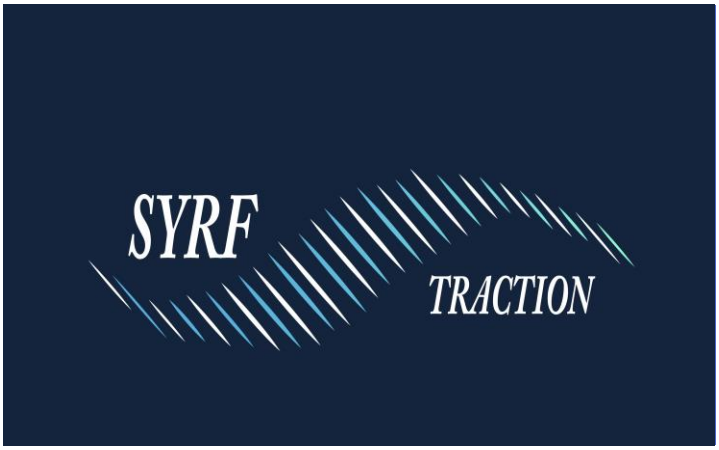
Syrf
User Guide



The Syrf® has been designed to apply Multi-Vector Active SpineTraction mVAST Protocols. It is a user-controlled therapy intended to treat musculoskeletal or neurologic impairment of the lumbar spine to relieve pain, relax muscle spasms, reduce stiffness, and decompress spinal structures. The Syrf® utilizes non-motorized spinal decompression to harnesses the power generated by the user when leg press exertion is applied. View protocols at www.SpineGevity.com

Table 1: Aspects of Motorized Spine Decompression, Flexion Distraction, and Whole Body Inversion compared to Syrf®

				
	Motorized Spine Decompression	**Flexion Distraction**	**Whole Body Inversion**	**Syrf® Multi-Vector Active Traction**
Product Design	Motor powered wench creates tension on non-elastic cable attached to lumbar belt. Mechanical force produces constant or variable pull patterns applied to the spine.	Table bends at the lumbar region, can be motorized or manually powered by clinician. Distraction force is designed to passively stretch spine structures & to create vacuum effect in the lumbar spine discs	A rotating support frame designed to anchor the lower extremities while turning the body upside down to produce gravity induced traction force.	User is reclined supine with belt secured around lumbar spine. Elastic bands are stretched between lumbar belt and table. Leg press exertion causes bed to glide on track. Elasticity adds comfort, matching the spring coil nature of the human spine.
Use of Device	The clinician sets the motorized wench to pull the cable at a prescribed intensity and pull pattern, depending upon clinical indications. Designed to be used in a clinical setting, programmed and monitored by clinician.	As the table is placed into flexion motion, traction force is localized by manual hands-on contact of the clinician. Designed to be used in a clinical setting with treatment applied by a qualified clinician.	Can be used at home or in a clinical setting. The user hangs upside down to activate traction forces anchored from the lower extremities. May not be tolerated or safe for people with high blood pressure or cranial sensitive issues.	Can be used in a clinical setting or at home with prescription by clinician. Safe for people who do not have advanced spine degenerative joint disease, spine/hip instability, abdominal aortic aneurism, or lumbar/pelvis pathology.
Application of Traction	Motorized wench produces pulling tension applied to the lumbar region. Passive therapy, allows the patient to relax. Force is applied in a single angle with non-elastic cable. Unloading is pre-programmed and localized by lumbar belt secured around the lower back.	Places localized pressure at specific points along the spine. User relaxes prone on the table. Passive distraction force is localized by manual hands-on contact applied by clinician. Angle of distraction force can be varied by clinician shifting lower section side to side or by rotation.	Places full body pressure with primary force localized at the ankles. Allows for multiple angles of gravity induced force with rotation of torso and adjusting the tilt angle. Tilting upside down increases cranial pressure; gravity induced stretch is not localized, but spread over the entire body	Leg press exertion causes the bed to glide away, creating tension on elastic bands and producing traction force localized to lumbar spine. Angle of force varies by shifting hips side to side, lifting/tucking pelvis, or adjusting anchoring point. Repetitive stroking or sustained exertion is applied
Traction Force	Passive traction force is pre-set by clinician, based on size/density of patient and clinical indication. Angle of force is adjusted by height of table relative to anchoring point of cable	Passive distraction force is minimal, depending on intensity of hands-on pressure applied by clinician, and flexion setting of the table	Gravity-induced traction force varies, based on weight of user and tilt angle of apparatus.	Active traction force is variable, depending on intensity of leg press exertion and density/length of elastic bands. Force is measured by load cell sensor, displayed on digital monitor, and prescribed based on clinical indication.

Motorized vs Non-motorized Spine Decompression

The Syrf device does not use external motorized power, but harnesses the power generated by the user when leg press exertion is applied. People tolerate user supplied force well, for the following reasons:

- When an individual is applying the force, they intuitively sense that they are in control of what is happening, rather than submitting to the control of an external machine.
- Many people have the natural tendency to be apprehensive when a machine is tugging on their spine. However, when they user remains in control of the force being applied, they more readily allow the traction force to be applied with less tendency to resist the force being applied due to apprehension or natural guarding mechanisms.
- Because the user is in control, they tend to automatically adjust the amount of force being applied because the natural proprioceptive feedback mechanisms remain activated - as opposed to an external machine with sensor feedback mechanisms designed to apply force based on research standards. While automated force application is applied based on standards, this not necessarily better than the patient's ability to reduce tension based on perceived comfort.
- Because the user experience is similar to common types of rowing machine exercise, people are less apprehensive because this seems more familiar and intuitive

Clinical Applications for Syrf®

Intended Use of the Syrf®

The Syrf® is a spinal traction bed designed to provide traction/distraction forces localized at the lumbar spine and the thoracolumbar paraspinal muscle fascia. The device is intended to be used by a licensed professional, with each therapy session monitored by trained personnel. The Syrf platform provides user-powered multi-vector traction and stretching for the lumbar spine region and is meant for use by adults. Use of the Syrf is indicated for the following conditions: low back pain, degenerative disc disease, mild spinal degenerative joint disease, early spinal stenosis, non-fragmented herniated disc, spinal curvature due to tight muscles, sciatica, and muscle spasm.

Therapeutic Effects of Multi-Vector Active Traction mVAST Spine Decompression

The application of a tractive force to decompress spinal structures alleviates pressure on the nerve root causing radicular symptoms. It acts to:

1. Unload and separate spinal vertebrae
2. Activate fluid imbibition of the intervertebral discs
3. Enlarge the intervertebral foramen
4. Separate the facet joints
5. Facilitate improved range of motion
6. Reduce pain-source tissue adhesions

Clinical case studies combining the use of spine decompression, flexion distraction, and rehab exercise, have indicated that mVAST protocols may provide synergistic benefit and achieve reduced pain

Effects on Muscles and Paraspinal Fascia

Multi-vector active traction stretches and releases muscles, reduces muscle spasm, and improves range of motion and flexibility. Blood vessels compressed by rigid muscles are allowed to relax, enabling blood flow and lymphatic circulation to return to the affected area. Thoracolumbar myofascial adhesions are stretched longitudinally and in the oblique plane when multi-vector forces are applied. The unique design of Syrf mVAST can provide a stretch that extends down into the lumbopelvic muscles and upward to the thoraco-lumbar paraspinal region. Spine segmental stretch and myofascial release may help to relieve conditions associated with lumbar spine and hip pain. Leg press exertion activates core stabilization muscles and lower extremity stabilization muscles. Activation of the kinematic chain with simultaneous spine decompression is a beneficial component in functional rehabilitation. Mechanoreceptors, stretch receptors, and paraspinal neurosensors are repetitively activated in multiple planes.

Compensational and Postural Effects

Lumbar spine traction provided by Syrf mVAST can also help to activate and retrain foundational stabilization muscles, thereby improving overall posture. Syrf mVAST has demonstrated the ability to reduce stiffness and pain while improving flexibility and foundational resilience of the lumbar spine. Loss of normal lumbar spine functional capacity causes pelvis shifting which has been implicated in a variety of conditions including postural distortion. Syrf mVAST may help to improve problems associated with foundational pelvis distortion and scoliosis by stretching and activating thoracolumbar and lumbopelvic stabilizing muscles. Conditions that cause lower back pain may also be associated with functional or structural problems in the hip, pelvis, sacro-iliac joints, or internal organs. Improving spinal functional capacity is known to improve weight-bearing dynamics and, subsequently, may improve these conditions. Clinician differential diagnosis is imperative.

Range of Motion

When segmental functional capacity is increased and connective tissue & myofascial adhesion is reduced, this results in improved range of spinal motion. The Syrf® can be used to reduce pain, or to maintain the health of the spine, leading to functional improvement and better range of motion.

Clinical Applications

Lumbar and thoracic spine traction provided by the Syrf® device is intended to treat musculoskeletal or neurologic impairment of the lumbar spine to relieve pain, relax muscle spasms and decompress spinal structures. Depending

on the nature and acuity of the complaint – acute, subacute or chronic – lumbar traction may be used alone or in conjunction with other treatment modalities. Active stretching protocols have also been developed for the thoracic spine and cervical spine. Clinical case studies[1] have indicated therapeutic value of engaging the upper spine combined with simultaneous lumbar spine decompression.

Muscle Spasms in the Lower Back

The gentle, even, consistent stretch of muscles in the neck reduces muscle spasm. Blood vessels compressed by rigid muscles are allowed to relax, enabling blood flow and lymphatic circulation to return to the affected area.

Lower Back Pain and Stiffness

Lumbar spine traction helps to relieve lower back pain and stiffness by gently stretching muscles and ligaments to release tension and reduce muscle spasm. This helps to increase flexibility and range of motion. Medical research demonstrates how spine decompression can help heal injured intervertebral discs and reduce lower back pain caused by compression of neural structures.[2] Other published research points to the benefits of therapeutic active motion in healing of tendon tissue,[3] improving structural and functional capacity of connective tissue. Spine rehabilitation strategies aim to improve spine segmental motor unit function while simultaneously activating core stabilization muscles and lower extremity foundational stabilization muscles.

Myofascial Tension: Lumbar -Thoracic- Cervical

Myofascial pain syndrome (MPS) of the thoraco-lumbar spine region as well as myofascial pain of the hip and leg muscles is often associated with poor posture and ergonomic stressors that develop with repetitive lifting strain and with prolonged sitting. Traction and rehabilitative exercise are effective treatments for myofascial pain. As function improves, postural distortion is reduced. Increased functional capacity enhances proprioceptive signals, thus improving balance lifting capacity. This results in reduced chance of re-injury.

Sciatic Nerve Pain and Intervertebral Disc Syndrome

Sciatic nerve pain typically originates in the lumbar spine. Bulging of the intervertebral disc and other forms of nerve entrapment have been successfully treated with spine decompression therapy. Unloading and traction of the intervertebral discs has been shown to reduce the internal pressure, thus creating a vacuum effect. This helps reduce disc bulge and herniation, thus reducing pressure on nerve roots.

More Advanced Forms of Spine Degeneration

With proper assessment and application by a licensed spine clinician, more complex spine syndromes might be considered for treatment. Because traction intensity can by limited to minimal force, most can be safely treated. Thorough case history, differential diagnosis, clinically indicated treatment strategy, and close monitoring are essential for all conditions that are classified as relative contra-indication. All conditions classified as absolute contra-indication for spine traction therapy should not be treated using Syrf mVAST..

Strain and Sprain Injuries

Lifting strains are the most common cause of lower back pain. Traumatic strain/sprain injuries resulting from whiplash injuries commonly effect the lower spine. Lumbar traction may effectively treat spine injuries and whiplash associated back pain. Lower back pain is associated with, or may occur independently of, whiplash attributable to motor-vehicle collisions. The Syrf mVAST device helps to relieve the muscle spasms associated with whiplash pain, improves blood flow to the injured muscles and helps to relieve compensational muscle spasm. Stretching the muscle fascia helps reduce scar tissue commonly caused by such injuries.

Secondary Effects of S-I Joint and Hips

Mechanical efficiency and structural stability of the lumbar spine effects balanced alignment and smooth motion of the pelvis and hips. The most common cause of pelvic distortion occurs due to compensational effects sourcing from the lumbar spine. Lumbar spine decompression and distraction are key components of in protocols designed to improve balance and reduce distortion. Syrf mVAST activates lumbopelvic muscles while also stretching the lumbar spine, improving strength and reducing hip imbalance.

Hip Pain, and Iliotibial Syndrome

Secondary effects of spinal compression are common as the human body responds to weight-bearing and ambulatory demands. Compensational irritation is common when lumbar spine structural and mechanical integrity is compromised.

Decompression, Distraction, and Traction

Spine decompression, flexion distraction, passive traction therapy, and active traction therapy may be applied with multiple variables such as intensity of traction force, patient positioning, vector/angle of force, exertion force hold vs. pump, frequency of treatment, and duration treatment.

Syrf® Instructions for Use

Active Traction Protocols Will Vary

The Syrf mVAST user can apply a constant force held over a sustained period of time, or a repetitive stroking force at varying angles. The clinician should direct a protocol alternating between constant and variable force applications to test for comfort and outcome of treatment. Each therapy session should be monitored in order to identify particular combinations of elements that more effectively localizes decompression force at a specific angle that yield more gratifying outcomes. Mechano-receptors and nerve sensors provide feedback to the user that helps localize a stretching force which should "feel good" to the user. Many people refer this feeling as the "sweet spot." As long as this force is within safe parameters (see Table 2) established by the clinician, this application is encouraged. However, some patients may attempt to maximize the force being applied and operate the device outside of recommended parameters. At no time is this recommended. Recommended treatment parameters should be observed and applied at all times. Users should never "push through" pain. While some slight discomfort is common, severe soreness is a red flag.

Load Intensity

The optional load cell sensor indicates force in lbs. and should be monitored on the digital display panel. At no time should the force exceed the recommended treatment parameters. If pain, tingling, or numbness occurs, stop using Syrf mVAST immediately. This may indicate spinal instability or other contra-indicated pathology.

Elastic Resistance Bands

Tensile force will vary according to the length, density, and number of elastic resistance bands used. The most appropriate combination of resistance bands will be determined based on comfort and maximum resistance parameters for each individual user. It is always best to start with minimal combinations of these elements to test for tolerance and safe application of therapeutic force. Bands are rated according to density and amount of resistance force to be applied. 12" and 18" band lengths are included.

Lumbar Belt Application

The lumbar belt and lumbar belt cushion should be in place before the patient attempts to mount the table. The patient will recline face up, with the belt line positioned in the center of the lumbar belt. First the cushion belt is wrapped and stretched securely. The outer lumbar belt is then securely pulled over the cushion, taking out any slack and fastening to Velcro tabs. The adjustable belt is then adjusted in length and clipped into plastic fastener. Fine tune the length adjustment to provide secure tension and test by tugging belt ring toward the feet. Set the length with sufficient tension to take up slack and provide secure, but comfortable snugness.

Attachment of Elastic Band

Resistance Bands should be attached between the lumbar belt ring and the load cell sensor bolt ring. Choice of density and length of resistance bands is based on clinical application and comfort of the patient. Length and density of the band will effect the total decompression force being applied. Most clinical applications respond to a combination of caudal traction and P-A (posterior to anterior) lumbar force vector. Attachment to the belt ring positioned in the frontal abdominal region will produce this combination of force vectors.

Optional Caudal-Sacral Belt Attachment

For lumbar spine conditions that might have an adverse response to P-A (posterior-anterior) force, the optional Caudal-Sacral belt is provided. Some conditions such as Grade 1 spondylolisthesis might respond betster by adding this belt attachment which applies more A-P lumbar traction force vector.

Planning a Syrf Therapy Session

Always Start Slowly – Testing for safe and comfortable tolerance is essential

***First Session:** Limit intensity to the most gentle intensity, approximately 15 lbs.to 25 lbs.. If the patient does not experience symptoms of sharp pain or soreness within 24 hours, treatment intensity may gradually be increased by 5% increments until reaching the maximum recommended treatment intensity parameters.

Subsequent Sessions: continue to increase intensity by 5% increments until reaching maximum intensity

Table 2: Maximum Intensity Parameters

Body Weight of user	<100 lbs.	<140 lbs.	<180 lbs.	<275* lbs.
Max lbs. applied	40 lbs.	50 lbs.	75 lbs.	95 lbs.

**Syrf mVAST is rated for maximum user body weight up to 275 lbs.*

Repetitive Exertion vs. Sustained Tension

Leg press exertion may be applied in repetitive "strokes," or by holding sustained tension, depending upon clinical application and user comfort. Most sessions will typically apply a combination of both. The clinician should guide the user to test both methods.

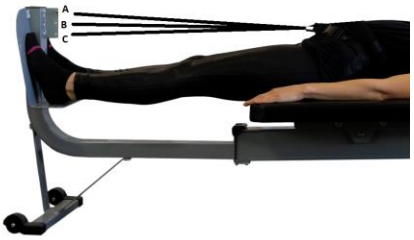
Number of Exertion Strokes for a Basic Session

Suggested number of repetitive strokes for a basic treatment session is 7 strokes midline, 7 strokes off-center to the right, and 7 strokes off-center to the left. Right and left off-center strokes are applied by shifting the hips off-center to the right or off-center to the left. This 7-7-7 protocol should be applied for at least 3 sets, depending upon clinical application and comfort of the user. Remember that "more is not necessarily better." Some people might want to continue beyond the recommended treatment parameters. This is not advised and may result in severe soreness or injury. The clinician may determine additional repetitions or sets are clinically indicated and safe to perform.

Angle of Elastic Bands Directs Level of Force

The vertical angle of the elastic band will affect the vector of force being applied to the spine. Most lumbar conditions respond favorably when traction force is applied in the range from 5 degrees to 20 degrees from the flat bed horizontal surface. However, depending upon varying spinal structural and mechanical factors, some conditions will respond better by adjusting the height higher or lower. As indicated in the figure below, the angle of the elastic bands will generally direct traction force higher or lower along the lumbar spine as follows:

A. P-A caudal force is applied to upper lumbar spine about L1, L2
B. P-A caudal force is applied to lower lumbar about L3, L4
C. P-A caudal force at the L/S lumbar spine, about L5/S1



Frequency of Application of Traction Therapy

The clinician will prescribe the frequency of therapy based on clinical indications. Earlier stages of care typically require increased frequency, gradually reducing in frequency as function improves and pain & stiffness is reduced.

Ongoing Application of Traction Therapy

Once symptoms have resolved, it is recommended to adhere to an ongoing maintenance program. The same factors that caused the condition being treated are prone to return. Syrf mVAST should be used as a part of an overall spine maintenance program directed by a qualified licensed clinician. Some conditions require a maintenance frequency that might range from multiple sessions per week to a monthly maintenance frequency, depending upon the structural, mechanical, and functional integrity of the spine.

References:

1. Brown MJ Syrf Research Studies. Unpublished 2014-2017
2. Dyer A, Vax-D Research and Development Gose Naguszewski and Naguszewski Neuro Research Vol 20, Sherry E, Kitchner P, and Smart R, "A prospective randomized controlled study of Vax-D and TENS for treatment of chronic low back pain," Journal of Neuro Research Vol 23 Oct 2001
3. Duncan RL, Turner CH, Mechanotransduction and the functional response of bone to mechanical strain. Calcif Tissue Inf 1995; 57:344-58

Syrf® is designed to be comfortable and user friendly. This design features a gliding bed, foot rest, and optional load cell sensor which measures and displays the amount of force being applied

Starting position, with elastic band secured to the lumbar belt and knees bent

Leg press exertion causes the bed to glide away, increasing elastic tension on the bands, and producing decompression/active traction force to be applied to the lumbar region

Neutral midline position of the hips produces caudal decompression force without added torque or rotation in the lumbar spine

Shifting the hips off-midline to the left produces a right rotation torque decompression force to the lumbar spine, thoracic spine, and pelvis.

Shifting the hips off mid-line to the right produces a left rotation torque decompression force to the lumbar spine, thoracic spine, and pelvis.

"Superman Right" rotation maneuver engages the lumbar, thoracic, and cervical spine. The simultaneous counter-force of lumbar decompression helps release myofascia adhesions, ligament capsule & facet fixations.

"Superman Left" rotation maneuver engages the lumbar, thoracic, and cervical spine. The simultaneous counter-force of lumbar decompression helps release myofascia adhesions, ligament capsule & facet fixations.

"Press Up Lumbar Extension – Beginner"
Applies P-A force at the lumbar spine, while increasing space between vertebrae

"Press Up Lumbar Extension – Advanced"
Applies P-A force at the lumbar spine with greater traction force intensity

Contra-indications

Moderate to severe spinal degenerative disc disease, facet joint arthropathy, syndesmophytes, spondylolysis, spondylolisthesis, spine instability, fusion, deformation, IVD extrusion,IVD sequestration, osteoporosis, progressive or advanced scoliosis, prior spine surgery, metal implants, abdominal or pelvic organic pathology, abdominal aorta calcification, abdominal aorta herniation, pelvic pathology, obesity, infection, neoplasm, or other conditions not conducive to traction or spine decompression therapy are strongly contra-indicated. Clinical assessment, including Case History, Physical Examination, differential diagnosis, and clinically indicated treatment plan by a licensed clinician is essential. Traction should be avoided in any condition of the lumbar spine where movement might aggravate the condition or result in spinal instability, spinal injury and/or nerve root injury at risk for causing paralysis or cauda equina syndrome. Traction therapy should never cause pain. A stretching sensation or some slight discomfort may be felt during treatment. If pain increases in the back, hips, mid-back, neck, or legs- or if dizziness, nausea or any other discomfort occurs during or after treatment, traction therapy should be discontinued.

The **Syrf®** mVAST is contraindicated for users weighing greater than 275 lbs.

Warnings and Precautions

- Caution should be observed when mounting the table, especially if the patient is unstable due to pain, muscle spasm, or weakness.
- At no time should the force exceed the recommended treatment parameters, as shown in Table 2. This is not advised and may result in severe soreness or injury.
- Traction should not cause pain. A stretching feeling or slight discomfort may be felt during treatment. If pain, tingling, or numbness occurs, stop using **Syrf®** mVAST immediately.
- The **Syrf®** is indicated for use by adults, weighing less than 275 lbs., under the care of a licensed health care professional. Home use should only be considered after clinical assessment and application training by your doctor.

Syrf® Installation and Servicing

Installation, Mobility, and Storage

Upon delivery and assembly of Syrf®, carefully remove protective packing/shipping material. Syrf can be easily moved and stored in upright position.

Syrf® has been developed to deliver spine decompression/traction forces along multiple vectors of the human spine while in the supine (face up) position. Because the user will be reclined in the supine position, it is important to consider appropriate placement to protect the privacy of the user. The foot of the table should be placed away from the view of others who might be in the room.

Servicing

The integrity of the elastic bands, attachment clips, and lumbar belt material should be inspected frequently. If any evidence of fraying or snapping occurs, discontinue therapy immediately and replace with new parts. The bed surface should be cleaned with a moist soft cloth after each therapy session.

Assessment, Application, and Oversight by a Licensed Clinician

Each Syrf device is licensed to the user under provisions of the User Agreement. Use of the device is limited to individuals under the license of the prescribing clinician who has been trained in the proper use and with knowledge of contra-indications of this device. Prescribing clinician agrees they are duly licensed to assess, diagnose, and treat spine syndromes as part of their lawful scope of practice

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