Cervicogenic Headache: Introduction

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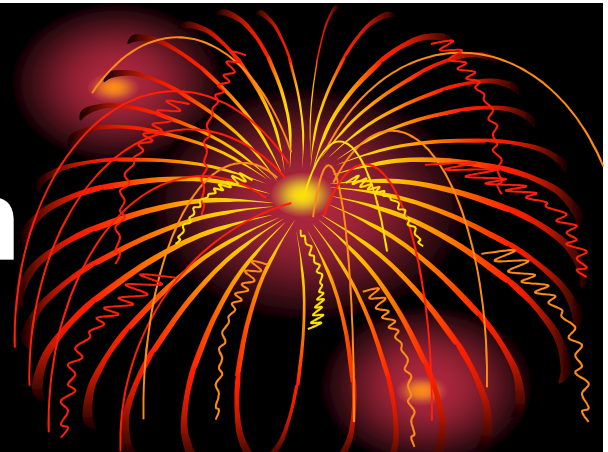
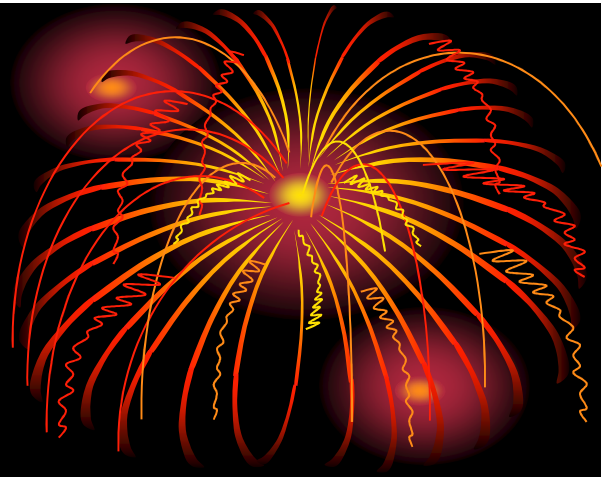
Case presentation



- 40 yrs, Female, 274xx098
- Past HX: poliomyelitis in childhood, old CVA (10 yrs ago?) without regular control.
- No HTN, DM, heart disease, smoking, Alc.
- Occupation: jobless.
- Trauma hx: ? (car accident)
- ----------
- Sudden onset of left limbs weakness and numb for 2 days before admission.
- Occipital headache and nuchal numb in daily activity.
- Lt dystonic limb and unsteady gait for months before s/s appear.

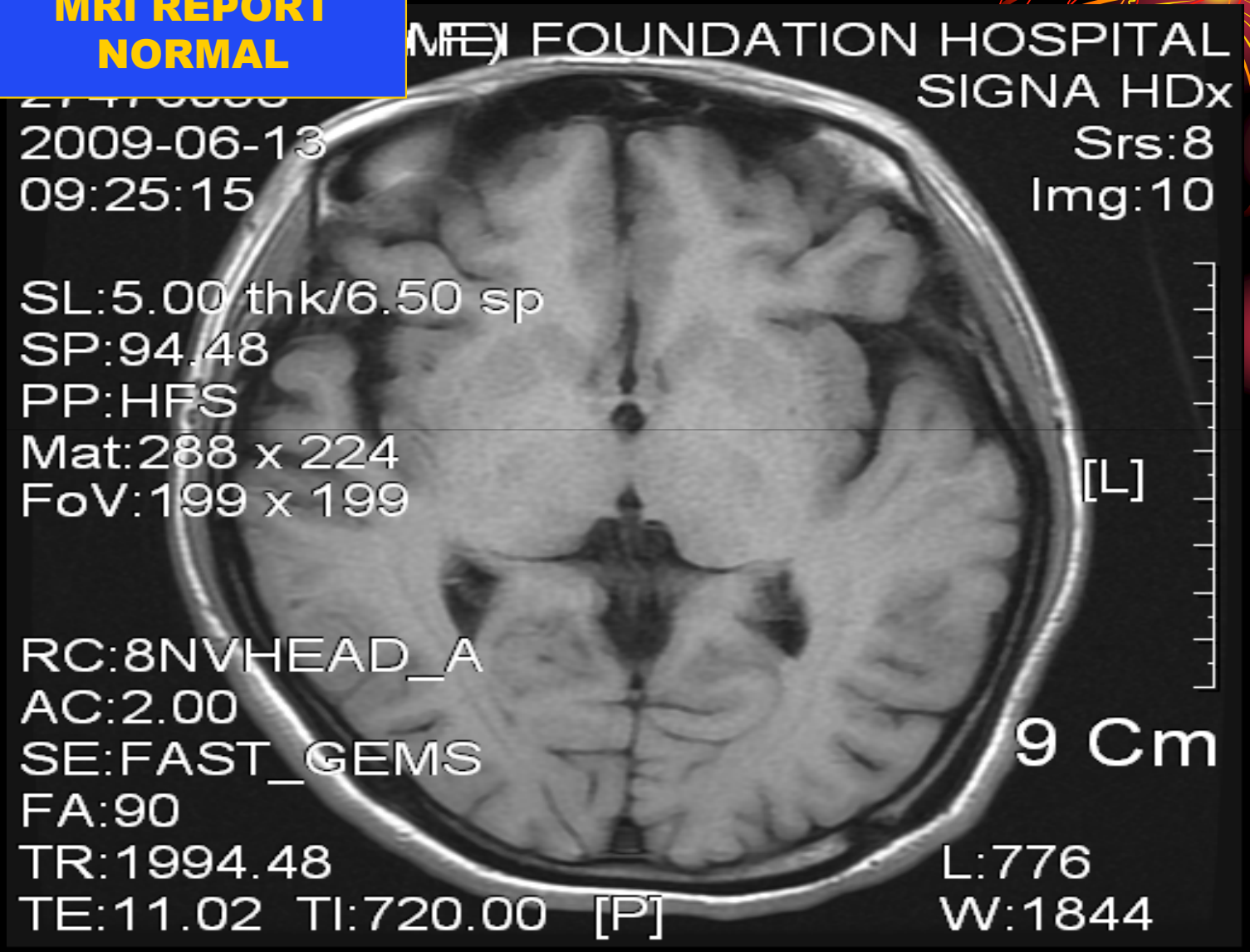


- **Lab:**

  -Hypochromic hypocytic anemia (Hb 9.4)
  -T/G 34 mg/dl (42-200mg/dl)
  -Protein-C 65.7% (77-158%)
  -Anti-thrombin III, protein-S: WNL

  -Dopscan=IMT=0.6/0.6 mm (VAs=141/236 ml/m)
  -Brain MRI, C-spine X-ray, C-MRI

MRI REPORT
NORMAL

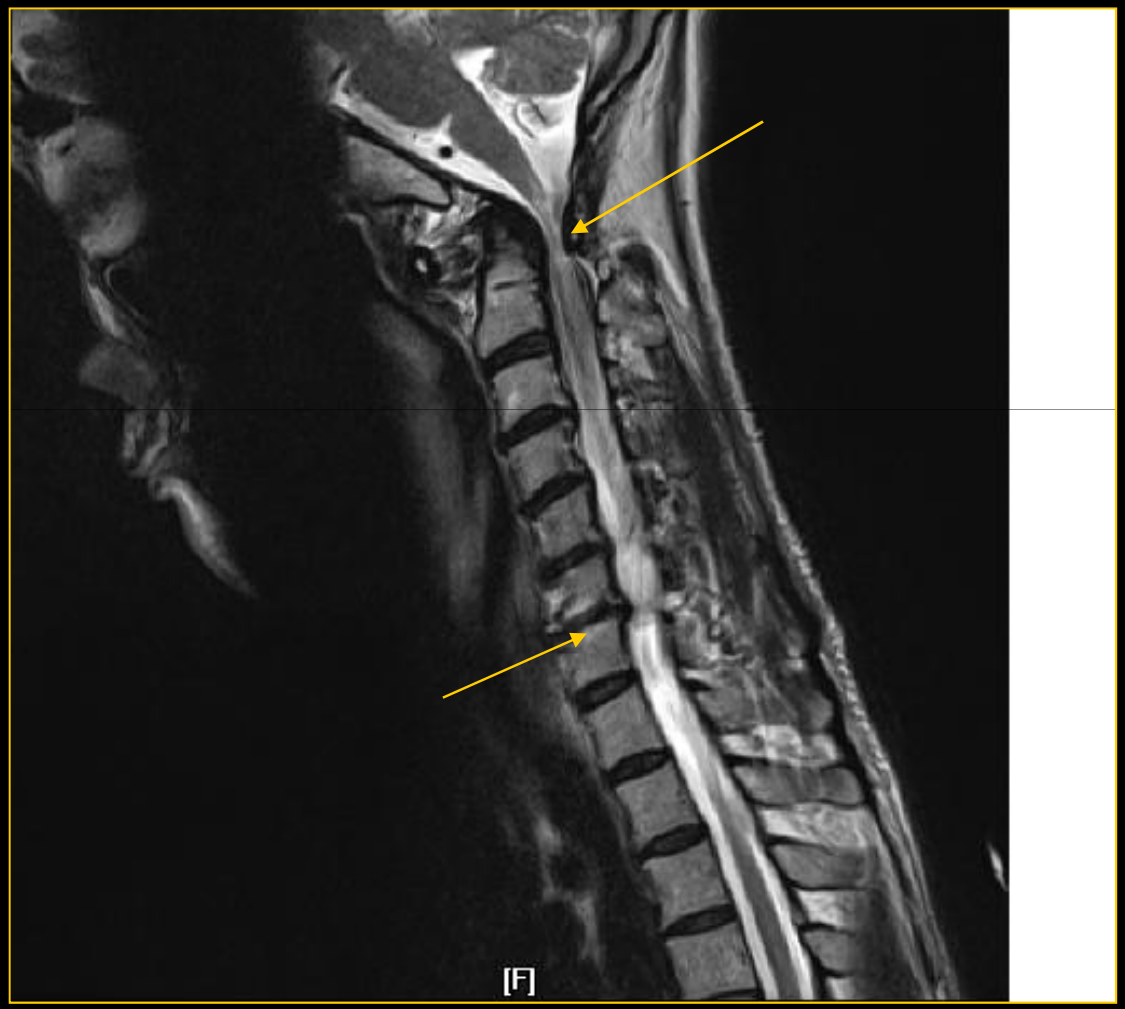


Headache Character

- Non-throbbing, non-pulsatile.
- Tightness of neck (R>L), dullness, sometimes sharping-like pain, extending to vertex and right eyeball.
- Eyeballs sore, bilaterally (R>L).
- Onset of HA: varied.
- Duration for hours, even for day or days.
- NSAID or IV injection relieved s/s.
- Frequency: everyday sometimes (>15d/ in past months).
- No weight-bearing work.
- Pain intensity: (VAS=3~8, mostly <6)
- Photo-, phono-phobia, aura, nausea/ vomiting: deny.
- 甩頭會有“喀喀”聲音,較舒服(但怕血管斷掉)

Neck(X-ray)

MRI



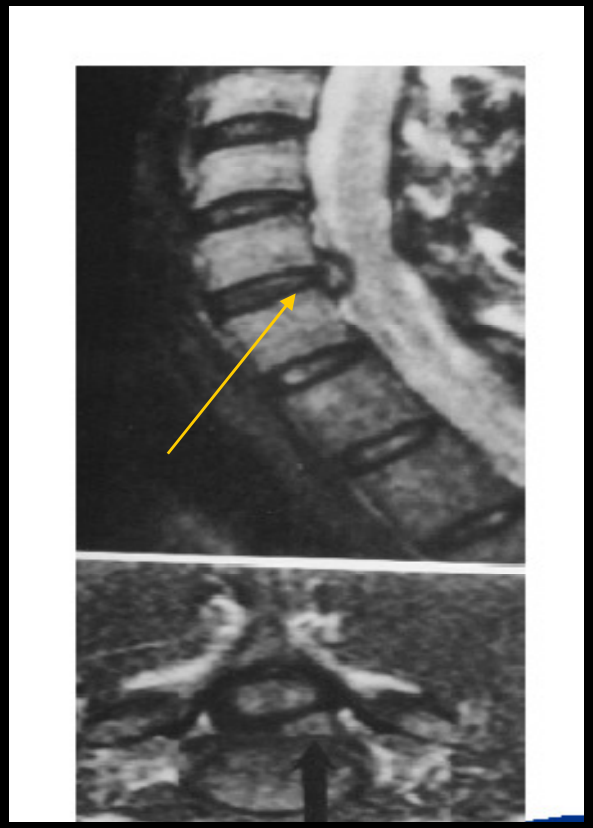
High C1-C2 Stenosis.

C6-7 Anterior-listhesis.

DDX HA?

- Tension type headache?
- Myofascial pain syndrome?
- Cervical neuralgia?
- Trigeminal neuralgia?
- Migraine without aura?
- Mixed headache?
- Or……

Similar Case in literature



Association: Low cervical prolapse with cervicogenic headache

Headache and neck pain improves or disappears in 80% of patients after surgery for the cervical disc prolapse.

These results indicate that pain afferents from the lower cervical roots can converge on the cervical trigeminal nucleus and the nucleus caudalis.

(CEH)

Cervicogenic headache

From the beginning about CEH…

- The description about such HA as early as 1926
- CEH was first termed by Sjaastad in 1983
- Set criteria in 1990, modified in 1998
- IHS criteria since 2004
- Prevalence from 0.7~13.8% (Martelletti et al. 2004)
- Female: male= 4:1
- Pain generated in any location of trigemino-cervical territory can be referred to frontal area (trigemino-cervical nucleus-TCN)
- GON (greater occipital nerve) stimulation play a role in both trigeminal and cervical neuronal activity.

Cervicogenic headache international study group (CEH-ISG, 1990)

Cervicogenic Headache: diagnostic criteria

- I. Unilateral headache without sideshift
- II. Symptoms and signs of neck involvement:

a. Provocation of attacks:
   1. Pain, seemingly of a similar nature, triggered by neck movement and/or sustained awkward head positioning.
   2. Pain similar in distribution and character to the spontaneously occurring pain elicited by external pressure over ipsilateral upper, posterior neck region or occipital region.

b. Ipsilateral neck, shoulder and arm pain of a rather vague, non-radicular nature.

c. Reduced range of motion in the cervical spine.

Sjaastad et al. Headache 1990;30: 725–726

ULLEVÅL universitetssykehus

Cervicogenic headache international study group (CEH-ISG, modified in 1998)

Table 1: Cervicogenic headache diagnostic criteria (Sjaastad et al. 1998b).

Major Criteria

I. Symptoms and signs of neck involvement; it is obligatory that one or more of the phenomena 1a to 1c are present.

Ia) Precipitation of head pain, similar to the usually occurring one:

Ia1) By neck movement and/or sustained, awkward head positioning, and/or:

Ia2) By external pressure over the upper cervical or occipital region on the symptomatic side.

Ib) Restriction of the range of motion (ROM) in the neck.

Ic) Ipsilateral neck, shoulder, or arm pain of a rather vague, non-radicular nature, or-occasionally-arm pain of a radicular nature.

II. Confirmatory evidence by diagnostic anesthetic blockages.

III Unilaterality of the head pain, without sideshift.

Head pain characteristics

IV. Moderate-severe, non-throbbing pain, usually starting in the neck

Episodes of varying duration, or:

Fluctuating, continuous pain

Other characteristics of some importance

V. Only marginal effect or lack of effect of indomethacin

Only marginal effect or lack of effect of ergotamine and sumatriptan.

Female sex.

Not infrequent occurrence of head or indirect neck trauma by history, usually of more than only medium severity.

Other features of lesser importance

VI. Various attack-related phenomen, only occasionally present and/or moderately expressed when present.

a) Nausea

b) Phono-and photo- phobia

c) Dizziness

d) Ipsilateral 'blurred vision'

e) Difficulties on swallowing

f) Ipsilateral edema, mostly in the periocular area

NECK-RELATED PAIN

RELIEF BY PROCEDURE OR ANESTHETHIA

UNILATERALITY

MOD TO SEVERE, NON-THROBBING
VARIED DURATION

POOR EFEFCT TO INDOCID
POOR EFEFCT TO TRIPTAN
TRAUMA-INDUCED NOT INFREQUENT
FEMALE SEX

NAUSEA
PHOTOPHOBIA
DIZZY
SWALLOWING ..ASSOCIATED

Cervicogenic headache international study group (CEH-ISG)

(minimal requirement, 1998b, Sjaastad et al)

- **Definite CEH:**
  -Precipitation of attacks subjectively and/or iatrogenically.
  -Positive anesthetic blockage effect.
  -Unilaterality without side-shifting.

- **Provisional CEH:**
  -Reduced range of neck motion.
  -Ipsilateral shoulder/arm pain.
  -Positive anesthetic blockage effect.
  -Unilaterality without side shifting.

ICHD(IHS) criteria (2004)

C Evidence that the pain can be attributed to the neck disorder or

D pain **resolves** within 3 months after successful treatment of the causative disorder or lesion

that implicate a source of pain in the neck

2. abolition of headache following diagnostic blockade of a cervical structure or its nerve supply using placebo or other adequate controls

11.2.1 頸因性頭痛
Cervicogenic headache

A. 源自頸而表現在頭及/或臉一處或多處的疼痛，符合基準C及D

B. 經臨床、實驗室及/或影像證明，有一已知是或普遍認定為頭痛確切致因的頸椎或頸部軟組織疾患或病變

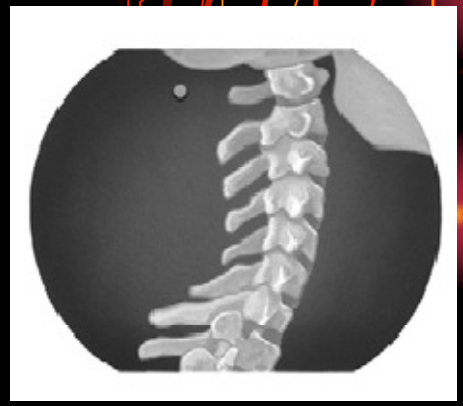
C. 依據至少下列一項，證實該疼痛可歸因於頸疾患或病變：
   1. 臨床徵候顯示，疼痛來自頸部
   2. 在安慰劑或其他合適的控制型試驗下，對頸部結構或其支配神經施行診斷性神經阻斷後，可解除頭痛

D. 疼痛在致病疾患或病變有效治療後三個月內緩解

ICHD-II *Cephalalgia* 2004; **24** (suppl)

Cervicogenic headache: etiology

- arthritis including facet syndrome
- discogenic pain syndromes
- radiculopathy
- neuropathy
- bursitis
- tendonitis
- referred visceral pain
- infectious and autoimmune disorders
- abnormal body mechanics
- metabolic/endocrine disease including hypothyroidism
- psychiatric disorders including depression
- fibromyalgia



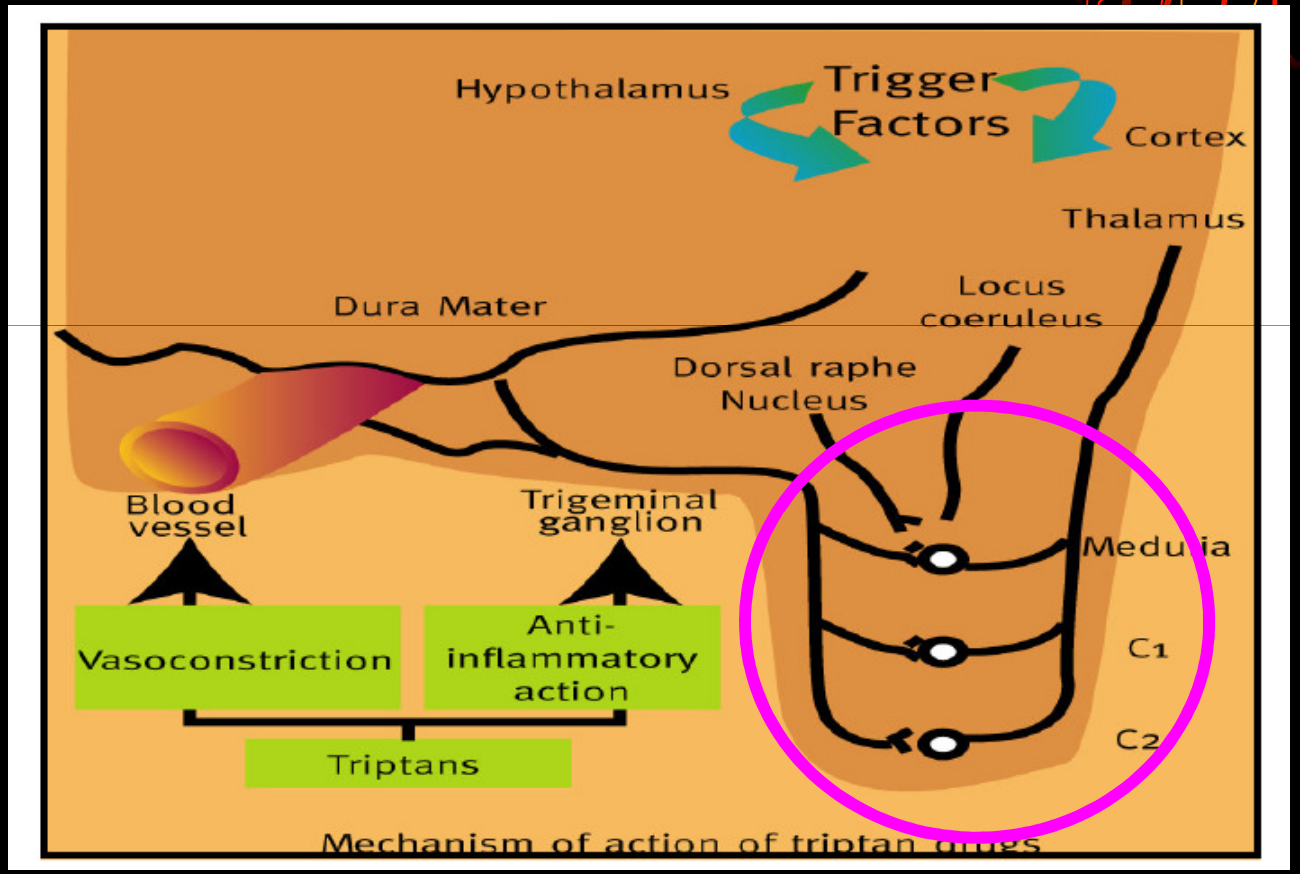
Cervical dysfunction and headache

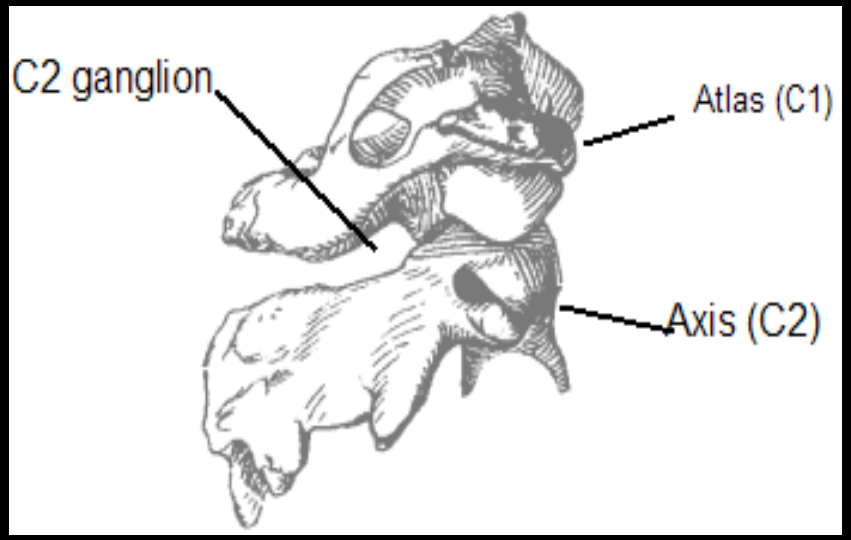
- The pain in cervicogenic headache is typically perceived within the dermatomes of the trigeminal and upper cervical (C2,3)
- Activation of the trigeminocervical nucleus (TCN).
- TCN - area of overlap between the spinal trigeminal nucleus pars caudalis and the cervical dorsal horn above the level of C3.
- Second-order nociceptive neurons within this area receive primary afferent input from both trigeminal and upper cervical (C1-3) nerves.
- This convergence of afferents then creates potential for the source of pain being misperceived at higher centres.

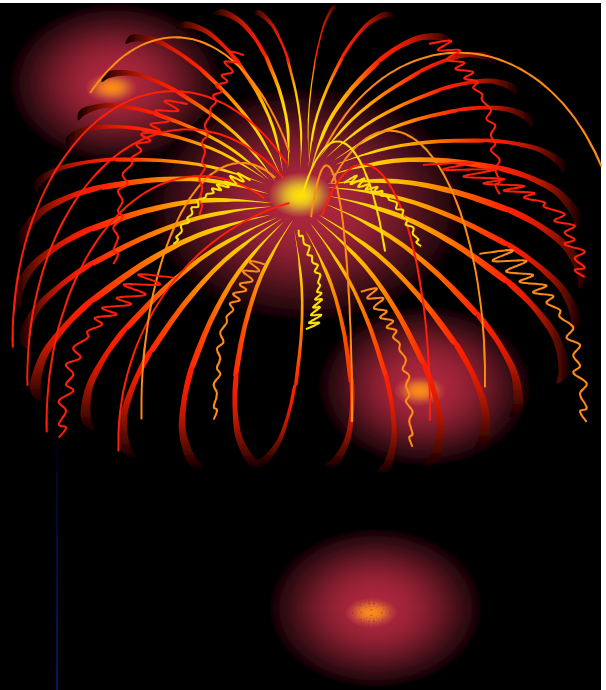
Possible Mechanism:

1. **High cervical nerves excitability C1-C3 with TCN involved.**
2. **NO and Cytokine the chemical substance.**
3. **Mixed Central and peripheral original mechanism.**

Trigeminal-cervical nucleus (TCN)



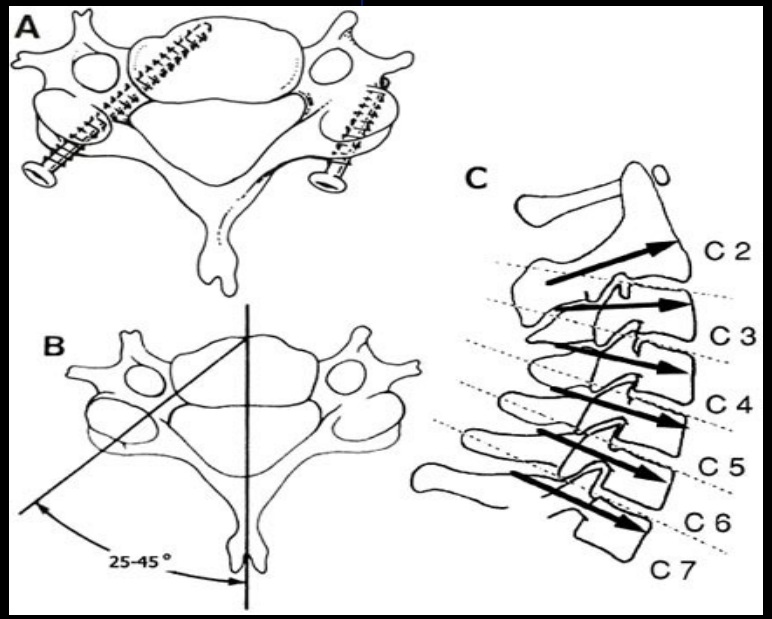




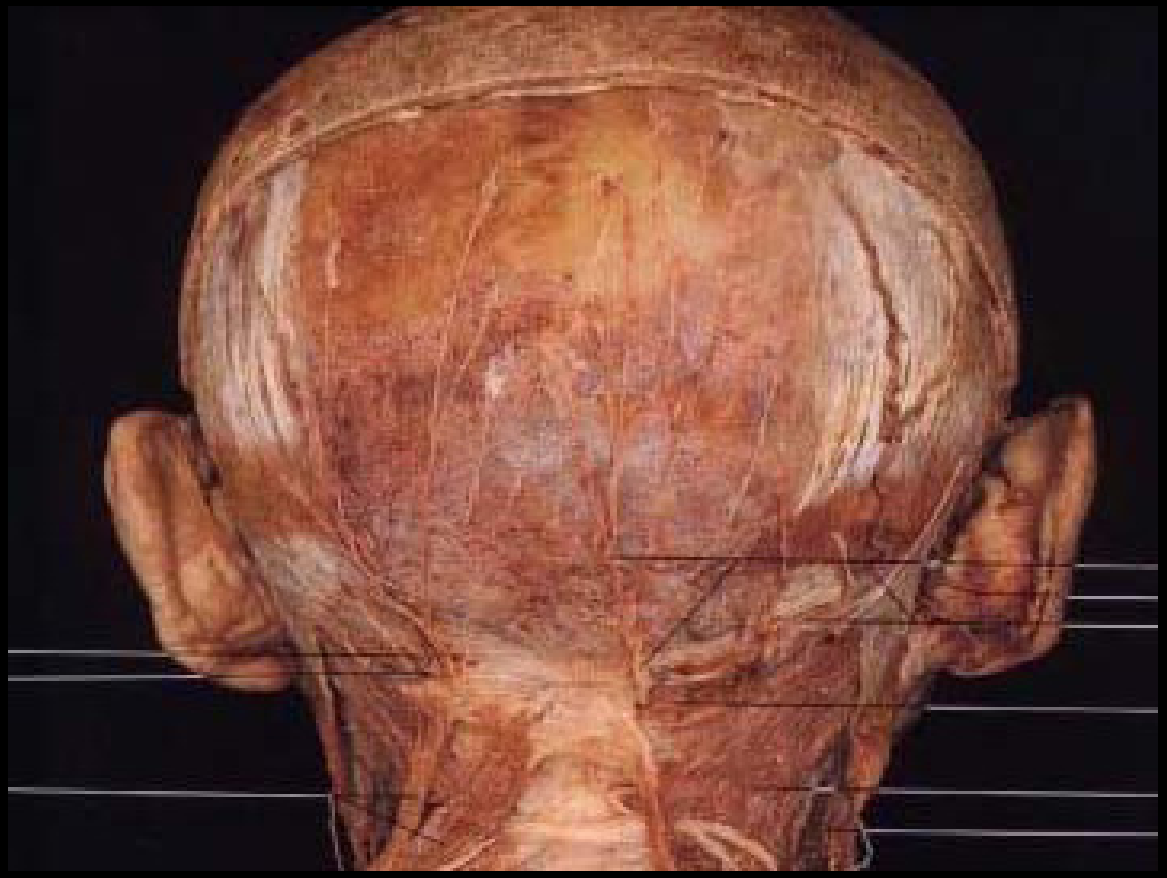
ALWAYS A PERIPHERAL ORIGIN?

ALWAYS A SECONDARY HEADACHE ORIGIN?

NO



NERVE, MUSCLE, BONE, FACET JOINT WITH CERVICOGENIC (OCCIPITAL) HEADACHE



Photophobia and phonophobia in tension-type and cervicogenic headache

J Vanagaite Vingen, LJ Stovner
Department of Neurology, University Hospital of Trondheim, Norway

(Cephalalgia 1998;18:313-8)

- **TTH /CEH had photo-/phono-phobia during/ between HA ($p<0.001$)**
- **In cervicogenic headache(CEH) patients, photophobia (<0.05) but not phonophobia (p=0.28) was greater on the symptomatic side than on the non-symptomatic side.**
- **The mechanism is not mentioned in this paper.**

Table 3. Comparisons of self-reported light and sound sensitivity in controls ($n=63$), TH ($n=28$), and CGH patients ($n=22$).

	Sensitive to light		Sensitive to sound	
	n (%)	X^2; *p* value	*n* (%)	X^2; *p* value
Controls versus	31 (48%)	—	34 (53%)	—
TH headache-free	19 (68%)	2.72; 0.10	17 (61%)	0.36; 0.55
CGH headache-free	11 (50%)	0.44; 0.51	14 (64%)	1.60; 0.21
TH during headache	25 (89%)	15.14; 0.0001	25 (89%)	12.49; <0.001
CGH during headache	18 (82%)	10.45; 0.001	19 (86%)	11.07; <0.001
TH headache-free vs TH during headache		5.26; <0.05		7.74; <0.01
TH headache-free vs CGH headache-free		0.49; 0.49		0.44; 0.51
TH during headache vs CGH during headache		0.10; 0.75		0.11; 0.74
CGH headache-free vs CGH during headache		5.26; <0.05		4.33; <0.05

REVIEW

Biological markers of cervicogenic headache

A Frese & S Evers

Department of Neurology, University of Münster, Münster, Germany

- **Imaging techniques. (not necessarily abnormal)**
- **Clinical signs. (different between IHS—CEHISG)**
- **Diagnostic blockage. (GON blockage)**
- **Neurophysiological studies. (R2 A/D asymmetry in blinking reflex)**
- **Laboratory testing. (CGRP no difference)**

Cephalalgia: 2008; 28 (Suppl. 1):21–23.

REVIEW

Is a *de novo* whiplash-associated pain most commonly cervicogenic headache?

(Cephalalgia 2008; 28 Suppl. 1:32–34).

MB Vincent
Hospital Universitário Clementino Fraga Filho, Faculdade de Medicina, Universidade Federal do Rio de Janeiro, Rio de Janeiro, Brazil

- **2771 pts of informed trauma hx with HA were collected (1993-2006)**
- **Fit IHS and modified Sjaastad's criteria of CEH in 1998, and excluded mixed type HA.**
- **Final: 1429-migraine, 400 TTH, 93- CEH (3.3%).**
- **Trauma were reported in CEH (15%), in TTH (1.5%).**
- **Time span between trauma and HA, TTH(12.1yr), CEH(7.2yr).**
- **Whiplash may predisposing CEH with short-or long-lasting effect.**

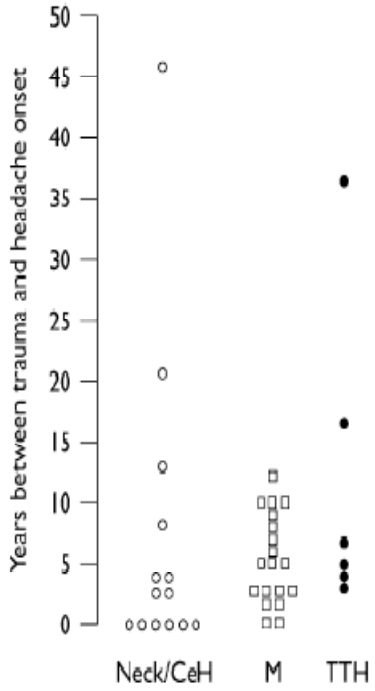


Figure 1 Time span (years) between trauma and headache onset in patients with occipital-nuchal headache or cervicogenic headache (Neck/CeH, $n = 14$, open circles); migraine (M, $n = 19$, squares) and tension-type headache (TTH, $n = 6$, filled circles).

(ACTA NEUROL SCAND; 2007)

ACTA NEUROLOGICA
SCANDINAVICA

Cervicogenic headache: long-term prognosis after neck surgery

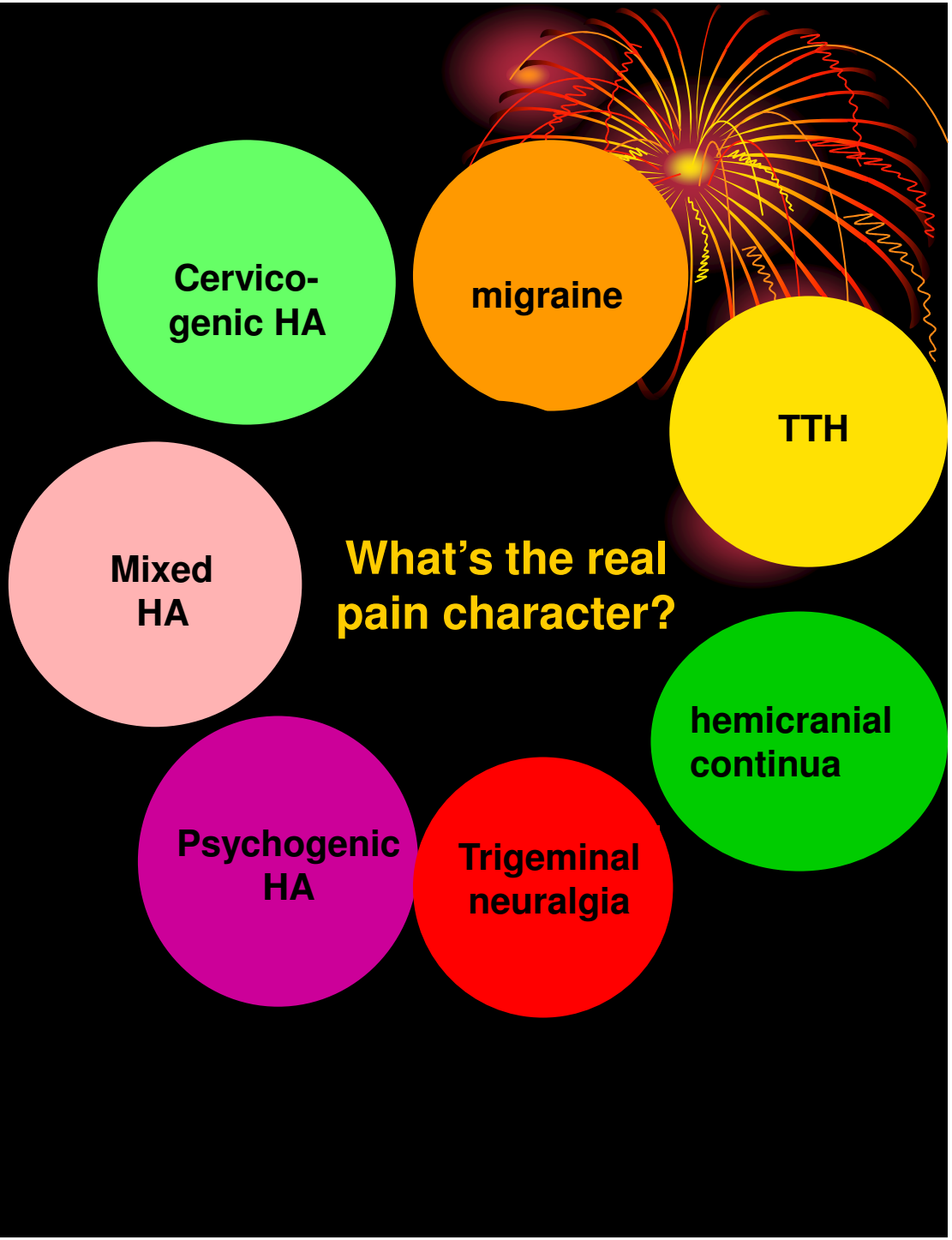
Jansen J, Sjaastad O. Cervicogenic headache: long-term prognosis after

J. Jansen[1], O. Sjaastad[2]

Objectives – To evaluate the postoperative fate of chronic, hard-to-treat and partly suicidal cervicogenic headache (CEH) patients (n = 32), diagnosed according to the CHISG criteria and treated with a decompression/stabilization operation in the cervical spine: the Smith/Robinson operation. *Methods* – The cervical levels of affection, singled out by magnetic resonance, anaesthetic blockades and X-ray examinations were mainly at the C4-5, C5-6, C6-7 levels; one or two discs were removed. The study was prospective and controlled. *Results* – During the 1- to 3-month-long postoperative period of collar-wearing, there generally was pain freedom. The mean time of follow-up was 19.8 months: pain recurrence, known to the authors, appeared after 1–58 months (n = 12). The mean time of improvement was: 14.8 months (range 1–58 months). Five patients stayed well ≥3 years. This is certainly a minimum figure. The patients ultimately were lost to follow-up. *Conclusions* – For the time being, this operation should preferably be used in selected, chronic, severely afflicted, preferably elderly CEH patients, when other therapeutic approaches are exhausted.

32 pts(26F),31-73y, mean HA(6y),varied C-level lesion.
100% remission within 1st yr, 1/3 pts recur s/s (58m).
12 re-op (C4-7 level), vague results and lost-f/u.

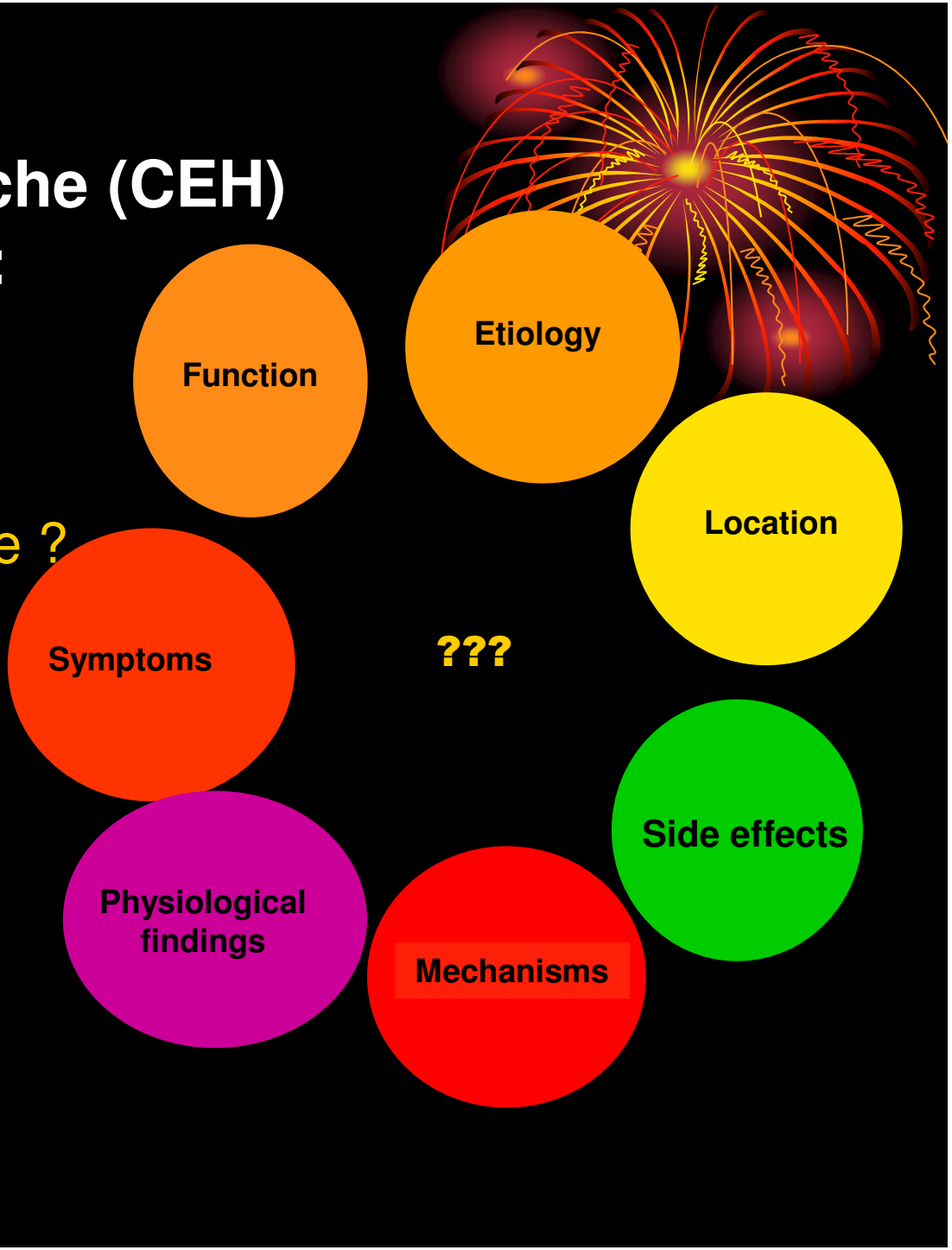
Headache and its boundaries



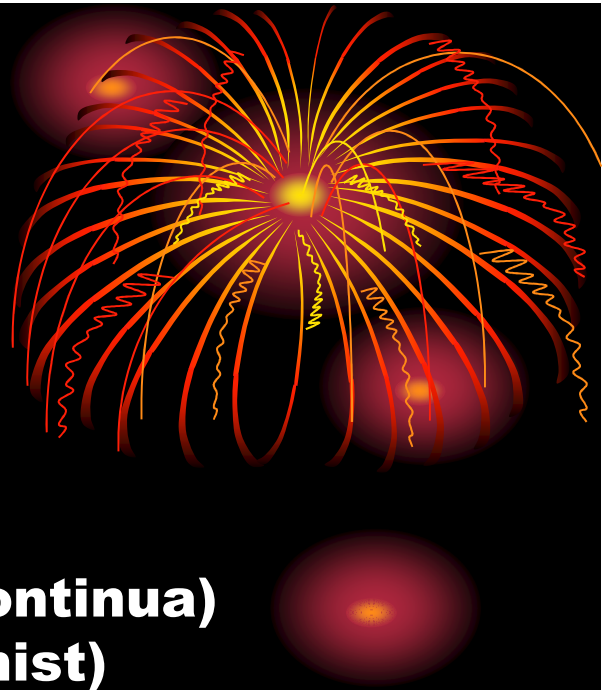
Challenge in Cervicogenic Headache (CEH) And Pain Treatment :

Get a better effect

- Reduce side effects
- What is the best measure ?



Treatment of CEH
(Non-invasive models)



- **Pharmacological treatment**
  (Ergot/ oxygen had no effects)
  (Triptan group had ineffective)
  (Indomethacin clarified hemicranial continua)
  (NSAID? Steroid? NO/cytokine antagonist)
- **Physiotherapy**
  (An initial therapy in many clinical settings)
- **TENS(100 Hz, 50 ms, 30 min)**
  (Melzack et al, 1965, Gate theory, to alleviate pain)

Brain-Gate Theory

- **Melzack and Wall (1965)**
- **Melzack-wall-Casey (1982), modified theory: cognitive control + descending brain stem control**

LIGHT PAIN (neuropathic pain, allodynia)

CRUDE PAIN (nociceptive + neuropathic pain)

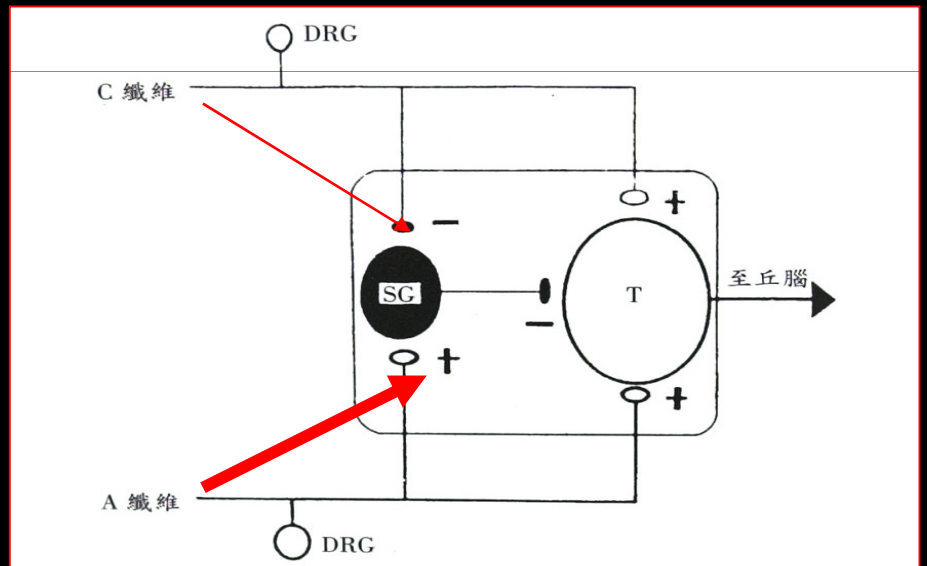
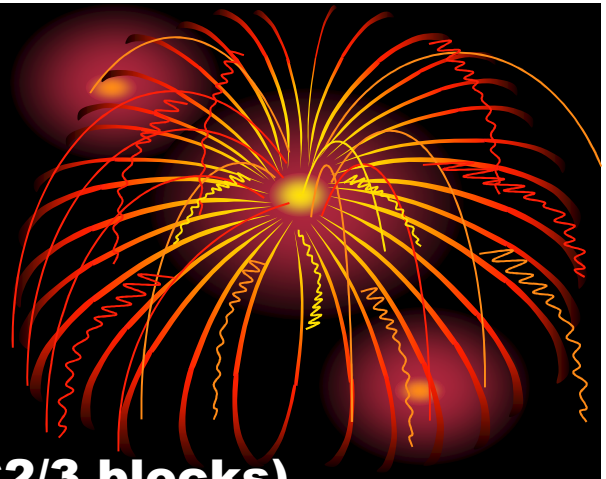


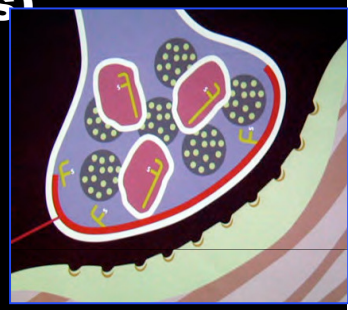
圖 3－1－12　閘門學說示意圖

DRG：背根神經節神經元　SG：背角膠狀質細胞　T：脊髓投射神經元　＋：興奮　－：抑制

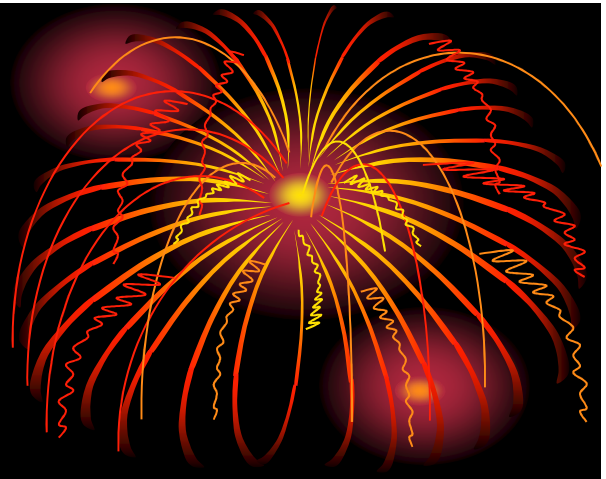
Treatment of CEH
(Invasive methods)

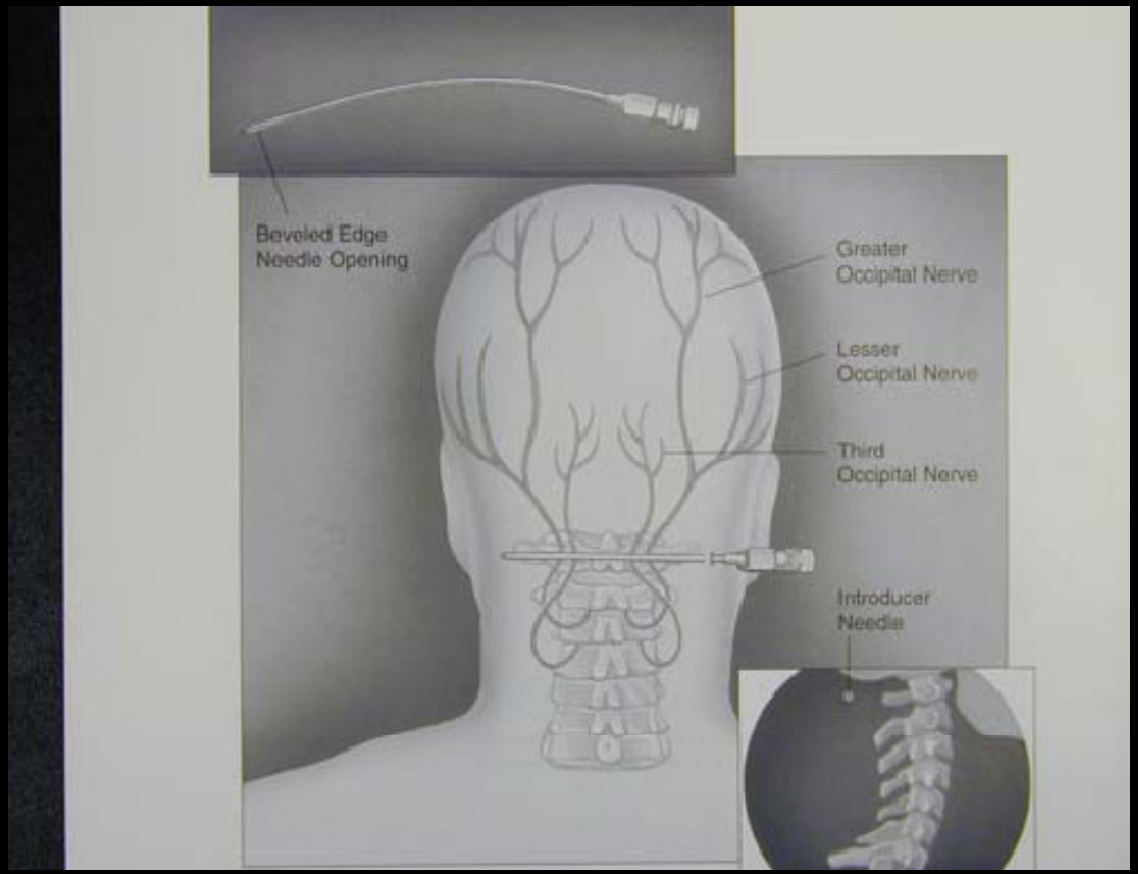


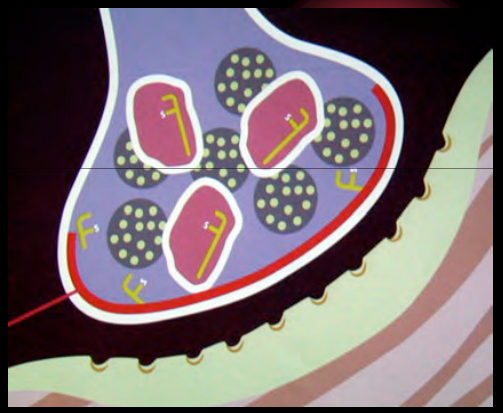
- **Anesthetic blocks of GON**
  (As a diagnostic tool, equal effective to C2/3 blocks)
- **Local anesthesia**
  (Lidocaine i.m in tender point or painful muscle)
- **Botox-A injection**
  (promising in muscle spasm with pain)
- **Epidural steroid injection**
  (Lidocaine or methyl-prednisolone in radicular pain)
- **RF therapy**
  (C1-2 dorsal rami neurotomy, C3-6 ineffective)
  (Skilled-hand technique)
- **-Dorsal colume stimulation** (N. stimulation)
- **Surgery**
  (Ganglionectomy, laminectomy, laminoplasty..)



Pre-synaptic



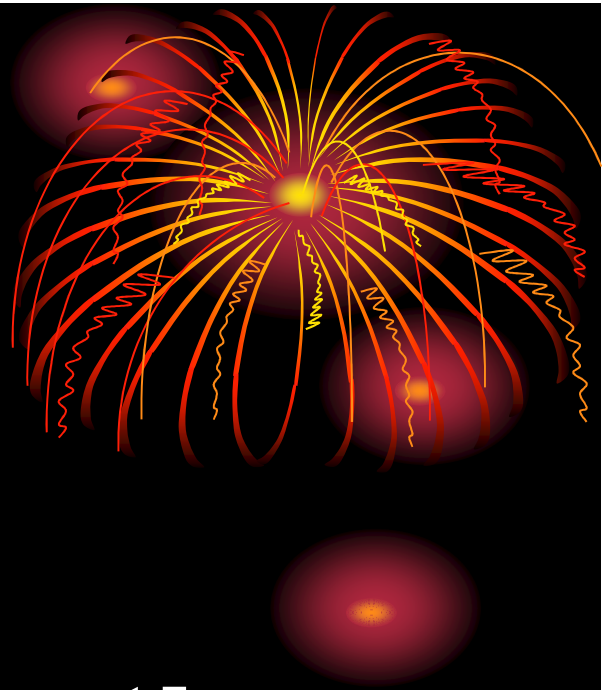




BOTOX-A:
Pre-synaptic

About CEH…

1. Not merely a symptom, but a complicated syndrome.
2. Correct diagnosis will have more effective treatment.
3. Stepwise therapy from non-invasive to invasive technique until a optimal response achieved.
4. Combined all treatment modality may be required.



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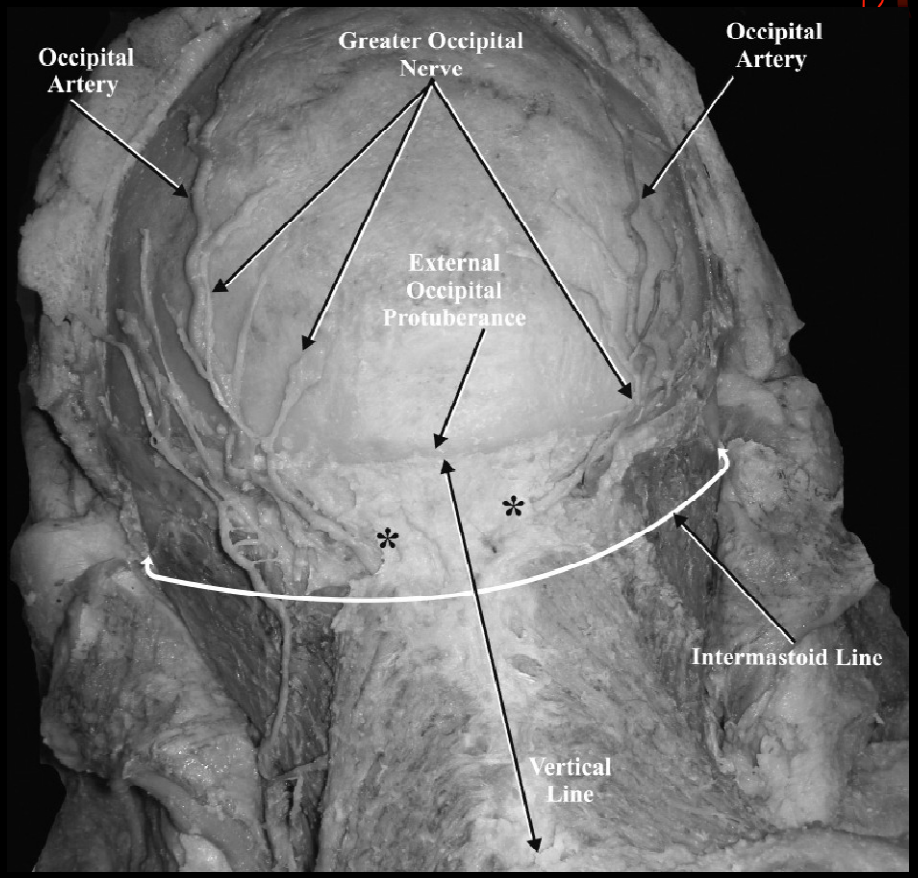
Occipital Artery
Greater Occipital Nerve
Occipital Artery
External Occipital Protuberance
*
*
Intermastoid Line
Vertical Line