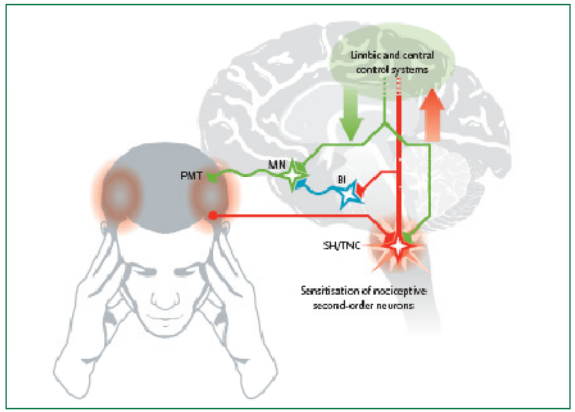
Cervicogenic Headache: Pathophysiology

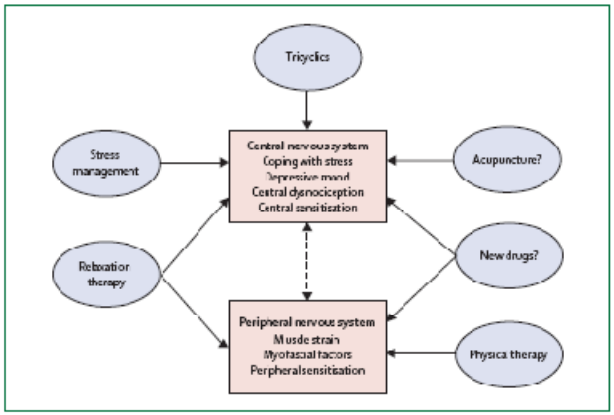
嘉基神經內科

許永居

李白詩云...

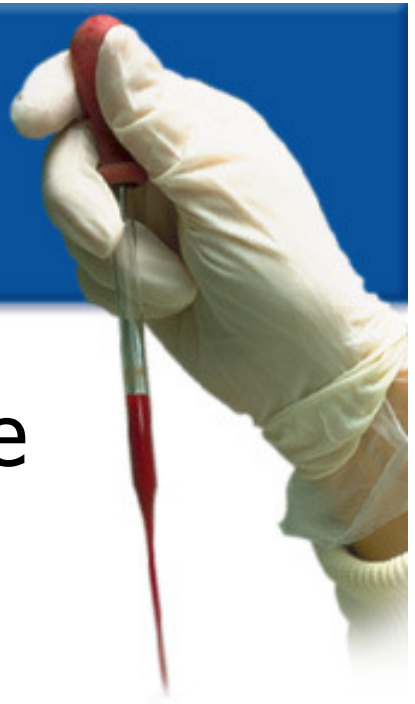
- 一拳擊碎黃鶴樓，
- 兩腳踢翻鸚鵡洲。
- 眼前有景道不得，
- 滋圃題詩在上頭。





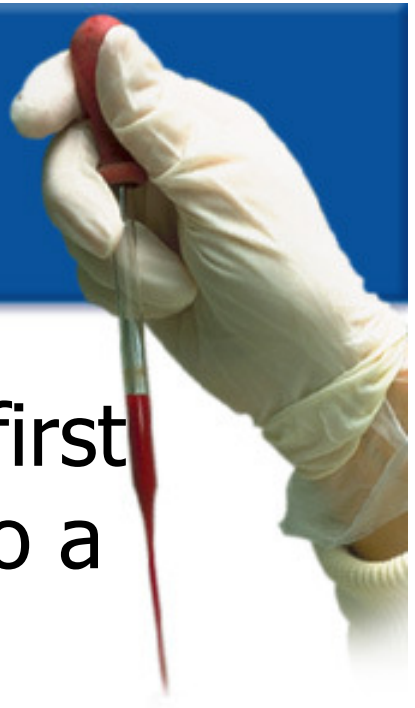
Controversies and Debate!

Synonym

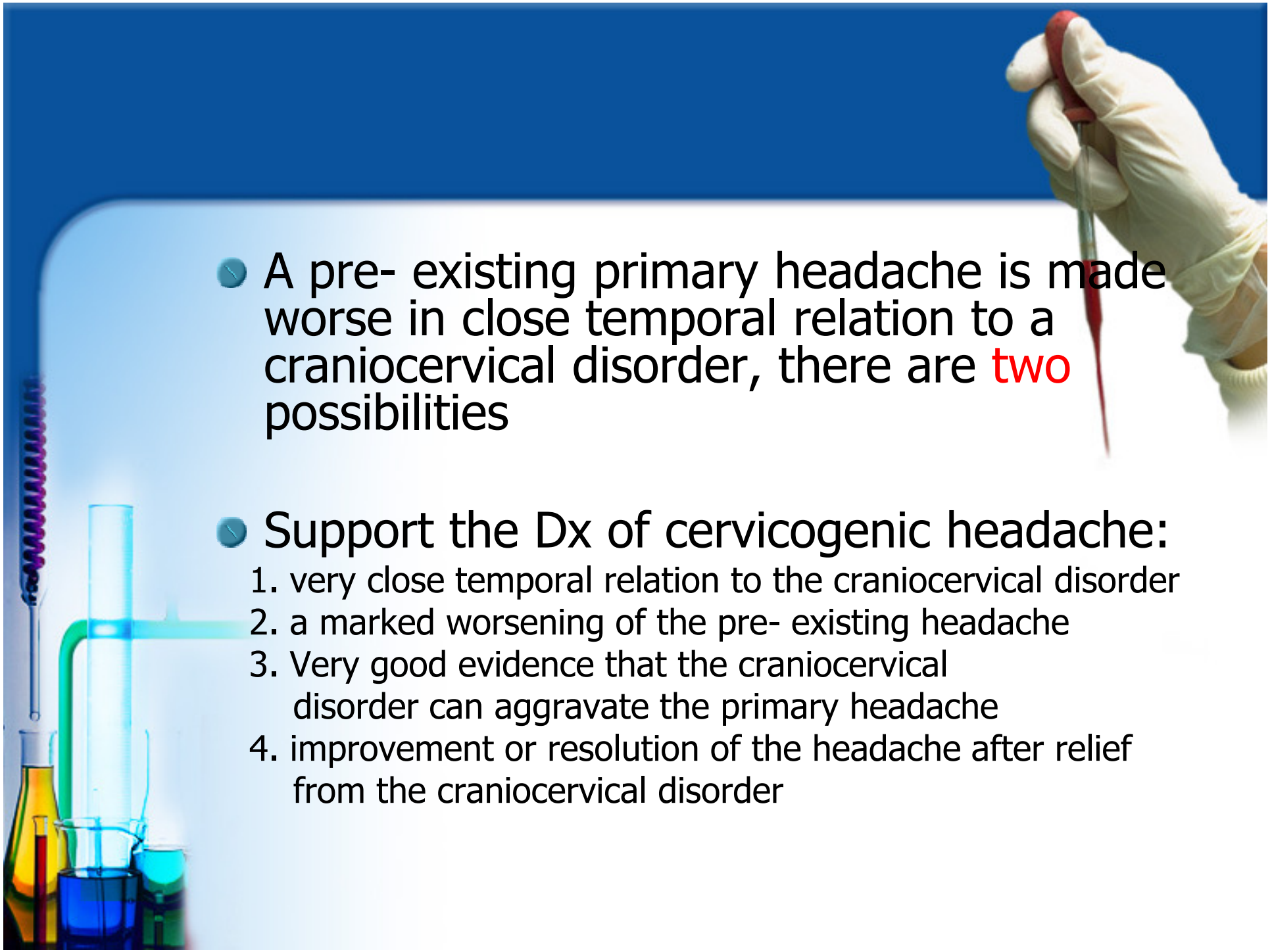


- Headache in the cervical spine
- Headache of cervical origin
- Cervical migraine
- Occipital neuralgia?

Introduction



- A new headache occurs for the first time in close temporal relation to a craniocervical disorder
- Even the headache has the characteristics of migraine, tension-type headache, or cluster headache.



- A pre- existing primary headache is made worse in close temporal relation to a craniocervical disorder, there are two possibilities

- Support the Dx of cervicogenic headache:

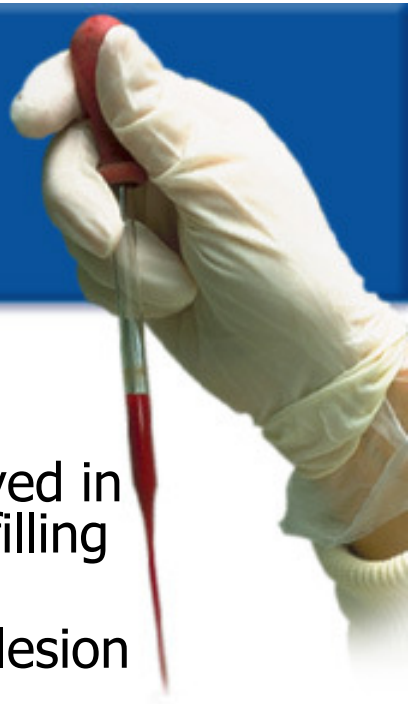
1. very close temporal relation to the craniocervical disorder
2. a marked worsening of the pre- existing headache
3. Very good evidence that the craniocervical disorder can aggravate the primary headache
4. improvement or resolution of the headache after relief from the craniocervical disorder

- Headache originated from nuchal area or localized there
- Not infrequently cause of headache
- Virtually all people over 40y/o easily has cervical spine degeneration changes
- However, not all such patient suffer from headache

11.2 Headache attributed to disorder of neck (Secondary Headache)

- 11.2.1 Cervicogenic Headache
- 11.2.2 Headache attributed to retropharyngeal tendonitis
- 11.2.3 Headache attributed to craniocervical dystonia

11.2.1 Cervicogenic Headache



A. Pain, referred from a source in the neck and perceived in one or more regions of the head and/or face, fulfilling criteria C and D

B. Clinical, lab and/or image evidence of a disorder or lesion within the cervical spine or soft tissue

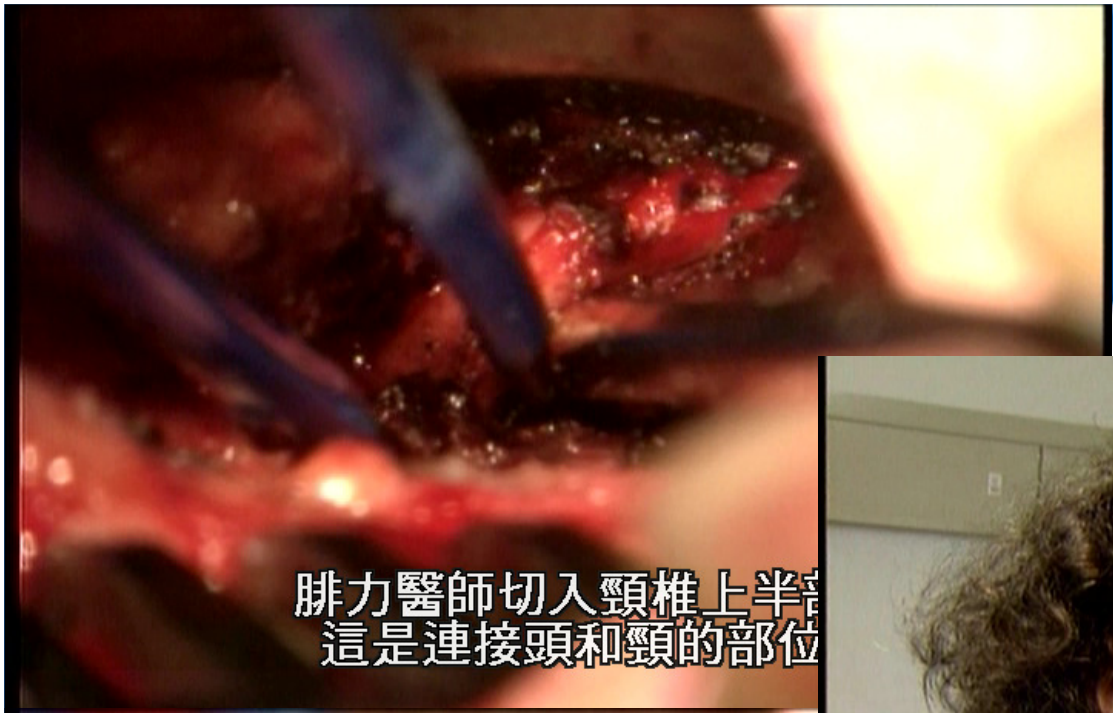
C. Pain could be attributed to cervical lesion based on at least one of the following:

1. demonstration of clinical signs that implicate a source of pain in the neck
2. abolition of headache following diagnostic blockage of a cervical structure or its nerve supply

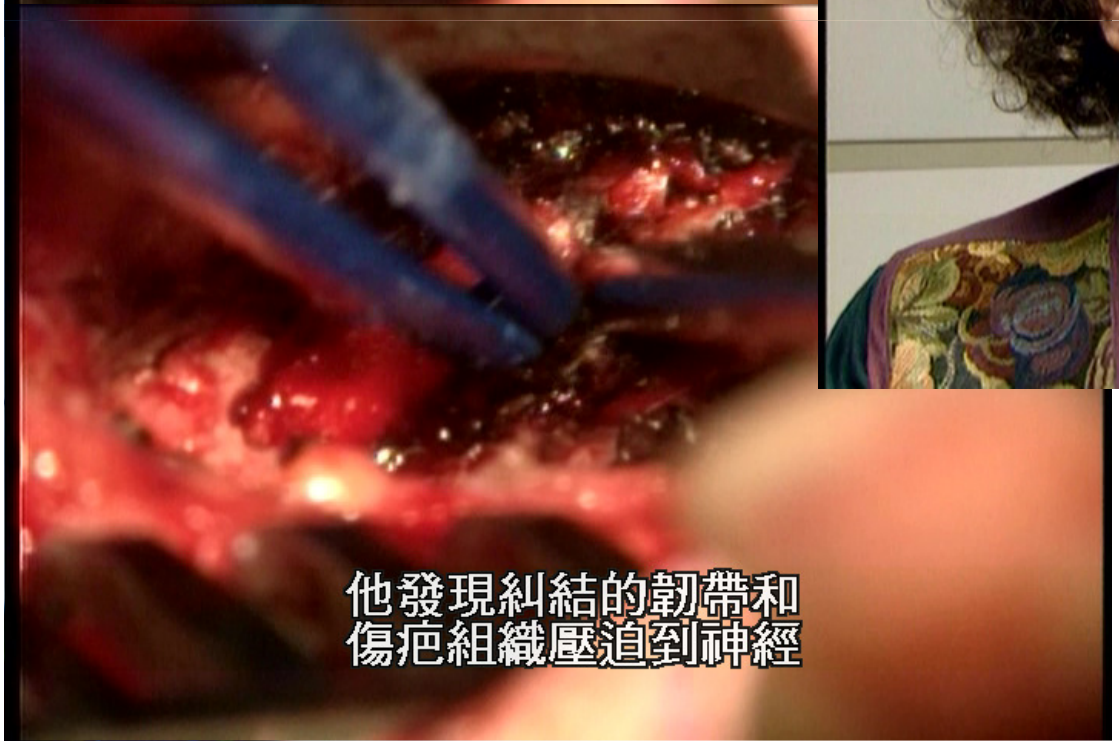
D. Pain resolves within 3 months after successful treatment of the causative disorder or lesion

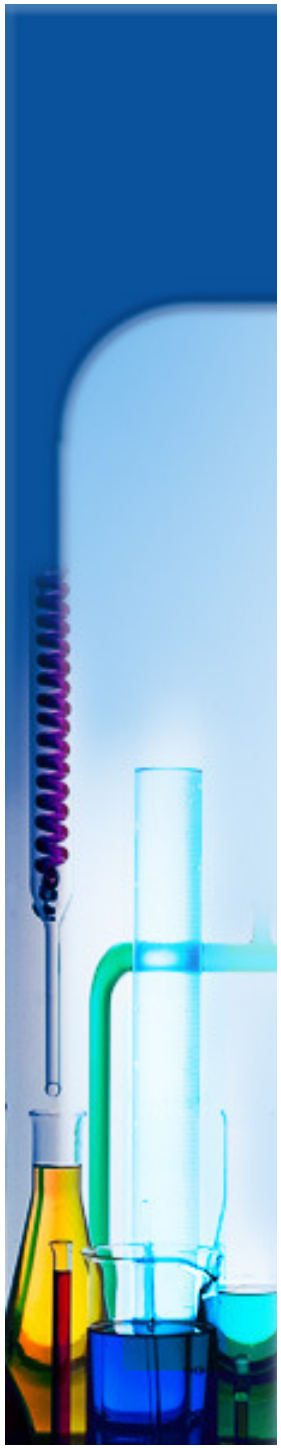

但是黛安娜的情形是
雪橇意外後, 事隔多年才頭痛


開刀


腓力醫師切入頸椎上半
這是連接頭和頸的部位


我真覺得不會再頭痛了
謝謝你


他發現糾結的韌帶和
傷疤組織壓迫到神經



- Major
  - Unilateral head pain
  - No sideshift
  - Clear involvement of neck
    - Triggered by neck movement or awkward positioning
    - Triggered by pressure over ipsilateral C2 region
    - Reduced range of motion of neck
  - Success of C2 ganglion anesthetic blockade (greater occipital nerve may be used, but is probably less reliable)
- Minor
  - C2 distribution numbness/hypesthesia
  - History of trauma
  - Ipsilateral neck, shoulder, or arm pain of vague, nonradicular character
  - Autonomic symptoms
    - Nausea, vomiting
    - Facial or periorbital swelling or erythema
  - Dizziness
  - Blurred vision ipsilaterally
  - Photophobia/phonophobia
  - Difficulty swallowing
  - Tinel's sign
  - Failure of indomethacin treatment

Sjasstad Cephalgia 1983;3: 249-256

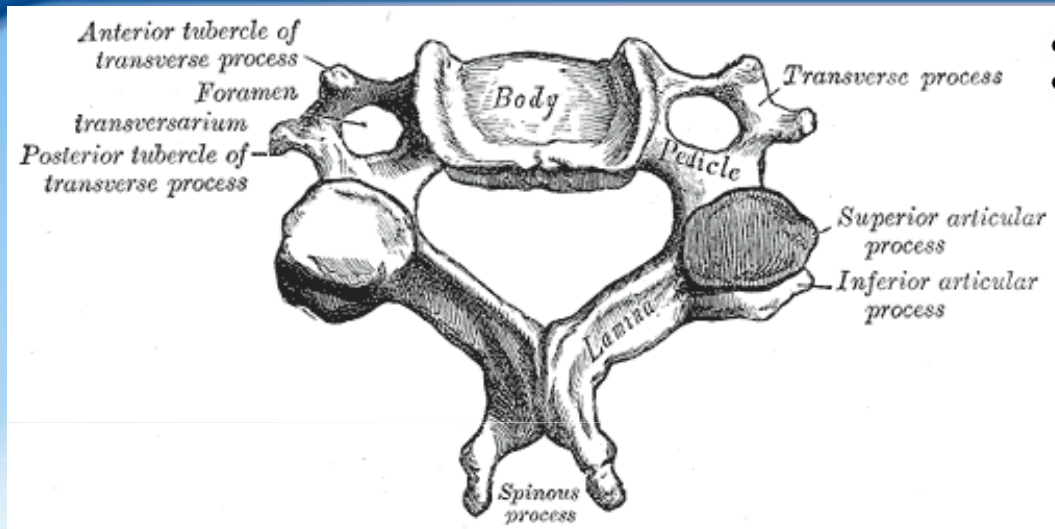
Pathophysiology- Debate

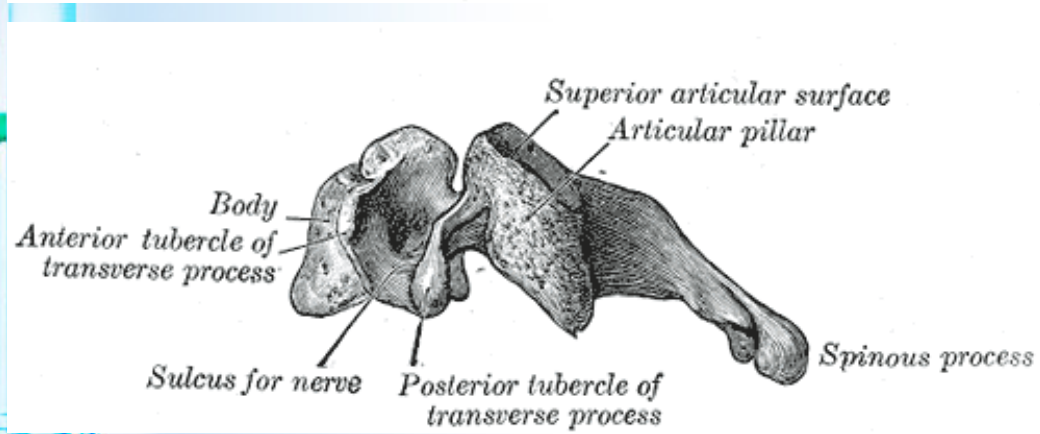
- Myofascial pain
- Vascular pain
- Radiculopathy
- Referred pain from upper cervical joint

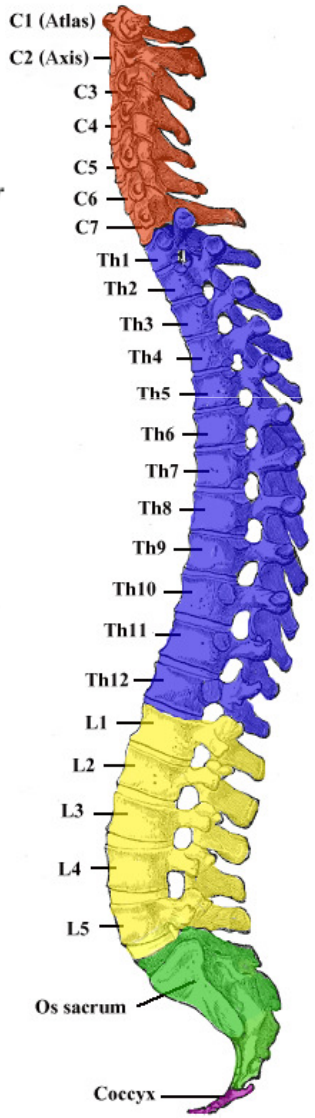
Pathophysiology

- Pain sensitive structure
  - Neuroanatomy
- Identifiable Stimuli
- Neurologic pathway through cervical to head

Anatomy

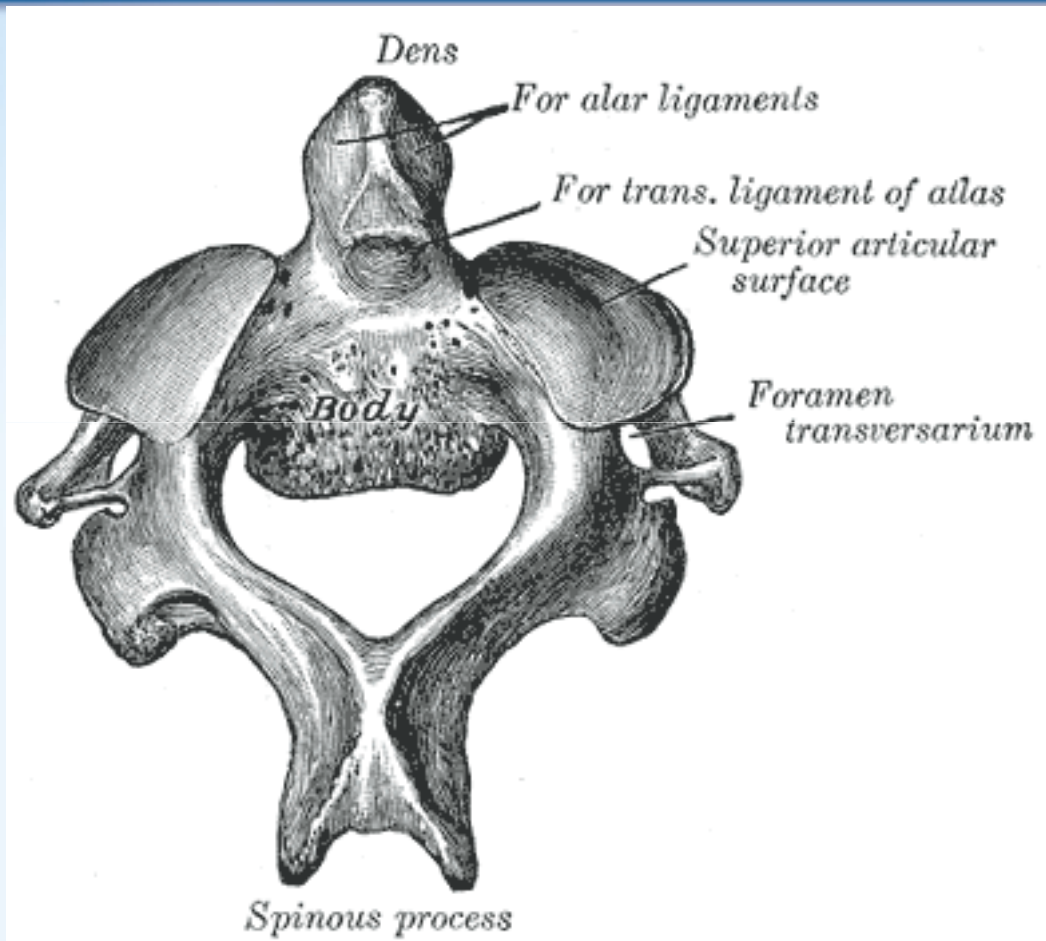

Anterior tubercle of transverse process
Foramen transversarium
Posterior tubercle of transverse process
Body
Pedicle
Transverse process
Superior articular process
Inferior articular process
Lamina
Spinous process


Superior articular surface
Articular pillar
Body
Anterior tubercle of transverse process
Sulcus for nerve
Posterior tubercle of transverse process
Spinous process

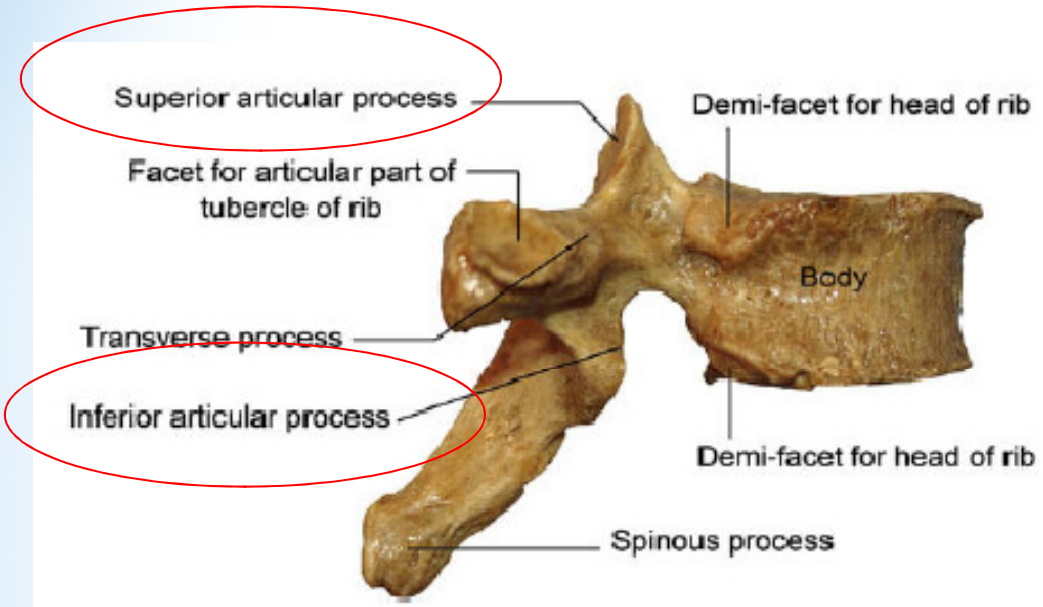

C1 (Atlas)
C2 (Axis)
C3
C4
C5
C6
C7
Th1
Th2
Th3
Th4
Th5
Th6
Th7
Th8
Th9
Th10
Th11
Th12
L1
L2
L3
L4
L5
Os sacrum
Coccyx

Atlas

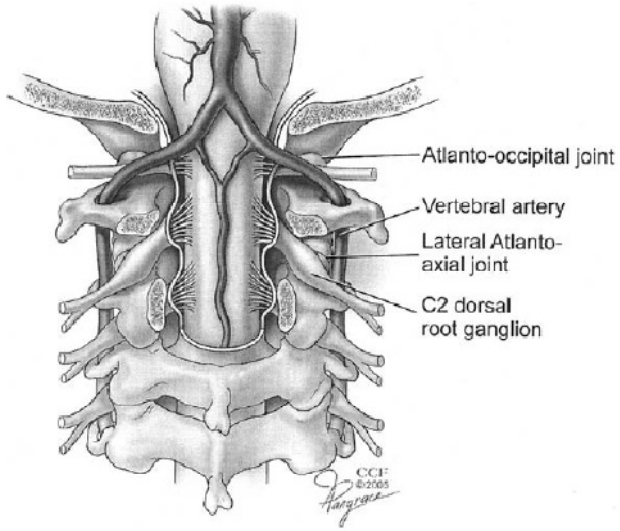
Axis


Dens
For alar ligaments
For trans. ligament of atlas
Superior articular surface
Body
Foramen transversarium
Spinous process

Zygapophysial/facet joint: C2-3



- Atlanto-occipital joint: C0/C1→ C1
- Atlanto-axial joint: C1/C2→ C2
- Zygapophysial/facet joint: C2/C3→ C3



Pain-Sensitive Structure of the Neck

- Vertebral Column:
  - Apophyseal joint
  - Alanto-occipital (condylar) joint
  - Annulus fibrosus
  - Spinal ligament
  - Vertebral periosteum
- Cervical Muscles
- Cervical nerve and roots
- Arteries: vertebral and carotid

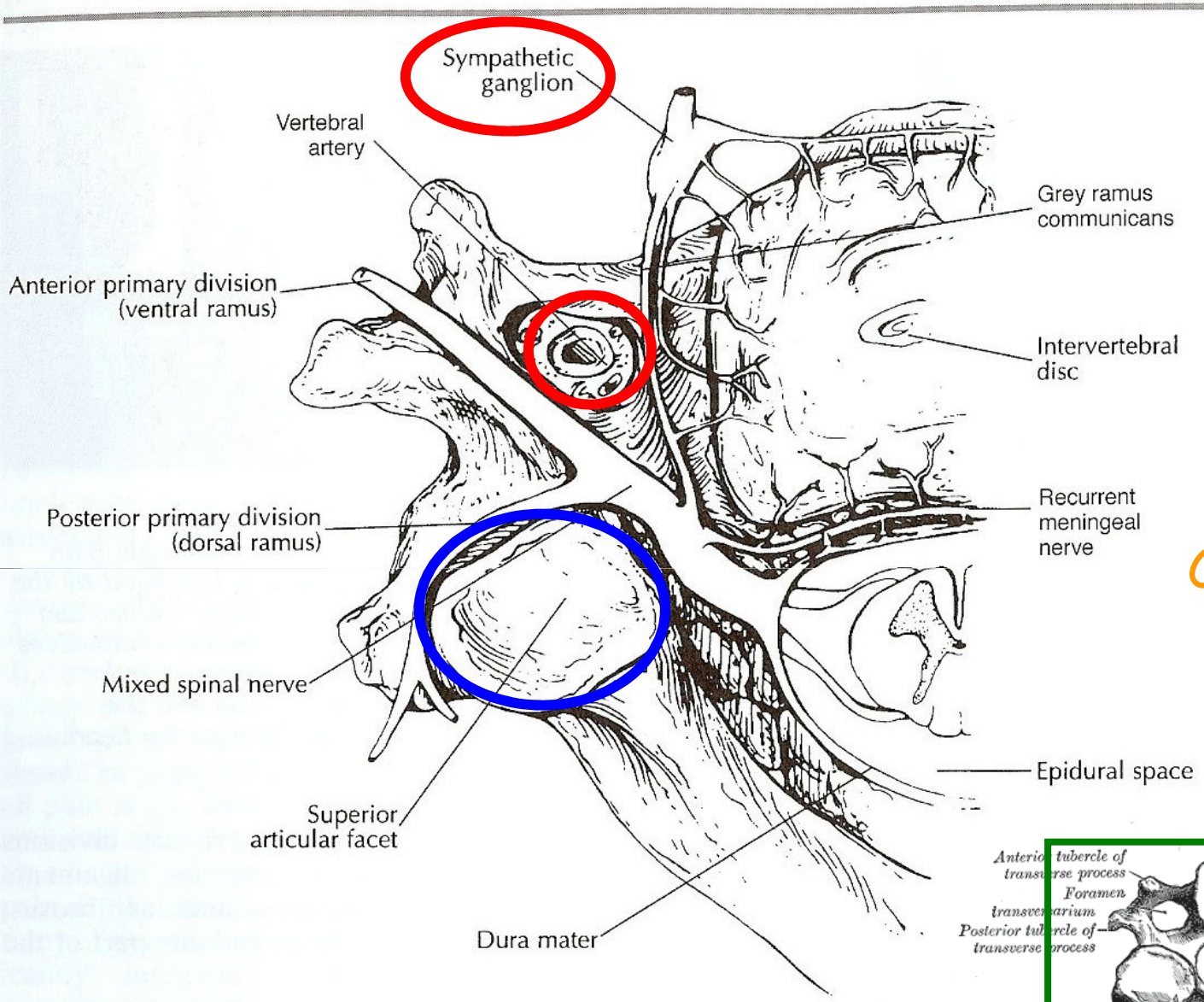
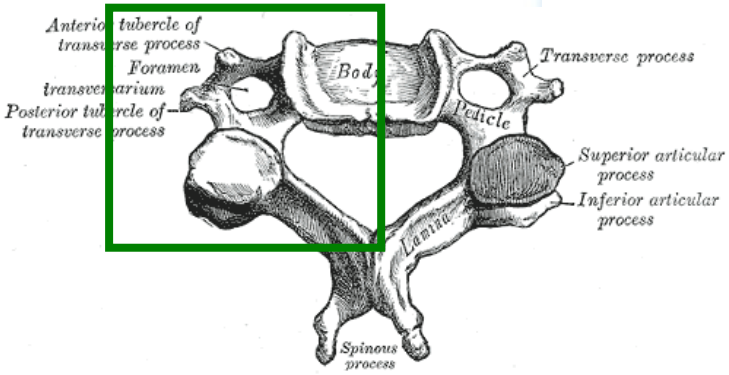


Figure 1.3 *Superior view of a cervical vertebra demonstrating the ne region. (From Figure 5–18 in Cramer G. The cervical region (Chapter 5 (1995)* Basic and Clinical Anatomy of the Spine, Spinal Cord and ANS. *Louis, pp. 109–155.)*

C fiber



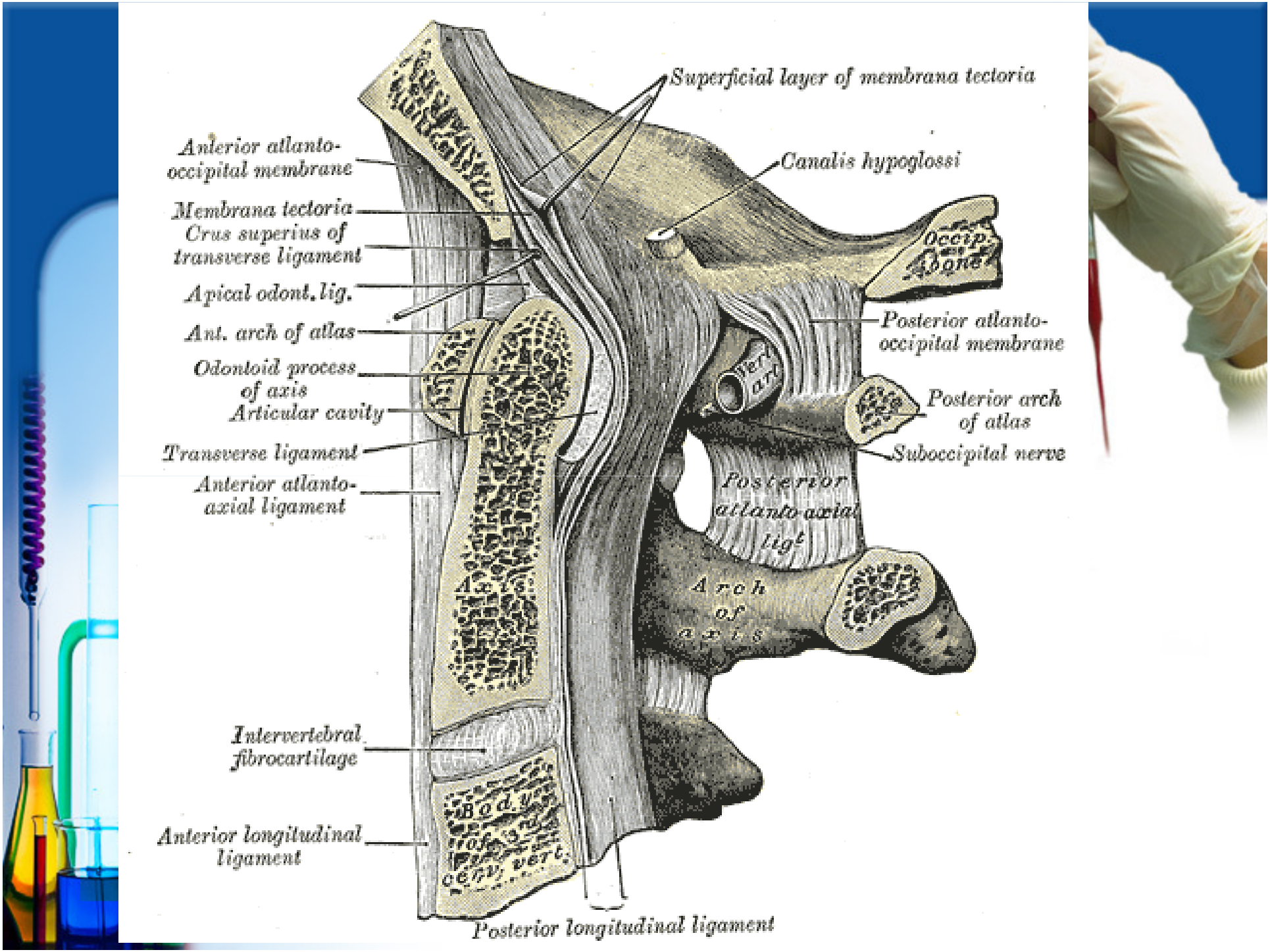

Superficial layer of membrana tectoria
Anterior atlanto-occipital membrane
Canalis hypoglossi
Membrana tectoria
Crus superius of transverse ligament
Occip. Bone
Apical odont. lig.
Posterior atlanto-occipital membrane
Ant. arch of atlas
Vert. art.
Odontoid process of axis
Posterior arch of atlas
Articular cavity
Suboccipital nerve
Transverse ligament
Posterior atlanto axial ligt
Anterior atlanto-axial ligament
Arch of axis
Intervertebral fibrocartilage
Anterior longitudinal ligament
Posterior longitudinal ligament

TABLE 1. *Common Sources of Cervicogenic Headache*

Atlantoaxial joint
C2–3 zygapophysial joint and third occipital headache
Occipital neuralgia and C2 neuralgia
C2–3 intervertebral disc
Upper posterior neck and paravertebral muscles

Pathophysiology

- Pain sensitive structure
- Identifiable Stimuli
- Neurologic pathway through cervical to head

11.2.1 Cervicogenic Headache

A. Pain, referred from a source in the neck and perceived in one or more regions of the head and/or face, fulfilling criteria C and D

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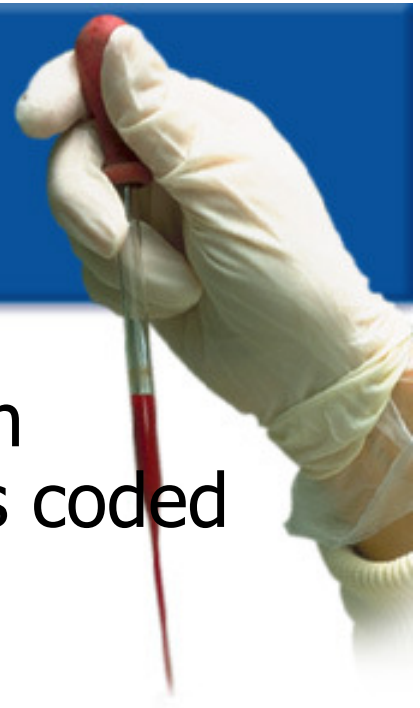


- Headache causally associated with cervical myofascial tender spots is coded as tension-type headache
- Criteria B:

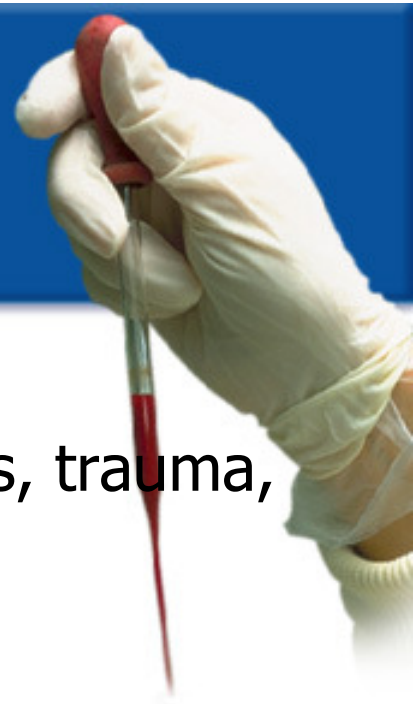
  tumor, fracture, infections, rheumatoid arthritis of the upper c-spine

  X cervical spondylosis, osteochondritis
- Criteria C: strict

  C1; C2: VAS>90% reduction

Cervical Causes of Headache

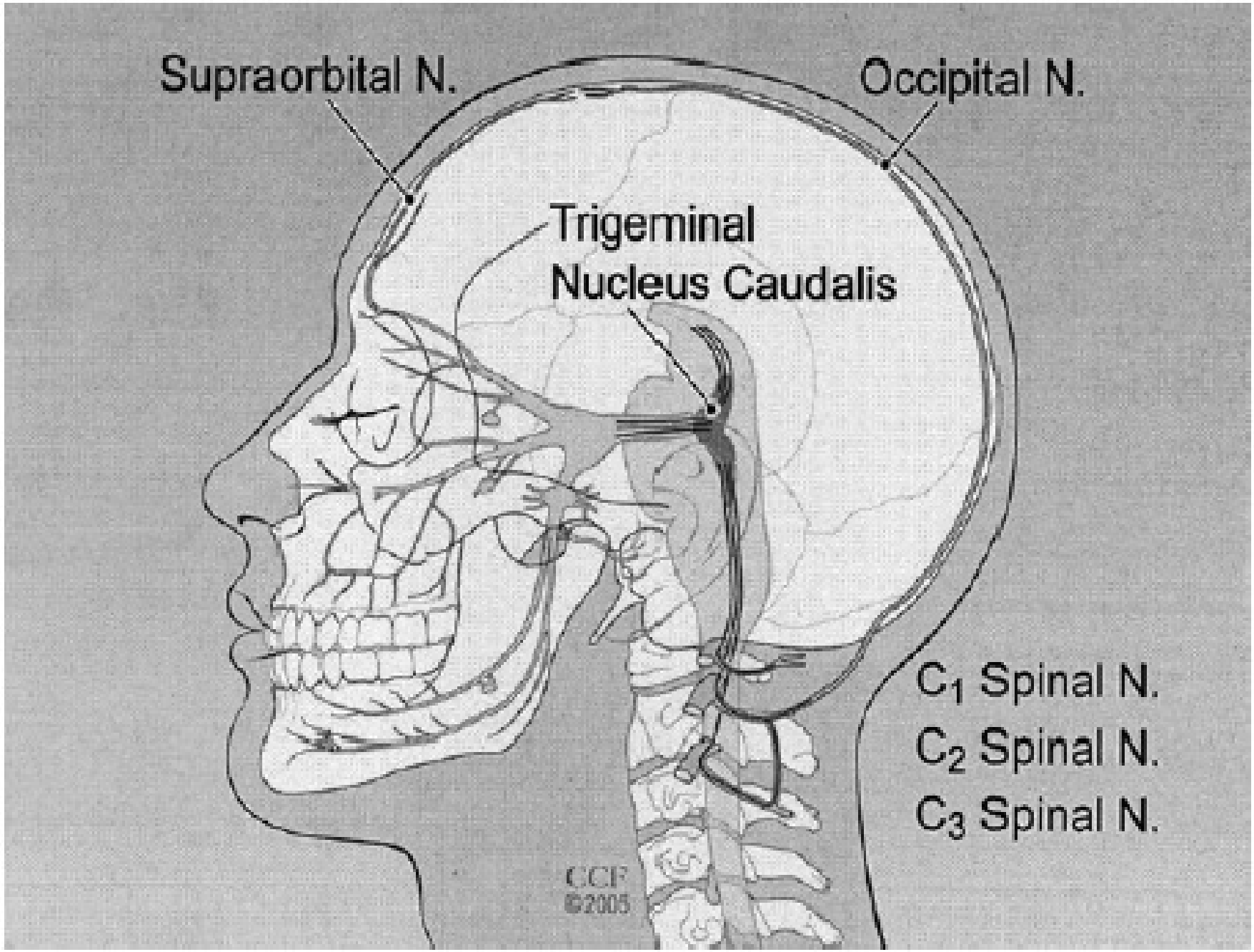
- Developmental anomalies
- Tumor
- Paget disease
- Osteomyelitis
- RA
- AS
- Truamatic subluxation, Whiplash injury
- Retropharyngeal tendinitis
- Cervical dystonia



- Apophyseal and other synovial joint , periosteum may be inflamed by arthritis, trauma, or infection
- Nerve endings in annulus fibrosus stimulated by herniated disc
- Ligament was stretched
- Cervical muscle may be strained, torn or maybe in painful spasm
- Cervical root may be injured by trauma or congenital deformity
- Artery occlusion or dissection

Pathophysiology

- Pain sensitive structure
- Identifiable Stimuli
- Neurologic pathway through cervical to head



The trigeminocervical complex.

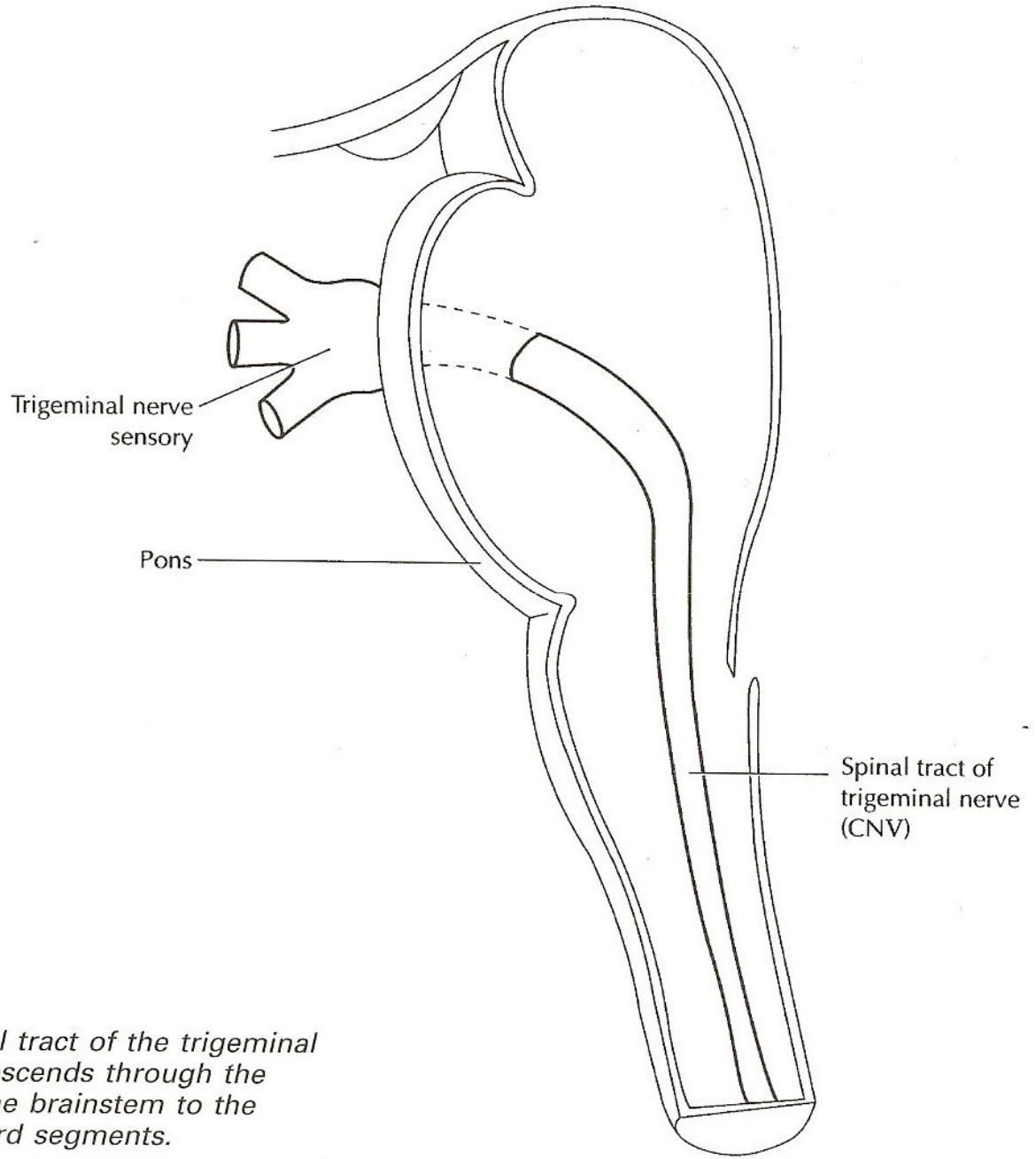


Figure 1.10 *The spinal tract of the trigeminal nerve. This pathway descends through the pons and medulla of the brainstem to the upper three cervical cord segments.*

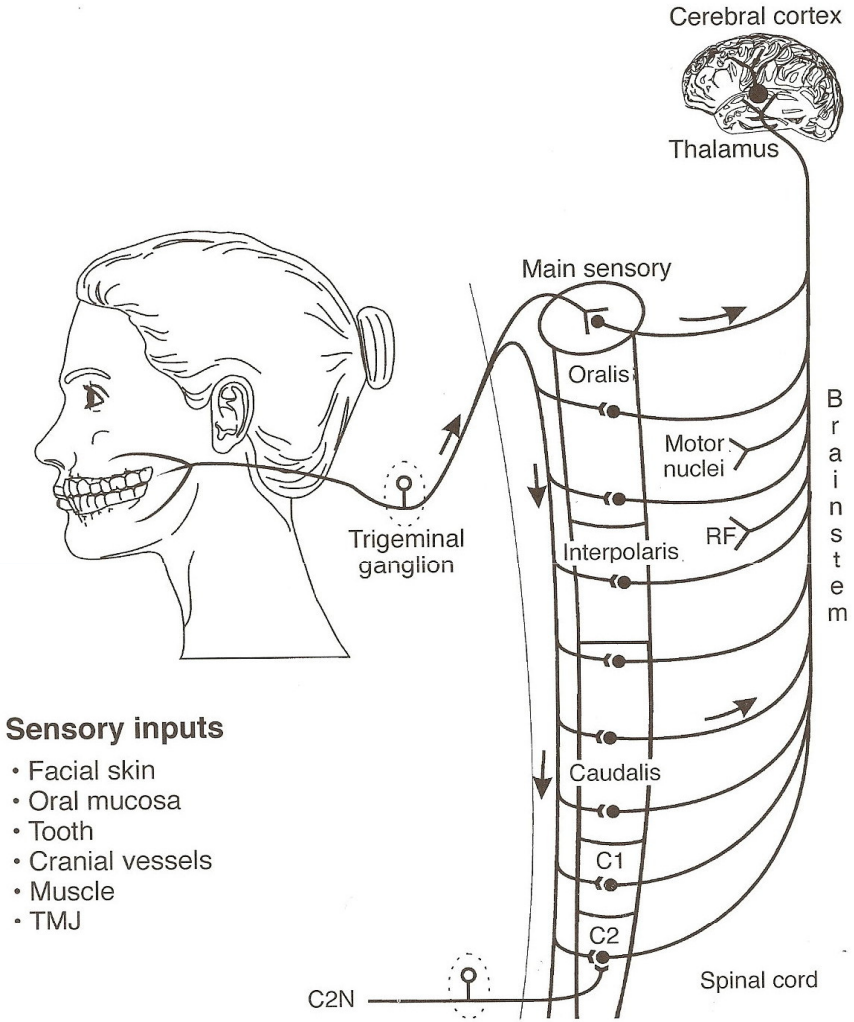
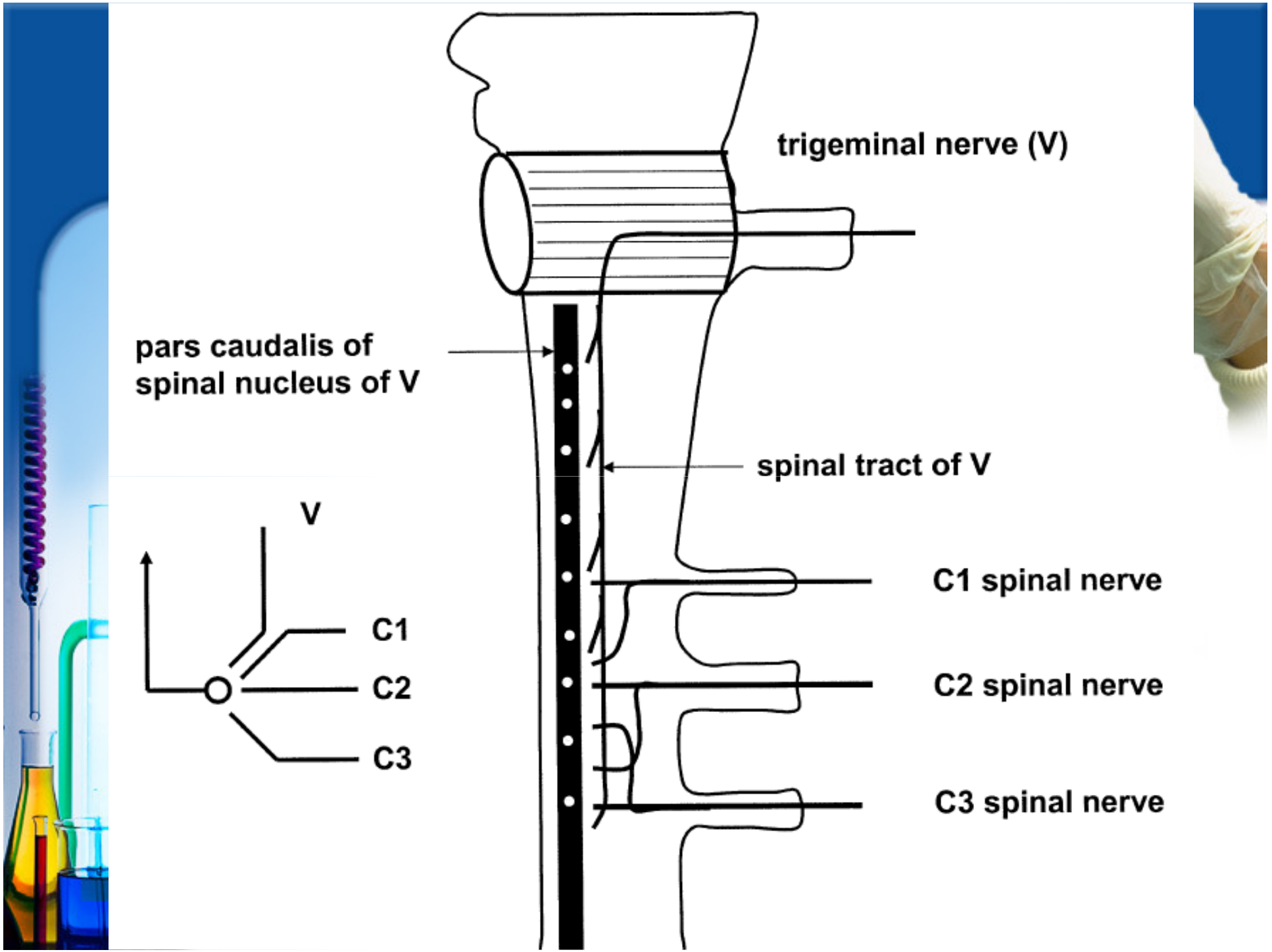
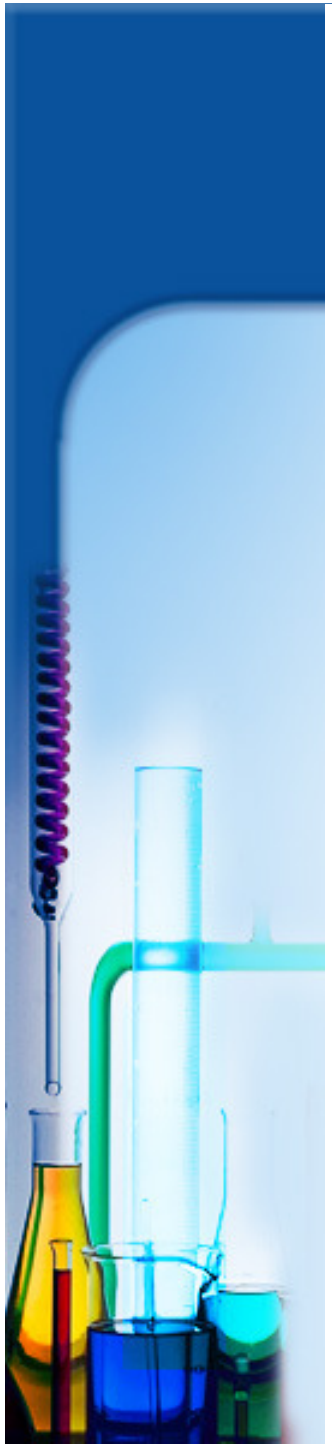


Figure 3.1 *Major somatosensory pathways from the face and mouth. Note that trigeminal primary afferents project via the trigeminal (V) ganglion to second-order neurons in the V brainstem complex. These neurons may project to neurons in brainstem regions such cranial nerve nuclei or the reticular formation (RF) or in higher levels of the brain (e.g., in the thalamus). Not shown are the projections of some cervical nerve afferents and cranial nerve VII, IX, X, XII and the first few cervical spinal nerves to the V complex and the projection of many VII, IX and X afferents to the solitary tract nucleus. Further input via C2N nerve of the second cervical nerve is detailed in the previous chapters (From Sessle, 1999, with modifications, reprinted from* Journal of Orofacial Pain, *with permission).*


trigeminal nerve (V)
pars caudalis of
spinal nucleus of V
spinal tract of V
V
C1
C2
C3
C1 spinal nerve
C2 spinal nerve
C3 spinal nerve



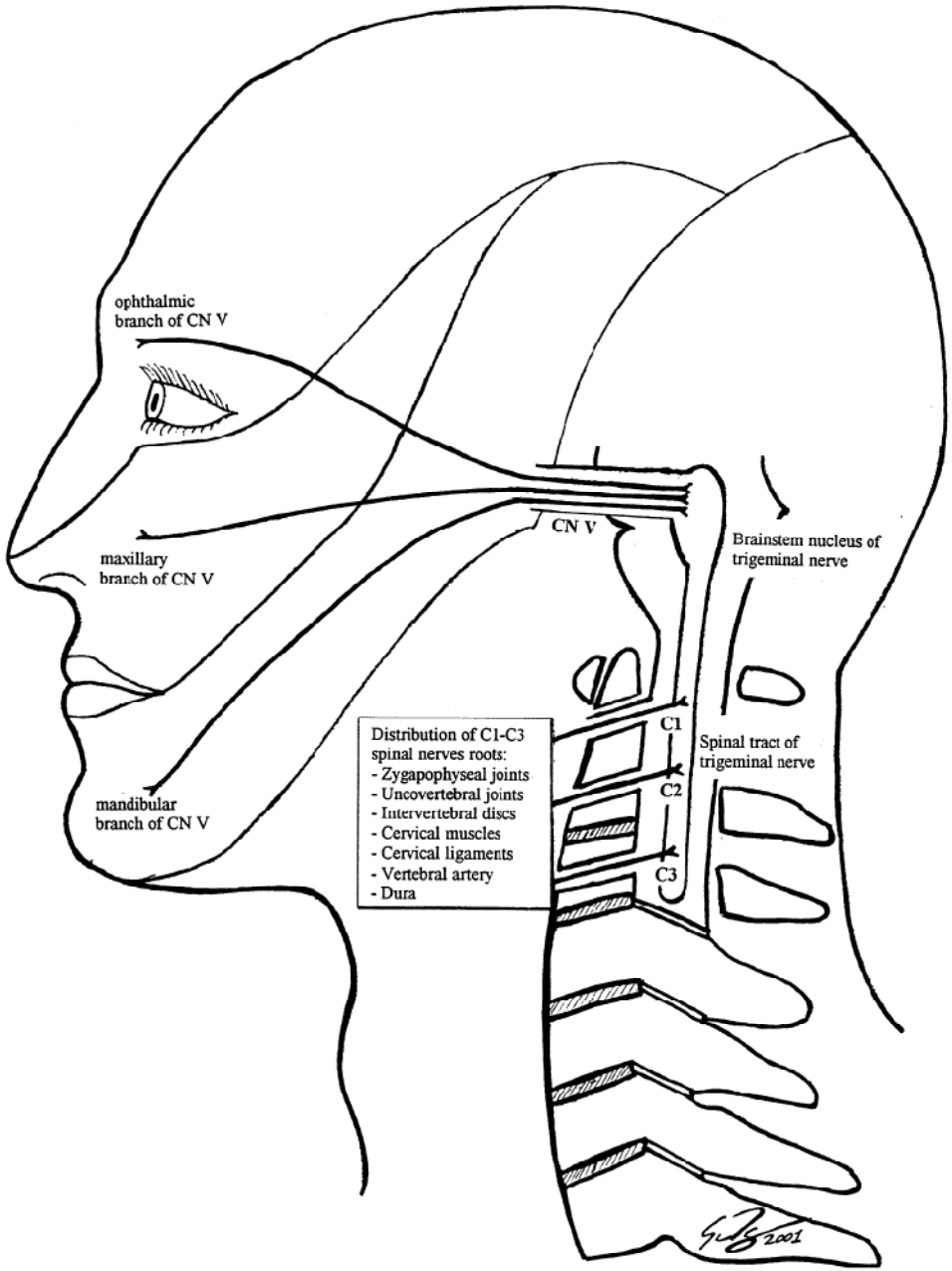
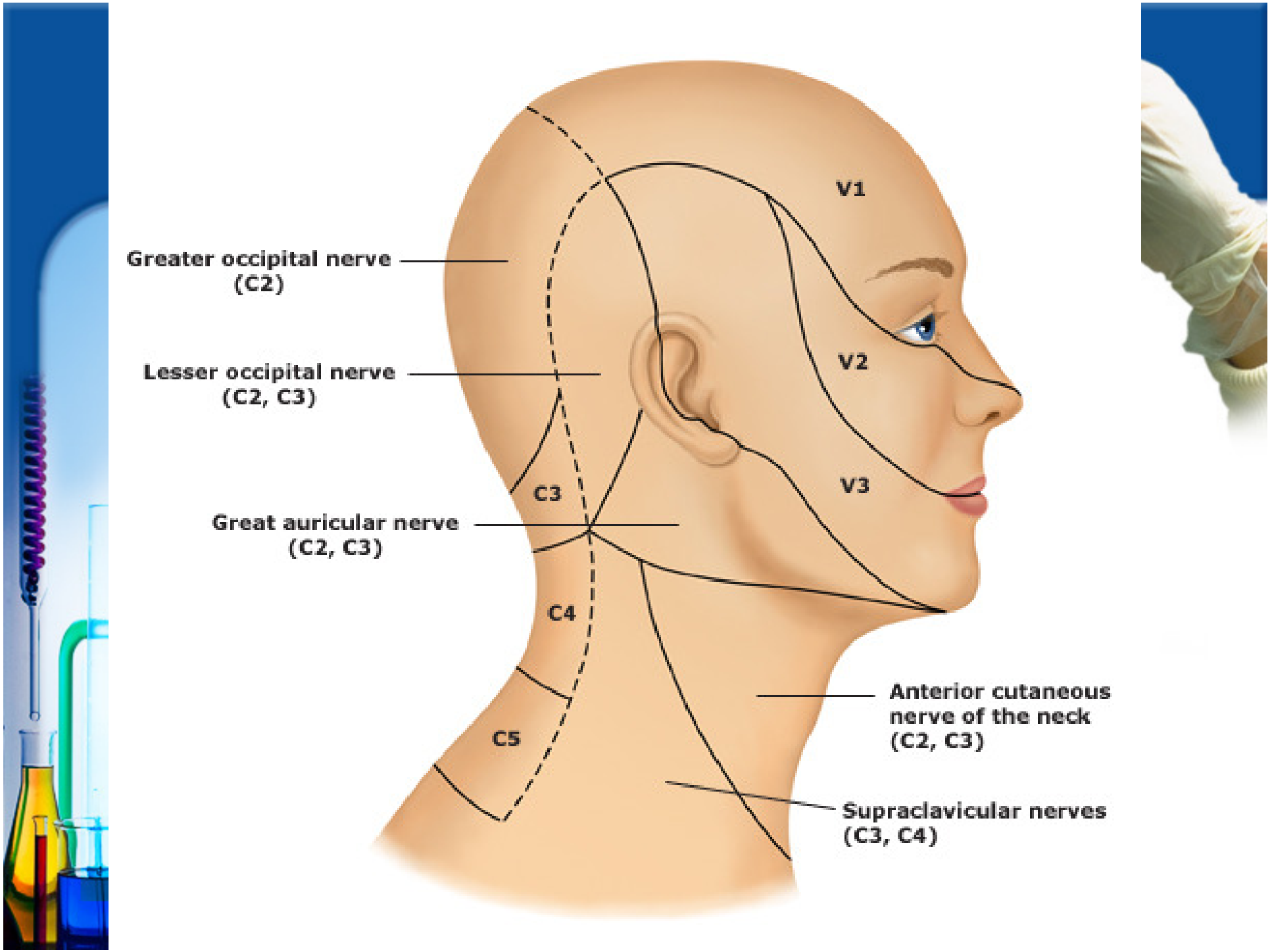
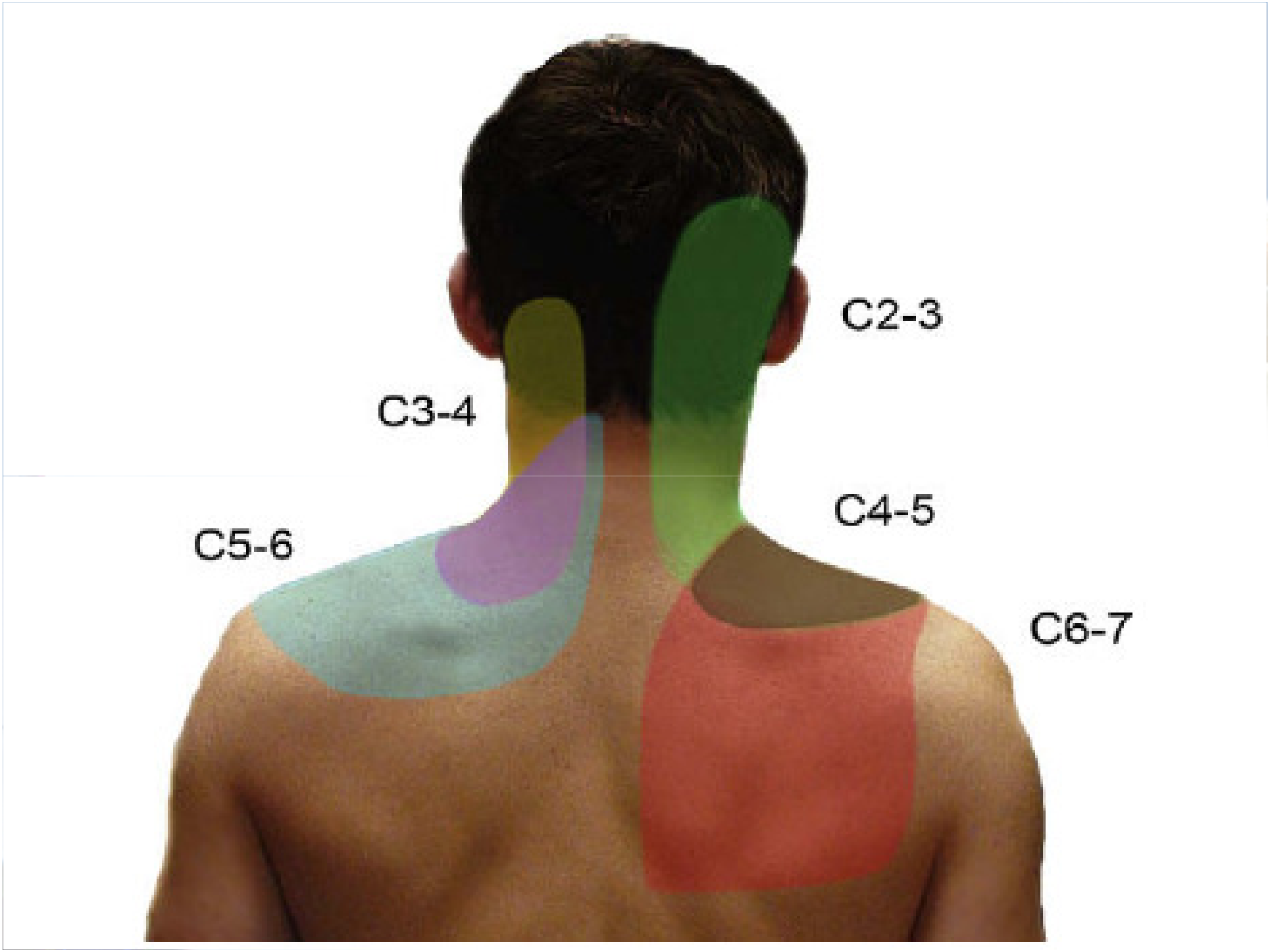


Fig. 1. Convergence of sensory input from the upper cervical nerve roots into the trigeminal nucleus.


Greater occipital nerve
(C2)
Lesser occipital nerve
(C2, C3)
Great auricular nerve
(C2, C3)
V1
V2
V3
C3
C4
C5
Anterior cutaneous
nerve of the neck
(C2, C3)
Supraclavicular nerves
(C3, C4)


C2-3
C3-4
C4-5
C5-6
C6-7

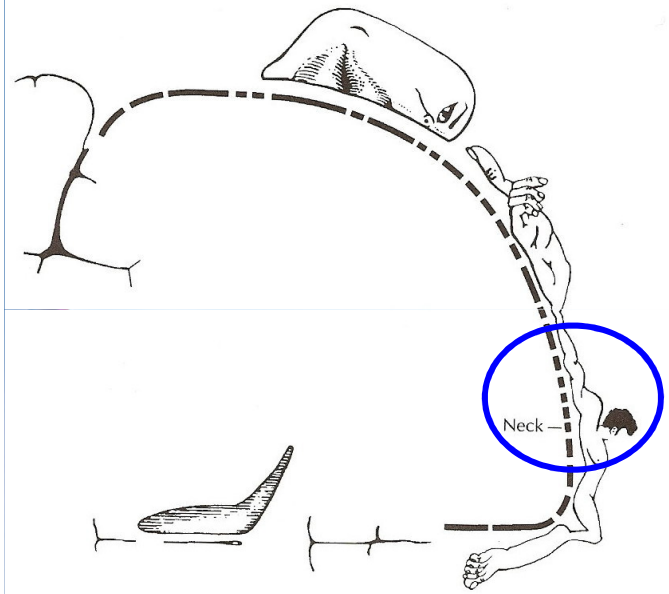


Figure 1.8 *Sens*
homunculus. Noti
small the neck re
the homunculus a
closely related it i
suboccipital and c
regions. These fea
the homunculus a
explain the broad
neck pain to the p
head.

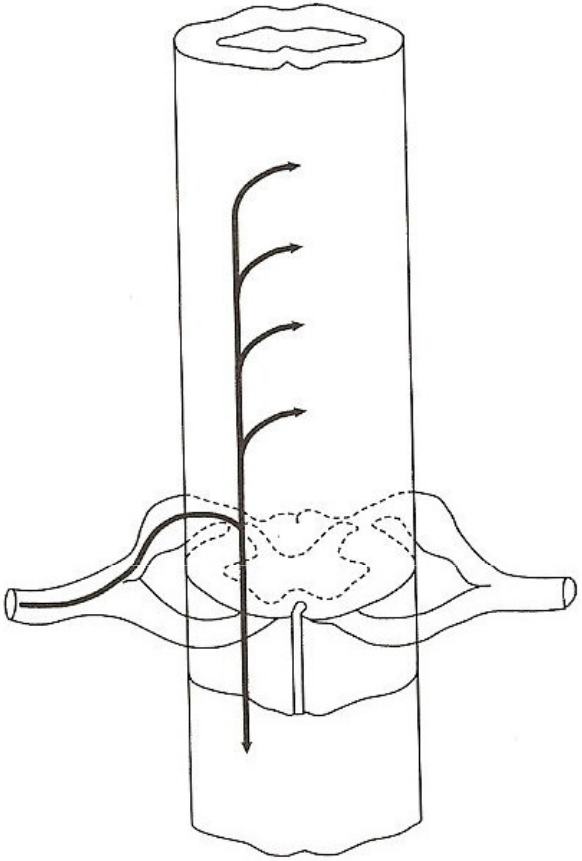
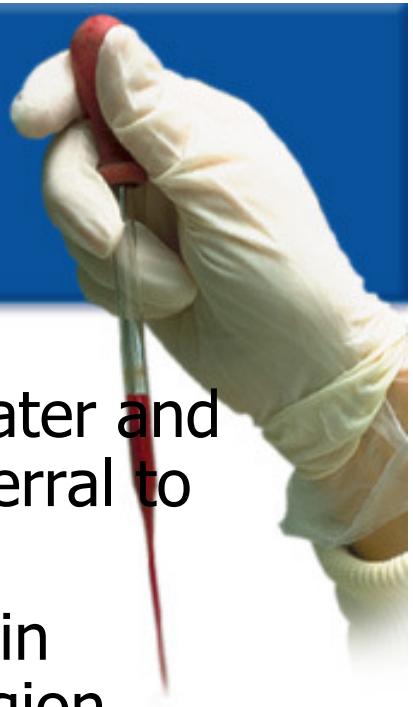


Figure 1.6 *Dispersion of incoming afferents in the spinal cord. Incoming afferents conducting nociception can disperse superiorly or inferiorly in the tract of Lissauer up to four spinal cord segments before synapsing on a tract cell. This dispersion may be one reason for decreased accuracy in the ability of humans to localize a region of tissue damage.*

Summary of Pathophysiology



- C2 sensory root and its extensions, greater and lesser occipital nerves allowing pain referral to the back of the head
- Possibly he C1 sensory root allowing pain referral to the vertex or frontal head region
- The descending spinal tract of the trigeminal nerve, intermingling impulses from the upper cervical segments with those from cranial nerve V: allowing pain referral from these segments to the head

- Major
  - Unilateral head pain
  - No sideshift
  - Clear involvement of neck
    - Triggered by neck movement or awkward positioning
    - Triggered by pressure over ipsilateral C2 region
    - Reduced range of motion of neck
  - Success of C2 ganglion anesthetic blockade (greater occipital nerve may be used, but is probably less reliable)
- Minor
  - C2 distribution numbness/hypesthesia
  - History of trauma
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  - Autonomic symptoms
    - Nausea, vomiting
    - Facial or periorbital swelling or erythema
  - Dizziness
  - Blurred vision ipsilaterally
  - Photophobia/phonophobia
  - Difficulty swallowing
  - Tinel's sign
  - Failure of indomethacin treatment


Any Problem?


醫生一般的診斷是
創傷後立即發生頭痛

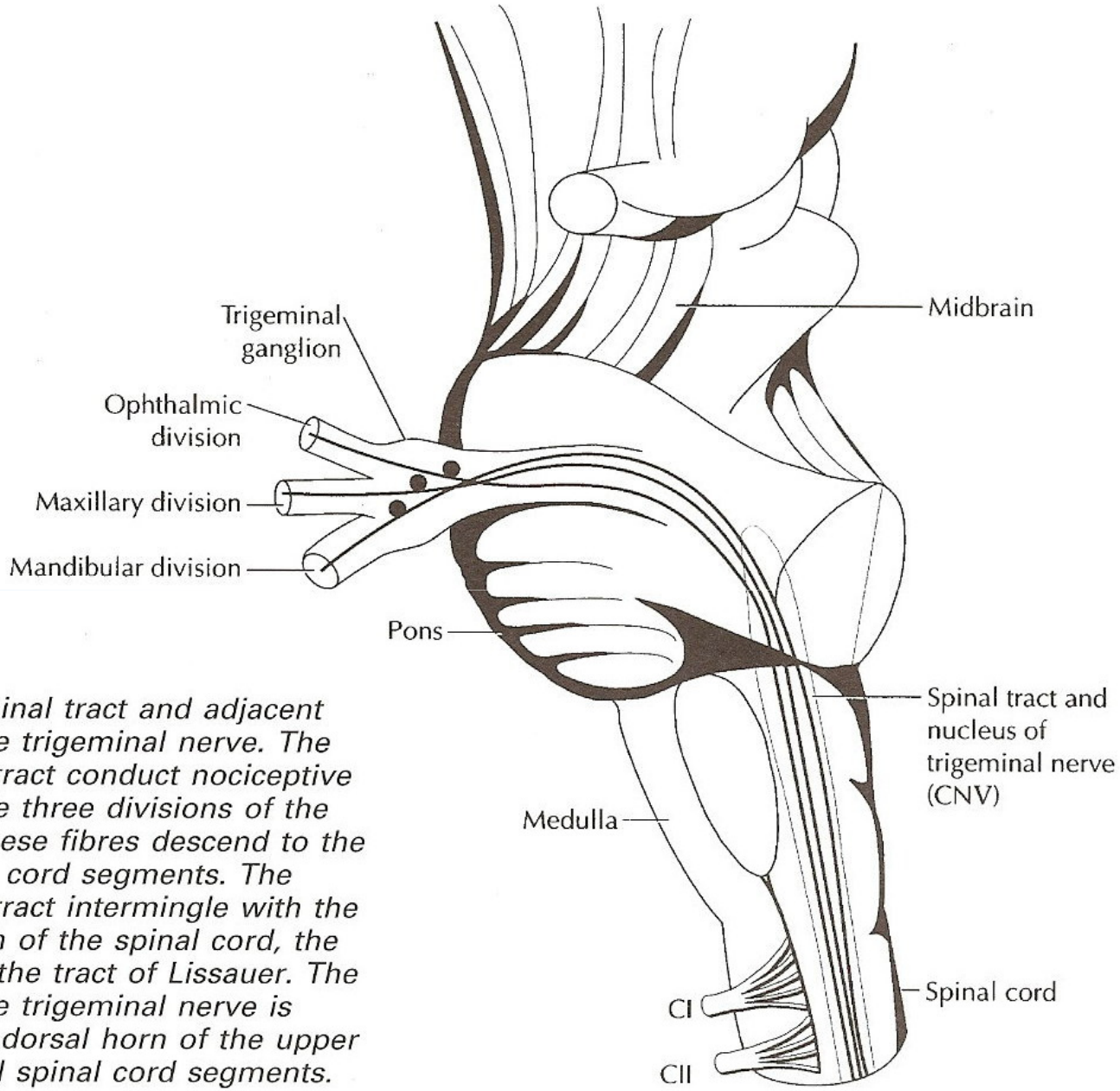

Figure 1.11 *The spinal tract and adjacent spinal nucleus of the trigeminal nerve. The fibres of the spinal tract conduct nociceptive information from the three divisions of the trigeminal nerve. These fibres descend to the upper three cervical cord segments. The fibres of the spinal tract intermingle with the posterolateral region of the spinal cord, the region occupied by the tract of Lissauer. The spinal nucleus of the trigeminal nerve is intermixed with the dorsal horn of the upper two to three cervical spinal cord segments.*

Feature	
Total no. of patients	35
Total no. of female patients	19
Total no. of syndromes (sides)	39
Mean age (± SD)	41.7 ± 12.2 yr
Mean duration of syndrome before surgical intervention	8.0 ± 22.5 mo
Mean follow-up (± SD)	21.0 ± 19.5 mo

Feature	No. of patients (n = 39)
Strictly unilateral pain	24
Left-sided pain	17
Contralateral spread of pain	5
Suboccipital/occipital pain	39 (origin of pain for all patients)
Parietotemporal pain	32
Retro-orbital pain	26
Frontal pain	14
Neck pain	9
Ipsilateral shoulder/arm pain	4
History of trauma	30
C2 sensory symptoms	9
Nausea/vomiting	7
Photophobia	3
Phonophobia	1
Dizziness	2
Visual changes	3
Ipsilateral lacrimation	1
Ipsilateral facial anhidrosis	1
Facial edema	0
Symptoms outside C2 effect	17
Tinel's sign	3
Pain with C2 pressure	9
Hypalgesia over C2	15
Limited range of motion/pain	15

[a] **SD, standard deviation.**

DD

- Unilateral/side-locked headache:
  - a) Cluster Headache
  - b) CPH/ Hemicranial Continua
  - c) Neck-tongue Syndrome
  - d) 3rd occipital Headache?
  - e) Occipital Neuralgia?
- Migraine
- Tension-type Headache
- Posttraumatic Headache

Cervical Migraine? CPH?

1. Attacks may be precipitated either by neck movements or by pressure against certain tender spots on the neck.
2. In some cases-with otherwise congruent symptomatology-there may be a homolateral shoulder, arm and hand pain, which may even be radiculopathic.
3. There is stiffness and pain in the neck with crepitation on movements.
4. There is reduced motility of the neck.

DD from Migraine

1. The visual disturbances probably differ from those of ordinary migraine.
2. The unilaterality is more or less absolute in this headache.
3. This headache does not alternate between sides.

Nerve Block