

# Therapy of chronic cervical syndrome with Spineliner

## Results of a Pilot Study

**Thomas Rustler**  
 Orthopaedic Hospital Vienna-Speising  
**Hans Tilscher**  
 Ludwig Boltzmann Institute for Conservative Orthopaedics

## Spineliner

Technical device for computer assisted physical diagnosis and therapy of painful dysfunction of the musculoskeletal system, especially the spine.  
 1997 licensed by Food and Drug Administration (FDA)  
 – there are more than 3000 devices in the United States of America, Europe, Australia and the Far East in clinical use.



## Functional principle:

Piezoelectric test-procedure  
 Investigation of material integrity and material fatigue. Employment in spaceflight (ceramic cooling elements of the Space Shuttle), aviation and bridge building.



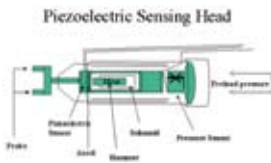
## Design and Development of Spineliner

Chiropractors: Beginning in 1901, mechanical adjusters are used for the treatment of the spine.  
 1987 Devices able to release series of impulses  
 1997 First release of the Spineliner



## Oscillating Percussion Technique

Physical principle of energy conversion:  
 Kinetic energy dissipates into potential energy and is further converted into kinetic energy again.  
 The physical phenomenon of vibration damping occurring during the procedure is measure- and quantifiable.



## Clinical Diagnostics

A released impulse induces an oscillation in the examined spinal segment. The piezoelectric sensor receives information about the reaction of the segment before the muscles respond with a contraction to this impact.  
 Pressure intensity: 0,41 to 0,55 bar (6-8 psi)  
 6 lb (2,7 kg) preload to activate the impulse



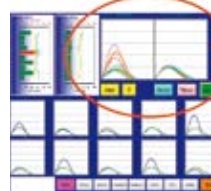
A piezoelectric sensor generates and digitizes an extra low voltage. The instrument then calculates the inverse logarithm of the damping coefficient of the tested segment. The test results are represented by sinus-shaped curves and bar charts. The amplitude provides the information about the resistance or mobility of the segment. The measured frequency allows conclusions about the dimension of the restriction in the spinal segment, which could have been caused by changes in the intervertebral disc, joints or muscles.



The profile of the curves gives information about the way of the movement.

The examination results can be interpreted by the shape of the curves:

- Resistance - bar charts (threshold)
- Frequency curve
- Comparison of mobility
- Analysis of each individual wave form



## Therapy

The treatment of the segments is applied by series of calculated mechanical impulses. Their intensity and frequency are adapted to the dysfunctional segment. The impulses are like HVLA (High velocity, low amplitude) treatment impulses. Impulse frequency is max. 12 Hz, max. Pressure 2,4 bar (35 p.s.i.). Also tensed muscles or the ligamentous- and capsular structures can be treated.  
 - Real-time Measurement and display of the therapy improvement  
 - Automatic Stop function when treatment goal is achieved

## Follow-up examination

A mobility diagram demonstrates the therapy success during the follow-up examination  
 - Converging curves  
 - Lower amplitudes  
 - Similar frequencies  
 - Harmonic profile of the curves



## Indication for a treatment

- Segmental hypomobility (Blockage)
- Muscular hypertension
- Trigger point technique
- Tender points
- Enthesopathy

## Contraindication

According to the contraindications of manual medicine (Tilscher H, Eder M, Chirotherapie 1998)  
 - Severe pathological morphology: inflammation, neoplasm, high-grade osteoporosis, trauma, fracture  
 - Severe local pain

## Basic research (in extracts)

- Oscillating mobilisation for functional recreation of traumatically defective column-joints (Paris SJ, Spin.Manip. Ther 1983 Oct)
- ... Motion stimulates fibroblasts (Akeson WH, Conn.Tiss.Res. 1977)
- Passive motion improves the osmotic liquid exchange of damaged intervertebral disks (Cox JM, LBP 1990)
- Re-education of mechanoreceptors by rapidly alternating application and relief of impacts on joints (Porterfield JA 1998)
- Constant impulses causing a stimulation of inhibiting mechanoreceptors (Fuhr AW, 1997)
- Mechanical treatment of trigger-points for pain reduction (Travell JG, Simons DG, 1996)
- Vibratory stimuli on tendons affect the function of the musculature and further the posture (Wierzbicka MM, J Neurophys 1198; Cordo P, J Neurophys 1995, Gurfinkel VS 1988, Paillard 1998, Roll 1986)

## Clinical trial

**Double-blind, randomized, placebo-controlled trial**  
 Ludwig Boltzmann Institute for conservative orthopaedics  
 (Univ.Prof.Dr.H.Tilscher)  
 Orthopaedic hospital Vienna-Speising

### Results

#### Inclusion criteria

- Chronic neck pain
- No analgetics
- No muscle relaxants
- No physiotherapy

#### Exclusion criteria

- Acute episode of pain
- Herniated disk with neurological deficits
- Polyarthritits, tumor, trauma

## Procedure

Treatment/ Sham-treatment  
 1st Examination (before treatment)  
 Treatment/ Sham-treatment  
 2nd Examination (after treatment)  
 3rd Examination after 1 week

## Data

ROM (goniometer): -lateral flexion, rotation, flexion/extension  
 VAS (visual analogous scale)  
 Neck Disability Score  
 SF 36  
 Pain graphic

## Material

51 subjects, age 25-83  
 - 33 females (65%)  
 - 18 males (35%)

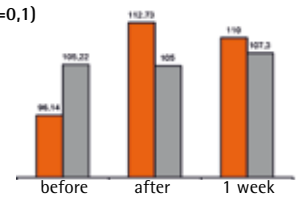
## Randomization

- 26 in real-treatment group  
 - 25 in sham-treatment group

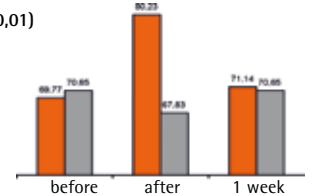
## Statistical Evaluation

- Multi Variate ANOVA

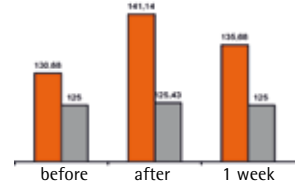
## Extension/Flexion (p=0,1)



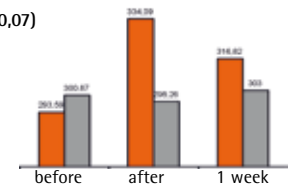
## Lateral Flexion (p=0,01)



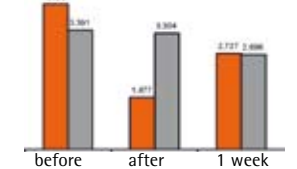
## Rotation (p=0,04)



## Complete - ROM (p=0,07)



## Pain (VAS) (p=0,001)



## Conclusion

- As compared with the sham-treatment subjects, the patients who received treatment with the Spineliner showed statistically significant improvements in neck pain and range of motion immediately after the treatment.
- After one week a slight but statistically not relevant improvement of range of motion was found.
- Treatment with the Spineliner, using the Oscillating Percussion Technique is an efficient treatment to improve ROM and to reduce pain.
- Further studies with a larger number of treatment sessions are necessary to prove the long term effects.

Den **Spineliner-Arzt** in Ihrer Nähe finden Sie unter  
[www.spineliner.com](http://www.spineliner.com)