

▶ A special thank you to our sponsor MediTrac!

▶ Booth 205



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**MediTrac**  
SMALL DEVICE. BIG RELIEF

### MediTrac Success

- Inter-vertebral disc and other spinal disorders are successfully treated by the Vertetrac dynamic ambulatory traction device for lumbar radiculopathy and the CerVico 2000 for cervical radiculopathy.
- Can create powerful traction that is 50% of the body weight of the patient.
- Over 10,000 lower back pain sufferers have been treated with vertetrac ( 56% men and 44% women between the ages of 17-79) with success rates of 85%-90%
- No harmful or negative side effects have been observed as a result of treatment with the Vertetrac during testing and subsequent patient use.




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Dr. Jennifer Miller, DC completed her B.S. in Biological Sciences and Genetics from North Carolina State University and received her Doctorate in Chiropractic from Palmer College of Chiropractic Florida in 2010. She has since developed a unique background while working with neuro and orthopedic surgeons, physiatrists, anesthesiologists, and other chiropractors as a consulting doctor for one of nation's largest interdisciplinary spine surgery centers. Dr. Miller has also served in an educational capacity teaching other physicians across the country about various spine injuries and has been featured in several trade publications and TV segments discussing pain pathology, conservative and interventional treatment options. In addition to her time in private practice, she now works as an independent consultant for MediTrac LTD, a mobile decompression device company in addition New Life Medical, a natural biologics tissue bank. Dr. Miller is also certified in Electrodiagnostics and performs in house and mobile EMG/NCV testing.

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# Evidence-based Approach to Radiculopathy Recovery

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**▶ Course Description**

▶ Radiculopathy can be a challenging clinical presentation by patients. Understanding the clinical approach toward a proper diagnosis can lead to a more effective treatment. Traction therapy has been used in health care as a modality for centuries. Research over the past decade has demonstrated mixed reviews (due to study design) of its effectiveness - until now. Learn about the clinical approach to evaluation, diagnosis, and treatment including the evidence behind traction and its effect on Cervical and Lumbar radiculopathy and how you can provide a treatment approach in-office that incorporates traction.

**▶ Learning Objectives**

- Learn clinical examination procedures for cervical and lumbar radiculopathy
- Review the literature on the therapeutic effectiveness of traction
- Understand the dynamics leading to effectiveness in treating disc lesions with traction and traction with motion

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What percentage of your current patients are being treated for disc conditions?

How are you treating their radiculopathy?

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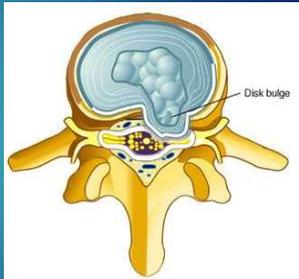
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# Radiculopathy

- ▶ “By definition, radiculopathy describes pain that radiates down the legs and is often described by patients as electric, burning, or sharp.
- ▶ The most common underlying cause of radiculopathy is irritation of a particular nerve, which can occur at any point along the nerve itself and is most often a result of a compressive force.”



Berry JA, Eila C, Saini HS, Miulli DE. A Review of Lumbar Radiculopathy, Diagnosis, and Treatment. *Cureus*. 2019;11(10):e5934. Published 2019 Oct 17. doi:10.7759/cureus.5934

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# Radiculopathy

- ▶ The most common levels of nerve root compression in the Cervical spine is C7, followed by C6; compression of C5 and C8 roots are less frequent.
- ▶ Lumbar intervertebral disc herniation occurs most commonly at L4/5 (L5 root; 50%) and at L5/S1 (S1 root; 46.3%) interspace. Consequently, compression of the 5<sup>th</sup> lumbar nerve root is most common, with the first sacral nerve roots a close second.

Antonio Romeo, Carla Vanti, Valerio Boldrini, Martina Ruggieri, Andrew A Guccione, Paolo Pillastrini, Lucia Bertozzi. Cervical Radiculopathy: Effectiveness of Adding Traction to Physical Therapy—A Systematic Review and Meta-Analysis of Randomized Controlled Trials. *Physical Therapy*, Volume 98, Issue 4, April 2018, Pages 231–242, <https://doi.org/10.1093/pt/ptx008>

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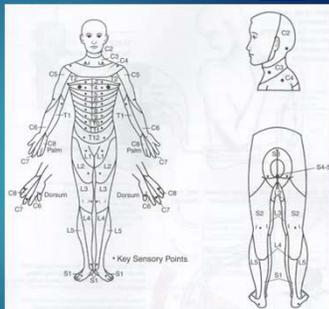
# Dermatomes and Myotomes

Dermatomes have a high degree of overlap- they represent cutaneous sensory innervation not necessarily efferent motor root function

Helpful in clinical evaluation to take into account but not diagnostic and specific- not as reliable as motor signs (paresis/DTR)

Ex. Carpal Tunnel pain diagrams from Mayo clinic

Radic Dx difficult due to sclerotogenous pain or other injury and pleurisegmental innervation



<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4269070/>  
 Neurological Clinics | Department of Neurology | Case Western Reserve University | Cleveland, Ohio 44106 | 216.863.2000

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(c) Best Practice Academy, LLC 2020

## Target Population:

Patients with radiculopathy  
and disc lesions

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## Process

- ▶ Detailed and Thorough History
- ▶ Physical Examination
- ▶ Diagnostic Testing

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## Detailed and thorough history

- OPPQRST for each complaint but with details (Pain, sensory symptoms, motor symptoms, gait, bowel/bladder function) Have you seen other providers? Trauma? When? Suddenly or Gradually? Timing- worse at a particular time of day?
- When discussing pain- Use pain scale and specific sites, quality (Neuropathic- usually burning, Mechanical-worse with movement and relief with rest) Document pain frequency-% of time awake- 5-10% increments as well as intensity Mild 1-3, Moderate 4-7, Severe 8-10. If patient says their pain is mild ask for a number between 1-3.
- Bowel/Bladder- ask about loss of feeling of fullness or numbness on wiping, loss of feeling for urethral stream control.

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Physical Examination

▶ Ortho Testing-  
Lumbar Spine

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Kemps Sitting

▶ While seated the patient is taken into extension and rotation to each side-local pain suggests facet-radiating pain suggests nerve root irritation.

▶ Standing kemps is less specific.

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Kemps Standing

▶ While standing the patient is taken into extension and rotation to each side-local pain suggests facet- radiating pain suggests nerve root irritation.

▶ Standing kemps is less specific

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## Nerve Root Tension Test

- ▶ **SLR & Well Leg Raise**
  - ▶ Right and Left : Patient's leg is passively elevated, while the patient's ASIS is stabilized.
  
- ▶ **Braggard's**
  - ▶ Patient's leg is passively elevated and then the patient's foot is dorsiflexed

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## Space Occupying Lesion

- ▶ **Valsalva (SOL)**
  - ▶ Patient coughs or bears down, as during a bowel movement. With a herniated disc, a Valsalva maneuver may increase pain or other disc-related symptoms.
  
- ▶ **Bechterew's (SOL)**
  - ▶ Patient seated asked to extend the knees
  
- ▶ **Combo: Bechterew, Braggard, Valsalva (SOL)**
  - ▶ Patient seated asked to extend the knees, then flex the neck forward, dorsiflex the foot, hold breath and bear down

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## Physical Examination

- ▶ **Ortho Testing-  
Cervical Spine**

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### The Best Cluster for Cervical Radiculopathy

The literature suggests that the best tests are a cluster including:

- ▶ - Upper limb tension test
- ▶ - Restricted cervical rotation <60 degrees
- ▶ - Distraction
- ▶ - Spurling's

History questions and standard neurological evaluation were not sensitive

Wainner RD, Fritz JM, Irrgang JJ, Boninger ML, Delitto A, Allison S. Reliability and diagnostic accuracy of the clinical examination and patient self-report measures for cervical radiculopathy. Spine Jan 1 2003;28(1):52-62.

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### Use of Likelihood Ratios

- ▶ Diagnostic accuracy is estimated through the use of likelihood ratios. The following is an explanation regarding the use of this predictive methodology.
- ▶ (+Likelihood Ratio= +LR, -Likelihood Ratio = -LR)

+LR / -LR	Explanation
1-2 / .5-1	Alters post-test probability of a diagnosis to a very small degree
2-5 / .2-.5	Alters post-test probability of a diagnosis to a small degree
5-10 / .1-.2	Alters post-test probability of a diagnosis to a moderate degree
>10 / <.1	Alters post-test probability of a diagnosis to a moderate degree

Jaeschke R, Guyatt G, Kilmer JG. User's Guide to the Medical Literature: Essentials of Evidence Based Practice. Chicago, IL; AMA Press, 2002.

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### Nerve Root Compression

2 of 4 Positive Findings: + Likelihood Ratio= .88, - Likelihood Ratio = 1.08  
 3 of 4 Positive Findings: + Likelihood Ratio= 6.1, - Likelihood Ratio = .64  
 4 of 4 Positive Findings: + Likelihood Ratio= 30.3, - Likelihood Ratio = .76

Wainner R, Fritz J, Irrgang J, Boninger M, Delitto A, Allison S. Reliability and diagnostic accuracy of the clinical examination and patient self-report measures for cervical radiculopathy. Spine, 2003:52-62.

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## Positive Spurling's Compression Test

- ▶ With the patient in the seated position and in a neutral cervical posture, the patient side flexed their head to the side of their referred symptoms while the examiner applied a combined compression and side flexion force in the direction of side flexion; reproducing radicular pain indicating nerve root involvement in the arm.

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## Positive Cervical Distraction

- ▶ With the patient supine the cervical spine was distracted by palpating the occiput and pulling the head away from the spine- holding the position for 30 seconds. Reduction of radiating pain was noted indicating nerve root involvement in the arm.

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## Positive Upper Limb Tension Test

- ▶ With the patient in the supine position the examiner blocked the shoulder girdle to stabilize the scapula and passively abducted the shoulder to 110 degrees with slight coronal extension while supinating the forearm and extending the wrist and fingers, implementing ulnar deviation- then finally applying elbow extension and lateral flexion of the neck to the opposite side; reproducing radicular pain indicating nerve root involvement in the arm.

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## Positive Cervical Spine Rotation less than 60 degrees

- ▶ During evaluation of the patient's range of motion, there was less than 60 degrees of active motion to the Cervical spine in rotation indicating probability of nerve root compression ( see Cervical Spine Active Range of Motion)

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## Neurological Evaluation

- ▶ Soft Touch
- ▶ Pinwheel
- ▶ Vibration- often times the first thing that is lost- test the soft tissue not the bone
- ▶ Reflexes
- ▶ Strength testing

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## COOK'S CLINICAL PREDICTION RULE FOR MYELOPATHY

▶ Positive findings associated with increased likelihood of myelopathy:

1. The patient's gait is abnormally wide based, ataxic and/or spastic in nature.
2. Positive Hoffmann's Test.
3. Positive Inverted Supinator Sign.
4. Positive Babinski Test.
5. The patient's age is greater than 45 years.

- ▶ 1 - 5 + Tests: + Likelihood Ratio = 1.4, - Likelihood Ratio = 0.18
- ▶ 2 - 5 + Tests: + Likelihood Ratio = 3.3, - Likelihood Ratio = 0.63
- ▶ 3 - 5 + Tests: + Likelihood Ratio = 30.9, - Likelihood Ratio = 0.81
- ▶ 4 - 5 + Tests: + Likelihood Ratio = Int, - Likelihood Ratio = 0.91

▶ Reference:

▶ Cook C, Brown C, Isaacs R, Roman M, Davis S, Richardson W. Clustered clinical findings for diagnosis of cervical spine myelopathy. J Man Manip Ther. 2010; 18(4):175-180.

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## Neurologic Evaluation

- ▶ **Quantitative Sensory Testing:**
  - ▶ Pinwheel
  - ▶ Monofilament Testing
  - ▶ Vibration
  - ▶ Toronto Clinical Scoring
- ▶ **Reflexes (0-4)**
  - ▶ 0 = no response; always abnormal
  - ▶ 1+ = a slight but definitely present response; may or may not be normal
  - ▶ 2+ = a brisk response; normal
  - ▶ 3+ = a very brisk response; may or may not be normal
  - ▶ 4+ = a tap elicits a repeating reflex (clonus); always abnormal
- ▶ **Strength Testing** (testing key muscles from the upper and lower extremities against the examiner's resistance and grading the patient's strength on a 0 to 5 scale accordingly):
  - ▶ 0 No muscle activation
  - ▶ 1 Trace muscle activation, such as a twitch, without achieving full range of motion
  - ▶ 2 Muscle activation with gravity eliminated, achieving full range of motion
  - ▶ 3 Muscle activation against gravity, full range of motion
  - ▶ 4 Muscle activation against some resistance, full range of motion
  - ▶ 5 Muscle activation against examiner's full resistance, full range of motion

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## Additionally

-Differentiate between neurogenic and vascular claudication (Neurogenic associated with back pain and worse with standing and unaffected with cycling while vascular is unaffected by posture and can be worsened with walking or cycling.

-Balance testing/gait assessment can be beneficial since disc pain and radiculopathy can often accompany peripheral neuropathy.

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## Diagnostics

- ▶ **Plain X-Rays-** Beneficial for assessing scoliosis, DJD, METS, instability, severity of degeneration and can exclude fractures/dislocations.
- ▶ **MRI/CT-** MRI beneficial for soft tissue/disc assessment- disc vs scar tissue vs fatty infiltrate etc. CT decent baseline tool in cases of MRI contraindication or is post traumatic hospital or occasional postsurgical situation. (Position makes a big difference- not 100% sensitive for DX of nerve root compromise in HNP)
- ▶ **Electrodiagnostics-** "Gold Standard" Needle EMG- if we see spontaneous potentials in two limb muscles innervated by the same nerve root by different peripheral nerves Ex. Biceps Brachii-musculocutaneous n. Brachioradialis-radial n.-> both C6 nerve root.
- ▶ NCV usually normal as DRG is not affected by most HNP- only 10% so wouldn't affect sensory, could have some affect on motor study but not common possible reduced amplitude not latency could be sign of a severe and chronic radiculopathy. Patient could have a diabetic polyneuropathy and radiculopathy.

Which should be ordered first????

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## Outcome Assessment Tools

- NUMERIC RATING SCALE OR VISUAL ANALOG SCALE
- PAIN DETECT QUESTIONNAIRE
- PAIN DISABILITY INDEX
- PATIENT SPECIFIC FUNCTION SCALE

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## How often to use OATS

- ▶ Several guidelines say that if the patient does not show any signs of objective improvement in any two consecutive 2 week periods then referral is indicated.
- ▶ Even though OATS aren't necessarily objective they do show a measurable as well as functional improvement.
- ▶ If there is no improvement after two weeks the change something you are doing and try it for another two weeks.
- ▶ At bare minimum every reexam or 4 weeks.

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What causes the disc to bulge, herniate, or degenerate?

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## Physical Loading and Disc Degeneration

- ▶ Traditional View
  - Physical loading at work is a dominant risk factor in disc degeneration
  - Ergonomists believe prevention of disc degeneration hinges on reduction of spinal loading in the work place.

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## Mechanisms of Annulus Failure

- ▶ Herniation/annular failure is associated with full flexion of the spine for prolonged or repeated periods of time.
- ▶ Herniation is almost impossible without compressive load and full flexion
- ▶ Implication for exercise prescription (flexion stretching, certain resistance exercise machines, sit ups, prolonged sitting) in addition to rehab approaches i.e. McKenzie approach, Cat-Camel Exercise

McGill, PhD, S. (2016). *Low Back Disorders Evidence-Based Prevention and Rehabilitation Third Edition* (3rd ed., p. 67). Human Kinetics.

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## Challenging the Cumulative Injury Model

- ▶ Anthropometric factors (genetics (74%), age, and normal postural loading) are more important than occupation and leisure time physical activity in intervertebral disc degeneration.

- ▶ Synopsis of Study.

Physical loading enhances rather than harms disc health.

- Higher levels of physical loading , those who were heavier and stronger had a slower rate of disc degeneration, in terms of signal loss on MRI.
- Those subjects who had smaller discs, and greater compression per unit area also had a slower rate of signal loss.

Videman T, Gibbons LE, Kaprio J, Battie MC. Challenging the cumulative injury model: positive effects of greater body mass on disc degeneration. *Spine J.* 2010;20(1):146-53. doi:10.1006/j.spinee.2009.10.005

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## Postural Loading

- ▶ We can't influence the genetic and age-related factors in disc degeneration BUT we can influence the postural loading factor...
- ▶ Improve postural biomechanics
  - Flexibility, stretching, strengthening, proprioception and gait training programs
  - Weight loss programs
  - Proper lifting and material handling programs

Videman T, Gibbons LE, Kaprio J, Battie MC. Challenging the cumulative injury model: positive effects of greater body mass on disc degeneration. *Spine J.* 2010;10(1):26-31. doi:10.1016/j.spinee.2009.10.005

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## Disc Height Loss

- ▶ Disc narrowing is a clear sign of pathology...
- ▶ Study results suggest that those with severe disc pathology; higher levels of physical loading may not be as beneficial.
- ▶ But doesn't negate the need for exercise based on clinical judgment to maximize function.

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- ▶ In discs with 70% of their original height remaining extended postures have been shown to slowly return the nucleus material in the posterior annulus towards the center of the disc.
- ▶ Repetitive extension does cause some concern since it was observed that while it does help with displaced disc material it can also lead to an increased rate of disc degeneration.
- ▶ Static extension postures are preferred. Cat Camel is beneficial since minimal load is placed on the disc due to the horizontal position and bending without compressive load doesn't exacerbate a disc bulge. (5-6 Cycles are usually appropriate)

McGill, PhD, S. (2016). *Low Back Disorders Evidence-Based Prevention and Rehabilitation Third Edition* (3rd ed., p. 67-68). Human Kinetics.

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## Why is conservative care the treatment of choice?

- ▶ There is low quality evidence that surgery may provide pain relief faster than physiotherapy or hard collar immobilization in patients with lumbar radiculopathy; but there is **little or no difference in the long-term.**
- ▶ There is very low quality evidence that patients with mild myelopathy feel subjectively better shortly after surgery, but there is **little or no difference in the long-term.**

Nikolaïdis I, Fouyas IP, Sandercock PA, Statham PF. Surgery for cervical radiculopathy or myelopathy. Cochrane Database Syst Rev. 2010 Jan 20;(1):CD001466.

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## Surgical vs Nonoperative Treatment for Lumbar Disk Herniation The Spine Patient Outcomes Research Trial (SPORT): A Randomized Trial

- ▶ Evaluated 501 patients with herniated lumbar discs and compared surgical vs. nonsurgical treatments. The primary outcome being SF-36, which is a benefit-cost ratio of lumbar fusion in comparison to other surgical Interventions and Oswestry Disability Index (ODI) scores at specific intervals. In the end, it found that both the surgery and the non-operative treatment groups improved substantially over a two-year period, with improvements consistently in favor of surgery for all periods but that were small and not statistically significant.
- ▶ A significant contribution from this study was that most patients improve given time, either with or without surgery.

<https://jamanetwork.com/journals/jama/fullarticle/254488>

Weinstein JN, Tosteson TD, Lurie JD, et al. Surgical vs Nonoperative Treatment for Lumbar Disk Herniation: The Spine Patient Outcomes Research Trial (SPORT): A Randomized Trial. JAMA. 2006;296(6):741-750. doi:10.1001/jama.296.6.741

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## Therapeutic Benefit of Traction

- ▶ What does the research say?

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**Mechanical traction for Neck Pain with or without symptoms that radiate to the neck or arm**

Results

In summary, our review found no evidence from RCTs with a low potential for bias that clearly supports or refutes the use of either continuous or intermittent traction for individuals with chronic neck disorders.

► Graham N, Gross A, Goldsmith CH, Klaber Moffett J, Haines T, Burnie SJ, Peloso PMJ. Mechanical traction for neck pain with or without radiculopathy. Cochrane Database of Systematic Reviews 2008, Issue 3. Art. No.: CD006408. DOI: 10.1002/14651858.CD006408.pub2

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**Traction for low-back pain with or without sciatica. Cochrane Database of Systematic Reviews 2013**

Results

The included studies show that traction as a single treatment or in combination with physiotherapy is no more effective in treating LBP than sham (pretend) treatment, physiotherapy without traction or other treatment methods including exercise, laser, ultrasound and corsets. These conclusions are valid for people with and without sciatica. There was no difference regarding the type of traction (manual or mechanical).

► Wegner J, Widjahaning IS, van Tulder MW, Blumberg SEI, de Vet HCW, Bouter LM, van der Heijden CJ. Traction for low-back pain with or without sciatica. Cochrane Database of Systematic Reviews 2013, Issue 8. Art. No.: CD009090. DOI: 10.1002/14651858.CD009090.pub5

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“To date, there is no accurate description of the mechanism of relief provided by lumbar traction.

The theory behind its efficiency emphasizes on the widening of the intervertebral foramen upon traction, with separation of the facet joint. This will relieve the sustained pressure on the nerve roots, and hence alleviate symptoms of radiculopathy.

Other theories suggest that traction allows for lumbar muscle relaxation and is not involved in intervertebral separation.”

► Abi-Aad KR, Derian A. Cervical Traction. In: StatPearls. Treasure Island (FL): StatPearls Publishing; 2020.

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## Why the inconsistency in the therapeutic value of traction?

- ▶ "Evidence-based guidelines and systematic reviews have generally not supported the use of traction for patients with LBP because of the lack of high-quality studies, heterogeneous patient samples, and lack of power.
- ▶ Despite the lack of evidence, traction is widely used, ranging from 41% to 76% of therapists, often in combination with other treatments without any clear consensus in terms of treatment parameters such as type, duration, frequency, force, or patient position."

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## Is lumbar traction effective for lumbar radiculopathy?

### ▶ Results

- ▶ Epidurography and CT investigations have shown that high force traction can reduce disc protrusions and relieve spinal nerve root compression symptoms. Despite these findings, lumbar traction is currently out of favor in the literature. Four reviews summarizing lumbar traction studies have concluded that there is no significant benefit for patients treated with lumbar traction compared with a control group.
- ▶ However, wide variations of methods and techniques were described in the studies cited. Some of the studies that showed lumbar traction to be ineffective were performed with low forces. In many of the studies, patient selection criteria were poorly defined. Most studies tended to group all patients with low back pain together and did not distinguish between subgroups or diagnosis. The only two studies that looked specifically at traction for herniated discs did not use forces generally considered sufficient to separate the intervertebral spaces.

D.M. Hall-Bibb PhD, MPT, R.S., Ryan PT,MS,MBA, in Orthopaedic Physical Therapy Secrets (Third Edition), 2017

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## Comparison of Electromyographic Activity in Normal Lumbar Sacrospinalis Musculature During Static Pelvic-Traction in Two Different Positions

### Results

- ▶ "The analysis of variance for a repeated measure design found significantly less lumbar sacrospinalis muscle activity during traction in the prone position than during traction in the supine position."

Weatherell VF. Comparison of Electro,yographic Activity in normal Lumbar Sacrospinalis Musculature during Static Pelvis-traction in Two Different Positions. THE JOURNAL OF ORTHOPAEDIC AND SPORTS PHYSICAL THERAPY. 1983

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## Cervical Traction

- ▶ Cervical Traction (CT) is still frequently recommended for patients with CR, and it is often used as an adjunct modality in outpatient rehabilitation. It may be applied mechanically or manually, intermittently or continuously.
- ▶ The physiological effects of CT may include separation of vertebral bodies, movement of facet joints, expansion of intervertebral foramen and stretching of soft tissues.

Romeo A, Vanti C, Boldrini V, Ruggeri M, Guccione AA, Pillastrini P, Bertozzi L. Cervical Radiculopathy: Effectiveness of Adding Traction to Physical Therapy-A Systematic Review and Meta-Analysis of Randomized Controlled Trials. *Phys Ther.* 2018 Apr 1;98(4):231-242. doi: 10.1093/ptst/psy001. Erratum in: *Phys Ther.* 2018 Aug 1;98(8):727. PMID: 29315428.

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## Cervical Radiculopathy: Effectiveness of Adding Traction to Physical Therapy- A Systematic Review and Meta- Analysis of Randomized Controlled Trials

### ▶ Results

- ▶ Five studies met the inclusion criteria. Mechanical traction had a significant effect on pain at short and intermediate terms ( $g=-.85$  [95%CI=-1.63 to -0.06] and  $g=-1.17$  [95%CI=-2.25 to -0.10], respectively) and significant effects on disability at intermediate term ( $g=-1.05$ ;95% CI=-1.81 to -0.28). Manual traction had significant effects on pain at short-term ( $g=-.85$ ;95% CI=-1.39 to -.30).

Romeo A, Vanti C, Boldrini V, Ruggeri M, Guccione AA, Pillastrini P, Bertozzi L. Cervical Radiculopathy: Effectiveness of Adding Traction to Physical Therapy-A Systematic Review and Meta-Analysis of Randomized Controlled Trials. *Phys Ther.* 2018 Apr 1;98(4):231-242. doi: 10.1093/ptst/psy001. Erratum in: *Phys Ther.* 2018 Aug 1;98(8):727. PMID: 29315428.

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## Traction Therapy

Ralph E. Gay, Jeffrey S. Brault, in Evidence-Based Management of Low Back Pain, 2012

- ▶ Axial distraction of the motion segment is thought to change the position of the nucleus pulposus relative to the posterior annulus fibrosus or change the disc-nerve interface, which could decrease mechanical pressure exerted on a nerve by a displaced disc.
- ▶ It is also possible that some forms of traction stimulate disc or joint repair, whereas others promote tissue degradation.
- ▶ Traction is indicated for LBP with or without neurologic involvement. Diagnostic imaging may be required before administering traction therapy for CLBP to exclude disease states such as severe osteoporosis or if signs or symptoms of neurologic compromise are present.

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Reducibility of Cervical Disk Herniation: Evaluation at MR Imaging During Cervical Traction With a Nonmagnetic Traction Device

**Results**

- ▶ “During traction, all volunteers and 21 patients had a substantial increase in the length of the cervical vertebral column. The disk herniation was completely resolved in three patients and partially reduced in 18.”

Chung TS, Lee YJ, Kang SW, Park CJ, Kang WS, Shim YW. Reducibility of cervical disk herniation: evaluation at MR imaging during cervical traction with a nonmagnetic traction device. Radiology. 2002 Dec;225(3):895-900. doi: 10.1148/radiol.2253011213. PMID: 12461276.

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“We reviewed all of the MR images and found changes in disk shape, reduced herniated nucleus pulposus through the torn annulus tract, separation of the adjoining disk and nerve root, and widening of facet joints. These findings suggest that direct reduction effects on lumbar intervertebral disks can be verified with MR imaging performed during traction.”

Chung TS, Yang HE, Ahn SJ, Park JH. Herniated Lumbar Disks: Real-time MR Imaging Evaluation during Continuous Traction [published correction appears in Radiology. 2015 Jun;275(3):934-5]. Radiology. 2015;275(3):755-762. doi:10.1148/radiol.14141400  
<https://pubs.rsc.org/doi/pdf/10.1148/radiol.14141400>

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**Herniated Lumbar Disks: Real-time MR Imaging Evaluation During Continuous Traction**

Continuous traction on herniated lumbar disks and surrounding structures resulted in change in disk shape, disk reduction with opening in the intervertebral disk, reduction of herniated disk volume, separation of the disk and adjoining nerve root, and widening of the facet joint. Both the mean lumbar vertebral column length (elongation of 1.45% after 30 minutes,  $P < .001$ ) and the mean disk reduction ratio (8.57%, 15.24%, and 17.94% after 10, 20, and 30 minutes of traction, respectively) increased with time of traction.

Chung TS, Yang HE, Ahn SJ, Park JH. Herniated Lumbar Disks: Real-time MR Imaging Evaluation during Continuous Traction [published correction appears in Radiology. 2015 Jun;275(3):934-5]. Radiology. 2015;275(3):755-762. doi:10.1148/radiol.14141400

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Chung TS, Yang HE, Ahn SJ, Park JH. Herniated Lumbar Disks: Real-time MR Imaging Evaluation during Continuous Traction [published correction appears in Radiology. 2015 Jun;275(3):934-5]. Radiology. 2015;275(3):755-762. doi:10.1148/radiol.14141400

**Figure 4**  
Sagittal MR images show disc shape before traction (left) and 30 minutes after traction (right). Reduction of the size between L4 and L5 is shown before and after pulling (arrows) after traction (arrowhead).

**Figure 5**  
TMR images show reduction of the HZ of the posterior annulus before traction (left) and 30 minutes after traction (right). The HZ of the posterior annulus is observed, and the disc shape is convex (arrowhead) prior to traction. The HZ has been reduced at the posterior annulus 30 minutes after traction and repositioned into the nucleus (arrowhead). The convexity of the disc has also disappeared. Reduction in the L4/5 disc space is also shown in axial views (lower right images).

61

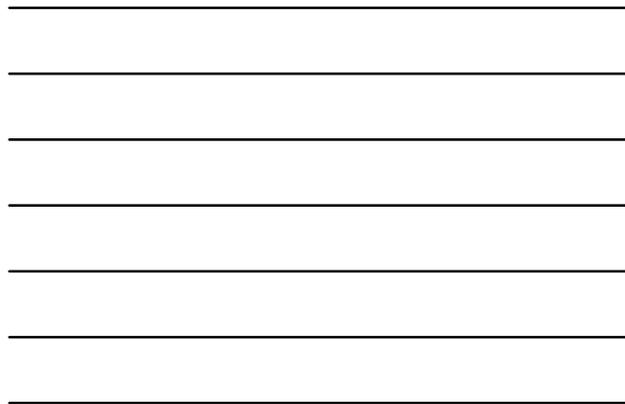


Chung TS, Yang HE, Ahn SJ, Park JH. Herniated Lumbar Disks: Real-time MR Imaging Evaluation during Continuous Traction [published correction appears in Radiology. 2015 Jun;275(3):934-5]. Radiology. 2015;275(3):755-762. doi:10.1148/radiol.14141400

**Figure 6**  
MR images show definite changes in disk shape before traction (left) and 30 minutes after traction (right). The HZ of the posterior annulus is observed, and the shape of the disk is convex (arrowhead). The volume of herniated disk material is reduced 50 minutes after traction (arrowhead). Reduction of herniated disk volume is also seen in axial views (lower right images).

**Figure 7**  
Sagittal MR images of adjacent disks and nerve root before traction (left) and 30 minutes after traction (right). Adjacent disks and nerve roots before traction (arrows) were separated after 30 minutes of traction. A coronal view (right) also clearly visualized (arrowhead).

62



### Elongation Affect

Time Point	Length of vertebral column (mm)	Reduction ratio
before traction	165.3	-
after 10 min of traction	166.5**	8.57
after 20 min of traction	167.3**	15.24**
after 30 min of traction	167.7*	17.94**

**Figure 8:** Bar graphs show elongation of lumbar vertebral column (left) and disk reduction ratio (right) in all patients (n = 48). \* = P < .001 compared with before traction. † = P < .001, compared with the length 10 minutes earlier. Repeated-measures analysis of variance was used for statistical analysis.

Chung TS, Yang HE, Ahn SJ, Park JH. Herniated Lumbar Disks: Real-time MR Imaging Evaluation during Continuous Traction [published correction appears in Radiology. 2015 Jun;275(3):934-5]. Radiology. 2015;275(3):755-762. doi:10.1148/radiol.14141400

63



## WHY TRACTION?

<p><b>Herniated Disc</b></p> <p>Pressure on the disc is so great that a tear occurs in the disc wall leading to sciatic pain (numbness and tingling)</p>	<p><b>Vertical Elongation</b></p> <p>A reduction of pressure inside the discs aids in pulling oxygen, nutrients, and moisture back into the disc</p>
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## What have we learned from the evidence regarding traction?

- ▶ Treatment parameters such as type, duration, frequency, force, and patient position are important factors:
- ✓ Does the traction create maximum vertical elongation?
- ✓ Is the traction applied for at least 30 minutes?
- ✓ Has the weight of the individual and weight of traction force applied within a therapeutically effective range?
- ✓ Is the patient in a posture that is conducive to a neutral/lordotic spine position during traction?

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## A 5-year follow-up study on non-surgical treatment of ruptured lumbar disc herniation

The results were excellent in 26 cases, good in 26 cases, fair in 14 cases, poor in 5 cases, and the excellent and good rate was 73.24%. The volume of protrusion decreased from (1 981.73±588.72) mm<sup>3</sup> to (1 011.82±395.47) mm<sup>3</sup>, the total absorption rate was (45.65±2.83)%, the protrusion was obviously absorbed in 24 cases, partially absorbed in 26 cases, not absorbed in 19 cases, and increased in 2 cases.

DAI Feng, YU Peng-fei, LIU Jin-tao, and JIANG Hong. A 5-year follow-up study on non-surgical treatment of ruptured lumbar disc herniation. [J] zhongguo gu shang / China J Orthop Trauma. 2020; 33(5):414-419.

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### Conclusion

Non-surgical treatment of ruptured lumbar disc herniation can achieve good results, clear the characteristics of the ruptured lumbar disc herniation and prognosis, and some patients have "reabsorption" phenomenon.

DAI Feng, YU Peng-fei, LIU Jin-tao and JIANG Hong. A 5-year follow-up study on non-surgical treatment of ruptured lumbar disc herniation [J]. zhongguo gu shang / China J Orthop Trauma, 2020, 33(5):414-419

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### Indications for Traction

- Degenerative Disc Disease
- Disc bulge
- Disc herniation
- Sciatica
- Spinal stenosis (due to disc herniation)
- Osteoarthritis
- Scoliosis

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### Contraindications for Traction

- Osteopenia/osteoporosis
- Osteomyelitis
- Bone cancer
- Pott's Disease
- Spondylolisthesis
- Vertebral fracture - within 6 months
- Fusion with internal fixation
- Ligamentous stretching injury
- Pregnancy from 4 months gestation
- Open wounds
- Cord compression
- Cauda Equina Syndrome
- History of cardiac disease
- Severe respiratory problems

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### Traction Treatment

- According to the institute for the Treatment of Spinal Disorders, disc disorders of mechanical nature can only be successfully treated using mechanical methods, and traction is proven to be the best option.
- Traction is an accepted form of mechanical treatment of disc disorders, but until now the results have been unsatisfactory.
- Poor results using traction are related to poor technique or patient selection rather than the concept of traction itself .
- Some forms and techniques fail to provide enough vertical + horizontal traction to relieve compression on the intervertebral discs.



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### Complications

(rarely encountered if patients are adequately screened)

- ▶ Postprocedural increase in peripheral nerve pain and a decrease in central pain, increase in neurological symptoms, or sudden disappearance of central pain are alarming signs of traction-induced spinal cord compromise.

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### Adverse Reactions

ALTHOUGH EXTREMELY UNCOMMON, IF YOU EXPERIENCE ANY OF THE FOLLOWING REACTIONS, DISCONTINUE USE OF TRACTION:

- DIZZINESS
- BREATHING DIFFICULTIES
- ABNORMAL FATIGUE
- AGGRAVATION OF SYMPTOMS

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**Redirection of Forces**  
schematic diagram

Resultant Force, Traction Force, Horizontal Force, L1, L2, L3, L4, L5, Axis of the lower lumbar spine

Ambulatory upright posture places the lumbar spine in the neutral position and enhances lordosis improving traction results.

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### Pain and Rehabilitation Stages

- ▶ Stage 1 – Acute/Pain Stage
  - ▶ (0-4 weeks)
- ▶ Stage 2 – Subacute/Recovery Stage
  - ▶ (5-12 weeks)
- ▶ Stage 3 – Chronic/Rehabilitative Stage
  - ▶ (12 weeks+)

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### Treatment Frequency Lumbar

- ▶ Acute/Subacute Condition: 12 consecutive daily treatments of 30 minutes duration.
- ▶ Chronic Condition: Daily treatment the first 1-2 weeks followed by 3-5 weeks with 2-3 sessions per week.
- ▶ After discharge from the formal treatment program, many patients maintain their gains with a maintenance program consisting of weekly or bimonthly traction sessions.

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Were there were complications noted in completing the above therapeutic activities?

- therapy was not completed due to patient intolerance to the therapy
- therapy was not completed due to time constraints for the patient
- therapy was completed but pain was noted
- therapy was completed but tingling was noted
- therapy was completed but weakness was noted
- therapy was completed but loss of balance was noted
- therapy was completed but experienced pain when complete range of motion was challenged

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Stabilization Exercise programing – The Big Three

**Curl- Up, Bridge, and Bird Dog**

- ▶ Isometric Holds shouldn't be any longer than 7-8 seconds.
- ▶ Focus is on extensor endurance vs strength so build up repetitions instead of duration of the holds
- ▶ They challenge muscle, spare spinal load and ensure stability
- ▶ Identify and eliminate Pain Triggers before beginning exercise program then progress and regress as indicated

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Exercise 1 Curl Up

- ▶ Good foundation for strong rectus abdominus-psoas and the abdominal wall activity is relatively low
- ▶ Motion is focused on the thoracic spine and no cervical or lumbar flexion should occur
- ▶ Beginner, Intermediate and Advanced versions

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## Exercise 1 Curl Up

- ▶ Lie on your back. Bend one leg, foot flat. Other leg is straight out.
- ▶ Place your palms down under the natural arch of your lower back.
- ▶ Slowly raise your chest, shoulders and head as one unit off the floor. Think of pulling your ribs into your pants pockets. Do not pull your chin to your chest.
- ▶ Hold the contraction for at least one full seconds.
- ▶ Repeat for the prescribed number of sets and repetitions.
- ▶ If neck discomfort occurs then have patient perform Neck Isometric exercises

Starting Posture- Supine with Hands supporting lumbar region- Do NOT Flatten Back- bent knee adds torque to pelvis to prevent lumbar flattening. No cervical spine motion should occur



Highest Level of Curl Up-Patient curls up against abdominal bracing and while up takes a few deep breaths. Plyometrics can be added with short range but rapid hip and shoulder flexion- all motion is in hip and shoulder joints and not in braced spine



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## Neck Isometric Exercises

- ▶ Build the neck by developing better control over direct muscle strength
- ▶ Tongue should be on roof of mouth behind front teeth and pushed up to activate deep flexors
- ▶ Increase repetitions of the hold relax cycles for stabilizing motor patterns to improve

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## Exercise #1: Neck Isometric Flexion

- Stand or sit up straight. Place palms on your forehead.
- Push for 5 seconds into your palms without moving your head/neck.
- Repeat for the prescribed number of sets and repetitions.



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### Exercise #2: Neck Isometric Extension

- Stand or sit up straight. Place palms on the back of your head.
- Push for 5 seconds into your palms without moving your head/neck.
- Repeat for the prescribed number of sets and repetitions.



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### Exercise #3: Neck Isometric Lateral Flexion

- Stand or sit up straight. Place one palm on the side of your head.
- Push for 5 seconds into your palm without moving your head/neck.
- Repeat for the prescribed number of sets and repetitions.



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### Exercise 2 Bird Dog

- ▶ Trains extensor muscles while the abdominals are activated to control and maintain a neutral spine.
- ▶ Remedial, Beginner, Intermediate and Advanced – Also Standing Options for those with Knee or Hip Replacements
- ▶ Common mistakes are hiking the hip and twisting the spine

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## Exercise 2 Bird Dog

- Get on all fours. Keep your knees under your hips and your hands under your armpits.
- Raise the left arm and reach forward. At the same time extend your right leg back and pull your toes to your knee. Reach as hard as you can in front of you and push your heel back like you are performing a leg press. It does not matter how far off the floor your arm and leg are.
- The key is to keep your torso straight meaning both your hips and shoulders are level to the floor. Push hard with the palm that is on the floor.
- Objective hold 6-8 seconds
- Repeat by switching the arm and leg.

Beginner- Raising one arm or one leg at a time.

Intermediate- Raising Opposite arm and leg simultaneously. Neutral Spine without motion and with abdominal bracing. Avoid raising arm or hand past horizontal.



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## Exercise 3 Side Plank

- ▶ Challenges the QL, lats, and obliques while sparing the spine from high loads.
- ▶ Remedial, Beginner, Intermediate and Advanced techniques all emphasize a neutral spine and braced rib cage.

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## Exercise 3 Side Plank

- Lie on your right side with your legs straight and feet stacked on top of each other. Place your right elbow under your right shoulder with your forearm pointing away from you and your hand balled into a fist. The pinky side of your hand should be in contact with the ground.
- With your neck neutral, breathe out and brace your core.
- Lift your hips off the mat so that you're supporting your weight on your elbow and the side of your right foot. Your body should be in a straight line from your ankles to your head.
- Hold this position for the duration of the exercise. Depending on your fitness level, aim for between 15 to 60 seconds.
- Repeat on your left side.

Beginner- Bridge front knees and they are bent at 90 degrees with their free hand capped over the opposite deltoid

Intermediate- Similar to the beginner but the legs are straight with the upper leg in front of the lower leg

Advanced Posture- Transferring from one elbow to the other while bracing instead of hiking hips off on the floor.



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## Flossing

- ▶ Beneficial in chronic sciatica cases however can also cause an acute onset.
- ▶ Be conservative to start and if patient has no change or relief then increase the flossing.
- ▶ McGill Technique Tips
  - Keep Motion Slow and Coordinated
  - The patient shouldn't push to end or painful range- create motion not static stretch
  - 10 Reps each leg to start then if no increase in symptoms can be done several times a day but wait at least two hours from waking
  - Reduce ROM if pain is provoked

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## When will patients see results?

[C] Best Practices Academy, LLC 2020

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Thank you!



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Extra Info:  
The correct coding

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98940: 1-2 Regions  
98941: 3-4 Regions  
98942: 5 Regions

- ▶ The chiropractic manipulative treatment codes include a pre-manipulation patient assessment.
- ▶ For purposes of CMT, the five spinal regions referred to are: cervical region (includes atlanto-occipital joint); thoracic region (includes costovertebral and costotransverse joints); lumbar region; sacral region; and pelvic (sacroiliac joint) region.
- ▶ The five extraspinal regions referred to are: head (including temporomandibular joint, excluding atlanto-occipital) region; lower extremities; upper extremities; rib cage (excluding costotransverse and costovertebral joints) and abdomen.

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97012  
Mechanical traction

*APPLICATION OF A MODALITY TO 1 OR MORE AREAS: TRACTION, MECHANICAL. TRACTION DOES NOT REQUIRE DIRECT (ONE-ON-ONE) PATIENT CONTACT AND IS NOT TIME-BASED.*

**PURPOSE:**  
SEPARATE AND STRETCH THE SPINAL SEGMENTS, PROMOTE DISTRACTION, AND GLIDING OF THE JOINT FACETS TO HELP PROMOTE JOINT HYDRATION.

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93

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## Traction: 97012 Code Description

**Clinical Responsibility**

Before starting the therapy, the physician evaluates the patient carefully to decide on the type of traction, the amount of weight to be applied, and the duration of the treatment. Mechanical traction begins with a series of 10-12 minute sessions, typically 10-12 minutes each, 2-3 times a week. In case of cervical traction, a mechanical traction device is used to treat the cervical spine. The patient lies on his back, and a head halter is placed under the back of head and jaw and attached to a machine. A certain time period and specific weight for the pulling action are set.

The traction can remain for the specified time (continuous traction) or intermittently (on/off cycle) during the treatment session. For lumbar traction, a motorized split-traction table is used. The patient is placed in a pelvic harness secured to one end of the table. Some motorized units are programmed by the therapist to maintain the traction session. Sometimes a pelvic belt with straps can also be used for distraction. Following each session, electrical muscle stimulation is applied to relax the muscle and ligaments. Expert supervision is an absolute must. Care is taken to keep the therapy session relaxing, so that no additional strain or pain is caused due to the force applied.

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## Addressing the Hypertonicity, myofascial fibrositis of the muscle

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## 97014

### Electrical stimulation, unattended

APPLICATION OF A MODALITY TO 1 OR MORE AREAS: ELECTRICAL STIMULATION (UNATTENDED) AND G0283 ELECTRICAL STIMULATION (UNATTENDED), TO ONE OR MORE AREAS FOR INDICATION(S) OTHER THAN WOUND CARE, AS PART OF A THERAPY PLAN OF CARE

**PURPOSE:**

TREAT EDEMA, INFLAMMATION, MUSCLE SPASM, LIMITED MOBILITY, ATROPHY, WOUND CARE, AND RE-EDUCATION OF MUSCLE FUNCTION.

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<b>Manual therapy techniques</b>	<b>(97140 Manual therapy techniques (eg, mobilization/manipulation, manual lymphatic drainage, manual traction), 1 or more regions, each 15 minutes)</b>	Include soft tissue and joint mobilization, manipulation, manual lymphatic drainage, manual traction, trigger point therapy (non-injectable), and myofascial release.
<b>97140</b>		

Manual therapy techniques are used to treat restricted motion of soft tissues in the extremities, neck, and trunk, and are used in an active and/or passive fashion to effect changes in the soft tissues, articular structures, neural, or vascular systems.

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### 97124 vs. 97140 (Massage vs. Manual Therapy)

- One difference between 97124 and 97140 is the intention of the therapy.
- If you are performing therapeutic massage to increase circulation and promote tissue relaxation to the muscles, and the treatment is based on or consists of a basic relaxation massage, use 97124.
- If, however, your intention is to increase pain-free range of motion and facilitate a return to functional activities, use 97140.

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### 9894X - 97140 Rule

Be aware, also, of the National Correct Coding Initiative (NCCI) edits created by the Centers for Medicare & Medicaid Service (CMS), which require manual therapy techniques, massage therapy, and neuromuscular re-education be **performed in a separate anatomic region than the chiropractic adjustment.**

When appropriate, attach modifier 59 *Distinct procedural service* to 97140 to indicate it is a distinct procedure and is being performed on a **different anatomic site than the chiropractic manipulative therapy (CMT).**

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Addressing the level of rehab required for the region

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### Therapeutic Exercise

- ▶ Active Exercises
- ▶ Active-Assisted Exercises
- ▶ Passive Exercises

Active therapeutic exercises involve one parameter being measured at most (such as strength, flexibility, or endurance).

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<p><b>Therapeutic procedure</b></p> <p><b>97110</b></p>	<p>CPT® guidance for 97110 Therapeutic procedure, 1 or more areas, each 15 minutes; therapeutic exercises to develop strength and endurance, range of motion and flexibility:</p>	<p>Therapeutic exercise incorporates one parameter (strength, endurance, range of motion or flexibility) to one or more areas of the body. Examples include treadmill (for endurance), isokinetic exercise (for range of motion), lumbar stabilization exercises (for flexibility), and gymnastic ball (for stretching or strengthening).</p>
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The goal of improving one of the following; strength, endurance, range of motion, or flexibility through exercise service makes a rehabilitative service a therapeutic exercise.

102

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**97150**  
**Therapeutic Procedures, group (2 or more)**

GROUP THERAPY (97150) CONSISTS OF SIMULTANEOUS TREATMENT FOR TWO OR MORE PATIENTS WHO MAY (OR MAY NOT) BE DOING THE SAME ACTIVITIES. 97150 IS NOT A TIME-BASED CODE.

GROUP THERAPY PROCEDURES INVOLVE CONSTANT ATTENDANCE OF THE PHYSICIAN OR THERAPIST, BUT BY DEFINITION DO NOT REQUIRE ONE-ON-ONE PATIENT CONTACT.

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103

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**Group vs. Individual Therapy Billing**

DOCUMENTATION TO SUPPORT 97150 MUST IDENTIFY THE SPECIFIC TREATMENT TECHNIQUE(S) USED IN THE GROUP, HOW THE TREATMENT TECHNIQUE WILL RESTORE FUNCTION, THE FREQUENCY AND DURATION OF THE PARTICULAR GROUP SETTING, THE NUMBER OF PERSONS IN THE GROUP, AND THE TREATMENT GOAL IN THE INDIVIDUALIZED PLAN.

**THE SPECIFIC, INDIVIDUAL THERAPEUTIC PROCEDURE SHOULD NOT BE REPORTED IN ADDITION TO THIS GROUP THERAPY CODE.**

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Addressing the education of the patient

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# 97535

## Self-care/Home Management Training

SELF-CARE/HOME MANAGEMENT TRAINING (EG, ACTIVITIES OF DAILY LIVING (ADL) AND COMPENSATORY TRAINING, MEAL PREPARATION, SAFETY PROCEDURES, AND INSTRUCTIONS IN USE OF ASSISTIVE TECHNOLOGY DEVICES/ADAPTIVE EQUIPMENT) DIRECT ONE-ON-ONE CONTACT BY PROVIDER, EACH 15 MINUTES

**PURPOSE:**

ADL AND COMPENSATORY TRAINING, MEAL PREPARATION, SAFETY PROCEDURES, AND INSTRUCTIONS IN USE OF ASSISTIVE TECHNOLOGY DEVICES/ADAPTIVE EQUIPMENT, WITH DIRECT ONE-ON-ONE CONTACT BY THE PROVIDER. THE PATIENT MUST HAVE THE CAPACITY TO LEARN FROM INSTRUCTIONS.

THE DOCUMENTATION MUST RELATE THE TRAINING TO THE PATIENT'S EXPECTED FUNCTIONAL GOALS, AND THE PROCEDURE MUST BE PART OF AN ACTIVE TREATMENT PLAN DIRECTED AT A SPECIFIC GOAL.

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106

# Time-based Codes

IT IS NOT APPROPRIATE TO COUNT ALL MINUTES OF TREATMENT IN A DAY TOWARD THE UNITS FOR ONE CODE IF OTHER SERVICES WERE PERFORMED FOR MORE THAN 15 MINUTES.

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107

# Time-based therapy codes

- Time-based therapy codes require the provider to have direct contact with the patient and are reported once for each 15 minutes of service.
- One-on-one contact is defined as "the provider is required to maintain visual, verbal, and/or manual contact with the patient."
- The therapy treatment documentation must include the total number of minutes spent treating the patient for each modality or the beginning and end times of each treatment.
- At least **eight minutes** of therapy must be performed to charge for one unit of any of the time-based codes.

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108

## Time-based Therapy Codes

1 unit	=	8-22 minutes
2 units	=	23-37 minutes
3 units	=	38-52 minutes
4 units	=	53-67 minutes

If a service represented by a 15-minute timed code is performed in a single day for at least 15 minutes, bill at least one unit. If the service is performed for at least 30 minutes, bill at least two units, etc.

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