



CURRENT RESEARCH

**OMT MECHANISMS AND
BASIC SCIENCE**

OMT MECHANISMS

INDIVIDUAL TECHNIQUES ARE BASICALLY THE SAME REGARDLESS OF THE PRACTITIONER'S DEGREE OR THE NAME THAT THE TECHNIQUE IS GIVEN



PÉTRISSAGE

Pétrissage:

Deep kneading or squeezing action to express swelling.

ECOP Glossary 2009



PÉTRISSAGE

Inhibitory influence of soleus massage onto the medial gastrocnemius H-reflex

M. Morelli, S. J. Sullivan and C. E. Chapman

Electromyogr. clin. Neurophysiol., 1998, 38, 87-93.

Pétrissage was applied over distal soleus muscle with 1.8kPa force in distal to proximal direction. 12 subjects. Medial gastroc H-reflex (Hoffman reflex – basically an electrically induced muscle stretch reflex) markedly reduced during massage for all 12 subjects.



INHIBITION

The Effects Of Circumferential Air-splint Pressure On Flexor Carpi Radialis H-reflex In Subjects **Without** Neurological Deficits

Perceptual and Motor Skills, 2006, 103, 565-579

Agostinucci, J; Holmberg, A; Mushen, M; Plisko, J; Gofman, M

Inflated a circumferential air-splint device around the flexor carpi radialis to 51-60mm Hg in 43 subjects. H-reflex increased at least 10% in 22 subjects and decreased at least 10% in 21 subjects.



INHIBITION

Inhibitory Effects Of Circumferential Air-splint Pressure On Flexor Carpi Radialis H-reflex In Adults **With Neurological Deficits**

Perceptual and Motor Skills, 2010, 110, 89-103

Agostinucci, J

Inflated a circumferential air-splint device around the flexor carpi radialis to 51-60mm Hg in 22 Post CVA subjects and 5 spinal cord injury patients. H-reflex increased in 2 subjects and decreased in 14 subjects.



CERVICAL TRACTION



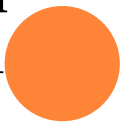
Manual cervical traction reduces alpha-motoneuron excitability in normal subjects

L Bradnam, L. Rochester and A. Vujnovich

Electromyogr. clin. Neurophysiol., 2000, 40, 259-266.

Following manual cervical traction H-reflex was significantly lower than preintervention trials. Manual cervical traction, therefore, reduced the excitability of the Flexor Carpi Radialis a-motoneuron pool.

Manual cervical traction may therefore evoke an inhibitory response in the central nervous system by raising the firing threshold of individual a-motoneurons.



CERVICAL MASSAGE VS HVLA

Comparison of effects of spinal manipulation and massage on motoneuron excitability

J. D. Dishman R. Bulbulian *Electromyogr. clin. Neurophysiol.*, 2001, 41, 97-106.

Baseline tibial nerve H-reflex amplitudes were obtained prior to the application of either lumbosacral spinal manipulation or paralumbar and limb massage. Post-interventional H-reflex recordings were recorded immediately following the application of either modality.

Massage subjects exhibited no significant reduction in motoneuronal activity immediately following administration. Spinal manipulation produced a transient attenuation of alpha motoneuronal excitability. Paraspinal and limb massage did not inhibit the motoneuron pool as measured immediately post-therapy.

Spinal manipulation procedures lead to short-term inhibitory effects on motoneuron excitability to a greater magnitude than massage.



LOW BACK PAIN, SOMATIC DYSFUNCTION AND SEGMENTAL BMD T-SCORE VARIATION IN THE LUMBAR SPINE

J AM OSTEOPATH ASSOC. 2011;111(2):89-96

This study investigated the association of altered lumbar vertebral mechanics (somatic dysfunction) and BMD T-score variability in subjects both with and without chronic low back pain (CLBP).

Sixty-four volunteers, ages 20 to 40, 16 CLBP - those with a self-reported history of CLBP for the past 3 months or more; 47 Non-LBP - those with no self-reported history of low back pain (LBP) in the last 3 months.

Each subject evaluated for TART by 2 physicians



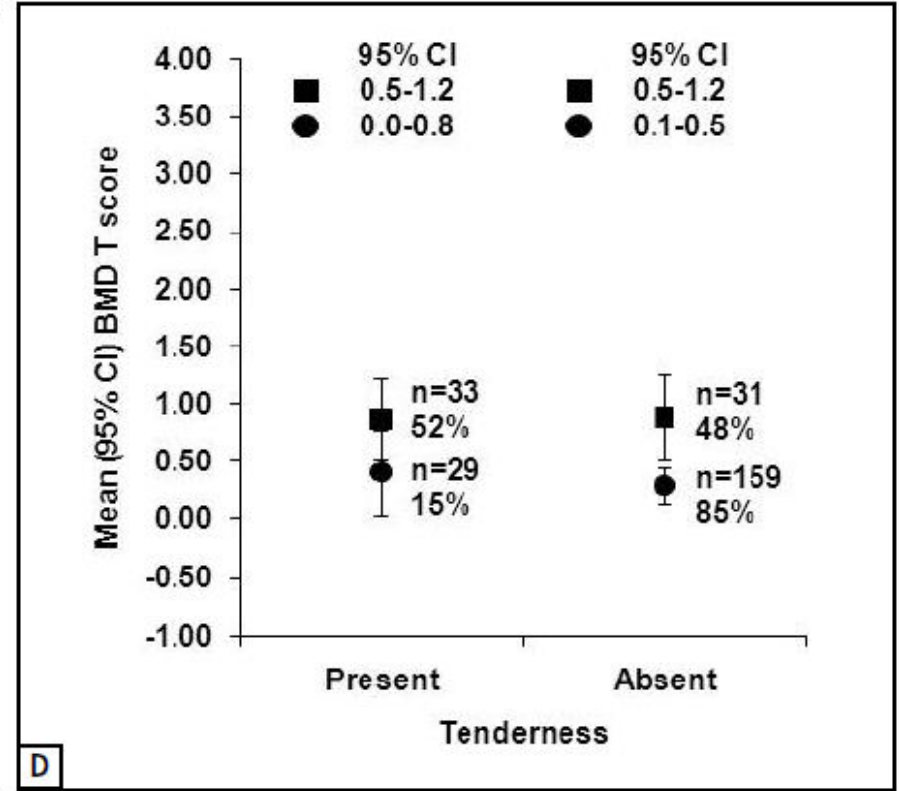
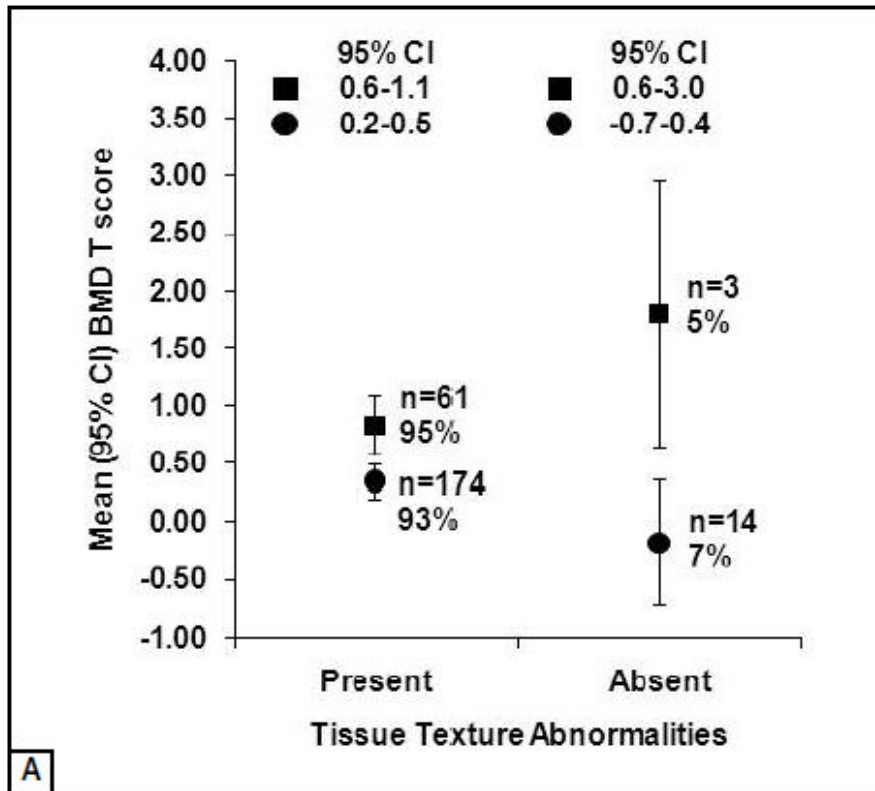
Table 2.
Relationship of Presence or Absence of Somatic Dysfunction
With Bone Mineral Density T Score

Somatic Dysfunction Assessment	Somatic Dysfunction, BMD T score, Mean (95% CI)		P Value
	Present	Absent	
■ Tissue Texture Abnormalities	0.5 (0.3-0.6)	0.2 (-0.3-0.7)	.26
□ n	235	17	
■ Rotational Asymmetry	0.5 (0.4-0.7)	-0.2 (-0.6-0.2)	.002
□ n	227	25	
■ Motion Restriction	0.6 (0.4-0.7)	0.1 (-0.2-0.3)	.03
□ n	192	60	
■ Tenderness	0.7 (0.4-0.9)	0.4 (0.2-0.5)	.09
□ n	62	190	

Abbreviations: BMD, bone mineral density; CI, confidence interval; n, number of vertebral segments (4 per subject) with or without particular somatic dysfunction.



TTA AND TENDERNESS

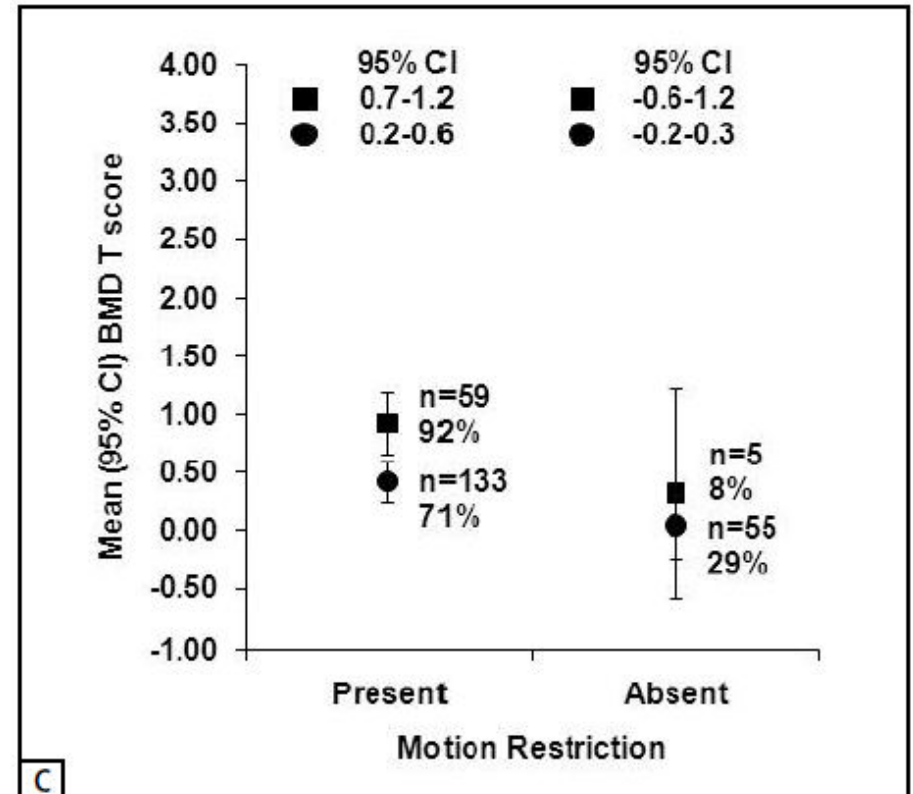
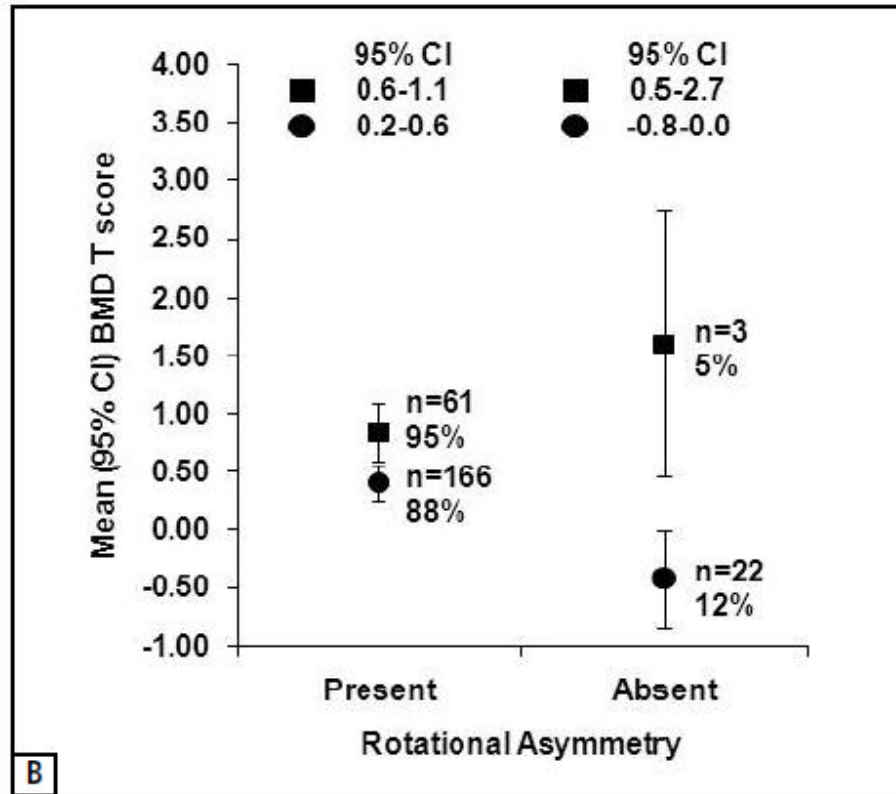


CLBP

No
LBP



ROTATION & AP SPRINGING MOTION



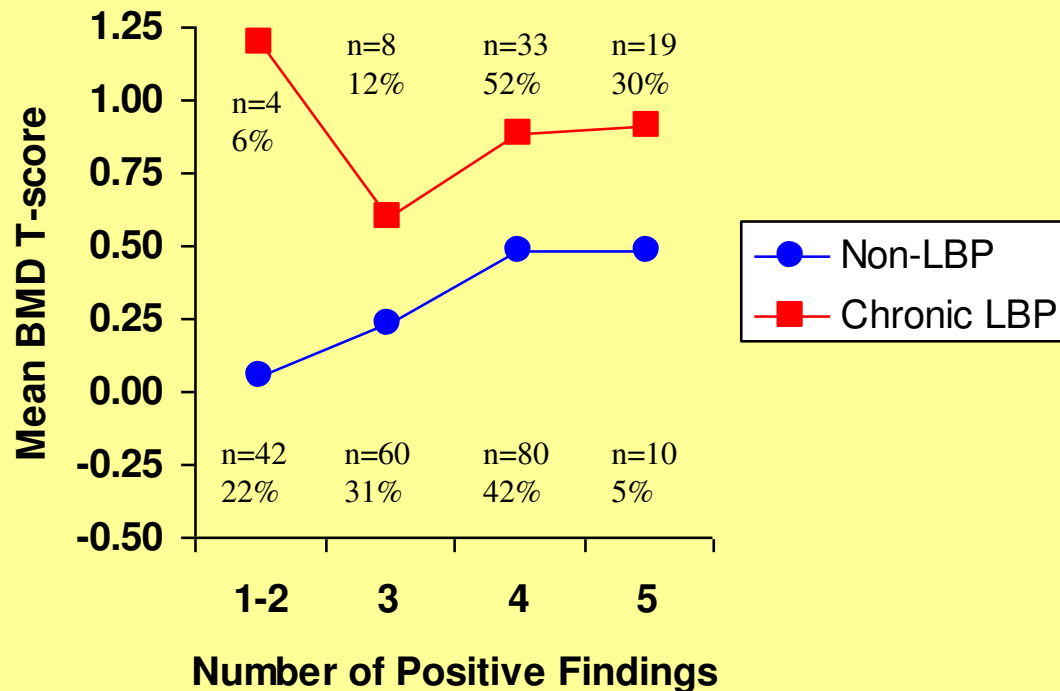
CLBP

No LBP



TOTAL NUMBER OF POSITIVE FINDINGS

Number of Positive Findings



- Number of positive findings is significantly related to BMD ($p=0.01$).
- Number of positive findings is significantly related to group membership ($p<0.0001$).

PRELIMINARY REPORT: BIOMECHANICS OF VERTEBRAL ARTERY SEGMENTS C 1-C6 DURING CERVICAL SPINAL MANIPULATION JMPT 2010;33:273-278)

- The purpose of this study was to measure strains in the human vertebral artery (VA) during spinal manipulation of the cervical spine.
- Methods: Eight piezoelectric ultrasound crystals of 0.5-mm diameter were sutured into the lumen of the left and right VA of one cadaver and monitored during ROM and HVLA.
- Strains during cervical spinal manipulations were lower than those obtained during range of motion testing, suggesting that neck manipulations impart stretches on the VA that are well within the normal physiologic range of neck motion.



CERVICAL SPINE MOBILIZATION FORCES APPLIED BY PHYSIOTHERAPY STUDENTS.

PHYSIOTHERAPY. 2010 JUN;96(2):120-9. EPUB 2009 DEC 23.

Students applied central and unilateral PA mobilization to C2 and C7 of one asymptomatic subject. Manual forces were measured in three directions using an instrumented treatment table. Spinal stiffness of mobilized subjects was measured at C2 and C7 using a device that applied a standard oscillating force while measuring this force and its concurrent displacement.

Higher applied force was associated with greater C7 stiffness, increased frequency of thumb pain, **male gender of the student or mobilized subject**, and a student being earlier in their learning process.

Lower forces were associated with greater C2 stiffness.

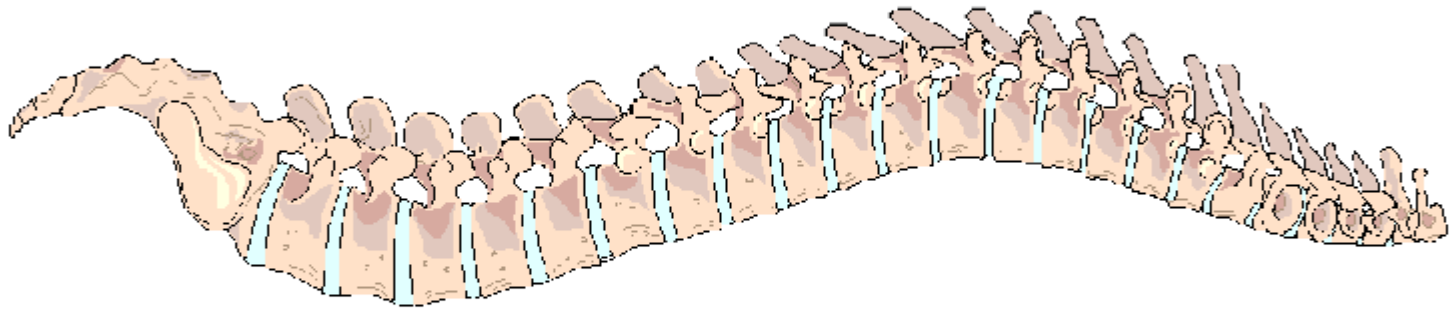


THE FORCES APPLIED BY FEMALE AND MALE CHIROPRACTORS DURING THORACIC SPINAL MANIPULATION. JMPT. 2004 JAN;27(1):49-56.

14 male and 14 female experience-matched chiropractors manipulated asymptomatic male adult subjects of similar height and weight. Thrust on transverse process in the vicinity of T4 and T9 with hand contact fit onto the sensor pad (area = 100 cm²).

There were **no significant differences** ($P < .05$) between male and female chiropractors for any measurements in the upper thoracic area. For the lower thoracic manipulations, the preload forces for the male chiropractors were significantly greater ($P < .05$) than those for the female chiropractors.





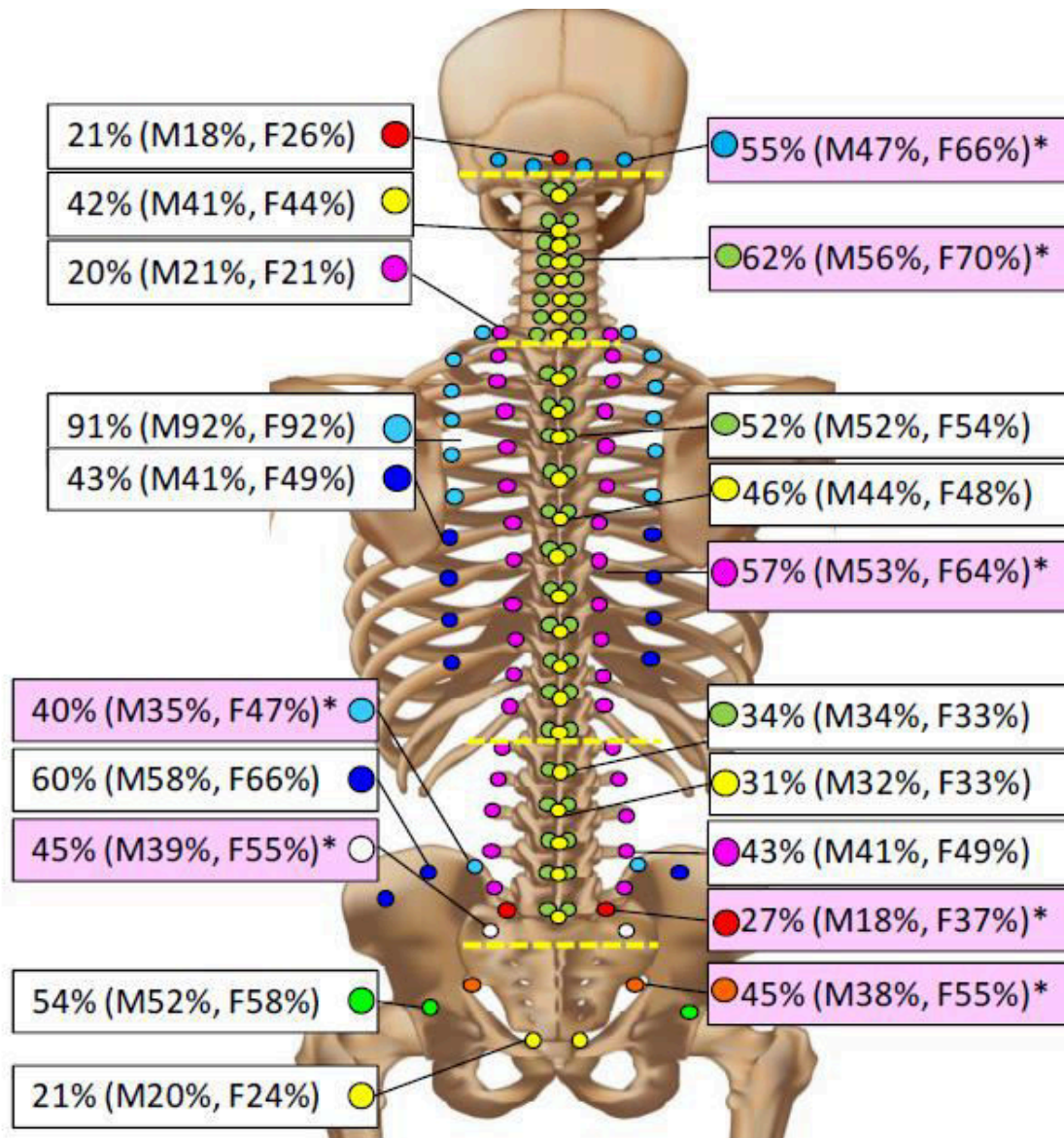
GUIDANCE HYPOTHESIS WITH VERBAL FEEDBACK IN LEARNING A PALPATION SKILL

PRINGLE 2004 *JMPT*

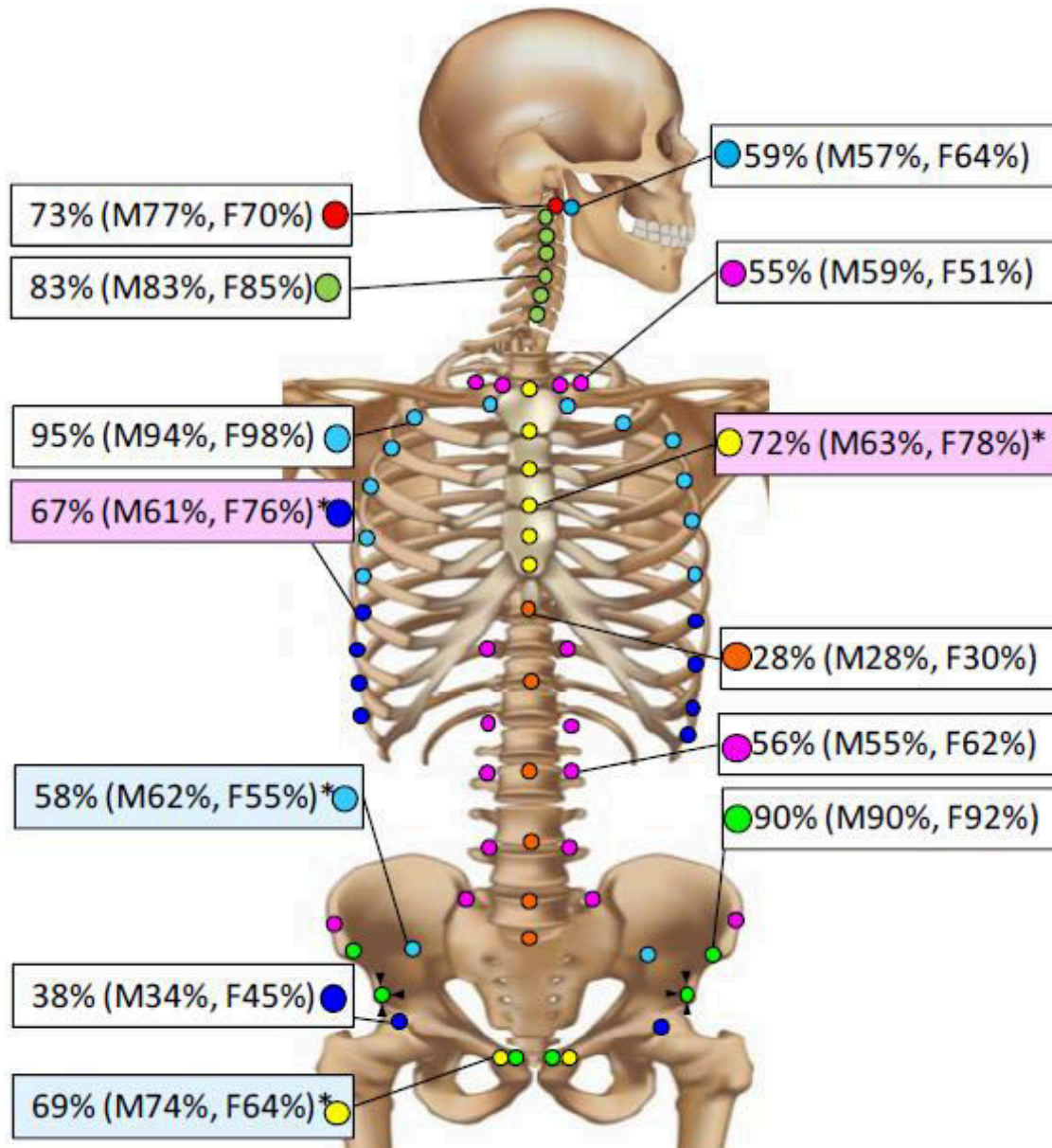
- 35 first-year chiropractic students were taught a motion testing technique
- **Constant** instructor feedback resulted in the **most accurate initial acquisition** of the manual skill
- **Intermittent** feedback resulted in the **best retention and learning**
- Groups of students that received feedback only **once** during each training session demonstrated the **lowest initial skills acquisition** and **lowest skill retention.**



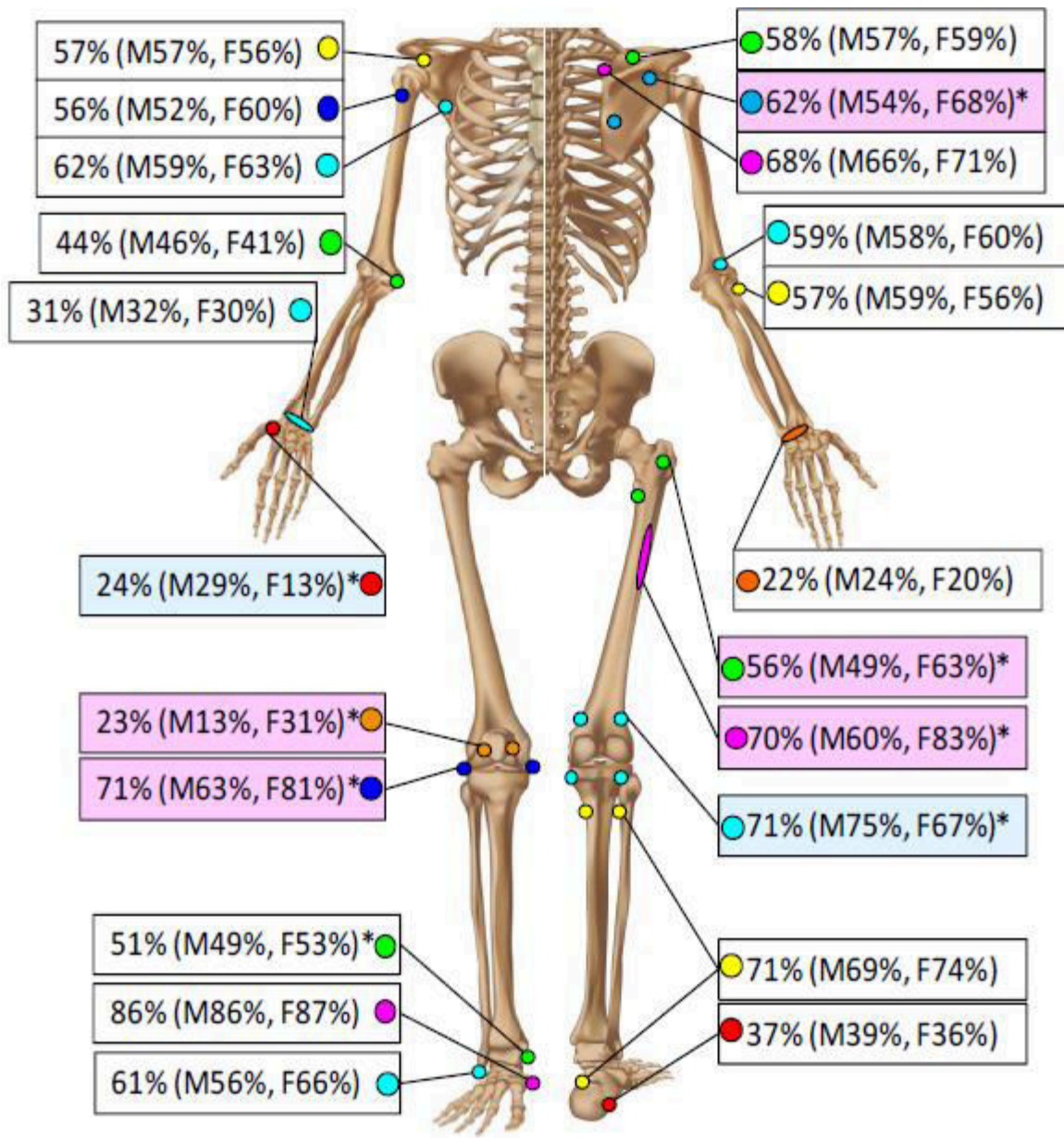
AACOM COUNTERSTRAIN STUDY



AACOM COUNTERSTRAIN STUDY



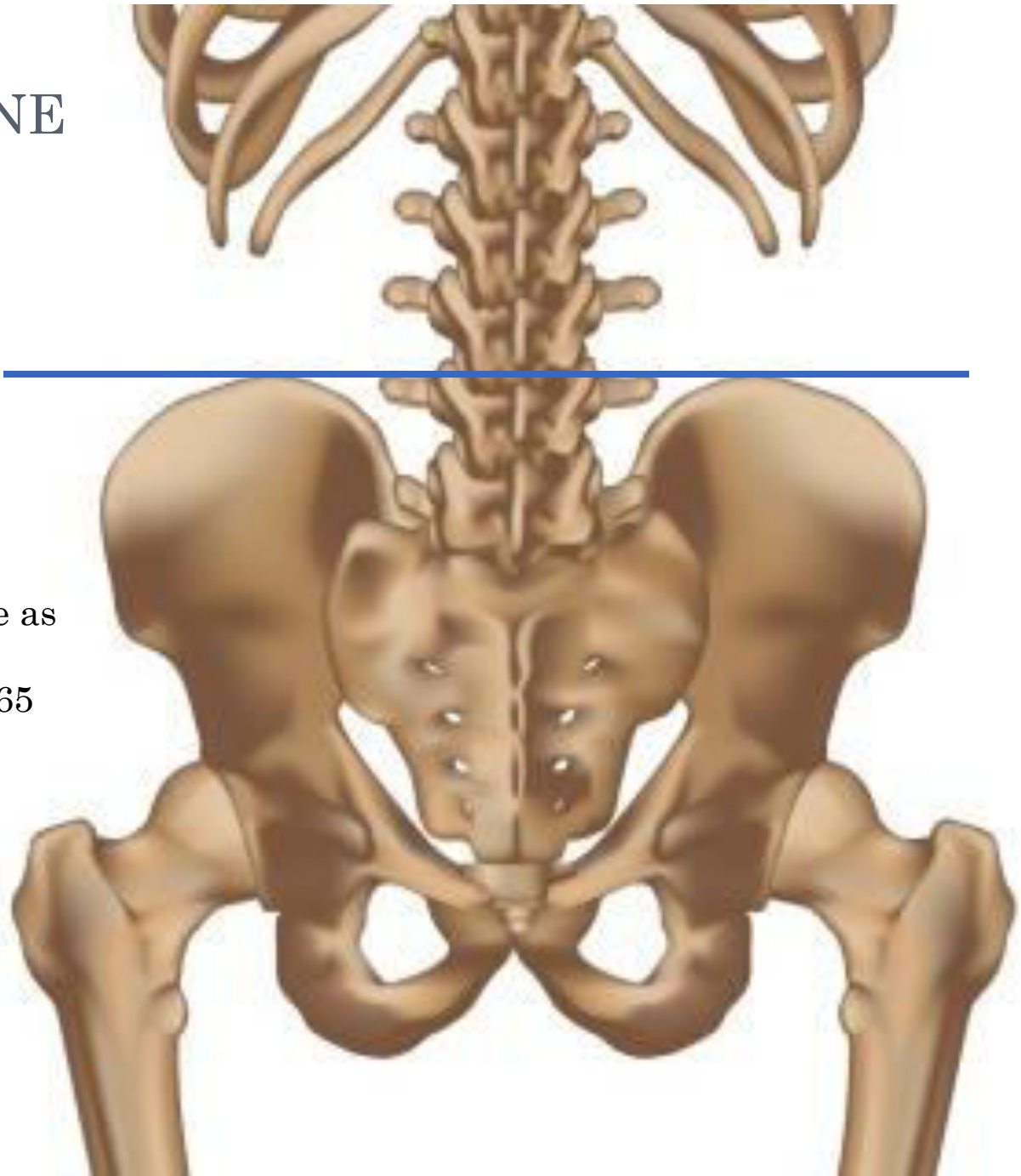
AACOM COUNTERSTRAIN STUDY



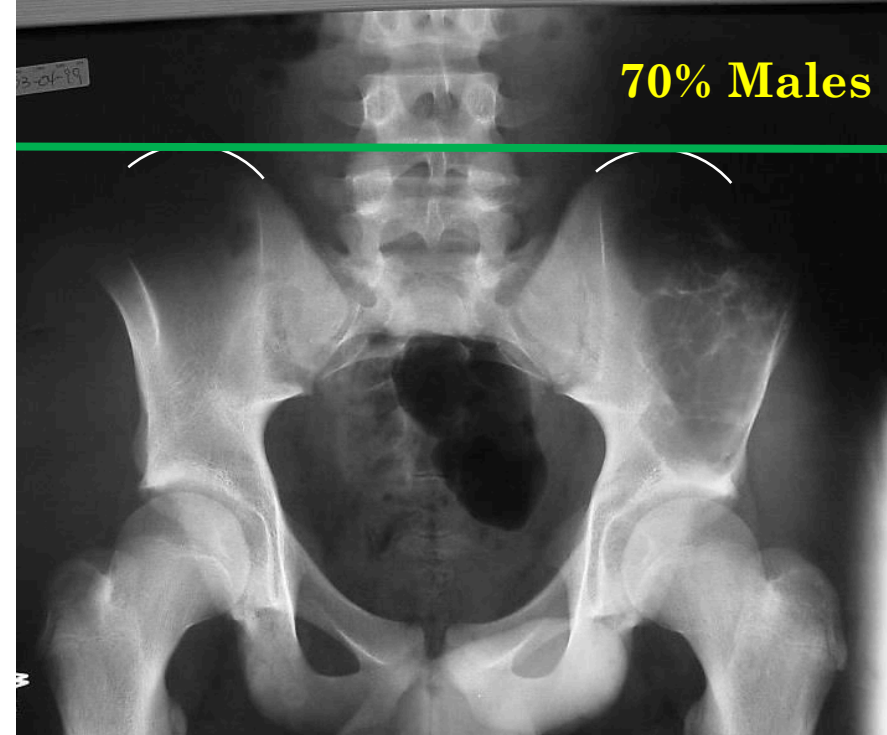
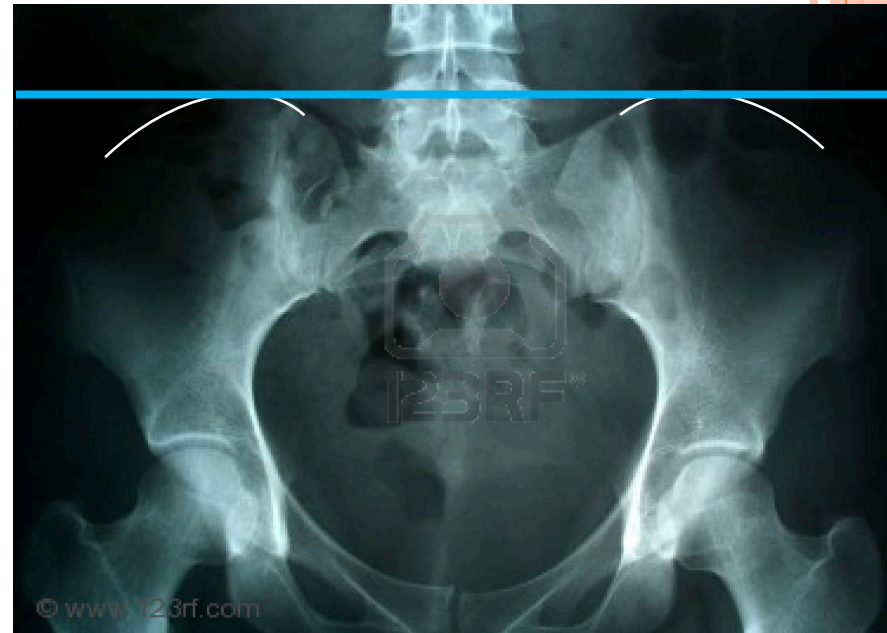
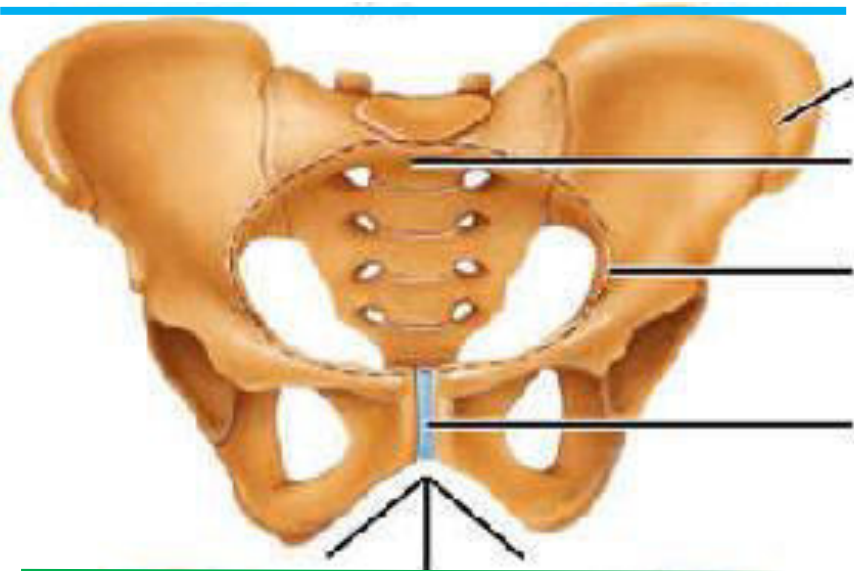
TUFFIER'S LINE

70% Males

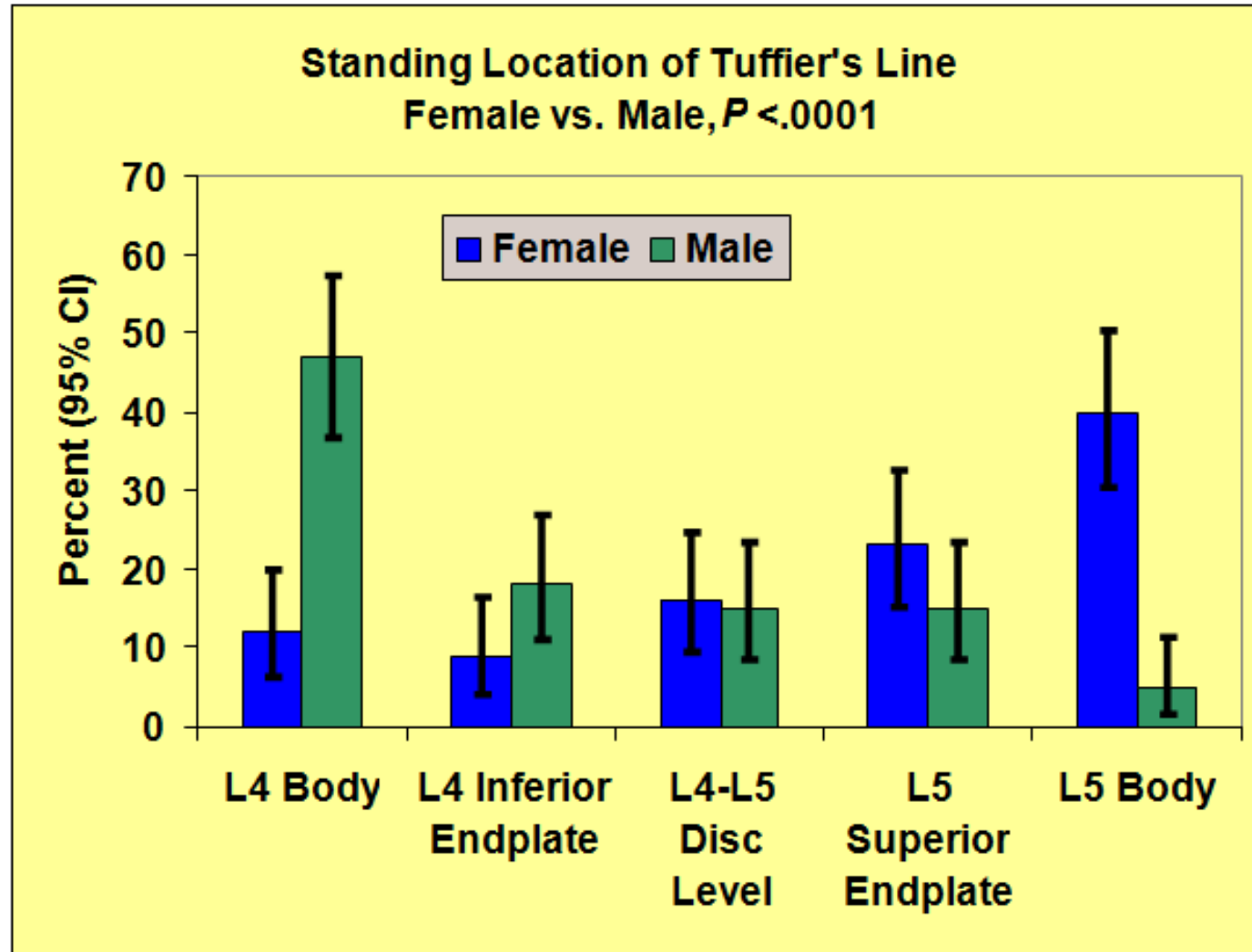
Reliability of Tuffier's Line as
an Anatomic Landmark.
Spine 2008;33(6):E161-E165



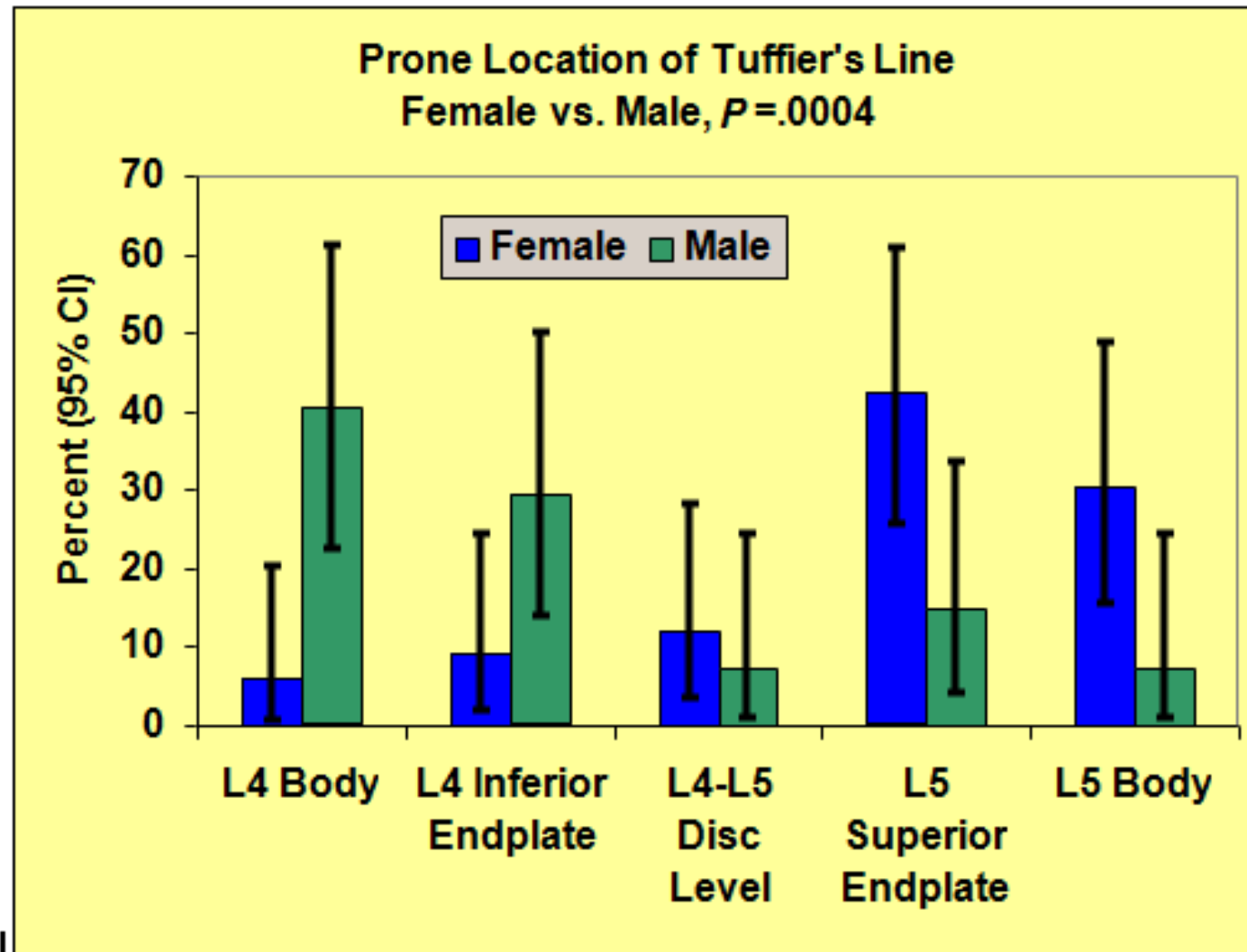
70% Females



TUFFIER'S LINE



TUFFIER'S LINE



OTHER SUPPORTING LITERATURE

- MacGibbon B, Farfan HF. A radiologic survey of various configurations of the lumbar spine. *Spine* 1979;4:258–66.
- Quinnell RC, Stockdale HR. The use of *in vivo* lumbar discography to assess the clinical significance of the position of the intercrestal line. *Spine* 1983;8: 305–7.
- Hogan QH. Tuffier's line: the normal distribution of anatomic parameters [letter]. *Anesth Analg* 1994;78:194.
- Kim HW, Ko YJ, Rhee WI, et al. Interexaminer reliability and accuracy of posterior superior iliac spine and iliac crest palpation for spinal level estimations. *J Manipulative Physiol Ther* 2007;30:386–9.



DOES THE ADJUSTMENT CAVITATE THE TARGETED JOINT? AN INVESTIGATION INTO THE LOCATION OF CAVITATION SOUNDS. JMPT 2004 FEB;27(2):E2

Thirty asymptomatic volunteers were randomly divided into 2 equal groups. Each group represented either the spinous hook adjustment or lower sacroiliac adjustment. Subjects had 8 microphones taped to their skin, over the relevant facet and sacroiliac joints. Radiographic confirmation was used to ensure optimal placement of the microphones. Sound signals produced during the adjustments were digitized, recorded, and analyzed statistically.

No statistically significant correlation existed between the anatomical location of cavitation sounds and the adjustment technique selected.



DETERMINING CAVITATION LOCATION DURING LUMBAR AND THORACIC SPINAL MANIPULATION: IS SPINAL MANIPULATION ACCURATE AND SPECIFIC?

JMPT 2004 JUL 1;29(13):1452-7.

Asymptomatic participants received SMT to either the thoracic or lumbar regions of their spine. Accelerometers were secured to the skin over the spinal column, and the relative time at which each accelerometer detected the vibration from the cavitation associated with the SMT was used to calculate the source of the vibration. The site of cavitation was then compared with the target location.

In the lumbar spine SMT was accurate about half the time. However, because most procedures were associated with multiple cavitations, in most cases, at least one cavitation emanated from the target joints. In the thoracic spine, SMT appears to be more accurate.



