yet had an impact on posture. With early detection (DEXA), it is possible to retard and, in some cases, even reverse early bone loss

and begin to build strong new bone, strengthen postural muscles, and avoid the problems that accompany advanced disease.

More advanced osteoporosis will reveal postural misalignments such as: excessive thoracic kyphosis (a very rounded upper back/Dowager's Hump) that is frequently accompanied by forward head and excessive cervical lordosis, as the person naturally seeks out the horizon in the "righting reflex;" excessive or overly flattened lumbar lordosis; a protruding abdomen and compression of the abdominal organs due to severe rounding of the back; loss of height; a forward-tilted and collapsed ribcage that may lean toward, or even onto, the pelvis; a side-leaning posture (the client will appear to be "listing" to one side) due to weakness, perhaps due to a fracture of the ribcage or hip; a scoliosis that has developed as a result of a fall and fracture to the pelvis or thoracic spine; a rotated hip; a shuffling gait and shortened stride (the knee may not fully extend, and the leg swing phase is reduced), as the client fears falling and walks haltingly; a walk that involves holding or touching a wall, again, an indication that there are balance issues and insecurity about stance, strength and gait. Watching the client arrive at the yoga therapy session, and observing her early movements, can yield valuable clues about her condition.

ROM: Clients with advanced osteoporosis will reveal limited ROM, particularly in the thoracic spine, which loses its ability to move into extension – it remains "stuck" in its kyphotic shape due to wedge or crush fractures and vertebral collapse. This lack of ROM may also be reflected in limited ROM in the shoulders and neck. Hip fractures can result in restricted internal hip rotation and hip flexion (which are movements that may have to be avoided if there has been a hip replacement); therefore, examiner caution is advised, and should be preceded by a thorough intake that reveals a history of hip problems (fracture, replacement, other surgery). Wrist fractures can cause limited ROM in the wrist.

MMT: Osteoporosis does not necessarily induce weakness, but weak erectors are a sign of trouble and are an indication that the client will benefit from a yoga therapy program that focuses on strengthening the erector spinae, multifidi, middle trapezius, splenius and semispinalis muscles, and SCM. The SCM and scalenes, and the upper trapezius, may be weak, tight, or both. The muscles of hip flexion, internal rotation, and extension, as well as the hip abductors and adductors, and the quadriceps muscles and hamstrings, may be shortened if the client has assumed a halting gait. The muscles that extend and flex the knee (quadriceps, hamstrings, gastrocnemius) may also be weak and tight. The muscles that move the wrist (flexor and extensor carpi radialis and ulnaris) may be weak after a wrist fracture; strengthening them may lessen the impact of a fall.

5. Contraindicated Yoga Practices

Structural Yoga Therapy for clients with osteoporosis

Cautions for Assessment and Yoga Therapy

It is important to work gently and carefully with clients with advanced osteoporosis. In performing body reading and ROM assessments, we may have to avoid movements that place clients at risk, if they have advanced disease.

For Manual Muscle Testing, it is probably best to not muscle test in areas where there is known risk, for example, for a hip that has been diagnosed with advanced osteoporosis.

Instead, clients can be asked to come into the test position, and to stay in that position. The abdominal strength test is especially contraindicated, as it asks the client to round the spine in coming up to sitting from supine. Observing the degree to which a client can contract the abdominals, for example during exhalation or pelvic tuck/thrust, represents an alternative way to assess abdominal strength without compromising safety.

In giving SY programs for clients with advanced osteoporosis, we need to ensure that we are giving movements that elongate, build core strength, and are safe and therapeutic, and that we are avoiding movements that place the spine or hip at risk.

In the opinion of numerous physicians and physical therapists with extensive experience working with patients with osteoporosis, poses involving rounding of the spine (spinal flexion) should be avoided, as they can result in fractures and dangerous vertebral collapse. *“Do you do sit-ups, abdominal crunches and leg lifts in an effort to strengthen the abdominal area? These forward-bending exercises compress the spine. And if you have low bone mass they will increase your risk of a compression fracture. Unfortunately, most people with low bone mass do not know it.”* (Meeks, Walk Tall, p. 10)

The orthopedists and physical therapists at Englewood Orthopedic Associates, NJ, recommend that people with osteoporosis adapt activities of daily living by bending the knees and keeping the back straight as much as possible.

Asanas such as Paschimottanasana, Uttanasana, and Garbasana (Child’s Pose) should be avoided in their round-backed versions. These poses can be given if the therapist instructs the client in ways to elongate the spine, and if the client is able to execute the poses in this way, without rounding the back. Straps can be used for Paschimottanasana. In addition, pressing the thighs to the ribcage too strongly (Apanasana) could cause a rib fracture – clients should widen the knees and modify the pose (“gently draw the knees TOWARD the rib cage”).

For osteoporotic hips, avoid Raja Kapotasana (Pigeon Pose), as it places too much pressure and weight on a flexed and externally rotated hip; there is great danger of causing a fracture of the neck of the femur in this pose.

In Trikonasana, it is important to emphasize elongating the waist and lifting the rib cage away from the hips. If clients cannot do this, and the ribcage is already tilting toward the hips, poses such as Trikonasana and Side Angle Pose should be avoided, at least until the client has strengthened the core muscles that make safe practice possible.

Sarvangasana and Sirsana place too much pressure on already weakened and misaligned cervical vertebrae and should be avoided. Also, potential falls from these poses can jar brittle bones and cause fractures. Avoid Halasana, as it involves rounding the thoracic spine and additionally places excessive weight and pressure on the upper back while in a very flexed position. Deep twists can endanger brittle vertebrae of clients with advanced osteoporosis, and should be avoided.

General Activities to Modify or Eliminate: Rounding the back, lifting with a rounded back, and “crunches,” including sitting up in a “crunched” way from a supine position, need

to be eliminated. Poor body mechanics, such as slumping while seated in a chair, should be avoided, and proper body mechanics for ADL's need to be learned.

6. General Recommendations

6.a. Therapeutic/free of pain

Constructive Rest Pose/Decompression Pose is optimal for decompressing the spine and relieving back pain. Wave Breath while relaxing in Constructive Rest Pose is helpful in alleviating pain, and can be the beginning of a strengthening practice, especially if the client focuses on the exhalation phase, thereby powerfully engaging the abdominal muscles.

In the beginning of a therapeutic program, the client should do asanas while lying supine on a well-padded mat to protect potentially fragile bones. Such an asana program would begin with Constructive Rest Pose to decompress the spine. Using the Wave Breath, the client can begin with Sara Meeks's "Realignment Routine" (see Appendix), and with pelvic tilt and tuck/thrust, focusing on lengthening the lumbar spine. Many of the JFS exercises can safely be done on the floor, or in a bed or chair (see Mukunda's DVD for modifications), focusing on using the breath, and on the awareness of which muscles are being strengthened, and which muscles are stretching or releasing. Avoid spinal flexion, lateral flexion and rotation for advanced osteoporosis.

Later, standing asanas and walking, balancing and strengthening semi-squats and lunges are all beneficial for strengthening large muscles groups, fostering coordination, enhancing balance, preventing falls, and teaching a focused way of moving with awareness of the muscles being used and strengthened.

Clients should be encouraged to learn relaxation skills to help them release tension and stress, as well as the fear that can accompany a diagnosis of osteoporosis.

Pranayama to soothe vata (Wave Breath and Nadi Shodhana), meditation, and a spiritual practice (if the client is interested) can help clients cope with the sadness and sense of loss they may experience as they leave unsafe movements behind in favor of movements that are safe and therapeutic. If there are strong emotions, a recommendation for some therapy or other support might be appropriate.

Yoga therapists can be helpful in fostering safe body mechanics for clients with osteoporosis, and they can retrain clients in safer ways to move, work, and perform ADL's (getting in and out of chair; sitting with a tall spine; lifting and bending safely, getting into and out of bed/car, brushing teeth without rounding the back, washing hair in a safe position; etc.).

6.b. Stabilize situation and lifestyle change recommendations

Once a client has been diagnosed, the work to prevent fracture, stop further bone loss, and build stronger bones must move forward. As basic yoga and additional exercises are mastered, new ones that are more fun can be added, and clients may be able to resume some their former activities, if they can maintain a safe body position, for example, during

dancing, sports, or other pleasurable activities. Adaptations in the workplace, home, etc. need to ensure an optimal environment for safe movement.

Clients can be taught to examine the home and work environment for fall prevention. Computer cables and telephone wires should be moved out of the way, low tables may have to be repositioned so that there is no danger of tripping over them, and toys may have to find an orderly 'home.' In the yoga studio, props need to be moved out of the way so that clients don't trip over them. Uncluttering the home, workplace and yoga studio will also soothe vata ... an additional benefit.

Education of the client can continue so that enjoyable activities can be added safely. Working with osteoporosis needs to become second nature, and an ongoing process; the exercises (yoga, additional exercises) will build the core postural muscles that can help make safe movement feel natural and comfortable.

6.c. Maintenance of underlying issues at the root of the situation

The asanas that are therapeutic need to become a regular routine, in order to retard bone loss and build new, stronger bone. According to a study by Jiang Y. et. al., reported in the Journal of Clinical Densitometry, 1999, "Bones usually respond and adapt to mechanical challenge." In other words, by exercising in safe ways, we can use the stress from muscle activity to stimulate healthy bone growth. Jiang and the other authors of the 1999 study encourage those with osteoporosis to "surprise the bone," by asking the body to perform movements in non-habitual ways, and to add new weight-bearing and resistance exercises to the exercise regimen, to stimulate healthy bone growth. According to Lanyon and Skerry (Journal of Bone Mineral Resorption, 2001), "The power of a loading regimen to drive changes in bone mass and architecture is determined by the degree to which the forces differ from those that the bone has habitually encountered and to which it has already adapted."

Clients can be encouraged to add more weight-bearing and resistance exercises in order to further build the muscles that stimulate bone growth, but they must do so safely (some machines in the gym can cause harm). Free weights (for weight-bearing) and flex bands (for resistance) may be safer options than some of the machines in the gym.

Walking and other low-impact aerobic exercises can help keep the body healthy and the mood elevated. Walking with a weighted vest may help add body weight and thereby increase bone mass (see above; this is a matter of some debate, and no clear guidelines have been established to date).

Heel drops can be a fun and easy way to encourage bone growth at the calcaneus and along the spine (per Deborah Quilter, NYC).

Swimming is a non-weight-bearing exercise and therefore does not build bone. However, swimming is aerobic, which is good for overall health and mood. The "breast stroke" may strengthen the postural muscles of the back and encourage good posture. Exercising in the pool with resistance paddles can be a fun way to help strengthen core muscles, and may help those with advanced disease begin to move safely and comfortably. It can also help alleviate the discomfort of arthritis, which often accompanies osteoporosis in the elderly population.

Clients with serious bone density issues may need to consider the use of medications to slow or stop bone loss; this is a decision the client needs to discuss with his/her doctor.

Eating a diet rich in calcium and Vitamin D (1000 mg, and/or 10-15 minutes of exposure to sunlight every day) can help; adding supplements (Cal-Mag, between 1500-2000 mg/day) can also play a role in building stronger bones (note that the body cannot absorb more than 500 mg of calcium at a time).

7. Q&A from www.yogaforums.com

☐ Posted: Mon Jul 01, 2002 2:30 am Post subject: Commentary on Osteoporosis

Pertaining to the question about **osteoporosis**...Ayurveda does not promote the increase of ANY DOSHA. The goal is to reduce the Vata dosha that is causing dryness, emaciation, weakness, constipation, dry skin, dry hair, inability to go to sleep easily at night and stay asleep, and all the other signs of Vata provocation. The increasing of any dosha is very, very different from DECREASING THE AFFECTED DOSHA through proper diet, lifestyle, Asana and pranayama practices, even proper mediation for specific dosha...vikruti and Prakriti. To increase Kapha dosha will only create congestion in the nadis...the individual needs to be assessed with a consultation and pulse diagnosis for proper protocol to be determined.

As much as we would like these steps to be a simple answer, **osteoporosis** is usually due to a Vata type Prakriti, leading a very typical Vata provoking lifestyle and diet and even Yoga practice for years which has led to **osteoporosis**. Eliminating deep seated Vata AMA and then going through Rasayana (rejuvenation) practices like Abhanga (sesame oil massage...must make sure the dhatu AGNI is strong enough to support the obligation therapy) is one practice that could be helpful. The most important step is to stop provoking Vata.

Love, blessings and health to all. P

☐ Posted: Mon Jul 01, 2002 2:36 am Post subject:

P is on the staff at Rocky Mountain Institute of Yoga and Ayurveda (www.earthlink.net/rmiya) with me. I highly respect her advice.

Joined: 31
Jan 2002
Posts: 411

☐ Posted: Fri May 10, 2002 9:08 pm Post subject:

I have a prospective student with severe **osteoporosis**. (51 yr. old female -- spine cracked during hysterectomy 18 months ago. Sedentary since then. 25 pounds overweight.) Any recommendations would be appreciated.

Thanks! M

Mukunda
Moderator

☐ Posted: Fri May 10, 2002 9:19 pm Post subject:

Joined: 31
Jan 2002
Posts: 543
Location:
Boulder,
CO

To build up the bones I would recommend that you look to Ayurvedic principles for increasing Kapha and its subtler component Ojas. See Prakruti by Robert Svododa for recommendations here. On the Asana level focus her on doing my Joint Freeing series as described in Structural Yoga Therapy book for strength (chap. 18 - pg. 171). She will benefit greatly by identifying the specific muscles that she is strengthening as described in the chapter 16 on anatomy. The objective is not necessarily for her to learn anatomy as it is to feel her anatomy responding with contraction forces in the specific places that are ideal for each motion. Learning to feel the feelings of strength as distinguished from stretch is often a surprisingly confusing

experience for many students. Often what is perceived as a stretch is really strength and tone. When this is clarified the student makes progress in toning the muscles, bone strength is necessarily built on this foundation over time. I would keep this woman to only doing this series with mild modifications to compensate for the tendency to be bored. I would not recommend asanas except those done lying on the floor to strengthen the spinal column (erector spinae muscles not latissimus - in other words do not use arm strength), until she is feeling emotionally and physically stronger.

8. References and Resources

BOOKS ABOUT OSTEOPOROSIS

Betz, Sherri R., PT. The Osteoporosis Exercise Book. Building Better Bones. Osteo Physical Therapy, 1999.

Cosman, Felicia, MD, Clinical Director, National Osteoporosis Foundation. What Your Doctor May Not Tell You About Osteoporosis. Warner Books, New York, NY, 2003.

Daniels, Dianne. Exercises for Osteoporosis. A Safe and Effective Way to Build Bone Density and Muscle Strength. Hatherleigh Press, New York, NY, 2000.

Maddern, Jan. Yoga Builds Bones. Easy Gentle Stretches That Prevent Osteoporosis. Element Books, Inc., Boston, Mass., 2000.

Meeks, Sara, PT, GCS. Walk Tall! An Exercise Program for the Prevention & Treatment of Osteoporosis. Triad Publishing Company, Gainesville, FL, 1999.

Notelovitz, Morris, MD, Ph.D. Stand Tall! Every Woman's Guide to Preventing and Treating Osteoporosis. With Marsha Ware, MD and Diana Tonnessen. Physical therapy consultant: Sara Meeks, PT, GCS. Triad Publishing Company, Gainesville, FL, 1998.

Sparrowe, Linda, and Walden, Patricia. Yoga for Healthy Bones: A Woman's Guide. Shambala Publications, Inc., May, 2004.

Taylor, Matt J., PT, and Rury, Jill S., PTA. Balance ...Constructing a Firm Foundation. A Fall Prevention Program. Embug Publishing Co., Galena, IL. ©2001 MyRehab, Inc. Available through: <http://www.dynamicsystemsrehab.com/item.php?id=125>

GENERAL INFORMATION ABOUT OSTEOPOROSIS

National Osteoporosis Foundation: <http://www.nof.org>

New York State Osteoporosis Prevention & Education Program: <http://www.nysopep.org>

Osteoporosis and Related Bone Diseases National Resource Center: <http://www.osteoporosis.gov>

National Osteoporosis Society: <http://www.nos.org.uk>

Foundation for Osteoporosis Research and Education: <http://www.fore.org>

Osteoporosis Patient Resources: <http://www.imaginis.net/osteoporosis>

Strong Women, Strong Bones: <http://www.strongwomen.com>

INFORMATION ABOUT EXERCISE FOR OSTEOPOROSIS

Sara Meeks Physical Therapy: <http://www.sarameekspt.com>

Matt Taylor: <http://www.yogatherapy.com/yogatopics.htm>

Mirabai Holland: <http://www.mirabaiHolland.com>

NUTRITION INFORMATION

American Dietetic Association: <http://www.eatright.org>

Food and Nutrition Information Center: <http://www.nal.usda.gov/fnic.html>

National Institutes of Health: <http://www.nih.gov>

MEDICATION & DIETARY SUPPLEMENT INFORMATION

Food and Drug Administration: <http://vm.cfsan.fda.gov/~foodlab.htm>

NIH Center for Complementary and Alternative Medicine: <http://altmed.od.nih.gov>

9. Appendix

APPENDIX A

OSTEOPOROSIS RISK ASSESSMENT

- Female
- Thin or small frame
- Advanced age
- Post-menopause
- History of abnormal menstrual periods, or anorexia nervosa or bulimia
- Low estrogen from menopause or hysterectomy with ovaries removed
- Lifelong low intake of calcium / calcium-deficient diet
- Inactive lifestyle
- Cigarette smoking and/or excessive use of alcohol
- Personal history of fracture after age forty
- Family history of osteoporosis
- History of taking corticosteroids, anticonvulsants, and certain other medications
- Inflammatory diseases, e.g., rheumatoid arthritis, hyperthyroidism, asthma, lupus
- For males: Low testosterone levels
- Ethnic background that is Caucasian or Asian, though African Americans and Hispanic Americans also have significant risk

Additional factors that may accelerate bone loss

- Inflammatory disorders (e.g., rheumatoid arthritis, asthma, lupus)
- Hyperparathyroidism or hyperthyroidism
- Cushing's, Turner's, or Klinefelter's syndrome
- Blood or bone marrow disorders
- Organ transplantation
- Kidney, liver, lung, or gastrointestinal disorders

- Breast or prostate cancer
- Spinal cord injury that leaves person with paralysis of the lower limbs
- Illness or condition that leaves person wheelchair-bound (amputation, stroke)
- Multiple sclerosis

APPENDIX B

REALIGNMENT ROUTINE - SARA MEEKS, PT, MS, GCS, KYT©2006

This routine decompresses and elongates the spine. Sara Meeks recommends doing this routine prior to one's regular yoga practice as it helps to relax the spine and then "warms up" the muscles of the spine in preparation for yoga postures. It is also useful at the end of yoga practice and at any time during practice to help bring the back, shoulders and hips back into alignment, and for relaxation.

(1) Decompression Exercise (Modified Savasana)

1. Lie on your back with knees bent, feet flat on floor and pointing straight ahead. Knees and feet hip distance apart.
Your face should be parallel to the floor. If your head is tilted back, place a pillow under it. You may also need a pillow under the shoulders. If your head is tilted forward, place a towel roll under your neck. Your cervical spine should be as neutral and relaxed as possible.
2. Arms at sides, slightly away from body, palms up.
3. Rest in this position a few moments.

(2) Shoulder Press

1. Lie on your back as in the Decompression Exercise.
2. Press shoulders downward toward the floor.
3. Hold 2-3 seconds, then relax. Repeat 3-5 times.
4. Coordinate movement with your breath, breathing in on the relaxation and out with the effort.

(3) Head Press

1. Lie on your back as in the Decompression Exercise.
2. Feel the weight of your head on the floor. Gently increase the weight of your head on the floor.
3. Hold 2-3 seconds, then relax. Repeat 3-5 times.
4. Coordinate movement with your breath, breathing in on the relaxation and out with the effort.

(4) Leg Lengthener

1. Lie on your back as in the Decompression Exercise.
2. Straighten one leg down to floor. Pull toes and forefoot

- toward knee and extend heel; “lengthen” leg by pulling your hip away from rib cage.
3. Hold 2-3 seconds, then relax. Repeat 1 time, re-bend knee.
 4. Repeat #2 and #3 with the left other leg. Repeat exercise for a total of 4-6 lengtheners each leg.
 5. Coordinate movement with your breath, breathing in on the relaxation and out with the effort.

APPENDIX C

ADDITIONAL EXERCISES FOR BONE STRENGTH & FALL PREVENTION

Lying Supine

Exaggerate Wave Breath & abdominal strengthening during exhalation – on exhalation, feel power of abdominals, and focus on lengthening low back. Learn/teach concept of “neutral spine.” *This differs from traditional yoga practice.* Normally we want the spine to arch and flatten naturally with the breath; with osteoporosis, clients benefit from learning to hold the lumbar spine in a lengthened, “neutral” position during movement, first in yoga practice, then in ADL’s.

JFS lying on the back, seated in a chair, or standing (using wall for support/balance), focusing on feeling the muscles that are being strengthened and stretched. Avoid rounding the back.

Full body stretch – arms overhead, flex feet, “grow” as you “climb rungs of a ladder.”

All 4’s

Tabletop – replace Cat with neutral spine. Do not round the back into Cat Thrust. Do the movement as follows: Inhale & lower spine (Dog Tilt); exhale & bring spine *to neutral*

Camel (Ustrasana) – use blocks or a chair behind client

Extended Child’s Pose (knees wide apart; hips *toward* heels; arms stretching forward; avoid pressing ribs against thighs)

Standing

“Prost Pillow Press”: Place a pillow/bolster between inner thighs. Rotate thighs inward so that the pillow moves backward. Hold there. Repeat several times.

Weight shifting: Shift weight from one foot to the other foot. Foot lift optional.

Stork Pose: Shift weight onto one foot, lift other leg up bending knee, let lower leg dangle; stay for 5 breaths. Release. Repeat other side. Position arms out to sides like “tight rope walker.”

Virabhadrasana I / Warrior I (without weights / with weights):

Utkatasana (Chair Pose): Sit into an imaginary chair, keep spine long and straight. (If client cannot keep spine long and straight, do not do the pose.) Stay for 5-10 breaths. Option for weaker clients: have client sit down and get up out of chair.

Plie Squats (without weights / with weights)

Grapevine Exercise: Walk sideways to one side, crossing one foot in front of the other, go to one side of the room, then return to start position. Add “FREEZE” at times, to stimulate stamina, strength, reaction time, and fun.

Downward Dog (omit if wrists are fragile) or Wall Downward Dog

Wall Push-Ups / Press-Aways: Place palms against wall at shoulder height. Bend elbows and bring straight body toward wall; straighten elbows and return to start position. Repeat 10x. Can hold at mid-point along the way to build strength.

Prone

Head Lift: Make a pillow with hands and rest forehead on hands. Inhale, raise head away from hands, continuing to look down at the mat (“as if looking into a mirror”); hold for 5 breaths; exhale and lower head onto hands. Can reverse breath pattern, exhaling on exertion (lift), and inhaling upon relaxation (lowering). Repeat several times.

Sphinx: Place elbows directly under shoulders, palms on floor. Stay, breathe, feel movement of back on inhale (lifting, stretching) and on exhale (relaxing).

Cobra (Bhujangasana): Do pose with hands next to chest at heart level. Come into pose, stay for a moment/a few breaths, release, repeat 5x. Then stay and hold for a few breaths. Alternative: Do pose with hands alongside legs, “sliding hands down along the seams of the pants”; retract scapulae, stay, release, repeat 5x. Then, hold for a few breaths.

“W’s”: Lie prone, with arms on floor, elbows at shoulder level and bent, hands at approximately level of head. Lift (a) just head; (b) head and chest; (c) head, chest and arms; (d) head, chest and arms with light weight in each hand (1-2 lbs.) Keep neck long (do NOT look up during lift), and spine elongated throughout.

Extended Child’s Pose: Be sure to place knees wide apart to protect ribs.

Supine

Elbow Press: interlace hands behind head; press elbows down into / toward mat, hold, release, repeat several times.

Angels in the Snow: bend knees, feet on mat, engage abdominals, move arms like “snow angels” (palms up).

Bridge (Setu Bandhasana) with ball between knees: Come into Bridge Pose, squeeze medium-size, soft ball between inner knees. Using a ball vs. block is preferable for those with osteoporosis.

Modified Apanasana (Knees-to-Chest): “Gently draw knees **TOWARD** chest”

Supported / Restorative Savasana: Support knees, head, neck, arms, etc. for Savasana, or rest in Constructive Rest Pose (knees bent & feet on floor, hip-width).

Guided Imagery: Remember a time when you moved freely ... strong, carefree movement ... moving with grace, ease ... dancing ... hopping ... skipping ... striding forward confidently ... visualize bones as dense, strong & sturdy, a powerful architecture for the body ... see yourself with a beautiful, natural posture, with a spine that has its beautiful natural curves, just as nature intended ... a graceful home for your spirit

Bring your awareness to your body ... and to your spine ... and visualize the beautiful bones of the spine ... the vertebrae ... And now, noticing how you feel after the practice you just did ... sense the strength and grace of your spine ... notice how strong and supple it feels ... how well it’s supported by the muscles and tendons, along its entire length ... And now, bring your awareness deep inside the bones of the spine, the vertebrae ... and now visualize, deep within the bones, powerful struts and support beams ... strong cables ... support structures that press against the walls of the bones from the inside out, holding the boney walls firmly in place, holding them up strongly and securely ... and now, visualize the outside walls of the vertebrae ... and see how beautifully they’re supported by strong muscle structures ... You may want to visualize how the practice you just did has stimulated the bones of the body to grow strong and proud ... supporting you in every way.

Moving Safely:

- Moving from supine to sitting: Roll onto side “like a log”. Do not crunch or curl up to sitting. After rolling onto the side, use arms and hand(s) to press up to sitting.
- Moving from sitting or kneeling to standing: Come to Tabletop Pose (All-4’s). Step one foot forward and put hands onto the thigh. Press hands into thigh to help bring body up to standing; step back foot forward and come to Mountain Pose. Can use a chair for additional support.

ADDITIONAL CONCEPTS FOR SAFE, BENEFICIAL MOVEMENT

Posture

Sitting: Sit tall. Don’t slump the shoulders or sit with a rounded back – this can exacerbate muscle tension and vertebral fracture. Balance the pelvis evenly on the ischial tuberosities and pubic symphysis.

Standing - Visualization: In Mountain Pose, imagine that ...

... you are arraying your body along an imaginary plumb line
... you are 2 inches taller than you really are
... you are being pulled up by a string attached to your crown
... you have a jewel at the space between the collarbones that you want to show off
... you are “spreading your wings” as you lift the chest and allow the collarbones to widen
... your pelvis is a bowl that you need to keep level – prevent liquid from spilling over the sides
... you are creating space at the front of the backbone (spine)

Shoulder Retraction with Depression

Stand with good body alignment, feet hip-width. Interlace your fingers behind your back, keeping elbows straight (can use strap). Squeeze your backbone with your shoulder blades, hold position, pull shoulder blades downward, and lift chest slightly. Hold 2-3 seconds, then relax. Repeat 3-5 times.

Physioroller Exercises for Core Strengthening

Consult Sara Meeks, PT, for physioroller exercise protocol and information about physiorollers in various shapes and densities. Use soft-density physiorollers for those with advanced osteoporosis.

Activities of Daily Living

Simple activities of daily living can cause vertebral fractures. Because we are least likely to think of these movements as we take them for granted, we need to have greater awareness of these activities and apply proper body mechanics and movement principles.

Use **proper body mechanics** when sitting down in a chair and standing up from sitting, picking up objects, getting into and out of the car, getting into and out of bed, getting from standing to the floor, and from the floor to standing, etc.

Avoid rounding the back

Bend knees and keep back straight ... do not round the back ... keep back long.
Bend from the hips, not the waist.

Maintain “Dog Tilt” folding forward from the hips (have a colleague observe you!).

In advanced osteoporosis, even a straight-backed forward bend is counterindicated.

Remember: The lower the bone density, and the more advanced the osteoporosis, the greater the danger of a vertebral fracture with spinal flexion.

Preventing Falls: Balance and Gait

Because of the risk of fracture from a fall, it is important to have correct gait (walking), and to do balance exercises in order to prevent a fall. Strengthening the muscles that are involved in walking and balancing (e.g., anterior tibialis, gluteus maximus/medius/minimus), is very important. ***If balance is compromised, use one or two chairs, or the wall, to steady the client.***

Balance exercises:

Toe lifts: keeping the heel on the floor, lift the toes by flexing your foot, then release.

Calf raises: rise up onto your toes as high as possible, pause, then slowly lower down.

Heel walks: Walk on your heels, keeping the balls of the feet off the floor.

Heel bounces: Rise up onto toes, then let heels “bounce” down to floor. Repeat several times.

Toe walks: Walk on toes, keeping heels off the floor.

Grapevine walking: Step sideways ... cross one foot in front of the other ... reverse direction.

Weight shifting: Stand upright, shift weight from one foot to the other.

One leg stand: Lift one leg up and stay for a few breaths. Switch legs.

Ball catch: Have a partner throw you a ball so that you have to take a step to the right or left to catch it. (Not appropriate for clients with severe balance or movement difficulties).

10. Bio

Charlotte Chandler Stone (Hamsa), RYT500, has been a student and teacher of yoga, yoga therapy and meditation for thirty years. She is certified in Structural Yoga Therapy and Phoenix Rising Yoga Therapy, and is a certified Structural Yoga teacher and teacher trainer who specializes in adapting yoga therapeutically for those with musculoskeletal issues or injuries. She is registered with the Yoga Alliance at the 500 hour level, and she teaches and coaches yoga therapists and teachers nationally and internationally. Her principal teacher is Mukunda Stiles, and she has trained with and assisted Sara Meeks, PT, GCS, a nationally recognized expert on the topic of osteoporosis. In her private practice, Charlotte incorporates yoga therapy, Thai Yoga bodywork, meditation, imagery, breathwork, and coaching, to help her clients find their optimal healing path. Additional areas of special training and expertise include working with clients with back and neck pain, scoliosis, cancer, anxiety, childhood trauma, and sexual abuse.

Charlotte gives presentations and workshops about yoga, yoga therapy and stress management in a range of settings. Her work has been featured on New Jersey News, Holy Name Hospital's *Health First* program, NYU's Cancer Institute, and in numerous articles and online magazines. Her mission is to help those on a healing path discover their innate potential for wholeness, self-understanding, and personal growth. Charlotte is the founder and director of the Stone Center for Yoga & Health, a therapeutic yoga center located at 1415 Queen Anne Road, Suite 204, Teaneck, NJ 07666, (201) 833-5955, www.stoneyoga.com.