SOMATIC MOVEMENT CENTER

FUNCTIONAL DISORDERS:
Idiopathic Scoliosis and Functional Leg Length Discrepancy

IDIOPATHIC SCOLIOSIS

What is scoliosis?

Scoliosis is a lateral curvature (side-bending) of the spine. A single curve in the spine is described as a C-curve. If the spine curves in both directions, it is described as an S-curve. If the degree of curvature is eleven degrees or more, it will be diagnosed as scoliosis.

Approximately 85% of scoliosis cases are classified as **idiopathic**, which means that the cause of the spinal curvature is unknown.

In cases of **congenital** scoliosis, the spinal curvature is a structural abnormality that is present at birth.

In cases of **neuromuscular** scoliosis, the spinal curvature is caused by a neurological or muscular disease, such as cerebral palsy, spinal cord trauma, muscular dystrophy, spinal muscular atrophy, spina bifida, neurofibromatosis, or Marfan syndrome.

What causes idiopathic scoliosis?

Many cases of idiopathic scoliosis are caused simply by chronically tight muscles pulling the spine out of alignment. This pattern of tightness may begin as a reaction to an injury or a functional habit.

The complex muscular patterns involved in idiopathic scoliosis

Scoliosis is never as simple as a single sideways bend or curve in the spine. People will always compensate or balance themselves out by developing other muscular patterns, like rotating to one side, arching their back, or rounding forward.

Some of the most important muscles involved in scoliosis are:

Internal and external obliques: The biggest, strongest muscles in the core that flex the spine laterally are the internal and external obliques. The obliques also rotate the spine, so any chronic tension in the obliques will likely create both a lateral curve and some degree of rotation.

Erector spinae group: This group of muscles travels from the base of the skull and cervical vertebrae all the way down to the pelvis, attaching to each vertebrae and rib. This group of muscles both laterally flexes the spine and extends it, meaning that it arches the back. So, chronic tension in these muscles can create both scoliosis and hyperlordosis.

Intertransversarii: These are small, short muscles that connect each individual vertebrae to the vertebrae above and below it in the cervical and lumbar portions of the spine. These little muscles laterally flex the cervical and lumbar spine. Since they are the deepest muscles in the neck and lower back, they are nearly impossible to touch or sense internally.

Quadratus lumborum (QL): Technically, the QL is the deepest abdominal muscle. The QL attaches our lowest rib to the top of our pelvis, and connects to the first through fourth lumbar vertebrae. This strong muscle laterally flexes the spine to either side, laterally tilts the pelvis (hikes the hips up one at a time), and helps to extend the spine. So, chronic tension in the QL not only contributes to lumbar scoliosis, but also to functional leg length discrepancy and hyperlordosis.

Latissimus dorsi: This is the broadest muscle of the back, spanning from the lumbar and lower half of the thoracic spine all the way to the upper arm just below the shoulder joint. The latissumus dorsi participates in many actions: extending, adducting, and medially rotating the shoulder, laterally flexing the spine, extending the spine, and even tilting the pelvis forward or to the side.

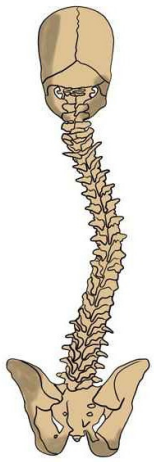
Transversospinalis group: These are small muscles in between each vertebrae, similar to the intertransversarii. But this group of muscles rotates and extends the spine, contributing to both scoliosis and hyperlordosis.

The most important thing to take away from this discussion is the fact that the muscular patterns involved in scoliosis can be very complex. All of the muscles in the core of the body, including some I haven't mentioned, can be involved in the lateral flexion, rotation, and extension or forward flexion of the spine, as well as in the compensatory patterns that people develop in order to balance themselves out.

The result of so many multi-functional muscles being involved is that idiopathic scoliosis typically involves lateral flexion to one or both sides, rotation to one or both sides, and either or both extension and forward flexion. Some people will hike one hip up higher than the other (functional leg length discrepancy), and some will pull one shoulder down or raise one up. Other people may have significant curvature in their spine, but their hips and shoulders will be perfectly even.

Working with idiopathic scoliosis

When working with idiopathic scoliosis, always remember that the student has muscle tension on both their right and left sides—just very different patterns of tension. **The "stronger" pattern, or their tighter side, is the one on the concave side of their curve.** This is the side that you should address first.



In this image of the spine from behind, the muscles on the left side of the torso are pulling the spine into a curve that is concave to the left.

Try to make your spine curve like the one in the picture, and you'll feel the muscles on the left side of your waist contract.

As with all conditions, it is most effective to address patterns of tension in the core of the body before moving outward. The lumbar spine is closer to the center of the body than the thoracic spine. So, **if your student has an S-shaped curve, begin by focusing on releasing the muscles that are causing the lumbar curve.** As the student begins to feel some release in those muscles, then they can begin to work with the muscles on the opposite side that are causing the thoracic curve.

Since the patterns of tension in scoliosis are so different from side to side, **it is very helpful to begin by spending more time working with the tighter side.** Your student can do more repetitions with their tighter side, or sometimes work only with their tighter side. When they stand up after practicing the exercises this way, their posture will feel unbalanced, but that's part of the learning and adjustment process that their nervous system needs to go through.

Make sure your student does the **Standing Awareness exercise** before and after every practice—this is a critical part of the process of adjusting their proprioception.

When your student does do the exercises on both sides, ask them to notice how each side of their body feels different. Ask them:

Can you sense your muscles more on one side than the other?
Are you using your muscles differently on each side?
Do you feel like you have more control on one side than the other?
Is one side tighter or looser than the other?

Then, your student can go back and forth from side to side, learning from their more coordinated side. If a movement feels easier or "right" on one side, tell your student to try to replicate that feeling and way of moving on their other side.

*I recommend having your student read the article “How to Fix the Imbalances in Your Body”: https://somaticmovementcenter.com/imbalances-body

The most effective exercises for idiopathic scoliosis

Since the patterns of tension in idiopathic scoliosis can be so complex—involving lateral flexion, forward flexion, extension, and rotation of the spine, as well as lateral tilting of the pelvis and elevation or depression of the shoulders—many exercises will be needed to fully address your student's pattern. Start slow and focus on the core of the body, and gradually work outward. The Side Curl is typically the most important exercise to do every day with the student's tighter side.

Arch & Flatten
Back Lift
Arch & Curl
Side Curl
Iliopsoas Release
Hip slides & Hip raises
Washcloth
Hip Circles
Hip Rotation
Flowering Arch & Curl
Lower Back Release
Proprioceptive Exercise 1
Scapula Scoops Part 1
Big X
Proprioceptive Exercise 2
Diagonal Curl
Proprioceptive Exercise 3
Steeple Movement
Seated Twist
Proprioceptive Exercise 4
Standing Hamstring Release
Hip Directions
Seated Hamstring Release
Breathing Exercises

FUNCTIONAL LEG LENGTH DISCREPANCY

What is functional leg length discrepancy (FLLD)?

Functional leg length discrepancy occurs when tight muscles laterally tilt the pelvis, making it appear that one leg is longer than the other.

What causes functional leg length discrepancy?

FLLD is very common—many people have it to some degree. Since virtually all of us are either right- or left-handed, we tend to use the dominant side of our body in different ways than our non-dominant side. Quite often, this imbalanced use of our body involves hiking one hip up or leaning more on one side, and over time, this results in a pattern of chronic muscle tension that causes FLLD.

FLLD may also be diagnosed as lateral pelvic tilt or pelvic torsion.

The muscular patterns of functional leg length discrepancy

At the root of FLLD is chronic tightness in the quadratus lumborum, internal and external obliques, and iliopsoas. These are all strong core muscles that laterally tilt the pelvis and provide essential core stability in full-body movements. Since we use them so much, it's very easy for them to become chronically tight as a result of overuse and imbalanced movement patterns.

In FLLD, other back muscles that laterally flex the spine (bend the spine to one side) will likely be tight as well, including the longissimus, iliocostalis, and latissimus dorsi. If the lateral spinal flexion progresses to more than 11 degrees, it may be diagnosed as scoliosis.

When someone is hiking one hip upward, they will likely compensate for this misalignment by shifting other parts of their body out of alignment. For example, when someone hikes their right hip up, they will shift their weight to their left side. Most likely, the left side of their rib cage will then tilt downward toward their left hip. So, the muscles on the right side of this person's waist are tight, hiking their right hip upward; while the muscles on the left side of their waist are tight as well, but they are pulling the left side of their rib cage downward.

It is also very common to have some rotation of the hips, pelvis, and spine along with FLLD. For example: When someone is standing with more weight on one side than the other, they can easily develop lateral (outward) rotation on one side and compensating medial (inward) rotation on the other. They might inwardly rotate the hip that they tend to lean on, and outwardly rotate the hip that they're hiking up. Their gluteal muscles will likely become tight on both sides as a result of this rotation, because different parts of the gluteal muscles rotate our hips inward and outward.

In this pattern of rotation, the internal rotators and adductors (the muscles on the inside of the thighs that pull the legs together) will become tight on the side that the person is leaning on and rotating inward. These muscles attach to the bottom of the pelvis, so they can pull the pelvis downward on that side, exacerbating the overall pattern.

If the lower hip is inwardly rotated, the tensor fascia latae on that side will become tight, creating tension in the iliotibial band. This tension, along with increased body weight being put on this side, can easily lead to knee problems.

Pelvic torsion also commonly occurs with FLLD. This describes the misalignment of the pelvis when one side is tilted forward and the other is tilted backward.

The pelvis can also be rotated on the transverse plane (imagine a Lazy Susan). So, one hip might be pulled forward while the other is pulled backward. This rotation can continue up the spine; the obliques, multifidi, and rotatores will become tight, rotating the vertebrae and leading to adjustments in the upper body. One shoulder may be pulled backward and the other forward; one shoulder may be pulled downward and the other upward; and the head may be turned or tilted to one side.

Conditions caused by or related to functional leg length discrepancy

Due to the way that people subconsciously adjust their posture and movement to accommodate functional leg length discrepancy, uneven stress can be put on many parts of the body, leading to the following conditions:

- Hip problems, including pain, tendinitis, bursitis, and osteoarthritis
- Iliopsoas syndrome
- Snapping hip syndrome
- Knee problems, including pain, tendinitis, bursitis, osteoarthritis, and recurring injuries
- Iliotibial band syndrome
- Stress fractures
- Ankle problems, including pain, tendinitis, and recurring injuries
- Bunions
- Foot pronation or supination
- Lower back pain
- Idiopathic scoliosis
- Sciatica
- Disc degeneration
- Tightness and pain in the neck and shoulders

Working with functional leg length discrepancy

Working with FLLD is similar to working with idiopathic scoliosis. First, identify which hip is higher. While both sides of the waist and back are tight in FLLD, they are tight in different ways. Your student will likely experience better results if they focus first on releasing the muscles that are hiking their higher hip upward; we'll call this their tighter side.

Instruct your student to do more repetitions with their tighter (higher hip) side, or to sometimes work only with their tighter side. When they stand up after practicing the exercises this way, their posture will feel unbalanced, but that's part of the learning and adjustment process that their nervous system needs to go through.

Make sure your student does the **Standing Awareness exercise** before and after every practice—this is a critical part of the process of adjusting their proprioception.

When your student does do the exercises on both sides, ask them to notice how each side of their body feels different. Ask them:

> Can you sense your muscles more on one side than the other?
> Are you using your muscles differently on each side?
> Do you feel like you have more control on one side than the other?
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Then, your student can go back and forth from side to side, learning from their more coordinated side. If a movement feels easier or "right" on one side, tell your student to try to replicate that feeling and way of moving on their other side.

*I recommend having your student read the article "How to Fix the Imbalances in Your Body": https://somaticmovementcenter.com/imbalances-body

The most effective exercises for functional leg length discrepancy

While the Side Curl and Proprioceptive Exercise #2 will likely be the most important exercises to do every day, it is also important to address tightness in the lower back and hip rotators and adductors.

> Arch & Flatten
> Back Lift
> Arch & Curl
> **Side Curl**
> One-sided Arch & Curl
> Iliopsoas Release
> Hip slides & Hip raises
> Diagonal Arch & Curl

Washcloth
Hip Circles
Hip Rotation
Lower Back Release
Big X
Proprioceptive Exercise 2
Hamstring Release
Gluteal Release
Diagonal Curl
Iliotibial Band Release
Standing Hamstring Release
Hip Directions
Seated Hamstring Release