



Dr. Kennedy

# Kennedy Decompression



I stand ready and willing to confuse all who enter....

# Decompression Therapy

Axial Traction as a clinical technique

Our goal is to give you the necessary information, training & equipment to be the best Decompression clinician getting the best possible results.

(They threatened to kill my cat if I didn't say that...)

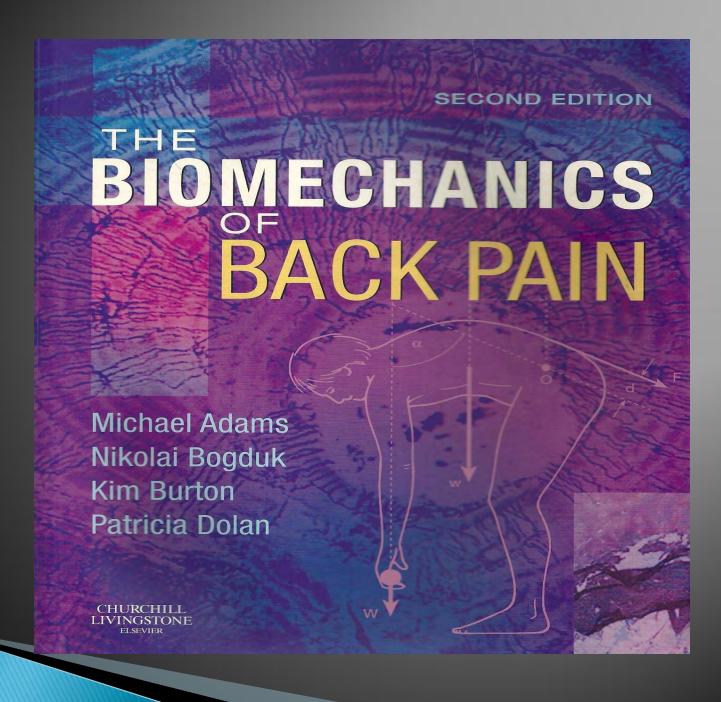
# Our guarantee:

We promise not to lie to you about anything this entire seminar...

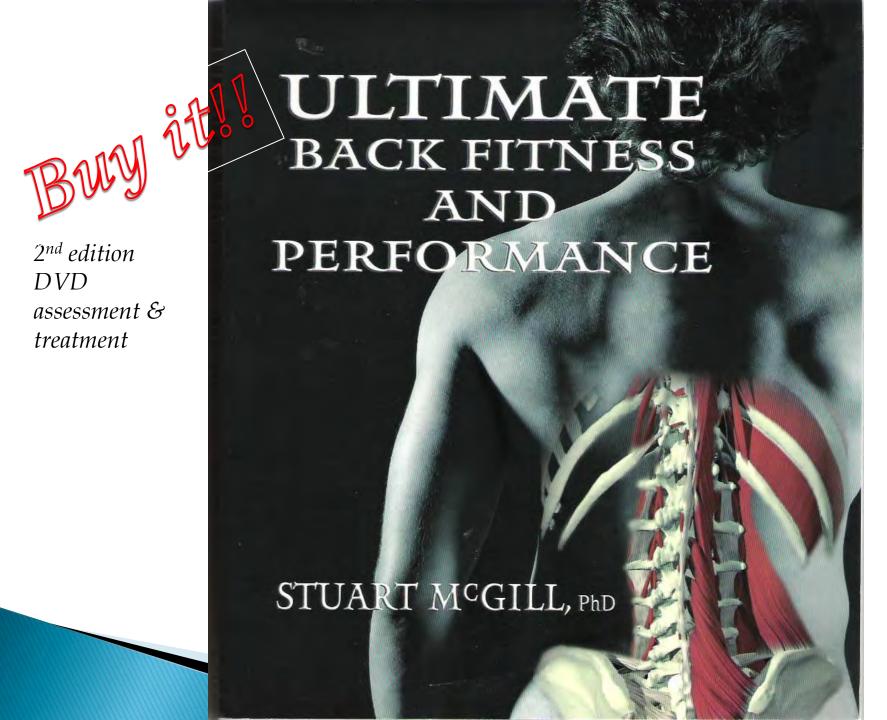
unless it becomes absolutely necessary.

Which it usually does...





2<sup>nd</sup> edition DVDassessment & treatment



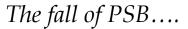
#### On the private-side of the website

See:

Why everyone needs Core training daily.....



Why Everyone needs Core Training.pdf







 $Lederman\_The\_fall\_of\_the\_postural-structural-biomechanical\_model.pdf$ 



DAY FOX PAUL-TAYLOR

NEUROMUSCULOSKELETAL CLINICAL TESTS

CHURCHILL LIVINGSTONE

#### NEURO-MUSCULOSKELETAL CLINICAL TESTS

RICHARD DAY
JOHN FOX
GRAEME PAUL-TAYLOR

A Clinician's Guide

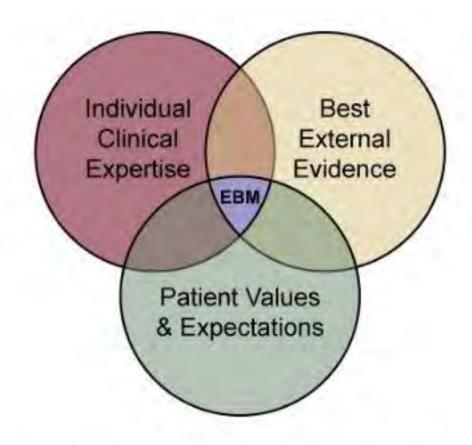
CHURCHILL

# Why a Decompression technique?

- Codify: a treatment with ample benefits BUT a lot of misinformation...
- Create: a classification system...to avoid an arbitrary application...

Define your enemy before you devise your battle...

Introduce: a few other valuable methods: Active movement concept, FmCl/FcCl & McGill stuff If all you have is a hammer...you'll treat everything like a nail.



The Evidence-based Medicine Triad

### Mechanical Treatment options

# 4 response *types*:

- Manipulation
- Traction
- Directional preference
- Stabilization

CPR's...Clinical Prediction Rules

**Spinal Compression** *is a syndrome and/or contributor in most patients* 

### Is There a Subgroup of Patients With Low Back Pain Likely to Benefit From Mechanical Traction?

Results of a Randomized Clinical Trial and Subgrouping Analysis

Julie M. Fritz, PhD, PT, ATC,\*† Weston Lindsay, MS, PT, ATC,\*

James W. Matheson, DPT, MS, SCS, CSCS,‡ Gerard P. Brennan, PhD, PT,\*

Stephen J. Hunter, MS, PT, OCS,\* Steve D. Moffit, OPT,\* Aaron Swalberg, MPT,\*

and Brian Rodriguez, PT, OCS\*

- Sciatic/pain below knee.
- Contralateral SLR.
- Initial peripheralization with extension.
- ▶ Low FABQ (2006 study)
- Foster directional preference with traction. position.
- Prone position with flexion-to-relief initially.
- ~35-50% bodyweight.

A clinical prediction rule for classifying patients with low back pain who demonstrate short-term improvement with mechanical lumbar traction.

Cai C, et al. Show all

Eur Spine J. 2009 Apr;18(4):554-61. doi: 10.1007/s00586-009-0909-9. Epub 2009 Mar 3.

#### Abstract

The objective of the study was to develop a clinical prediction rule for identifying patients with low back pain, who improved with mechanical lumbar traction. A prospective, cohort study was conducted in a physiotherapy clinic at a local hospital. Patients with low back pain, referred to physiotherapy were included in the study. The intervention was a standardized mechanical lumbar traction program, which comprised three sessions provided within 9 days. Patient

A

clinical prediction rule with four variables (non-involvement of manual work, low level fear-avoidance beliefs, no neurological deficit and age above 30 years) was identified. The presence of all four variables (positive likelihood ratio = 9.36) increased the probability of response rate with mechanical lumbar traction from 19.4 to 69.2%. It appears that patients with low back pain who were likely to respond to mechanical lumbar traction may be identified.

List of various "decompression" studies available as a document on the website



# Dixon 1979....

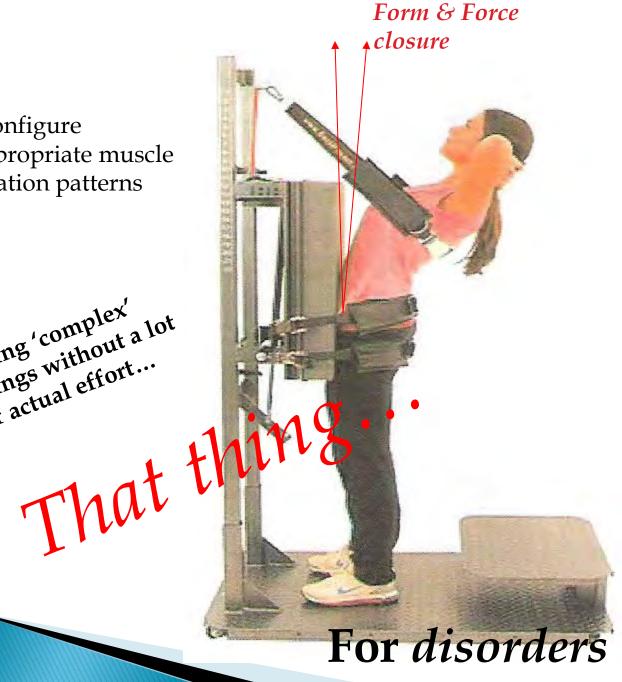
Subsequent studies from Mackenzie, Weber Nachemson and Waddle



For Compression

Re-configure Inappropriate muscle activation patterns

Doing complex a lot things without a lot of actual effort...



Repositioning of painful body region....

Then exercising "in" a new pattern



Your own thing(s)...

#### A mechanism of action of the ATM2

#### Abstract

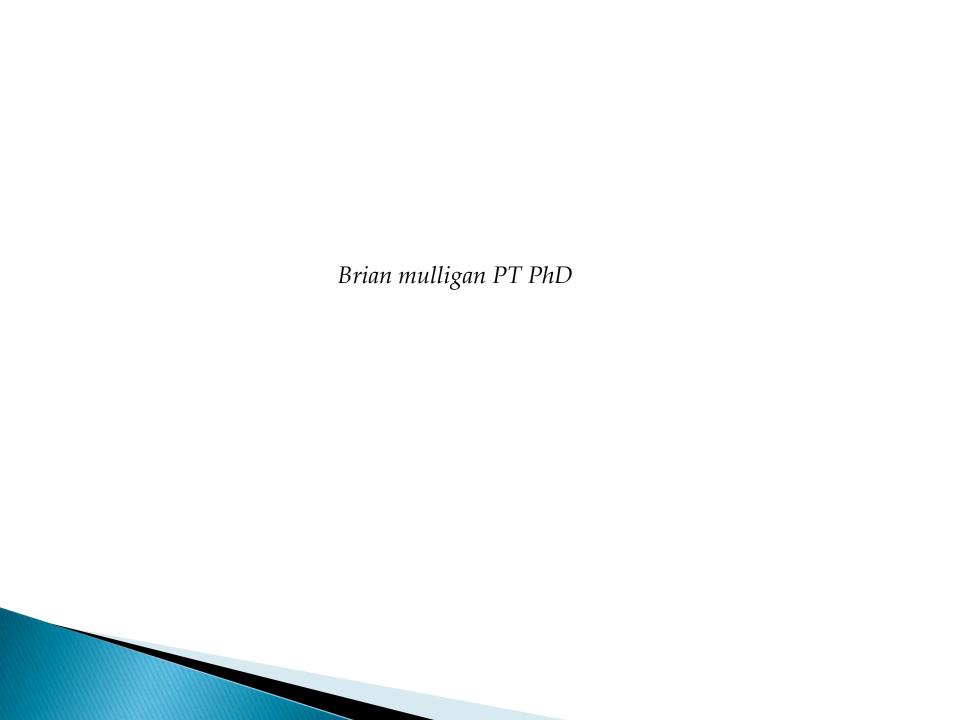
[Purpose] This study investigated the effects of a pelvic belt on the electromyography (EMG) activity of the abdominal muscles during a single-leg hold in the hook-lying position on a round foam roll. [Subjects] Seventeen healthy female volunteers were recruited for this study. [Methods] The participants performed single-leg-hold exercises on a round foam roll with and without a pelvic belt. Surface EMG was recorded from the rectus abdominis (RA), internal oblique (IO), and external oblique (EO) bilaterally. [Results] The EMG activity of the bilateral RA, EO, and IO was significantly lower when the pelvic belt applied. [Conclusions] Our finding that the bilateral EO, IO, and RA muscles were less active with a pelvic belt during trunkstabilizing exercises on an unstable surface suggests that the pelvic belt provided "form closure".

If you find yourself in a hole... quit digging...

A PRELIMINARY STUDY TO EVALUATE POSTURAL IMPROVEMENT IN SUBJECTS WITH SCOLIOSIS:
ACTIVE THERAPEUTIC MOVEMENT VERSION 2
DEVICE AND HOME EXERCISES USING THE MULLIGAN'S MOBILIZATION-WITHMOVEMENT CONCEPT

Lewis C et al. JMPT Sept(10) 2014





I have decided to leave my past behind me, so if I owe you money ... I'm sorry.. But I've moved on.

# Program Silly-bus

#### Classification analysis/provocative examination

Standing & recumbent assessment

Compression vs. movement disorder

Directional preference

Form-Closure & Force-Closure

LASER/modalities

Belting/restraint

Table lock & spring tension changes

Prone vs. supine

Cervical

ATM2/rehab

- 5% HNP vs 95% LBP
- Farfan TT
- Centralizers vs. partial vs. non
- Picking a scab
- Extension vs flexion...flexion intolerance
- Sitting/flexion-intolerance problems/end-plates

#### "Prediction detective"

#### Look at compression classifications:

- Directional relief/Extension (~60%)
- ✓ Or not...
- Better recumbent
- Sit-to-stand pain (disc not facet)
- Antalgia (painful to correct)
- Lateral bending/shift DP
- Form/force Closure pain (Fm/FcCL)
- 'Decompression' maneuvers
- IDP provocations: SLR/Millgrams
- Nerve Tension signs ULTT, Slump

  MRI

#### A shameless steal from Saharmanns book

Compression

Differences in the compressive forces on the intervertebral disks in different positions were reported by Nachemson. 37 In addition, contraction of the psous and the back extensor muscles also increases the compression forces on the spine. Compression force is the major factor if a patient's symptoms are alleviated or reduced when (1) recumbent, (2) standing rather than sitting, (3) sitting while supporting with the arms, or (4) sitting with the lumbar spine extended rather than flexed. Compression affects not only the disks but also the forces on the facet joints and ligaments. The effect of compression is not specific to any one category or diagnosis but must be considered as a contributing factor to the patient's movement impairment.

# Inflammatory syndrome

# Postural syndrome

End-range stress on normal structures

# Dysfunctional syndrome

~15%

End-range stress on shortened structures

# Derangement syndrome

Anatomical alteration of disc/nucleus

### Nerve root adherence

 $\sim 5\%$ 

A flexion dysfunctional syndrome

Movement disorder

Disc 'migration'

Reducible vs. irreducible

Mackenzie institute

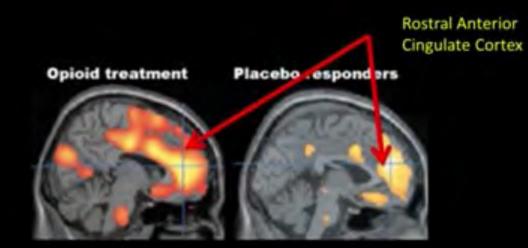
### Lest we get too committed to anything....

According to a meta-analysis of clinical trials in 2006, treatment utilizing the McKenzie method is somewhat effective for acute low back pain, but the evidence suggests that it is not effective for chronic low-back pain. [22] A 2012 systematic review agreed with this, finding that centralization occurred more frequently in acute patients (74%) compared to subacute (50%) and chronic (40%).[23] Also, centralisation was found to be more common in younger patients. Cervical centralization was observed in only 37% of patients.

### The (4)top business management tips:

- 1. Have a near ruthless dedication to money!
- 2. Strive to keep patients under care for at least 8 weeks!
- 3. Teach core 'control & training' and better sitting and bending.
- 4. give your patients HOPE...

Harvard researchers showed that expectation of relief from acupuncture also translated into stronger relief experienced by volunteers subjected to experimental pain. Their clinical observation was confirmed by functional MRI scans showing stronger activation of pain relieving structures in the brain. The researchers concluded that while acupuncture provides pain relief by sending blocking messages up to the central nervous system, messages regulating pain perception from the brain down can affect pain perception depending on person's expectations. This suggests that having a positive expectation when seeing doctors and undergoing various treatments may improve the outcome of these treatments.



Science (2002) 295: 1737-1740

### 4 Questions:

1. Do you know what's wrong?

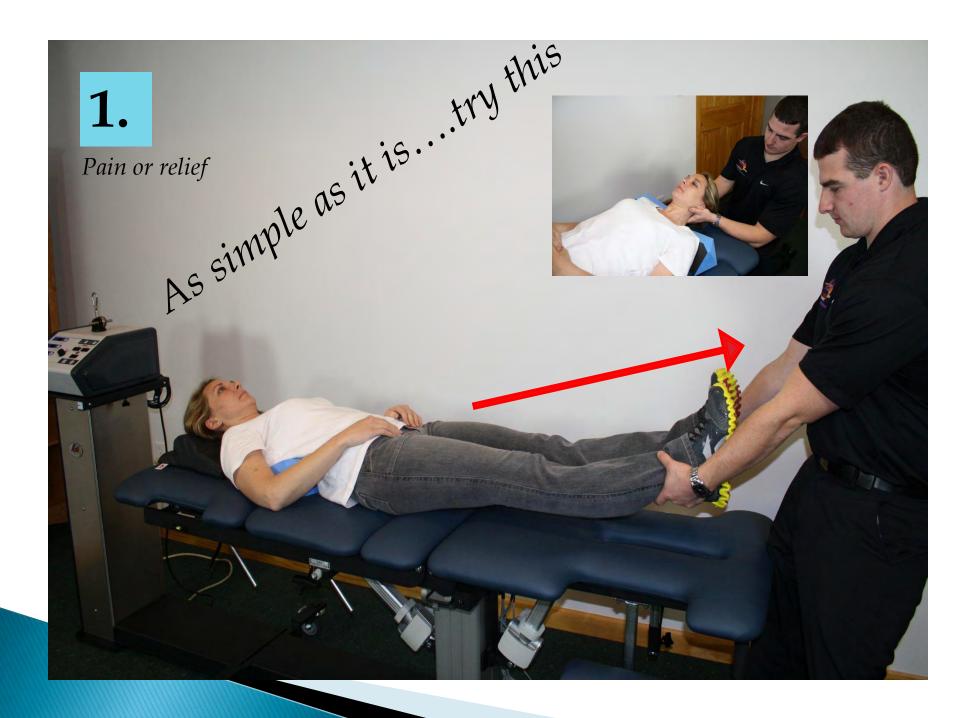
2. Can you fix it?

3. How long will it take?

4. How much will it cost?

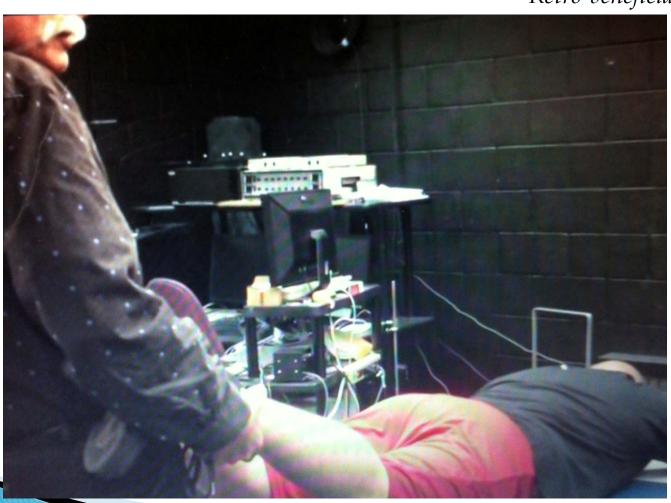
## Important Concepts...

- Distraction relieves pain
- Extension relieves pain
- Extension increases pain
- Distraction incites pain
- Somatic referral
- Radicular
- Form/force-closure



# Stuart McGill PhD demonstrating prone-extended traction with patient complaining of discogenic/referral pain

Retro-beneficial posture



Simple passive & active extension... Pain or relief

Fig. 15.26A

Can reveal an intact posterior disc with an extension Prone resting position directional preference...

When the motion segment is extended the facet joints contact each other and the center of rotation moves posteriorly toward the facets, causing the anterior disc space to widen. This effectively shields the posterior disc from further compression [<u>32</u>]. Gay et al 2008 And why 'standing' often feels better than sitting Painful
Peripheralizing
extension can
reveal a lessresponsive,
complex disc or
nerve-involved
condition...

#### INTERVENTIONAL

### Prone Lumbar Mechanical Traction in Patients with Signs of Nerve Root Compression

### Predictor Variables

- 1. Peripheralization with repeated lumbar extension
- 2. Positive crossed SLR

#### Clinical Bottom Line

The presence of one or more predictor variable helps to identify patients with signs of nerve root compression who have a higher likelihood of experiencing a 50% reduction in disability after 6 weeks of manual therapy, extension exercises, lumbar traction, and education. The methodological quality of the derivation study was acceptable; therefore, it is appropriate to use this CPR as a component of the best available evidence.

### Examination

- Peripheralization with repeated lumbar extension (Figure 7.18)
  - Standing, the patient repeatedly bent backward for 10 repetitions to assess the change in lower extremity symptoms. If symptoms moved distally it was considered peripheralizaton.



Often
Traction is
the ONLY
viable
treatment
option
initially...
For noncenteralizers

4.

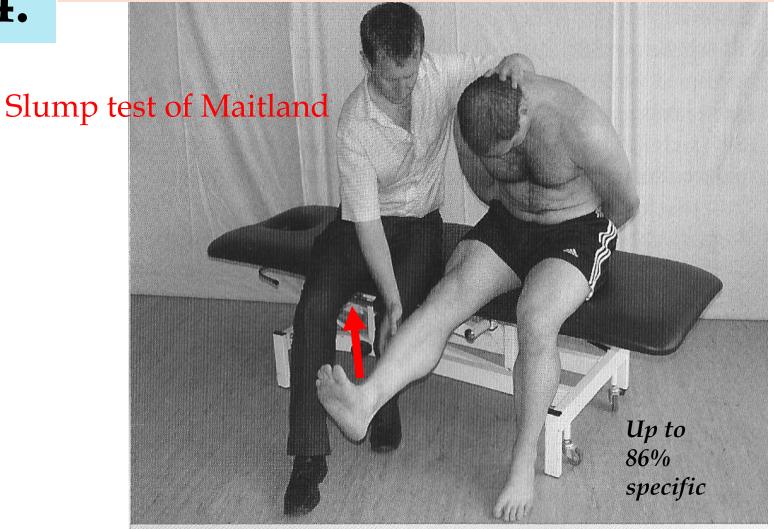


Fig 10.3 Slump test: The patient extends one knee and reports any change in symptoms.

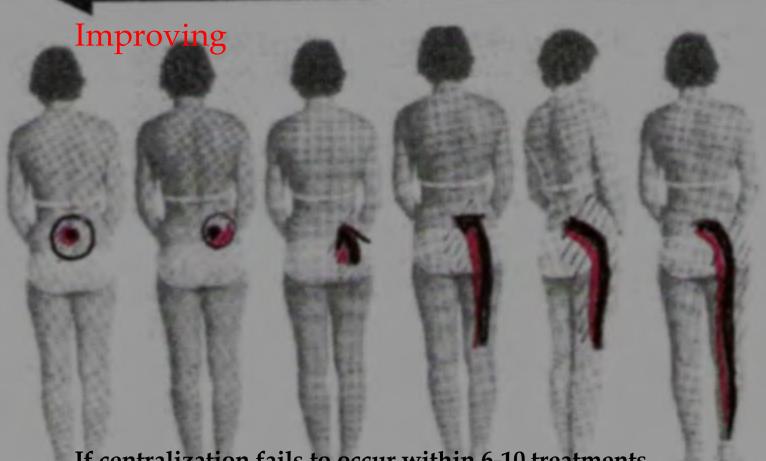
IF 'negative' Not an issue

# Femoral stretch test for upper nerve levels....



### The Centralization Phenomenon

Most studies verify the importance of 'centralizing' symptoms.



If centralization fails to occur within 6-10 treatments trouble may be a brewin'.....

### A quick digression:

An 'adhered nerve root' is a flexion dysfunction syndrome according to Mackenzie with the following signs:

- 1. Recent sciatic.
- 2. Symptoms of 2-3 months.
- 3. Leg pain only produced upon "loading" of irritated tissues.
- 4. Major limitation in standing-forward-flexion.
- 5. Consistent movement produces pain that subsides soon after movement stops.

Lying knee-to-chest is given to judge above symptoms & response

This is NOT a centralizing/peripheralizing activity i.e. derangement

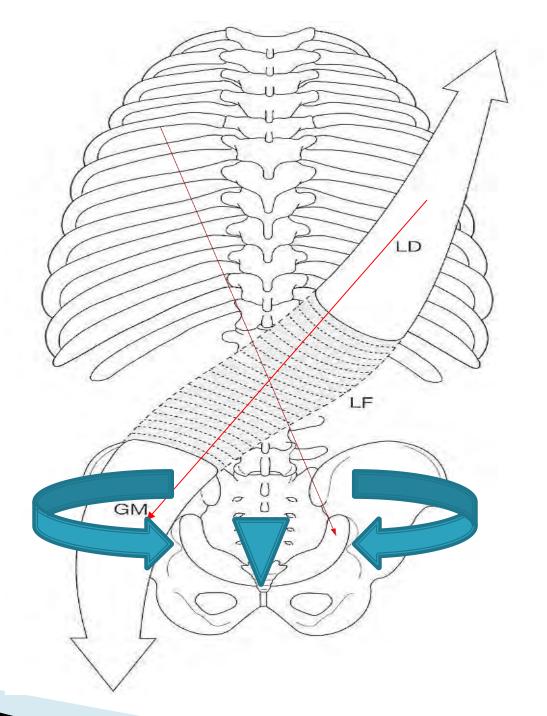
Continued "flexion" activities can be very helpful





# Anatomical Form-closure

Our Form-Closure is external & "supplemental"



# Effects of external pelvic compression on form closure, force closure, and neuromotor control of the lumbopelvic spine — A systematic review

Ashokan Arumugam, Stephan Milosavijevic, Stephanie Woodley, Gisela Sole

Received 8 August 2011; received in revised form 27 January 2012; accepted 31 January 2012, published online 05 March 2012.

Abstract

Full Text

References

### Abstract

Optimal lumbopelvic stability is a function of form closure (joint anatomy), force closure (additional compressive forces acting across the joints) and neuromotor control. Impairment of any of these mechanisms can result in pain, instability, altered lumbopelvic kinematics, and changes in muscle strength and motor control. External pelvic compression (EPC) has been hypothesised to have an effect on force closure and neuromotor control. However, the specific application parameters (type, location and force) and hypothesized effects of EPC are unclear. Thus, a systematic review was conducted to summarize the *in vivo* and *in vitro* effects of EPC. Eighteen articles met the eligibility criteria, with quality ranging from 33% to 72% based on a modified Downs and Black index. A modified van Tulder's rating system was used to ascertain the level of evidence synthesised from this review. There is moderate evidence to support the role of EPC in decreasing laxity of the sacroiliac joint, changing lumbopelvic kinematics, altering selective recruitment of stabilizing musculature, and reducing pain. There is limited evidence for effects of EPC on decreasing sacral mobility, and affecting strength of muscles surrounding the SIJ, factors which require further investigation.

The pelvis can be stabilized either "force closure" or "form closure". Snijders et al. coined the term form closure to describe how the joint's shape contributes to stability, whereas "force closure" refers to other forces acting across the joint to create stability<sup>5</sup>). According to theoretical modeling of force closure, the anterior attachment of the transverse and internal oblique abdominal muscles to the iliac crest places the muscle ideally to act on the ilium

## brief digression (SI joint):

You have an  $\sim$ 70% positive likelihood the SI is a source of cLBP/buttocks pain if 3 of 5 SI tests are positive.

Likewise if 3 of 5 are negative there is an  $\sim$ 70% likelihood you do not.

### SI Joint Common Symptoms

- Lumbosacral pain
- Buttock pain
- Pain referring to the groin
- · Hip girdle, thigh and leg pain
- Poor sleep habits
- Sitting problems
- Unilateral leg instability

**FABRE** 

Gaenslens

Distraction

Thigh trust

### Side compression

SI "can" mimic discogenic pain...though less likily to radiate from L4/L5

Degeneration of Sacroiliac Joint After Instrumented Lumbar or Lumbosacral Fusion

A Prospective Colourt Study Over Five-Year Follow up

Results. The incidence of SIJ degeneration in the fusion group was 75% (24/32), which was significantly higher than that of the control Group 38.2% (13/34) (P < 0.05). The incidence of SIJ degeneration (bilateral and unilateral) and bilateral SIJ degeneration was higher in group 2 than in group 1 (P = 0.028 and 0.04, respectively).

and the state of t



# Hip differentiation

# Why are Form & Force *Closure* tests important?

Muscle contraction increases disc compression; discs hurt when muscles contract.

Disc compression vs. Movement *Disorder* 

# 'Discs' tend to be irritated, not helped with Fm/FcCL

A **reduction** in the "protective" contraction patterns leading to an *increase* strain/load on the disc

Thus an increase of pain is perceived...

## F.A.C.T.R treatment strategy

- Find the impairment (Global)

  Global bending & motion assessment
- Assess the impairment
- Create an awareness in the patient of...
- Treat the impairment
- Reassess the impairment

# "Back Pain"....

- Everything in general...nothing in particular
- #1 disabler worldwide...excepting marriage
- No single treatment has ever been shown to improve on the natural history of the phenomena".



Remedies that really work.

LOW BACK PAIN

### Back Pain Myths Slideshow





### Fact: Chiropractic Care Can Help

The American College of Physicians and American Pain Society guidelines for treatment of lower back pain recommend that patients and doctors consider other options with proven benefits, such as spinal manipulation or massage therapy.





WebMD

Q

### Decompression?

Nonsurgical spinal decompression is a type of motorized traction that may help relieve back pain. Spinal decompression works by gently stretching the spine. That changes the force and position of the spine. This will take pressure off the spinal disks, which are gel-like cushions between the bones in your spine.

Proponents of this treatment say that over time, negative pressure from this therapy may cause bulging or herniated disks to retract. That can take pressure off the nerves and other structures in your spine. This in turn, helps promote movement of water, oxygen, and nutrient-rich fluids into the disks so they can heal.

### (continued)

# What Is Nonsurgical Spinal Decompression? continued...

Doctors have used nonsurgical spinal decompression in an attempt to treat:

- Back or neck pain or sciatica, which is pain, weakness, or tingling that extends down the leg
- Bulging or herniated disks or degenerative disk disease
- Worn spinal joints (called posterior facet syndrome)
- Injured or diseased spinal nerve roots (called radiculopathy)

## Traction vs. Decompression

NOT Machine dependent per se.

Except that it can ONLY occur on a Kdt table....

Degenerative

Dependent on the 'status' of the disc.

# The FDA & Decompression

- The FDA allows manufacturers to state: traction achieves its effect (pain relief) via decompression of spinal structures.
- Decompression is: unloading due to distraction and positioning.

Distraction predictably reduced nuclear pressure. The effect is related to the degenerative status of the disc which alters compressive loads. Adding flexion or extension had no additional effect on the IDP.

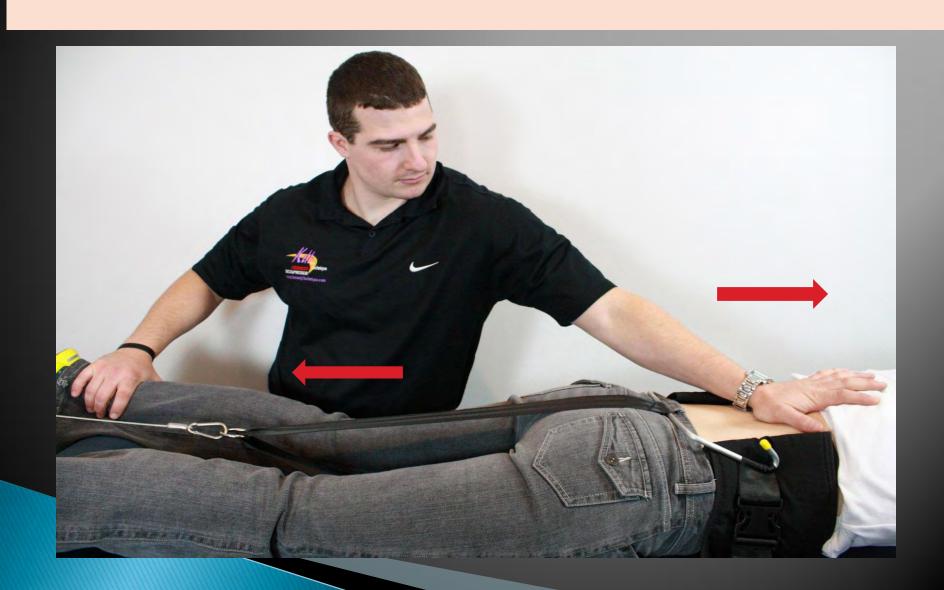
1: Spine J. 2008 Nov-Dec;8(6):982-90. Epub 2007 Nov 5.

Stress in lumbar intervertebral discs during distraction: a cadaveric study.

Gay RE, Ilharreborde B, Zhao KD, Berglund LJ, Bronfort G, An KN.

Department of Physical Medicine and Rehabilitation, Mayo Clinic, 200 1st St. SW, Rochester, MN 55905, USA. rgay@mayo.edu

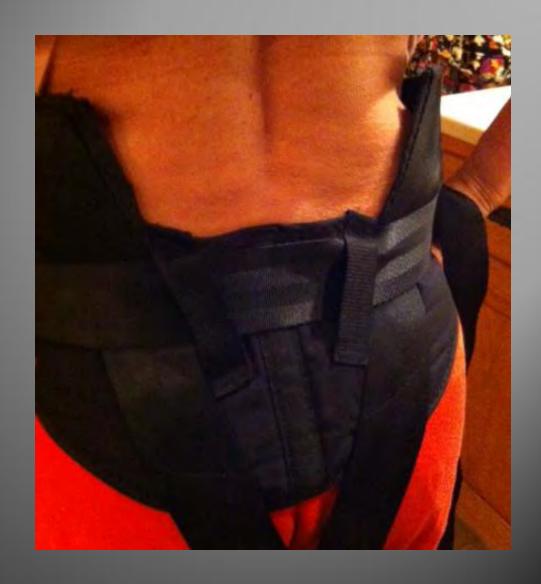
### Manual '*interface*' to distract upper level(s)



Newest belt design:

# VERSA-Belt

Prone, supine, prone-open and side-lying



The normal lumbar nucleus is displaced anteriorly by extension and posteriorly by flexion when lying [29, 30] but changes in nucleus pressure and position in degenerated discs are not as predictable [29, 31, 32] and degenerated discs have been noted to bulge posteriorly with extension [30, 33]. Our findings are consistent with reports that degenerated discs may respond differently than healthy discs to flexion and extension [30, 31, 33] and extends that observation to include flexion and extension combined with distraction. The qualitative differences we observed in stress distribution between relatively healthy and degenerated discs might be due to the degenerated discs being unable to generate or maintain nucleus pressure.

The primary mechanical theory underlying the use of distraction therapies for disc herniation is that they reduce nucleus pressure and pull peripheral nucleus tissue toward the center of the disc [34-36]. Distraction has been shown to produce temporary negative pressure in the nucleus of living patients [18]. Nucleus pressure in the present experiment became negative during axial-distraction in 4 of 8 low degeneration discs but in only 1 of 7 high degeneration discs.

Farfan (1973)<sup>5</sup> suggests that the presence of radial basis in the annulus precedes disc derangement. Harris a Macnab (1954)<sup>6</sup> demonstrated that radial tears are related to underlying compression fractures of the vertebral end plates. As radial fissures also occur in the absence of compression injuries. Farfan proposes that with a sudden severe fast rotation stress or with repeated torsional strain radial tears may develop as a result of penetration of the weakened annulus by nuclear material.<sup>5</sup>

Disc damage is followed by a natural healing proinjury to the annulus initiates progressive fibrosis of the nucleus and inner annulus, and granulation tissue is tan down in the nucleus as well as in the radial fissures. Once the disc is injured, it may never regain its original strength and stiffness. The scar tissue in the disc reduces its nurmal elasticity and it requires less mechanical stress to re-injure the disc. This sequence of events may well be the rationalfor the development of low back pain recurrence and in high incidence.

# In-tact (hydrostatic) disc...

- ▶ Less than 40–50% desiccated.
- Contained (outer wall in-tact).
- + Valsalvas
- Typically both back and Leg pain/referral
- Typically a Directional preference
- Most often Extension

The annulus can't "decompress" ... it is subjected to the action of compression/tension or changes in fluid content of the nucleus.

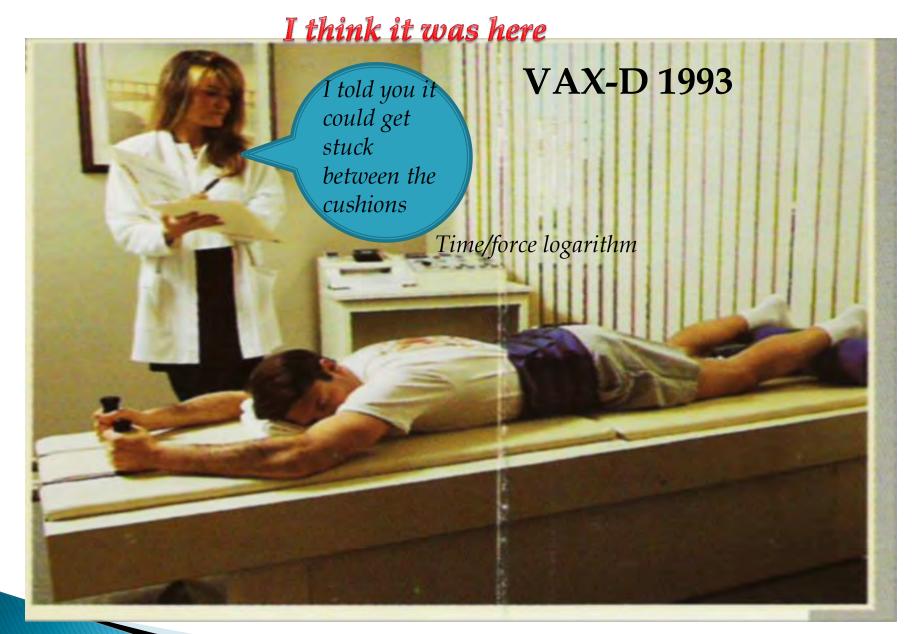
But a damaged annulus can & does cause a lot of pain...

Nucleus pulposus pressure has been used to calculate axial loads on the spine [25, 27]. This is appropriate because the normal nucleus acts as a fluid with the stress being hydrostatic or isotropic (equal in all directions). As such it is a scalar quantity that can be measured with strain gauge technology. Quantifying stress in the anulus is more problematic. Annular stress is not isotropic but anisotropic with different vertical and horizontal components

In case you're really frightened by Ebola keep this in mind...



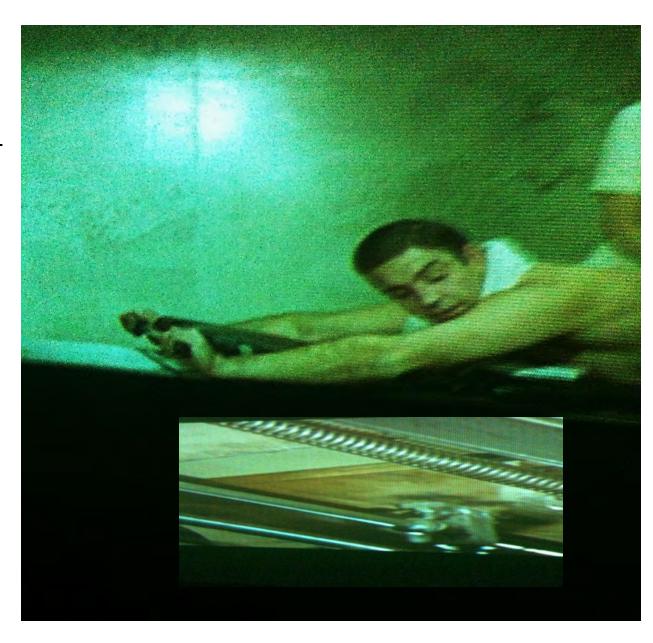
# 2 minute Decompression history....



Lay down, hold on & shut up

### **Thunderball**

1963 Suspiciously VAX-D like...40 years earlier.



#### Other \$30-125,000 units





## Trunk muscle response to various protocols of lumbar traction.

Cholewicki et al Manual Ther 2009

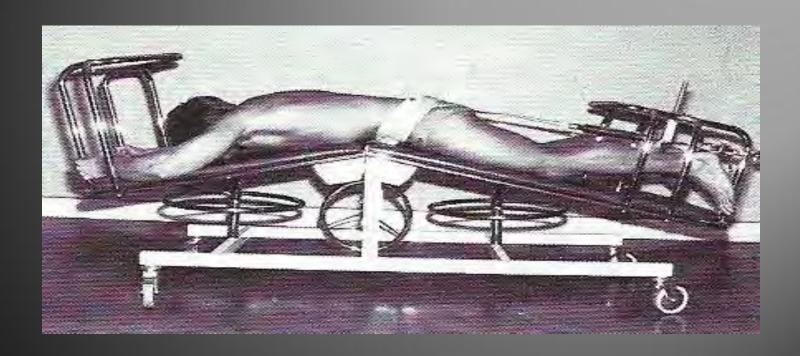
- Researchers found "muscle activity is minimal during traction". In fact muscle activity was .065% MVA (vs. 1.7% in static standing).
- Authors concluded traction increases disc fluid flow (as evidenced by limited sit-and-reach) and muscle activity during traction is not an impediment.

#### Note:

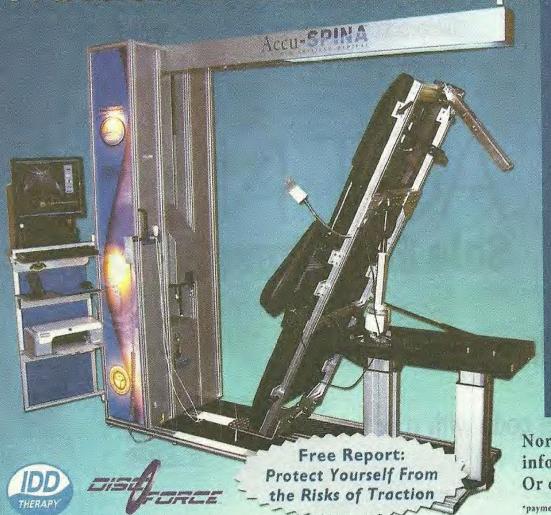
p. 264 Low Back Pain (*Cox 1999*):

EMG shows F/D creates up to 12% MVC of paraspinal muscles during treatment: "activity of the muscles should be monitored during F/D procedures".

#### **Auto-Traction 1970**



Traction is NOT Decompression



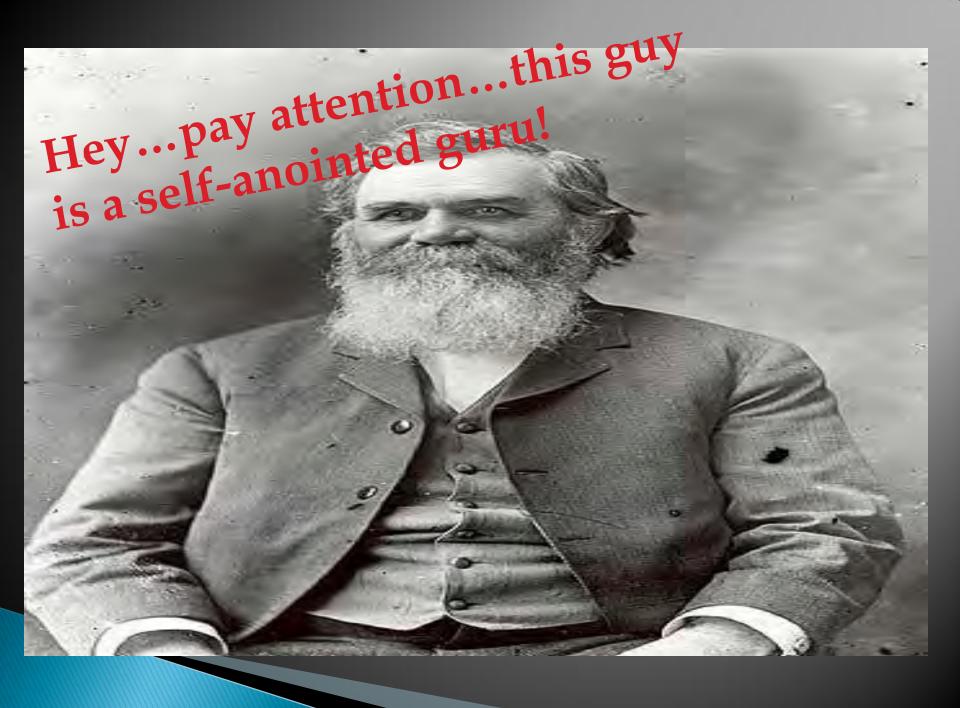
Don't be fooled by self-anointed gurus pushing traction devices with no successful studies to back them.

For as little as \$180/mo\* you can have the best decompression systems as proven by our 92% success rate.

New or Pre-Owned,
North American Medical
can fill your equipment needs
without exposing you and your
practice to the liabilities of
purchasing inferior equipment
from NON-FDA regulated resellers.

North American Medical Corp. info@namcorporation.com Or call: (770) 541-0012, ext. 5340

\*payments vary by model †US Musculoskeletal Review 2006, Issue if



## Then what is Decompression?

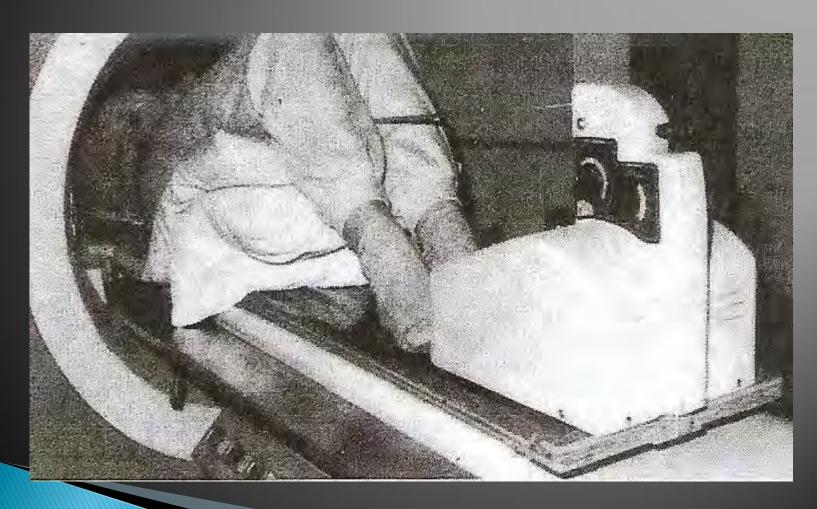
A codified, patient classificationbased application of axial traction with the intention of 'decompressing' a compressed structure, namely a disc.

- > To enhance healing/promote diffusion/OSMOSIS
- > Reduce outer annular protrusions Pain relief
- > Reduce nerve/disc impingement
- > Modulate mechanoreceptors
- > Reduce muscular tonicity
- > Foster directional preference
- > Solve all the world's problems

And to make you enough money that you can continue to eat at taco bell without feeling guilty!

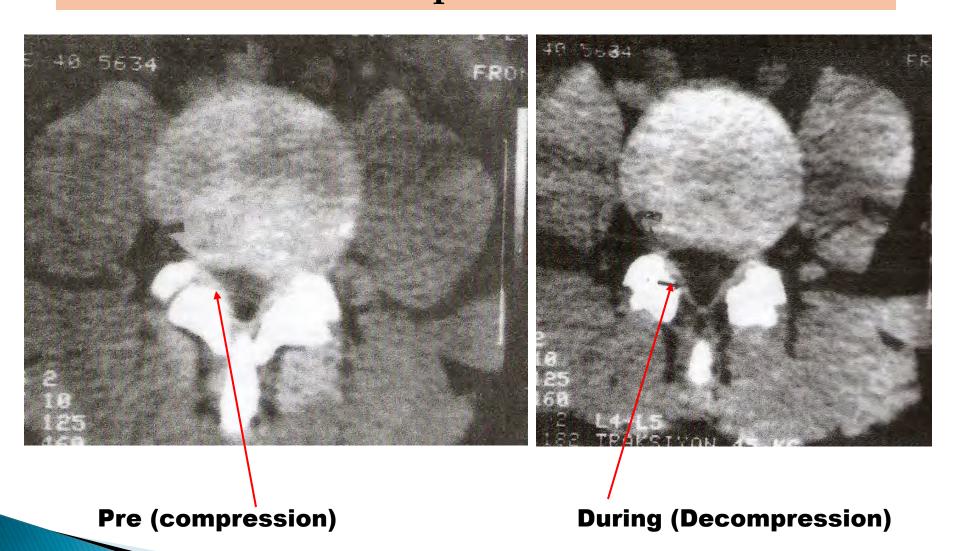
## What does traction dop

Onal et al (Spine) 1989 Traction in CT scanner



Demonstrable reduction in size of herniations with reduced pain.

#### Disc & neural decompression in an intact disc



## COMPARISON OF 3 PHYSICAL THERAPY MODALITIES FOR ACUTE PAIN IN LUMBAR DISC HERNIATION MEASURED BY CLINICAL EVALUATION AND MAGNETIC RESONANCE IMAGING

Zeliha Unlu, MD,<sup>a</sup> Saliha Tascı, MD,<sup>b</sup> Serdar Tarhan, MD,<sup>c</sup> Yuksel Pabuscu, MD,<sup>d</sup> and Serap Islak, MD<sup>e</sup>

2008 JMPT

Traction, LASER, US

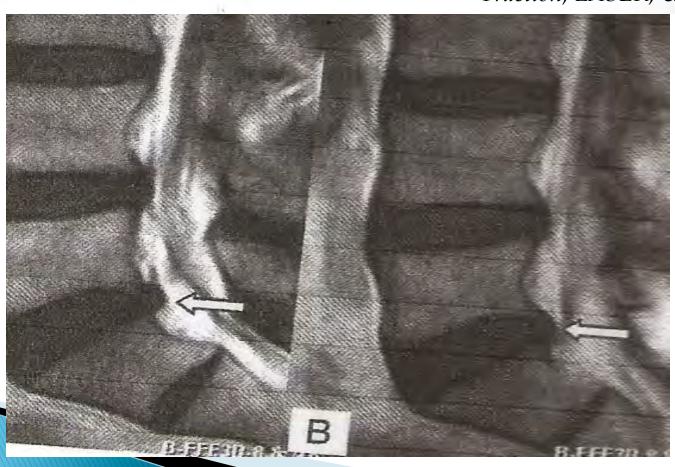


Table 4. The levels of LDH in all therapy groups

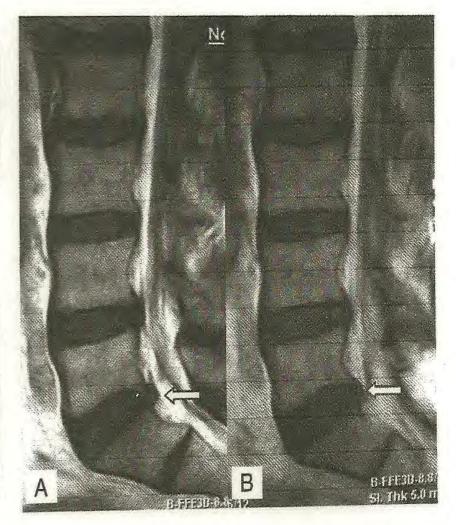
	No. of patients at the L2-L3	No. of patients at the L3-L4	No. of patients at the L4-L5	No. of patients at the L5-S1
Traction (n = 20)	1 (5)	5 (25)	17 (85)	14 (70)
Laser (n = 20)	2 (10)	2 (10)	15 (75)	14 (70)
Ultrasound (n = 20)	3 (15)	10 (50)	19 (95)	13 (65)

Data in parentheses are percentages.

Table 5. Changes in size of the herniated mass on MRI

		Traction (n = 20)		Laser (n = 20)		Ultrasound (n = 20)	
		Mean (SD)	P value	Mean (SD)	P value	Mean (SD)	P value
Size Before (mm) treatment After treatment	5.5 (1.6) 4.9 (1.8)		4.7 (2.1)				
	After	4.4 (1.4)	*000	4.1 (1.5)	.000*	3.6 (1.3)	.000*

<sup>\*</sup> Significant recovery compared to baseline values in the same group (P < .05).



#### **Decompression:**

"Sweeps 'compression' out of the way" temporarily...

This affords a more decisive evaluation & classification.

Compression vs. movement disorder

# Why 'look' for that differential???

Because the ATM2 is SO amazing at addressing movement-pattern pain and disorders that we're ALWAYS looking to find those people....!

#### **DISC/Compression**

### the "TRACTION 3"

- Decompression...nutrient enhancement, healing improvement, centripetal effect (dependent on the *health* of the disc).
- 'Stretch'... regional mobilization, stimulation & modulation of mechanoreceptors I, II, III, 'stretch' of shortened structures.
- 'Placebo' effect

## We are reducing "adverse axial mechanical loading"

....To 'trigger' healing.

In the long run fitness and posture MUST be addressed

### As well as Advil deficiencies....

## A "phasic physiologic phenomena".....

Bogduk

What happens must be during the **action of traction**. No discernible tissue "creep" remains after arising. However disc osmosis may 'trigger' a healing effect & collagen cross binding and reduction of pain mediators.

Diffusion of fluids

Pain relief via Modulation of nociception (type IV)

Type I, II, III mechanoreceptors. Influenced by 'traction'

B.D. Wyke

## 3 studies on tractions' effects...

- Disc decompression
- Foraminal enlargement
- Reduced size of HNP

1: Physiother Theory Pract. 2005 Jan-Mar;21(1):3-11.

Related Articles, Links

Related Articles, Links

Computed tomographic evaluation of lumbar spinal structures during traction.

Sari H, Akarirmak U, Karacan I, Akman H.

Department of Physical Medicine and Rehabilitation, Medical Faculty of Cerrahpasa, Istanbul University, Istanbul, Turkey.

Spine J. 2008 Jul-Aug;8(4):619-23. Epub 2007 Jun 21.

## Quantitative changes in the cervical neural foramen resulting from axial traction: in vivo imaging study.

Liu J, Ebraheim NA, Sanford CG Jr, Patil V, Elsamaloty H, Treuhaft K, Farrell S.

Department of Orthopaedic Surgery, Medical University of Ohio, 3065 Arlington Avenue, Toledo, OH 43614, USA. jialiu@meduohio.edu

1: Rheumatol Int. 2005 Oct 25;:1-5 [Epub ahead of print]

SpringerLink

Effect of continuous lumbar traction on the size of herniated disc material in lumbar disc herniation.

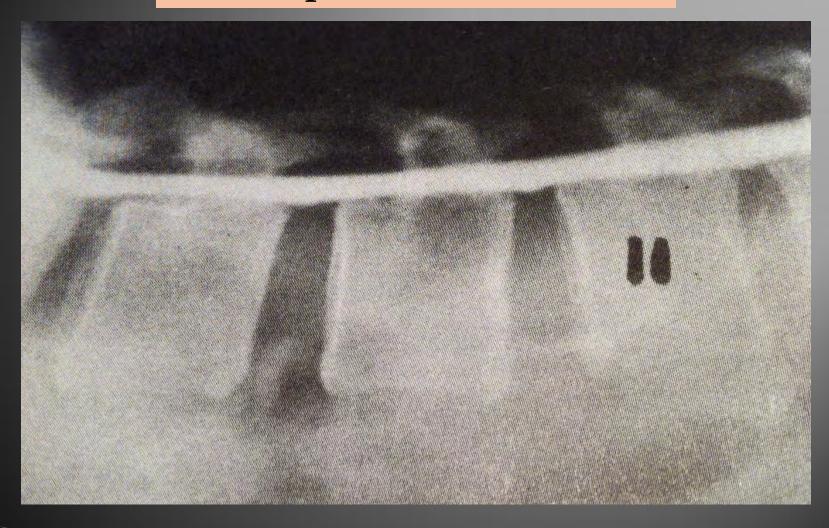
Ozturk B, Gunduz OH, Ozoran K, Bostanoglu S.

Department of Physical Medicine and Rehabilitation, Institution of Origin, Ankara Numune Education and Research Hospital, Ankara, Turkey.

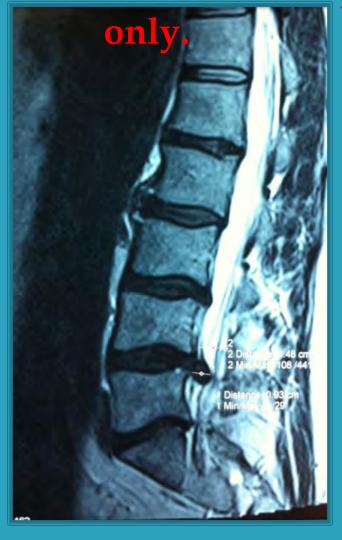
A viable therapy for most discogenic Low back/neck & leg/hip/groin projected or referred pain generated from the disc.

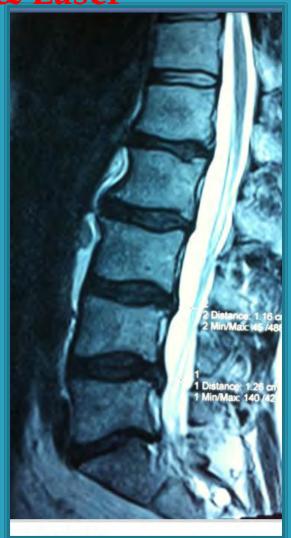
What else are you gonna do?...

### Decompression circa 1968

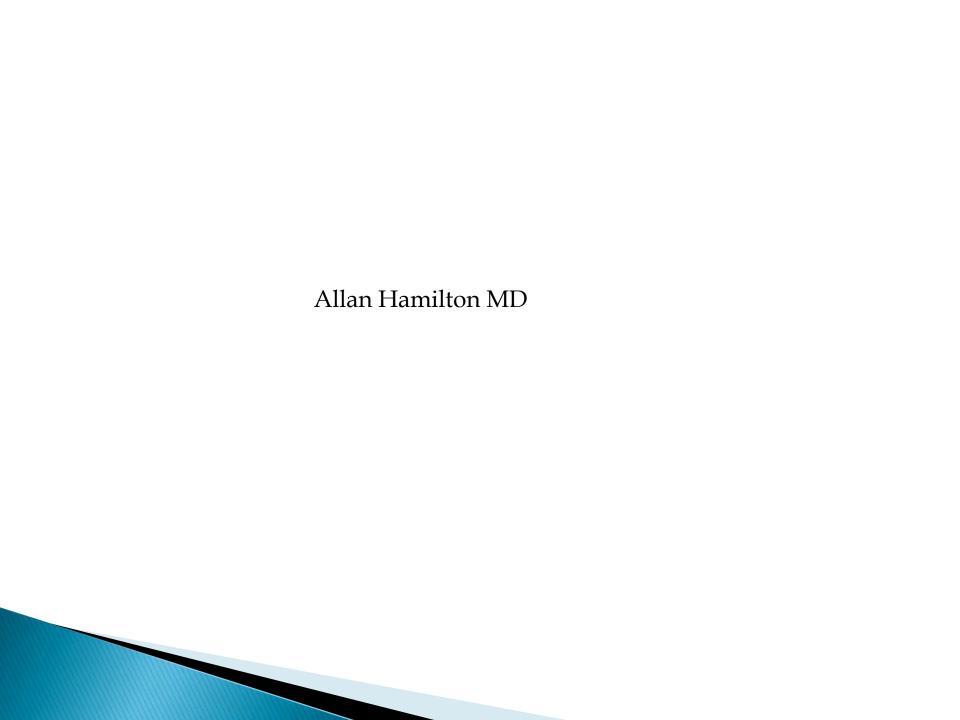


8 week post MRI...Decompression & Laser





 A herniated nucleus pulposus is most common in those aged below 40 years, whilst degeneration of discs tends to affect those aged over 40 years, with the prevalence increasing with advancing age. Disc lesions of the lumbar spine are more common than the cervical spine and disc lesions of the thoracic spine are rare.



"Bed rest reduces disc hydrostatic pressure below osmotic pressure...thus allowing an inflow of fluid".

"Traction is expedited bed rest...without the disuse side effects".

Cyriax (1960)

#### Classification basic assessment

### **Back Pain & impairment**

Disc/compression

Some of both...

Movement disorders

maybe disc but NOT compression

"Clinical Convenience"

The simplest classification

### Recognize....

#### **Compression (DISC)**

- Better 'decompressed'/recumbent or 'lordotic' seated position or 'sit-lift'
- Referral pain
- Relief position (DP)
- First 1/3rd ROM pain
- Deeper pain...poorly localized...ache
- 'Chemical' LEAKY Disc?
- Nerve tension signs

#### Disorder

- Recurrent motion provokes pain
- Localized
- Limited referral
- Highly mechanical
- Fm/FcCL relief
- End-range pain, typically **last 1/3<sup>rd</sup> R.O.M.**



Clinical examination procedures to determine the effect of axial decompression procedures on patients with LBP.

Holtzman et al JOSPT 2012 42(2)

#### Study of "compression" vs. *Disorder*....

This study classifies 'compression' & 'predictive' "tests".

A disc 'compression' syndrome will impair motion (but not be rectified via "realignment/repositioning FmCl/FcCl)... Lateral bend with "decompression"



Done sitting as well

#### Transitional "Decompression" lying



#### Transitional "Decompression' sitting



IF relief in a transitional Decompression position Traction is likely warranted



Manual 'Decompression" in side-lying

## And don't underestimate 'low force' or overestimate 'high force'

required for set-up and use.

Regardless, the conceptual basis for the use of mechanical traction is logical and consistent with the premise of the current study. Using procedures to decompress the lumbar spine should assist in decreasing symptoms if axial compression is contributing to the patient's LBP. In this study, the intensity of the decompression methods used was likely less than the typical intensity used for mechanical traction to distract lumbar vertebrae.10,11 Yet beneficial effects for this sample of patients with chronic LBP without radiating symptoms still were observed. This is consistent with the literature regarding the use of mechanical traction with less force. For example, and an ability of an arrangement of the arrangement of the

### Synergy-response Decompression

## Best done in a multi-focal treatment application.

High-power LASER...NO REALLY, they are worth it....

*Ultrasound/Combo* 

Exercise/directional preference

ATM2

Soft-tissue work/manipulation

Mild aerobics

**Nutritionals** 

Ergonomics

Medications when warranted

#### And keep doing this if it fits your clinical plan.



Physiother Theory Pract. 2010 May;26(4):256-66.

Lumbar extension exercises in conjunction with mechanical traction for the management of a patient with a lumbar herniated disc.

Gagne AR, Hasson SM.

Physiotherapy Associates, North Smithfield, Rhode Island, USA.

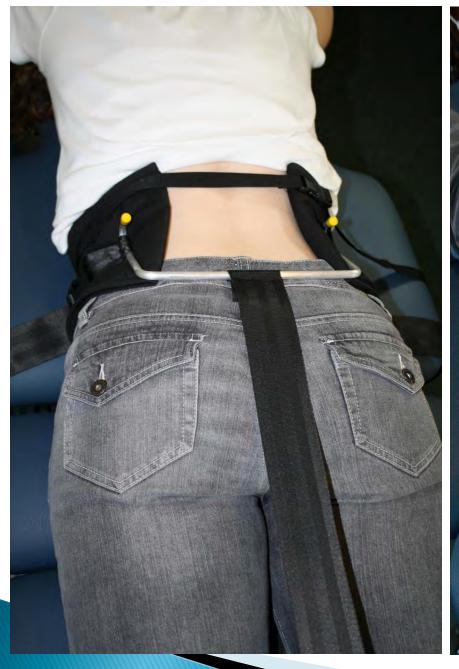
## Belting 101.5

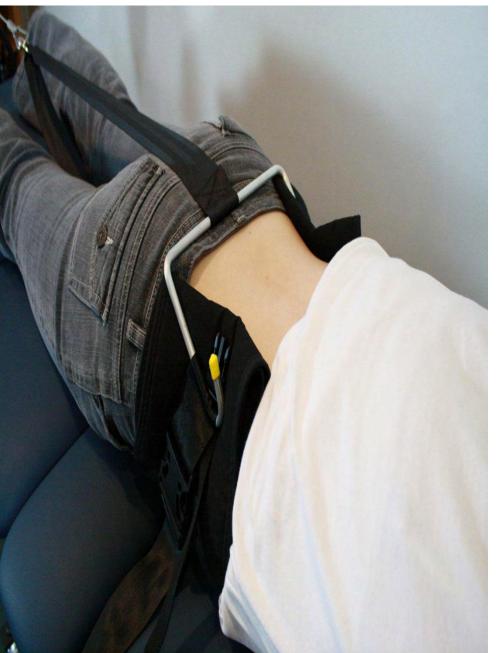
## OPEN ARCHITECTURE DECOMPRESSION ...

LASER or
Ultrasound
during prone
Decompression
therapy

2 for the time of 1







#### *In case you've dismissed Ultrasound.....*

EMC Musculoskelet Disord, 2012 Oct 2:13:192, doi: 10.1186/1471-2474-13-192

The effect of continuous ultrasound on chronic non-specific low back pain: a single blind placebo-controlled randomized trial.

Ebadi S1, Ansari NN, Naghdi S, Jalaei S, Sadat M, Bagheri H, Vantulder MW, Henschke N, Fallah E.

Author information

#### Abstract

BACKGROUND: Non-specific chronic low back pain (NSCLBP) is one of the most common musculoskeletal disorders around the world including Iran.

One of the most widely used modalities in the field of physiotherapy is therapeutic ultrasound (US). Despite its common use, there is still inconclusive evidence to support its effectiveness in patients with NSCLBP. The objective of this study was to evaluate the effect of continuous US compared with placebo US additional to exercise therapy for patients with NSCLBP.

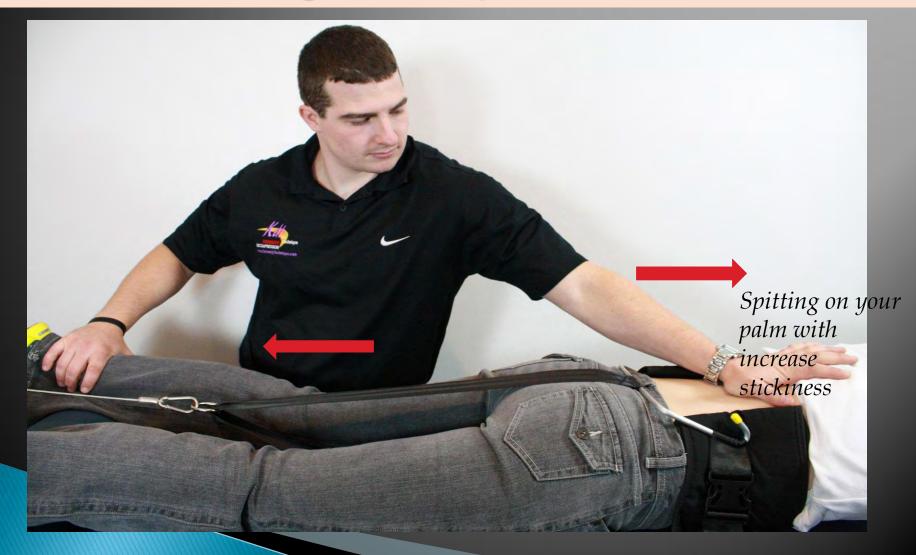
METHODS: In this single blind placebo controlled study, 50 patients with NSCLBP were randomized into two treatment groups: 1) continuous US (1 MHz &1.5 W/cm2) plus exercise 2) placebo US plus exercise. Patients received treatments for 4 weeks, 10 treatment sessions, 3 times per week, every other day. Treatment effects were assessed in terms of primary outcome measures: 1) functional disability, measured by Functional Rating Index, and 2) global pain, measured by a visual analog scale. Secondary outcome measures were lumbar flexion and extension range of motion (ROM), endurance time and rate of decline in median frequency of electromyography spectrum during a Biering Sorensen test. All outcome variables were measured before, after treatment, and after one-month follow-up. An intention to treat analysis was performed. Main effects of Time and Group as well as their interaction effect on outcome measures were investigated using repeated measure ANOVA.

RESULTS: Analysis showed that both groups had improved regarding function (FRI) and global pain (VAS) (P < .001). Lumbar ROM as well as holding time during the Sorensen test and median frequency slope of all measured paravertebral muscles did not change significantly in either group (P > .05). Improvement in function and lumbar ROM as well as endurance time were significantly greater in the group receiving continuous US (P < .05).

CONCLUSIONS: The study showed that adding continuous US to a semi supervised exercise program significantly improved function, lumbar ROM and endurance time. Further studies including a third group of only exercise and no US can establish the possible effects of placebo US.

**TRIAL REGISTRATION: NTR2251** 

# Manual '*interface*' to address specific level(s) during decompression



"I'm not saying let's kill all the stupid people I'm saying let's remove all the warning labels and let things sort themselves out".

Dali Lama

## Billing decompression...

- Traction 97012
- ▶ RUV 4.2...\$8.00-\$15.00 typically
- CPT allows only 1 unit

**NO** minimum time: 1 minute or 12 hours

▶ HCPC S9090

Decompression began as a cash service...as a way to create a lucrative non-insurance revenue stream.



Cost-effective and affordable equipment allows a fair cash reimbursement most all patients can afford...

## Decompression at 'your' office:

• Effective !

• Affordable!

• Available!

## Global fees;

15+ treatments are popular.

Many highly successful clinics "sell" 20-25 and "give-away" several further if needed

#### Often inclusive:

Decompression, Laser, Rehab, Brace, Adjusting, TENS, Netflix etc.

\$1500.00-\$1800.00 is Kdt typical

If you want more ....charge more...this used to be America!!

## Maitland: Vertebral manipulation

#### **Traction considerations**

\*Although many authors suggest certain forces, the signs & symptoms must guide...the actual force is for recording purposes only". "If 20-40#'s relieves use it".

"Rarely if ever is traction needed for more than 15 minutes" 1: Niger Postgrad Med J. 2006 Sep;13(3):230-5.

Effects of different cervical traction weights on neck pain and mobility.

Akinbo SR, Noronha CC, Okanlawon AO, Danesi MA.

Department of Physiotherapy, College of Medicine, University of Lagos.

Lower force makes more sense....

1: Eur Spine J. 2009 Jan 14. [Epub ahead of print]

Development of a clinical prediction rule to identify patients with neck pain likely to benefit from cervical traction and exercise.

Raney NH, Petersen EJ, Smith TA, Cowan JE, Rendeiro DG, Deyle GD, Childs JD.

Department of Physical Therapy, Wilford Hall Medical Center, 134 Evans Ave, San Antonio, TX, 78209, USA, Sanantoniogirl1@hotmail.com.

1: J Manipulative Physiol Ther. 2002 Mar-Apr; 25(3): 188-92.

J Manipulative Physiol Ther

Intermittent cervical traction for cervical radiculopathy caused by large-volume herniated disks.

Constantoyannis C, Konstantinou D, Kourtopoulos H, Papadakis N.

Department of Neurosurgery, University of Umea, Umea, Sweden.

If relief...don't necessarily increase.

• "It is wise to avoid being too aggressive in the initial session to any untoward effects".

"Not surprisingly very modest force (20#'s) can in fact prove the efficacy of the traction without any side-effects to the patient".

#### A few bites from McGill...

- Pulling the knees to the chest may give the perception of relief (via muscle stretch receptors) but this approach only guarantees more pain & stiffness the next day".
- "Eliminating spine flexion, especially in the AM has been proven very effective".
- Discs have only so many flexion cycles before they damage...don't waste them in flexion abdominal training".

- "With repeated flexion cycles the annulus breaches layer by layer with progressive delamination of the layers".
- "Subsequent twisting leads to circumferential 'rents' in the annulus that tend to make McKenzie extension approaches useless or exacerbating" in some cases". 2012 Meta-analysis
- "Even though straightforward it can't be stressed enough that if there are good days and bad days some activity, perturbed motion or motor control pattern is the cause".

#### Important clinical consideration

- Pain going from Sitting-to-standing is highly suggestive of DISC
- Pain standing-TO-sitting, or right after sitting is likely MOVEMENT DISORDER
- Kemps test may be nearly 100% specific for FACET (Laslett et al)

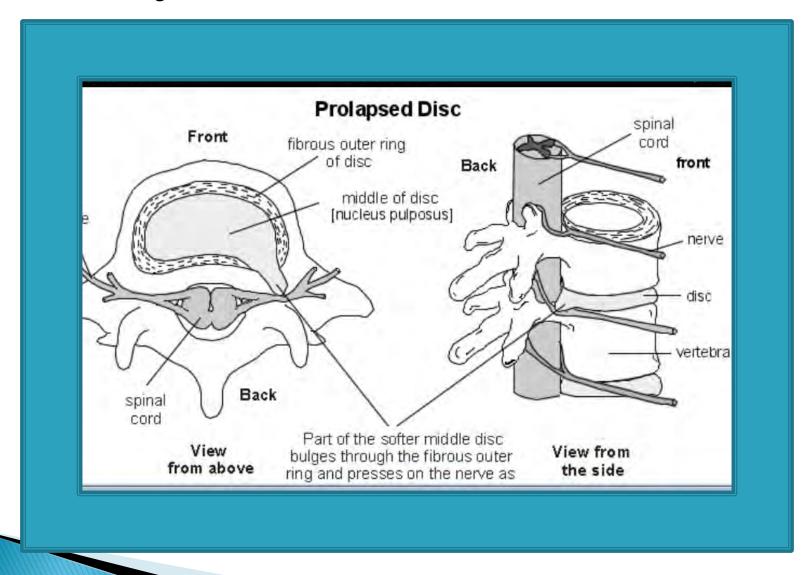
## The enemy(s).... DISC

▶ HNP...with or without nerve involvement

Degenerative disc syndrome

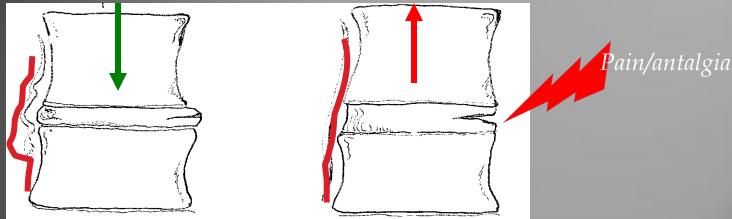
"Sprain"/disc-tear (outer annular wall)

## Dynamic disc model...



## Why 'Decompression' may hurt...

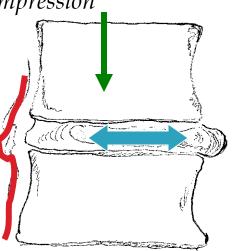
Annular disruption



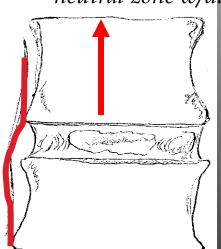
Annular irritation is NOT "distention" from internal nuclear pressure

Ligament laxity & enlarged neutral zone w/compression

Nuclear extrusion



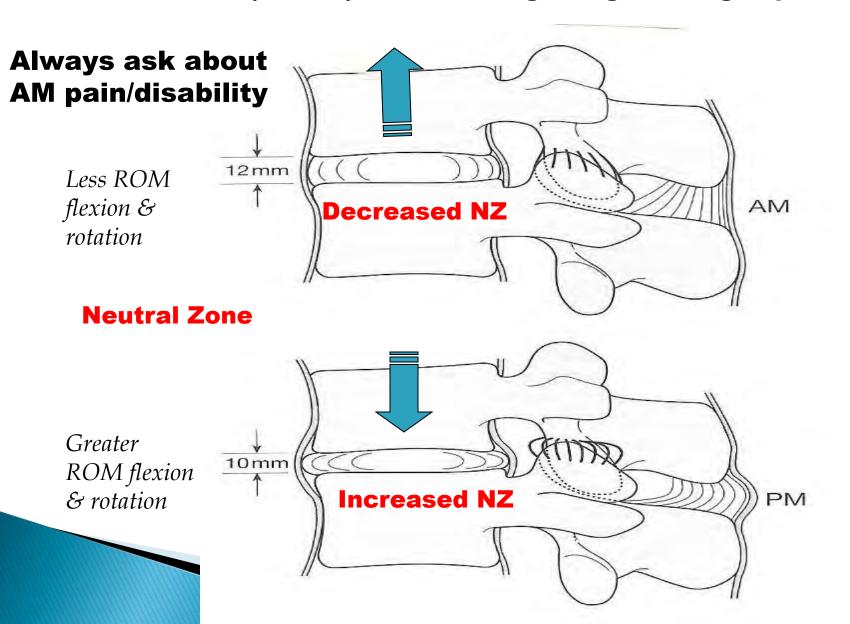
Ligament tension & reduced neutral zone w/distraction





Outer annular "distention" IS from internal nuclear pressure

#### Diurnal (AM/PM) disc 'swelling...height change up to 3/4"



## HNP

#### Without "stenosis":

- Directional preference
- Typically extension
- Often Prone Extension-to-relief

Less 'leg' symptoms

#### With "stenosis":

- Often poor DP
- 'flexion' relief
- Often supine
- Dominant leg symptoms

#### Disc referral pain (Somatic) vs. Nerve referral pain (radicular)

#### Somatic referral

- Diffuse, multiple sites...ache
- Usually not below knee (but can)
- Annular disc projected pain90%

#### Radicular

- Lancinating, consistent.
- Below knee/ankle
- Usually associated with numbness/motor loss
- Nerve compression or chemically induced.

  10%
  TNF

Somatic referral pain is based on "convergence": within the spinal cord afferents synapse on 2<sup>nd</sup> order neurons. The stronger the stimulus the more projection down the limb.

Radiculitis is a "pinched nerve"

## Get on the Silly-bus

#### Classification analysis/provocative examination

Standing & recumbent assessment

Compression vs. movement *disorder* 

Directional preference=centralization

Form-Closure & Force-Closure

#### Movement disorder

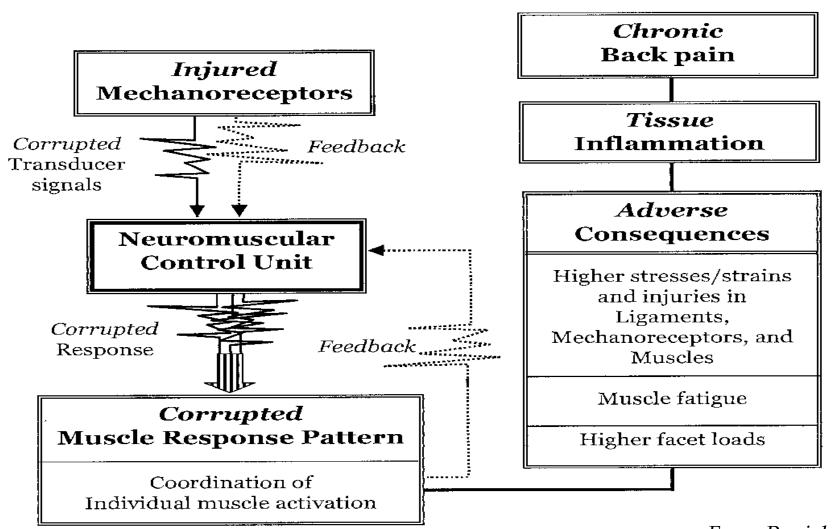
Inappropriate muscle activation patterns...'motor control deficits'

FmCl/FcCl (segmental or regional hypermobility).

 Corrupted transducer effect...sub-failure ligament damage (Panjabi) to corrupted signals for muscle activation patterns

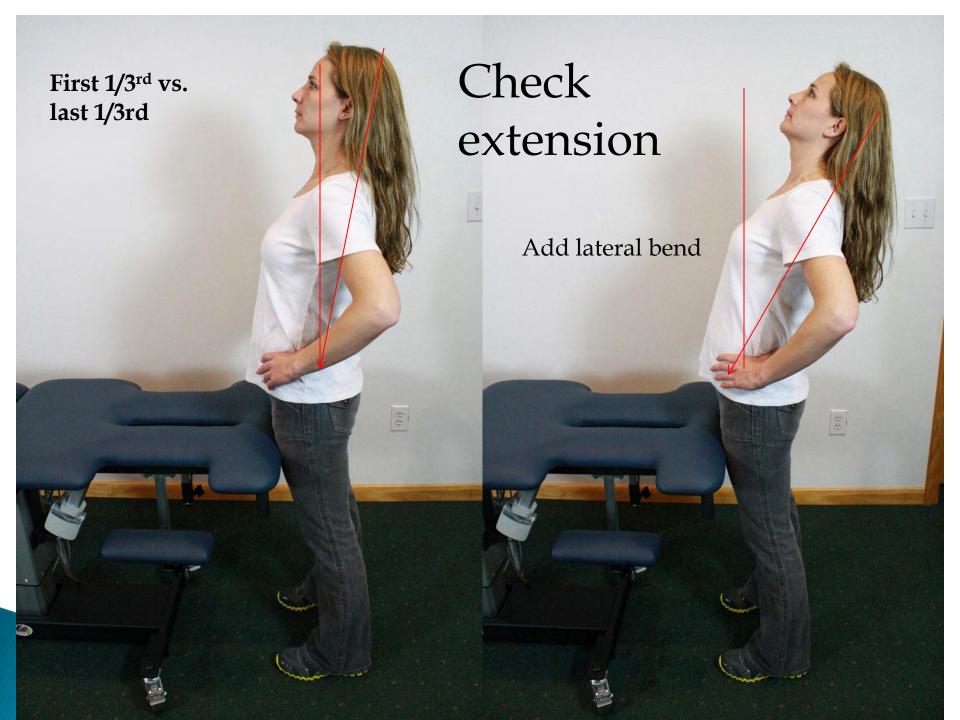
#### Movement *Disorder* theory:

#### Injured mechanoreceptors give corrupted signals



From Panjabi





## 1) Standing Flexion pain

'1st third vs. last 3rd'

1) Herniated disc...'migration effect' peripheralization of pain...(<55 yr old)

2) Movement disorder... + FmCL

## 2) Standing Extension pain

Extent & degree (°) pain begins:

- 1) **Migration pattern...Do 3–4** repetitions...Discs "*move*" & repetitions typically improve pain (stress–shielding?)
- 2) Movement *disorder...*+ FmCL/FcCL
- 3) Degenerative joint/imbrication (old...like me).





Extension (no translation) 1-20°

Add Laterality to >>disc/facet load

First 1/3<sup>rd</sup> Disc

Check Kemps

Last 1/3<sup>rd</sup> Disorder

**Then check Form Closure** 

# Check Kemps test....

 $My 2^{nd} Ex-wife...$ 



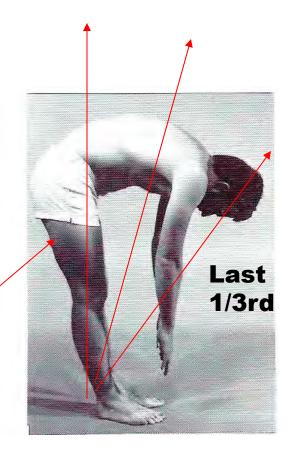


PRONE POSITION/HYPEREXTENSION is a differentiation test between a DISC & an EXTENSION Movement *Disorder*.

Disc is often relieved in extension postures

Larger ROM more likely **Disorder**.

No somatic referral with flexion disorder



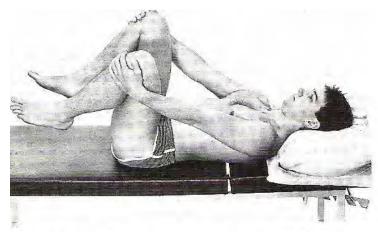
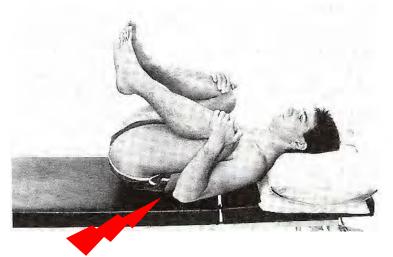


Fig. 15.21A The patient grasps the separated knees.



Active posterior disc may be irritated in hyperflexion

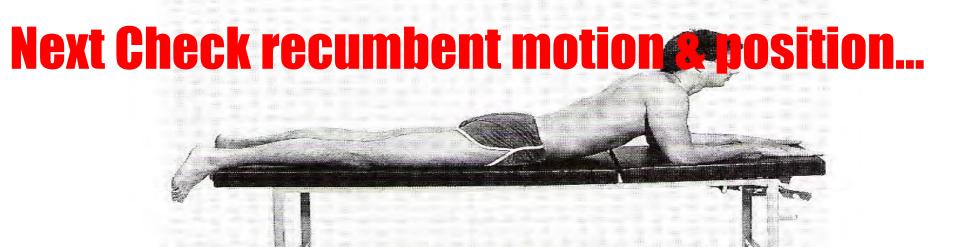
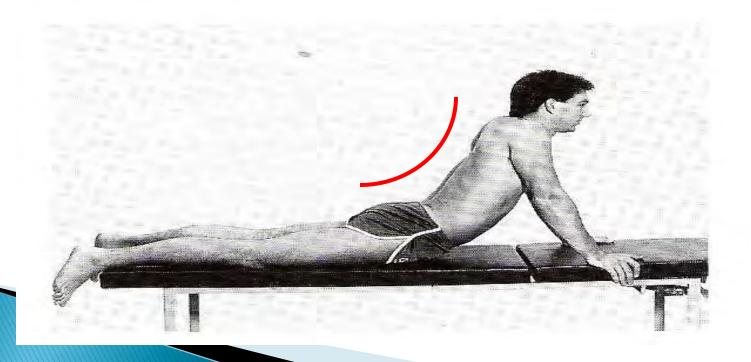
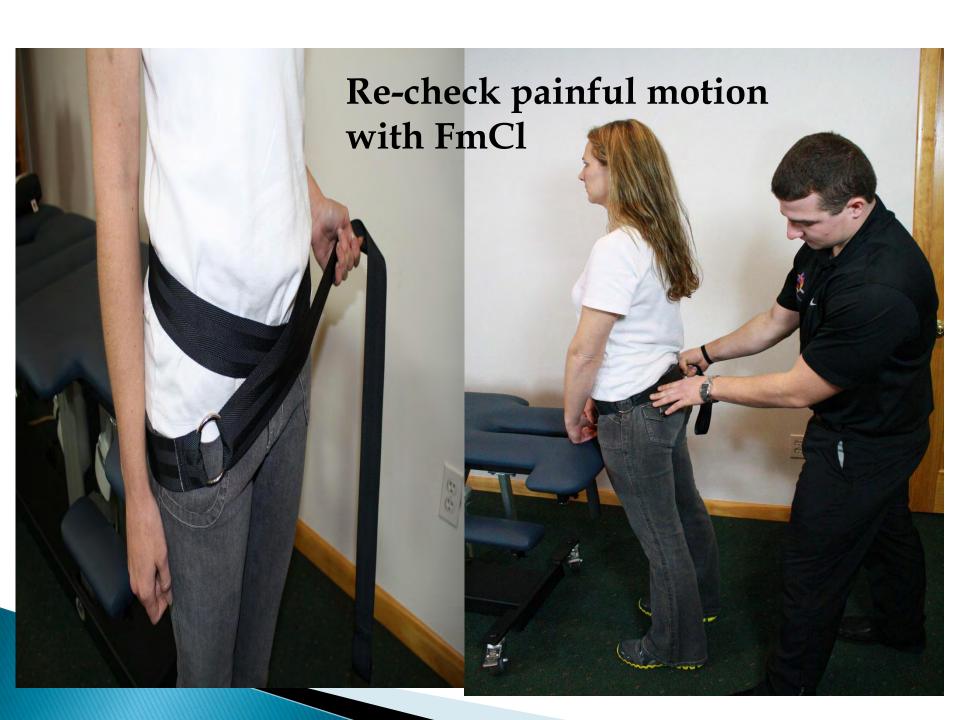


Fig. 15.26A Prone resting position.





## Long FmCl belt can wrap several times to better capture the area



These tests mimic what the ATM can do However it is a "screening test"

#### Shear instability testing....Force Closure

Manual Testing for Lumbar Joint Shear Stability (continued)

extensors will reduce shearing instability if present. If pain is present in the resting position but then disappears or subsides with the active cocontraction, the test is positive. This test proves conclusively that activating the extensors stabilizes the shear instability and eliminates the pain. Now the trick is to incorporate these extensor motor patterns into exercise prescriptions to carry over to daily activities.





#### A Note on Motion Palpation

Some clinicians use their hands to feel specific vertebral motion during a whole trunk motion such as flexion or twisting. When they detect a "blocked" or "stiff-feeling" segment, they often declare it pathological and make it the target of mobilizing treatment. Clinicians rarely, however, consider the flexibility in the spinous process and bony neural arch noted in chapter 4. Two of my PhD students questioned whether the

When muscle confidence in the part of the

doesn't increase o quantify the effect figure 12.4) and not ve metric had asymmetric a joint with mobilizati

Testing for Aberrar During Challenged

> The test for aberrant m it is about the only wa tasks that require hig include athletes and c employees, and so or

Segmental lumbar mobility in individuals with low back pain: in vivo assessment during manual and self-imposed motion using dynamic MRI.

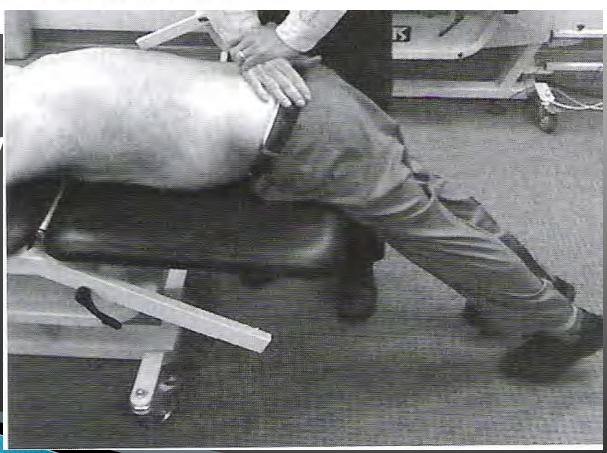
Kulig K, Powers CM, Landel RF, Chen H, Fredericson M, Guillet M. Butts K.

## SPINAL PALPATION FOR LUMBAR SEGMENTAL MOBILITY AND PAIN PROVOCATION: AN INTEREXAMINER RELIABILITY STUDY

Michael Schneider, DC, a,b Richard Erhard, PT, DC, Jennifer Brach, PT, PhD, William Tellin, DC, Frank Imbarlina, DC, and Anthony Delitto, PT, PhD<sup>g</sup>

Poor reliability for 'Motion'.

Good reliability for 'Paim'.



Disc problems & motion disorders are closely "linked"....that's why Decompression & ATM make such a powerful combo

## Discogenic origin of spinal instability.

- The loss of disc height (from damage or genetics) adversely influences the tension & compression ration of the segments and spine creating 'instability'.
- Disc 'degeneration' is an inflammatory, degradation phenomena of ineffective healing
- Familial (70%)
- Early-age compressive injury...poor healing

Spine (Phila Pa 1976). 2005 Dec 1;30(23):2621-30.

#### Discogenic origins of spinal instability.

Zhao F, Pollintine P, Hole BD, Dolan P, Adams MA.

Department of Orthopaedics, Sir Run Run Shaw Hospital, ZheJiang University, HangZhou City, ZheJiang, People's Republic of China.

## Sprains....

Usually 'rotationally' induced with compression often giving some 'relief'

Severe AM pain...NO directional preference

Antalgia without specific leg-referral/sciatic

#### Types of Annular Fissures:

The three main types of annular fissures are listed below in order of progression:

- The rim lesion A horizontal tear of the outer annular fibers of the disc near their attachments into the ring apophysis. They are often associated with bone spurs.
- The concentric tear The splitting of the lamellae of the annulus in a circumferential direction. Trauma (not aging or degeneration) is usually the major cause of this type or tear, specifically from excessive twisting as in a golf swing or throwing a discus in track & field. Research shows that for reasons yet undiscovered, the lamellae lose the ability to "stick together." This loss of adhesion is called delamination.
- The radial tear A horizontally oriented tear that goes from the inner nucleus pulposus through the entire outer region of the disc. These are significantly associated with the aging process and disc degeneration.

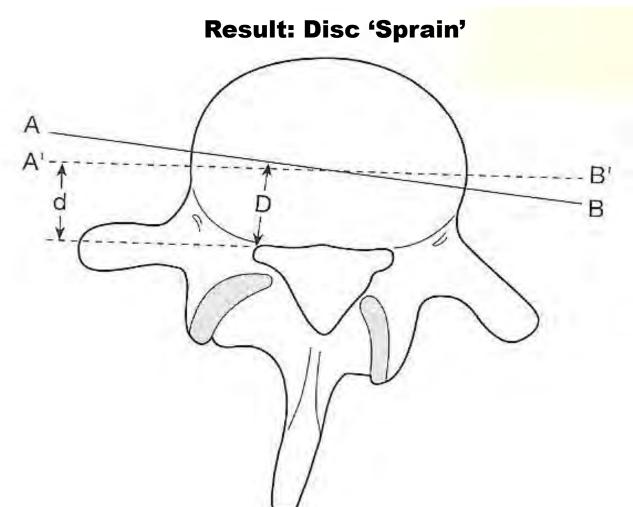
## Sprain mechanism

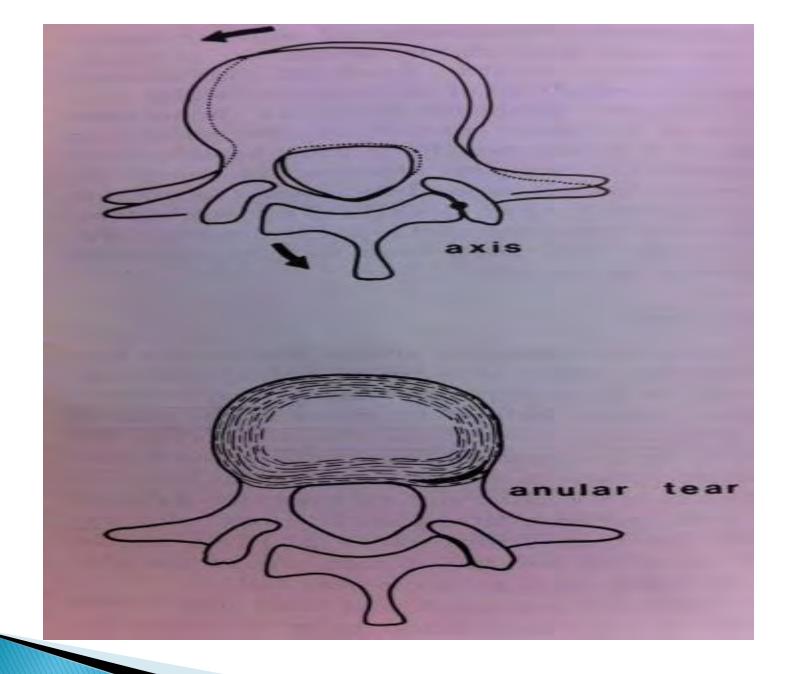
"Acute non-specific, unendurable LBP is a re-rupture of an asymptomatic ruptured region in the posterior annulus...in a moderately degenerated disc with a radial tear".

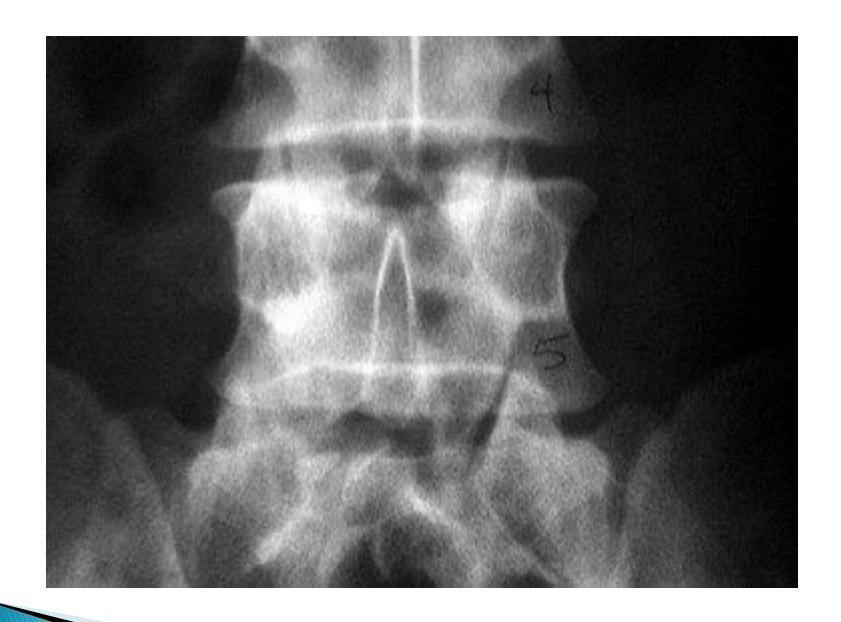
"Radial fissures are a sign of torsional injury...80% of fissures occur in asymmetrical joints (tropism). Up to 90% of patients with unilateral LBP have articular tropism on that side".

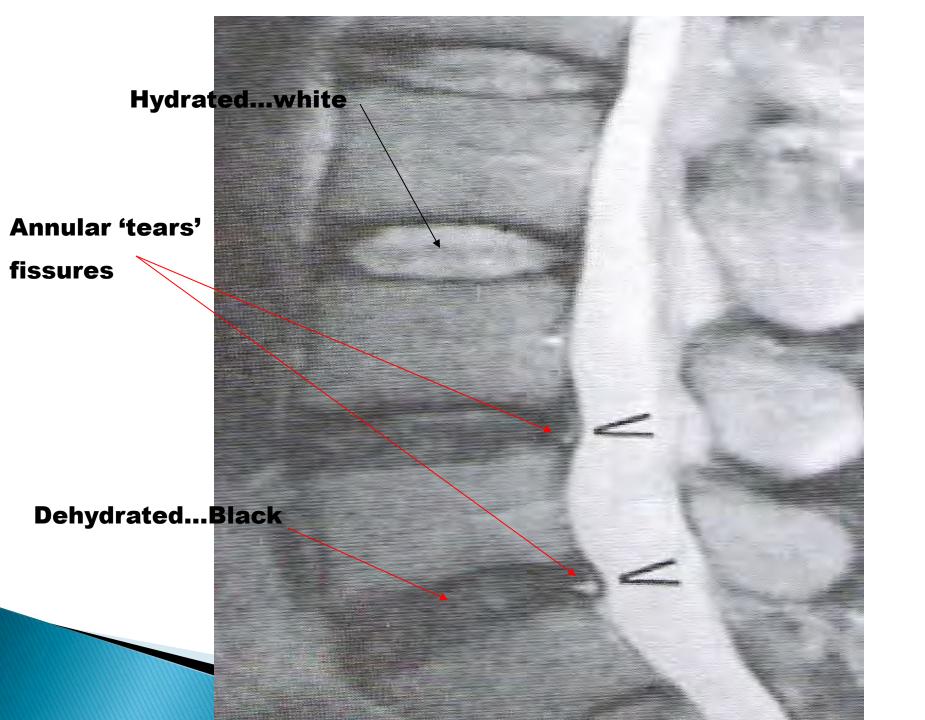
Eur Spine 2005 & Bogduk 1996

#### Tropism reduces disc 'protection' from flexion/rotation











"Classic" disc tear

## IDET & artificial disc





## **FABQ**

- Depression = back pain
- MRI vs. FABQ...FABQ wins.
   MRI findings may NOT relate to future pain or disability.
   Spine. 2005 Jan;5(1)
- FABQ is relevant to all CPR studies...the lower the score the better result!

## Facet Relationship to pain

Cervical: 55%

Thoracic: 42%

**Lumbar: 30%** 

#### Conclusion

This study evaluated patients with chronic, non-specific spin pain involving all three regions of the spine: cervical, thorac and lumbar spine. Painful cervical facets were identified in 55% of patients with neck pain, 42% of patients with thoraci pain, and 31% of patients with low back pain. False-positive rates after single injections were 63%, 55%, and 27% for cervical, thoracic, and lumbar facet joint blocks, respectively Overall, of the 500 patients with chronic spinal pain evaluat in this study, 28% had painful cervical facets, 6% painful thoracic facets, and 25% painful lumbar facets. At least one region was involved in 43% of patients; at least two regions 15% of patients and 2% of patients had painful facets in all three regions of the spine. Depending on the regions involve most patients had two or three symptomatic facet joints.

Although single diagnostic blocks appear unreliable, with a relatively high false-positive rate, true-positive results obtained by performing two sets of diagnostic blocks on separate occasions indicate that facet joints are a cause of chronic spinal pain in nearly half of all patients with chronic spinal pain presenting to an interventional pain management practice. Because these patients typically have failed conservative management, including physical therapy, chiropractic treatment and analgesics, patients with chronic spinal pain may benefit from specific interventions designed

# Ifound this humerus

## For HNP... Traction positioning 101:

**Prone** is the "GO TO" position

Supine is the "Fall Back" position

**Note:** Always check for Extension directional preference.

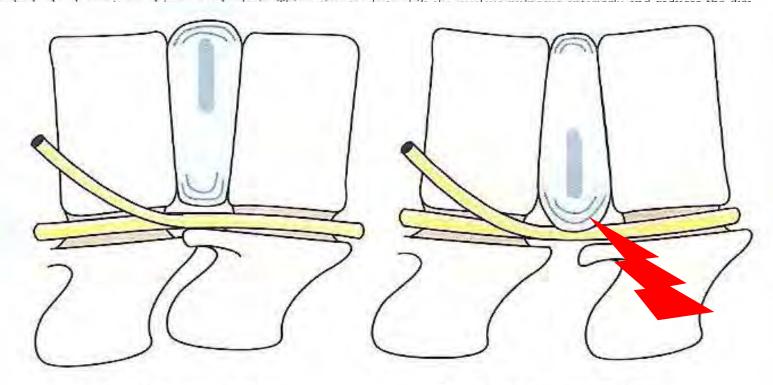
## Why?

- Fritz et al (2) studies 2007-present
- Saunders, Grieves, Maitland, Cyriax, Mathews
- McKenzie extension directional preference.
- ▶ (2) 1000+ patient population studies (VAX-D)

Extension & standing upright tend to be pain-relieving

# Intervertebral lumbar extension Vertebral canal Intervertebral disc Nucleus pulposus ligament iervertebral foramen Spinal nerve

UNE 9-08. Anterior and posterior till of the pelvis and its effect on the killematics of the lumbar spine. A and C, Anterior



Anterior separation (backward bending)

Posterior separation (forward bending)

This doesn't mean everyone will be prone...but, in the younger HNP population (25–55) it is best to try to assess for an extension directional preference and when found treat PRONE...if possible.

There are 3 postural choices...



#### Prone position of HNP/somatic referral pain

To stop leg referral symptoms



With an extension bias

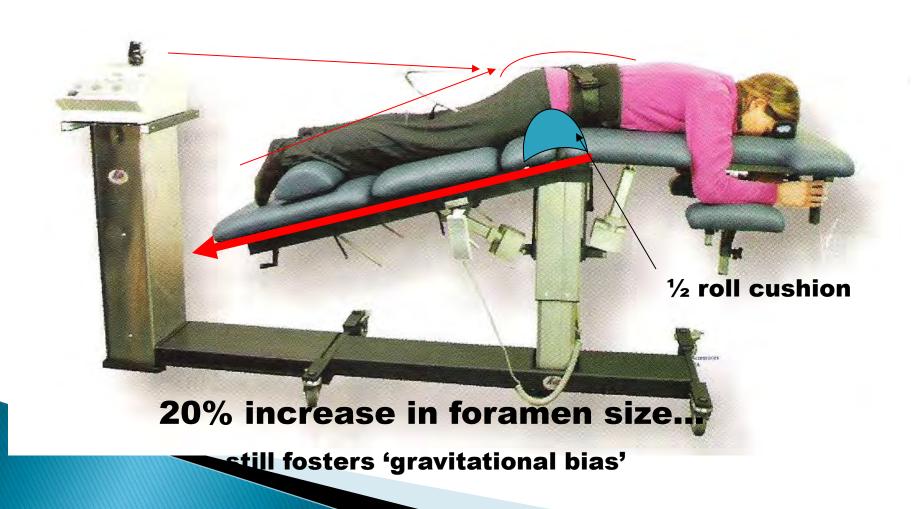
Extension/reverse 'hammock' positioning is variant prone option...

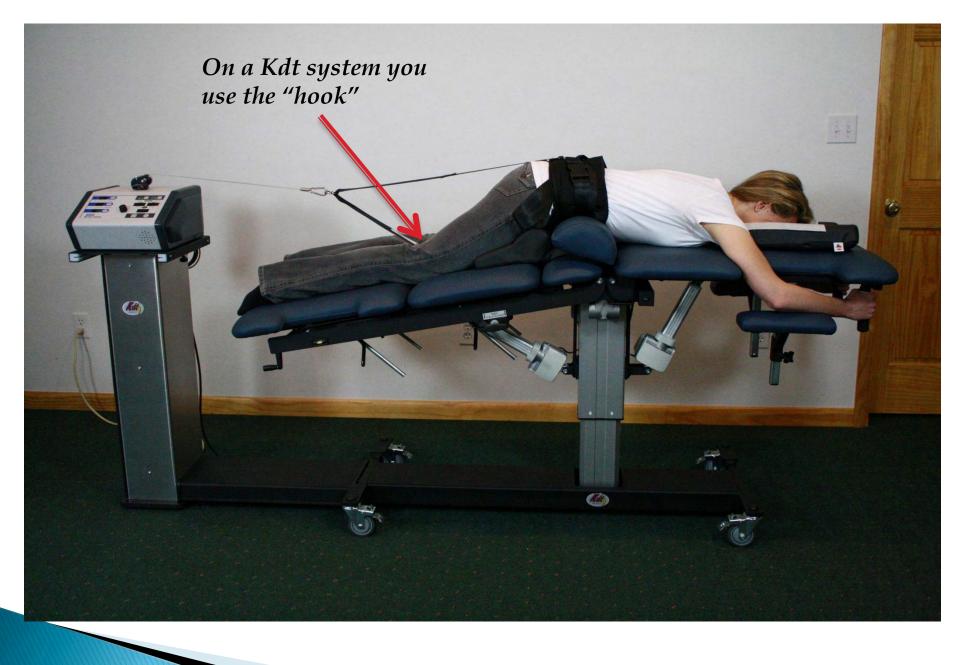


For Disc/HNP with an Extension directional preference...NO peripheralization in extension...NO distinct Extension Movement Disorder.

### 3<sup>rd option</sup>: Flexion positioning prone

Accommodation of neural-stress signs.



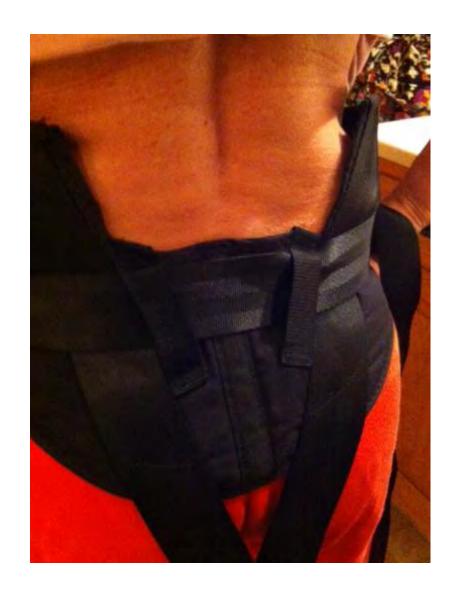


## Side-lying is a transitional position



Anti-gravity effect of the long back muscles is eliminated in this position

Versa-Belt can be ideal for side-lying and adding modalities.





## Traction restraint: 101

#### **Thoracic Wing-Vest**



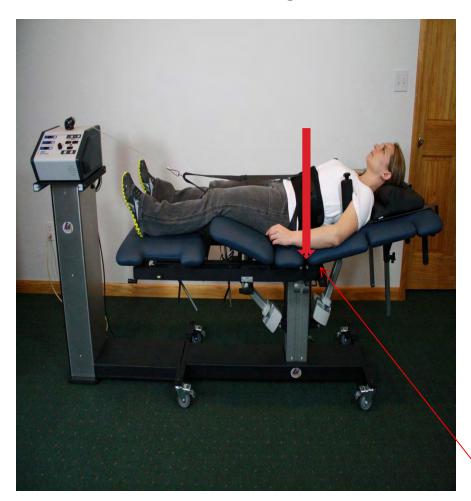
### **Decompression Blocks**





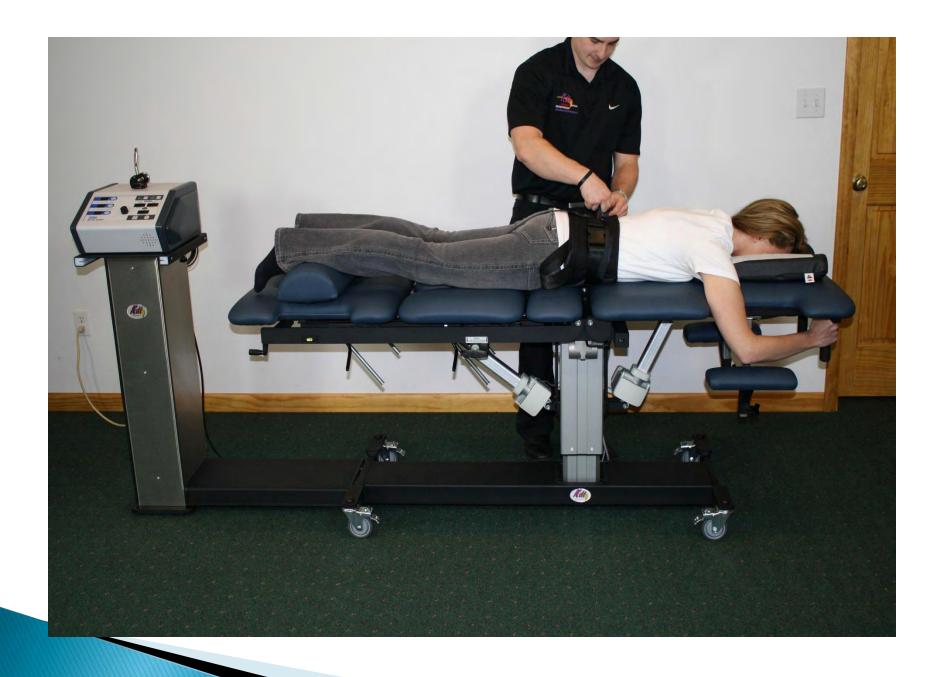


#### Proper belting: Abdominal wrap, cinch at or 1" above crest

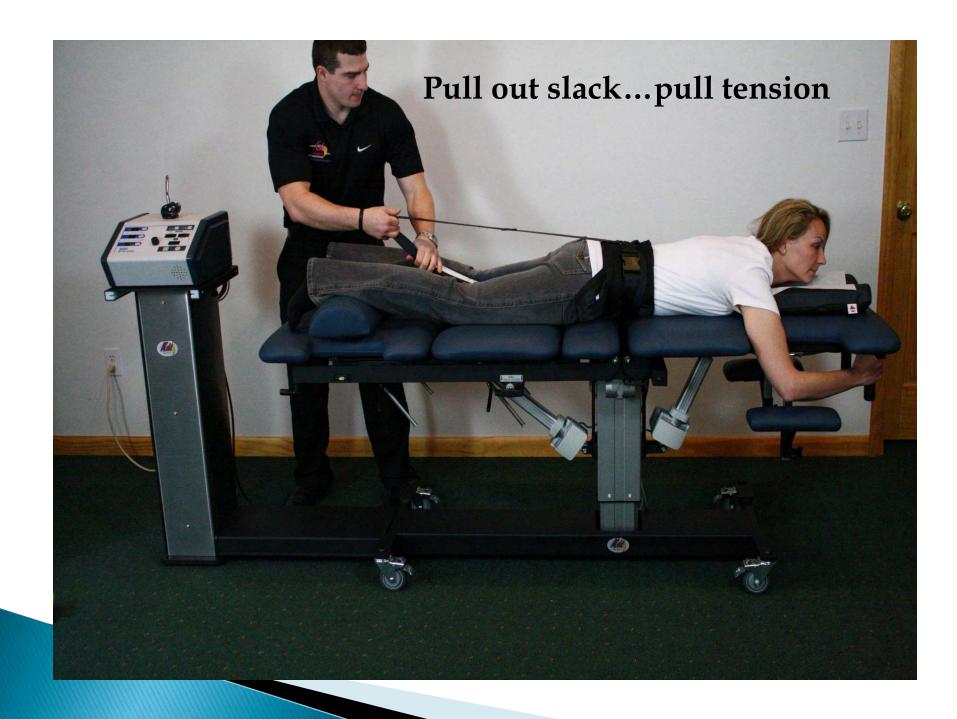




Crest at table split



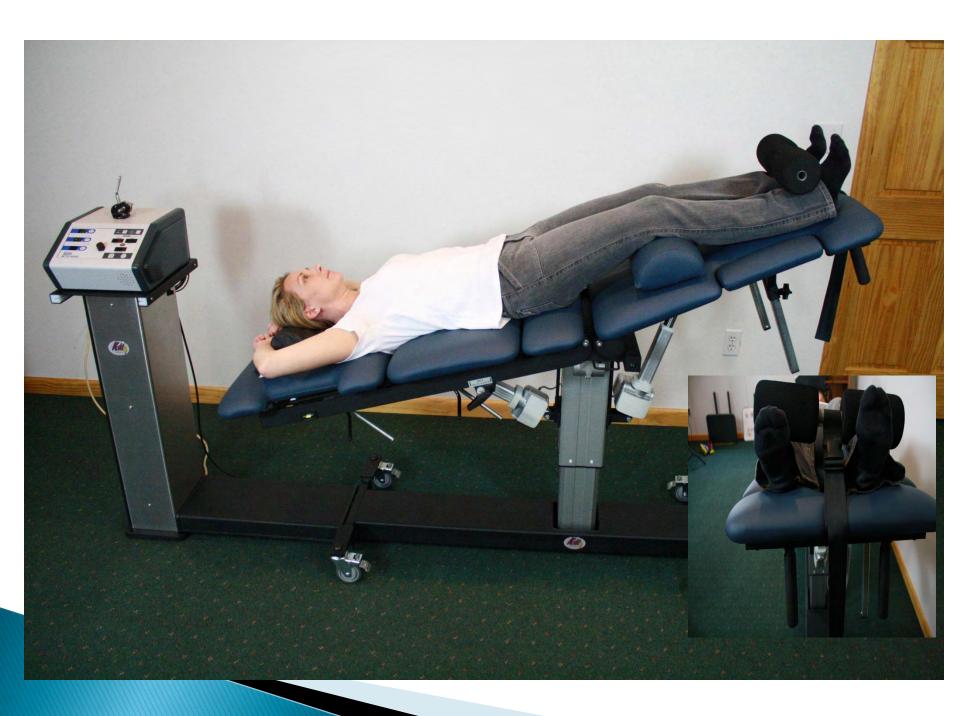




Inversion is a 'testing' position, wellness/adjusting/massage position or thoracic treatment option, supine or prone



Prone inversion is ideal for instrument adjusting & massage





And we suggest 3 main 'Pull Patterns"...prone or supine.

# Pull Patterns (35% TBW lumbar)

*Initial treatment session(s)* 

'Trac' long: 45/25sec.

'Trac' short: 10/15sec

CPM: no hold/rest

If its' working....don't arbitrarily increase force or time.

If relief...don't necessarily increase.

30 lbs. can be a safe & effective starting force in many conditions... generally we'll reduce 'rest-force' proportionally (12–15 lbs.).

Traction weights are of particular interest in the design of a study; several previous trials in this area have used sham traction, that is, a low weight that is perceived to be negligible. However, because the mechanism by which traction may affect the lumbar spine is not fully understood, it cannot be assumed that sham traction with low weights will not have an effect.<sup>24</sup> In some cases, the sham traction weight has been within the weight regimens recommended by clinical experts for treatment, meaning that the control is potentially active. It is important therefore to establish traction weights for use in future clinical trials. The survey results support the use of lower weights (5-60kg), which is similar to that suggested by the principal manual therapy texts (10-85kg). 13-15 In past traction

### **Continuous Passive Motion**

**CPM** Excellent for 'mechanized' manual Rest @ '0' #'s distraction 2-3 second hold minimizes treatments & 40-70#'s 'Decompression/fluid in-flow effect... mobilizations.

AM pain or 'rest disability' could result.

# CPM can be pain relieving & less irritating for some patients.

### The 4 Disc Classifications

- Disc protrusion / extrusion < 10% population
   Focal protrusion < 25% of disc wall
   Leaky disc......Nerve tension signs</li>
   Disc bulge > +80% "Flat tire"
- Diffuse, circumferential bulge >50% of disc wall
  Stenosis......Nerve Tension
- Bisc degeneration...100%

Loss of internal pressure/NO hydrostatic mechanism Stenosis

4. Disc "**sprain**"...outer annulus 'tear' without nuclear migration (rotation-created LBP)

## Disc displacement grades:

### Normal

- Bulge (symmetrical extension of peripheral annulus past end-plates)
- 3. **Focal Protrusion** (thru the annulus but not thru posterior longitudinal ligament).
- Extrusion (often thru PLL).
- Fragment (no contact with parent disc).

Prolapse thru a radial tear from end plate fracture





## Reality check...

(Spine 2009)

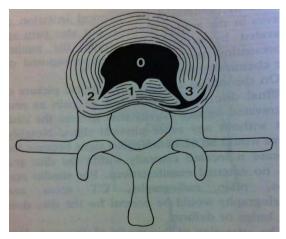
Degeneration of the disc over time creates hypermobility (instability) then eventfully hypomobility & stability...with consequences: Stenosis, loss of ROM, neural compromise etc.

# IDD...Internal Disc Disruption

Consequences of end-plate damage

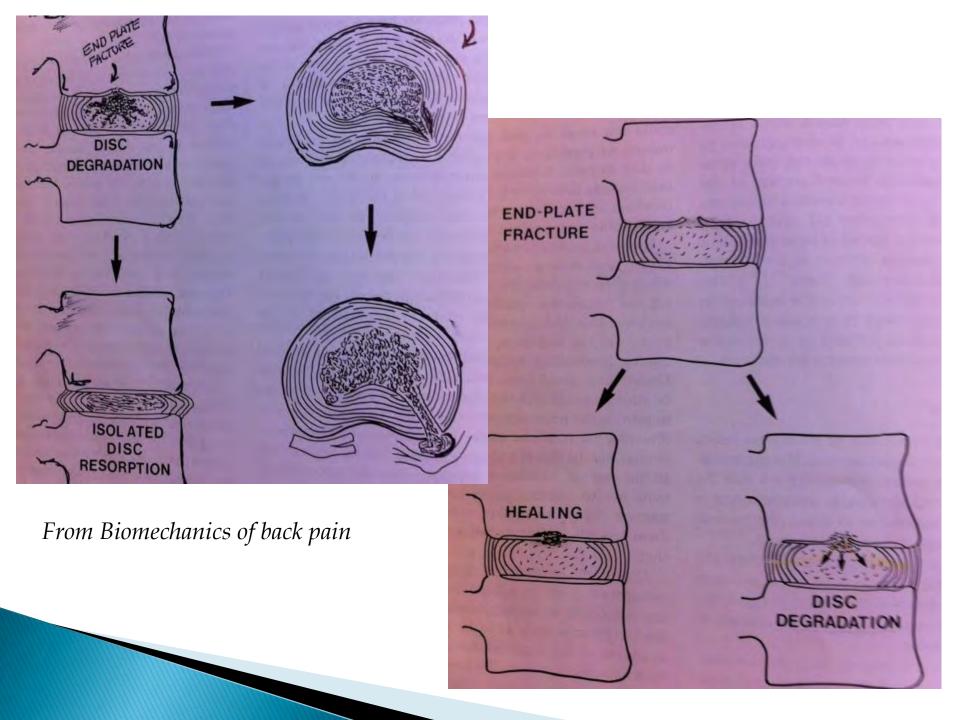
Matrix breakdown of internal regions of the nucleus.

Eventual loss of hydraulic efficacy.

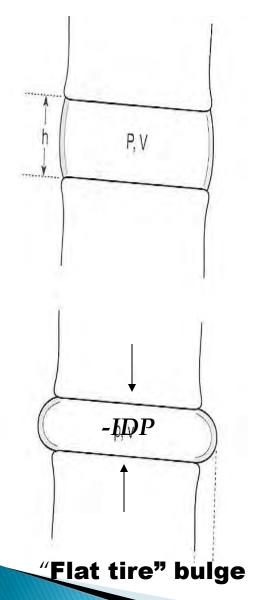


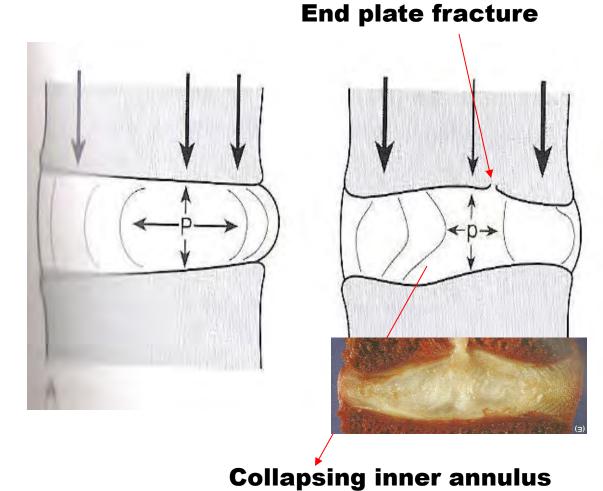
Degeneration.



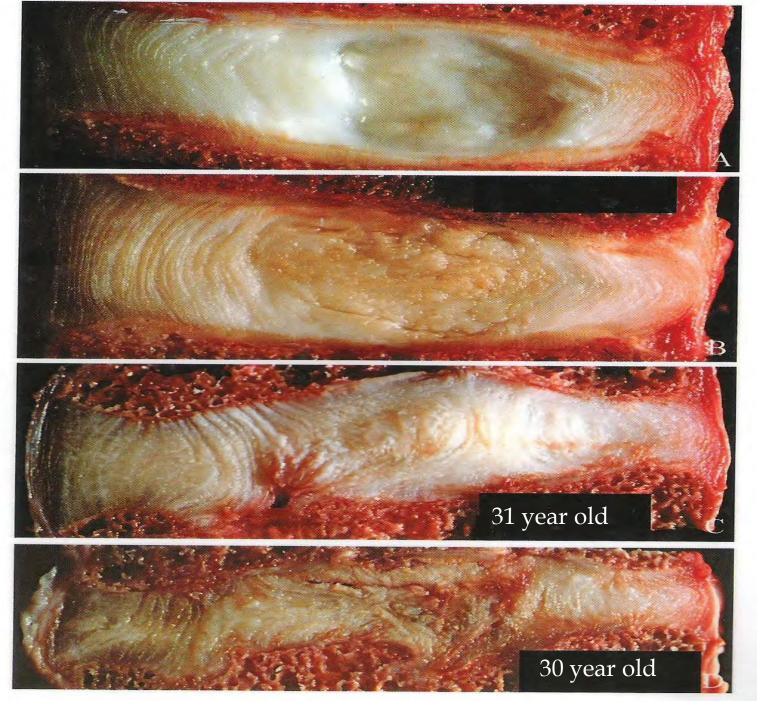


### **Results of loss of IDP**





Neo-innervations



Lumbar intervertebral discs sectioned in the mid-sagittal plane, anterior on left. Those discs, which were not subjected

# Lateral shift

Fix the lateral-shift *before* trying to aggressively add extension.

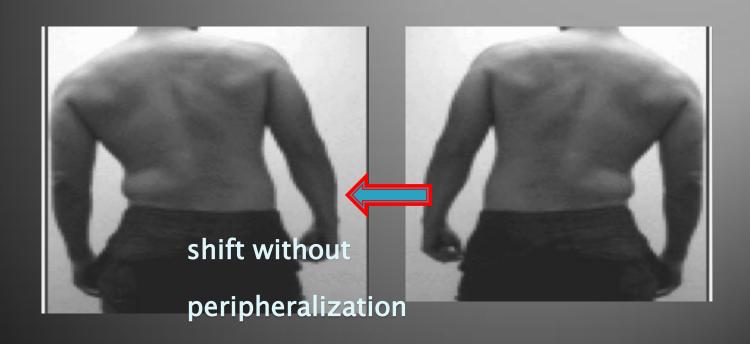
However Decompression/traction can be utilized with good results with a shift in many cases.

# Look for antalgia & 'lateral' or translational 'shift':

Shifts can have a 'medial' (same side as leg pain Or 'lateral' (opposite to leg pain) orientation



No definitive connection to 'what' the problem is BUT, IF it can be 'counter-shifted' it offers a better prognosis.



Copyright 2009 Journal of Manual & Manipulative Therapy

Manual Correction of an Acute Lumbar Lateral Shift: Maintenance of Correction and Rehabilitation: A Case Report with Video

Mark Laslett, FNZCP, PhD, Dip.MT, Dip.MDT

Mark Laslett, Director of Clinical Services, PhysioSouth Ltd, Christchurch, Canterbury, New Zealand; Senior Research Fellow, Auckland University of Technology, Auckland, New Zealand:

Address all correspondence and requests for reprints to: Dr. Mark Laslett, Email: mark.laslett@xtra.co.nz.

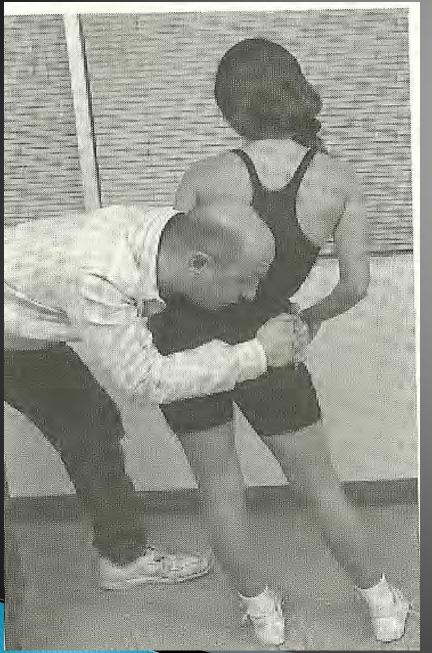
#### Abstract

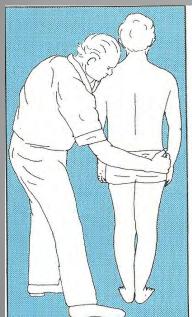
Other Sections V

The acute onset lumbar lateral shift, otherwise known as a list or acute scoliosis, is a common clinical observation associated with low back

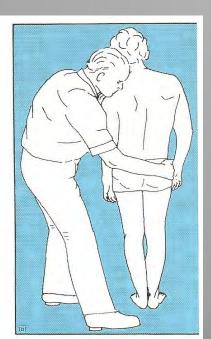
# Association Between Direction of Lateral Lumbar Shift, Movement Tests, and Side of Symptoms in Patients with Low Back Pain Syndrome

Janet A Tenhula, Steven J Rose and Anthony Delitto PHYS THER. 1990; 70:480-486.



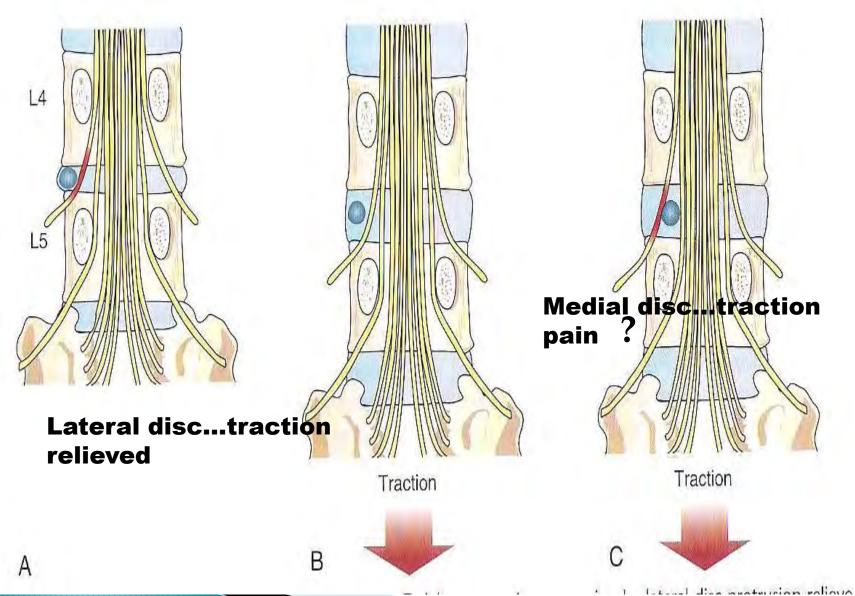








### Why traction may create pain based on position of disc & nerve



## Side-lying is a transitional position



Anti-gravity effect of the long back muscles is eliminated in this position

If it peripheralizes & remains recalcitrant prognosis may be poor.

# Orthopedic & Neurodynamic Tests

# Quick definitions...

- Reliability: how likely +2 examiners will agree on the same finding.
- Validity: whether what they have 'found' has demonstrable 'truth' or support to normative data.
- Sensitivity: how likely you have the problem a test claims to reveal when positive.
- Specificity: how likely you don't have the problem if the test is negative.

Odds ratio...

### Proven Nerve Tension test

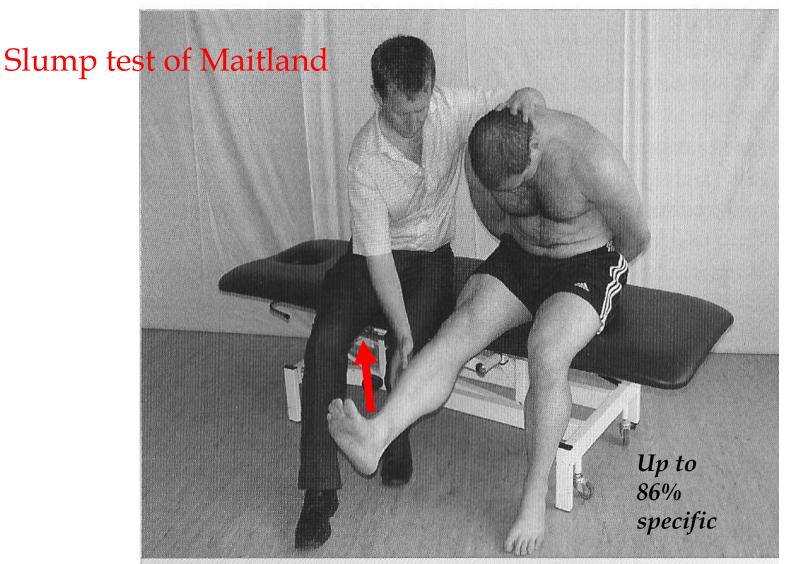
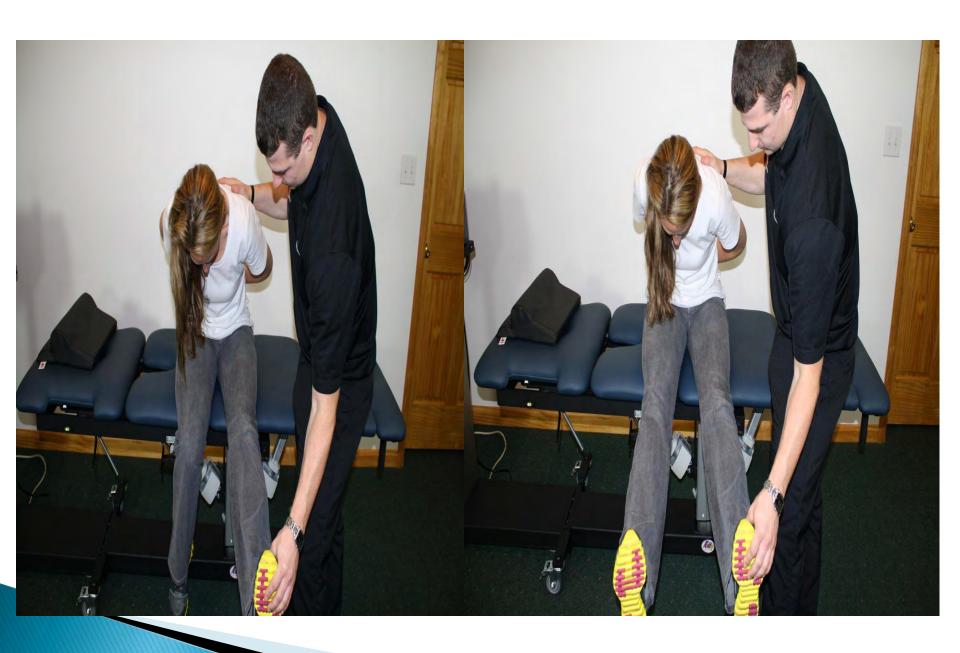


Fig 10.3 Slump test: The patient extends one knee and reports any change in symptoms.

Butler: The sensitive nervous system

Maitland: Manipulative therapy





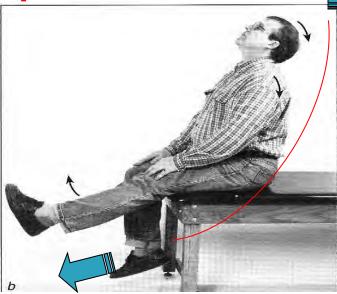
### Flossing

The patient, seated and with the legs able to swing freely, flexes the cervical spine (a). This creates a pull on the spinal cord from the cranial end and a release from the caudal end. This should not produce sciatic symptoms (see the discussion of the slump test in chapter 12). Then, the patient extends the cervical spine with simultaneous knee extension on the side with sciatica (b). This pulls the nerve from the caudal end with a corresponding release at the cranial end. The cycle is completed as the knee is flexed with coordinated motion of the cervical spine flexing. This causes the nerves to floss through the vertebral tissues. If the patient experiences minor sciatic symptoms when the cervical spine is flexed or the knee is extended, then he should reduce the range of motion at these joints until no pain is provoked. Some patients who have suffered sciatica pain for years report reductions in their sciatic symptoms within a few days to a couple of weeks; others report increasing symptoms.

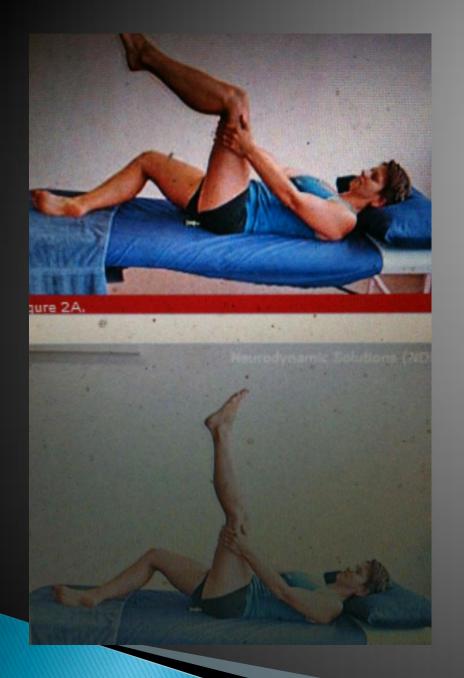
A note of caution is needed here: while this can be wonderful in helping chronic sciatica resolution, it can also cause an acute onset. Be very conservative in the first session. If the nerve is adhered so that it can't slide, the sciatic symptoms will be exacerbated. However, if the patient reports no change or even relief the next day, then proceed to increase the flossing. We have not been able to uncover a procedure that predicts who will do well or who will be exacerbated from this flossing procedure. Monitor all patients and remove the procedure from the programs of any patients whose symptoms worsen.

### Positive 'Slump'...chronic sciatic





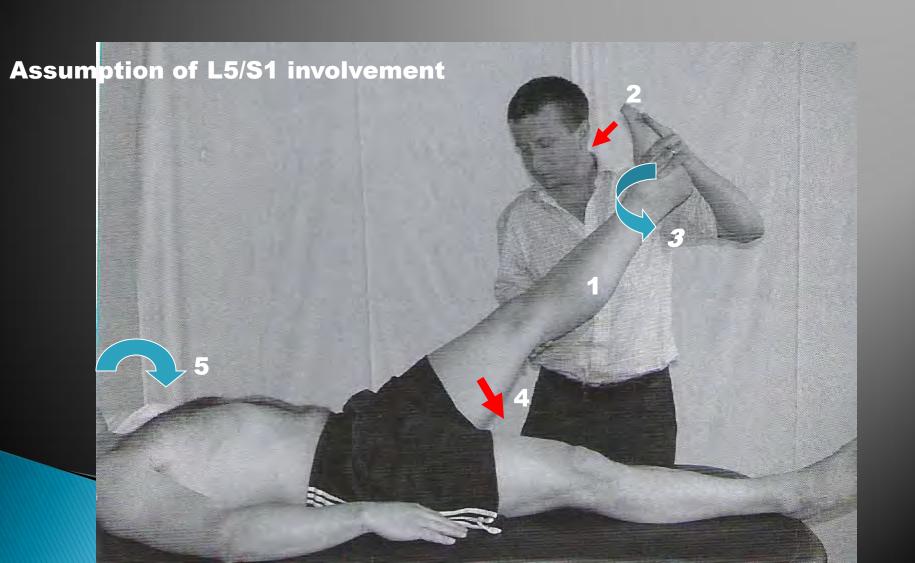
Effectivity of neural mobilization is thought to be due to neural "flossing" effect, that is, its ability to restore normal mobility and length relationship, and consequently, blood flow and axonal transport dynamics in compromised neural tissue. Neural mobilization is very effective in breaking up the adhesions and bringing about mobility. The results of this study also depict the same. The conventional treatment effectively reduces pain and increases ROM at the joint but is unable to climmate the root cause of the problem According to Caret of al //095) it helps at previding symptomatic relief colse





# 5 point SLR

~75% accurate but in <40 yr olds



# Femoral stretch test for upper nerve levels....



#### Classification tests:

- 1. L.I.P.I.D. *profile &* referral pain pattern(s)
- 2. Bending pain/impairment
- 3. Form Closure FmCL
- 4. Recumbent re-assessment of bending pain
- 5. Force Closure FcCL

**ALR** 

Shear instability testing

Prone instability

Standing & recumbent assessments

"Global", not intersegmental tests

### Provocative/challenge tests

- Form Closure...FmCL (external Bracing)
- Force Closure...FcCL (internal contracting)

Both indicative of movement *disorders*Not primary disc **compression** 

#### Form Closure (FmCl):

External Bracing...changing motor control pattern(?)

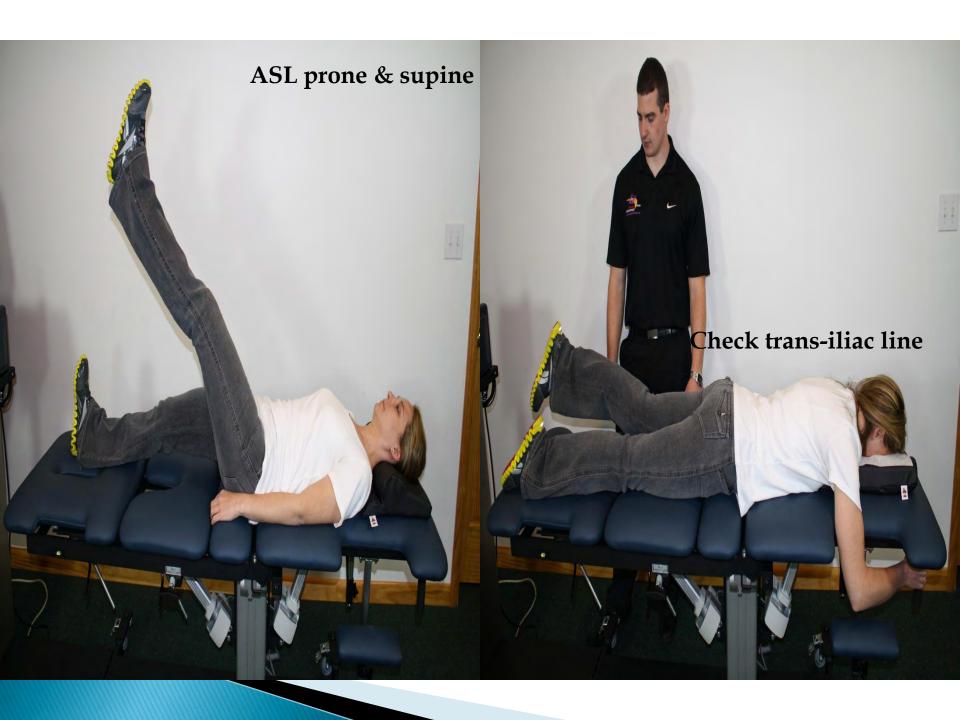
- Hand pressure
- Patient Fm Assist belt pressure
- Against-a-wall pressure
- Assistance pressure
- ATM2 belting

#### Force Closure:

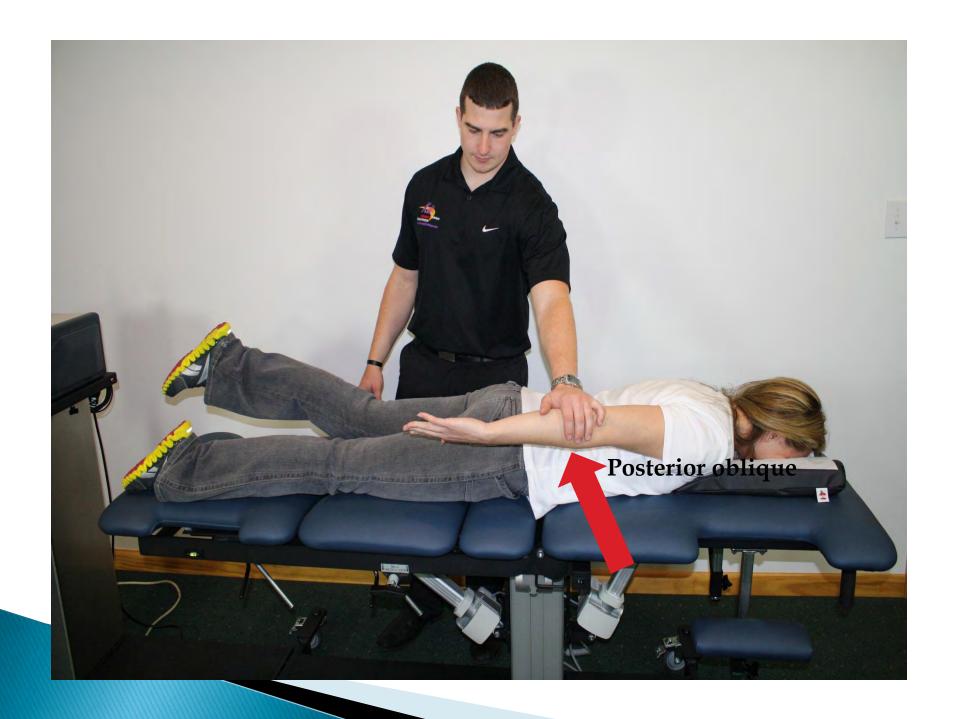
# Internal *contraction bracing* reducing motion & **shear**

- ALR...prone & supine dynamic instability/Oblique challenges
- Shear instability (McGill test)
- Trendelenberg
- TrA contraction
- Cervical FmCl...upright & recumbent

From Vleeming, Lee & Snijder







#### Shear instability testing....Force Closure

Manual Testing for Lumbar Joint Shear Stability (continued)

extensors will reduce shearing instability if present. If pain is present in the resting position but then disappears or subsides with the active cocontraction, the test is positive. This test proves conclusively that activating the extensors stabilizes the shear instability and eliminates the pain. Now the trick is to incorporate these extensor motor patterns into exercise prescriptions to carry over to daily activities.





#### A Note on Motion Palpation

Some clinicians use their hands to feel specific vertebral motion during a whole trunk motion such as flexion or twisting. When they detect a "blocked" or "stiff-feeling" segment, they often declare it pathological and make it the target of mobilizing treatment. Clinicians rarely, however, consider the flexibility in the spinous process and bony neural arch noted in chapter 4. Two of my PhD students questioned whether the

When muscle confidence in the part of the

doesn't increase o quantify the effect figure 12.4) and not ve metric had asymmetric a joint with mobilizati

Testing for Aberrar During Challenged

> The test for aberrant m it is about the only wa tasks that require hig include athletes and c employees, and so or

Segmental lumbar mobility in individuals with low back pain: in vivo assessment during manual and self-imposed motion using dynamic MRI.

Kulig K, Powers CM, Landel RF, Chen H, Fredericson M, Guillet M. Butts K.

# Motions to check general "stability" & spinal control:

- Free-form, heels-down parallel squat.
- 2. Standing pelvic tilt.
- 3. Abdominal (TrA) draw-in.
- 4. Co-contraction "brace" without diaphragm.
- 5. Trendelenbergs.
- 6. Skull retraction & repositioning.
- 7. Paying co-pay without being prompted.

Tests to determine relative strength & endurance of the core

musculature.





If your patients are leaving your care WITHOUT any improvement in these Core endurance/control activities you're missing the big picture!

to the gym, and try these times timed tests.



Plank Assume a pushup position but with your weight on your forearms. Brace your abs, clench your glutes, and keep your body straight from head to heel. Start the timer. When you lose alignment, stop the clock.



Side plank Lie on one side with your legs straight, and prop up your upper body on your forearm. Raise your hips so your body forms a straight line from nose to toes, and hold. Start the timer. Once you sag, stop the timer. (For bonus points, raise your top leg.)



Dook automates Doctries would for a lease

#### The Stabilizero...

The TrA is an oblique contractor creating virtually no spinal compression.

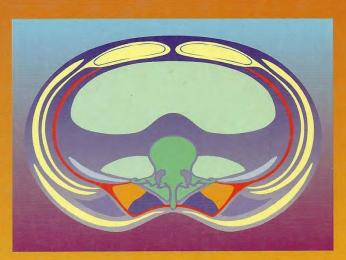
The Multifidus deep-fibers also are non-compression 'intersegmental-stabilizers'.

# THERAPEUTIC EXERCISE FOR SPINAL SEGMENTAL STABILIZATION IN LOW BACK PAIN

SCIENTIFIC BASIS AND CLINICAL APPROACH

Carolyn Richardson
Gwendolen Jull
Paul Hodges
Julie Hides

Foreword by Manohar M Panjabi



CHURCHILL LIVINGSTONE

# Segmental stabilization & muscular strengthening in cLBP: a comparative study

Franca et al JOSPT 2012

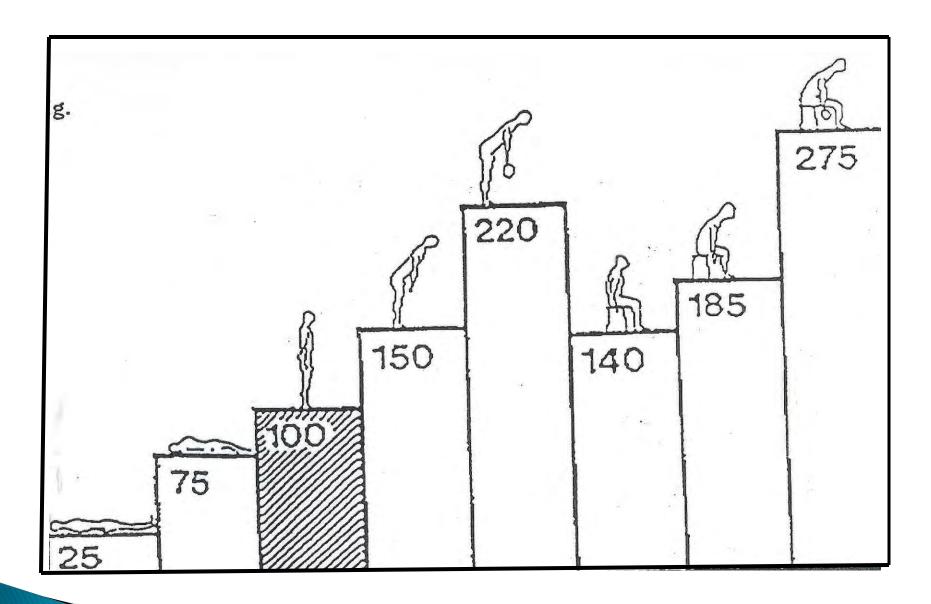
Both lessened pain and reduced disability but SS training was superior for all variables. Strength training did not improve TrA activation

Cairns et al: found those with a history of, but NO present LBP had TrA/Multifidus impairment.

## Eyal Lederman....

#### The ATM2 stands alone

- The ATM2 addresses issues NO other phys med device has been able to...
- Simple, quick, with minimal learning curve & no side-effects.
- FmCl & FcCl have NO other easy plug-in treatment...If so please tell us!!
- ATM2 = better results.
- Extensive training from them



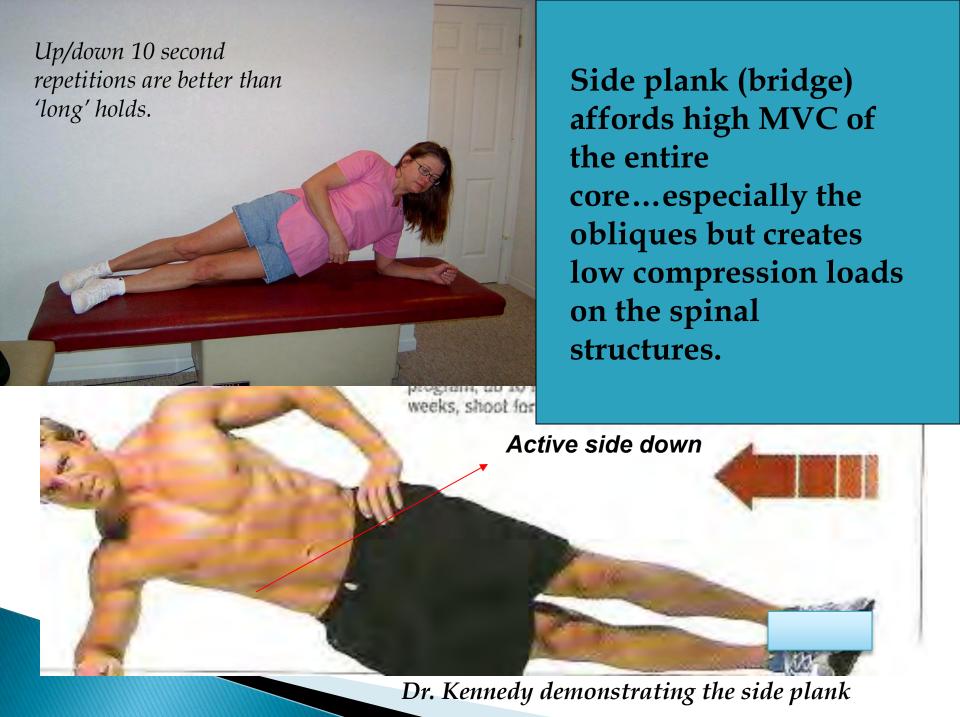
**Nechemson's IDP study** 



Mild co-contraction BRACING (~10 % MVC) ala' McGill creates: "stiffness & stability with symmetrical stiffness offering greater stability"

However, biomechanics and kinesiology expert Stuart McGill indicates that spine stabilization is assured by "the ability to cocontract the abdominal wall (abdominal brace) independently of any lung ventilation patterns. Good stabilizers maintain the critical symmetrical muscle stiffness...Poor stabilizers allow abdominal contraction levels to cycle with breathing at critical moments when stability is required. Grooving muscular activation patterns so that a particular direction in lung air flow is entrained to a particular part of any exertion is not helpful. This would be of little carryover value to other activities; in fact it would be counterproductive." [8]

Here's how to do it: Lie on your back with your arms at your sides. Bend your hips and knees to a 90-degree angle. Maintain a naturally arched back. Slightly rock your pelvis forward and backward on your tailbone to fine-tune your back position. Once you're comfortable, take three normal breaths. Exhale normally on your third breath, then purse your lips and push any remaining air out of your lungs. Reset by rocking your pelvis and repeat the breathing pattern.



#### Excellent 'stabilization' exercise







Q

In the current case series, Loren M. Fishman, MD, from the College of Physicians and Surgeons at Columbia University in New York City, and colleagues looked at the effects of a yoga pose called the side plank in 25 people with certain types of scoliosis, either idiopathic or degenerative scoliosis. The researchers taught people the pose and told them to hold the pose for 10 to 20 seconds once a day for the first week. After that, patients were told to hold the pose for as long as possible once a day, but only on the weaker side of their spine.



Q

#### continued...

The patients reported holding the pose for an average of 1.5 minutes. On average, patients had a 32% reduction in their primary spinal curve.

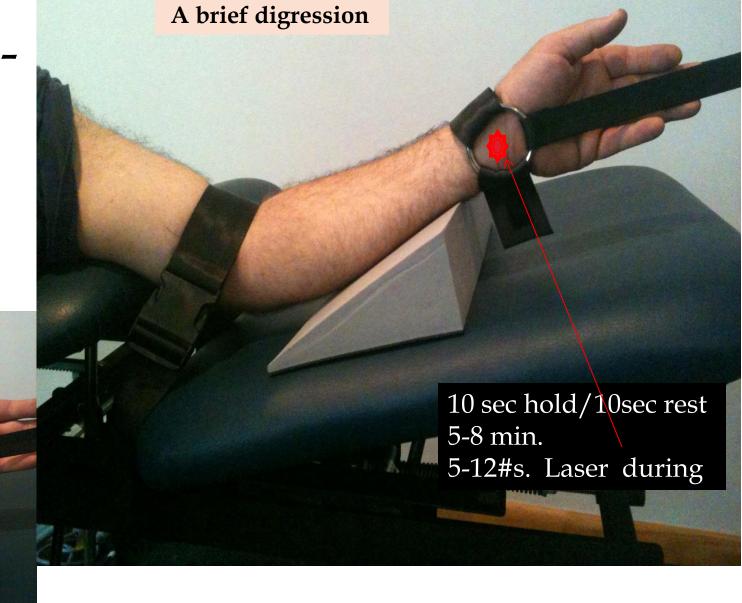
The 19 people who did the pose at least four times per week had the most improvement. Children ages 10-18 with idiopathic scoliosis who did the pose at least four times per week had, on average, a 49.2% improvement in their primary curve. Adults with degenerative scoliosis had, on average, a 38.4% improvement in their primary curve

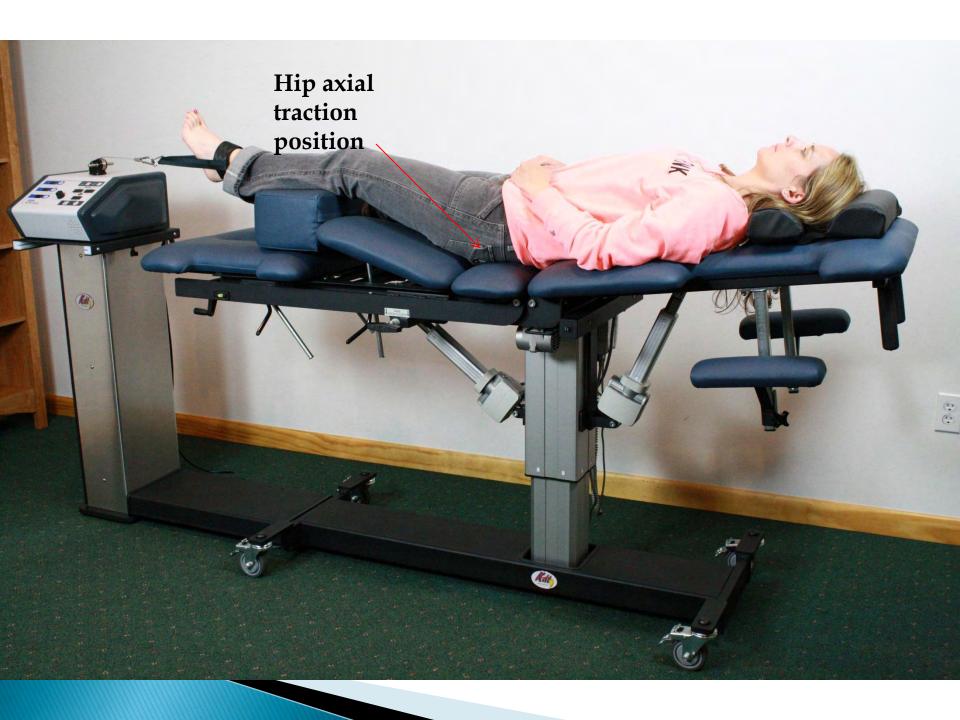


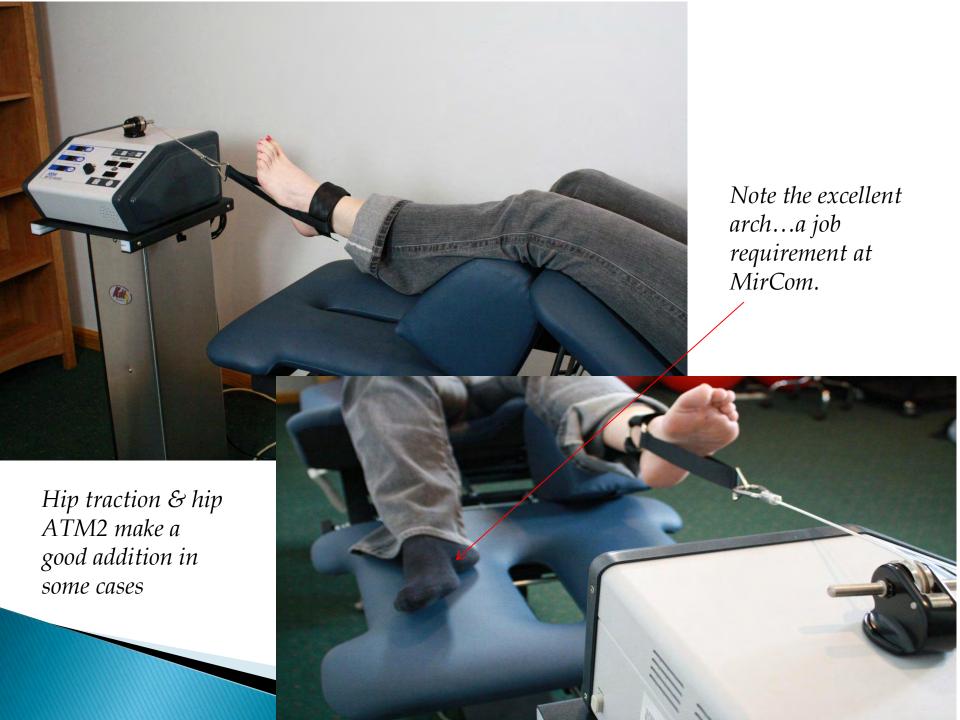


Cross/crawl

A carpal-Laser traction option







## The CERVICLES

#### Cervical Classification 'QUICK LIST'

- Rotation into pain; (Compression) Disc.
- ✓ Rotation away; *Disorder*.
- Disc/Traction signs; Pain-below-elbow, ULNTT, distraction relief, Spurlings, shoulder abduction pain
- Distraction relief.
- Supine cervical flexion test relief (Force Closure); *Disorder*.

## 2014 cervical study Fritz et al

- Starting force: 12-25 pounds
- Conclusion: "We found adding mechanical traction to patients with CR led to greater improvement. These improvements were particularly notable at LONG-TERM follow up"
- And: "Though patients who fit the sub-grouping criteria may be particularly likely to benefit...limiting its use to just this group may result in sub-optimal outcomes for other groups"

Development of a clinical prediction rule to identify patients with neck pain who are likely to benefit from homebased mechanical cervical traction.

Cai C, et al. Show all

Eur Spine J. 2011 Jun;20(6):912-22. doi: 10.1007/s00586-010-1673-6. Epub 2011 Jan 15.

#### Abstract

The objective of the study was to identify the population of patients with neck pain who improved with home-based mechanical cervical traction (HMCT). A prospective cohort study was conducted in a physical therapy clinic at a local hospital. Patients with neck pain referred to the clinic for physical therapy were included in the study. A HMCT program was given to participants for 2 weeks. The patient's demographic data, Numerical Pain Scale (NPS) score. Neck Disability Index (NDI) and Fear-

# The value of provocative tests in diagnosis of cervical radiculopathy

Majid Ghasemi, Khodayar Golabchi, Seyed Ali Mousavi, Bahador Asadi, Majid Rezvani<sup>1</sup>, Vahid Shaygannejad, Mehri Salari

Departments of Neurology, Neurolsurgery, Isfahan Neuroscience Research Centre, Isfahan University of Medical Sciences, Isfahan, Iran

Background: This study was aimed at assessing the accuracy of provocative tests in diagnosis of acute or chronic Cervical Radiculopathy (CR) based on an electrodiagnostic reference criterion. Materials and Methods: Shoulder Abduction Test (SAT), Spurling Test (ST), Upper Limb Tension Test (ULTT), and electromyography were done on 97 patients who referred to Electrodiagnostic center in the university hospital from January 2010 to March 2011. All of the participants had neck and radicular pain for at least 3 weeks. They were classified according to electrodiagnostic findings. Then diagnostic values of provocative tests were assessed in diagnosis of acute or chronic CR on the basis of reference criterion. Results: SAT and ST were more specific (85%) compared to ULTT, while ULTT was more sensitive (60.46% in acute and 35.29% in chronic) than the other two. SAT and ST had a significant accuracy for comparison between acute and chronic CR (P < 0.05). Conclusion: ULTT is suitable for screening of CR, while SAT and ST can support diagnosis. SAT and ST are good diagnostic tests for comparison between acute and chronic CR.

Key words: Cervical radiculopathy, electrodiagnostic study, shoulder abduction test, spurling test, upper limb tension test

This study suggests using ULTT for screening purposes in patients with neck and arm pains to diagnose CR, so the negative test can minimize further workups. In contrast, physicians can use SAT and ST for confirmation of CR especially the acute form in suspected patients, because of the high specificity, PPV and the discrepancy of diagnostic value among acute and chronic patients Regarding the lower accuracy of the provocative tests in chronic CR, especially SAT and ST, we can conclude that in the patients with prolonged symptoms, these tests can be negative and lead to no diagnosis of CR.

#### Cervical considerations....

- Loss of curve
- Extension tolerance
- Distraction relief



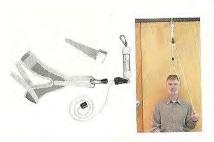






An over-the-door unit is necessary when patients cannot be made pain-free when recumbent.

NeckPro is a great choice



### **Neckpro® Overdoor Traction Device**

#### Standard Features:

- · Eliminates the bag of water and trial and error method of traction tension
- Precision-made compression spring and unique ratcheting device
- · Precise amount of cervical traction tension
- Tension increase in 1 lb increments(20 lb total)
- Comfortable head halter
- Simple, effective, portable, affordable
- One of the most user friendly cervical devices available

860-0034	Neckpro Traction Device	\$62.99
860-0036	Replacement Head	\$20.99
	Halters	



#### ComforTrac Cervical Traction

- 50 lbs of total traction
- (10, 15, and 20 degrees) angle of incline easily adjusted by repositioning stand
- Portable and lightweight, comes with carrying case on wheels
- Simple one-button pump release
- Comfortable Swedish cushion
- Rounded edges for comfortable grip
- Hand pump gauge displays force in both lb and Kg
- Patent-pending designs revolutionize home cervical traction

860-0065	\$445.0













## Kdt cervical device



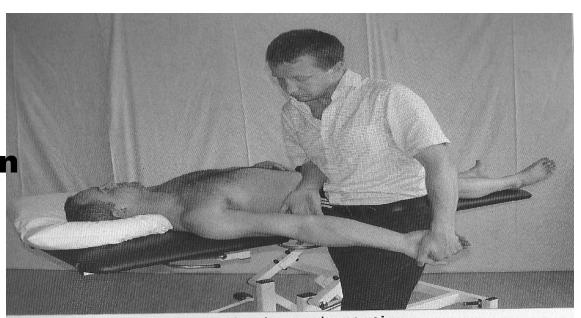
## Skull 'overstrap'



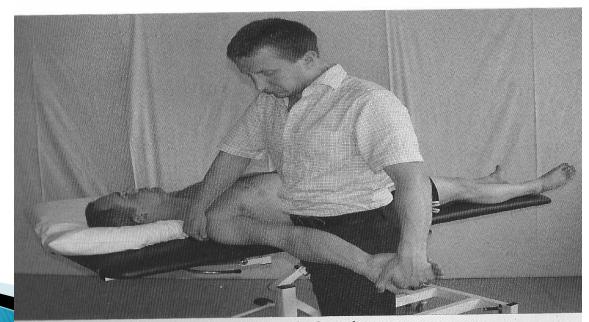
## Clinical prediction rules (cervical)

- Painful arm abduction
- ULTT (type 1)
- Distraction relief
- Seated 'occipital lift'
- Rotation INTO side of pain increases pain

Type 1 ULTT for brachial plexus/median nerve.



g 10.10 ULTT 1: Shoulder lateral rotation.



ig 10.11 ULTT 1: Shoulder abduction.

#### **1984 ULNTT**



Fig. 17.1 Gleno-humeral abduction to the painful limit.



Fig. 17.2 Reduction of abduction just short of the painful limit.



Fig. 17.3 Gleno-humeral external rotation to the painful limit.



Fig. 17.4 Reduction of external rotation to just short of the painful limit.



Fig. 17.5 Forearm supination, without gleno-humeral movement.

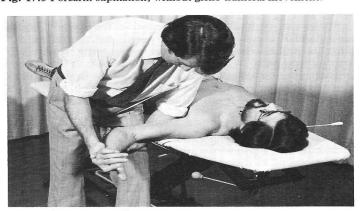


Fig. 17.6 Elbor flexion with forearm supination, without gleno-humeral movement. This final movement often reproduces the upper arm pain.

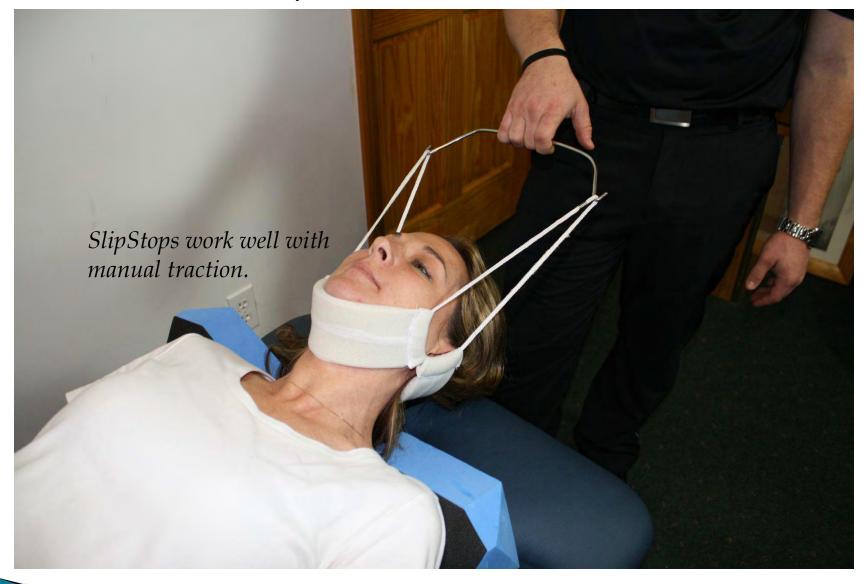
Occipital 'shelf' lift with arm abduction



#### Manual distraction test & treatment.



#### A form of manual/harness traction in-office and at-home



### Cervical protocols & pull patterns

- ▶ 10% TBW (good starting point).
- Or (if you prefer arbitrary numbers)... Female: 15-25 pounds. Males: 20-32 pounds.
- ▶ Time: 5–10 minutes.
- 'Trac'-long...30sec pull/15sec pull
- 'Trac'-short...10sec pull/10sec pull
- CPM
- Always manual traction first.

\*\*\*\*Many standard PT texts suggest 4-7# cervical traction

## Why 'lower' force?

Quantitative changes in the cervical foramen resulting from axial traction. Lui et al; Spine 2008.

Traction has a significant effect on the foraminal height and area. This effect peaks at approx. **20 pounds** of axial tension. Additional force imparts little increase.

10% TBW 1: Niger Postgrad Med J. 2006 Sep;13(3):230-5.

Effects of different cervical traction weights on neck pain and mobility.

Akinbo SR, Noronha CC, Okanlawon AO, Danesi MA.

Department of Physiotherapy, College of Medicine, University of Lagos.

#### 1979 Modern mobilization therapy



Fig. 64.4 Cervical traction must be applied with care. Heavy intermittent traction may prolong the condition, and by exacerbating cause unnecessary suffering

1: Niger Postgrad Med J. 2006 Sep;13(3):230-5.

Effects of different cervical traction weights on neck pain and mobility.

Akinbo SR, Noronha CC, Okanlawon AO, Danesi MA.

Department of Physiotherapy, College of Medicine, University of Lagos.

1: Eur Spine J. 2009 Jan 14. [Epub ahead of print]

Development of a clinical prediction rule to identify patients with neck pain likely to benefit from cervical traction and exercise.

Raney NH, Petersen EJ, Smith TA, Cowan JE, Rendeiro DG, Deyle GD, Childs JD.

Department of Physical Therapy, Wilford Hall Medical Center, 134 Evans Ave, San Antonio, TX, 78209, USA, Sanantoniogirl1@hotmail.com.

☐ 1: J Manipulative Physiol Ther. 2002 Mar-Apr; 25(3): 188-92.

J Manipulative Physiol Ther

Intermittent cervical traction for cervical radiculopathy caused by large-volume herniated disks.

Constantoyannis C, Konstantinou D, Kourtopoulos H, Papadakis N.

Department of Neurosurgery, University of Umea, Umea, Sweden.

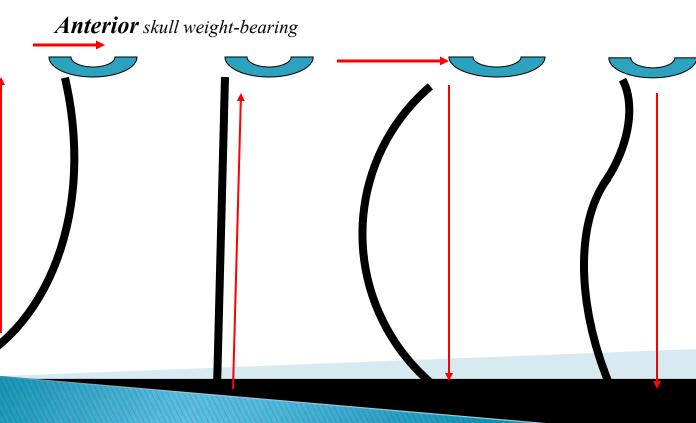
## Force-closure for cervical stability



Co-contraction of cervical muscles creating 'stability' & compression

## Examples of abnormal cervical curves

These represent 4 basic shifts from normal. Loss of curve & anterior displacement tend to respond to **NeckDeck** therapy.



Hypolordotic

Military

Kyphotic

5



# The 'Neck deck' is simple, inexpensive & easy-to-use





*In office & at-home use* 

