



Welcome to the
Basic Course!

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Agenda

- Principles
- Clinical use
 - Diagnosis
 - Treatment
- Practical use – Hands on!

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Spineliner

The Spineliner is a computer-based instrument for the **diagnosis and treatment** of painful dysfunctions of the musculoskeletal system, especially of the spine.



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Spineliner

When used for the treatment of **trigger points** the frequency of these muscles is analyzed in order to calculate the appropriate treatment frequency.

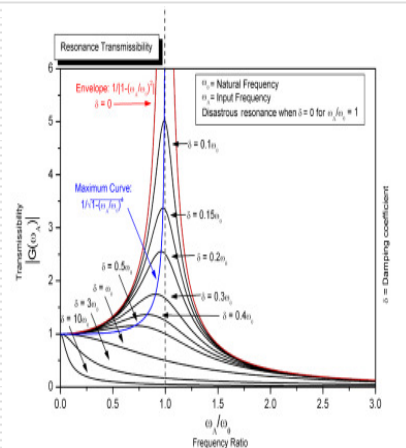


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Technology

- **Resonance** is the tendency of a system to **oscillate** at larger **amplitude** at some **frequencies** than at others (= resonance frequencies).
- At these frequencies, even small **periodic** driving forces can produce large amplitude oscillations.



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Technology

Oscillating Percussion Technique

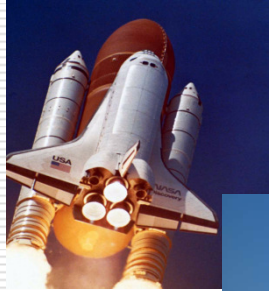
- Based on the physical phenomenon of energy conversion
- From kinetic energy to potential to kinetic
- Vibration damping, as a physical science phenomenon, is **measurable and quantitative**

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Piezoelectric Testing

This technology is used by the NASA in the space program in order to evaluate the integrity of the ceramic cooling tiles on the outside of the space shuttle.



It is also in use in the aviation and the civil engineering industry to test metal fatigue in aircraft and bridge spans.



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Evolution

- Influence of chiropractors using Adjusters
- Electronic Adjuster with feedback function
- 1997 Spineliner approved by the FDA
- 2003 CE certified
- > 4000 units in use worldwide



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Dr.Masafumi Yamasaki (Japan)

Evolution of the Spineliner with
Walter V.Pierce D.C. (US), † 1993

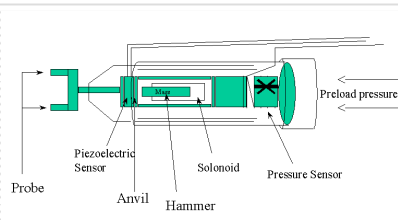


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Piezoelectric Testing Head

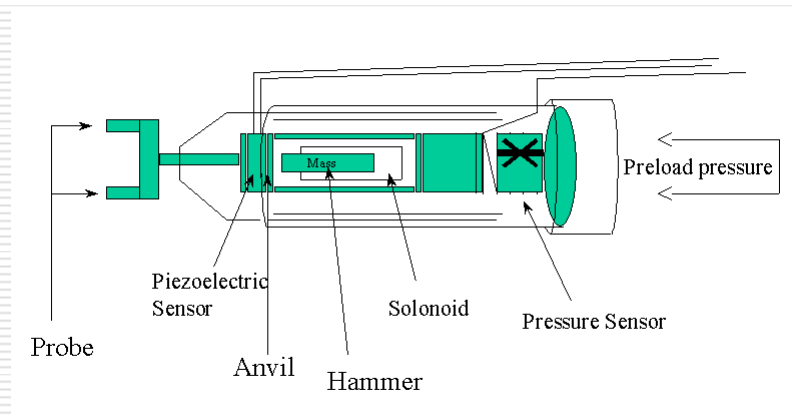
- The **testing head** contains an impulse hammer, an anvil, and a piezoelectric sensor. It is equipped with various testing probes.
- Testing for spinal segment compliance is accomplished by selecting and inserting one of the testing probes into the testing head.



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Piezoelectric Testing Head



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Testing Probes

- U 20mm (Spin. Proc.)
- U 30mm (Spine Stand.)
- U 45mm (paraspinous)
- U 100mm (paraspinous)
- U asymmetr. (Rotation)
- Single Point (TP, MP)
- Single Point Ø 20mm (TP, MP)
- Single Point Ø 45mm (Muscle)



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Tips I



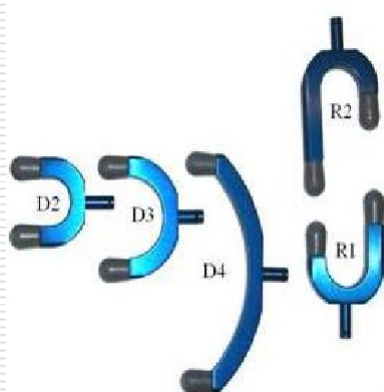
- D1: With the help of D1, a "direct" bone contact via the spinal process can be achieved for extremely muscular or obese patients; also for the Achilles' tendon

- E1: especially for acupuncture/trigger point treatment (in the face)
- E2: Triggerpoint with stronger impulse
- E3: the trigger point application "per se"
- E4 & E5: used for e.g. manipulation of the ribs or treatment of big muscle/ligament structures or if the force of impulse should be lower

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Tips II



- D2: Standard- Spine-Tip
- D3: mainly on the Lumbar Spine, generating an impulse on the transverse process
- D4: mainly for: paraspinal (next to the spine) & interscapulovertebral (between the shoulder blades in the height of the segments) & the iliolumbar ligaments (between hip and the transverse processes of the Lumbar Spine) and iliosacral ligaments (between hip and sacral bone)
- R1 & R2: for the treatment of scoliosis; R1 can also be used for the iliosacral joint (joint between the sacral and the iliac bone).

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Segmental Examination

- For analysis, the testing head is positioned, with the testing probe in place, at the proper spinal segmental level and at the desired angle or vector.
- By compressing the handle smoothly, a predetermined pre-load pressure (6 lb = 2,7 kg) signals the firing of a hammer against an anvil which sends a force impulse through a force sensor.



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Segmental Examination

- A mild percussive impulse (< 1 ms, $421,84 \text{ g/cm}^2$) is transmitted through a piezoelectric sensor and into a vertebral segment
- The piezoelectric sensor registers the reflective force of the computer controlled impulse faster than the muscle can contract and guard against this impact

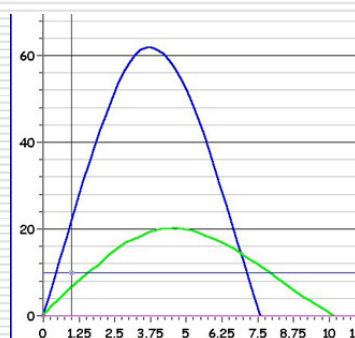


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Segmental Examination

- The result is the formation of an electronic wave form that is characteristic of the ratio of tissue resistance and force dissipation.
- The electronic wave form is analyzed for peak amplitude, peak time, rise time, slew rate and frequency.

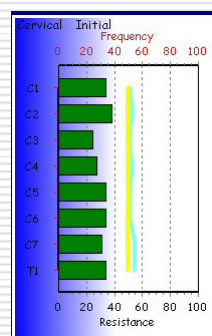


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Segmental Examination

- A frequency predictive of the conditional resonance of the underlying spinal segment is calculated and displayed.
- The amplitude of the peak, characteristic of the wave form, and the amount of resistance or compliance of the spinal segment are displayed.
- A bar chart is produced on a computer screen. The relative height of each bar is assessed by the practitioner so that a determination of relative compliance (stiffness or mobility) can be made.

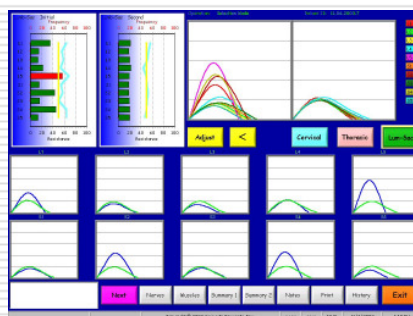


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Chart Presentation

- The wave form amplitude relating to vertebral segment resistance, is displayed as a series of bar charts for visual interpretation of the comparative mobility or resistance of each vertebral motion segment.

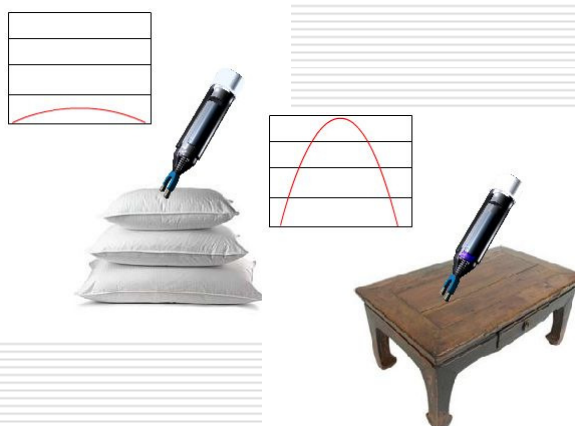


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Chart Presentation

- The frequency is a measure of the amount of discal and articular degeneration.
- The waveform shape identifies the overall motion of the segment.

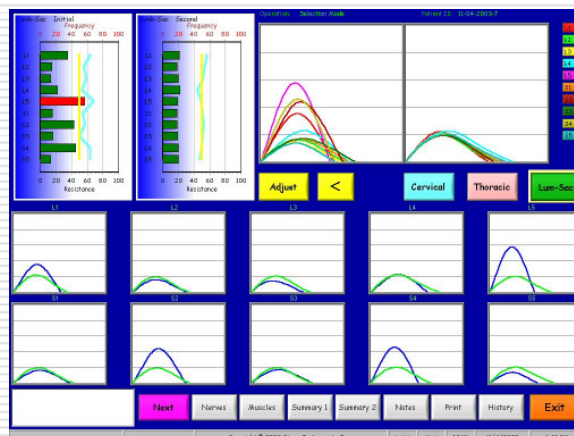


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Analysis

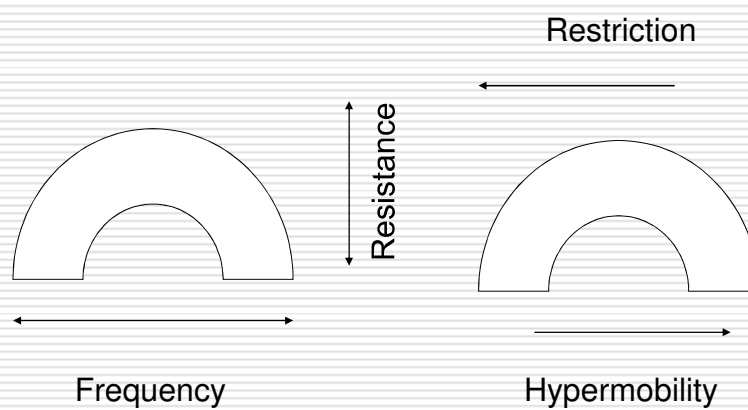
- Resistance
- Mobility
- Frequency
- Wave-shape



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Interpretation



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Composite waveform view

- The overlap of these waveforms give a quick indication of the patient's condition.
- The ideal is that all would be identical



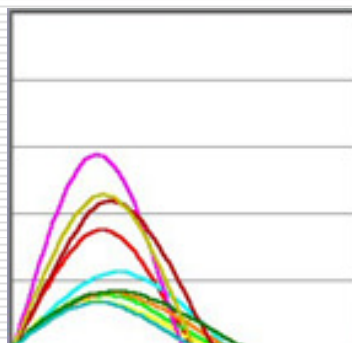
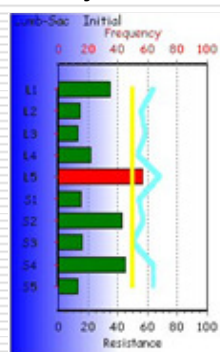
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Interpretation

The amplitude (high bar, high curve) is a measure of joint resistance
The higher the amplitude the more restricted the joint

High frequency (short curve) is an indicator of segmental restriction

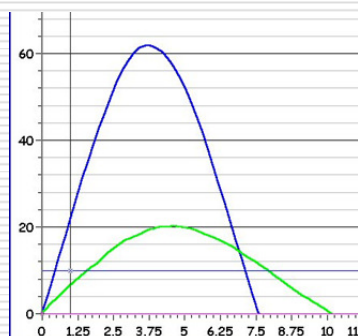


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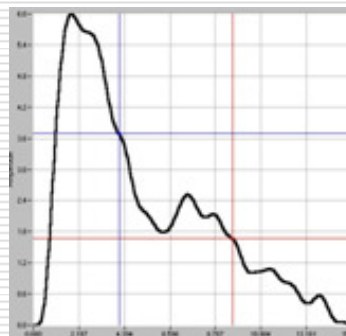
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Interpretation

An apex shifted to the left indicates segmental hypomobility



Aberrant curves are found in dysfunctional segments



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Treatment decisions

Indications

- Restriction – high frequency (short curve, right shift of frequency line)
- Increased resistance (high amplitude = high bar, high curve)
- Left shift of apex (hypomobility)
- Aberrant curves

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Indications

- Segmental Dysfunction
- Treatment of Trigger points or Tender points
- Painful Joint Capsules
- Insertions of Muscles, Tendons, Ligaments
- Stimulation of Acupuncture Points

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Indications (examples)

- Neckpain, Headache
- Dizziness, Vertigo, Tinnitus
- Post cervical trauma („Whiplash“)
- Facial pain (TMJ)
- Neck muscles (trapezius, lev. scap.)
- Paravertebral muscles
- Kyphotic back (also osteoporotic)

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Indications (examples)

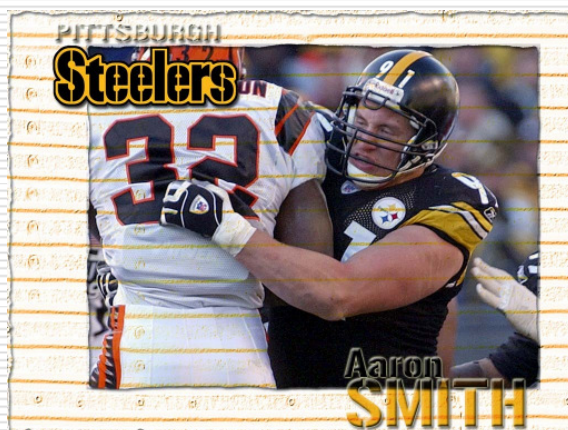
- Restricted joint function (shoulder, hip, knee)
- Jumper's Knee
- Tennis- and Golfer elbow
- Heel spur pain
- Tendinitis of Achilles tendon

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Treatment of Athletes

- Mobilizing treatment before training
- Trigger points afterwards
- US Olympic Team of Track and Field
- Pittsburgh Steelers
- German Formula I drivers



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Contraindications

According to the rules of the Austrian Society of Manual Medicine (ÖÄGMM)

(Textbook: Tilscher H, Eder M, Chirotherapy 1998)

- Severe Structural Changes
 - Inflammation
 - Malignoma
 - Trauma, Fracture
 - Advanced Osteoporosis (Treatment max. 15 psi)
- Local Pain

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Head Joint (Occiput – C1)

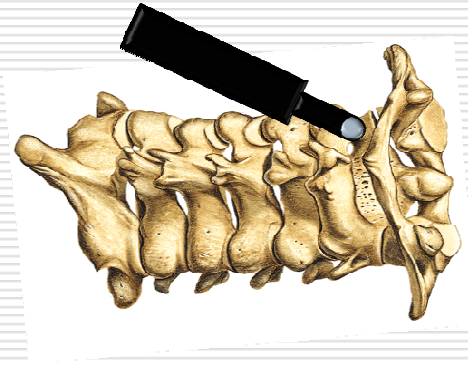


- Angle of app. 90° on skin
- Directly beneath the occiput („more cephalad than you think“)
- In the condylar plane

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Head Joint (Occiput – C1)

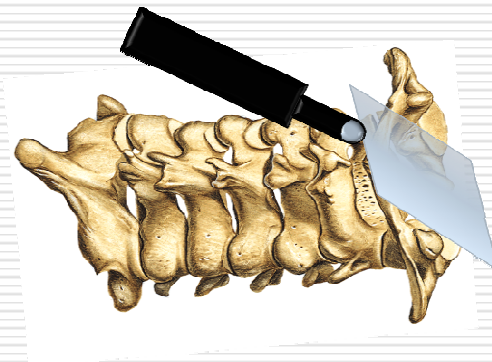


- Angle of app. 90° on skin
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Head Joint (Occiput – C1)

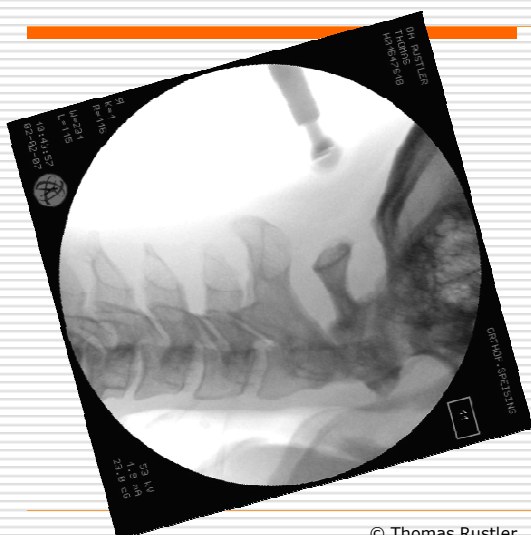


- Angle of app. 90° on skin
- Directly beneath the occiput („more cephalad than you think“)
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Head Joint (Occiput – C1)

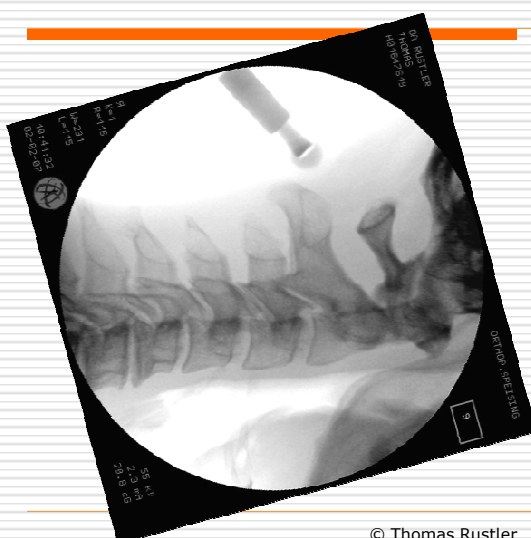


- Angle of app. 90° on skin
- Directly beneath the occiput („more cephalad than you think“)
- In the condylar plane

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C 1 (dorsal arch of Atlas)



- Cervical spine is extended in treatment position
- Indication: Atlas superior
- 45° on surface
- Directly above spinous process of C2

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C 2/3



- 45° on surface
- Directly beneath spinous process of C2

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C 2/3



- 45° on surface
- Directly beneath spinous process of C2

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C 2/3



- 45° on surface
- Directly beneath spinous process of C2

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C 5/6

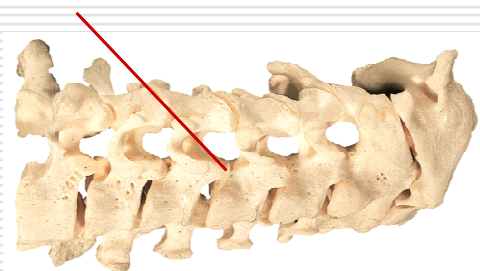


- 45° on surface
- Directly above spinous process of C6

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C 5/6

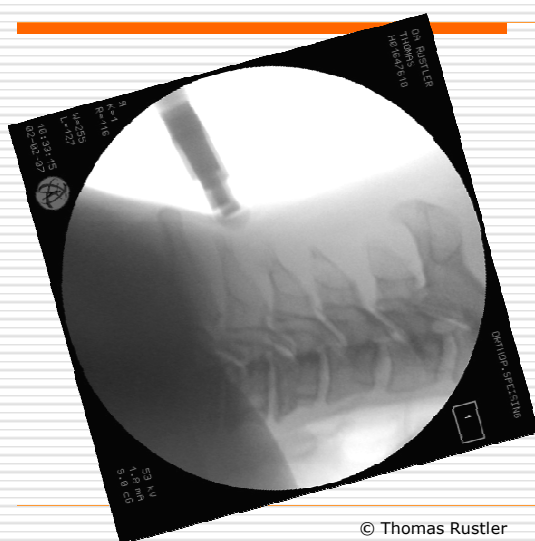


- 45° on surface
- Directly above spinous process of C6

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C 5/6



- 45° on surface
- Directly above spinous process of C6

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Problems in caudad Cervical Spine

- Spinous processes get longer towards C7
- Often subcutaneous edema causes bump
- Probe has a tendency to slip in cephalad direction

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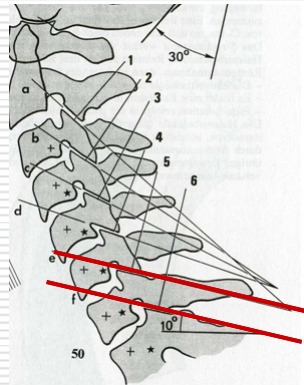
Anatomical Considerations

- The plane of the facet joints from 3rd to 6th vertebra is approximately 45° from horizontal.
- The plane of the facet joint between C6 and C7 is 15°-20°.
- C7-T1 is often about 10° from horizontal.

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C6-T1



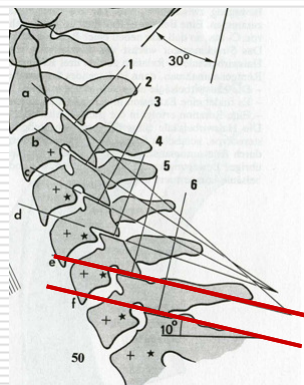
Kapandji

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- For C6/C7 and C7/T1 use angle of 65°-70° on surface (skin)
- Defined by plane of facet joints and direction of spinous processes

C6-T1



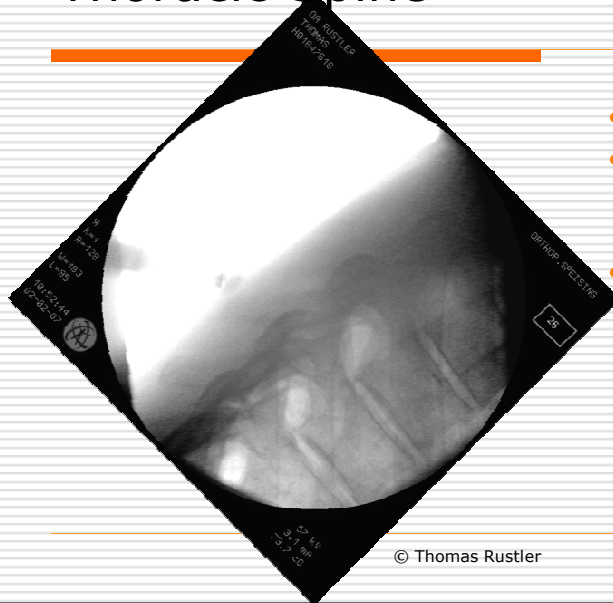
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- Prevents slipping in cephalad direction
- Better diagnosis and treatment results in lower cervical spine

Thoracic Spine

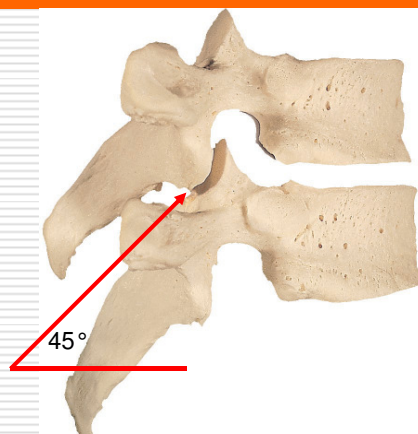


- 45° on surface
- Directly beneath palpated spinous process
- Topographic Orientation!

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Thoracic Spine



- 45° on surface
- Directly beneath palpated spinous process
- Different length of spinous processes does not matter!

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Lumbar Spine



- Different orientation of facet joints
- Compromise
 - 45° on surface to improve translatory segmental mobility
 - Directly above palpated spinous process

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Lumbar Spine

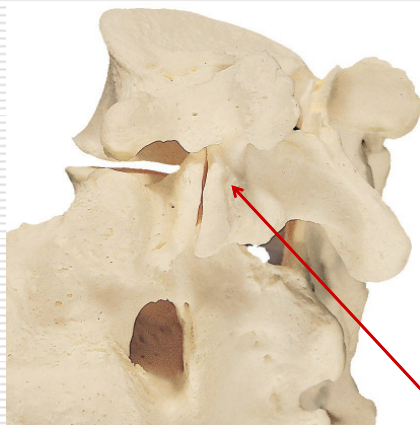


- Different orientation of facet joints
- Compromise
 - 45° on surface to improve translatory segmental mobility
 - Directly above palpated spinous process

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Lumbar Spine



- Different orientation of facet joints
- Compromise
 - 45° on surface to improve translatory segmental mobility
 - Directly above palpated spinous process

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Position of probe

- Occiput – C1:
90° angle (condylar plane)
- C6 – T1:
angle of 65°-70° on surface
- Rest of spine:
45° angle (approximate plane of facet joints)

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Treatment Mode

- This instrument utilizes a low impact, high velocity, periodic driving force to impart an induced harmonic motion to spinal segments.
- The goal is to achieve the resonance of a vertebral unit.

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Spineliner Treatment

Settings

- Segment
- Frequency
- Force
- Limit



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Treatment Mode



As long as vertebral compliance is changing, the impulses continue to a preset maximum. The impulse does not exceed 2,4 bar (35 psi) with a frequency not higher than 12 hertz.

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Treatment Mode



The descending curve is an indicator of increasing segmental mobility of decreasing muscle tension.

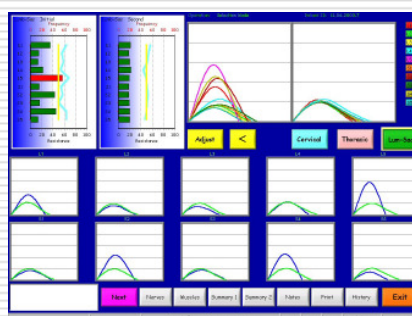
When the computer registers 10 consecutive "taps" that are measured equally it automatically stops the percussion.

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Patient Information

- A further examination after treatment shows the therapeutic effect



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Patient Information

- Pre-treatment and post-treatment charts are displayed simultaneously
- Summary charts may be displayed in an easy to understand format showing the patient's progress



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Research



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Scientific Background

- "In recently injured joints ... such neurophysiologic techniques as oscillation will be employed." (Paris SJ, Spin.Manip.Ther 1983 Oct)
- "Motion provides a stimulus to which fibroblasts respond..." (Akeson WH, Conn.Tiss.Res. 1977)
- "Passive motion of herniated but non-extruded discs induces an osmotic exchange of fluids causing an imbibition of the discs in motion." (Cox JM, LBP 1990)

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Scientific Background

- "...evidence that mechanoreceptors respond to continual changes in the loading and unloading of spinal articular complexes." (Porterfield JA, 1998)
- "Ligament "loading and unloading" ... initiates proprioceptive and kinesthetic response as well as reflex activity of musculature." (Fuhr AW, 1997)

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Clinical Trial #1 (Single treatment)

Randomized, Placebo controlled
Double blinded (Patient and Examiner)
Orthopedic Hospital Vienna-Speising
FIMM Congress Bratislava 2004

Inclusion criteria

Chronic neck pain
No pain medication
No muscle relaxants
No physiotherapy

Exclusion criteria

Acute neck pain
Disc herniation with
neurologic deficit
Polyarthritis, Tumor,
Trauma

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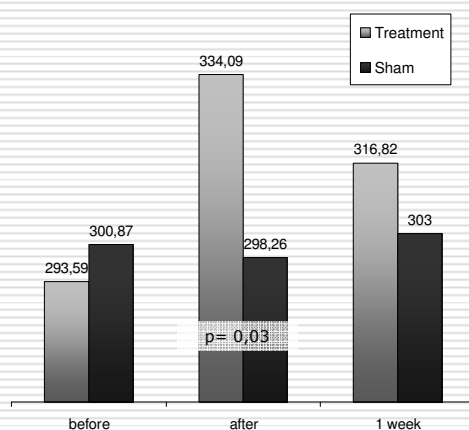
Baseline Characteristics

- Collected Data
 - ROM (Sidebending, Rotation, Flexion), NRS
- 51 subjects, age 25-83, Ø 54,3 yrs.
 - 33 female 65%
 - 18 male 35%
- Randomization
 - 26 treatment group
 - 25 sham treatment group
- Statistical Analysis
 - Multi Variance ANOVA

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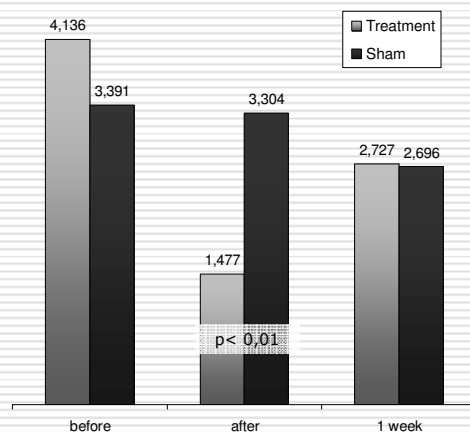
Results: ROM



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Results: Pain (NRS)



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Conclusion

- A single treatment with the Spineliner is effective in order to **improve ROM** and to **reduce pain** as short term effects.
- Further studies with a larger **number of treatment sessions** will have to prove long term effects.

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Clinical Trial #2 (3 treatments)

Randomized, Placebo controlled
 Double blinded (Patient and Examiner)
 Orthopedic Dept. Otto Wagner Hospital,
 Vienna 2009

Inclusion criteria

Chronic neck pain
 No pain medication
 No muscle relaxants
 No physiotherapy

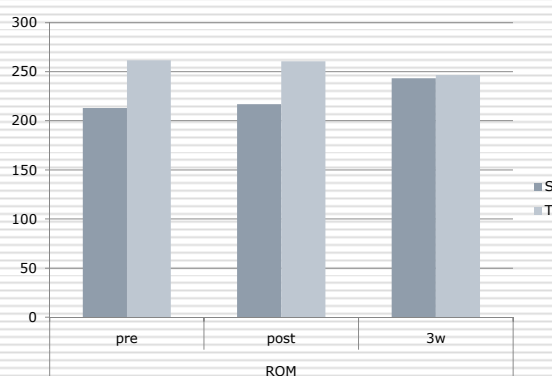
Exclusion criteria

Acute neck pain
 Disc herniation with
 neurologic deficit
 Polyarthrititis, Tumor,
 Trauma

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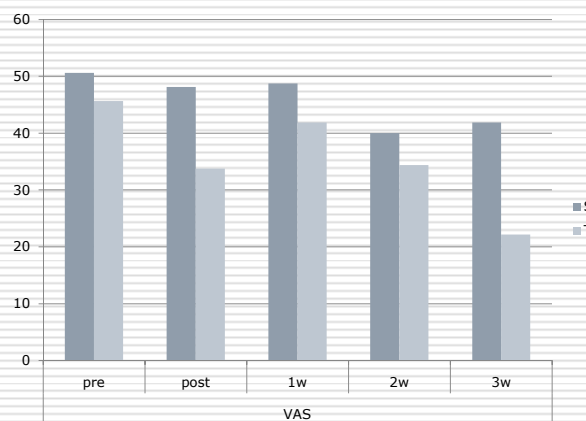
Results: ROM



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Results: Pain (NRS)



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Conclusion

- A series of 3 treatments with the Spineliner within 3 weeks is effective to **reduce pain** as intermediate effect.
- **Continuing pain reduction** was observed after the last treatment session.

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Advantages

- Comprehensive applications
- Objective method
- Non invasive procedure
- No radiation
- Real time documentation of therapeutic effect
- Chart presentation
- Modern communication basis
- Provides information transfer to patients
- Improves patients' motivation

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Advantages

- Documented patient history
- No physical challenge
- Reduction of visit time
- Easy to learn
- No rotational manipulation of the cervical spine
- No risk of fractures in patients with osteoporosis
- Gentle manipulation in hypermobile individuals

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Clinical advantages

- Combination with chiropractic and osteopathic techniques
- Combination with injections
- Integrative therapy
 - Physiotherapy
 - Training therapy
 - Ergotherapy



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Combination with other kinds of therapy I

- Mobilisation of the ribs (Tip D4, 20psi) afterwards treatment with manual therapy
- Functional disorder of the sacroiliac joint
Treatment approach:
Impulses in the area of the cornua sacralia (Tip E2, 10psi), afterwards muscel-engery-techniques
- In general a combination of physio- & training-therapy is recommended

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Combination with other kinds of therapy II

Acupuncture alternative -

Time saving with comparable results

According to Dr. Nikolaus Aigner, Vienna, common indications and points

- | | |
|---------------------|---|
| • Back Pain: | B10, G20, G21, LG14, |
| • Dizziness: | 3E5 |
| • Tension headache: | Di2 |
| • Megrim: | 3E5, G34, Pam9 |
| • Shoulder pain: | M38 (frozen shoulder point), 3E14, Di15 |
| • Lumbago: | B40, b60, B23, Dü3 |
| • Lumbago lateral: | G34 |

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"Quick Wins"

- Treatments that cause IMMEDIATE pain relief
- Easy to learn for the therapist
- Short duration of therapy
- „WOW-impact“ for patients
- High „Word of mouth“ factor (innovative doctor, pain relief without injection, ...)



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"Quick Wins"

Quick achievements for patient and therapist

- 1) Occipital points
- 2) Trapezius muscle with head rotation
- 3) Shoulder
- 4) CS in extension
- 5) ThS in Extension & interscapulovertebral trigger points
- 6) Heel Spur Pain
- 7) Tinnitus
- 8) Tenniselbow

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Occipital muscle insertions

Indication:

- Upper Cervical Syndrome, tension headache, Vertigo, Whiplash injury
- Insertion points of the short neck muscles
- Muscles: M. splenius capitis, m. semispinalis, m. sternocleidomastoideus
- Tip can be "moulded" during treatment – strong decline of the treatment curve and immediate relief of muscle tension
- 3 points on each side (Hackett A,B,C)
- Hackett T-point on the occiput
- 10 p.s.i., limit 100 impulses, Autostop on, Tip E3



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Dynamic head-rotation

Indication:

Restricted head rotation, pain on movement:
The therapist lets the patient contract the shortened muscle against resistance. After a few seconds the patient relaxes. Consequently the previously tense muscle can be stretched without big effort or pain. The same procedure is repeated in the newly attained position in order to clearly increase range of motion and to reduce tension.

- Target structures: trigger points on the rim of the m. trapezius pars descendens
- Therapist gently moves the patient's chin into head-rotation position
- 15 p.s.i., no limit, Tip E3
- 3-4 runs, until the final position is clearly improved (higher ROM), can be combined with postisometric relaxation

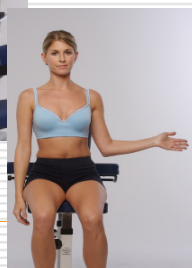
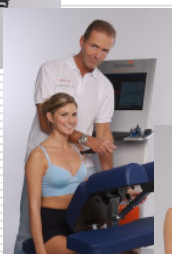
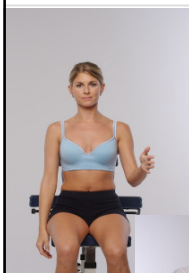


Depending on the school, this technique is either called Postisometric Relaxation (PIR), Muscle-Energy-Technique (MET) or also Neuro-Muscular-Technique (NMT).

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Shoulder



Indication:

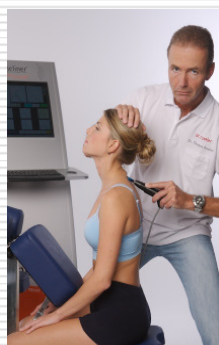
Restricted ROM in the glenohumeral joint

- Therapy 15 p.s.i., no limit, autostop on
- Therapist positions hand at 90° („Shaking Hands position“), gently rotates the lower arm to the maximum end position (outward rotation).
- 1-2 points with max. 3 runs around the greater and lesser tubercle
- After: improved outward rotation

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CS dynamic Extension



Indication:

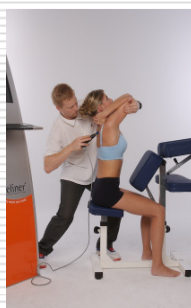
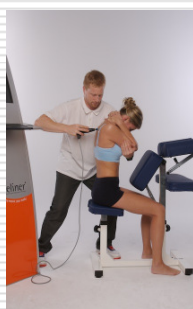
restricted ROM when extending the CS, no improvement after repeated segmental treatment

- Points: 1-2 "worst" cervical vertebra
- Impulses: no limit, autostop on, max. 3 runs/point
- Therapist's hand on the patient's forehead leads to slight extension movement.

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Dynamic Thoracic Extension



Target structures: interscapulovertebral muscles (m. iliocostalis p. cervicalis, mm. rhomboidei), Costotransverse joints – e.g. on the level of Th2, Th4, Th6, etc.

- Indication: juvenile kyphosis, segmental functional restriction, osteoporotic kyphosis
- Therapy goal: improvement of the thoracic spine-extension, mobilisation of the costotransverse joints
- Impulse power: 15 p.s.i., if required (no palpable decrease of the muscle tonus after treatment) 20 p.s.i, Tip D4, autostop on

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Heel Spur



- Previous experience discussed at advanced-meetings - insertion of Plantaraponeurosis on Calcaneus - excellent results!!
- „there where it hurts“ method
- Tip choice: E3 or with patients who are not so sensitive E1 (better effect)
- 15-35 p.s.i., increase after consulting patient
- approx. 500-2000 impulses

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Tinnitus



- After successful therapy of the head joints and the ABC – points.
- 2 points behind the ear, laterally on the Mastoid process and in front of the ear
- Over the Temporomandibular Joint Tip E3, p.s.i. 10, Autostop on (see annex), possibly Parietooccipital Suture (E3 or E1)

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Epicondylitis humeri radialis



- Target Structures: Insertions of: m. extensor digitorum communis, m. extensor carpi radialis + 3 points throughout the length of each muscle
- Indication: „Tennis elbow“
- Tip E1 or E3, if acute and intense pain can also be treated with Tip E4 or E5
- Points: 5
- Impulse Force: 15 p.s.i.
- Limits: 50 impulses und Autostop
- Additional Treatment: Insertion of m. supinator

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US-Concepts

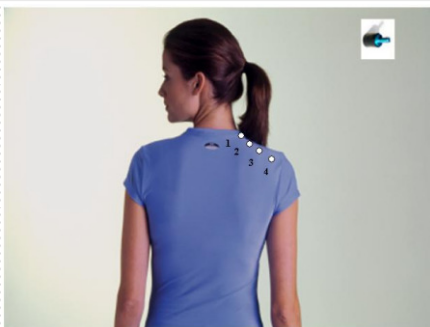


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US-Concepts - samples

Cervical ROM



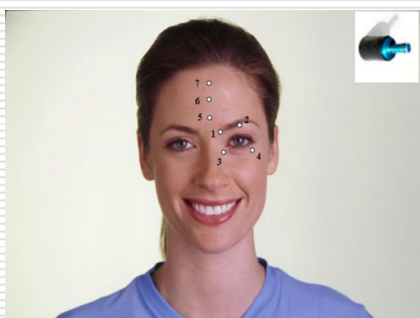
- Force: 20
- Hertz: 12
- Tip Used: Small Rubber Protocol
- Line of Drive: 90 Degrees to the Surface
- Number of Impulses per spot: 10-15
- Start by testing the range of motion of the patient
- Starting at the top of the belly of the trapezius muscle, adjust each point 10-15 times then move one half-inch down and repeat until you reach the end of the trapezius muscle
- Repeat this on the opposite side
- Recheck the range of motion in both directions and note the improvements
- Repeat the entire protocol two times, three times per week for one to two weeks

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US-Concepts - samples

Sinus



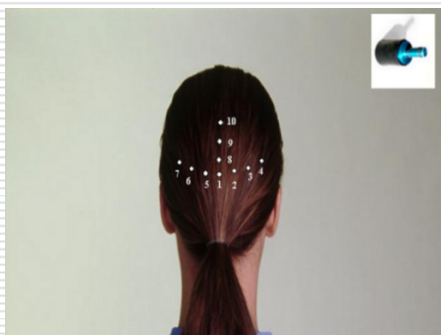
- * No Preload
- Force: 10
- Hertz: 12
- Tip Used: Single Rubber Tip
- Line of Drive: 90 degrees to the Surface
- Number of Impulses per spot: 5-10
- #1 at the Frontal Process
- #2 Supraorbital Margin
- #3 Nasal Bone
- #4 Zygomatic Bone
- #5 Glabella
- #6 1/2 inch above Glabella
- #7 1 inch above Glabella
- Repeat the entire protocol two times, no more than three times in one day.
- Instruct patient to use ice at home for 20 minutes on and 40 minutes off, three times per day of treatment

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US-Concepts - samples

Headaches



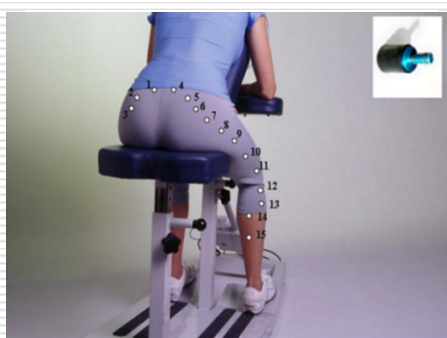
- Force: 15
- Hertz: 12
- Tip Used: Small Rubber Protocol Tip
- Line of Drive: 90 Degrees to the Surface
- Number of Impulses per spot: 10-15
- Start with #1 at the EOP
- Move to each spot as numbered
- Repeat the entire protocol two times, no more than three times in one day
- Instruct the patient to use ice at home, 20 minutes on and 40 minutes off at least three times per day of treatment

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Sciatica



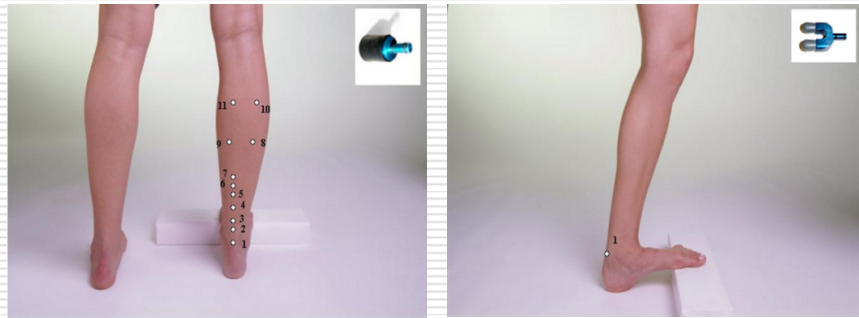
- Force: 20
- Hertz: 12
- Tip Used: Small Rubber Tip
- Line of Drive: 90 Degrees to the Surface
- Number of Impulses per spot: 10-15
- Left Sciatica Protocol

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Achilles

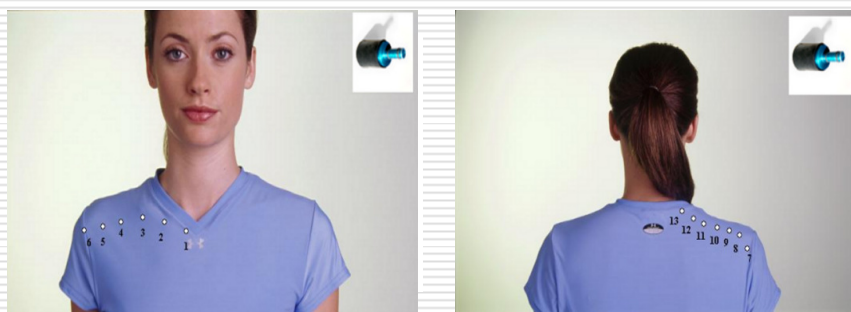


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Shoulder



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Alternative Asian Method



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Dr. Masafumi Yamasaki (Japan)

Development of the Spineliner with
Walter V. Pierce D.C. (US), † 1993



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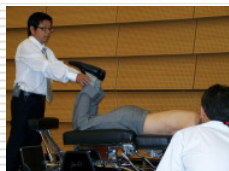
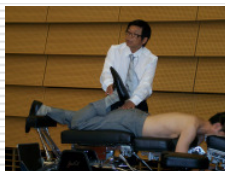
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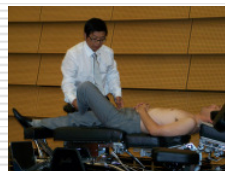
Diagnostic



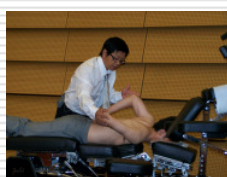
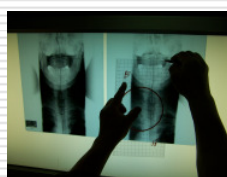
at the patient

length of the leg/
rotation of the pelvis

m. rectus femoris



hip-pelvis-lower lumbar

shoulder-thoracic-upper
lumbarshoulder-upper thoracic-
lower cervical

radiology – complete static in upright position - change



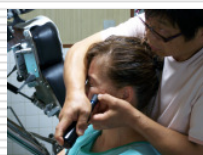
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Therapy on the head



retroauricular



at the zygoma



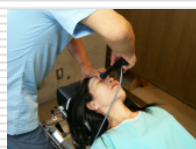
orbita-edge-trigemini-N1



os parietale



os frontale



os frontale-os lacrimale



orbita-edge-trigemini-N2



orbita-edge upper & lower

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Therapy cervical, upper thoracic



nuchal - 1



nuchal - 2



ventral



lower cervical



upper trapezius



scapula-edge-medial



axillar.fold - dorsal



scapula-edge - lateral

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Therapy pelvis – lumbar



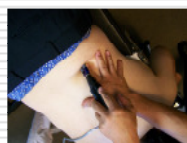
localisation



exact palpation



maxpoint sacral



m. quadratus lumborum caudal



m. quadratus lumborum cranial

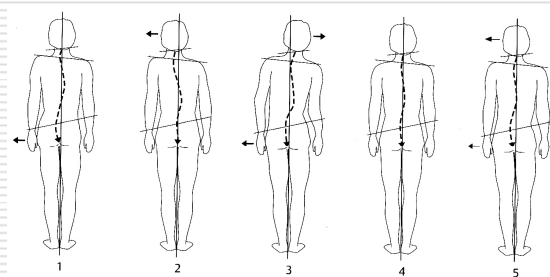


facet L1

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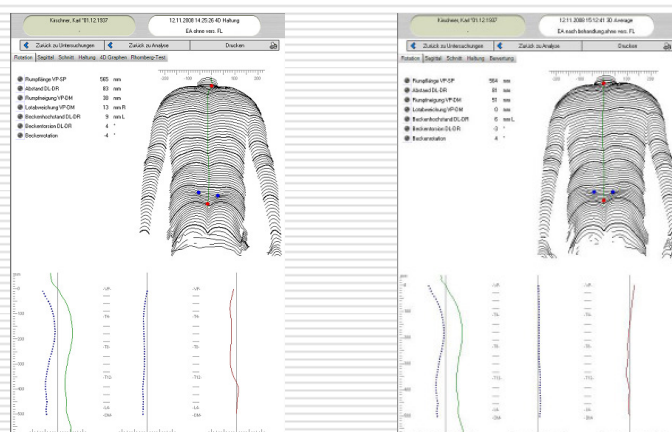
Body static matters ...



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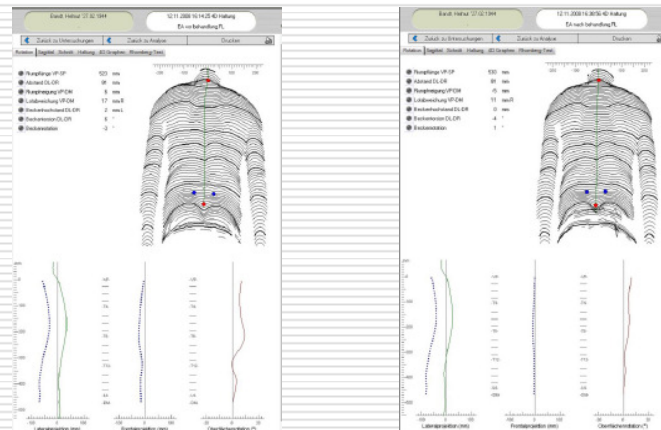
Status – pre Therapy – after Therapy



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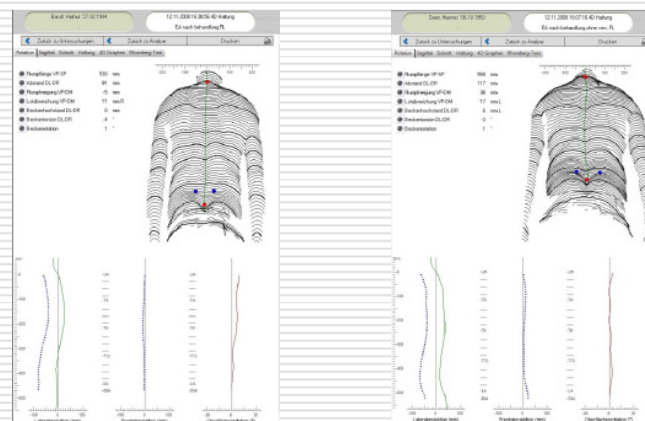
Status – pre Therapy – after Therapy



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Status – pre Therapy – after Therapy



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Implementation in office



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Thank You!

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