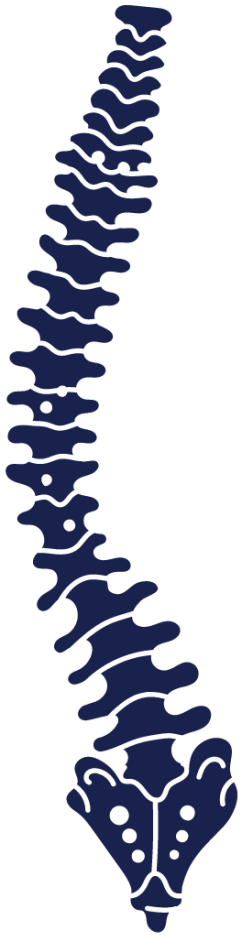
GraviSpine



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What is GraviSpine

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- The device is used for three-plane mechanical correction of pathological curvature of the spine
- Allows you to correct the spine by both elongation (that gives correction of the long axis of the spine) and by derotation

- It is an inversion table, so it has all the advantages of a gravity traction
- Thanks to its design, it allows for versatile use, for many patologies

Application:

- as a part of children and adolescents scoliosis treatment,
- adult patients with scoliosis to improve the comfort of everyday life
- Scheuermann's Disease
- functional asymmetries of the the posture

- In the treatment of spine pain syndromes at the level of Th and L-S of adults and adolescents
- Inflammatory conditions of intervertebral discs and vertebrae of adults and adolescents
- preparation for surgical procedures of scoliosis (and others)

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Advantages of GraviSpine:

- decompression of the intervertebral joints facilitates lateral correction and derotation of the curvature of the spine - it creates convenient conditions for correcting scoliosis without the use of pressure forces
- patient supine position and the use of lateral pads (hip and shoulder) with stabilization of the trunk, results in a precise three dimensional correction of the spine while maintaining the stabilization of the pelvic and spine connection

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- Thanks to the horizontal position and stabilization of the pelvis (in the transverse, sagittal and frontal plane), there is no decompensation of the spine in the sections above and below the curvature
- Automatic adjustment of inclination angle for anti-gravity decompression on the spine at any angle change intervals

- The device accelerates the treatment of already developed scoliosis, and also inhibits the progression at the stage of scoliosis formation
- Alternative to other devices used for treatment
- Ability to treat more patients
- Easy transport even for one therapist, thanks to the equipment with four wheels and brake

How GraviSpine works

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- Thanks to the ability to lean the patient lying on the table with his head down to an angle of 20^0-30^0, we gain an antigravity environment for the spine
- The achieved effect contributes to the relief of intervertebral joints, and intervertebral spaces (intervertebral discs)

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- Slight stretching of the spine due to the relaxation of the above structures:
  - ➢Creates optimal conditions for correction of lateral curvature of the spine
  - ➢It also causes a natural physiological derotation of the vertebrae in scoliosis

- As a result of the action of gravity forces together with the corrective forces of the lateral pads on the spine, we obtain an effective three dimensional correction of scoliosis

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- Before each procedure, the asymmetry of the back is evaluated, marking the top of the curvature on the trunk with a marker for precise placement of corrective pads

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- Thanks to the parameters displayed on the screen, we can accurately, manually dose the corrective force of the lateral pads, individually adjusting the pressure to the patient's feelings (usually the range is 8-20 kg)
- At the same time, we remain in constant eye contact with the patient, providing him with a sense of security

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- automated inclination angle of the table allows you to obtain an anti-gravity decompression on the spine at any angle change intervals
- device has the ability to set the duration of the procedure, and will signal its end

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- Over time because of loosening of the tissues and elongation of the spine, you will observe a decrease in the previous values of the pads pressure (this is a natural thing)
- Thanks to the indications from the display, you can adjust the pressure again to the initial values and patients sensations.

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- Pressure indications can also be used to perform active breathing exercises during the procedure (Biofeedback)
- The patient, under the control of the physiotherapist, performs a slow inhalation with the concave side of the curve, observing a decrease in the value of the pressure of the compression pad on the convex side of the curve by 2-3 kg

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Does it work?

- The GraviSpine therapy Model is consistent with the SOSORT recommendations (**Society on Scoliosis Orthopedic and Rehabilitation Treatment):**
  - Early diagnosis, observation with rational use of X-ray of the spine, taking therapeutic measures at the initial stage of scoliosis development (the possibility of including the device in therapy)
  - Conservative treatment most effective in the team: medical doctor, physiotherapist, orthopedic technician implemented by :
    (a) specific exercises
    (b) use of spinal jacket
    (c) education,
  - Objective assessment of treatment outcomes and possible surgical treatment taking into account the quality of life of a person with scoliosis

- The effectiveness of the method is confirmed by the documented results of 830 children with scoliosis treated in the rehabilitation center "Troniny" in 2011-2019
- The device underwent a positive clinical evaluation carried out in cooperation with the Wiktor Dega Orthopaedic and Rehabilitation Clinical Hospital in Poznań in the Department of Spine Surgery and Orthopaedics of Children led by prof. Tomasz Kotwicki

- In scoliosis, the tendons and ligaments on the convex side of the curvature are stretched, and the contractured (shortened) on the concave side.
- Taking into account the functional aspect of the interconnected successive motor units of the spine, the most structural difference of the sides, translates into a violation of their function at the top of the curvature.

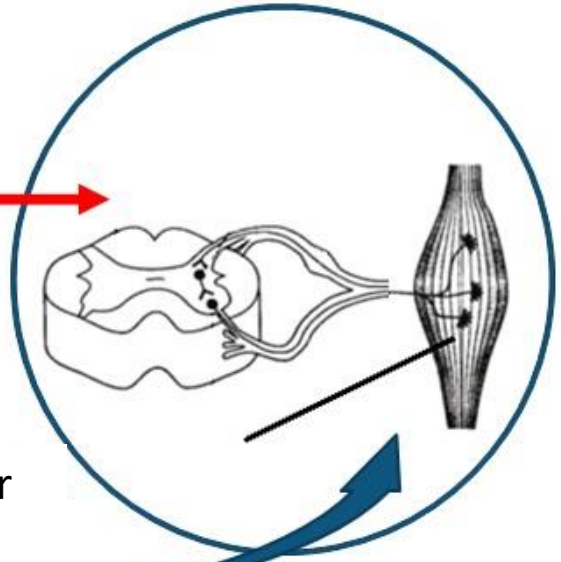
The functional asymmetry of the motor units at the top of the curve affects the subsequent motor units down and up, and vice versa, as it is a system that reacts to each other, subjected to complex control by the peripheral and central nervous system.

- The top of the curvature convexity is exactly where the GraviSpine acts

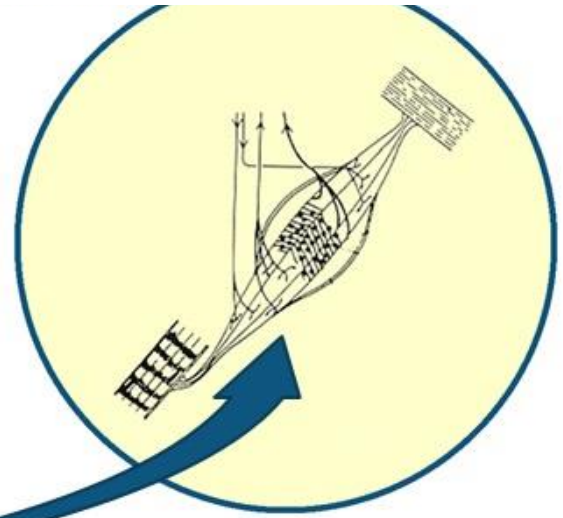
- Connective tissue (tendons, fascia, ligaments and capsules) can significantly restrict the mobility of the vertebrae.
- In biomechanical aspect - asymmetries in the elasticity of the connective tissue can favor the displacement of the vertebrae in the frontal plane on one side, which leads to the development of torsional forces causing the appearance of a tendency to structural changes (morphological spine).

- The GraviSpine device counteracts this phenomenon.
- By pressing on the top of the curve, it causes the contracted connective tissue to stretch on the concave side of the curve.
- Relaxation of the contracted connective tissue helps to derotation of the vertebrae.

- Stretching of the contracted structures initially causes activation and stimulation of the sensory receptors and mechanoreceptors of these structures. However, with prolonged exposure, the rate of signals slows down and the active tension in the muscle fiber and the musculo-tendon connections decreases. When the tissue is constantly stretched, then we have to deal with its deformation and after some time its tension decreases (there is a slackening).



Receptors (muscles, tendon, ligament, capsule, fascia, meniges) neuromuscular spindle



Effector – motor unit

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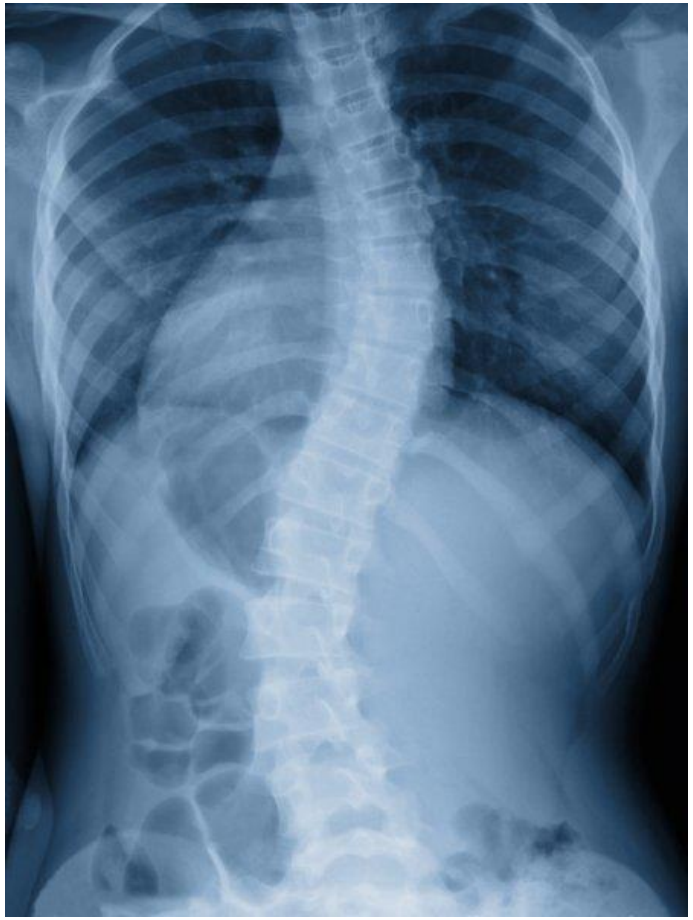
- During the procedure, corrective pads counteract the resistance of the tissues of the trunk, which is formed by ligaments, capsules of the intervertebral joints, intercostal muscles, as well as fascia of the muscles of the trunk. These structures are formed from a strong connective tissue. Triggered stretching movements provide a stimulus to the collagen ordering of these tissues. This leads to the disappearance of old collagen fibers and the formation of new ones.

- The use of deep activation of fascia mechanoreceptors activates afferent stimuli to CNS. During stretching, Pacinian corpuscules are stimulated as proprioreceptors, which are used to control movements. This influence can be maintained for several hours after the procedure due to the so-called "fascial memory" .

- By stimulating the paraspinal tissues, we activate mechanoreceptors and proprioreceptors from the perispinal structures in a multi-sited and multidimensional way. Thus, there is a symmetry of afferent stimuli running from receptors to CNS. This results in a symmetrical response of efferent stimuli from the brain to the postural structures of the spine, which creates conditions for improved spinal reflex control.

Advantages of using GraviSpine in the treatment of scoliosis



- 3dimensional spine correction
- Traction carried out in the gravitational load position, causing symmetrization of cerebral stimuli from mechanoreceptors of spinal structures
- Correction of curvature by precise action of pads correcting the curvature on the basis of an earlier examination with a scoliometer or orthometer and applying markers on the patient's body

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- The supine, horizontal position of the child's torso and the use of lateral hip counterpads with stabilization of the torso from the front belt at pelvic level guarantees very good stabilization of the pelvic position and connection with the spine
- Increase in intervertebral space
- Ensured patient safety, thanks to the selection of the corrective force of individual adjustment through direct assessment of the behavior of the trunk segment of the child during the application of pressure

Advantages of using GraviSpine in Scheuermann's disease

- Traction carried out in the gravitational decompression position, causing symmetrization of stimuli to CNS from mechanoreceptors of spinal structures
- Correction of curvature by precise action of pads correcting the curvature on the basis of an earlier examination with a scoliometer or orthometer and applying markers on the patient's body

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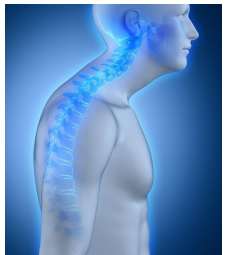
- The supine, horizontal position, of child's torso and the use of lateral hip counterpads with stabilization of the torso from the front belt at pelvic level guarantees very good stabilization of the pelvic position and connection with the spine
- Manual control of correction level selection supported by orthometer measurements
- Increase in intervertebral space
- Ensured patient safety, thanks to the selection of the corrective force of individual adjustment through direct assessment of the behavior of the trunk segment of the child during the application of pressure



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Advantages of using GraviSpine in back pain syndromes at the level of Th and L-S in adults and adolescents

- Intervertebral space decompression, intervertebral joints decompression
- Reduction in venous congestion of vasculature of the spine motor units (two adjacent vertebrae and intervertebral disc) conducive to the treatment of post-traumatic conditions (rupture of the disc), inflammatory reactions

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- Decompression on the vertebrae of the spine, reducing tension in the bone structures, promoting the processes of regeneration and reconstruction of the vertebrae
- The use of the L-S position of the spine relative to the lower extremities (Perschl's position) helps to reduce tension in the posterior part of the disk space by reducing lumbar lordosis
- Decompression of the L5 - S1 connection occurs in the pelvic level equalization environment in the frontal plane, which contributes to the relief of the nerve structures
- The antigravity traction causes symmetrical stretching of the ligament structures and muscle groups on both sides of the spine, which contributes to the correction of biomechanics disturbed in some disease units

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Advantages of using GraviSpine in the treatment of inflammation of the intervertebral discs and vertebrae

- Intervertebral space decompression, intervertebral joints decompression

- Reduction in venous congestion of vasculature of the spine motor units (two adjacent vertebrae and intervertebral disc) conducive to the treatment of post-traumatic conditions (rupture of the disc), inflammatory reactions

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- Decompression on the vertebrae of the spine, reducing tension in the bone structures, promoting the processes of regeneration and reconstruction of the vertebrae
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Contraindications to the use of GraviSpine:

- Infectious diseases with impaired functions of the body
- Congenital malformations of the osteoarticular system, especially of the spine and lower limbs
- Defects and diseases of the nervous system that can affect the musculoskeletal system or the course of the procedure (eg. epilepsy)
- Post-traumatic conditions with bone and skeletal effects that may affect the body after the use of GraviSpine (fractures, dislocations and sprains of the spine)

- Addictions and/or mental disorders
- Malformations and congenital diseases of the cardiovascular system (congenital and acquired heart defects) - after consultation with cardiologist
- Vascular malformations of the brain
- Cardiovascular diseases - untreated hypertension
- Glaucoma

Questions?

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Thank you for your attention!

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