Headaches

A Pain Science Approach

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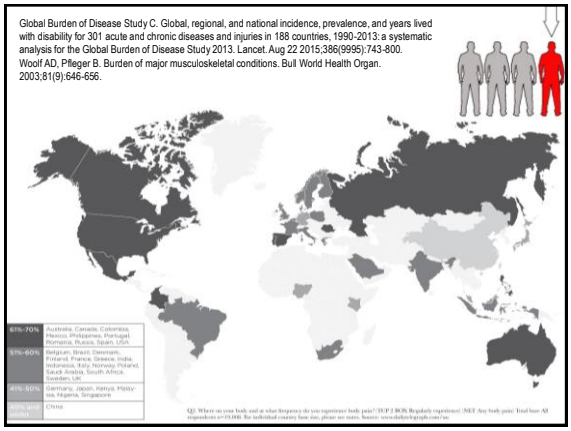
International Spine & Pain Institute | EIM Evidence in Motion | TNRG Therapeutic Neuroscience Research Group | St Ambrose University | UNLV University of Nevada, Las Vegas

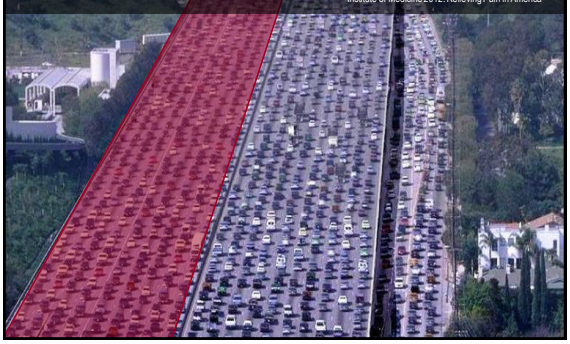
Education is Therapy...

Global Burden of Disease Study C. Global, regional, and national incidence, prevalence, and years lived with disability for 301 acute and chronic diseases and injuries in 188 countries, 1990-2013: a systematic analysis for the Global Burden of Disease Study 2013. Lancet. Aug 22 2015;386(9995):743-800.
Woolf AD, Pfleger B. Burden of major musculoskeletal conditions. Bull World Health Organ. 2003;81(9):646-656.



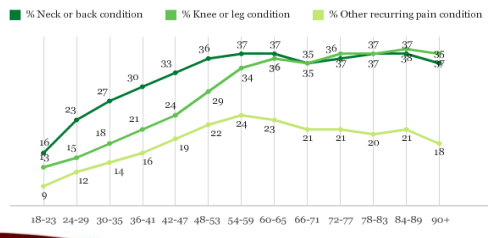
>100 Million Americans have some form of persistent pain

Institute of Medicine 2012: Relieving Pain in America



Specific to this course: Spinal Pain

Percentage of Americans Who Have a Chronic Pain Condition, by Age



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Most Research: Low Back Pain

LBP accounts for 25% of outpatient PT in the US

Jette DU, Jette AM. Physical therapy and health outcomes in patients with spinal impairments. *Physical therapy.* Sep 1996;76(9):930-941; discussion 942-935.
Jette AM, Delitto A. Physical therapy treatment choices for musculoskeletal impairments. *Physical therapy.* Feb 1997;77(2):145-154.
Carey TS, Freburger JK, Holmes GM, et al. A long way to go: practice patterns and evidence in chronic low back pain care. *Spine.* Apr 1 2009;34(7):718-724.

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Prevalence of C-spine Disorders

- 65.4% Lifetime prevalence
- 53.6% 12-month prevalence
  - Approx. 15% moderate to severe pain.
- 25% of OP PT visits.
- 44% with neck pain progress to chronic symptoms

Jette DU, Jette AM. Physical therapy and health outcomes in patients with spinal impairments. *Physical therapy.* Sep 1996;76(9):930-941; discussion 942-935.
Jette AM, Delitto A. Physical therapy treatment choices for musculoskeletal impairments. *Physical therapy.* Feb 1997;77(2):145-154.
Borghouts JA, Koes BW, Bouter LM. The clinical course and prognostic factors of non-specific neck pain: a systematic review. *Pain.* Jul 1998;77(1):1-13.

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Prevalence of C-spine disorders

Neck pain in Hong Kong: a telephone survey on prevalence, consequences, and risk groups. **65.4%**

The Saskatchewan Health and Back Pain Survey. The prevalence of neck pain and related disability in Saskatchewan adults. **66.7%**

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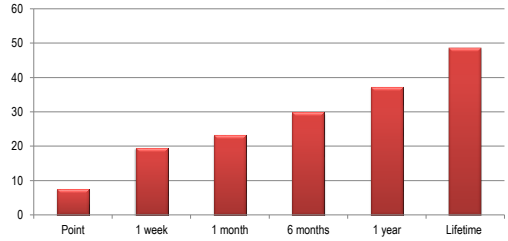
Fejer R, Kyvik KO, Hartvigsen J. The prevalence of neck pain in the world population: a systematic critical review of the literature. *European spine journal : official publication of the European Spine Society, the European Spinal Deformity Society, and the European Section of the Cervical Spine Research Society.* Jun 2006;15(6):834-848.



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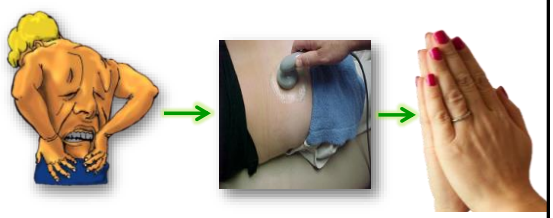
In Spinal Pain (especially LBP) a model emerged…



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Followed by another…

- If a 100 people attended PT with LBP, surely some must get better when we manipulate them.
- Some must get better if we teach them stabilization exercises
- Some need medical attention
- Etc.

Wouldn't it be great to know ahead of time who they are?

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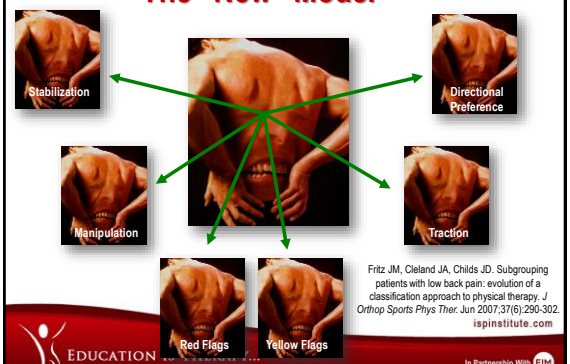
The "New" Model



Fritz JM, Cleland JA, Childs JD. Subgrouping patients with low back pain: evolution of a classification approach to physical therapy. *J Orthop Sports Phys Ther.* Jun 2007;37(6):290-302.

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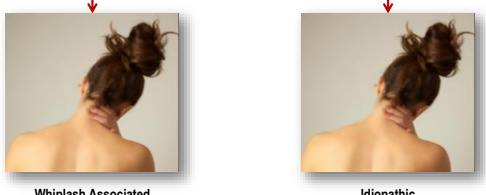
New Neck Pain Model



Whiplash Associated Idiopathic

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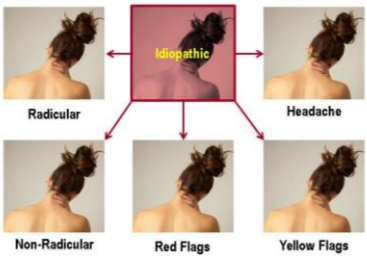
Idiopathic Neck Pain



Clinical Practice Guidelines Linked to the International Classification of Functioning, Disability, and Health From the Orthopedic Section of the American Physical Therapy Association 2008

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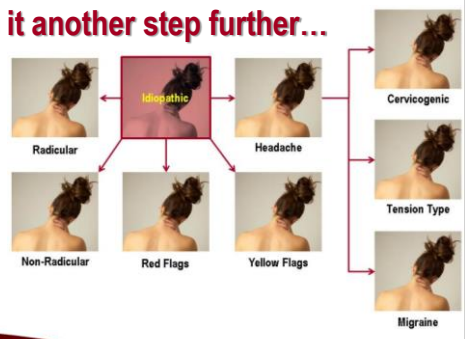
Taking it another step further…

Clinical Practice Guidelines Linked to the International Classification of Functioning, Disability, and Health From the Orthopedic Section of the American Physical Therapy Association 2008



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Prevalence

Headaches are common

- 47% point prevalence
- 68% Lifetime prevalence

- Cervicogenic headache:
  - 2.5 - 13.8% of the population
- Tension-type Headache:
  - 40-74% of population - almost 80% of all headache diagnoses

Pfaffenrath V, Kaube H. Diagnostics of cervicogenic headache. *Funct Neurol.* Apr-Jun 1990;5(2):159-164.
Jensen R. Diagnosis, epidemiology, and impact of tension-type headache. Curr Pain Headache Rep. Dec 2003;7(6):455-459.
Stovner L, Hagen K, Jensen R, et al. The global burden of headache: a documentation of headache prevalence and disability worldwide. Cephalalgia. Mar 2007;27(3):193-210.
Jensen R, Stovner LJ. Epidemiology and comorbidity of headache. Lancet Neurol. Apr 2008;7(4):354-361.

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Impact of Headaches

- One of the 5 most disabling disorders in women
- More functional limitation than chronic diabetes, HT, OA and LBP
- Socio-economic impact
- Impact on individual headache sufferer

Stovner L, Hagen K, Jensen R, et al. The global burden of headache: a documentation of headache prevalence and disability worldwide. *Cephalalgia.* Mar 2007;27(3):193-210.
Solomon S. Diagnosis of primary headache disorders. Validity of the International Headache Society criteria in clinical practice. Neurol Clin. Feb 1997;15(1):15-26.
Rasmussen BK, Jensen R, Olesen J. Impact of headache on sickness absence and utilisation of medical services: a Danish population study. Journal of epidemiology and community health. Aug 1992;46(4):443-446.
Boardman HF, Thomas E, Croft PR, Millson DS. Epidemiology of headache in an English district. Cephalalgia. Mar 2003;23(2):129-137.
Wiendels NJ, Knuistingh Neven A, Rosendaal FR, et al. Chronic frequent headache in the general population: prevalence and associated factors. Cephalalgia. Dec 2006;26(12):1434-1442.
Saunders K, Merikangas K, Low NC, Von Korff M, Kessler RC. Impact of comorbidity on headache-related disability. Neurology. Feb 12 2008;70(7):538-547.

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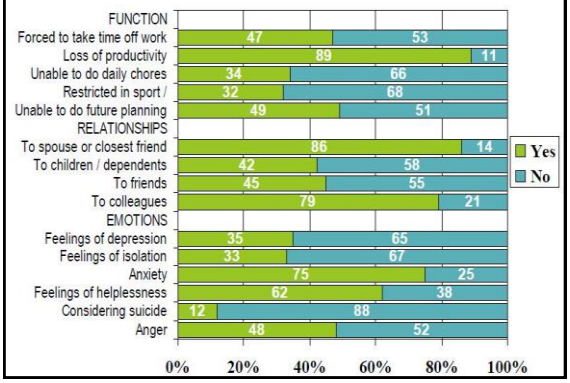
Perceived Impact of Chronic HA [Diener 2001]



Chronic Headaches…

- 70 – 90% gradually change from episodic to almost continuous headache syndromes within an average time period of 10.7 years
- Prevalence of Chronic Daily Headache = 3 - 5 % of the population

Silberstein SD, Lipton RB. Headache epidemiology. Emphasis on migraine. *Neurol Clin.* May 1996;14(2):421-434.
Spierings EL, Ranke AH, Schroevers M, Honkoop PC. Chronic daily headache: a time perspective. Headache. Apr 2000;40(4):306-310.
Dodick DW, Capobianco DJ. Treatment and management of cluster headache. Curr Pain Headache Rep. Feb 2001;5(1):83-91.
Wang SJ, Fuh JL, Lu SR, et al. Chronic daily headache in Chinese elderly: prevalence, risk factors, and biannual follow-up. Neurology. Jan 25 2000;54(2):314-319.
Lu SR, Fuh JL, Chen WT, Juang KD, Wang SJ. Chronic daily headache in Taipei, Taiwan: prevalence, follow-up and outcome predictors. Cephalalgia. Dec 2001;21(10):980-986.
Prencipe M, Casini AR, Ferretti C, et al. Prevalence of headache in an elderly population: attack frequency, disability, and use of medication. Journal of neurology, neurosurgery, and psychiatry. Mar 2001;70(3):377-381.

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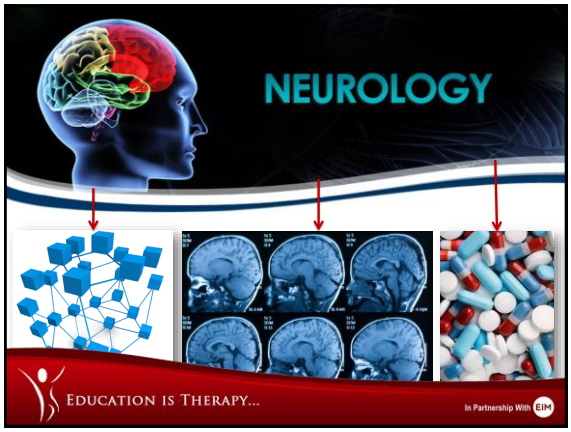

1. Tension-Type
2. Cervicogenic
3. Migraine

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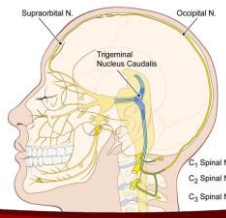
TCN: Headaches

The TCN is a **relay center**
- Afferent fibers from the upper three cervical nerve roots
- Trigeminal nerve

The spinal nucleus of the trigeminal nerve extends caudally to the dorsal horn of the upper three cervical spinal segments

Bartsch T, Goadsby P.J. Increased responses in trigeminocervical nociceptive neurons to cervical input after stimulation of the dura mater. *Brain*. Aug 2003;126(Pt 8):1801-1813.
Bogduk N. The neck and headaches. Neurol Clin. Feb 2004;22(1):151-171, vii.
Narouze SN, Kapural L. Supraorbital nerve electric stimulation for the treatment of intractable chronic cluster headache: a case report. Headache. Jul-Aug 2007;47(7):1100-1102.



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TCN: Filling the Cauldron*

*Concept from Dr. Ina Diener
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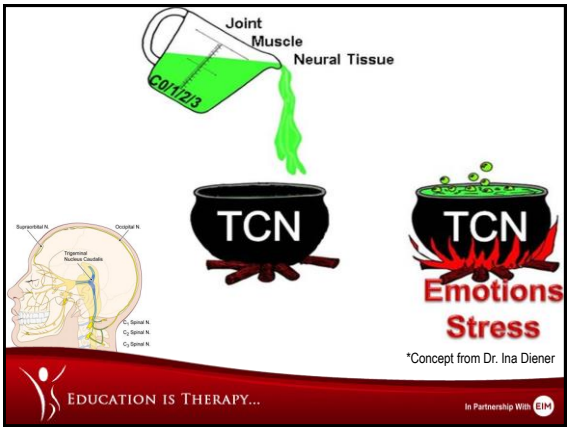

*Concept from Dr. Ina Diener
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1. Tension-Type Headache

Fernandez-de-Las-Penas C, Ge HY, Arendt-Nielsen L, Cuadrado ML, Pareja JA. Referred pain from trapezius muscle trigger points shares similar characteristics with chronic tension type headache. *Eur J Pain.* May 2007;11(4):475-482.
Fernandez-de-las-Penas C, Caminero AB, Madeleine P, et al. Multiple active myofascial trigger points and pressure pain sensitivity maps in the temporalis muscle are related in women with chronic tension type headache. Clin J Pain. Jul-Aug 2009;25(6):506-512.
Fernandez-De-Las-Penaz C, Arendt-Nielsen L, Gerwin R. Tension-Type and Cervicogenci Headache: Pathology, Diagnosis, and Management. Sudbury: Jones and Bartlett; 2010.

1. Tension-Type Headache

The following criteria are a synthesis of the more common pain features and characteristics of the different TTH diagnoses

Pain features and characteristic of headache attacks in TTH:

A. Headaches lasting from 30 minutes to 7 days

B. Headaches with at least 2 of the following pain characteristics:
   1. Bilateral location
   2. Pressing/tightening (non-pulsating) quality
   3. Mild or moderate intensity
   4. Not aggravated by routine physical activity such as walking or climbing stairs

C. Both of the following:
   1. No nausea or vomiting (anorexia may occur)
   2. No more than one of photophobia or phonophobia

D. Not attributed to other disorder*

1. Tension-Type Headache

Severity = Frequency!

Finally, depending on the frequency of the headaches, patients can be diagnosed as:

a. **Infrequent episodic TTH**: At least 10 episodes occurring on <1day per month on average (<12 days per year)

b. **Frequent episodic TTH**: At least 10 episodes occurring >1 but <15 days per month for at least 3 months (>12 but <180 days per year)

c. **Chronic tension type headache**: Headache occurring on >15 days per month on average for > 3 months (> 180 days per year)

Notes: * History and physical and neurological examination do not suggest any of the disorders listed in groups 5-12, or history and/or physical and/or neurological examination do suggest such disorders but it is ruled out by appropriate investigations, or such disorder is present but headache does not occur for the first time in close temporal relation to the disorder.

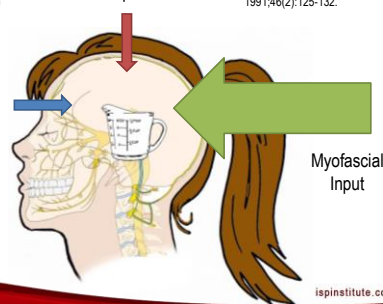
** Langemark M, Olesen J. Pericranial tenderness in tension headache. A blind controlled study. *Cephalalgia* 1987; 7: 249-255

1. Tension-Type Headache

TTH is the most common headache seen in physical therapy

Fernandez-de-las-Penas C, Schoenen J. Chronic tension-type headache: what is new? *Curr Opin Neurol.* Jun 2009;22(3):254-261.

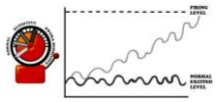
1. Tension-Type Headache

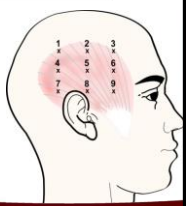


Olesen J. Clinical and pathophysiological observations in migraine and tension-type headache explained by integration of vascular, supraspinal and myofascial inputs. *Pain.* Aug 1991;46(2):125-132.

1. TTH: Central Sensitization…

- Increased sensitivity due to HA
- Headache causes central sensitivity and not the other way around





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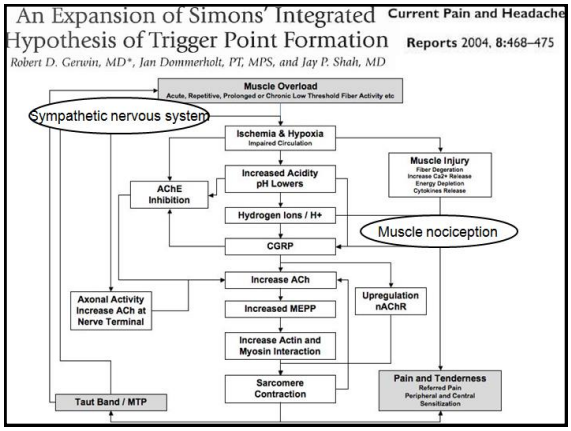
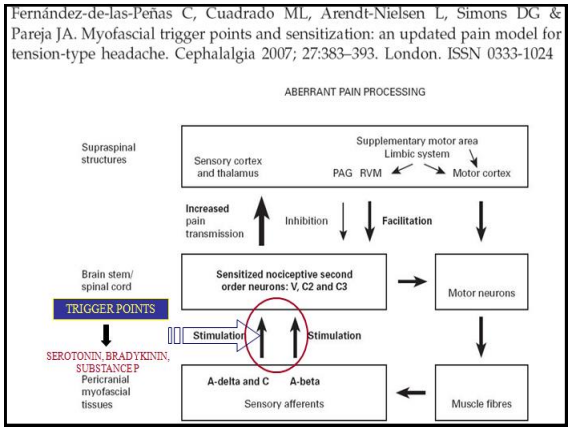
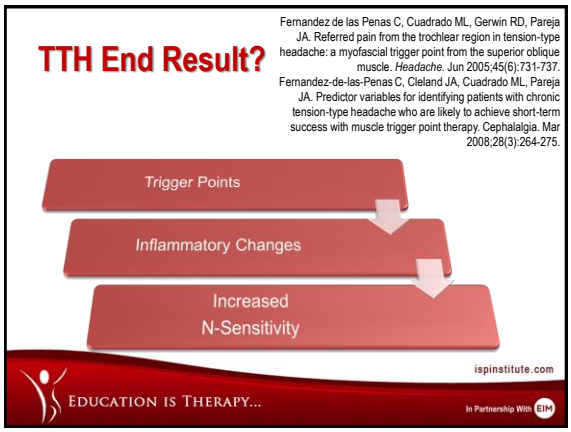
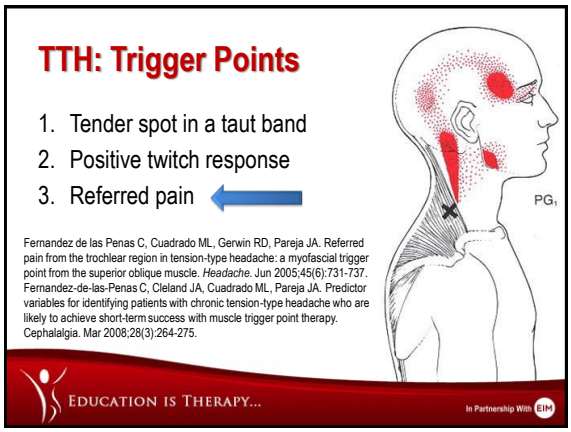
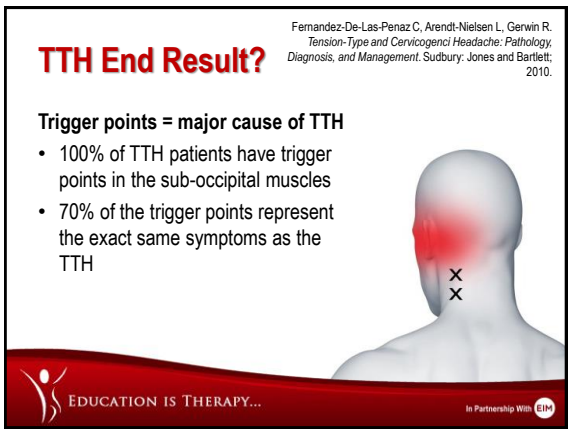
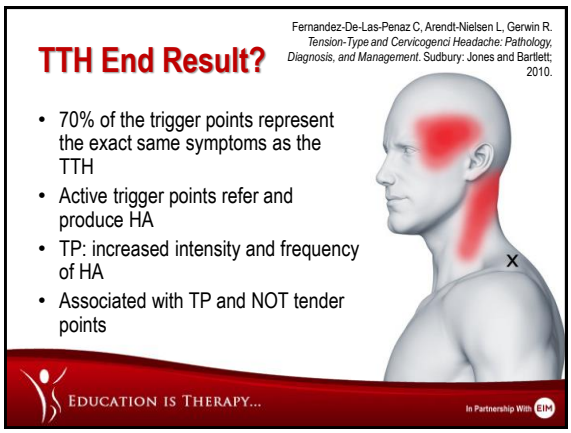






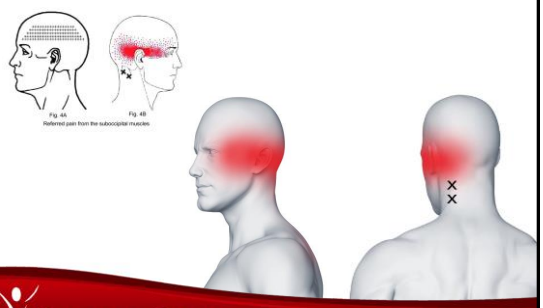






1. Sub-occipital

Fernandez-De-Las-Penaz C, Arendt-Nielsen L, Gerwin R. *Tension-Type and Cervicogenci Headache: Pathology, Diagnosis, and Management*. Sudbury: Jones and Bartlett; 2010.



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2. Temporalis

Fernandez-De-Las-Penaz C, Arendt-Nielsen L, Gerwin R. *Tension-Type and Cervicogenci Headache: Pathology, Diagnosis, and Management*. Sudbury: Jones and Bartlett; 2010.

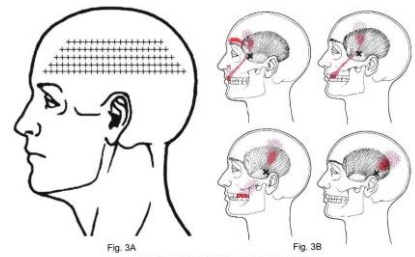

Fig. 3A Fig. 3B

Referred pain from the temporalis muscle

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3. Sternocleidomastoid

Fernandez-De-Las-Penaz C, Arendt-Nielsen L, Gerwin R. *Tension-Type and Cervicogenci Headache: Pathology, Diagnosis, and Management*. Sudbury: Jones and Bartlett; 2010.

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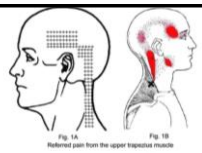
4. Upper Trapezius



Fernandez-De-Las-Penaz C, Arendt-Nielsen L, Gerwin R. *Tension-Type and Cervicogenci Headache: Pathology, Diagnosis, and Management*. Sudbury: Jones and Bartlett; 2010.

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2. Cervicogenic Headache

Bogduk N. Cervicogenic headache. *Cephalalgia*. Oct 2004;24(10):819-820.
Bogduk N. Cervicogenic headache: anatomic basis and pathophysiologic mechanisms. Curr Pain Headache Rep. Aug 2001;5(4):382-386.
Fredriksen TA, Sjaastad O. Cervicogenic headache: current concepts of pathogenesis related to anatomical structure. Clin Exp Rheumatol. Mar-Apr 2000;18(2 Suppl 19):S16-18.
Jull GA, Stanton WR. Predictors of responsiveness to physiotherapy management of cervicogenic headache. Cephalalgia. Feb 2005;25(2):101-108.

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Sjaastad O, Fredriksen TA, Pfaffenrath V. Cervicogenic headache: diagnostic criteria. *Headache*. Nov 1990;30(11):725-726.

Table 3: Major Diagnostic Criteria for Cervicogenic Headache (Sjaastad et al, 1998)[5]

A. Symptoms and signs of neck involvement:
   1. Precipitation of comparable head pain by
      - Neck movement or sustained awkward head postures, and/or
      - External pressure over the upper cervical or occipital region on the symptomatic side
   2. Restriction of range of motion in the neck
   3. Ipsi-lateral neck, shoulder or arm pain

B. Confirmatory evidence by diagnostic blocks

C. Unilaterality of head pain, without side shift

D. Head pain characteristics:
   1. Moderate-severe, non-throbbing and non-lancinating pain
   2. Episodes of varying duration
   3. Fluctuating continuous pain

There are other characteristics, but of less importance.

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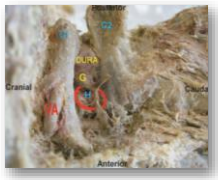
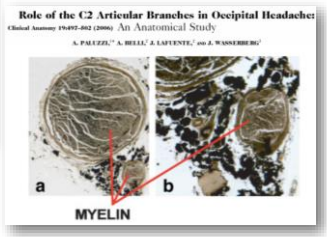
C-Spine: Large, extra sensitive nerves





Paluzzi A, Belli A, Lafuente J, Wasserberg J. Role of the C2 articular branches in occipital headache: an anatomical study. *Clin Anat.* Sep 2006;19(6):497-502.

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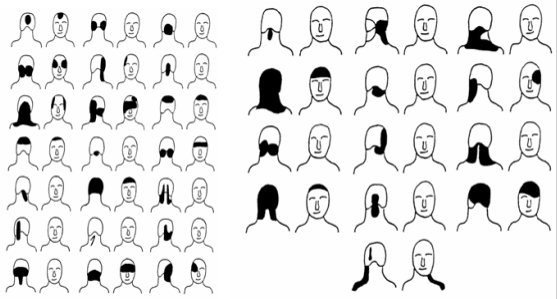
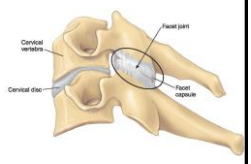
Stimulation of the Cervical Spine Facet Joints

Bogduk N. Role of anesthesiologic blockade in headache management. *Curr Pain Headache Rep.* Oct 2004;8(5):399-403.
Cooper G, Bailey B, Bogduk N. Cervical zygapophysial joint pain maps. Pain Med. May-Jun 2007;8(4):344-353.



Cervical Spine Facet Joints*



* Zygapophyseal Joints

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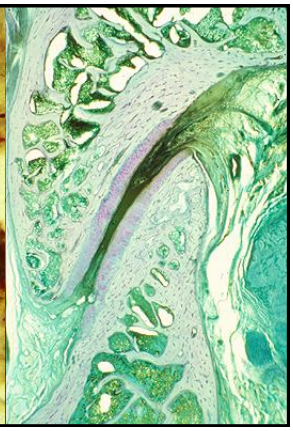
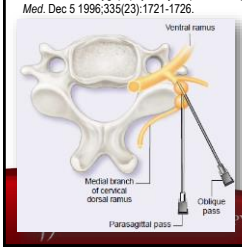
Images courtesy Twomey and Taylor

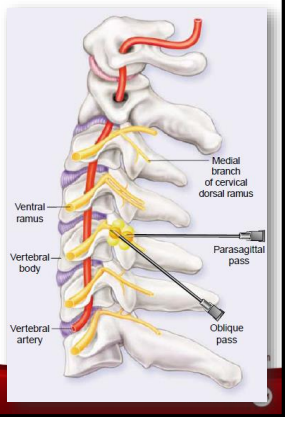


Nerve Innervation

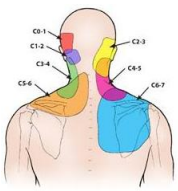
- Medial branch
- Dorsal ramus

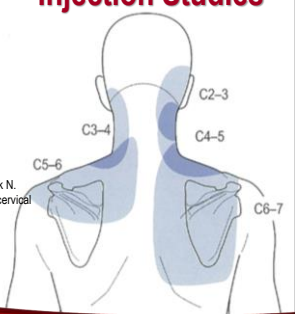
Lord SM, Barnsley L, Wallis BJ, McDonald GJ, Bogduk N. Percutaneous radio-frequency neurotomy for chronic cervical zygapophyseal-joint pain. *N. Engl. J. Med.* Dec 5 1996;335(23):1721-1726.





Injection Studies





Lord SM, Barnsley L, Wallis BJ, McDonald GJ, Bogduk N. Percutaneous radio-frequency neurotomy for chronic cervical zygapophyseal-joint pain. N. Engl. J. Med. Dec 5 1996;335(23):1721-1726.
Bogduk N. The neck. *Baillieres Clin Rheumatol.* Jun 1999;13(2):261-285.

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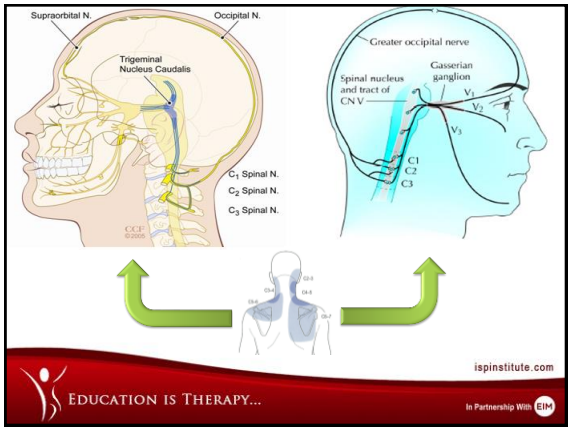
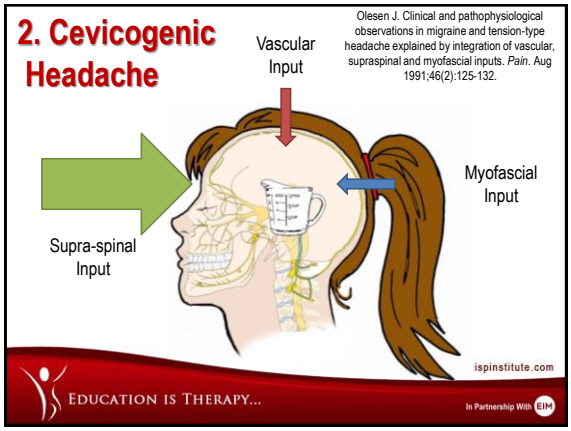
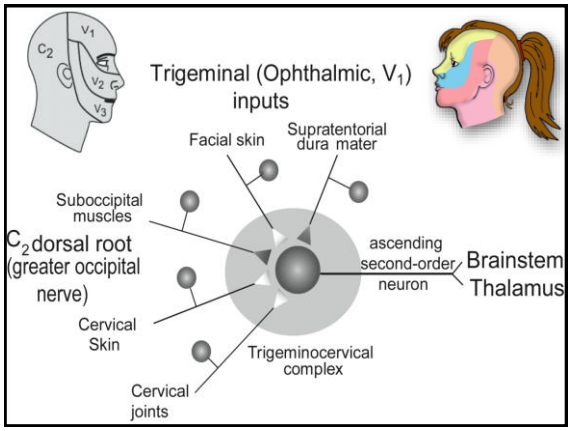
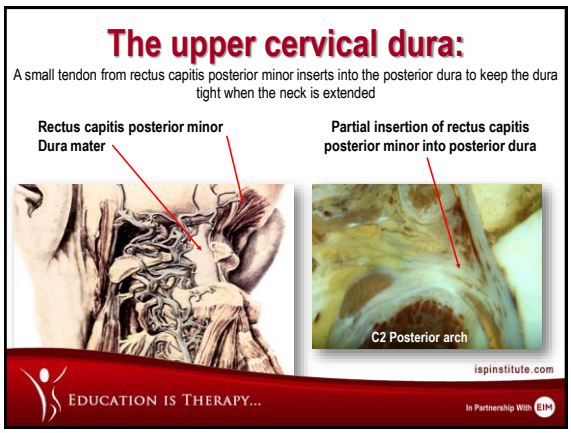
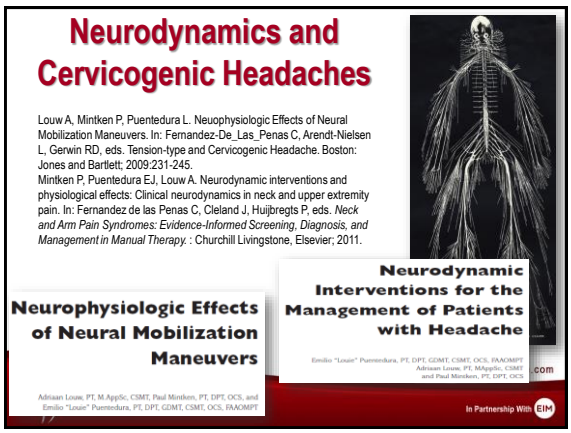


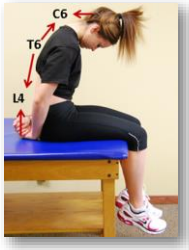








Dural Ligaments and Headaches



Louw A, Mintken P, Puentedura L. Neuophysiologic Effects of Neural Mobilization Maneuvers. In: Fernandez-De_Las_Penas C, Arendt-Nielsen L, Gerwin RD, eds. Tension-type and Cervicogenic Headache. Boston: Jones and Bartlett; 2009:231-245.

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Kids, Growth Spurts and Headaches

von Piekartz HJ, Schouten S, Aufdemkampe G. Neurodynamic responses in children with migraine or cervicogenic headache versus a control group. A comparative study. *Man Ther.* May 2007;12(2):153-160.

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WAD: Forward Head

Rectus capitis posterior minor
Dura mater

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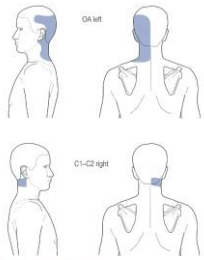
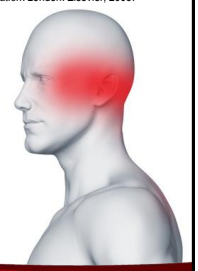
Sub-Occipital Clinical Presentation



Maitland G, Hengeveld E, Banks K, English K. *Maitland's Vertebral Manipulation*. London: Elsevier; 2005.



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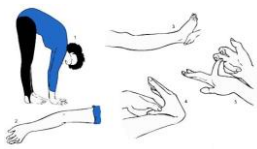
Hypermobility linked to headaches

- Eleven of the 12 headache patients were found to have cervical spine joint hypermobility.
- Ten of the 12 NDPH patients had evidence of widespread joint hypermobility with the Beighton score.
- We suggest that joint hypermobility, specifically of the cervical spine, may be a predisposing factor for the development of headaches



Rozen TD, Roth JM, Denenberg N. Cervical spine joint hypermobility: a possible predisposing factor for new daily persistent headache. *Cephalalgia.* Oct 2006;26(10):1182-1185.

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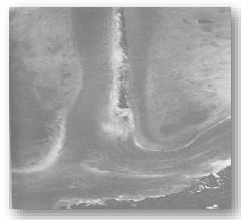
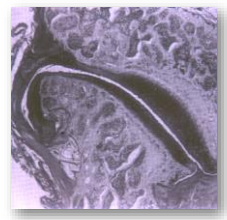
WAD Capsular Avulsions





Jull G, Sterling M, Falla D, O'Leary SP, Treleaven J. *Whiplash, Headache, and Neck Pain: Research-Based Directions for Physical Therapies*. Philidelphia, PA: Churchill Livingston; 2008.

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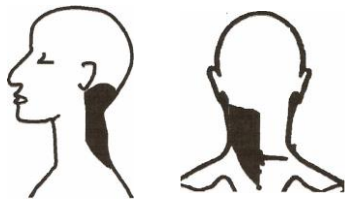
Pain Distribution & Arterial Dysfunction

Taylor AJ, Kerry R. A 'system based' approach to risk assessment of the cervical spine prior to manual therapy *International Journal of Osteopathic Medicine* 2010;13:85-93.



Vertebral Artery

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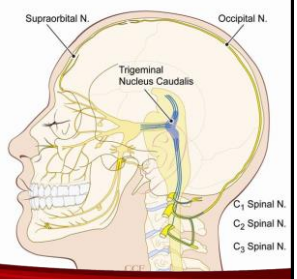
WAD: Headache

Bogduk N. Cervicogenic headache. Cephalalgia. Oct 2004;24(10):819-820.
Bogduk N. The neck and headaches. Neurol Clin. Feb 2004;22(1):151-171, vii.

Several structures, when stimulated, have also been shown to cause headaches:

- Facet joints
- Atlanto-occipital joints and ligaments
- Ligaments of the cervical spine
- Annulus of the IVD
- Periosteum of the VB
- Cervical muscles



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3. Migraines

Olesen J. Clinical and pathophysiological observations in migraine and tension-type headache explained by integration of vascular, supraspinal and myofascial inputs. *Pain.* Aug 1991;46(2):125-132.
Fernandez-de-Las-Penas C, Madeleine P, Caminero A, Cuadrado M, Arendt-Nielsen L, Pareja J. Generalized neck-shoulder hyperalgesia in chronic tension-type headache and unilateral migraine assessed by pressure pain sensitivity topographical maps of the trapezius muscle. *Cephalalgia.* Jun 8 2009.
Fernandez-de-las-Penas C, Arendt-Nielsen L, Simons DG. Exploding vs. imploding headache in migraine prophylaxis with Botulinum Toxin A. Pain. Jun 2007;129(3):363-364; author reply 364-365.

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3. Migraines

Olesen J. Clinical and pathophysiological observations in migraine and tension-type headache explained by integration of vascular, supraspinal and myofascial inputs. *Pain.* Aug 1991;46(2):125-132.

The most noticeable difference between TTH, CG and migraines is the presence of:

- Photophobia
- Vomiting
- Nausea
- Throbbing
- Pounding

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3. Migraine

Olesen J. Clinical and pathophysiological observations in migraine and tension-type headache explained by integration of vascular, supraspinal and myofascial inputs. *Pain.* Aug 1991;46(2):125-132.

Table 2: International Headache Classification of Migraine without Aura (IHS Second Edition, 2004)[4]

Diagnostic criteria:

A. At least five attacks fulfilling criteria B-D

B. Headache attacks lasting 4-72 hours (untreated or unsuccessfully treated)

C. Headaches with at least 2 of the following pain characteristics:
   1. Unilateral location
   2. Pulsating quality
   3. Moderate or severe intensity
   4. Aggravation by or causing avoidance of routine physical activity such as walking or climbing stairs

D. During headache at least one of the following:
   1. Nausea and/or vomiting
   2. Photophobia and phonophobia

E. Not attributed to other disorder*

Notes: * History and physical and neurological examination do not suggest any of the disorders listed in groups 5-12, or history and/or physical and/or neurological examination do suggest such disorders but it is ruled out by appropriate investigations, or such disorder is present but headache does not occur for the first time in close temporal relation to the disorder.

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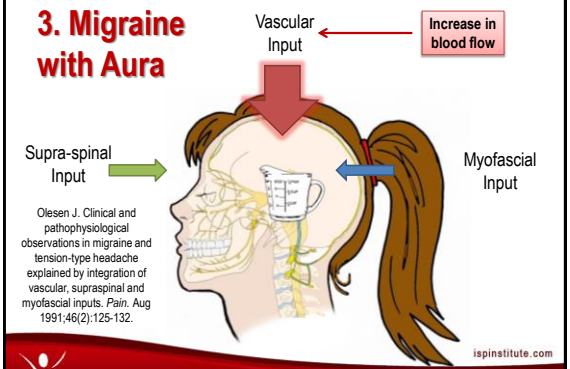
3. Migraine with Aura



Olesen J. Clinical and pathophysiological observations in migraine and tension-type headache explained by integration of vascular, supraspinal and myofascial inputs. *Pain.* Aug 1991;46(2):125-132.

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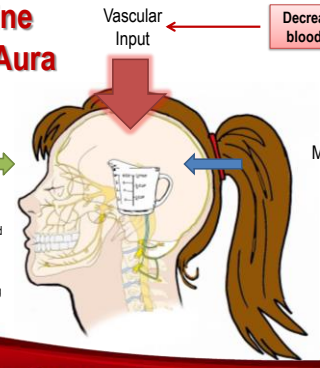
3. Migraine without Aura



Olesen J. Clinical and pathophysiological observations in migraine and tension-type headache explained by integration of vascular, supraspinal and myofascial inputs. *Pain.* Aug 1991;46(2):125-132.

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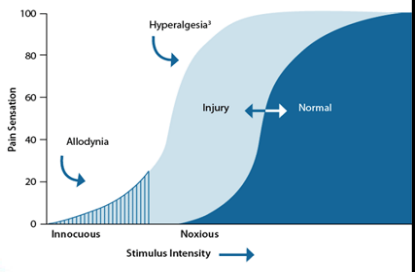
3. Migraine: Allodynia

Fernandez-de-las-Penas C, Arendt-Nielsen L, Cuadrado ML, Pareja JA. Generalized mechanical pain sensitivity over nerve tissues in patients with strictly unilateral migraine. *Clin J Pain.* Jun 2009;25(5):401-406.
Goadsby PJ. Migraine pathophysiology. Headache. Apr 2005;45 Suppl 1:S14-24.



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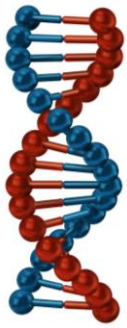
3. Migraines

Only headache category associated with genetics



Nielsen CS, Knudsen GP, Steingrimsdottir OA. Twin studies of pain. *Clin Genet.* Oct 2012;82(4):331-340.
Lipton RB, Bigal ME, Diamond M, Freitag F, Reed ML, Stewart WF. Migraine prevalence, disease burden, and the need for preventive therapy. Neurology. Jan 30 2007;68(5):343-349.
Bigal ME, Lipton RB, Winner P, Reed ML, Diamond S, Stewart WF. Migraine in adolescents: association with socioeconomic status and family history. Neurology. Jul 3 2007;69(1):16-25.

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Other Headaches (? Migraines)

Exercise-related Headaches

- Exertional headache
- Valsalva-type maneuvers
  - Wrestling
  - Weight-lifting
- Not vascular, but has a vascular base
  - ?blood pressure
- Exclude subarachnoid hemorrhage

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Other Headaches (? Migraines)

- Effort headache
  - Most common type of HA in athletes
  - Maximal or submaximal aerobic activity
  - ?Fluid imbalance
- 'Migraine-like' treatment e.g. medicine
- Goggle headache
- Diver's headache
- Altitude headache

Marmura MJ, Hernandez PB. High-altitude headache. Curr Pain Headache Rep. May 2015;19(5):483.
Massey EW. Effort headache in runners. Headache. May 1982;22(3):99-100.
Cheshire WP, Jr., Ott MC. Headache in divers. Headache. Mar 2001;41(3):235-247.

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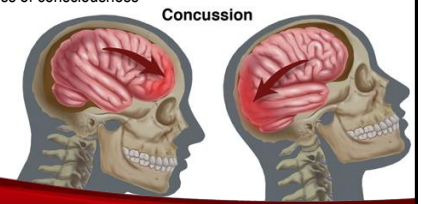
Post-traumatic Headaches

Zasler ND. Sports concussion headache. *Brain injury.* 2015;29(2):207-220.
Seifert TD. Sports concussion and associated post-traumatic headache. Headache. May 2013;53(5):726-736.
Stovner LJ, Schrader H, Mickeviciene D, Surkiene D, Sand T. Headache after concussion. European journal of neurology. Jan 2009;16(1):112-120.

Concussion

- Blow to the head
- With/without loss of consciousness
- Headache
- Disorientation
- Confusion
- Dizziness
- Amnesia
- Etc.



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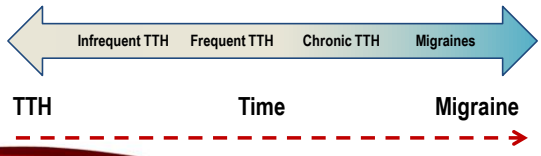
Headache Continuum

- With persistent input there is increased CNS sensitivity and development of allodynia
- Migraine sufferers also suffer from TTH and that TTH patients (especially chronic TTH) suffer from migraines

Vargas BB. Tension-type headache and migraine: two points on a continuum? *Curr Pain Headache Rep.* Dec 2008;12(6):433-436.



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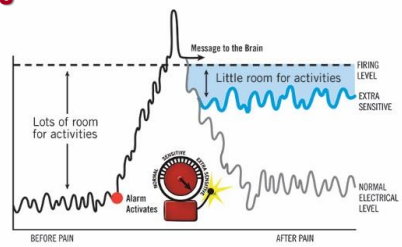
Migraine: Increased Sensitization



Louw A. *Why Do I Hurt Workbook.* Minneapolis, MN: OPTP; 2016.

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Headache Summary

Antonaci F, Sjaastad O. Cervicogenic headache: a real headache. *Curr Neurol Neurosci Rep.* Apr 2011;11(2):149-155.

Clinical Trait	CGH	TTH	Migraine
Unilaterality %	100	8	52
Mechanical precipitation	100	4	4
Prior onset, attacks%	97	30	22
Diffuse Arm discomfort %	100	7	8
Restriction, ROM %	93	17	16
Photophobia %	19	15	68

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The Subjective Examination

The subjective evaluation is the cornerstone in establishing an effective treatment plan

Maitland GD. *Vertebral Manipulation.* 6th ed. London: Butterworths; 1986.
Jones MA. Clinical reasoning in manual therapy. Physical Therapy. 1992;72:875-883.
Maitland G, Hengeveld E, Banks K, English K. Maitland's Vertebral Manipulation. London: Elsevier; 2005.

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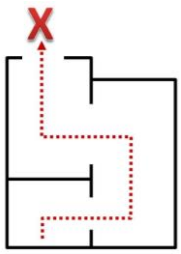
The Subjective Examination

- **Goals**
  - Diagnose
  - Prognosis
  - Precautions/Contraindications
  - Comparative subjective measures
  - Develop a relationship
  - Determine "SINS"



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"SINS"

Barakatt ET, Romano PS, Riddle DL, Beckett LA, Kravitz R. An Exploration of Maitland's Concept of Pain Irritability in Patients with Low Back Pain. *J Man Manip Ther.* 2009;17(4):196-205.

- **"Severity"**
  - Debilitating; High intensity
- **"Irritability"**
  - Small movement causes a lot of pain and take a while to subside
- **"Nature"**
  - Deep; burning…type of pathology, i.e., nerve root
- **"Stage"**
  - Prognosis/stage of the disorder

→ Gathered subjectively and objectively to help aid diagnosis, prognosis, caution and vigor of tests and treatments

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"SINS"

- **SINSS**
  - Severity
  - Irritability
  - Nature
  - Stage
  - **STABILITY**
- **SPINS**
  - Severity
  - **PAIN MECHANISM**
  - Irritability
  - Nature
  - Stage

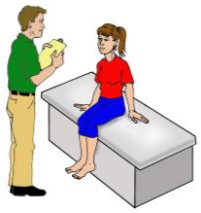
Barakatt ET, Romano PS, Riddle DL, Beckett LA, Kravitz R. An Exploration of Maitland's Concept of Pain Irritability in Patients with Low Back Pain. *J Man Manip Ther.* 2009;17(4):196-205.

Interview Skills…

Maitland G. *Peripheral Manipulation*. Second ed. London: Butterworths; 1977.

Maitland G. *Peripheral Manipulation* Third ed. Oxford: Butterworth Heinemann; 1991.

- Verbal and non-verbal
- Open ended questions
- Receptive
- Control the interview where needed
- Speak slowly
- Be deliberate in questions
- Ask one question at a time
- Never assume anything
- Use the patient's words



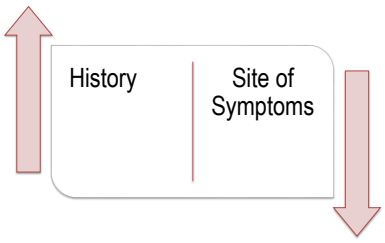
The Categories

1. Kind of disorder
2. History
3. Site of Symptoms
4. Behavior of Symptoms
5. Special Questions

1. Kind of Disorder

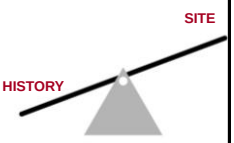
- The main problem – from the patient's perspective
- Typically:
  - Pain (headache)
  - Limited movement
  - Limited range of motion
  - Decreased Function
  - Facial symptoms: Paresthesia, etc.
  - Photophobia
  - Phonophobia
  - Etc.

Next?



Why we use "History" first…

- By focusing on pain and the word "pain" we increase the pain experience
- Immediately jumping to "site" maybe over-emphasizes pain?
- Building a relationship/trust with a patient is strongly correlated to success



Louw A, Diener I, Puentedura E. Comparison of Terminology in Patient Education Booklets for Lumbar Surgery. *International Journal of Health Sciences.* 2014;2(3):47-56.
Louw A, Zimney K, O'Hotto C, Hilton S. The Clinical Application of Teaching People about Pain. Physiotherapy Theory and Practice. 2016;32(5)
Puentedura EJ, Louw A. A neuroscience approach to managing athletes with low back pain. Phys Ther Sport. Aug 2012;13(3):123-133.

2. History

Maitland G. *Peripheral Manipulation*. Second ed. London: Butterworths; 1977.
Maitland G. *Peripheral Manipulation* Third ed. Oxford: Butterworth Heinemann; 1991.

- **Onset of the disorder**
  - How and when did this start?
  - What kind of symptoms was present when it started?
  - Did any of the symptoms spread anywhere else?
  - How long did it take for the symptoms to come on?
  - What were you doing around the time of the onset?
  - What do you think happened?
  - Why do you think you hurt?

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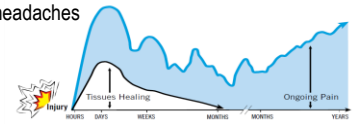
2. History

- **Progression of the disorder**
  - Is it getting better, worse or the same?
  - If (better, worse or the same), in which way?
  - Musculoskeletal issues get better (by itself) over time: Cervicogenic headaches



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2. History

Maitland G. *Peripheral Manipulation*. Second ed. London: Butterworths; 1977.
Maitland G. *Peripheral Manipulation* Third ed. Oxford: Butterworth Heinemann; 1991.

- **Diagnosis, treatment and it's effect**
  - Self
  - Pharmaceutical
  - Surgical
  - Specialists
  - Conservative/non-pharmaceutical
    - Manual therapy?
    - Effect?

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2. History

- **Previous history**
  - Similar episodes
    - How often does it happen?
    - How long does it last?
  - Any cervical spine episodes
    - Motor vehicle collisions
  - Other orthopedic issues
  - Other medical issues

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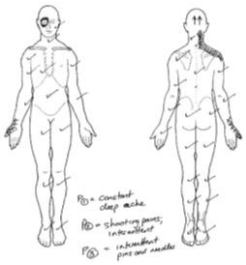
3. Site of Symptoms

- Area/s
- Depth
- Nature
- Correlation

Maitland G. *Peripheral Manipulation*. Second ed. London: Butterworths; 1977.
Maitland G. *Peripheral Manipulation* Third ed. Oxford: Butterworth Heinemann; 1991.



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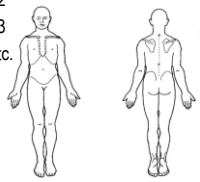
3. Site of Symptoms

- **Area**
  - Body Chart
  - Patient completes it
  - Be as precise as you can
  - Descriptions of the symptoms
    - Patient language
  - Symptoms free areas marked with a checkmark
- **Prioritize the symptoms**
  - P1
  - P2
  - P3
  - Etc.



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3. Site of Symptoms

- **Nature**
  - Constant vs. Intermittent
    - Constant:
      - Variable
      - Non-variable
  - *"Dull, Ache, Sharp, Stabbing, Burning"*
- Correlation between symptoms:
  - "When P1 gets bad, then P2 starts"

Maitland G. *Peripheral Manipulation*. Second ed. London: Butterworths; 1977. Maitland G. *Peripheral Manipulation* Third ed. Oxford: Butterworth Heinemann; 1991.

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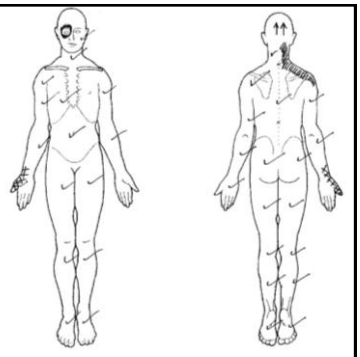
Areas

- Does this help?
- We need more…



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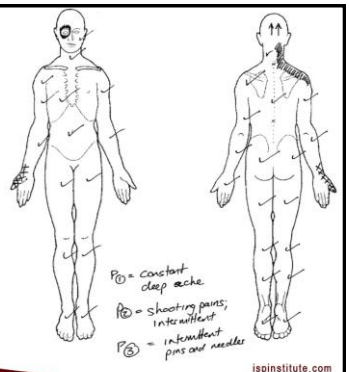
Nature

- Adding more detail
- Patient information



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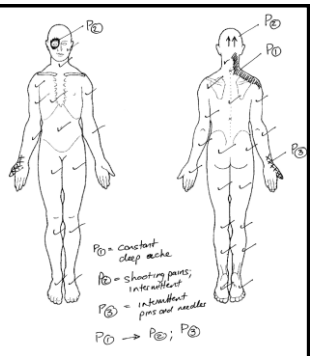
Correlation

If you can only aim at one (P1, P2 or P3), which one would you and why?



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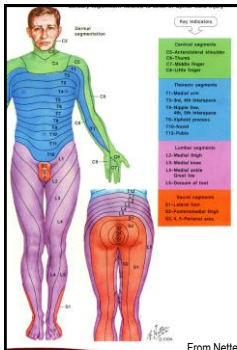

From Netter

3. Site of Symptoms

- Need a working knowledge of dermatomes…

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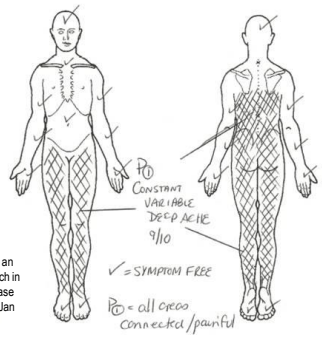
Chronic Widespread Pain



Louw A, Puentedura EL, Mintken P. Use of an abbreviated neuroscience education approach in the treatment of chronic low back pain: A case report. *Physiotherapy theory and practice*. Jan 2012;28(1):50-62.

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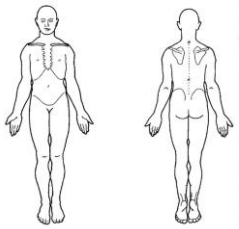
Body Charts and Neuroscience

Louw A, Schmidt SG, Louw C, Puentedura EJ. Moving without moving: immediate management following lumbar spine surgery using a graded motor imagery approach: a case report. Physiotherapy Theory and Practice. Oct 2015;31(7):509-517.
Louw A, Farrell K, Wettach L, Uhl J, Majkowski K, Welding M. Immediate effects of sensory discrimination for chronic low back pain: a case series. *New Zealand Journal of Physiotherapy.* 2015:60-65
Wand BM, Keeves J, Bourgoin C, et al. Mislocalization of sensory information in people with chronic low back pain: a preliminary investigation. *The Clinical journal of pain.* Aug 2013;29(8):737-743.



Neglect & Spinal Pain

Moseley GL, Gallagher L, Gallace A. Neglect-like tactile dysfunction in chronic back pain. *Neurology.* Jul 24 2012;79(4):327-332.

Headaches and Facial Pain

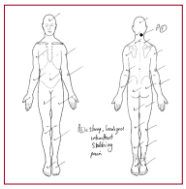
- Face Recognition in Patients with Migraine Yetkin-Ozden, Ekizoglu & Baykan Pain Practice 2014
  - Migraineurs had poorer performance in both face recognition and visuospatial perception
- Recognition of emotional facial expressions and alexithymia in patients with chronic facial pain Von Piekartz et al 2013
  - Recognition of facially expressed emotions, and the ability to identify and describe one's own feelings are restricted in chronic facial pain suffers

Emerging Research: Headaches and Facial Pain

von Piekartz H, Mohr G. Reduction of head and face pain by challenging lateralization and basic emotions: a proposal for future assessment and rehabilitation strategies. *J Man Manip Ther.* Feb 2014;22(1):24-35.

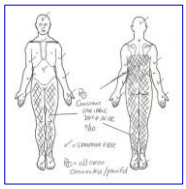
Figure 1 The six basic emotions: happiness, sadness, surprise, anger, disgust, and fear.

So What?



Maps are likely intact/sharp

Traditional Manual Therapy



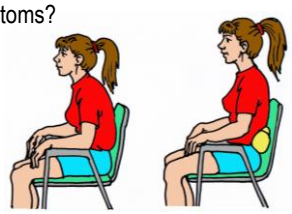
Maps are likely smudged

Pain Science

4. Behavior of Symptoms

Maitland G. *Peripheral Manipulation*. Second ed. London: Butterworths; 1977.
Maitland G. *Peripheral Manipulation* Third ed. Oxford: Butterworth Heinemann; 1991.

- What increases symptoms?
- What decreases symptoms?
- SINS (SINSS/SPINS)
- Latency
- Daily Pattern



4. Behavior of Symptoms

- **Increases**
  - Activity
  - Positions
  - Mechanical loading
  - Duration
  - Frequency
- **Decreases**
  - Unloading
  - Rest (short)
  - Rest (long)
    - Sleep
  - Self-treatments
  - Medications

Maitland G. *Peripheral Manipulation*. Second ed. London: Butterworths; 1977.
Maitland G. *Peripheral Manipulation* Third ed. Oxford: Butterworth Heinemann; 1991.

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4. Behavior of Symptoms

✓SINS

- Latency
  - "I will pay for it later today or tomorrow"
    - Inflammation
    - Sensitized nervous system

Maitland G. *Peripheral Manipulation*. Second ed. London: Butterworths; 1977.
Maitland G. *Peripheral Manipulation* Third ed. Oxford: Butterworth Heinemann; 1991.

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4. Behavior of Symptoms

- **Daily pattern**
  - AM – still in bed awake
  - AM – immediately out of bed
  - 30 minutes later after moving
  - Middle of the day
  - Afternoon
  - Evening
  - At night

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5. Special Questions

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Red Flag Screening

Common:
- Unaffected by spinal movement
- Associated symptoms, i.e., heartburn
- Past medical history
- Insidious onset of symptoms
- Risk increases significantly with:
  - Age (under 20; over 50)
  - Family history
  - Past personal history
  - Sudden, unexpected weight loss/gain

Ross MD, Boissonnault WG. Red flags: to screen or not to screen? *The Journal of orthopaedic and sports physical therapy.* Nov 2010;40(11):682-684.
Sizer PS, Jr., Brismee JM, Cook C. Medical screening for red flags in the diagnosis and management of musculoskeletal spine pain. Pain Pract. Mar 2007;7(1):53-71.

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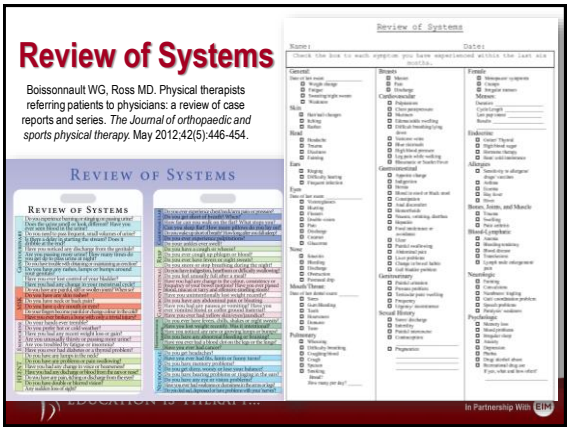
Review of Systems

Boissonnault WG, Ross MD. Physical therapists referring patients to physicians: a review of case reports and series. *The Journal of orthopaedic and sports physical therapy.* May 2012;42(5):446-454.



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Biggest Predictors of Cancer

Risk increases significantly with:

- Past personal history of cancer
- Failure to improve within 1 month of treatment
- Age: Under 20 or over 50
- Family history of cancer (genetic)
- Sudden unexplained weight loss/gain

Deyo RA, Diehl AK. Cancer as a cause of back pain: frequency, clinical presentation, and diagnostic strategies. J Gen Intern Med. 1988;3:230-238.

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Where is NIGHT PAIN?

- The 1994 US Agency for Health Care Policy and Research guidelines suggest nighttime pain should be used as a "red flag."
- Although it is a significant and disruptive symptom for patients, these results challenge the specificity of the presence of night pain per se as a useful diagnostic indicator for serious spinal pathology in a back pain triage clinic.
- Night pain typically only shows up at the end-stages of cancer…

Harding IJ, Davies E, Buchanan E, Fairbank JT. The symptom of night pain in a back pain triage clinic. *Spine.* Sep 1 2005;30(17):1985-1988.

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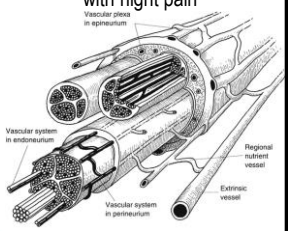
Where is NIGHT PAIN? So What?

Brod M, Pohlman B, Blum SI, Ramasamy A, Carson R. Burden of Illness of Diabetic Peripheral Neuropathic Pain: A Qualitative Study. *Patient.* Aug 2015;8(4):339-348.
Gore M, Brandenburg NA, Dukes E, Hoffman DL, Tai KS, Stacey B. Pain severity in diabetic peripheral neuropathy is associated with patient functioning, symptom levels of anxiety and depression, and sleep. J Pain Symptom Manage. Oct 2005;30(4):374-385.
Pain, depression and sleep disorders in patients with diabetic and nondiabetic carpal tunnel syndrome Kocabicak E, Terzi M, Akpinar K, Paksoy K, Cebeci I, Iyigun O. Restless leg syndrome and sleep quality in lumbar radiculopathy patients. Behav Neurol. 2014;2014:245358.

Neuropathic pain is synonymous with night pain



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Contraindications and Precautions

What's the difference?

- Contraindication – wouldn't/ shouldn't use a physical test or technique under any circumstances

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Contraindications and Precautions

Precaution

- *Depending upon the skill, experience and training of the practitioner, the type of test or technique selected, the amount of leverage and force used, and the age, general health and physical condition of the patient,*

it may not be the wisest choice

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5. Special Questions

Vertebrobasilar Insufficiency

5 D's

- Dizziness
- Diplopia
- Dysphagia
- Drop attacks
- Dysarthria

And

- Ataxia

3 N's

- Nystagmus
- Numbness
- Nausea

Childs JD, Flynn TW, Fritz JM, et al. Screening for vertebrobasilar insufficiency in patients with neck pain: manual therapy decision-making in the presence of uncertainty. *J Orthop Sports Phys Ther.* May 2005;35(5):300-306.

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Medication: 5 Key ones for spinal pain

1. Pain medication
2. Anti-inflammatories
3. Muscle Relaxers
4. Anti-depressants
5. Anti-seizure

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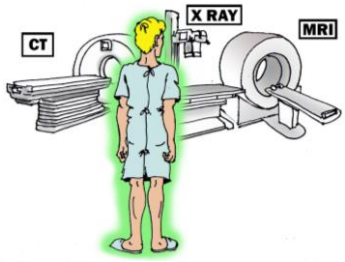
Imaging…



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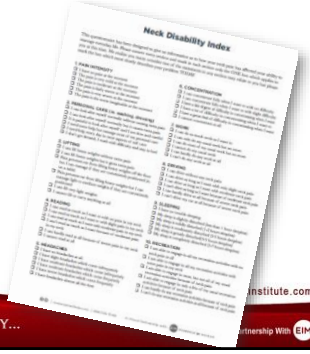
Various Outcome Measures

NDI (Neck Disability Index) validated for HA and WAD



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Planning the Physical Examination

90% of the "diagnosis" comes from the subjective examination…

Jones MA. Clinical reasoning: the foundation of clinical practice. Part 1. Australian Journal of Physiotherapy. 1997;43:167-170.
Jones MA, Rivett DA. *Clinical Reasoning for Manual Therapists*. Edinburgh: Butterworth Heinemann; 2004.

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Why do a Physical Examination?

- To confirm your subjective hypothesis/diagnosis
- To find "comparative signs" to use to assess the effect of treatment techniques and overall progress
- To choose techniques and plan the treatment
- To determine the patient's movement limits
- To determine the patient's willingness to move
- Patient want it

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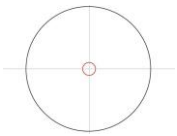
Planning the Physical Examination

Sources of the symptoms

- Possible structures at fault
  - Both for local and referred pain
- Highlight (*) the structures which must be examined on DAY 1
- Do the symptoms appear to fit those commonly associated with a particular syndrome or disorder?



Maitland GD. *Vertebral Manipulation*. 6th ed. London: Butterworths; 1986.

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Planning the Physical Examination

Behavior of the symptoms:

- Severity ←→ High Low
- Irritability ←→ High Low

Is the condition primarily inflammatory or mechanical?

←→ Inflammatory Mechanical

Maitland GD. *Vertebral Manipulation*. 6th ed. London: Butterworths; 1986.

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Planning the Physical Examination

At which point will you limit your physical evaluation?

- To the point of onset - short of pain
- Partial reproduction
- Total reproduction
- Production of referred symptoms

- Would you perform a neurological evaluation?
- Do you expect a comparative sign(s) easy/hard to find?

Maitland GD. *Vertebral Manipulation*. 6th ed. London: Butterworths; 1986.

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Planning the Physical Examination

- Not all tests are needed
- Triage
  - Based on the working hypothesis (diagnosis), if I could only do 1 test to confirm/negate the hypothesis, which one would it be?
  - If I could do one more test, which one would it be?
  - Etc.

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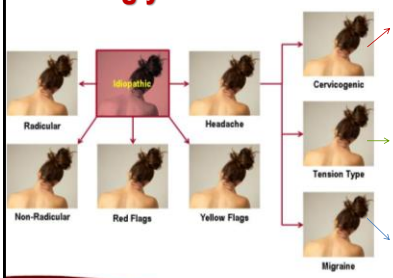
Planning your Examination



C-Facet Joints
AO and AA Joints
Dura Mater
Skin
Sub-occipital Muscles

Trigger Points

Central Sensitization

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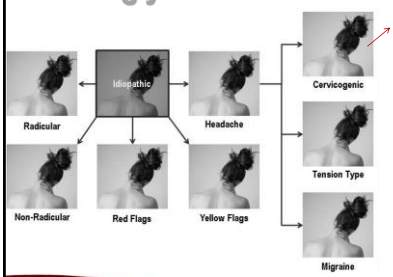
Planning your Examination



C-Facet Joints
AO and AA Joints
Dura Mater
Skin
Sub-occipital Muscles

Cervical AROM
Cervical PROM
Palpation
Combined Movements
Sustained Movements
Posture
Compression
Distraction
Soft Tissue (non-TP)
Neurodynamics
Stabilization
Sensorimotor

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Cervicogenic (Traditional C-Spine Screen)

- Posture
  - Head positions
- Active C-ROM
- Passive C-ROM
  - Combined
  - Repeated
  - Sustained
- Compression
- Distraction
- Passive C-ROM
- Joint Palpation
  - Accessory
  - Physiological

(Most of this is well known and well described)

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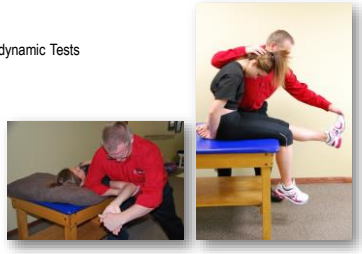
Cervicogenic (Traditional C-Spine Screen)

- Neurodynamics
  - Upper Limb Neurodynamic Tests
  - Straight leg raise
  - Slump
  - Slump longsit

(Most of this is well known and well described)



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Cervicogenic (Traditional C-Spine Screen)

- Stabilization
- Senorimotor

(Not well known or well described)

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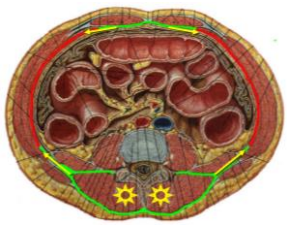
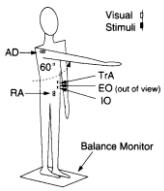
Spinal Stabilization





Richardson C, Hodges P, Hides J. *Therapeutic Exercise For Lumbopelvic Stabilization*. Second ed. London: Churchill Livingstone; 2004.

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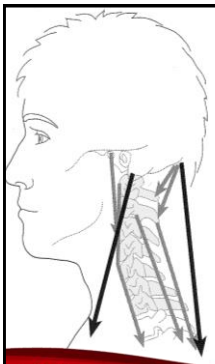

Jull G, Sterling M, Falla D, O'Leary SP, Treleaven J. *Whiplash, Headache, and Neck Pain: Research-Based Directions for Physical Therapies*. Philidelphia, PA: Churchill Livingston; 2008.

- **Superficial muscles**
  - greater capacity to exert torque force due to their larger lever arms and cross-sectional areas
  - span both cervical regions
- **Deep muscles**
  - more localized to either craniocervical or typical cervical regions
  - have segmental attachments, larger spindle densities, and muscle fiber compositions that enable them to guide and support motion segments

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Changes in strength and endurance

More important finding appears to be loss of craniocervical and cervical flexor endurance at lower contraction levels **(25% and 20% MVC)**

Low intensity contractile deficit detrimental to stability of the C spine

Jull G, Sterling M, Falla D, O'Leary SP, Treleaven J. *Whiplash, Headache, and Neck Pain: Research-Based Directions for Physical Therapies*. Philidelphia, PA: Churchill Livingston; 2008.

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Alterations in cervical motor control

- Emerging body of research evidence
- Shows changes in:
  - **Amplitude**
  - **Timing**

  of cervical muscle activation associated with neck pain

Jull G, Sterling M, Falla D, O'Leary SP, Treleaven J. *Whiplash, Headache, and Neck Pain: Research-Based Directions for Physical Therapies*. Philidelphia, PA: Churchill Livingston; 2008.

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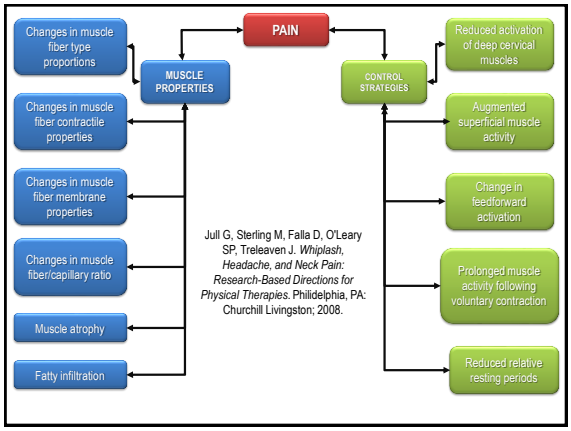

Assessment of Cervical Muscle Function

1. Craniocervical flexion test (CCFT)
2. Cervical joint position sense
3. Standing balance
4. Occulomotor assessment

Jull G, Sterling M, Falla D, O'Leary SP, Treleaven J. *Whiplash, Headache, and Neck Pain: Research-Based Directions for Physical Therapies*. Philidelphia, PA: Churchill Livingston; 2008.

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Craniocervical flexion test (CCFT)

Supine crook lying

- Neck in neutral position (no pillow)
- Line of face horizontal
- Line bisecting neck longitudinally is horizontal to testing surface
- Use layers of towels under head to achieve neutral position
- Keep upper cervical region free for positioning pressure biofeedback device

Jull G, Sterling M, Falla D, O'Leary SP, Treleaven J. *Whiplash, Headache, and Neck Pain: Research-Based Directions for Physical Therapies*. Philidelphia, PA: Churchill Livingston; 2008.

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Craniocervical flexion test (CCFT)

Pressure biofeedback device

- Placed behind neck so it abuts the occiput to monitor change in shape of curve as it flattens with the contraction of deep cervical flexors
- Pressure inflated to 20 mmHg
- Instruct patient to perform a head-nodding action (as if saying "yes")
- Target sequentially five 2-mmHg progressive increases from baseline of 20 to max of 30 mmHg as well as hold

Jull G, Sterling M, Falla D, O'Leary SP, Treleaven J. *Whiplash, Headache, and Neck Pain: Research-Based Directions for Physical Therapies*. Philidelphia, PA: Churchill Livingston; 2008.

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Craniocervical flexion test (CCFT)

Formal test procedure - Two stages

1. Movement analysis of the five progressive stages of the craniocervical flexion action

Jull G, Sterling M, Falla D, O'Leary SP, Treleaven J. *Whiplash, Headache, and Neck Pain: Research-Based Directions for Physical Therapies*. Philidelphia, PA: Churchill Livingston; 2008.

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Craniocervical flexion test (CCFT)

2. Testing of isometric capacity of deep neck flexors at test stages that the patient is able to achieve with correct craniocervical flexion action

Jull G, Sterling M, Falla D, O'Leary SP, Treleaven J. *Whiplash, Headache, and Neck Pain: Research-Based Directions for Physical Therapies*. Philidelphia, PA: Churchill Livingston; 2008.

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Without the Pressure Biofeedback

- Similar CCFT position
- Maximal contraction/nod (100%)
- Then ½ of that (50%)
- Then ½ of that (25%)
- Hold 25% - lift head off the towel and hold…

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CCFT Normative Data

Neck Flexor Muscle Endurance Test

Pain free individuals:

Men: 38 seconds

Women: 29 seconds

Jull GA, O'Leary SP, Falla DL. Clinical assessment of the deep cervical flexor muscles: the craniocervical flexion test. *J Manipulative Physiol Ther.* Sep 2008;31(7):525-533.
James G, Doe T. The craniocervical flexion test: intra-tester reliability in asymptomatic subjects. Physiother Res Int. Sep 2010;15(3):144-149.
Harris KD, Heer DM, Roy TC, Santos DM, Whitman JM, Wainner RS. Reliability of a measurement of neck flexor muscle endurance. Physical therapy. Dec 2005;85(12):1349-1355.
Domenech MA, Sizer PS, Dedrick GS, McGalliard MK, Brismee JM. The deep neck flexor endurance test: normative data scores in healthy adults. PM & R : the journal of injury, function, and rehabilitation. Feb 2011;3(2):105-110.

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Cervical joint position sense

Measure ability to relocate the natural head posture with eyes closed

Joint position error (JPE) is angular difference between starting postural position and that assumed after a neck movement

Jull G, Falla D, Treleaven J, Hodges P, Vicenzino B. Retraining cervical joint position sense: the effect of two exercise regimes. *J Orthop Res.* Mar 2007;25(3):404-412.
Treleaven J, Jull G, LowChoy N. The relationship of cervical joint position error to balance and eye movement disturbances in persistent whiplash. Man Ther. May 2006;11(2):99-106.

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2. Cervical joint position sense

- Use of laser pointer
  - Patient sits 90 cm away from wall
  - Starting position projected by laser onto wall and marked
  - Patient closes eyes and moves into extension (or rotation L/R) then 'relocates' to start position
  - Second mark placed on wall
  - Measure difference between two marked points in centimeters as negative or positive value (undershoot/ overshoot)

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Cervical Joint Position Sense

Jull G, Falla D, Treleaven J, Hodges P, Vicenzino B. Retraining cervical joint position sense: the effect of two exercise regimes. *J Orthop Res.* Mar 2007;25(3):404-412.
Treleaven J, Jull G, LowChoy N. The relationship of cervical joint position error to balance and eye movement disturbances in persistent whiplash. Man Ther. May 2006;11(2):99-106.

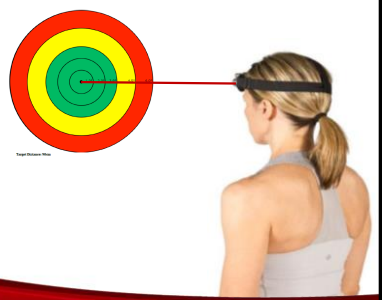

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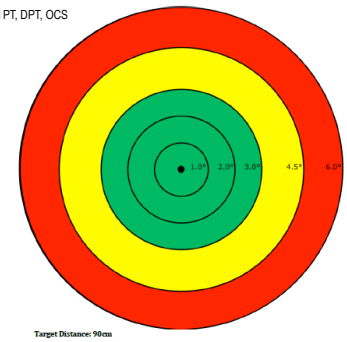
Image from Rob Landel PT, DPT, OCS



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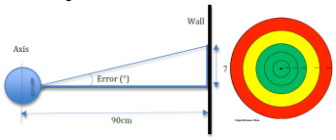
- Errors of >4.5° (for this target, beyond the yellow circle) are likely to be significant.
- Distance from center of the target to a 4.5-degree error depends the distance the patient is from the target. This target is calibrated for a patient who is 90 cm away.
- If the patient (center of axis of rotation to the target, thus, the crown of the head) is 90 cm from the target, then a 7 cm error from the center of the target translates to a 4.5 degree error.

Treleaven J, Jull G, Sterling M. Dizziness and unsteadiness following whiplash injury: characteristic features and relationship with cervical joint position error. *J Rehabil Med*. Jan 2003;35(1):36-43.

Images and information from Rob Landel PT, DPT, OCS



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Cut-off Scores

- ≤ 4.5 degrees (horizontal) denotes "normal" cervical proprioception. (Sensitivity 86%, Specificity 93%)
- > 4.5 degrees (horizontal) indicates abnormal cervical proprioception.

Revel M, Minguet M, Gregoy P, Vaillant J, Manuel JL. Changes in cervicocephalic kinesthesia after a proprioceptive rehabilitation program in patients with neck pain: a randomized controlled study. *Archives of physical medicine and rehabilitation*. Aug 1994;75(8):895-899.

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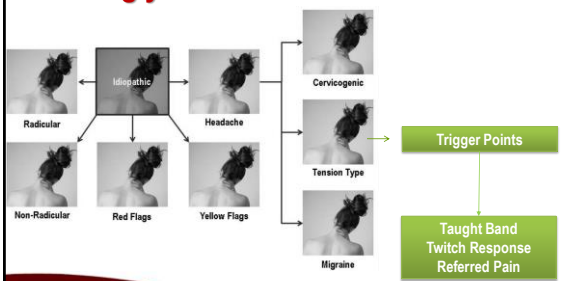
Planning your Examination



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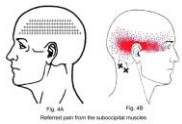
1. Sub-occipital

Fernandez-De-Las-Penaz C, Arendt-Nielsen L, Gerwin R. *Tension-Type and Cervicogenci Headache: Pathology, Diagnosis, and Management*. Sudbury: Jones and Bartlett; 2010.



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2. Temporalis

Fernandez-De-Las-Penaz C, Arendt-Nielsen L, Gerwin R. *Tension-Type and Cervicogenci Headache: Pathology, Diagnosis, and Management*. Sudbury: Jones and Bartlett; 2010.

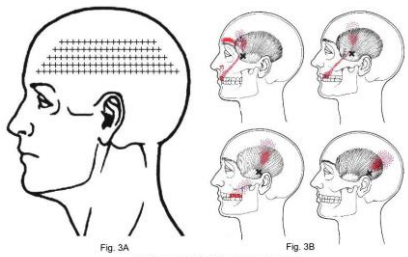

Fig. 3A Fig. 3B

Referred pain from the temporalis muscle

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3. Sternocleidomastoid

Fernandez-De-Las-Penaz C, Arendt-Nielsen L, Gerwin R. *Tension-Type and Cervicogenci Headache: Pathology, Diagnosis, and Management*. Sudbury: Jones and Bartlett; 2010.

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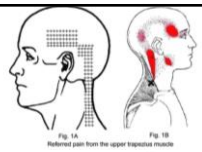
4. Upper Trapezius

Fernandez-De-Las-Penaz C, Arendt-Nielsen L, Gerwin R. *Tension-Type and Cervicogenci Headache: Pathology, Diagnosis, and Management*. Sudbury: Jones and Bartlett; 2010.



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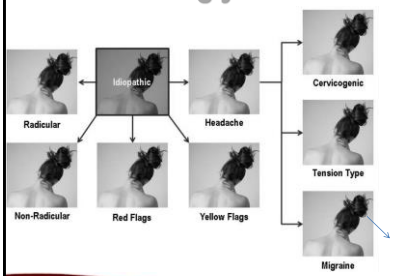
Planning your Examination



Recommend you screen for TTH and Cervicogenic to rule out before considering migraine, UNLESS you suspect central sensitization

Central Sensitization

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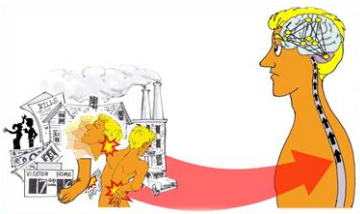
Central Sensitization

Primary lesion or dysfunction is located in the spinal cord, brainstem and cerebral hemispheres

Nijs J, Van Houdenhove B, Oostendorp RA. Recognition of central sensitization in patients with musculoskeletal pain: Application of pain neurophysiology in manual therapy practice. *Man Ther.* Apr 2010;15(2):135-141.



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Central Sensitization

- Symptom and sign cluster (486 times) for CS
  - Disproportionate pain
  - Disproportionate aggravating and easing factors
  - Diffuse palpation tenderness
  - Psychosocial issues

486x

Smart KM, Blake C, Staines A, Thacker M, Doody C. Mechanisms-based classifications of musculoskeletal pain: Part 1 of 3: Symptoms and signs of central sensitisation in patients with low back (+/-leg) pain. *Manual therapy.* Aug 2012;17(4):336-344.

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Fear-Avoidance

Presence of avoidance behavior is associated with increased risk of prolonged disability and work loss.

- FABQ-Work sub-scale scores >34
- FABQ-Physical Activities sub-scale scores >14

Fritz, J. M. and S. Z. George (2002). "Identifying psychosocial variables in patients with acute work-related low back pain: the importance of fear-avoidance beliefs." Phys Ther **82**(10): 973-983.
Poiraudeau, S., et al. (2006). "Fear-avoidance beliefs about back pain in patients with subacute low back pain." Pain 124(3): 305-311.

Fear-Avoidance Beliefs Questionnaire (FABQ)
Waddell et al (1993) Pain , 52 (1993) 157 - 168

Here are some of the things which other patients have told us about their pain. For each statement please circle any number from 0 to 6 to say how much physical activities such as bending, lifting, walking or driving affect or would affect your back pain.

	Completely disagree			Unsure			Completely agree
1. My pain was caused by physical activity	0	1	2	3	4	5	6
2. Physical activity makes my pain worse	0	1	2	3	4	5	6
3. Physical activity might harm my back	0	1	2	3	4	5	6
4. I should not do physical activities which (might) make my pain worse	0	1	2	3	4	5	6
5. I cannot do physical activities which (might) make my pain worse	0	1	2	3	4	5	6

The following statements are about how your normal work affects or would affect your back pain

	Completely disagree			Unsure			Completely agree
6. My pain was caused by my work or by an accident at work	0	1	2	3	4	5	6
7. My work aggravated my pain	0	1	2	3	4	5	6
8. I have a claim for compensation for my pain	0	1	2	3	4	5	6
9. My work is too heavy for me	0	1	2	3	4	5	6
10. My work makes or would make my pain worse	0	1	2	3	4	5	6
11. My work might harm my back	0	1	2	3	4	5	6
12. I should not do my normal work with my present pain	0	1	2	3	4	5	6
13. I cannot do my normal work with my present pain	0	1	2	3	4	5	6
14. I cannot do my normal work till my pain is treated	0	1	2	3	4	5	6
15. I do not think that I will be back to my normal work within 3 months	0	1	2	3	4	5	6
16. I do not think that I will ever be able to go back to that work	0	1	2	3	4	5	6

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Pain Catastrophization Scale

Previous studies utilizing the PCS have shown a median score of 18 for healthy individuals and in patients with pain, the PCS is generally higher.

Sullivan, M. J. L., et al. (1995). "The pain catastrophizing scale: Development and validation." Psychological assessment 7: 524-532.

PCS

Code:_____

We are interested in the types of thoughts and feeling that you have when you are in pain. Listed below are thirteen statements describing different thoughts and feelings that may be associated with pain. Please indicate the degree to which you have these thoughts and feelings when you are experiencing pain.

	Not at all	To a slight degree	To a moderate degree	To a great degree	All the time
1 worry all the time about whether the pain will end	0	1	2	3	4
2 feel I can't go on	0	1	2	3	4
3 It's terrible and I think it's never going to get any better	0	1	2	3	4
4 It's awful and I feel that it overwhelms me	0	1	2	3	4
5 feel I can't stand it anymore	0	1	2	3	4
6 become afraid that the pain will get worse	0	1	2	3	4
7 keep thinking of other painful events	0	1	2	3	4
8 anxiously want the pain to go away	0	1	2	3	4
9 can't seem to keep it out of my mind	0	1	2	3	4
10 keep thinking about how much it hurts	0	1	2	3	4
11 keep thinking about how badly I want the pain to stop	0	1	2	3	4
12 There's nothing I can do to reduce the intensity of the pain	0	1	2	3	4
13 wonder whether something serious may happen	0	1	2	3	4

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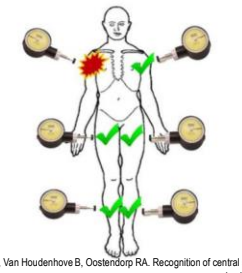
Testing a Sensitive Nervous System

Nijs J, Van Houdenhove B, Oostendorp RA. Recognition of central sensitization in patients with musculoskeletal pain: Application of pain neurophysiology in manual therapy practice. Manual therapy. Apr 2010;15(2):135-141.

Overview of the clinical examination of patients with suspected central sensitization.[a]

Clinical tests
1. Assessment of pressure pain thresholds at sites remote from the symptomatic site
2. Assessment of sensitivity to touch during manual palpation at sites remote from the symptomatic site
3. Assessment of sensitivity to vibration at sites remote from the symptomatic site
4. Assessment of sensitivity to heat at sites remote from the symptomatic site
5. Assessment of sensitivity to cold at sites remote from the symptomatic site
6. Assessment of pressure pain thresholds during and following exercise
7. Assessment of joint end feel
8. Brachial plexus provocation test

Peripheral Sensitization / Central Sensitization



Nijs J, Van Houdenhove B, Oostendorp RA. Recognition of central sensitization in patients with musculoskeletal pain: Application of pain neurophysiology in manual therapy practice. *Man Ther.* Apr 2010;15(2):135-141.
Smart KM, Blake C, Staines A, Thacker M, Doody C. Mechanisms-based classifications of musculoskeletal pain: Part 1 of 3: Symptoms and signs of central sensitisation in patients with low back (+/-leg) pain. Manual therapy. Aug 2012;17(4):336-344.

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Nerve Palpation: With/without pressure algometry…

Away from the "hot spot"

Walsh, J. and T. Hall (2009). "Reliability, validity and diagnostic accuracy of palpation of the sciatic, tibial and common peroneal nerves in the examination of low back related leg pain." Man Ther **14**(6): 623-629.

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Vibration Sensitization

Dysfunction of A-beta fibers and Pacini corpuscles have shown increased sensitivity in neuropathic pain

Greening J, Lynn B, Leary R. Sensory and autonomic function in the hands of patients with non-specific arm pain (NSAP) and asymptomatic office workers. *Pain.* Jul 2003;104(1-2):275-281.
Tyros I, Soundy A, Heneghan NR. Vibration sensibility of the median nerve in a population with chronic whiplash associated disorder: Intra- and inter-rater reliability study. Manual therapy. Sep 2016;25:81-86.

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Heat and Cold…

Nijs J, Van Houdenhove B, Oostendorp RA. Recognition of central sensitization in patients with musculoskeletal pain: Application of pain neurophysiology in manual therapy practice. Manual therapy. Apr 2010;15(2):135-141.

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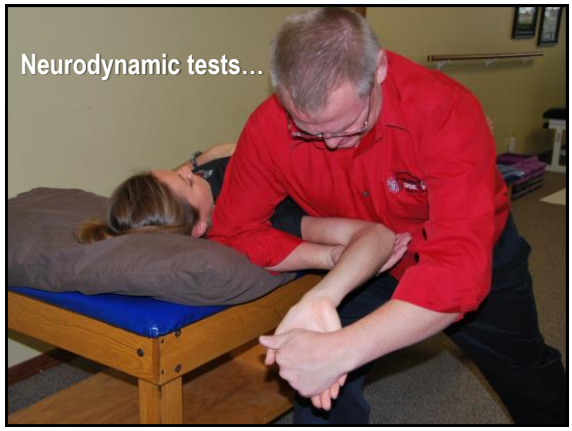
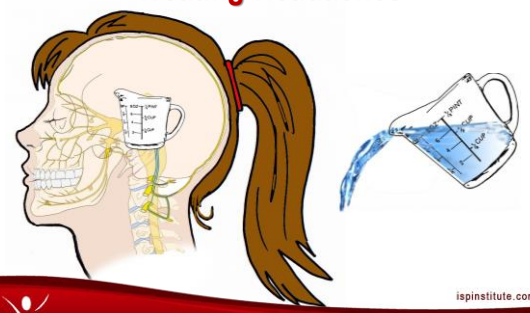
Neurodynamic tests…



Treating Headaches



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Medical Management for HA

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Medicine and Tension Type Headaches

Amitriptylin – commonly used in TTH
- 11% improvement when compared to placebo

Ibuprofen – commonly used for TTH
- Little efficacy in treating TTH

Tricyclic antidepressants
- Have also not shown major efficacy in treating TTH

Torrente Castells E, Vazquez Delgado E, Gay Escoda C. Use of amitriptyline for the treatment of chronic tension-type headache. Review of the literature. *Med Oral Patol Oral Cir Bucal.* Sep 2008;13(9):E567-572.

TTH accounts for 80% of headaches

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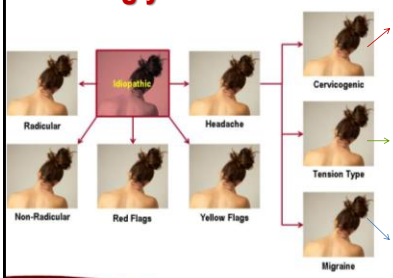
Planning your Treatment



C-Facet Joints
AO and AA Joints
Dura Mater
Skin
Sub-occipital Muscles

Trigger Points
SCM
Trapezius
Temporalis
Sub-occipital

Vascular
Too Much
Too Little

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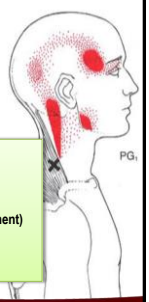
Tension Type Headache

Tension Type

Trigger Points
SCM
Trapezius
Temporalis
Sub-occipital

Ischemic Compression
Stretches
Soft Tissue Massage
Dry Needling
Spinal Manipulation (facilitated segment)
Contract Relax
Spray and Stretch
Etc.



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Cervicogenic Headache

Cervicogenic

C-Facet Joints
AO and AA Joints
Dura Mater
Skin
Sub-occipital Muscles

Spinal Mobilization
Spinal Manipulation
Motor Control
ROM Exercises
Soft Tissue Mobilization
Traction
Neurodynamics
Graded Motor Imagery
Desensitization
Modalities
Etc.

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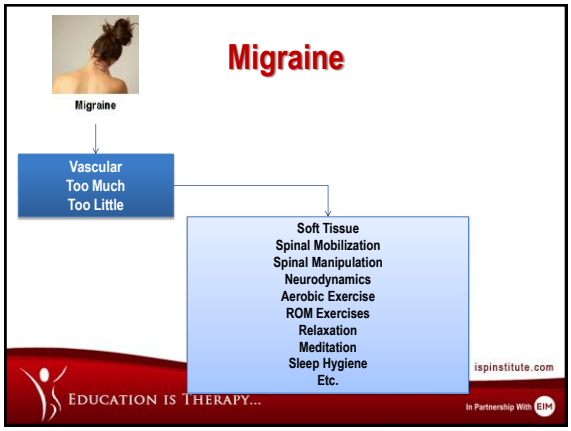

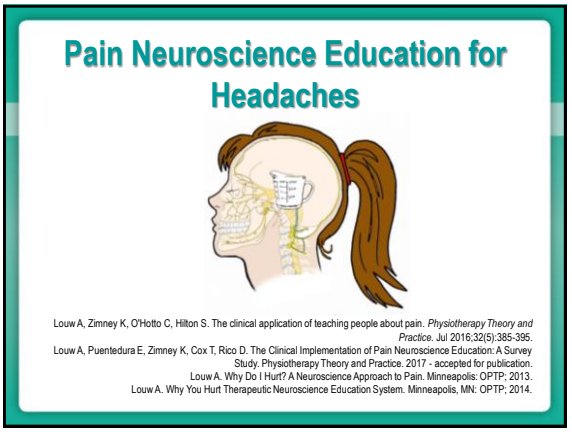

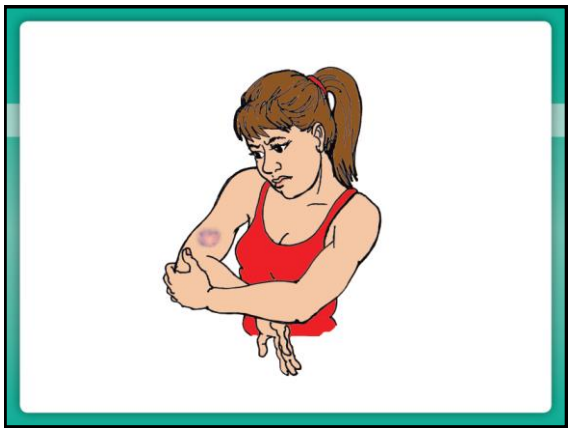

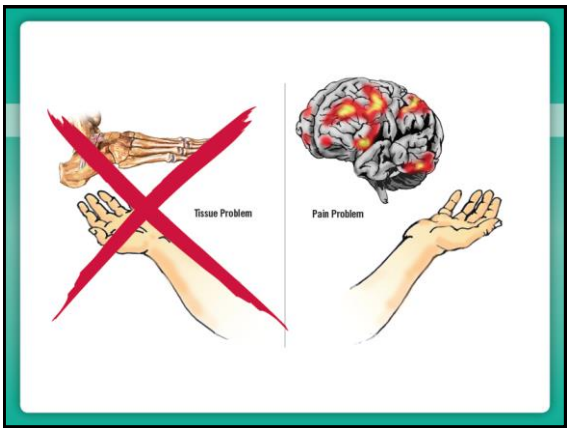

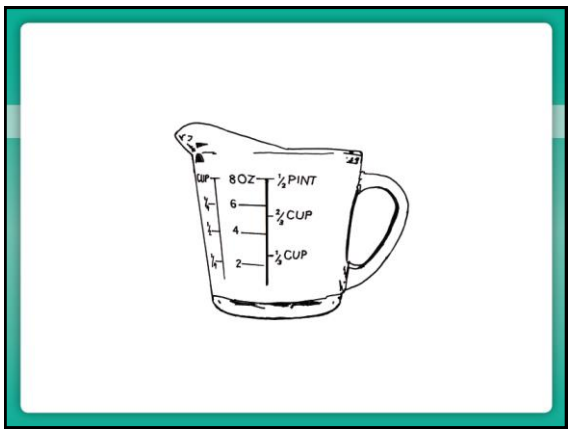

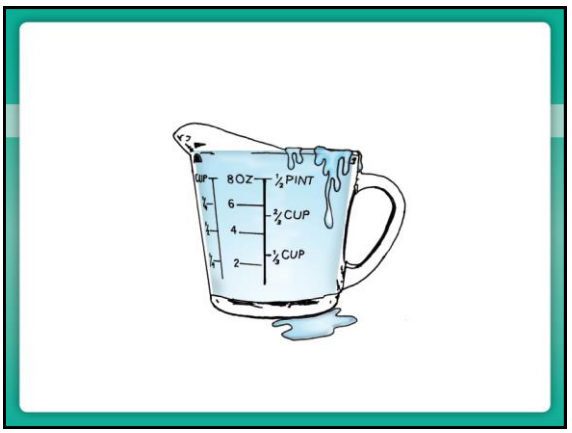

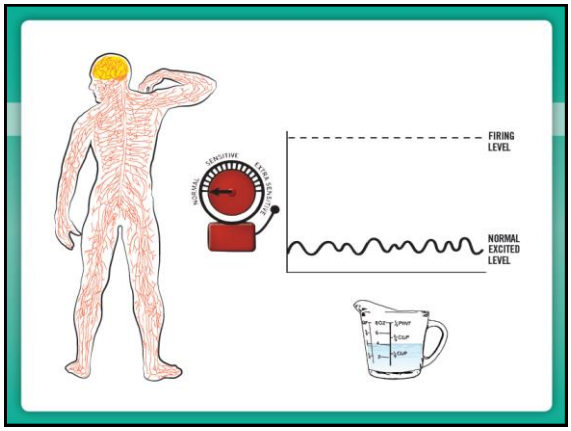

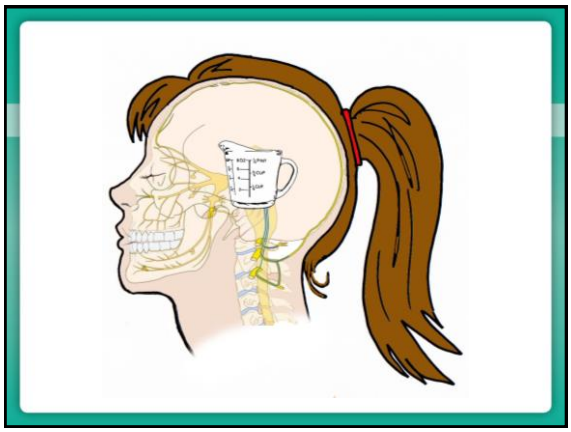

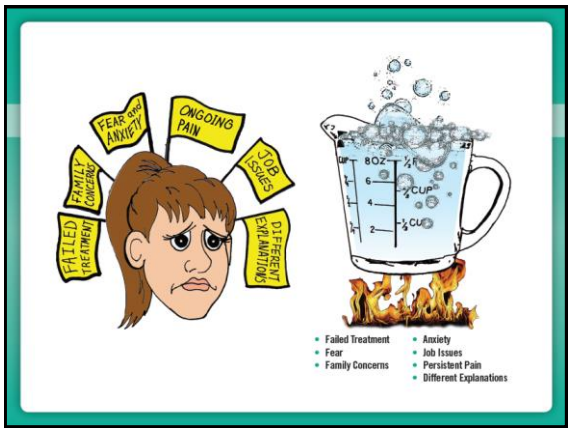

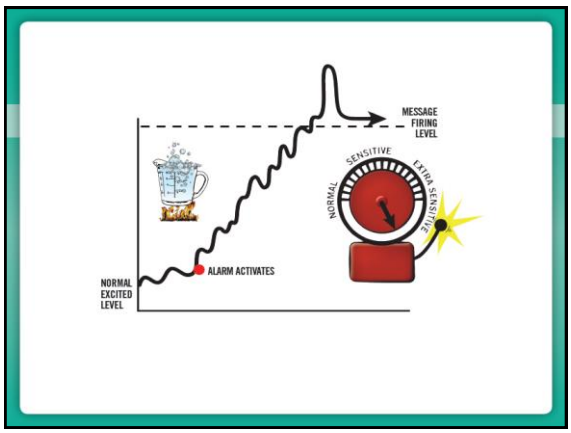

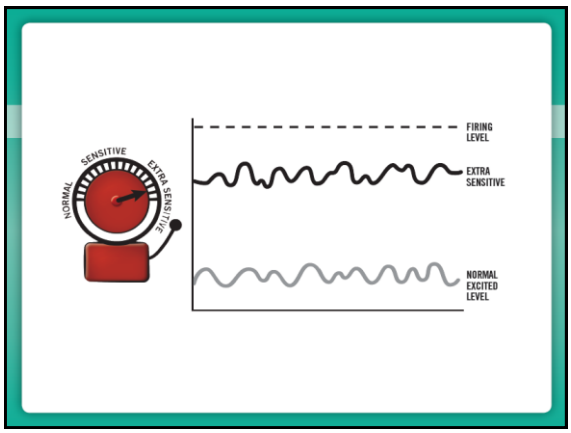

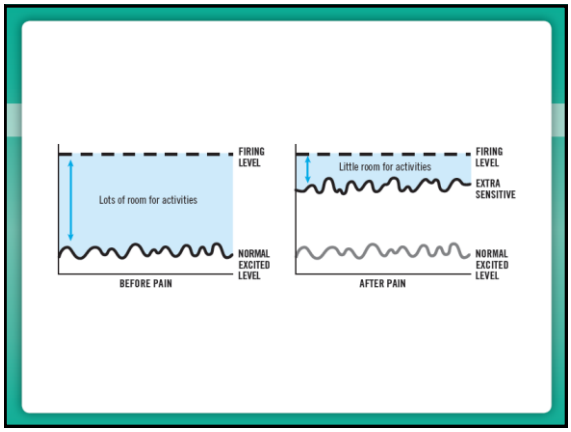

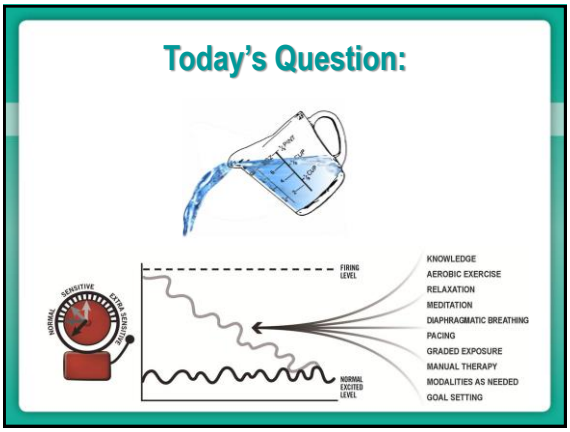

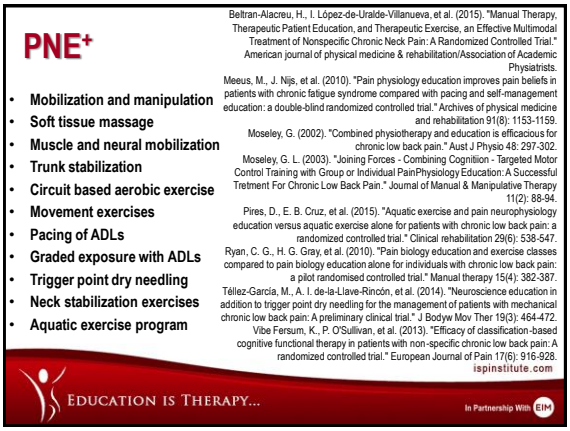

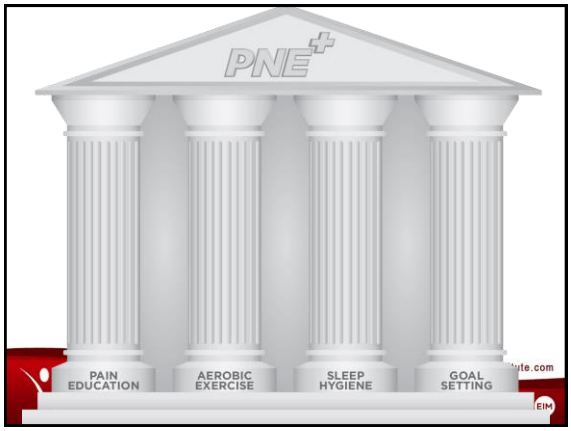

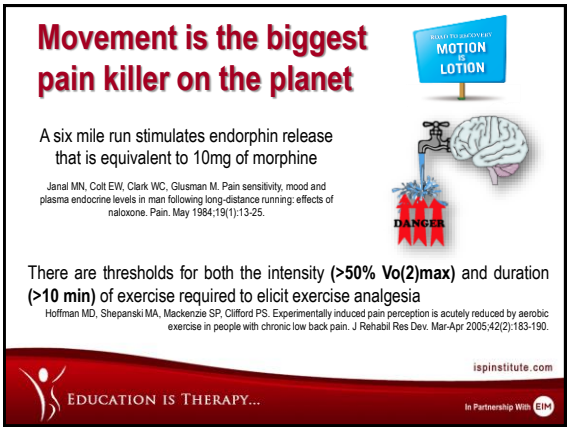

Calming Nerves: Sleep Hygiene

Below is a list of strategies to help you develop a healthy sleeping pattern. Choose one every day, and over time you will see the benefit. Use this as your sleep checklist:

- ☐ Set a time to go to bed — before 11pm.
- ☐ Quiet the house by turning off the computer and the TV.
- ☐ Reduce fluid intake in the evening.
- ☐ Reduce alcoholic beverages in the late evening.
- ☐ Darken and cool the bedroom.
- ☐ Remove kids and pets from your bed (no bed buddies).
- ☐ Park your ideas. Place a notepad and pen next to your bed.
- ☐ Relax, meditate or read a book before bed.
- ☐ Avoid checking e-mails or messages before bed.
- ☐ Stay in bed. If you cannot sleep, close your eyes and relax.
- ☐ Set a wake time, and stay in bed until then.
- ☐ Eliminate naps. If naps are needed, limit them to power naps of fewer than 20 minutes.
- ☐ Avoid caffeine in the late afternoons or evenings.
- ☐ Exercise during the day.

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Goal Setting

Most patients:

- No goals
- Poorly defined goals

You have to have a reason to get out of bed

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PNE+

Louw A, Zimney K, O'Hotto C, Hilton S. The clinical application of teaching people about pain. *Physiotherapy Theory and Practice.* Jul 2016;32(5):385-395.
Louw A, Zimney K, Puentedura EJ, Diener I. The efficacy of pain neuroscience education on musculoskeletal pain: A systematic review of the literature. Physiotherapy Theory and Practice. Jul 2016;32(5):332-355.

- ❑ Manual therapy
- ❑ Soft tissue treatment
- ❑ Aquatic therapy
- ❑ Modalities
- ❑ Diet
- ❑ Meditation
- ❑ Relaxation
- ❑ Mindfulness
- ❑ Breathing
- ❑ Pilates
- ❑ Yoga
- ❑ Social interaction
- ❑ Humor
- ❑ Spirituality
- ❑ Other…

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End-Result

- **Teach people about pain**
- **Exercise**
- **Modalities**
- **Manual therapy**
- **Relaxation/Meditation**
- **Breathing**
- **Sleep hygiene**
- **Safe, healing environment**
- **Coping skills**
- **Pacing and graded exposure**
- **Goal setting**
- **More….**

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Clinical Case Example

Manual Therapy PLUS PNE

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Patient Case

- Sandy is a 56 year-old lady
- Insidious onset of right forearm and elbow 2 years ago
- Worked as a legal aide and possible increase work and stress around the time
- Pain spread:
  - Right wrist
  - Right upper arm
  - Right neck
  - Headaches

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Patient Case

- Multiple treatments/consultations
  - 3 different physical therapists
  - 2 different chiropractors
  - Several physicians
    - Rheumatologist
    - Neurologist
    - Pain management
- Epidurals
  - No relief
- MRI
  - Mild DJD
- EMG
  - Mild "nerve issues"
- PT
  - Sub-occipital muscles soft tissue treatment
    - Severe increase in her headaches

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Patient Case: Current

- Right neck pain and constant headaches – right > left from the occiput to the eyebrow
- Significant sleep disturbance
- Changed work due to pain
  - NDI 25 (severe disability)
  - UE functional scale 58/80
- Headache increases with
  - Direct pressure to the neck/scalp
  - Sitting "still" more than 30 minutes
- Most relief:
  - Keep moving; heat; Advil (ibuprofen)


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Patient Case: Physical

- Pleasant; no visible distress
- Extreme tenderness to palpation around the neck and scalp per pressure algometry
- Positive Tinnel tests:
  - Bilateral cubital tunnels
  - Bilateral posterior tarsal tunnels
  - Bilateral posterior knee

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Patient Case: Physical

- Shoulder AROM WFL Left = Right
- Cervical Spine AROM
  - Flexion and extension 90%
  - Rotation left/right 75%
  - Side flexion left/right 50%
- Slump: Positive LE/Neck symptoms with structural differentiation
- Positive ULNT's: Median, Radial and Ulnar left and right
- Intact:
  - Neurological, Babinski, Klonus, Grip strength, TPD, Cranial nerves
- PAIVMs, PPIVMs: Unable to assess due to pain

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Clinical Impression

- Peripheral Sensitization
- Central Sensitization
- Cervicogenic Headache
- Hyperalgesia
- Allodynia

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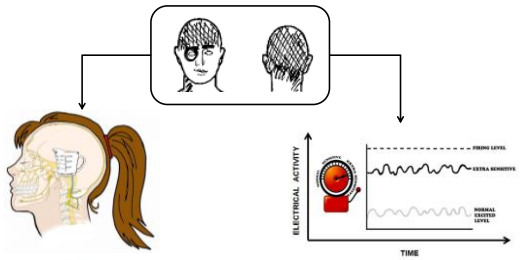
Problem



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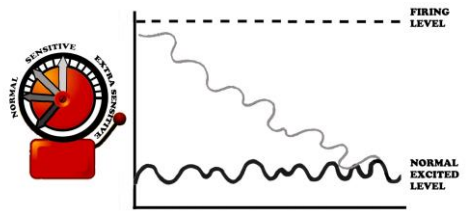
Solution…?



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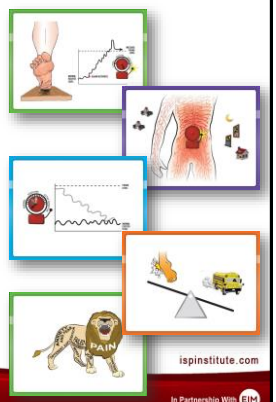
Treatment (initial)

- PNE
  - Sensitive Nerves
  - Nosy Neighbors
  - Calming Sensitive Nerves
  - Pain Comes from the Brain
  - Lions and Stress



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Treatment (initial)

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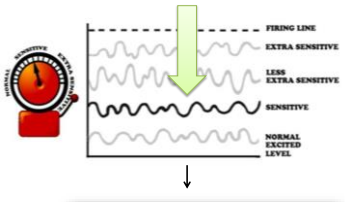
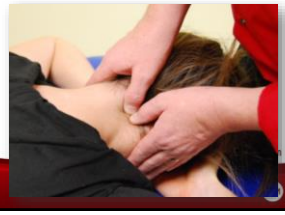
End-Result?





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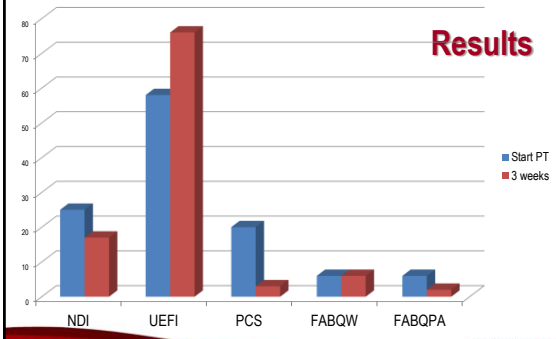
Results



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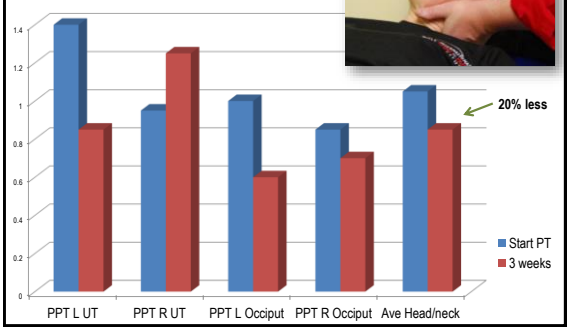
Even with mobilization and manipulation…



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Taylor & Francis

A clinical perspective on a pain neuroscience education approach to manual therapy

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Louw A, Nijs J, Puentedura E. Pain Neuroscience Education and Manual Therapy. *Journal of Manual & Manipulative Therapy.* 2017

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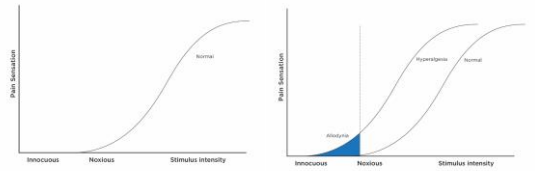

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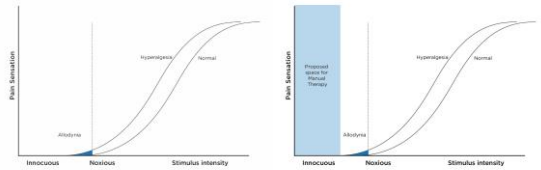

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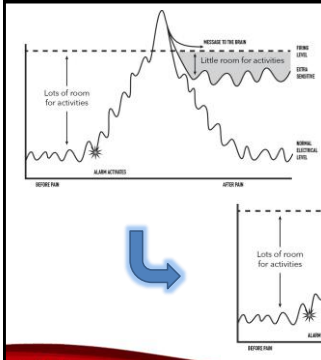

Louw A, Nijs J, Puentedura E. Pain Neuroscience Education and Manual Therapy. *Journal of Manual & Manipulative Therapy.* 2017

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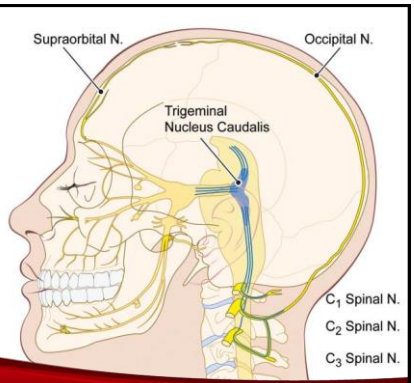
Key to headaches

Trigeminal Cervical Nucleus (TCN)



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