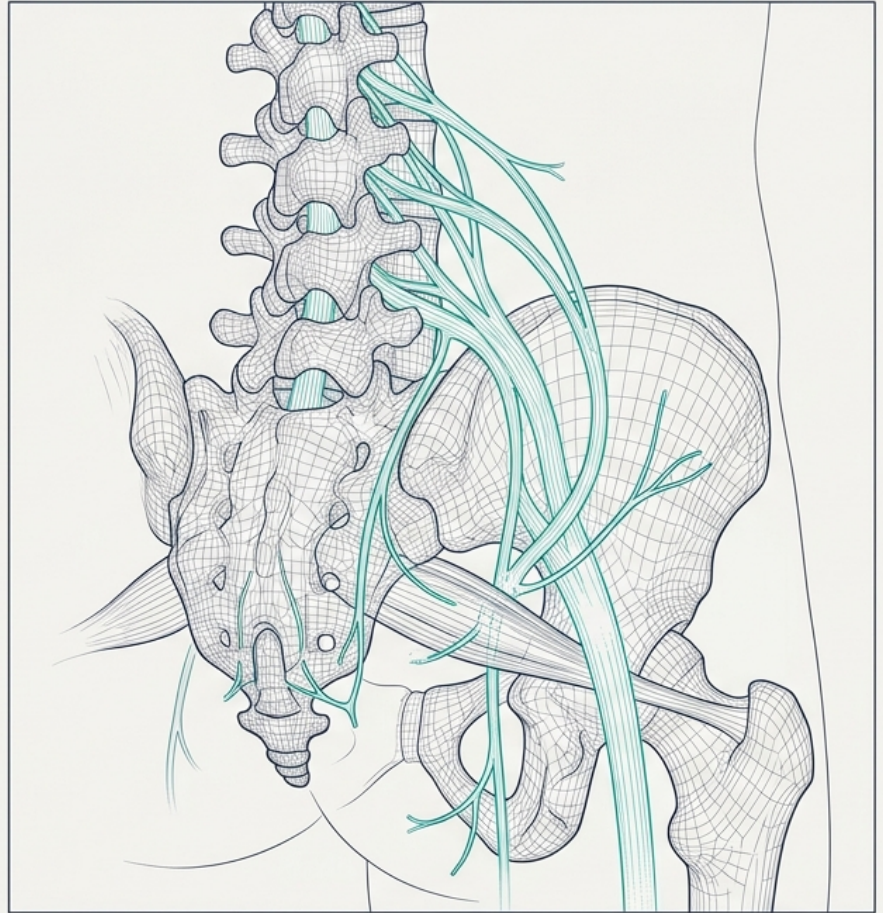


# Sciatica and Related Conditions Through an NMFS Perspective

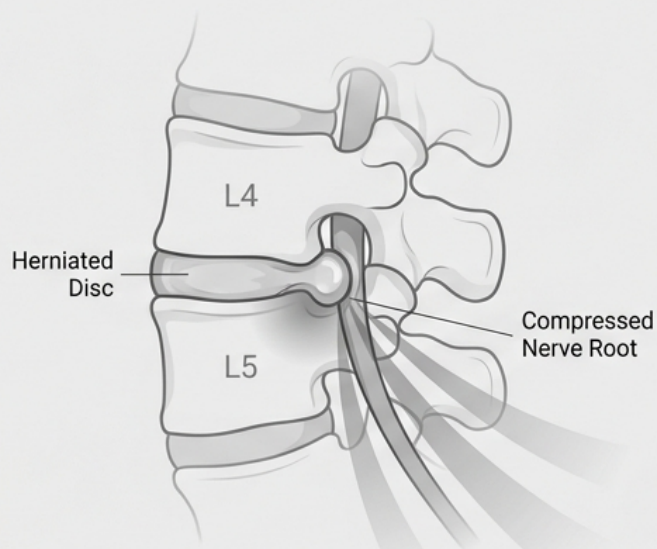
Exploring myofascial, biomechanical, and motor-unit contributors beyond classical nerve-root pathology.

A subgroup-based model integrating classical neurology with Neuromyofascial Science.



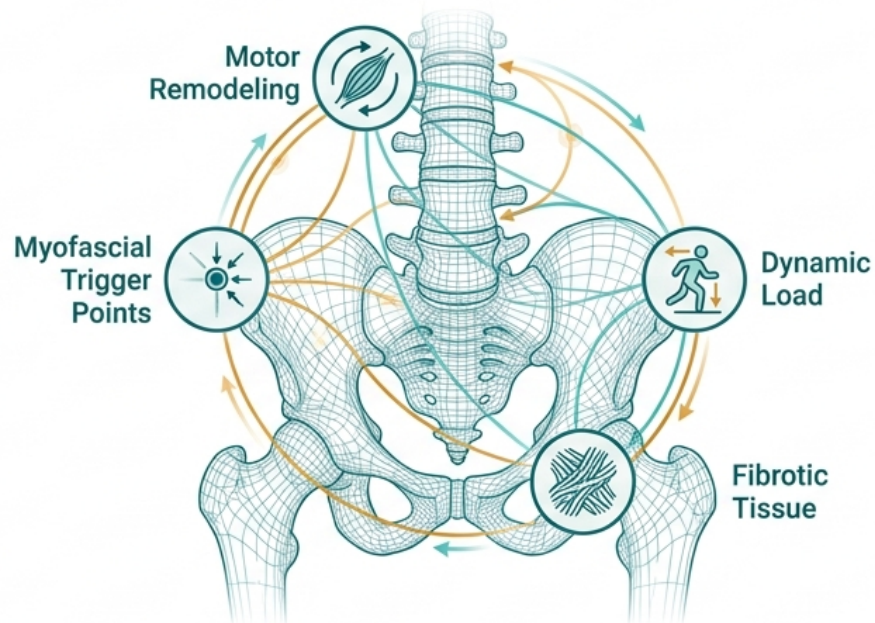
# Does a static MRI fully explain persistent lower-limb radiculopathy?

## The Classical Baseline



A herniated disc structurally compresses the L4-L5 or L5-S1 nerve root, referring severe pain, numbness, or tingling into the leg and foot.

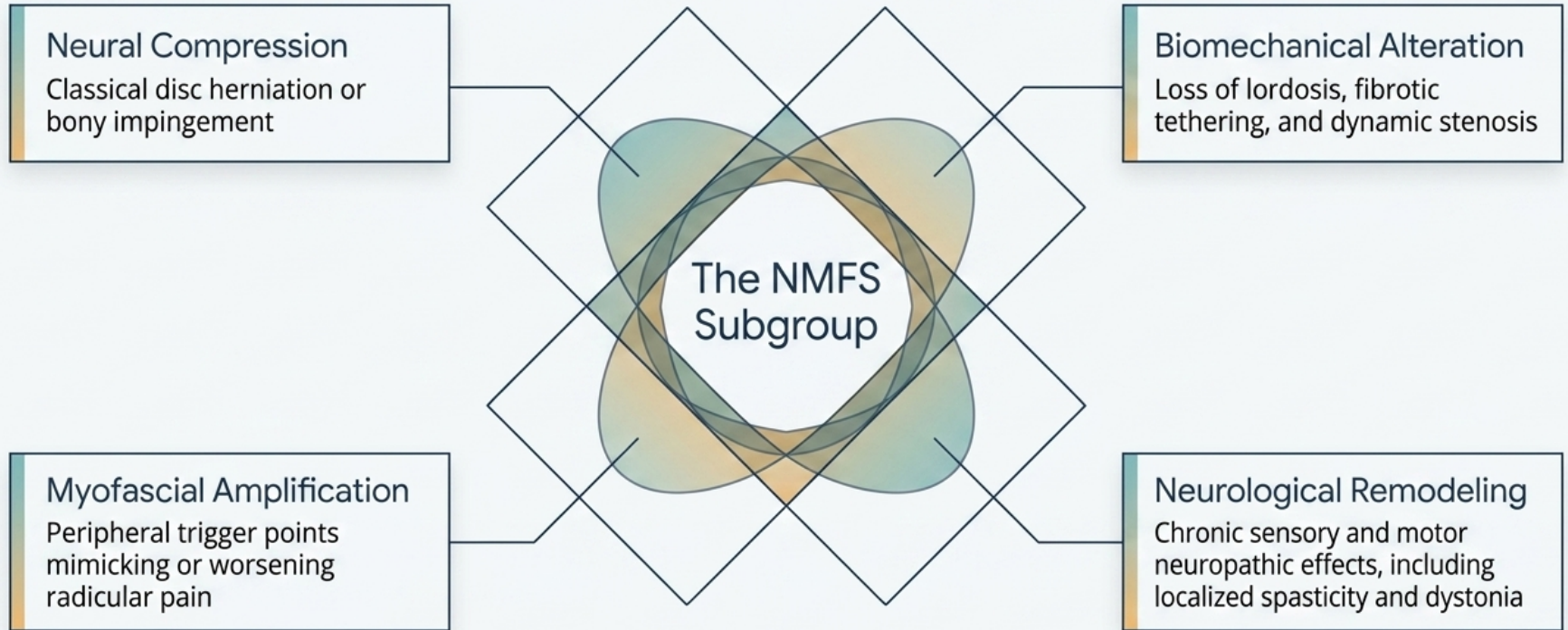
## The Clinical Reality



Symptoms, disability levels, and treatment responses frequently vary from, or persist despite, static MRI findings.

**The Diagnostic Question:** Can persistent sciatic syndromes reflect a broader, **integrated neuromyofascial process** in specific patient subgroups?

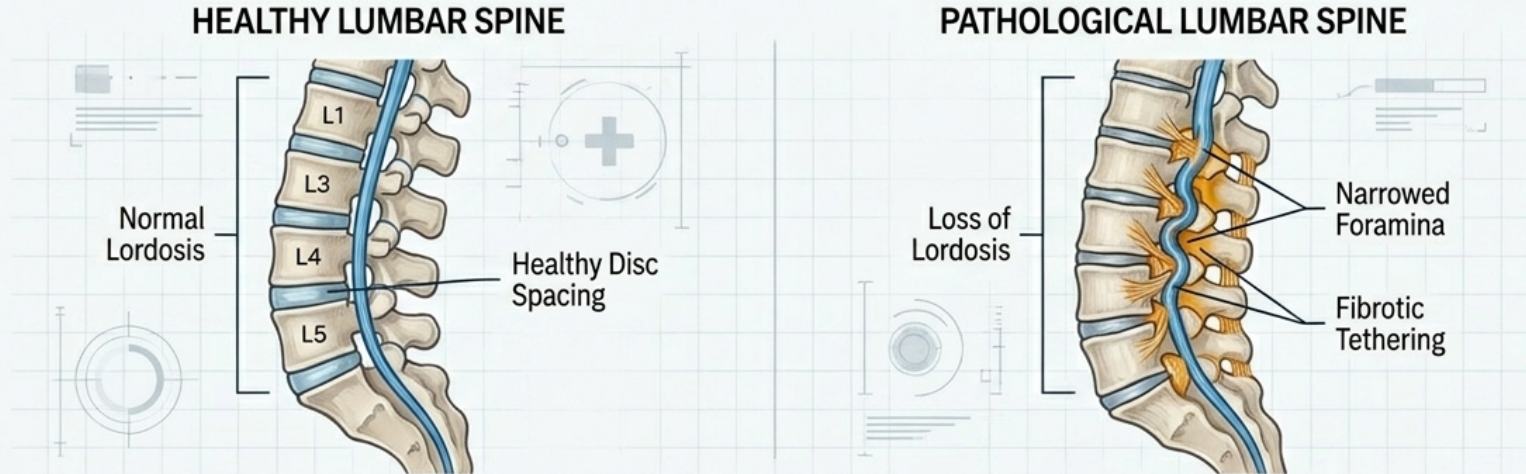
# A subgroup model integrating classical neurology with Neuromyofascial Science



# Contrasting the classical diagnostic lens with the NMFS subgroup model

Feature	Classical Model	NMFS Subgroup Model
Primary Lesion	Static Disc/Bone Compression	Multi-level (Disc + Myofascial + Mechanics)
Symptom Driver	Sensory nerve irritation	Neural irritation + Trigger Point amplification
Motor Deficits	Late-stage gross weakness	Chronic motor-unit remodeling (clumsiness, heaviness)
Diagnostic Focus	Static supine MRI	Clinical exam, dynamic load, myofascial mapping

# Fibrotic tissue and altered posture actively tether the neural pathway



## 1. Old Injury

Trauma initiates neuromyofascial pathology, leaving behind scar tissue and fibrosis.

## 2. Structural Shift

Fibrotic changes tether spinal segments, fundamentally reducing segmental mobility.

## 3. Loss of Lordosis

The natural lumbar curve straightens, altering articulation and vertebral pressure.

## 4. Neural Tension

Abnormal mechanics subject exiting nerve roots and peripheral pathways to persistent compression or tension.

# Peripheral trigger points mimic and amplify radicular nerve pain



## 1. The Mechanism

Peripheral trigger points form in response to chronic neuropathy, acting as symptom amplifiers that mimic or compound radicular pain.

## 2. Diagnostic Interference (Saeidian et al., 2014)

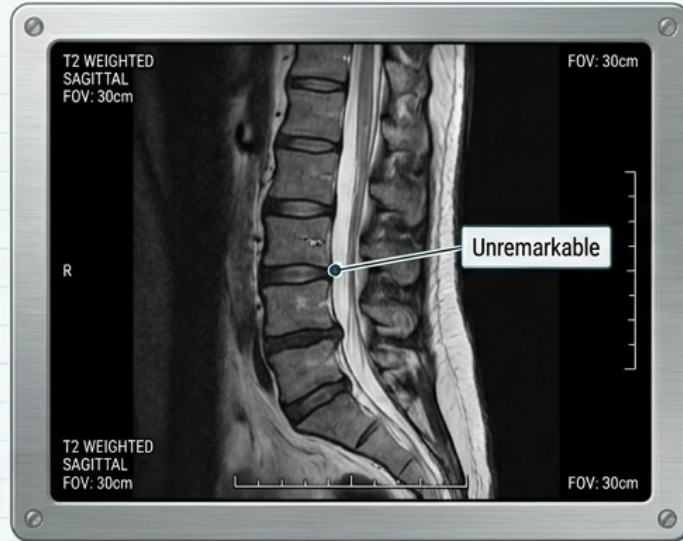
Active trigger points are highly prevalent in lumbosacral radiculopathy subsets; localized injections significantly improved pain outcomes.

## Therapeutic Response (Rajan & Gurudut, 2023)

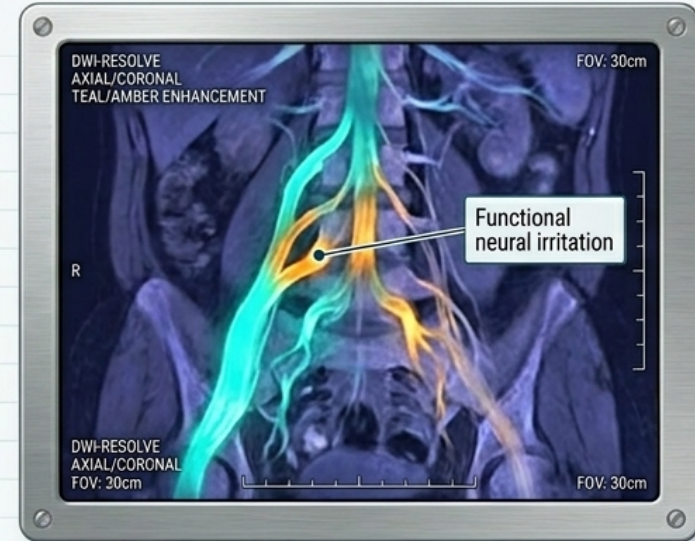
RCT demonstrating that targeting trunk and leg myofascial tissue improves radicular symptom burden, pressure pain threshold, and lumbar flexion.

# Reverse-engineering the symptom pattern beyond static imaging

STATIC SUPINE MRI (LUMBAR SPINE)



3T MR NEUROGRAPHY (DWI-RESOLVE)



## The Diagnostic Challenge

Neutral, supine MRI provides a structural snapshot but frequently misses functional neural irritation.

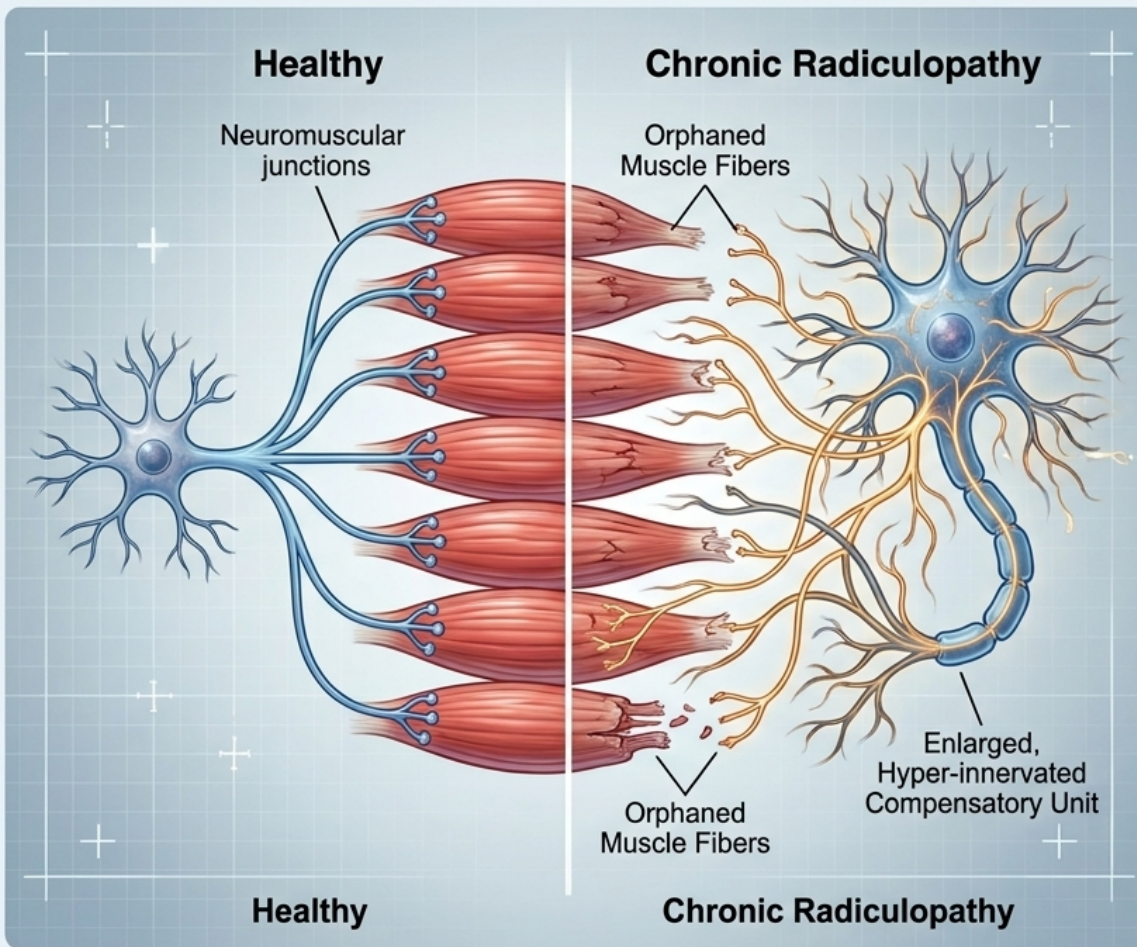
## Clinical Primacy (Vroomen et al., 2002)

Diagnostic accuracy studies reinforce that history and structured physical examination remain vital for accurate nerve-root diagnosis; sciatica is a clinical pattern, not just an MRI label.

## Advanced Detection (Abdulaal et al., 2021)

DWI-RESOLVE MR Neurography successfully localizes nerve abnormalities matching patient symptoms precisely where standard imaging falls short.

# Chronic radiculopathy drives explicit motor-unit remodeling



## The Symptom Profile

Patients frequently report a heavy leg, progressive clumsiness, or episodes of of the leg giving way without warning (e.g., on stairs).

## The NMFS Mechanism

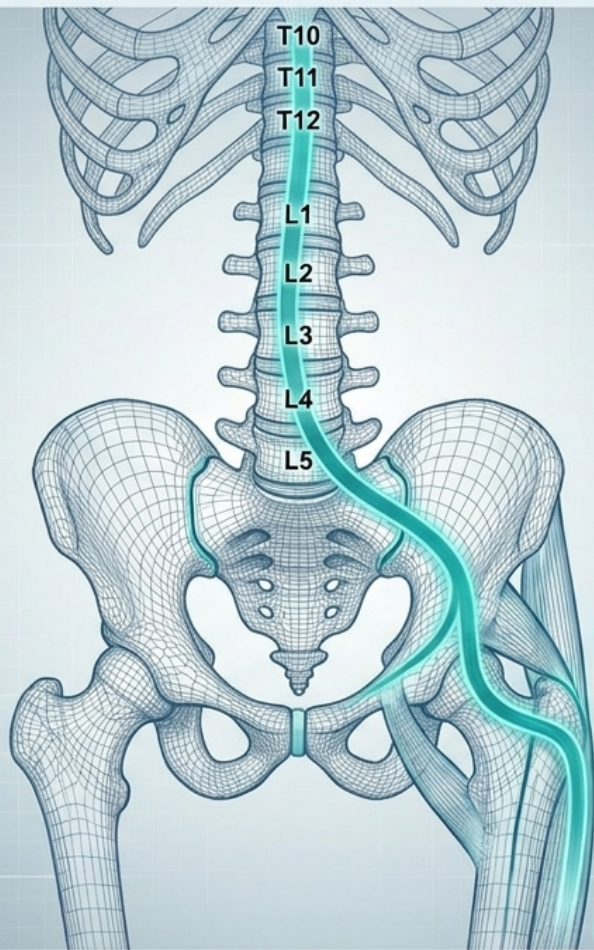
Chronic radicular compression induces sensory and motor neuropathy, precipitating localized spasticity and dystonia

## Biological Evidence

(Rodriguez-Falces et al., 2025)

EMG filling analysis confirms significant motor-unit loss and compensatory remodeling in chronic radiculopathy patients compared to healthy controls.

# Evaluating the interconnected kinematics of Hip-Spine Syndrome



## The Atypical Pattern

Pain localized along the outer thigh and calf, a physically externally rotated foot, concurrent hip and upper lower-back pain, often lacking classic foot paresthesia.

## Systemic Overlap

Combined injuries in the thoracic and lumbar spine create overlapping motor and sensory neuropathies.

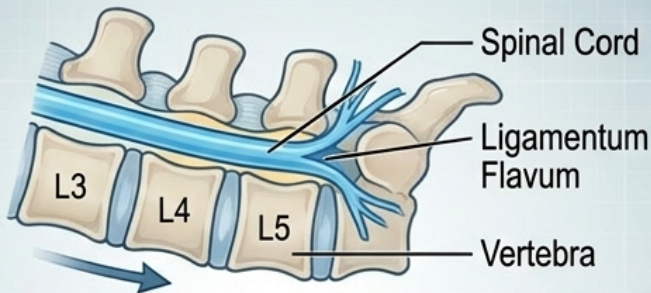
## The Clinical Result

Motor nerve disruption drives muscle dystonia across the pelvis, hip, and lower limb, requiring the entire region to be evaluated as a single integrated kinematic chain.

# Lumbar spinal stenosis acts as a dynamic, load-sensitive phenomenon

## Anatomical Load Response

### Supine / Flexed



### Axial Load / Extension



## The NMFS Perspective

Stenosis involves jagged, tethered spinal cord pathways exacerbated by abnormal vertebral movement rather than smooth anatomical transitions.

## The Impact of Gravity

Symptoms frequently emerge exclusively during standing, walking, or extension.

## Empirical Validation

(Fang et al., 2024)

MRI studies utilizing novel axial loading devices prove that positional loading and lumbar extension significantly exacerbate stenosis (e.g., thickening of the ligamentum flavum) compared to resting supine positions.

## Published literature supports specific component mechanisms of the NMFS framework

These six studies strengthen a subgroup-based interpretation. They document component mechanisms but do not establish the full NMFS model as the universal cause of all sciatica.

- ✓ **Peripheral Amplification:** Myofascial trigger points actively complicate and amplify radicular symptoms.
- ✓ **Soft-Tissue Target:** Myofascial release improves pressure pain and functional outcomes in select radiculopathy cohorts.
- ✓ **Biological Remodeling:** Chronic nerve compression causes explicit motor-unit loss and structural remodeling.
- ✓ **Mechanical Reality:** Positional axial loading actively alters the physical severity of spinal stenosis.
- ✓ **Diagnostic Limits:** Routine static imaging frequently misses localized, symptom-matched nerve pathology.

# Adapting assessment protocols for complex lower-limb presentations



## Look Beyond the Disc

Evaluate for prior physical trauma, regional fibrotic tissue, and biomechanical tethering affecting lumbar lordosis.



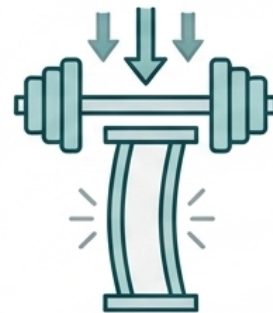
## Map the Soft Tissue

Systematically assess peripheral myofascial layers for active trigger points that mimic or amplify nerve pain.



## Assess Motor Function

Look past pain scales to evaluate gait abnormalities, motor control, giving-way episodes, and lumbopelvic coordination.



## Consider Dynamic Loads

Recognize that severe stenosis and nerve irritation may only physically manifest under axial load or in active postures.



## **Expanding the diagnostic lens improves outcomes for atypical presentations**

Classical disc herniation remains a vital diagnostic pillar...

...but for complex, persistent, or atypical lower-limb syndromes, patient outcomes rely on a wider perspective.

Integrating Neuromyofascial Science allows clinicians to identify and treat the biomechanical, myofascial, and motor-unit variables that fundamentally complicate the clinical picture.