

Hypermobility 110: Lumbar Instability



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-
- Slide handouts and recording available at:
<https://webpace.clarkson.edu/~lrussek/hsd.html>





Who Am I?

- Professor Emeritus, Physical Therapy, Clarkson University.
- Staff PT, St. Lawrence Health System, Potsdam NY.
 - Clinical specialties: hypermobility, chronic pain, fibromyalgia, headaches, temporomandibular disorders
- Facilitator of the North America Allied Health Professionals ECHO
- Member of:
 - The Allied Health Working Group of the International Consortium of Ehlers-Danlos Syndromes and Hypermobility Spectrum Disorders
 - The National Academy of Sciences, Engineering and Medicine Committee on Selected Heritable Connective Tissue Disorders and Disability.
- Author of "Chronic Pain" chapter in *Physical Rehabilitation* textbook for PT students
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- I do free weekly Zoom lectures for people with HSD (see website)

**I do not have any
conflicts of interest to report**

Russek - HSD 110: Lumbar Instability



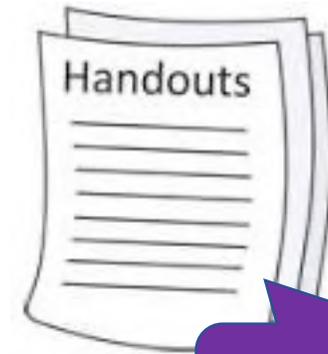
Hypermobility Lecture Series Schedule

- HSD 101: Basics of HSD/hEDS and self-care
- HSD 102: POTS and POTS self-care, basics of MCAS
- HSD 103: Pain management in HSD/hEDS
- HSD 104: Safe exercise selection and progression with HSD/hEDS
- HSD 105: Posture and joint protection
- HSD 106: Gut issues in HSD/hEDS, POTS, MCAS
- HSD 107: Fatigue in HSD/hEDS and POTS
- HSD 108: Headaches, migraines, & TMJ pain associated with HSD, POTS and MCAS
- HSD 109: Breathing disorders in HSD
- HSD 110: Lumbar instability
- HSD 111: Conservative Management of Cervical instability (Part 1, Anatomy & Testing is recorded)
- HSD 112: The vagus nerve
- HSD 113: The role of fascia

I will refer to these if you want more info



Relevant Handouts Available



I will refer to these if you want more info

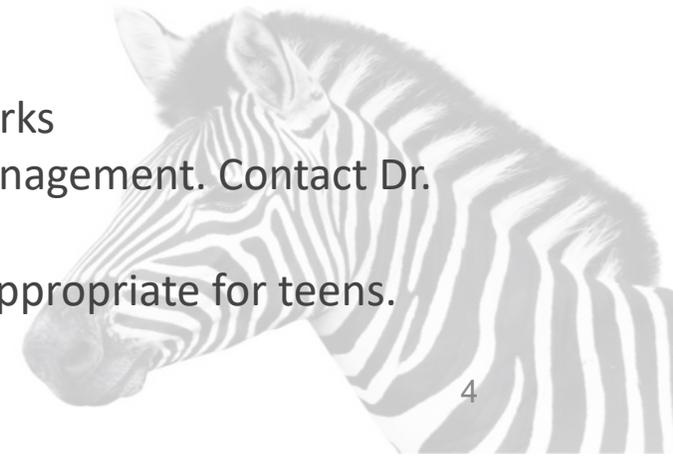
- <https://webpace.clarkson.edu/~lrussek/research.html>

• Self-Care Strategies

- [Breathing](#). Breathing incorrectly can increase low back pain and instability, pain sensitivity, and more.
- [Posture](#). Good posture decreases strain on muscles and joints, and can prevent many problems.
- [Joint Protection Strategies](#) Learning to protect your joints and muscles is critical to self-care.
- [Sleep Hygiene and Positioning](#). Sleep posture and sleep hygiene strategies.
- [Starting to Exercise Ideas](#). Some ideas to help you get started on exercise: how to deal with fatigue, pain, and fear of movement
- [Topicals for pain management](#). Topicals can be a helpful

• Pain Management

- [Pain self-care plan](#). Create a pain self-care plan to improve your pain management.
- [Pain flare management plan](#). Create a flare management plan so you know what works
- [Curable chronic pain management app](#). Cognitive behavioral approaches to pain management. Contact Dr. Russek if you are interested in 6 weeks free access: lrussek@clarkson.edu
- [Free chronic pain management apps for teens](#). Similar information as Curable, but appropriate for teens.



DISCLAIMER

The information in this presentation is for general purposes, only, and may or may not apply to your situation.

Check with your health care provider before starting any new exercises or self-care, to ensure that they are appropriate and safe for YOU.

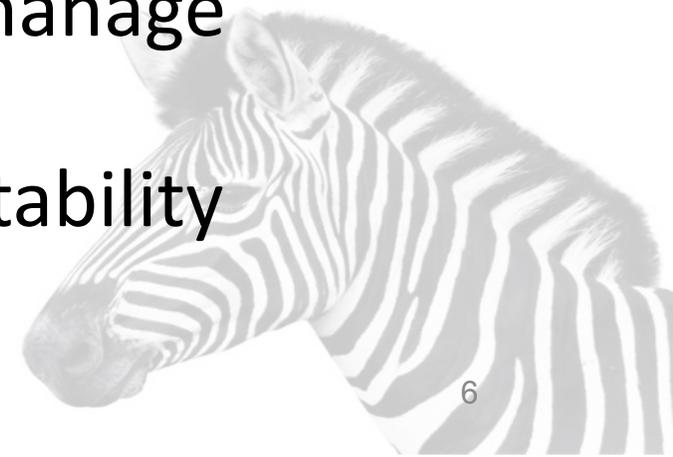
I cannot diagnose you or provide personal medical recommendations, and this lecture should not be used for those purposes.



Objectives

At the end of this presentation, participants will be able to:

1. Identify key anatomical structures in the lumbar spine
2. Describe causes of lumbar instability pain
3. Recognize signs and symptoms of lumbar instability
4. Identify things you can do to minimize pain due to lumbar instability
5. Describe how physical therapy can help you manage lumbar instability
6. Understand that you CAN manage lumbar instability



Approach to Management of HSD

Assist patient in identifying and managing systemic comorbidities: education, treatment and/or referral

Decrease central, peripheral, and autonomic pain sensitization

Educate for correct posture and joint alignment, body mechanics, joint protection, appropriate use of splints and braces

Proprioceptive and motor control training, with training to relax muscles that are guarding

Stabilization, strengthening, muscle flexibility, aerobic conditioning

Integration of proper alignment & movement into function

Education about flare management

HSD/hEDS Treatment Progression

Assist patient in managing systemic comorbidities: education, treatment and/or referral

HSD102: POTS & MCAS;
HSD106: GI issues;

Decrease central and peripheral pain sensitization

HSD103: Pain
HSD109: Breathing
HSD112: Vagus nerve

Educate for correct posture and joint alignment, body mechanics, joint protection, appropriate use of splints and braces

HSD105: Posture & Joint Protection

Proprioceptive and motor control training, with training to relax muscles that are guarding

HSD104: Exercise
HSD110/111:
Lumbar/Cervical instability

Stabilization, strengthening, muscle flexibility, aerobic conditioning

HSD105: Posture & Joint Protection

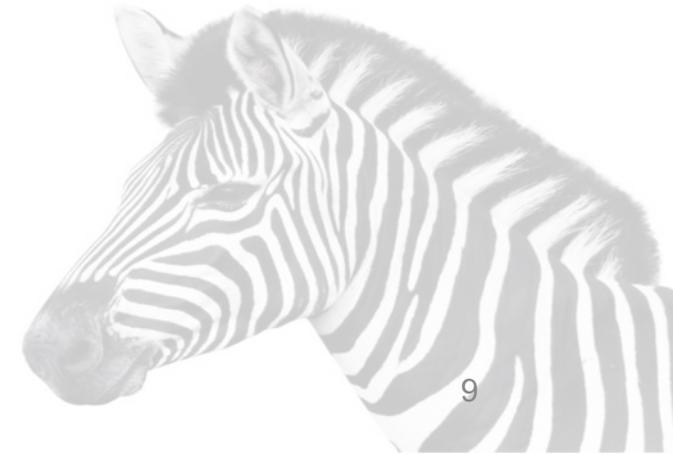
Integration of proper alignment & movement into function

HSD103: Pain
HSD109: Breathing
HSD112: Vagus nerve

Education about flare management

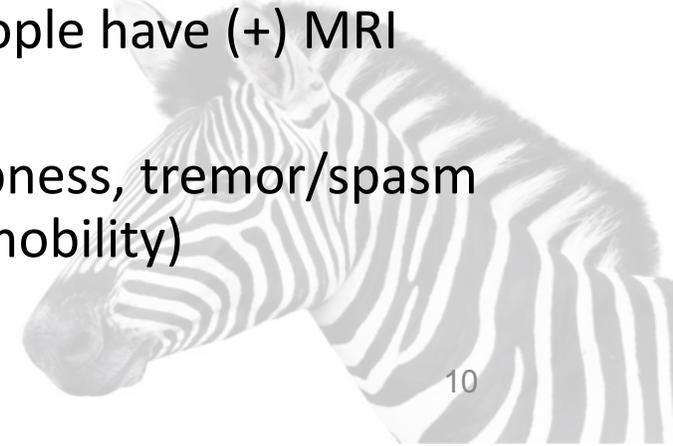
Russek: HSD112 Vagus Nerve

Understanding Your Back Pain



What Kind of Back Problem Is It?

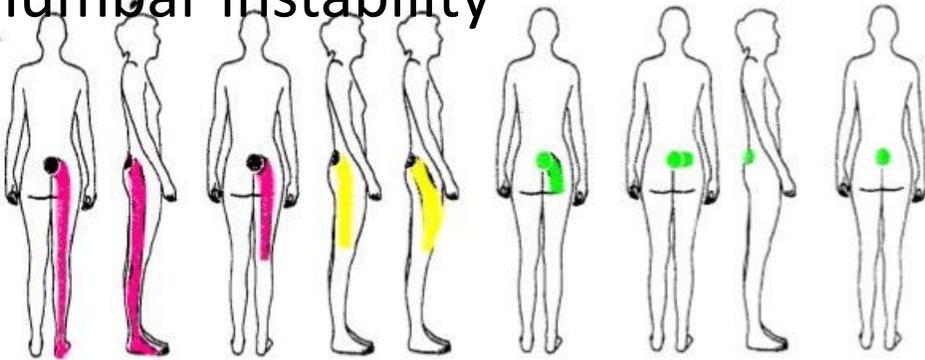
- Lumbar instability:
 - Intermittent pain, typically in the back/buttock, sometimes very intense
 - Provoked by minimal movements, sometimes better with activity
- Spondylolisthesis:
 - Vertebral malalignment on imaging, may be asymptomatic
- Muscle spasm:
 - Localized pain and stiffness. May be secondary to instability
- Herniated disc (aka 'flexion syndrome'):
 - MUST have radiating pain into the leg that radiates with back flexion, centralizes with extension; may have one-sided neurological issues (numbness or weakness).
 - MRI results correlate poorly with symptoms – many pain free people have (+) MRI
- Tethered cord:
 - Bilateral neurological signs into the legs, such as weakness, numbness, tremor/spasm
 - Loss of bladder or bowel control (not incontinence due to hypermobility)



Lumbar Flexion Syndrome

Looks like:

- Pain in the back and radiating down the back of one leg: “sciatica”
- Radiating pain increased with forward bending and sitting
 - Pain typically ‘centralizes’ with standing, walking, back extension
- May be present in people with lumbar instability



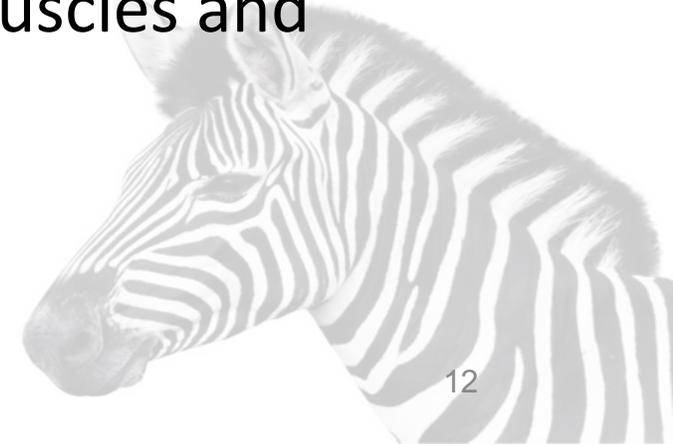
What to do:

- Avoid lumbar flexion until the pain has fully centralized.
- Lumbar extension exercises (arching backwards) may be helpful if they centralize the pain. But it may be more complicated.
- Once pain has centralized and you no longer have radiating pain with flexion, you can gradually resume flexion exercises.



What Is Lumbar Instability?

- Inability to control spinal movement within the 'neutral zone'
- Lumbar stability is normally a combination of:
 - Passive structures, such as the disc, facet joints and ligaments
 - Muscles acting on or affecting the spine
 - Neurological system (brain and nerves) that controls the muscles
- People with hypermobility have stretchy passive structures
- BUT, what makes the spine unstable is failure of the muscles and nervous system to provide control



Symptoms of Lumbar Instability

- Symptoms:
 - Sharp, intense pain, usually in the back, but maybe also buttocks or thighs
 - There may be 'catching' or 'locking' in the spine or you may feel like your spine 'gives out'
- Onset
 - Might be initially triggered by a specific injury, but not necessarily
 - Often gets worse when you have been less active or stopped exercising
- Pattern
 - Pain (initially) occurs in bouts, where it comes and goes
 - These bouts of pain may become more frequent and longer over time
 - Specific bouts often triggered by small movements, especially quick or unexpected
 - May be aggravated by prolonged postures, such as sitting or standing



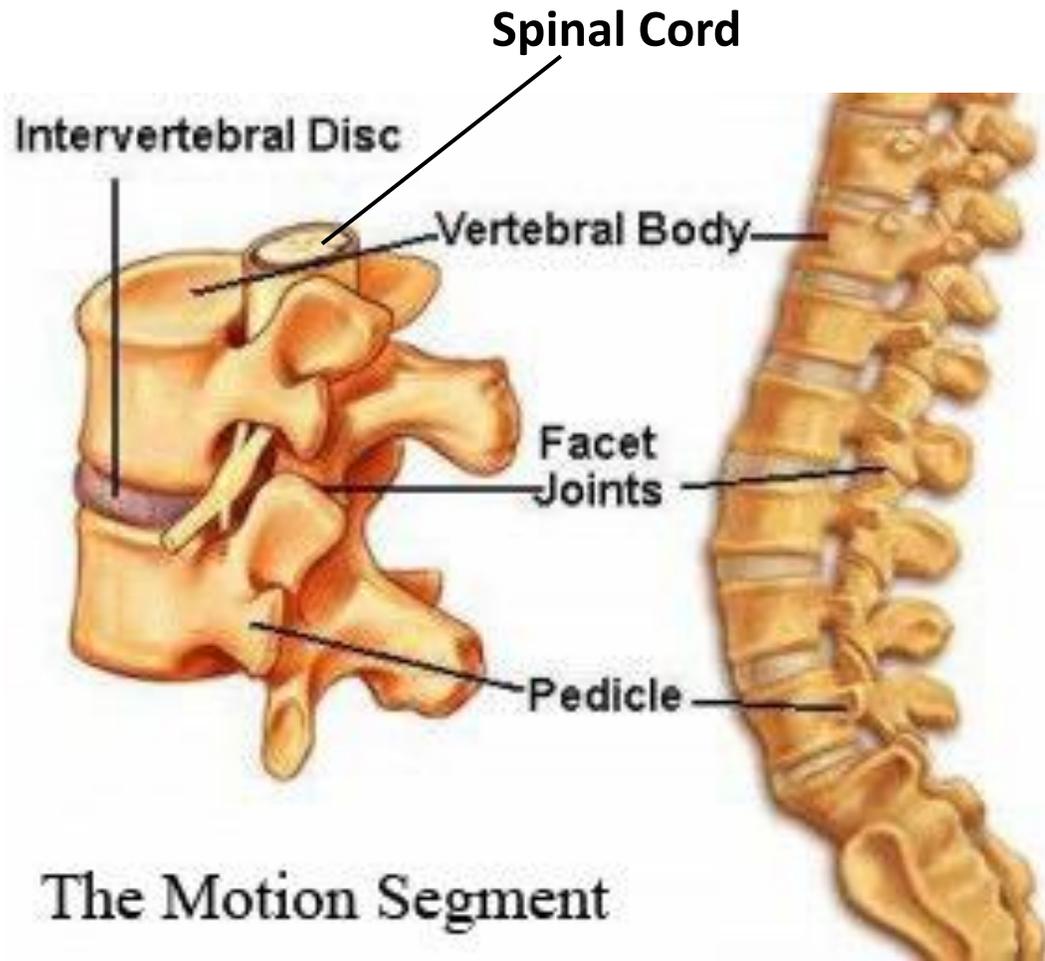
Saragiotto, 2018

IMPORTANT!

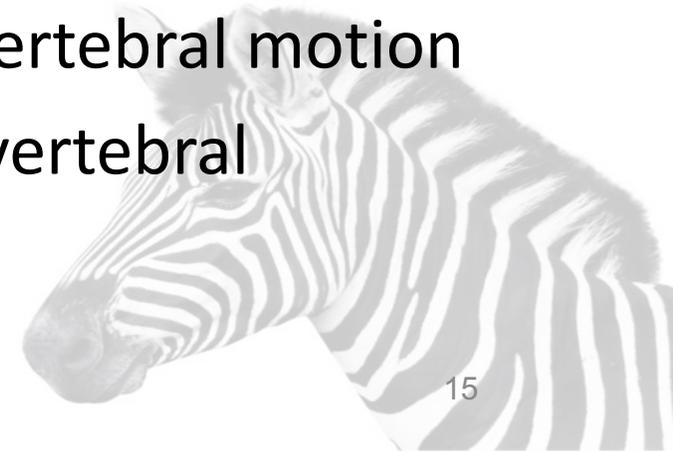
- Functional lumbar instability occurs when muscles (and the nervous system that controls the muscles) do not effectively control stability and motion
- Instability, therefore, can come and go based on things you CAN control
- There is another, similar but different problem resulting from lumbar instability, called spondylolisthesis



Spine Anatomy

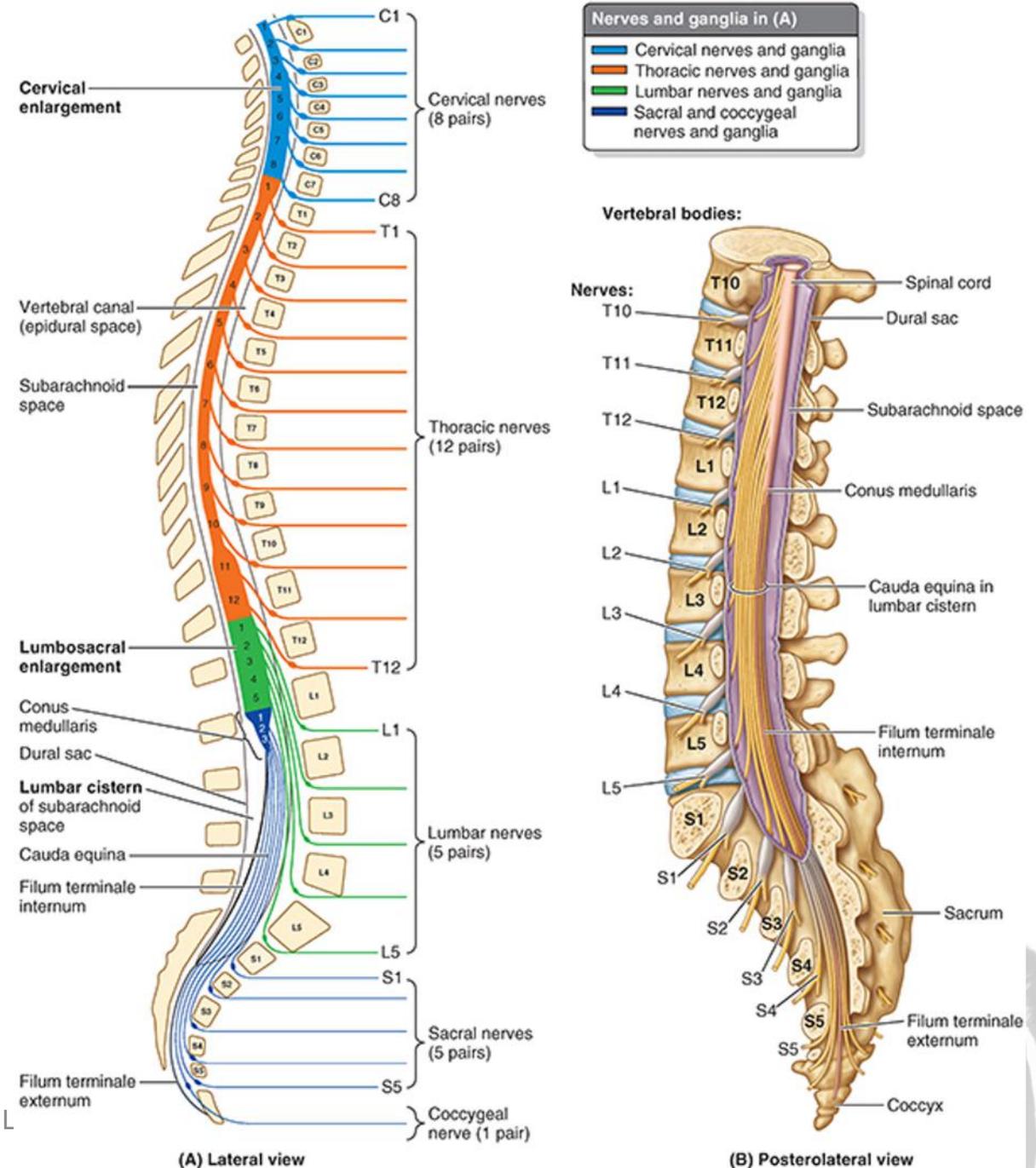


- Vertebrae are separated by intervertebral discs
 - Discs allow movement between vertebrae
- Vertebrae connect at facet joints
 - Facet joints control direction of movement between vertebrae
- Ligaments limit vertebral motion
- Muscles control vertebral motion



Spinal Cord

- The spinal cord has neuron cell bodies in it; cell bodies control nerve function
- The nerves have axons, which act like electrical cables to transmit signals
- The spinal cord ends at lumbar vertebra 2
- Below L2, nerves inside the spinal canal form the 'cauda equina' (horse's tail)



What is Spondylolisthesis?



- Also called “a Spondy”
- One vertebra slips forward on another
- Most spondy’s do NOT cause pain or symptoms
- Typically occurs in the low back
- Degenerative spondy occurs when the disc is weak or damaged
 - Typically older people, probably also zebras
- ‘Isthmic’ spondy occurs if there is a fracture in the vertebra
 - Typically in younger people, from intense exercise

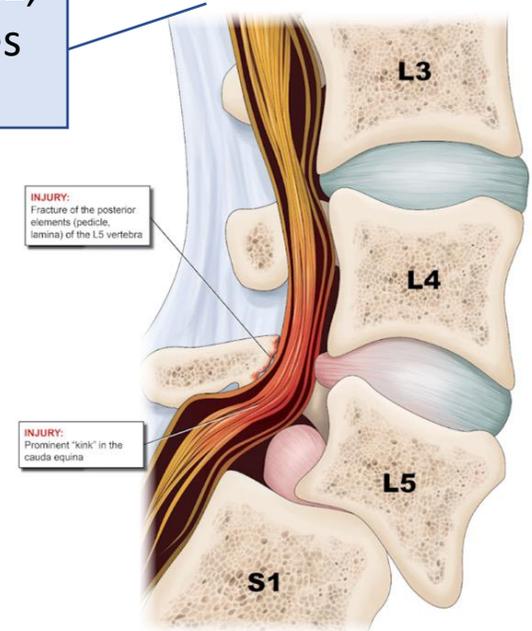


Spondylolisthesis

- X-ray findings are poorly correlated to pain
- The spinal canal in the lumbar spine has space
- Spinal cord has ended and only nerve roots here
- Symptoms, when present, include:
 - Buttock and posterior thigh pain
 - Back muscle spasm
 - Radiculopathy: compression of nerve root
 - Typically worse with standing upright, walking, lumbar extension
 - Cauda equina syndrome: buttock numbness, bowel/bladder, acute pain
 - If you have neurological weakness or abnormal reflexes, see a doctor

Nerve
root

Spinal cord ends at L2,
cauda equina nerves
are below



Colorized Interpretation of L5-S1 Spondylolisthesis Injury

<http://www.annamocatcat.com/2019/01/post-accident-injuries-of-lumbar-spine.html>



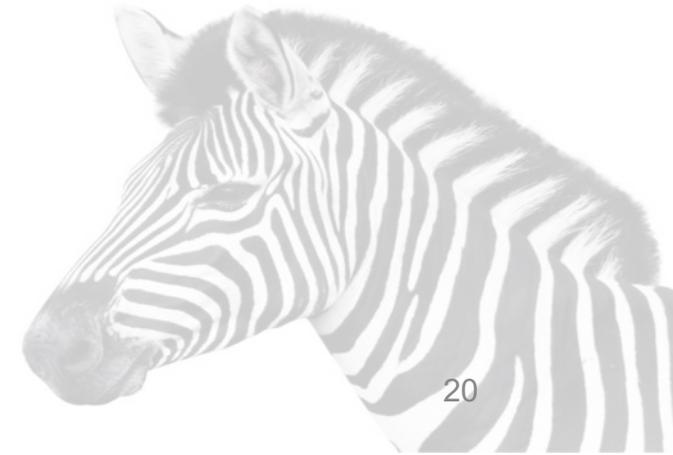
IMPORTANT!

- If you have a spondylolisthesis, it might or might not be causing your pain – most spondy's do NOT cause symptoms!
- Although the vertebra is not in the correct place, you are not 'broken'
- Many people with spondy's have pain due to functional instability
- Everything in this presentation would apply...
- You CAN learn to control functional instability

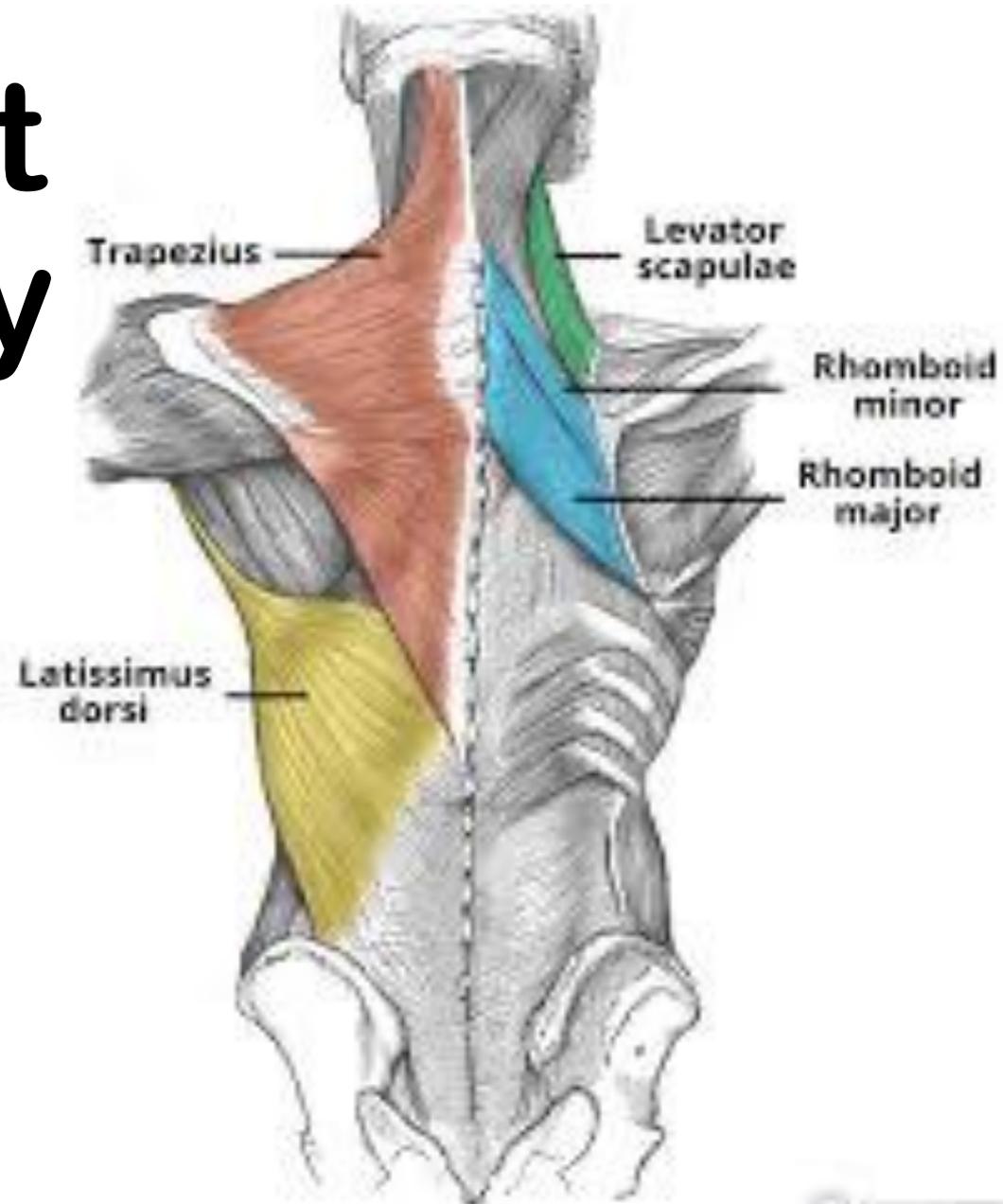




Questions?



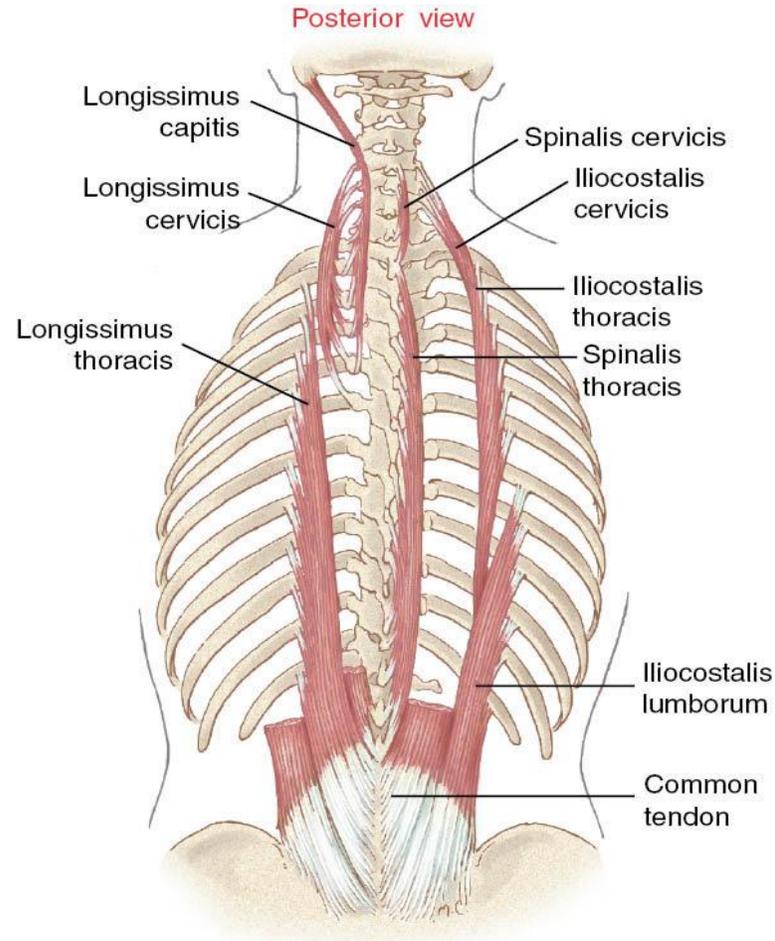
Relevant Anatomy



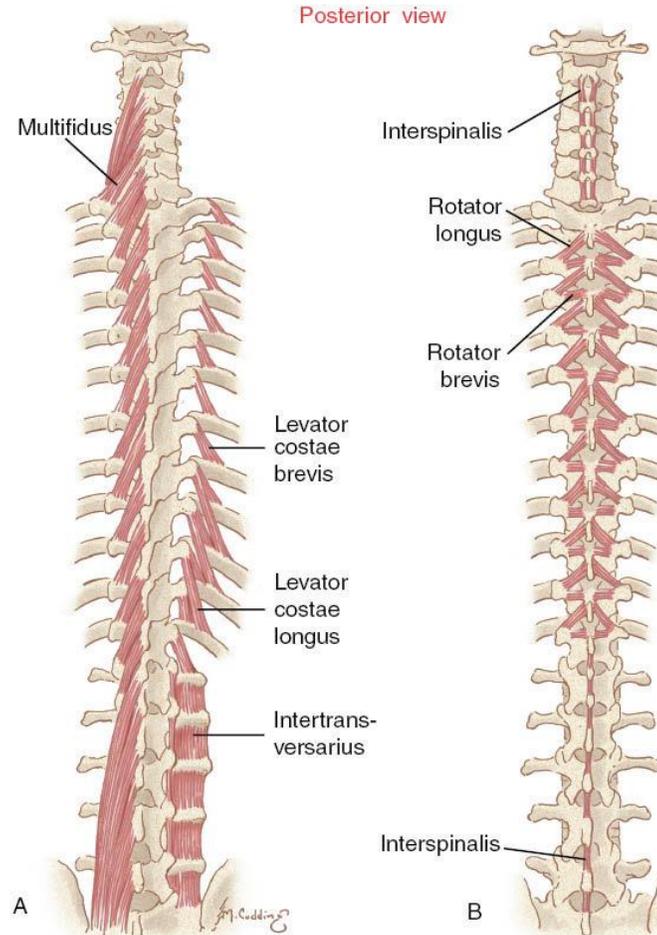
Russek - HSD 110: Lumbar Instability



Mobilizer vs. Stabilizer Spinal Muscles



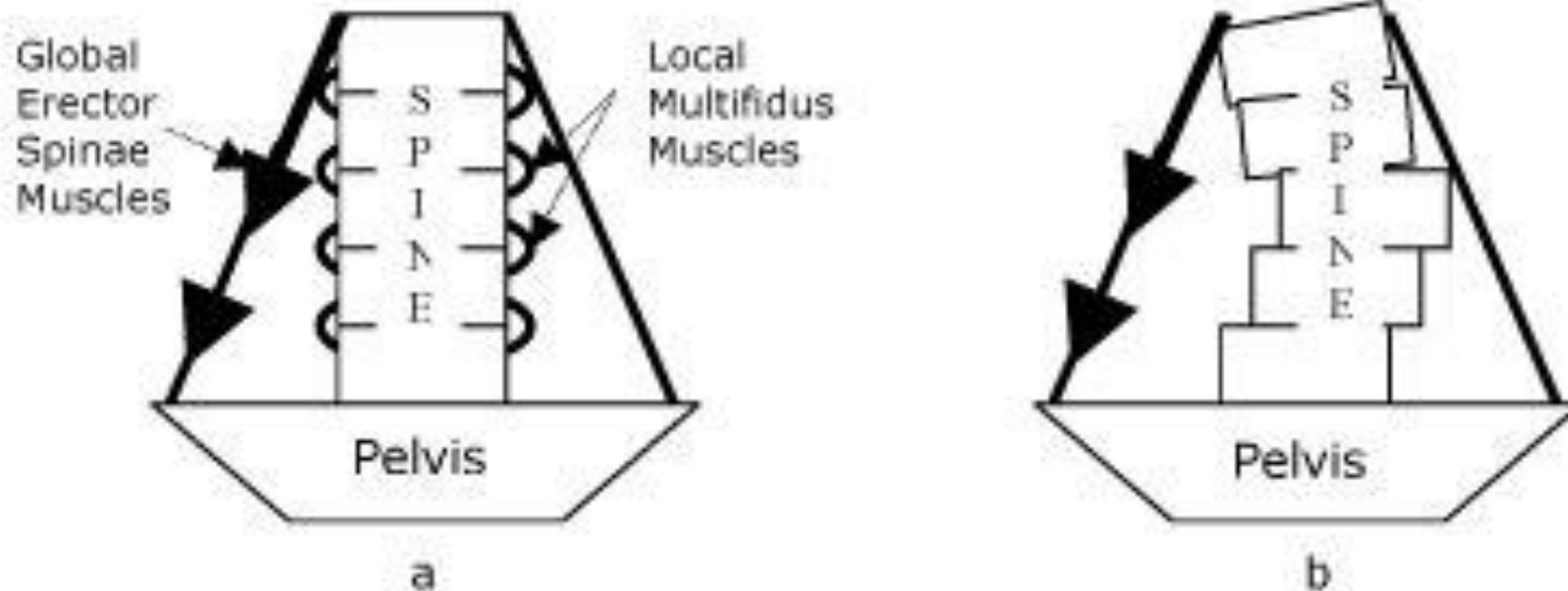
(Modified from Lutgens K, Hamilton N: Kinesiology: scientific basis of human motion, ed 9, Madison, Wis, 1997, Brown and Benchmark.)



(Modified from Lutgens K, Hamilton N: Kinesiology: scientific basis of human motion, ed 9, Madison, Wis, 1997, Brown and Benchmark.)



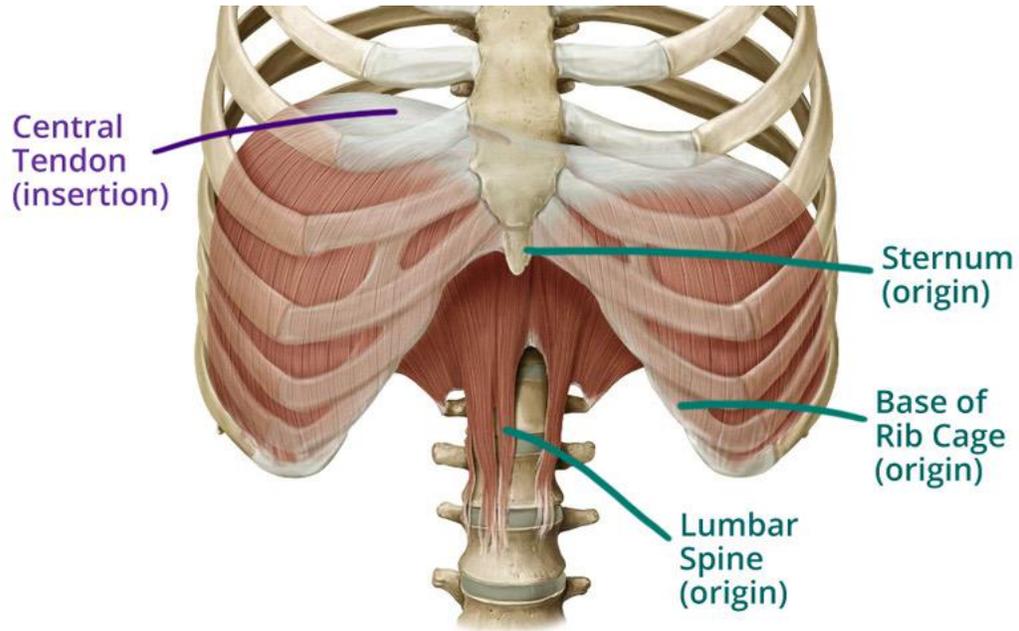
Core Stabilization Concept



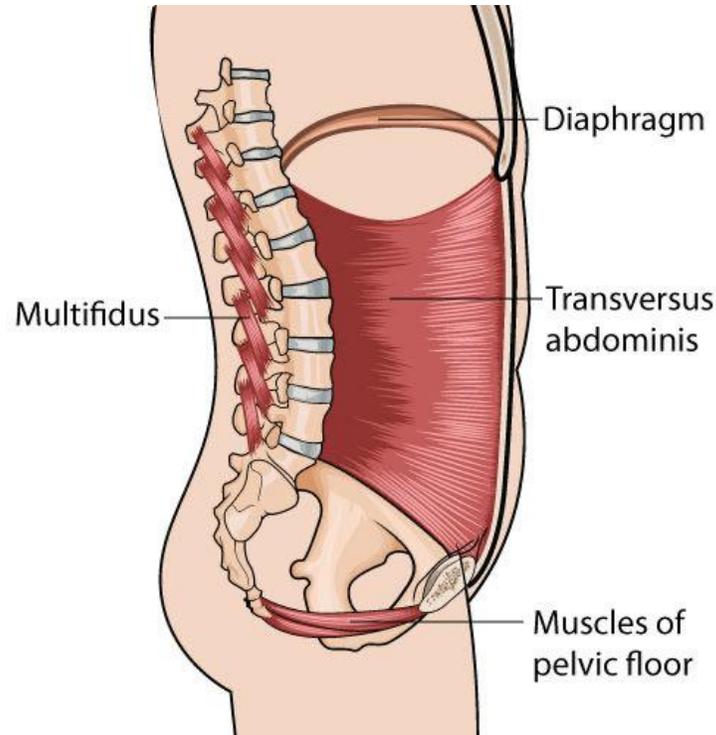
- Instability occurs when the short, deep, stabilizing muscles are not effective
- The long, superficial muscles try to help, but make instability worse
 - And cause pain through going into spasm

(picture from https://www.physio-pedia.com/images/d/dd/Ms_systems.jpg)

Other Stabilizing Muscles

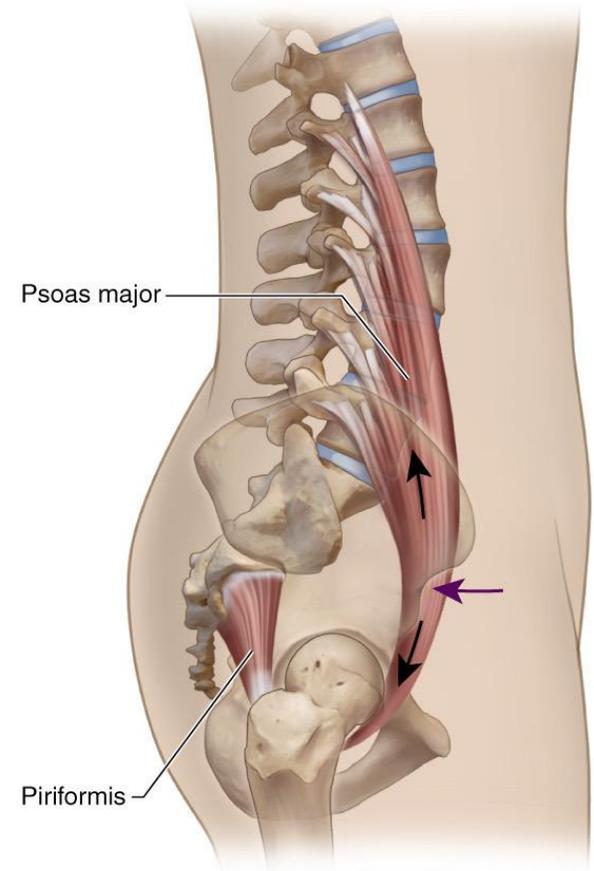


The Diaphragm — Origin & Insertion



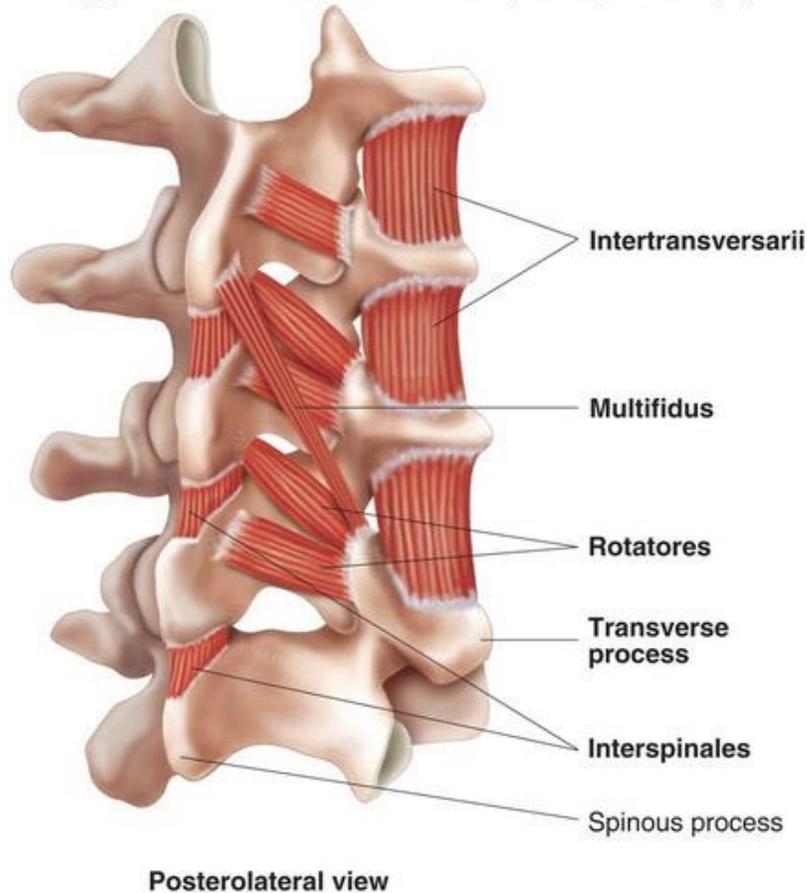
The Pelvic Floor

The Psoas



Body Awareness Role of Spine Muscles

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- Deep stabilizing muscles provide position and movement awareness in the spine
 - Rotatores muscles have 3x the number of position sensing nerves as other muscles!
- People with HSD/hEDS often have poor body awareness
- Treatment often needs to start with restoring this body awareness

• Russo, 2018

<https://brentbrookbush.com/articles/anatomy-articles/muscular-anatomy/rotatores-interspinales-and-intertransversarii/>

Russek - HSD 110: Lumbar Instability

When Muscles Don't Work Right...

- Local stabilizer dysfunction
 - (e.g., multifidi, transversus abdominus, psoas)
 - Are inhibited by pain
 - Leads to instability and poor segmental control
- Global stabilizer
 - (e.g., internal/external obliques, spinalis, gluteus medius)
 - Difficulty controlling movement
 - Often become weak and long
- Global mobilizer
 - (e.g., rectus abdominus, iliocostalis, piriformis)
 - Responds to pain by going into spasm
 - Tightness in these muscles causes imbalances elsewhere

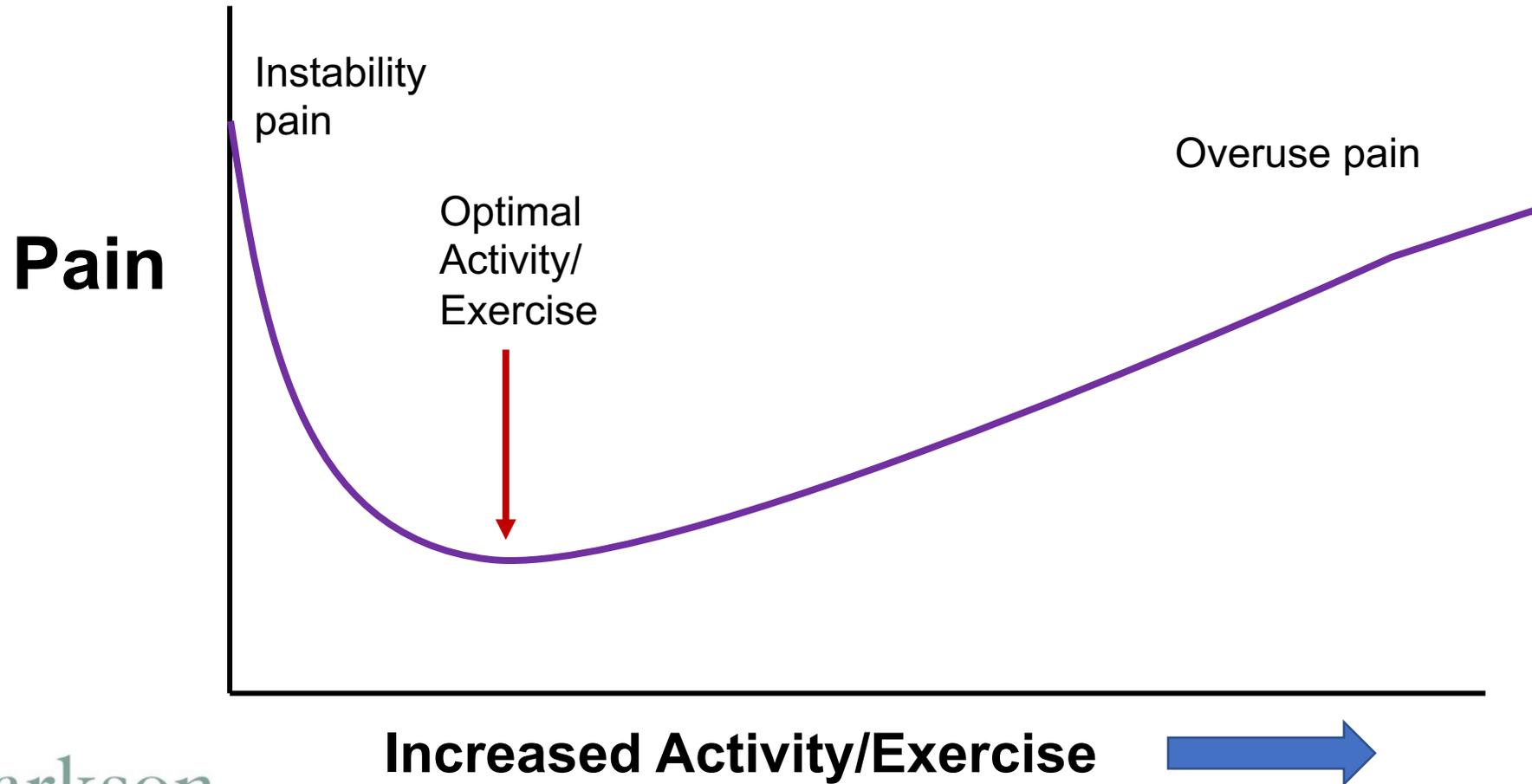


(Gibbons, 2001)

Managing Lumbar Instability



Proposed Exercise/Pain Relationship



Steps to Managing Lumbar Instability

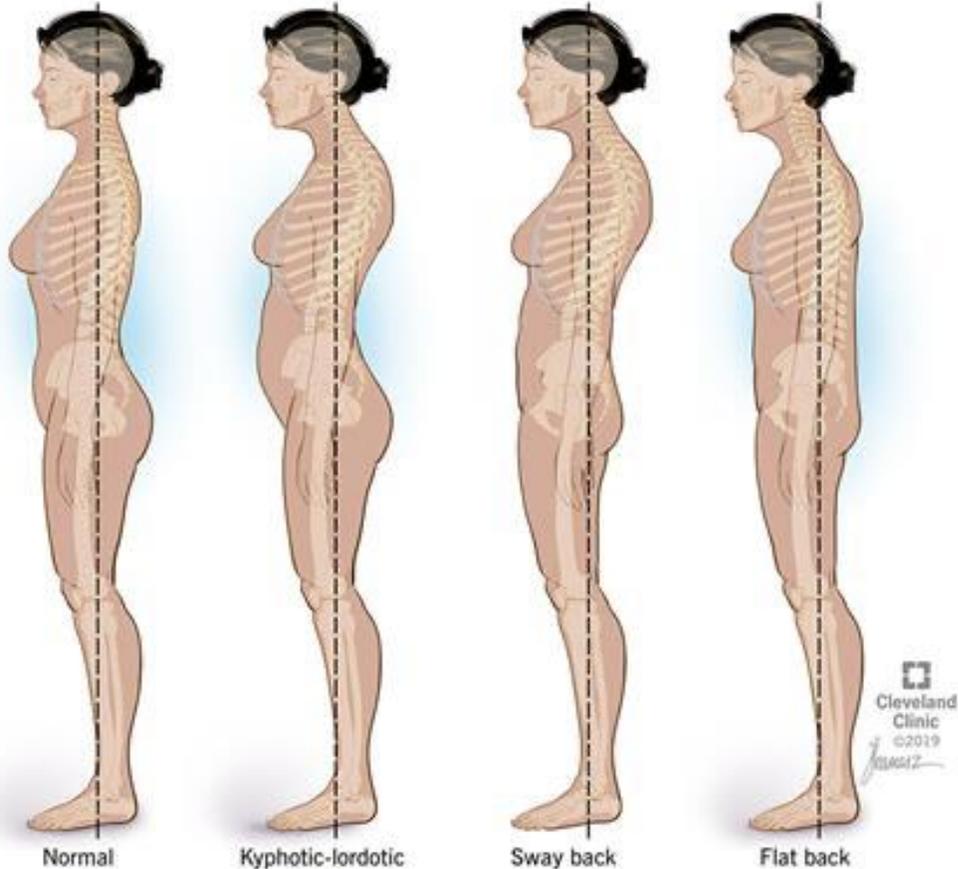
1. Learn and use good posture and body mechanics
2. Breathe correctly, using your diaphragm muscle
3. Calm your central nervous system if it is in overdrive
4. Train your body awareness (proprioception), especially in the spine
5. Learn to activate the correct muscles and not overuse the incorrect muscles (i.e., isolate the stabilizing muscles)
6. Strengthen core muscles safely
7. Use the correct muscles to stabilize during function



Posture

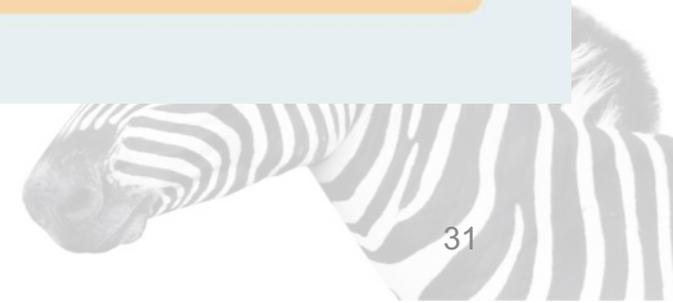
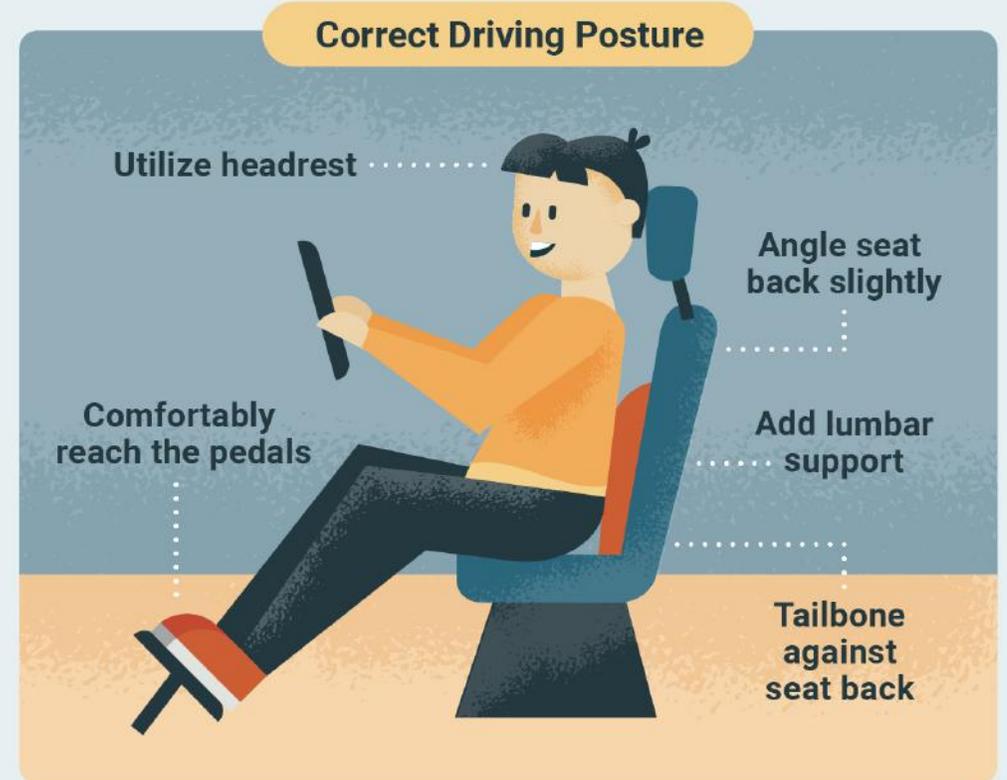
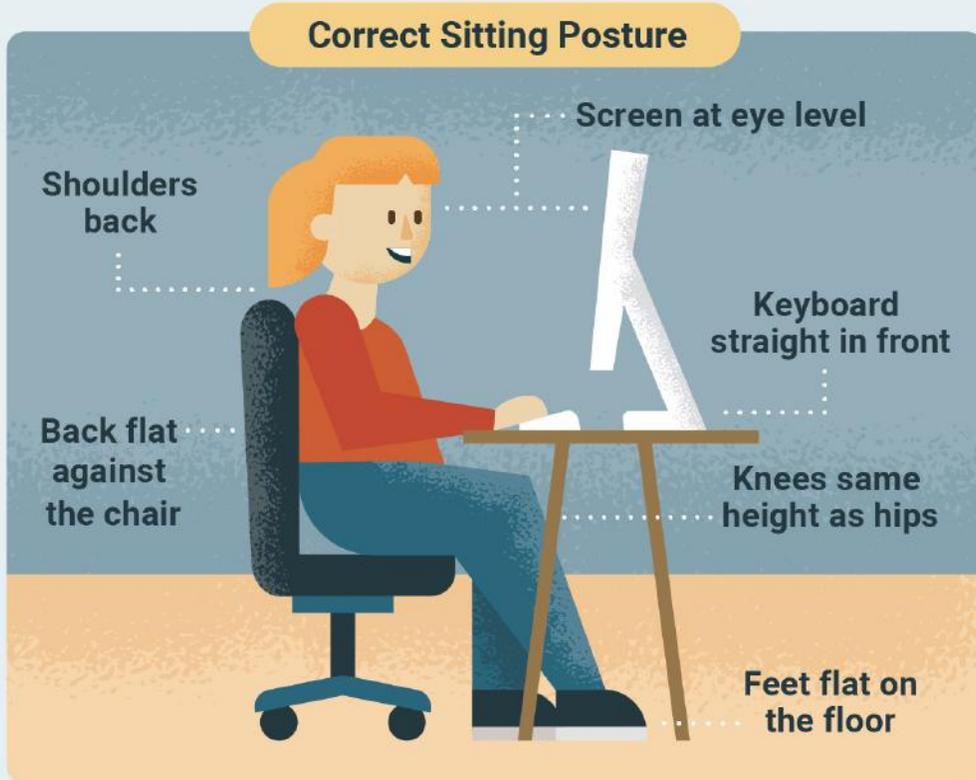
Posture handout

4 Common Postural Tendencies

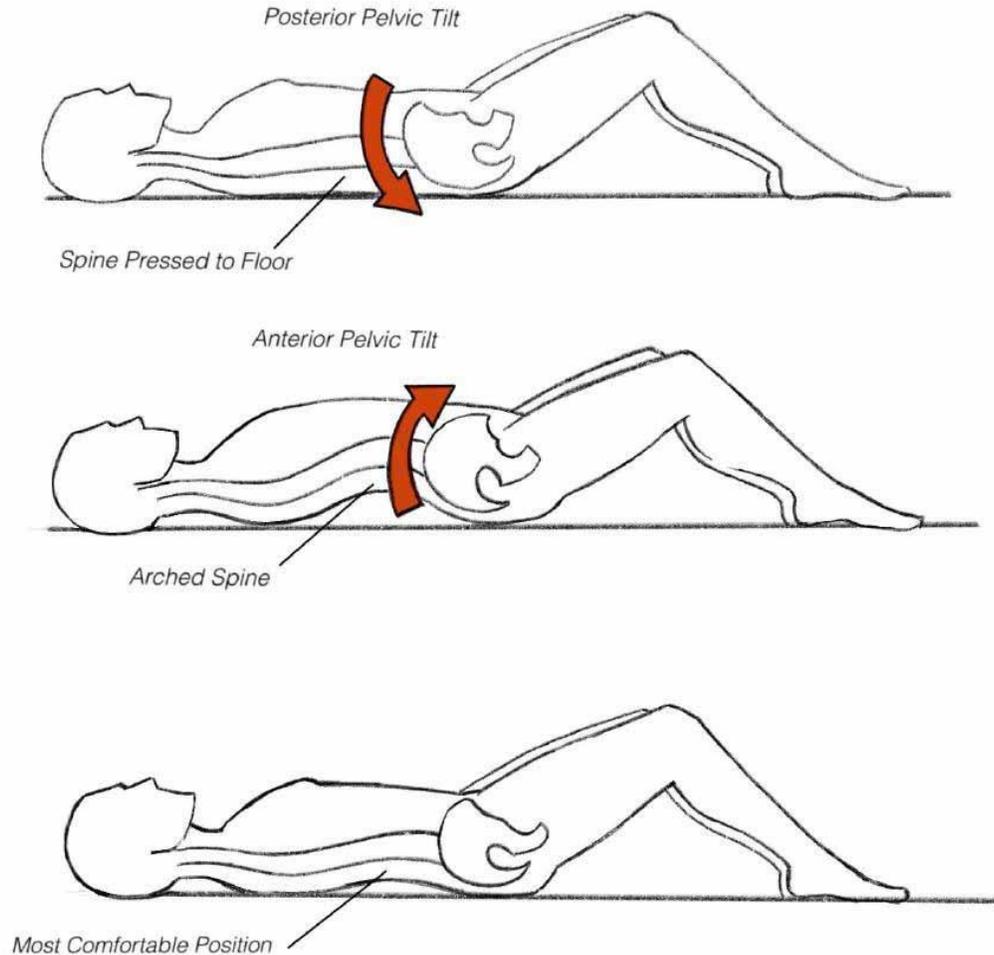


- Standing posture should have ankles, knees, hips, shoulders and ear aligned
- Your pelvis should be in 'neutral'
- Poor posture is often due to hanging on your ligaments
- This overstretches already stretchy ligaments
- It allows core muscles to become long and weak
- Increased arch in the low back increases lumbar instability
- Consider your feet, knees, hips and pelvis – these provide the foundation for the spine

Good Sitting Posture



Example: Finding Pelvic Neutral



- To find pelvic neutral, you need to be able to do anterior and posterior pelvic tilts
- Many hypermobile people have too much arch in their low back (lordosis)
- Lordosis is associated with anterior pelvic tilt
- Many people struggle to do a posterior pelvic tilt



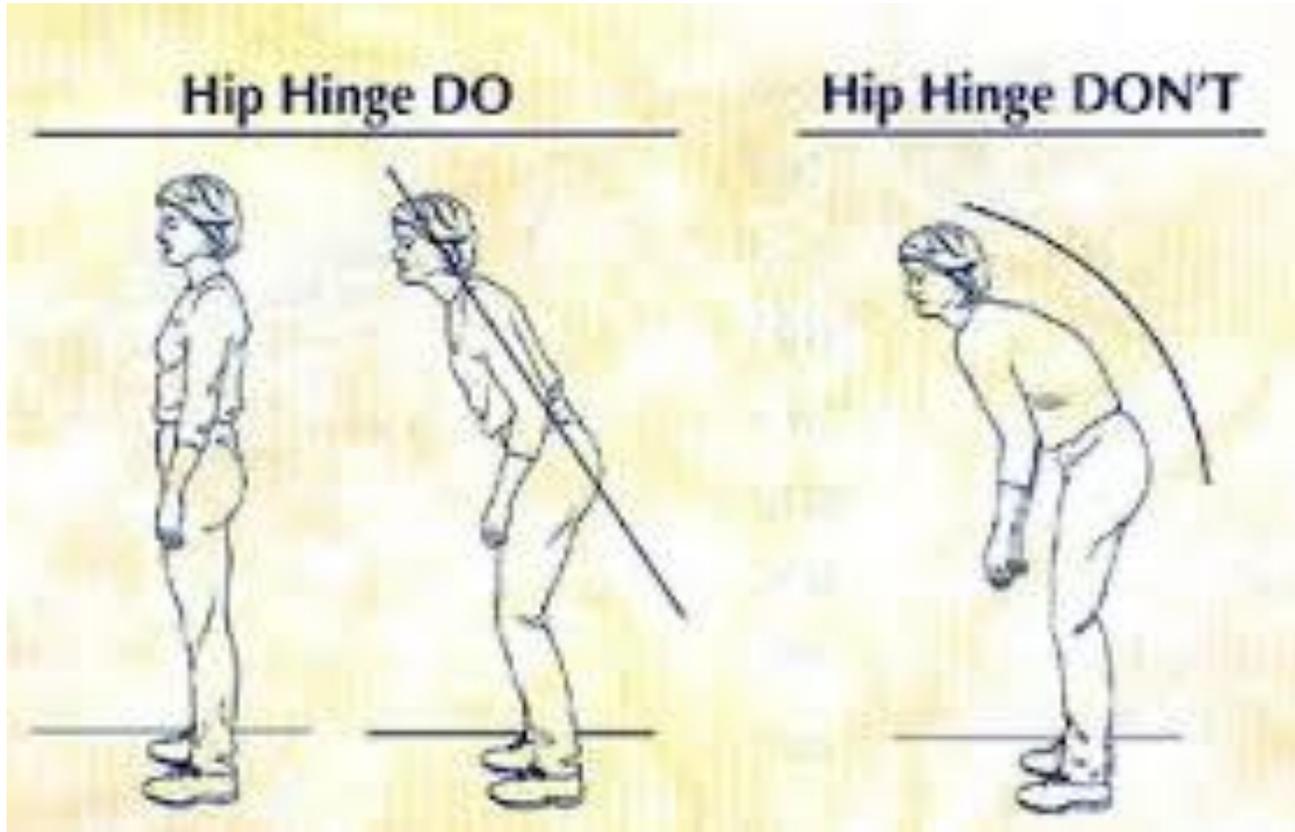
What You Can Do About Posture



Learn correct lumbar posture:

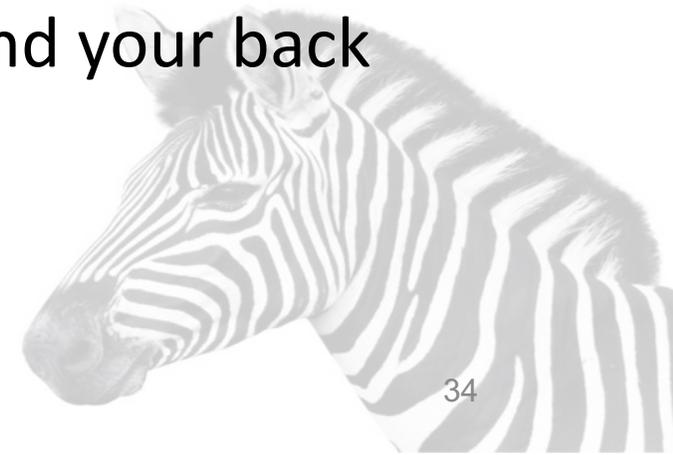
- Stand with your back to the wall, feet a few inches from the wall, knees very slightly flexed (not locked in extension)
- You should have just a finger's width of space between you and the wall.
- If you have too much space behind your back, drop your tailbone, and bring your back towards the wall.
- You should have a little arch for good posture
- <https://www.mayoclinic.org/healthy-lifestyle/adult-health/multimedia/back-pain/sls-20076817?s=4>

Use Good Body Mechanics

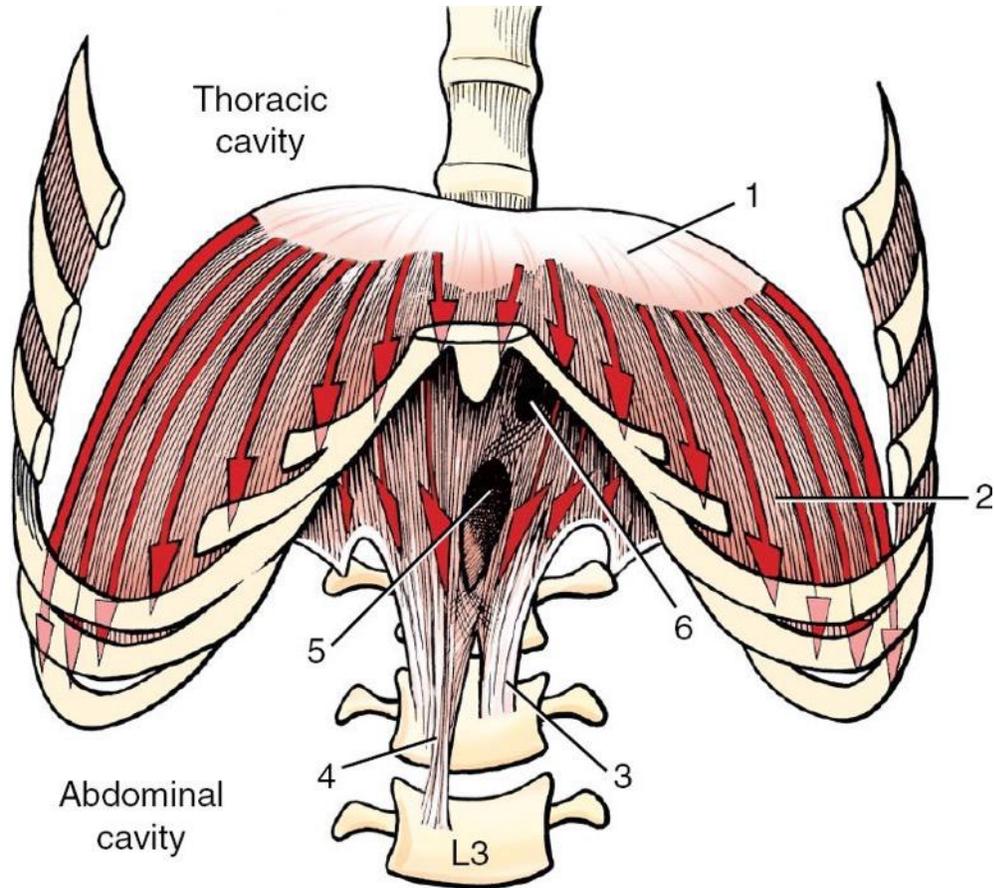


<https://physicaltherapyprescott.com/hip-hinge-a-natural-solution-for-low-back-pain/>

- For example...
- Use a 'hinge hip' movement when bending forward
- Keep hips, spine and head aligned
- Flex/hinge from the hip
- Do not round your back



Diaphragmatic Breathing

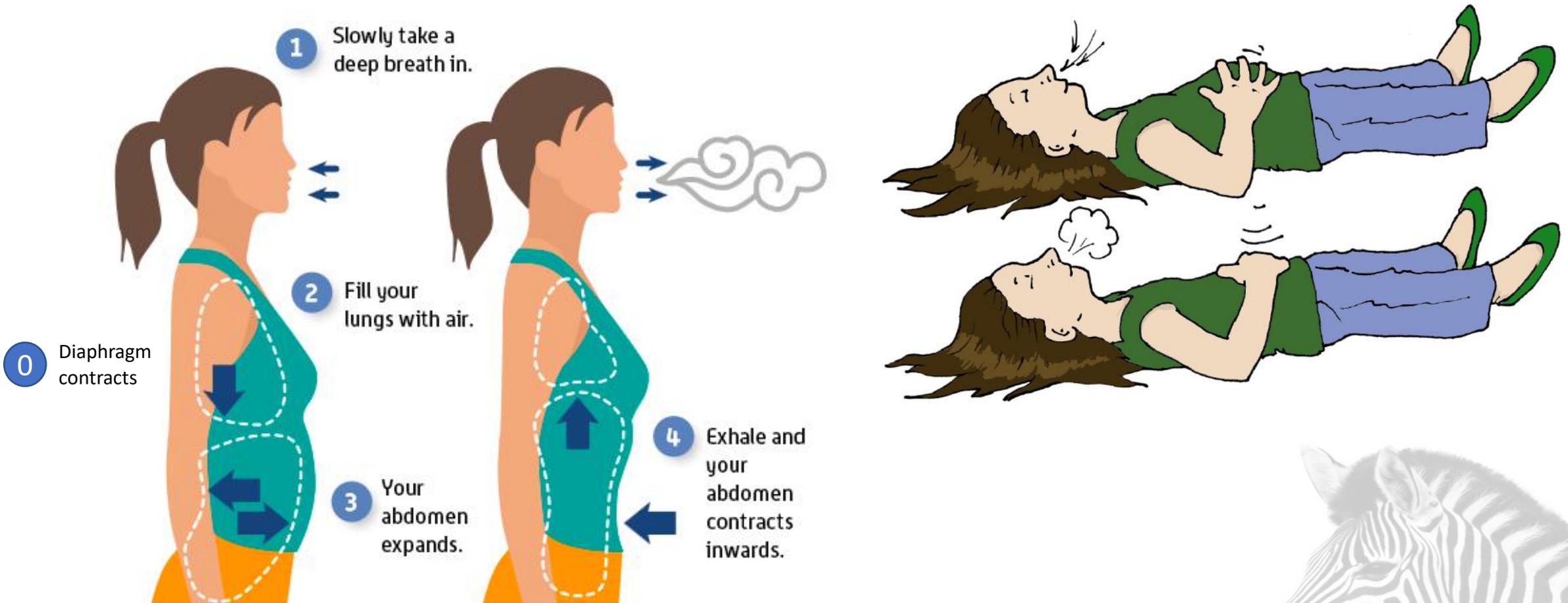


(Modified from Kapandji IA: *The physiology of joints*, vol 3, New York, 1974, Churchill Livingstone.)

- The diaphragm is the primary muscle for relaxed breathing
- The diaphragm coordinates with abdominal and pelvic floor muscles
- Together, these muscles stabilizes the lumbar spine
- Breathing exercises help strengthen abdominal and lumbar stabilizing muscles

(Fortin, 2021; Finta, 2014; Kocjan, 2017)

Diaphragmatic Breathing Practice



<https://onepointhealth.com.au/physiotherapy/the-what-why-how-of-diaphragm-breathing/>
<https://webstockreview.net/image/breath-clipart-relaxing/300073.html>

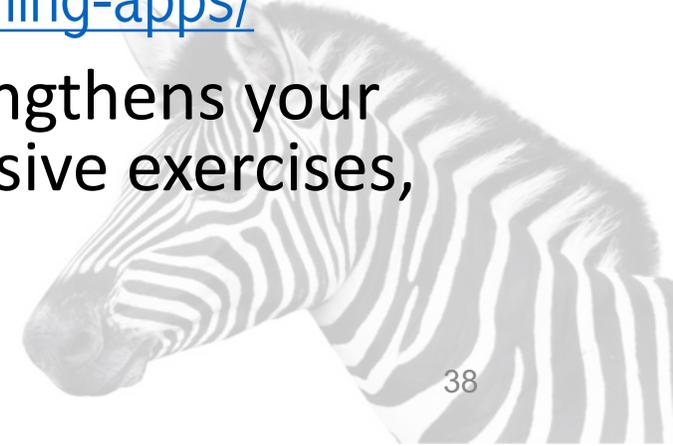
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How To Learn Better Breathing

HSD 109: Breathing

- Check whether you breathe with your belly or chest
 - Place a hand on belly and chest, and feel which moves
 - Do this both lying down and sitting up, as it can be different
 - Breathe slowly, 5 seconds in, and 5 seconds out (you might need to work up to this over a few weeks)
- You can strengthen your diaphragm more by placing a light weight on your belly while lying down.
- Review of breathing apps: <https://freeappsforme.com/breathing-apps/>
- Diaphragmatic breathing while sitting or standing strengthens your abdominal muscles... if you can't tolerate more aggressive exercises, start with breathing



Curable/Pain handout

Manage Central Sensitization



HSD103: Pain
HSD109: Breathing
HSD112: Vagus nerve

- The central nervous system (CNS) can become oversensitive
 - It is like “turning the volume up” on pain
 - It is abnormal function of the central nervous system (spinal cord or brain) resulting in increased pain experience
 - The nervous system can get “stuck” here through neuroplasticity
- Often aggravated by psychological and social factors such as stress, anxiety, etc. but it is NOT psychosomatic!
- You can decrease central sensitization



Strategies to Manage Sensitization

Pain Self-Care Plan

- Learn about ‘pain neuroscience’ to help you understand pain sensitization
- Identify what might be putting your nerves in overdrive – stress, poor sleep, anxiety, MCAS, etc.
- Do exercises that can calm your nervous system – e.g., diaphragmatic or slow breathing, yoga, Tai Chi, etc.
- Use other strategies to calm your nervous system: meditation, chanting, binaural music, vagus nerve calming





Questions?



Body Awareness (Proprioception)

- People with hypermobility typically have poor body awareness
- If you don't know where your spine is, you cannot control it
- You can train body awareness by using feedback – either a pressure feedback device, PT feedback, your finger tips, a mirror, etc.
- Once you know where your spine is, you can start to control it



Proprioception Training Options



Example of Proprioception Exercise



Stability ball exercises

- Sit tall on the ball, feet wide apart
- Increase challenge by:
 - Placing feet closer together
 - Closing your eyes
 - Moving your arms
- More challenging exercises with professional guidance



Motor Control Before Strengthening

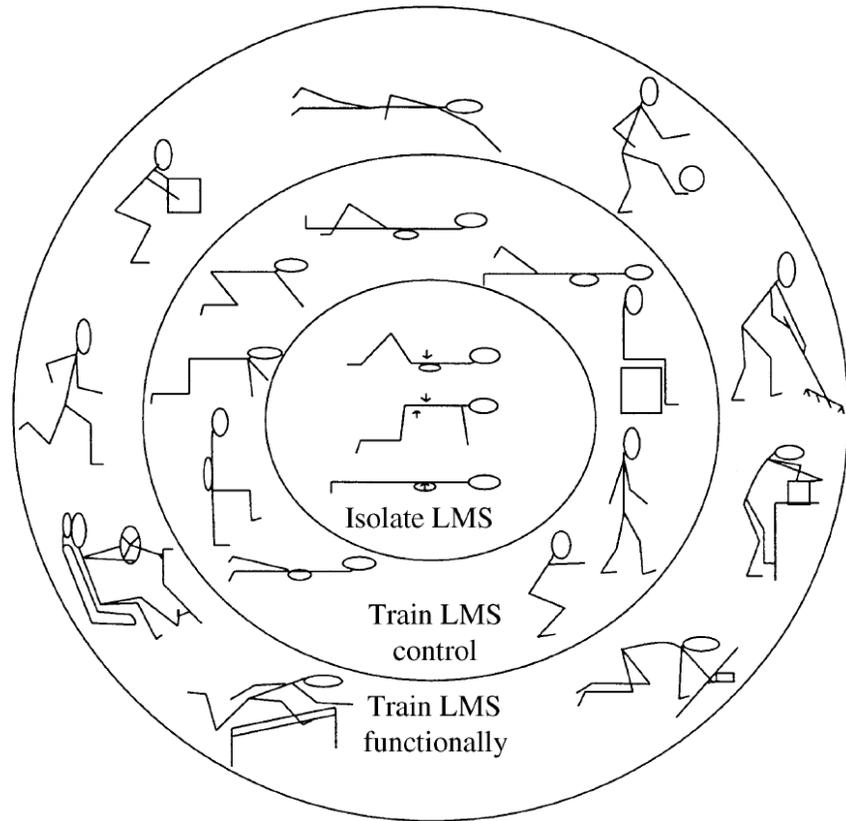


Fig. 12—Stages of rehabilitation based on a motor learning model (LMS – local muscle system). (Reproduced by kind permission of W.B. Saunders.)

- Motor control is about using the correct muscle, at the correct time, and the correct intensity
- Stabilizing muscles often ‘shut down’ when there is pain, and they often don’t come back
- Start by isolating stabilizing muscles
- Then teach them to control movement
- Finally integrate into function

O’Sullivan, 2000

Example: Finding Pelvic Neutral

- Find Neutral Pelvis: the middle between arched and flat back
- Set this to 40 mmHg using the Stabilizer™ or CoreCoach™ or use fingertips on pelvic bones to monitor to make sure pelvic doesn't move during the exercise



Example: Knee Fall-Out

- Start in pelvic neutral, 5-point alignment check
- Drop one knee out over 5 sec., starting with 2" movement
- Hold and perform 5-point alignment check,
- Return to neutral in 5 sec. while maintaining 40mmHg.
- Repeat x5 right, x5 left, x5 alternate, starting and stopping in neutral.



5 POINT POSTURE CHECK

To be performed during each of the **5 second holds**

1. Feet balanced equal weight distribution
2. Knees – hip width apart
3. Belly rise and fall
4. Ribcage still
5. Shoulders out of ears

For a Change of Pace...

Augmented Reality



- We think of stabilization exercises as being static
- However, moving the limbs on a stable core is also lumbar stabilization
- Augmented reality games like this (Whack-A-Mole, from Active Arcade™) encourages lumbar stability in a game format.
- Active Arcade™ is a free app.

“Ready, Set, Go”

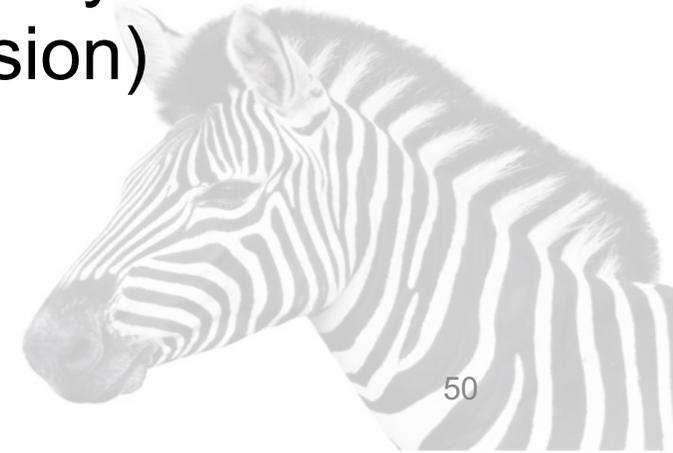


- Instability events often occur when we are relaxed
 - E.g., rolling over in bed, standing from a chair, turning...
- It can help to pre-activate the stabilizing muscles
 - **“Ready”**: be mindful that you plan to move
 - **“Set”**: pre-activate the stabilizing muscles (gently)
 - **“Go”**: move slowly and mindfully

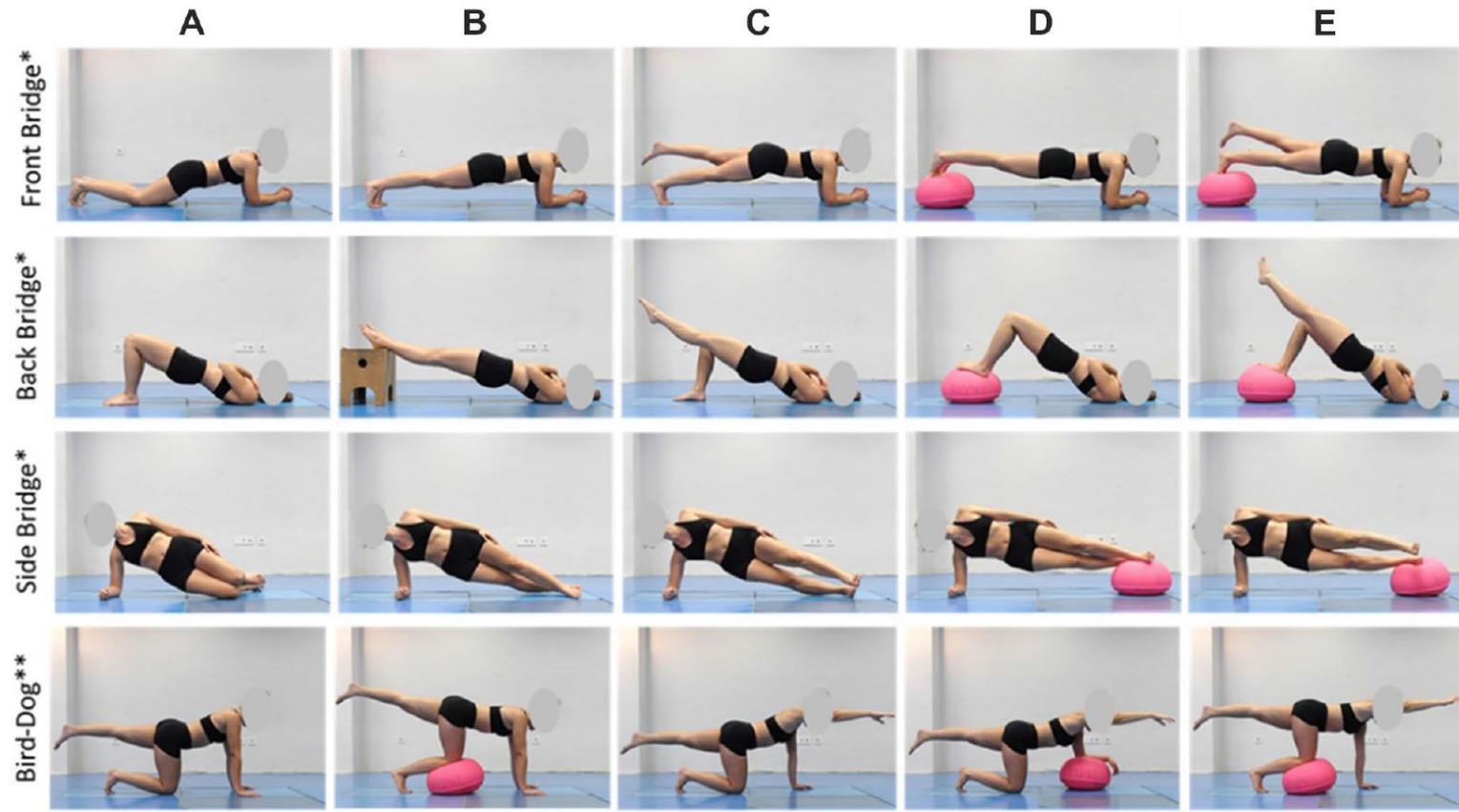


“Pull Yourself Together”

- People with HSD are like these push toys with the tension released (bottom picture)
- We need to “Pull ourselves together” so the joints are held in better alignment (top picture)
- This creates a slight, healthy stiffness in the joints (not rigid tension)



Progress Exercises Carefully!



- These ‘standard’ core stabilization exercises are too difficult for many zebras
- It may take you weeks to progress to the typical first exercise
- A PT can help you understand what exercises are safe for you



Vera-Garcia, 2020

Fig.1 Core stabilization exercises on two force platforms. *Variations of the front, back and side bridge exercises: A: short bridges; B: long bridges; C: bridging with single leg support; D: bridging with double leg support on a hemisphere ball; E: bridging with single leg support on a hemisphere ball. **Variations of the bird-dog exercise: A: three-point position with an elevated leg; B: three-point position

with an elevated leg and the contralateral knee on a hemisphere ball; C: classic two-point bird-dog position with elevated contralateral leg and arm; D: two-point bird-dog position with the forearm on a hemisphere ball; E: two-point bird-dog position with the knee on a hemisphere ball
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Motor Control Exercises Work

- Research shows that motor control exercises are more effective for people with lumbar instability than general fitness exercises.
(Frizziero, 2021; Saner, 2016)
- This is true for people with HSD/hEDS, as well. (Toprak-Celenay, 2017)
 - However, Beighton $\geq 5/9$ predicted poor response to lumbar stabilization program. (Lariviere, 2022)
- Not all 'core strengthening' exercises are motor control or stabilization exercises (e.g., 'crunches' can be harmful)
- Pilates can be as beneficial as PT-led exercise (Frizziero, 2021)
 - Jeannie Di Bon's Strengthen Your Hypermobility Core Pilates program and Zebra Club are very popular among people with hypermobility: <https://jeannedibon.com>



FREE 7 DAY TRIAL WITH FULL ACCESS



The Zebra Club

Begin your journey to safe, healthy,
pain-free movement with our app today



Note: Jeannie and I are friends and colleagues, but I have no financial interest in her program

Jeannie Di Bon's Zebra Club: Pilates specifically for people with hypermobility



In Summary...

- Lumbar instability is about muscle control, which you can change
 - Loose joints do not mean instability is inevitable!
- You can learn body awareness (proprioception)
 - But it often requires some type of external feedback
- You can learn to re-activate stabilizing muscles, but it is often difficult!
- It is very important that you do exercises correctly
 - The exercises need to be appropriate for you
 - You need to be activating the correct muscles
- It can really help to have an EDS-knowledgeable PT or movement specialist (e.g., Pilates instructor) on your team



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Thank
you!





Questions?

