




## The Female Athlete


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2016 CONFERENCE & EXPO



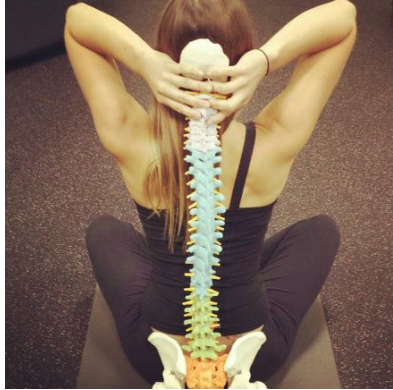
## Objectives

- Understand an introduction to Applied Functional Science.
- Identify the components of the Pelvic Core Neuromuscular System and the unique Female Biomechanics.
- Understand the functional relationship of the PCNS in reference to the female athlete, pregnant/postpartum patient and older female patient.
- Describe how to functionally stimulate the PCNS and how it applies to core stability.
- Develop exercise strategies for the PCNS and apply it to the female athlete, pregnancy/postpartum patient and older female patient.





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PHYSICAL THERAPY FOR WOMEN'S HEALTH

## Pelvic Core Neuromuscular System




**Why do you need to understand  
the Pelvic Core Neuromuscular  
System  
And  
How it will influence every female  
patient who walks into your  
clinic?**

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## Statistics


- One in Three women have Pelvic Core Dysfunction.
- Pelvic Core Dysfunction can be devastating to the female's quality of life.
- Pelvic Core Dysfunction can contribute to Orthopedic Injuries (Low Back Pain, ACL Injury, Hip Labrum Injuries etc...).
- Fewer than half of all women seek medical care for Pelvic Core Dysfunction.
- 60%-80% of Women experience nerve injuries during pregnancy and labor/delivery.

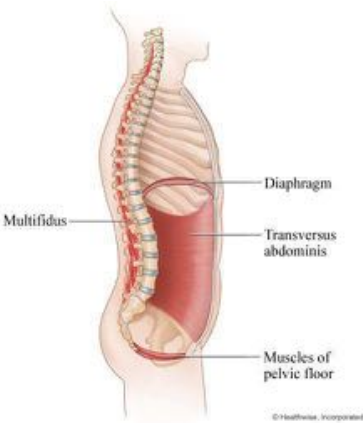
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 **Female Athletes**





 **The Pelvic Core Neuromuscular System**





Top of the Core : Respiratory Diaphragm

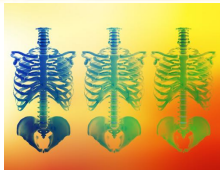
Front of the Core: The Abdominals

Back of the Core: The Hip and Back Muscles


Bottom of the Core: The Pelvic Floor Muscles




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 Role of the Pelvic Floor Muscles





- 1. Support** – In the Female: provide support to the bladder, uterus and bowel.  
 - In the Male: provide support to the bladder and bowel.
- 2. Bladder and Bowel Control** – to prevent accidental loss of urine or feces.
- 3. Sexual Function** – Sexual Appreciation and Orgasm.
- 4. Pelvic Core Mostability** – Considered an integrated part of PCNS for complete Mobility and Stability.

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 Female Biomechanics

- **Female Pelvis:** wider, pelvic cavity that is more shallow and more circular.
- **Hip Joints:** smaller and more forward facing (anteversion) with an increase in anterior pelvic tilt.
- **Variation and fluctuation in systemic tone and stability via Estrogen/Progesterone.**

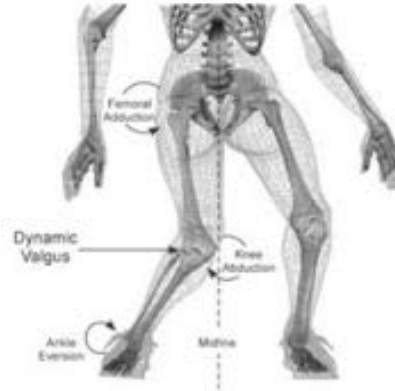


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## Female Biomechanics

- **Knee joints:** larger Q-angle resulting in more genu valgum.
- **Reliance on gravity and ground reaction forces (Quad dominance).**
- **Transverse plane** hip loading deficiency with increase chance for valgus stress injuries.



## The Core

“**Core Stability**” is defined as the ability to control the position and motion of the trunk over the pelvis to allow optimum production, transfer and control of force and motion to the terminal segment in integrated athletic activities.

(Kibler et al, 2006)




### Planks vs Sit ups?

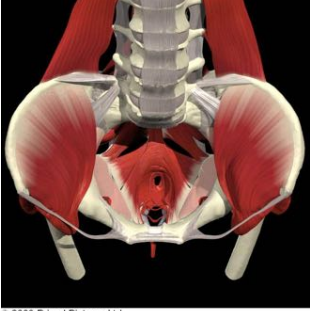

Sit ups once ruled as the way to tighter abs and a slimmer waistline. Now planks are the gold standard for working your core. Your core includes your back, side, pelvic and buttock muscles”

Harvard Health Publications, Harvard Medical School, “Want a Stronger Core? Skip the sit ups.”  
January 3, 2013






 **Pelvic Floor Muscles**





© 2003 Primal Pictures Ltd.

The **Obturator Internus** is fascially connected to the **Levator Ani** group of muscles.

What impact does hip rotation have on pelvic floor function?




 **The Respiratory Diaphragm**


**Dome Shaped Muscle Attaching to Ribs, Sternum, and Upper Lumbar Spine .(Roof)**


**The respiratory diaphragm is functionally linked to the pelvic floor.**

**Function:**

- Thoracic/Lumbar Spine Mobilization
- Ph Level Determinant in all Body Cells ( $O_2$  /  $CO_2$  Exchange)
- Internal Organ Motility / Mobility
- Sympathetic / Parasympathetic nervous system balance








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## The Abdominals

- The abdominals react to motion, gravity and ground reaction forces.
- They decelerate the trunk in all three planes.
- Best Loaded in transverse plane and frontal plane, minimally stimulated in sagittal plane.
- Need an eccentric stimulus to produce a concentric force.
- When the abdominal muscles are contracted they produce an inward pull at the waist.
- Can assist in expulsion of the fetus.
- If exercised inappropriately can place excessive pressure on the perineum.  
(Gray et al, 2005)




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## Thoracolumbar Fascia

Connects LE's (via gluteus maximus), to the UE's (via Latissimus dorsi).

- Attaches to the internal obliques and transverse abdominus mm.
- Provides Three-Dimensional Support, or a "Corset" to the lumbar spine.  
(Posterior fascia, abdominal fascia anteriorly, and oblique mm. laterally.)



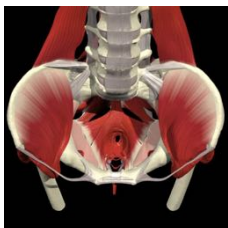

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## Hip Rotators


- **Function:** Transverse plane mm. They decelerate internal rotation at the hip to protect hip, knee and ankle. Transverse plane decelerators.
- O.I.: Assists in closure of the urethra and anus.

(Gray et al, 2005)

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## Applied Functional Science and the PCNS

**Functional Approach to Pelvic Core Neuromuscular System (PCNS).**

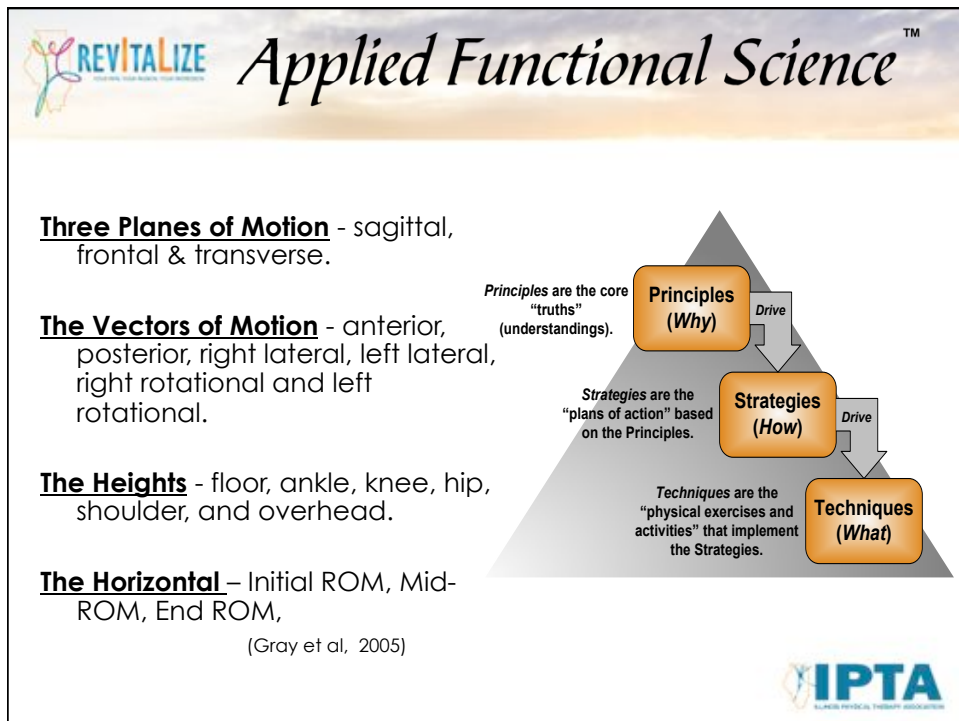
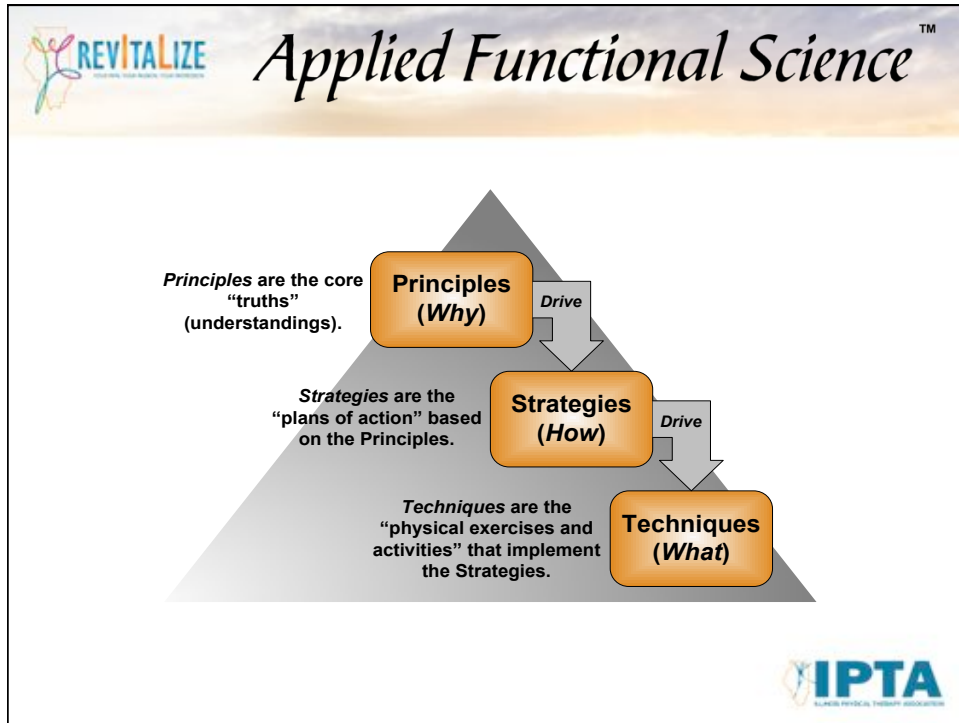
**We can create an environment in which function will improve and be restored.**




FB/SHAIKAT CHARANIA

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 **Functional Nomenclature**


SFT


**XXX** – Neutral

**R/L XX** – R/L Stride

**XW/NX** – Wide/Narrow

**XXE/I** – External Rotation/  
Internal Rotation

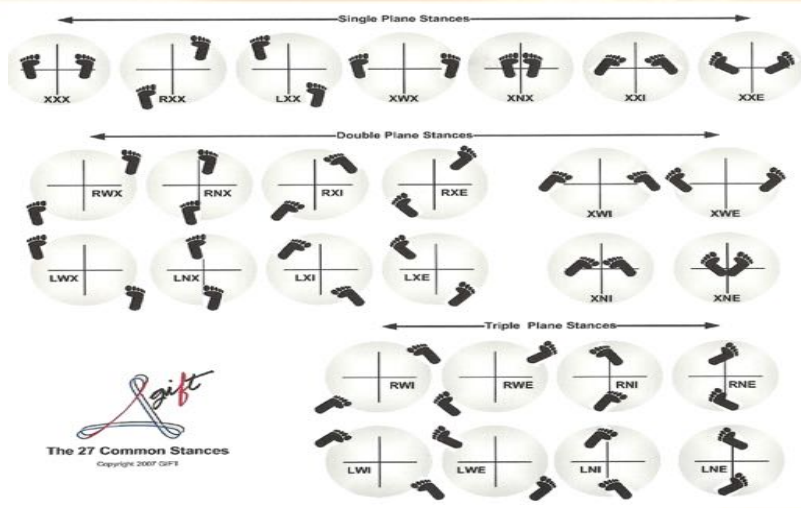



 **Functional Nomenclature**


Single Plane Stances


Double Plane Stances

Triple Plane Stances



  
The 27 Common Stances  
Copyright 2007 GPTA






3D MAPS - (Movement Analysis and Performance System)

6 Vital Transformational Zones

- Anterior Chain Reaction
- Posterior Chain Reaction
- Same Side Lateral Chain Reaction
- Opposite Side Lateral Chain Reaction
- Same Side Rotational Chain Reaction
- Opposite Side Rotational Chain Reaction



**VITAL TRANSFORMATIONAL ZONES**  
Motions of Primary Joint Complexes

**RIGHT**  **LEFT**



Cervical EXTENSION  
Shoulder FLEXION  
Thoracic EXTENSION  
Lumbar EXTENSION  
Hip EXTENSION  
Knee EXTENSION  
Subtalar/Ankle DORSIFLEXION

**ANTERIOR CHAIN REACTION®**

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# VITAL TRANSFORMATIONAL ZONES

Motions of Primary Joint Complexes

**RIGHT**  **LEFT**



Cervical FLEXION  
Shoulder EXTENSION  
Thoracic FLEXION  
Lumbar FLEXION  
Hip FLEXION  
Knee FLEXION  
Subtalar/Ankle PLANTAR FLEXION

**POSTERIOR CHAIN REACTION®**

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# VITAL TRANSFORMATIONAL ZONES

Motions of Primary Joint Complexes

**RIGHT**  **LEFT**



Cervical LATERAL FLEXION - OPPOSITE  
Shoulder ADDUCTION - OPPOSITE  
ADDUCTION - SAME  
Thoracic LATERAL FLEXION - OPPOSITE  
Lumbar LATERAL FLEXION - OPPOSITE  
Hip ADDUCTION  
Knee ADDUCTION  
Subtalar/Ankle EVERSION

**SAME SIDE LATERAL CHAIN REACTION®**

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# VITAL TRANSFORMATIONAL ZONES

Motions of Primary Joint Complexes

**RIGHT**  **LEFT**



**STABILITY** **MOBILITY** **MOBILITY** **STABILITY**


- Cervical  
LATERAL FLEXION - SAME
- Shoulder  
ABDUCTION - OPPOSITE  
ADDUCTION - SAME
- Thoracic  
LATERAL FLEXION - SAME
- Lumbar  
LATERAL FLEXION - SAME
- Hip  
ADDUCTION
- Knee  
ADDUCTION
- Subtalar/Ankle  
INVERSION


## OPPOSITE SIDE LATERAL CHAIN REACTION®

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# VITAL TRANSFORMATIONAL ZONES

Motions of Primary Joint Complexes

**RIGHT**  **LEFT**



**STABILITY** **MOBILITY** **MOBILITY** **STABILITY**

- Cervical  
ROTATION - SAME
- Shoulder  
HORIZONTAL ABDUCTION - SAME  
HORIZONTAL ADDUCTION - OPPOSITE
- Thoracic  
ROTATION - SAME
- Lumbar  
ROTATION - SAME
- Hip  
EXTERNAL ROTATION
- Knee  
EXTERNAL ROTATION
- Subtalar/Ankle  
ABDUCTION

## SAME SIDE ROTATIONAL CHAIN REACTION®

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# VITAL TRANSFORMATIONAL ZONES

Motions of Primary Joint Complexes

**RIGHT** **LEFT**

**STABILITY** **MOBILITY** **MOBILITY** **STABILITY**

- Cervical: ROTATION - OPPOSITE
- Shoulder: HORIZONTAL ADDUCTION - SAME, HORIZONTAL ABDUCTION - OPPOSITE, TORSION: ROTATION - OPPOSITE
- Lumbar: ROTATION - OPPOSITE
- Hip: INTERNAL ROTATION
- Knee: INTERNAL ROTATION
- Subtalar/Ankle: ADDUCTION

## OPPOSITE SIDE ROTATIONAL CHAIN REACTION®

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 **Revitalize**

# Transformational Zones





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 **PCNS**

Pelvic Core Neuromuscular System  
Function  
is a  
**Chain Reactive Activity**  
and should happen **Automatically**

How do we design  
**Environments**  
for  
**Training and Treatment?**  
*(Gray et al, 2005)*








 **Female Functional  
Fitness**

**Big Rocks for FFF**

1. **Thoracic Spine Mobility** for PCNS Loading.
2. **Hip Mobility** for PCNS Loading.
3. **Subtalar Joint and Foot Mobility** for PCNS Loading.







## Pelvic Core Dysfunction and the Female Athlete

There is abundant research linking pelvic pain, and associated urinary tract symptoms, as well as Orthopedic injuries with various sporting activities. The studies reported on in this lecture are offered as awareness – particularly against excessive training and sport in early life.

***“Train Like a Girl”***





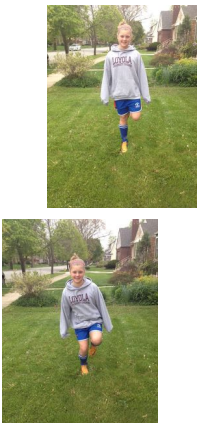

## The Young Female Athlete


Prior to puberty:  
Males and females have approximately the same rate of knee injuries.

“What happens in females during and after puberty that may increase their risk for knee injuries?”

As the females’ skeletal system changes in height and density, their corresponding muscles do not increase in strength and mass at the same rate as a male’s muscles would. Moving through puberty for young girls can significantly increase their body mass(lean mm. and body fat) without a corresponding increase in lean muscle mass to effectively move and stabilize their bodies and joints.

Weakness in the PCNS, hip and thigh muscles will correspond to problems in the knee including anterior knee pain or patellofemoral syndrome as well as the high incidence of Anterior Cruciate Ligament Injury.






 **ACL Injury**


Multiple etiology/Multiple theory:

Anatomic and Physiologic references:



- Female Pelvic width.  
Q-angle.
- Smaller femoral notch.
- Hypermobility/Ligament laxity –  
Hormonal influence.
- Lack of Ecentric Training







 **Female Athletes**

- Variation and fluctuation in systemic tone and stability via Estrogen/ Progesterone.
- Reliance on gravity and ground reaction forces (Quad dominance).
- Transverse plane hip loading deficiency with increase chance for valgus stress injuries.
- Gender differences in knee abduction during execution and ready position.
- Suggests altered muscle control/ contraction patterns of adductors and abductors of the hip and knee.











## Female Biomechanics

- Possible linkage between shock-absorbing capacity of LE's and continence.
- Pressure transmission theory: Increases in abdominal forces are transmitted to the bladder. Poor shock attenuation increase stress to the knees.
- Arch height was measured in subtalar neutral(knee straight) and maximal dorsiflexion(knee and ankle flexed).
- Change in arch height(mean +/-SD) was 8.94+/- 0.08%- Incontinent women13.70+/- 0.09% -continent women.
- Study found statistical significance between foot flexibility and UI. (Nygaard, et al)



Foot Anatomy





## Young Female Athlete

**Thoracic Spine Mobility for PCNS Loading:**

Type I and Type II motion with a squat.


**Hip Mobility for PCNS Loading:**

IROM,MROM,EROM Squat with IR/ER.

**STJ/Foot Mobility for PCNS Loading:**

3-D Achilles/ Hip Stretch and Foot Mobility.


**Practice/Game Ready:** SLB Tri-Plane Hip Quick Hits.



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## Pregnancy and the PCNS

- **Increase in hormones leads to laxity of the connective tissue, ligaments, tendons and joints.**
- Postural changes include:
  - Increased lumbar lordosis, shift of the center of gravity towards an anterior position.
  - Increased thoracic kyphosis.
  - Rounded shoulders
  - Increased forward head.
  - Lowering of the longitudinal arch in the foot.
  - Dormant butt syndrome.
  - Hyperextension at the knees.
  - Pelvic floor muscle laxity/pressure
  - Rectus Diastisis.



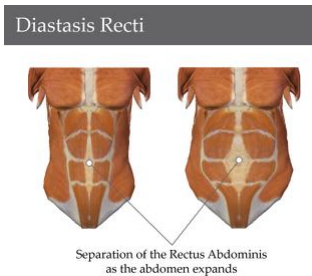
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## Rectus Diastisis

- Rectus Diastisis- functional repair or surgical repair?  
(Lee et al, 2011)
- Check
- Correct
- Integrate the abdominals with the rest of the Pelvic Core Neuromuscular System

**Diastasis Recti**



Separation of the Rectus Abdominis as the abdomen expands

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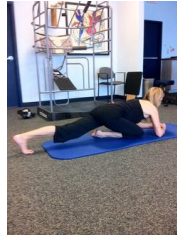


## Labor and Delivery Preparation

Pregnant Client:

**Labor and Delivery Preparation**-On ground Stretches and Deep Squat

Diastisis Correction Matrix



## Postpartum Restoration

Need to RESTORE the Pelvic Core Muscles, as well as the muscles that influence the Pelvic Core during pregnancy.

Changes during pregnancy (ie: hormone levels, weight of the baby onto the perineum, total body weight gain, fatigue levels, postural changes, rectus diastisis) all place increased stresses through the Pelvic Core Muscles.

Motor patterning throughout the abdominals, hip/ pelvic girdle muscles and pelvic floor muscles (Pelvic Core) will decrease dysfunction during pregnancy and prepare the body for labor/ delivery, as well as enhancing postpartum recovery. (Functional Feeding of the PCNS)

(Simkin et al, 2000)








## Postpartum Restoration

- Return to Exercise?
- What type of delivery?
- Rectus Diastasis?
- Current Pelvic Floor Dysfunction or Pain?
- Tri-Plane Mobility?
- Tri-Plane Strengthening?
- When do you return to IMPACT TYPE EXERCISE?









## Postpartum Restoration

- Pelvic Floor mm. and abdominal mm. may have lost the subconscious/automatic reaction!
- Follow the **Police Principles**: Protection, Optimal loading, Ice (first 24 hours, followed by Heat), Compression and Elevation.
- Use an Abdominal Binder and/or Compression shorts for 2-12 weeks after baby. (Longer if RD present)
- High Impact exercise (Running) should start when breastfeeding is completed and regular menses is re-established.
- Progress your client through a developmental sequence to re-establish the reflexive response of the PCNS
- 
- Meet with a Physical Therapist for Biomechanical eval, Pelvic Floor Health assessment and exercise progression.
- Sex: No amount of pain should ever be considered normal. It can take 3-12 months for the Pelvic floor to feel normal again. Sexual appreciation can be enhanced by PCNS exercises/rehabilitation.

 **Postpartum Restoration**

**Thoracic Spine Mobility for PCNS Restoration:**

Pelvicore Bridge with Tri-plane arm drivers.


**Hip Mobility for PCNS Restoration:**

Pelvicore Standing Hip Mobility(Baby Rock Matrix)

**STJ/Foot Mobility for PCNS Restoration:**

Pelvicore split stance squat(R/LXX) in neutral and IR/ ER

**Impact Preparation Matrix!** 

 **Post-Menopausal Female Athlete**

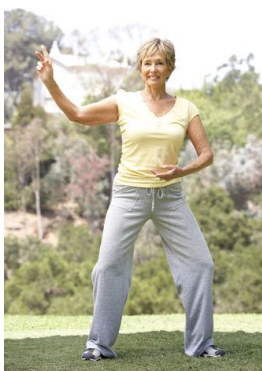
Post-Menopausal Women:


- Weak abdominals
- Loss of hip range of motion
- Rectus diastasis
- Postural deviations
- Pelvic asymmetries
- Decreased balance reactions
- Incontinence
- Pelvic Organ Prolapse

(Kotarinos et al)

The three most common and definable conditions encountered clinically are **urinary incontinence, anal incontinence and pelvic organ prolapse.**

(Center for Population Research et al, 1999)







## Questions to ask your clients

How often do you urinate during the day?

Do you get up at night to go to the bathroom? If yes, how many times?

Do you ever have accidental leakage of urine during activities such as coughing, sneezing, laughing, running, exercising, or lifting?

Do you ever have accidental leakage of urine associated with a sudden strong urge to urinate or do you have trouble reaching the toilet in time?



## Questions to ask your clients

Do you do a lot of “just in case” toileting?


Do you have trouble controlling gas?

Have you ever lost bowel control?

If you are sexually active, do you have pain during or after intercourse?

Do you have pain before, during, or after urination or bowel movements?





## Post-Menopausal Female Athlete

**Thoracic Mobility for PCNS Loading:**




Pelvicore Split Stance (R/LXX) with IR/ER arms swings.

**Hip Mobility for PCNS Loading:**

Pelvicore OH to Ground Reach in neutral, narrow and wide stance(XXX,XN/WX). (standing or sitting)

**STJ/Foot Mobility for PCNS Loading:**

Barefoot gastoc/soleus stretch in neutral, IR and ER.


## PCNS Restoration

All women are at risk for Pelvic Core Dysfunction because of their unique anatomy

**Factors that increase this risk:**

- Puberty and Hormonal Changes influences biomechanics.
- Lack of Female Specific Cross Training at a young age.
- Pregnancy
- Vaginal Birth and Cesarean Section.
- Lack of Postpartum Education and Training for PCNS Restoration.
- Chronic Straining-constipation, heavy lifting, chronic coughing.
- PCNS Weakness and lack of Mobility.
- Pelvic Pain.
- Pelvic Organ Prolapse.

(Murphy et al 2003)





## GET YOUR PELVICORE ON!!!



**Individual Programs**

- Fitness Athlete
- Women's Health
- Men's Health
- Pregnancy
- Incontinence




**Group Exercise**

- Cardio Pelvicore Fusion
- Inner Pelvicore
- Pelvicore Sit & Fit







**PELVICORE BY PELVIC SOLUTIONS L.L.C.**  
AND  
**CHRISTINA M. CHRISTIE PT, CCE, FAFS, FMR**

## Pelvicore™

- Core muscles include abdominal muscles, hips, back, butt and PELVIC FLOOR.
- All of these muscles are layered and interconnected.
- Exercising Pelvic Core Muscles will promote mostability throughout the Pelvic Floor and Pelvic Girdle.
- This will enhance strength, coordination, balance....etc. (Kibler et al, 2006)





## REVITALIZE 2016

The Female Athlete- Christina M Christie PT, CCE, FAFS, FMR, 3DMAPS

- Takeaway #1- Female Biomechanics...Train Like a Girl!
- Takeaway #2- AFS...Local - Global – Local.
- Takeaway #3- Ask the right questions in reference to Female Health with every Female Patient.
- Takeaway #4- Identify the Objective signs related to Female Biomechanics and Female Health.

Material presented at IPTA 2016 REVITALIZE Conference



# Thank you!!!

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