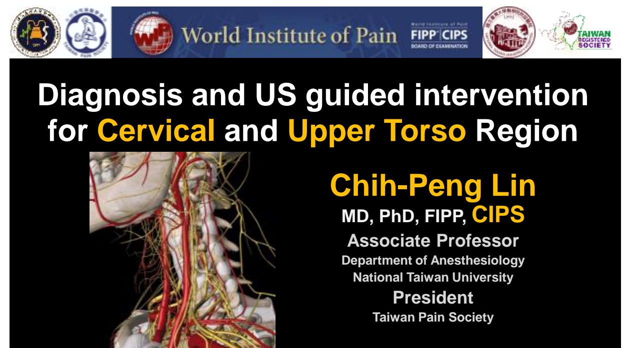
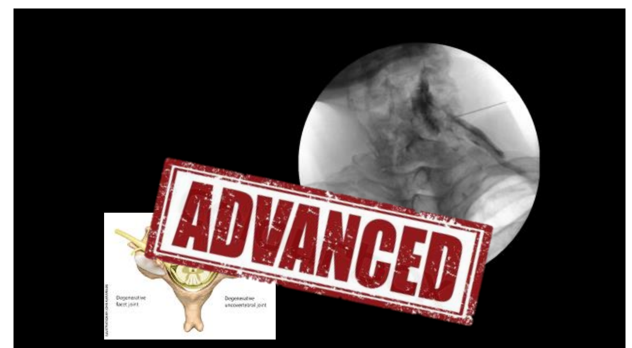
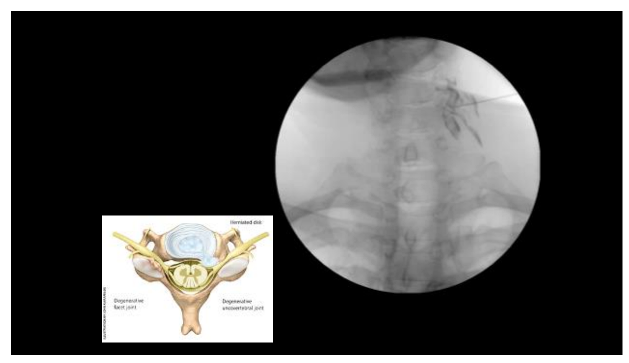
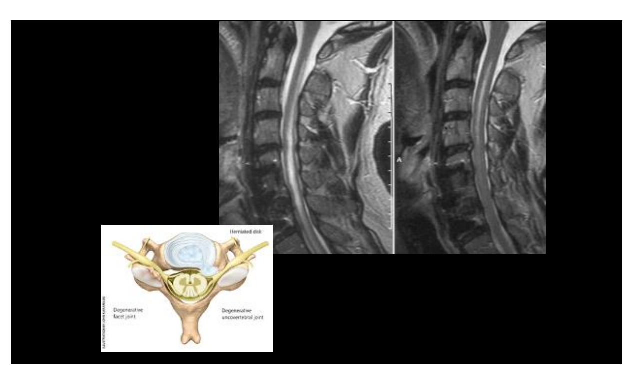

World Institute of Pain
FIPP CIPS
Diagnosis and US guided intervention for Cervical and Upper Torso Region
Chih-Peng Lin
MD, PhD, FIPP, CIPS
Associate Professor
Department of Anesthesiology
National Taiwan University
President
Taiwan Pain Society

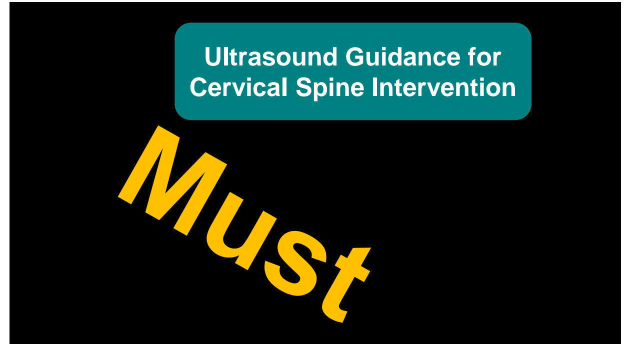

ADVANCED

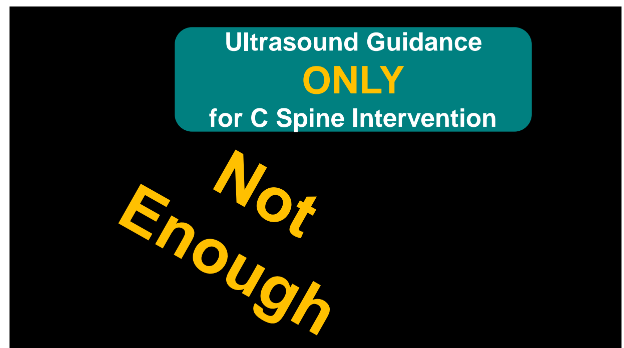
STANDARD PRACTICE

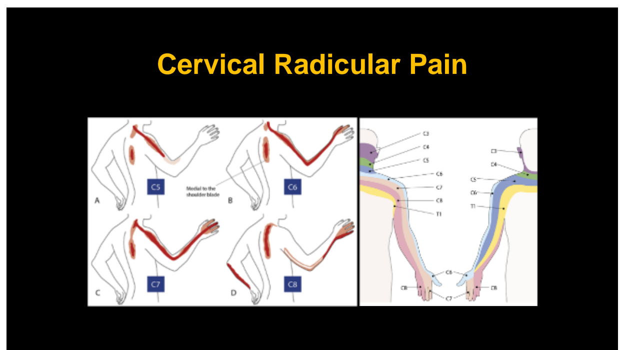
RISK

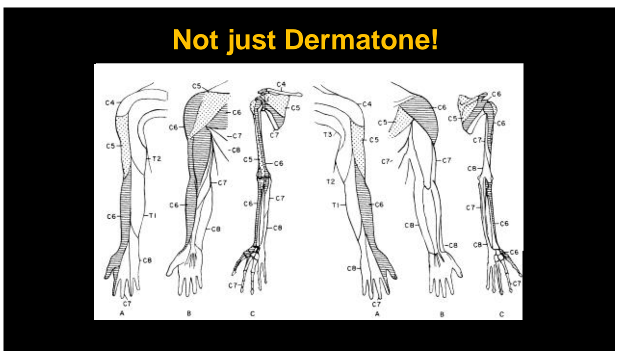












Cervical Radicular Pain

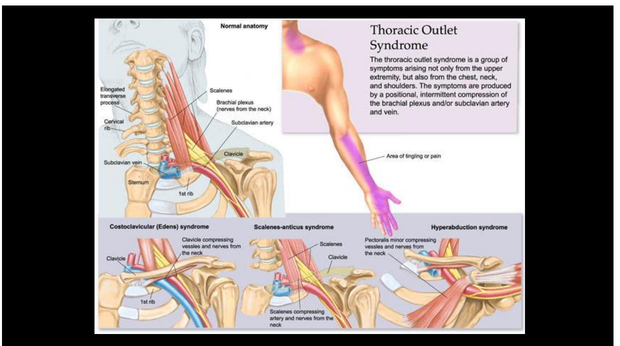
Root	Pain distribution	Weakness	Sensory loss	Reflex loss
C5	Lateral upper arm	Deltoid	Lateral upper arm	Biceps reflex
C6	Lateral forearm Thumb, index finger	Biceps, brachioradialis Wrist extensors	Thumb and index finger	Supinator (+biceps) reflex
C7	Posterior arm, middle finger	Triceps, wrist flexors	Posterior forearm, index and middle finger	Triceps reflex
C8	Medial forearm, small finger	Intrinsic hand muscles, abductors, finger extension	Little finger	Triceps reflex

Classical Neurologic Examination

- **Testing sensation, strength, and tendon reflexes**
- **Specific clinical tests**
  - Spurling/neck compression test — Sensitivity :40-60%, Specificity : 92-100%
  - Shoulder abduction (relief) test — Sensitivity : 43-50%, Specificity : 80-100%
  - Axial manual traction test (Neck distraction) — Sensitivity : 40-43%, Specificity : 100%

Common Differential Diagnosis of Cervical Raidculopathy

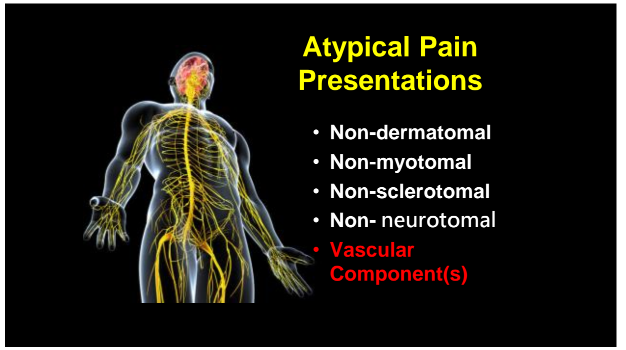
- Brachial Plexus Injury in Sports Medicine
- Cervical Discogenic Pain Syndrome
- Cervical Facet Syndrome
- Rotator Cuff Injury
- Thoracic outlet syndrome
- Muscular problems mimicking cervical radiculopathy

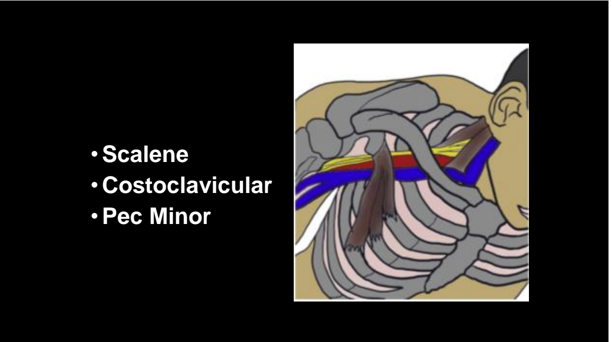


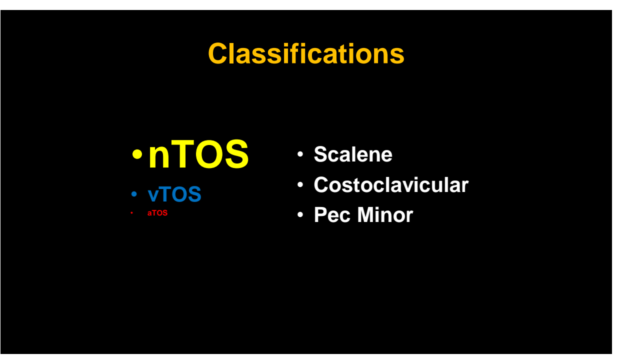
Epidemiology

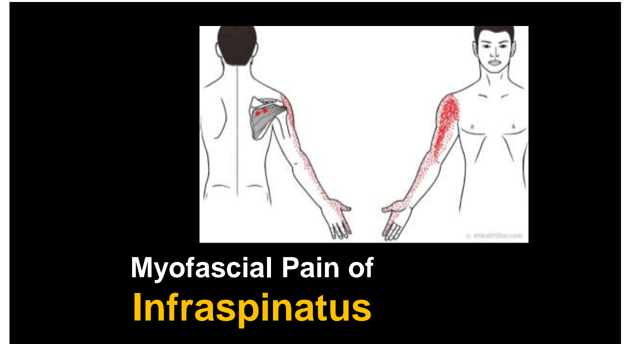
- Incidence 1-2%
- Age – usually 20-50 Y
- Gender- F:M – 3:1
- No racial predilection

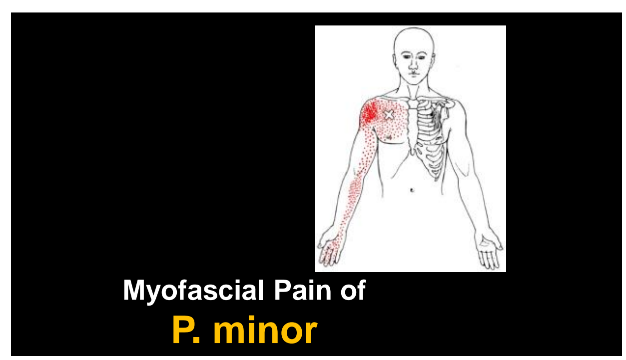
- Neurogenic - TOS>95%
- Venous TOS – 4%
- Arterial TOS – 1%

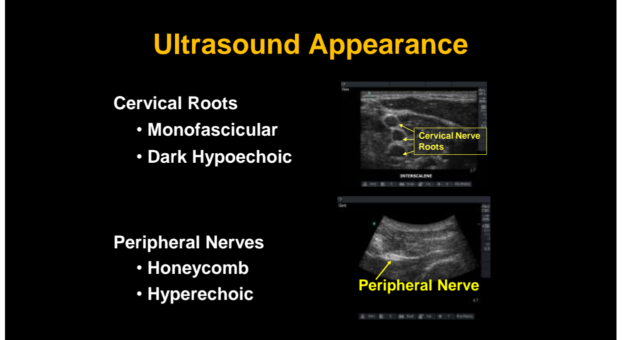




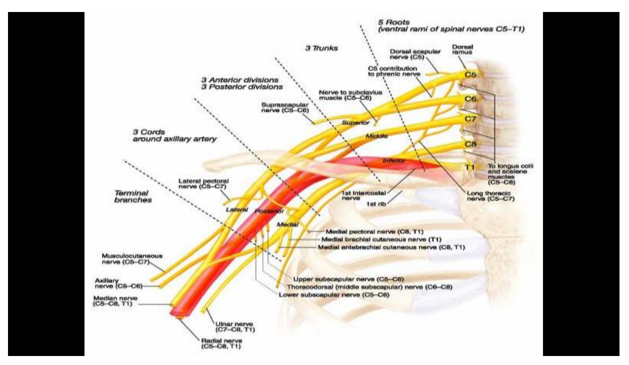


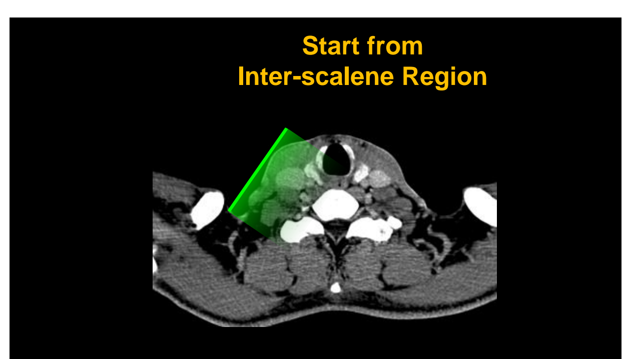

Myofascial Pain of
Infraspinatus

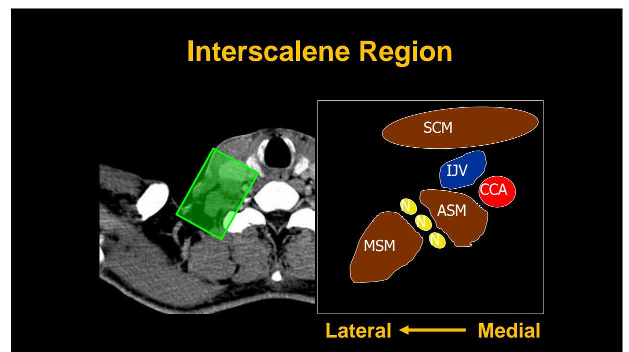

Myofascial Pain of
P. minor

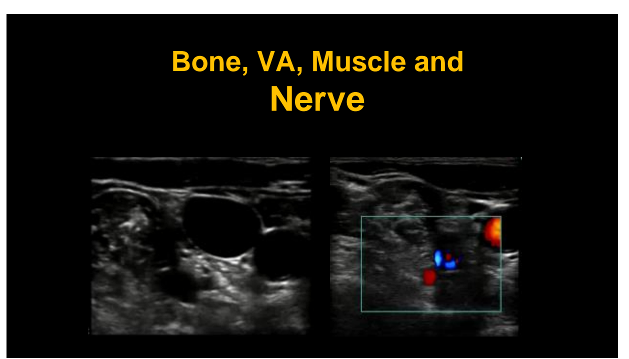

Ultrasound Appearance
Cervical Roots
• Monofascicular
• Dark Hypoechoic
Cervical Nerve Roots
Peripheral Nerves
• Honeycomb
• Hyperechoic
Peripheral Nerve

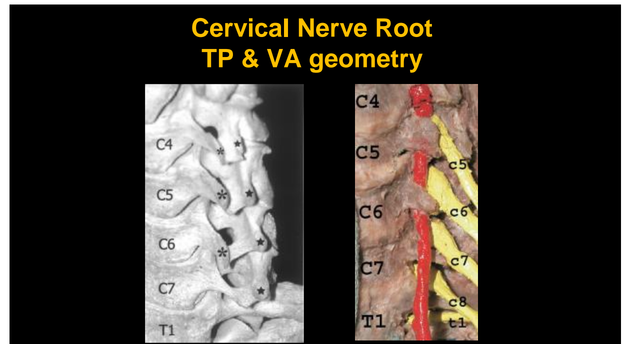
What Structure
you will NEVER miss

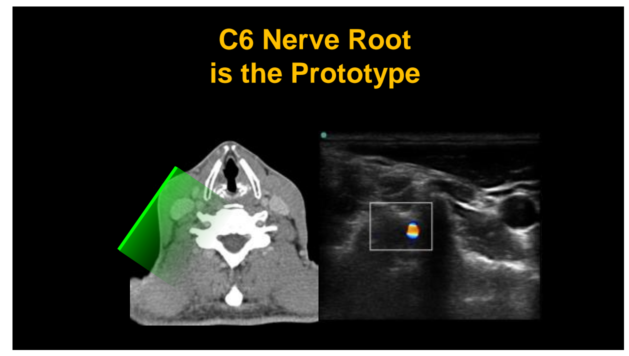

5 Roots
(ventral rami of spinal nerves C5–T1)
3 Trunks
Dorsal scapular nerve (C5)
Dorsal ramus
C5 contribution to phrenic nerve
3 Anterior divisions
3 Posterior divisions
Nerve to subclavius muscle (C5–C6)
Suprascapular nerve (C5–C6)
Superior
Middle
Inferior
C5
C6
C7
C8
T1
3 Cords
around axillary artery
To longus colli and scalene muscles (C5–C8)
Lateral pectoral nerve (C5–C7)
Terminal branches
1st intercostal nerve
1st rib
Long thoracic nerve (C5–C7)
Lateral
Posterior
Medial
Medial pectoral nerve (C8, T1)
Medial brachial cutaneous nerve (T1)
Medial antebrachial cutaneous nerve (C8, T1)
Musculocutaneous nerve (C5–C7)
Axillary nerve (C5–C6)
Median nerve (C5–C8, T1)
Upper subscapular nerve (C5–C6)
Thoracodorsal (middle subscapular) nerve (C6–C8)
Lower subscapular nerve (C5–C6)
Ulnar nerve (C7–C8, T1)
Radial nerve (C5–C8, T1)

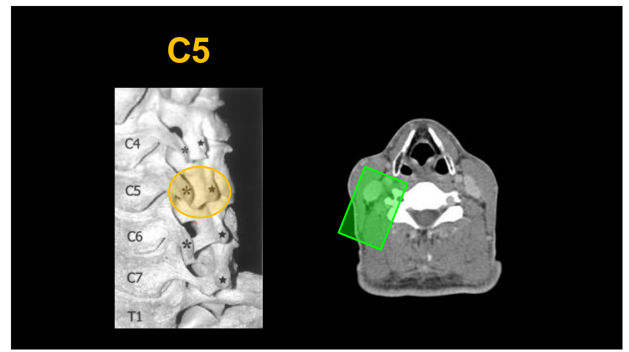

Start from
Inter-scalene Region

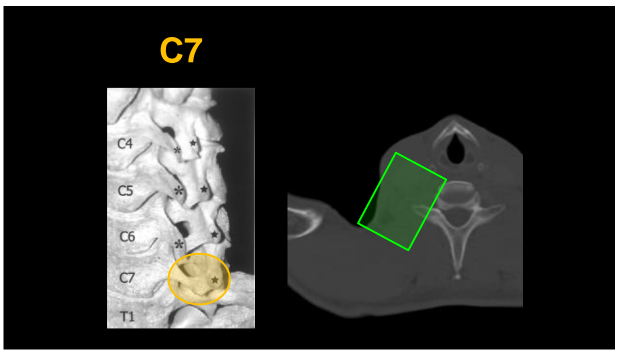

Interscalene Region
SCM
IJV
CCA
ASM
MSM
Lateral
Medial

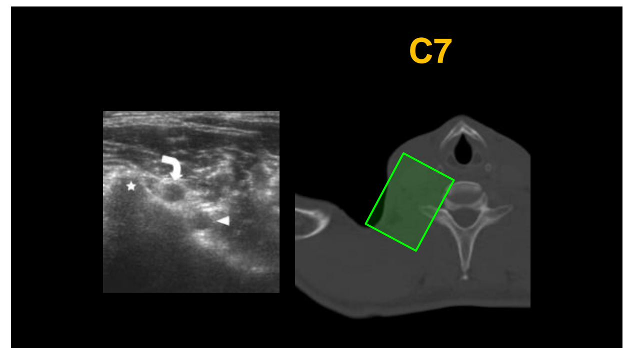

Bone, VA, Muscle and
Nerve

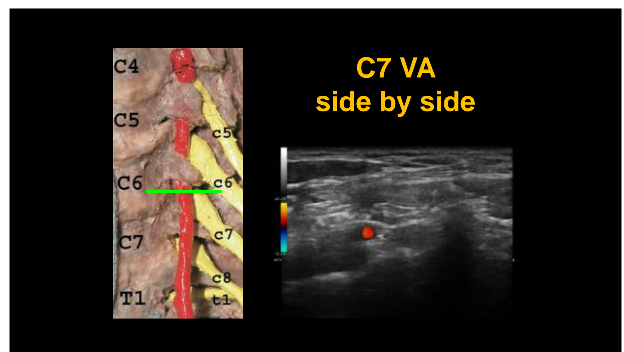

Cervical Nerve Root
TP & VA geometry
C4
C5
C6
C7
T1

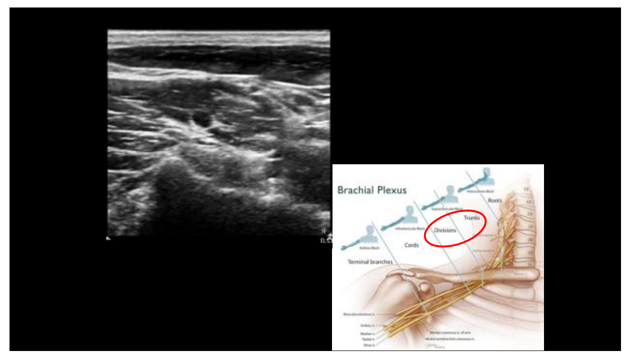

C6 Nerve Root
is the Prototype

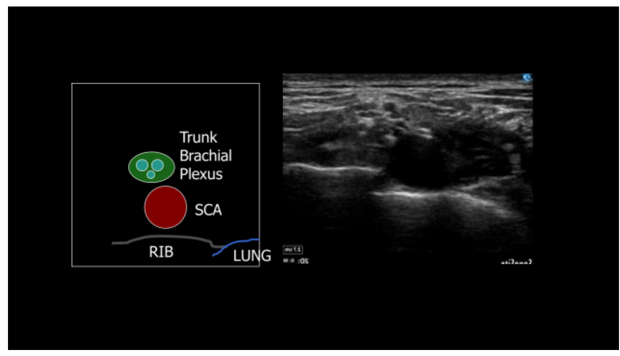

C5
C4
C5
C6
C7
T1

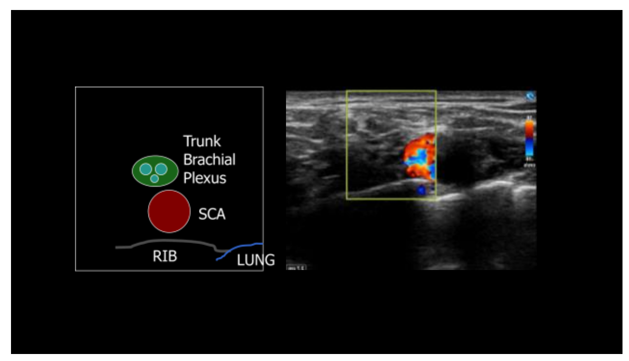

C7
C4
C5
C6
C7
T1


C7

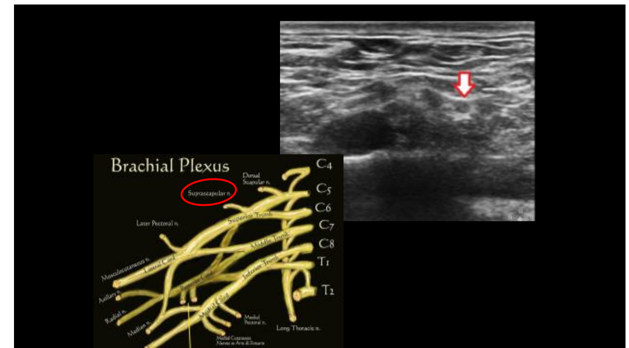

C7 VA
side by side
C4
C5
C6
C7
T1
c5
c6
c7
c8
t1

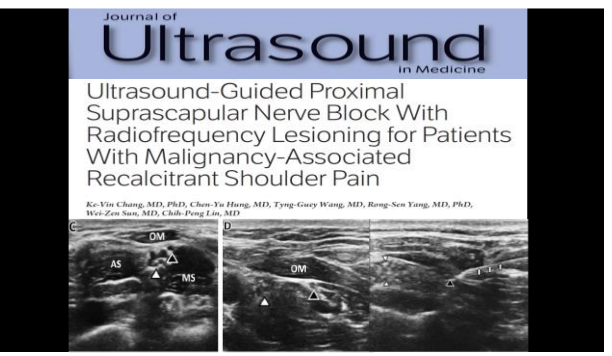

Brachial Plexus

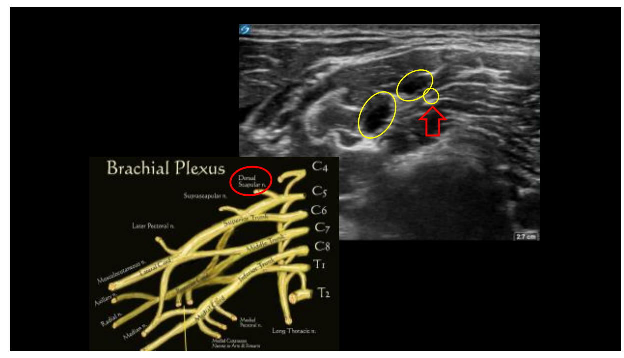

Trunk
Brachial
Plexus
SCA
RIB
LUNG


Trunk
Brachial
Plexus
SCA
RIB
LUNG

Something Harder!
Trace the Tiny strings

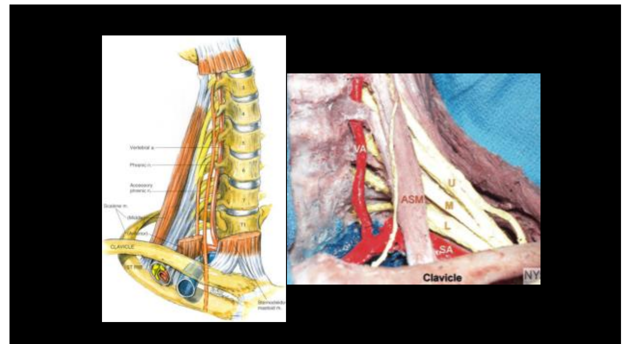

Brachial Plexus
C4
C5
C6
C7
C8
T1
T2

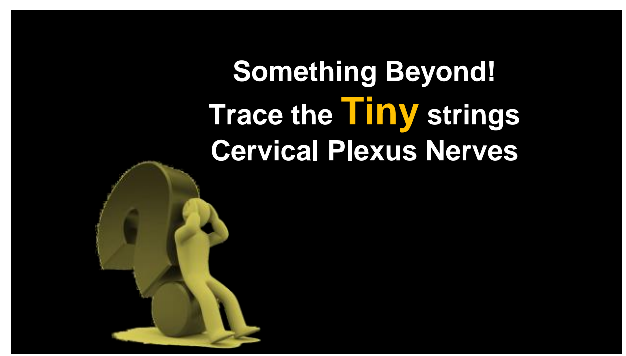

Journal of
Ultrasound
in Medicine
Ultrasound-Guided Proximal Suprascapular Nerve Block With Radiofrequency Lesioning for Patients With Malignancy-Associated Recalcitrant Shoulder Pain
Ke-Vin Chang, MD, PhD, Chen-Yu Hung, MD, Tyng-Guey Wang, MD, Rong-Sen Yang, MD, PhD, Wei-Zen Sun, MD, Chih-Peng Lin, MD
OM
AS
MS
OM

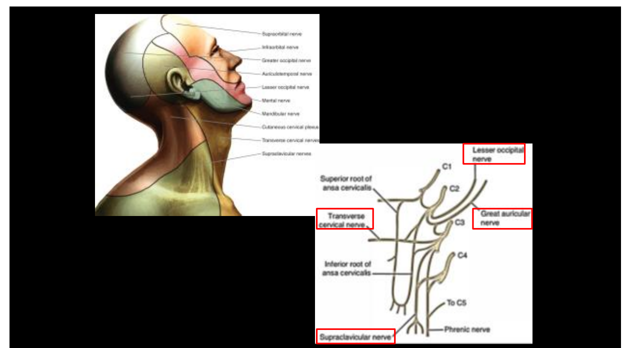

Brachial Plexus
C4
C5
C6
C7
C8
T1
T2

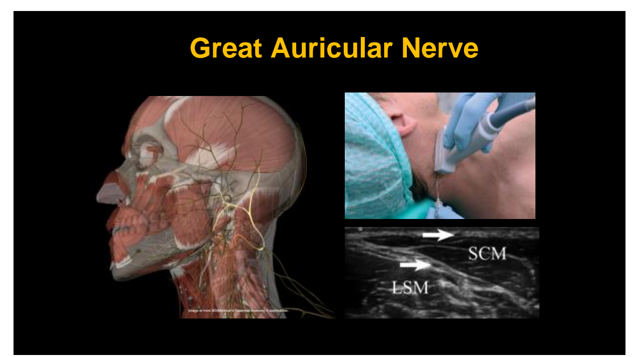
Journal of Pain Research
Dovepress
PERSPECTIVES
Sonographic tracking of trunk nerves: essential for ultrasound-guided pain management and research
Ke-Vin Chang
Chih-Peng Lin
Chia-Shiang Lin
Wei-Ting Wu
Manoj K Karmakar
Levent Özçakar

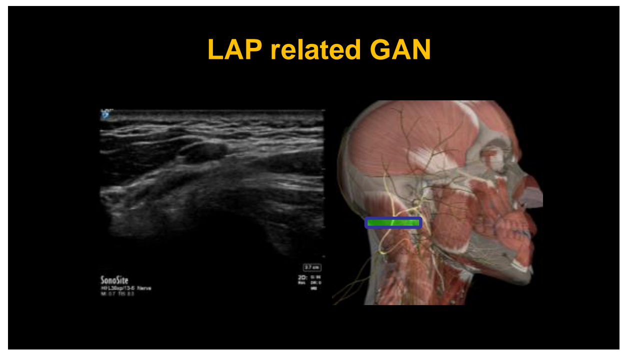
Something Beyond!
Trace the Tiny strings
Phrenic Nerve

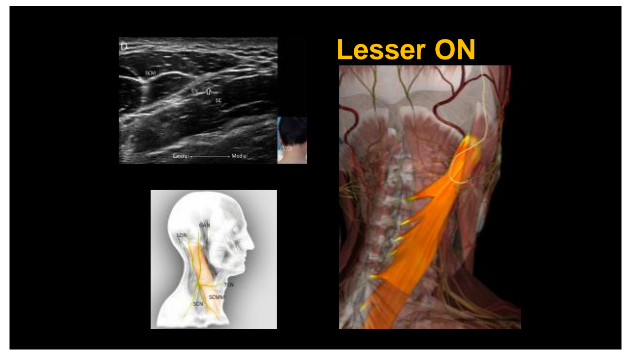

VA
ASM
U
M
L
SA
Clavicle


Something Beyond!
Trace the Tiny strings
Cervical Plexus Nerves

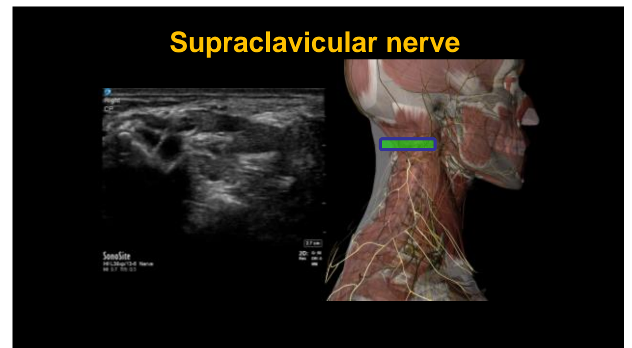

Supraorbital nerve
Infraorbital nerve
Greater occipital nerve
Auriculotemporal nerve
Lesser occipital nerve
Mental nerve
Mandibular nerve
Cutaneous cervical plexus
Transverse cervical nerves
Supraclavicular nerves
Lesser occipital nerve
C1
C2
C3
C4
Superior root of ansa cervicalis
Transverse cervical nerve
Great auricular nerve
Inferior root of ansa cervicalis
To C5
Phrenic nerve
Supraclavicular nerve

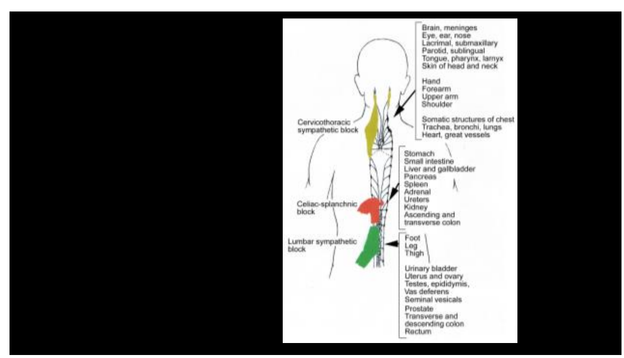

Great Auricular Nerve
SCM
LSM


LAP related GAN
SonoSite


Lesser ON

Supraclavicular nerve





Indications for Cervical Sympathetic Chain Stellate Ganglion Block

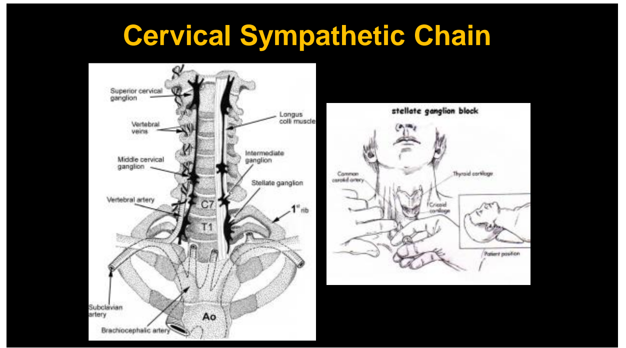
- **Diagnosis and treatment of autonomic dysfunction**
  - Vascular insufficiency in the head, neck, upper extremities
  - Ventricular arrhythmia due to sympathetic imbalance on left side
  - Hyperhidrosis
- **Painful syndromes**
  - Complex regional syndrome type I (RSD) and II (causalgia)
  - Neuropathic states (herpes zoster, postherpetic neuralgia)
  - Phantom pain

JAMA Psychiatry | Original Investigation

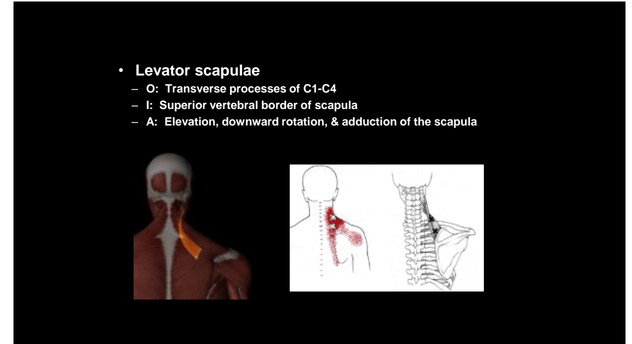
Effect of Stellate Ganglion Block Treatment on Posttraumatic Stress Disorder Symptoms

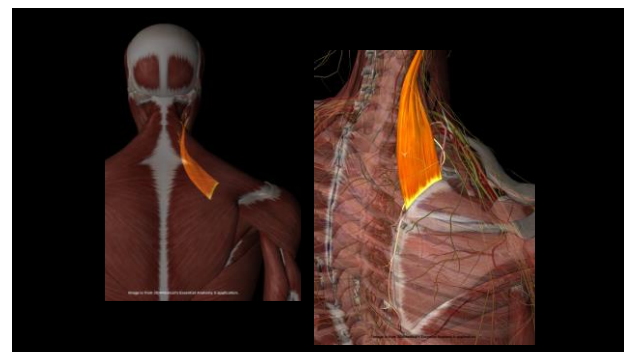
A Randomized Clinical Trial

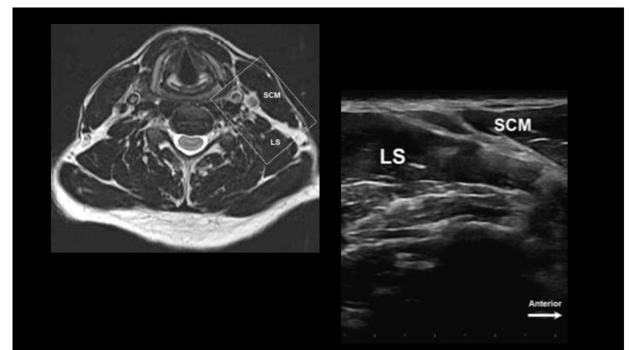
Cervical Sympathetic Chain

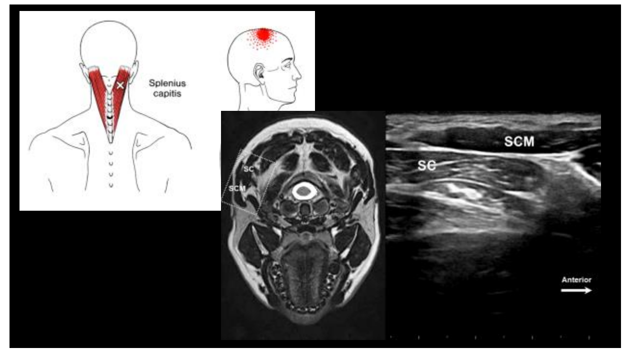


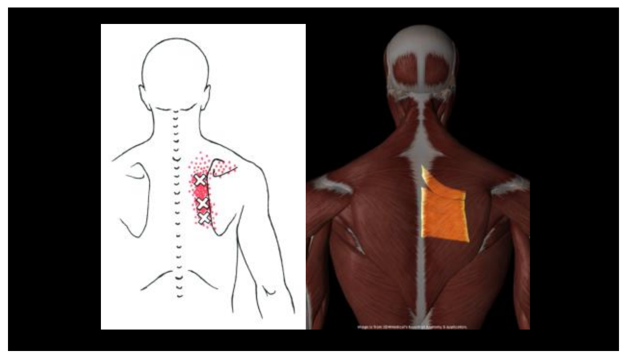
- **Levator scapulae**
  - **O: Transverse processes of C1-C4**
  - **I: Superior vertebral border of scapula**
  - **A: Elevation, downward rotation, & adduction of the scapula**

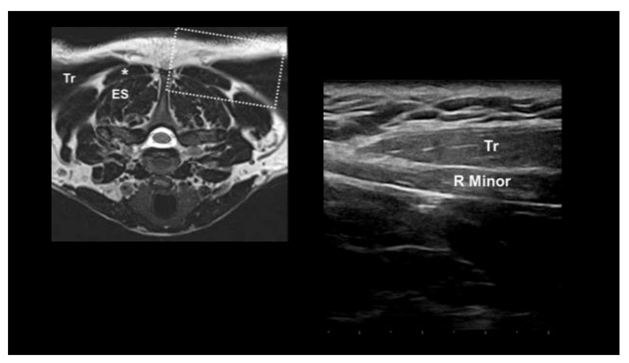


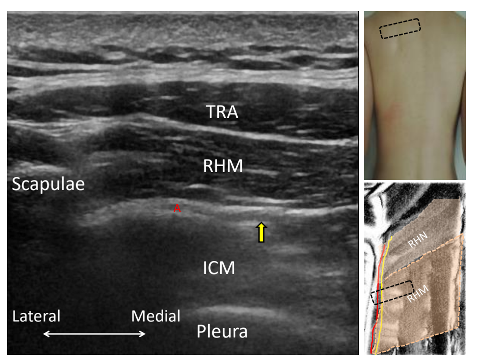


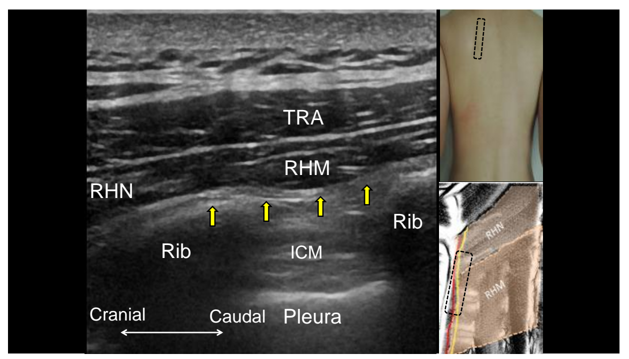

SCM
LS
SCM
LS
Anterior

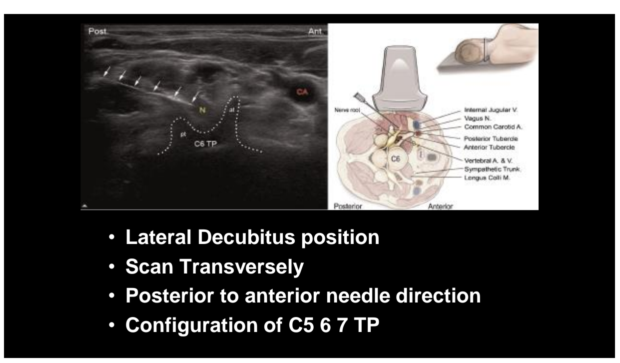

Splenius capitis
SCM
SC
Anterior

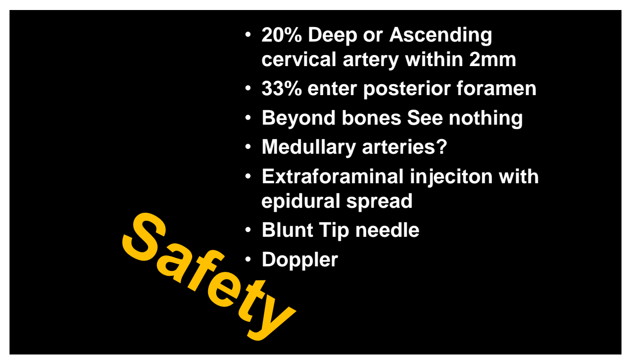


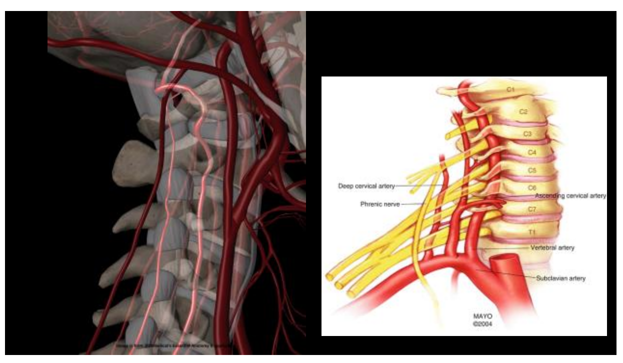

Tr
ES
Tr
R Minor

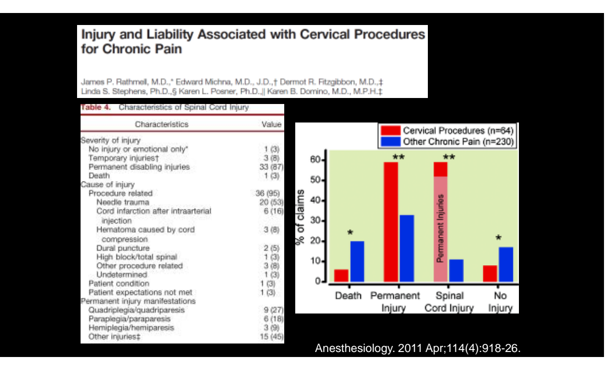

TRA
RHM
Scapulae
ICM
Lateral
Medial
Pleura









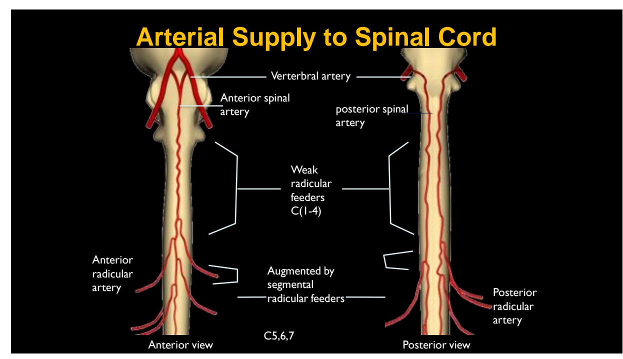

Injury and Liability Associated with Cervical Procedures for Chronic Pain

James P. Rathmell, M.D.,* Edward Michna, M.D., J.D.,† Dermot R. Fitzgibbon, M.D.,‡ Linda S. Stephens, Ph.D.,§ Karen L. Posner, Ph.D.,|| Karen B. Domino, M.D., M.P.H.‡

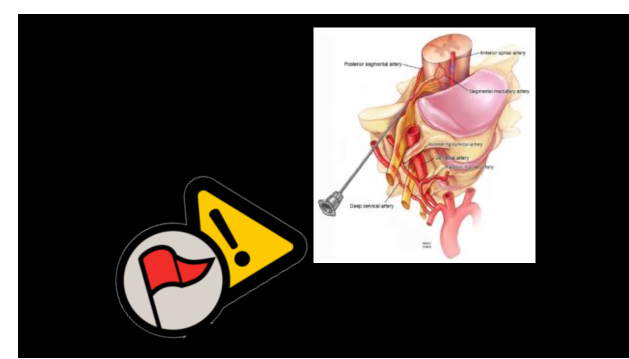
Table 4. Characteristics of Spinal Cord Injury

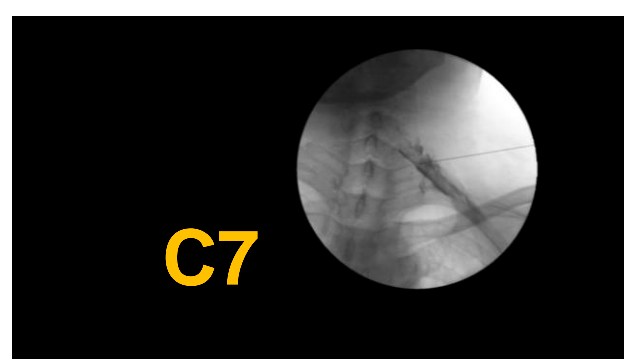
Characteristics	Value
Severity of injury	
No injury or emotional only*	1 (3)
Temporary injuries†	3 (8)
Permanent disabling injuries	33 (87)
Death	1 (3)
Cause of injury	
Procedure related	36 (95)
Needle trauma	20 (53)
Cord infarction after intraarterial injection	6 (16)
Hematoma caused by cord compression	3 (8)
Dural puncture	2 (5)
High block/total spinal	1 (3)
Other procedure related	3 (8)
Undetermined	1 (3)
Patient condition	1 (3)
Patient expectations not met	1 (3)
Permanent injury manifestations	
Quadriplegia/quadriparesis	9 (27)
Paraplegia/paraparesis	6 (18)
Hemiplegia/hemiparesis	3 (9)
Other injuries‡	15 (45)

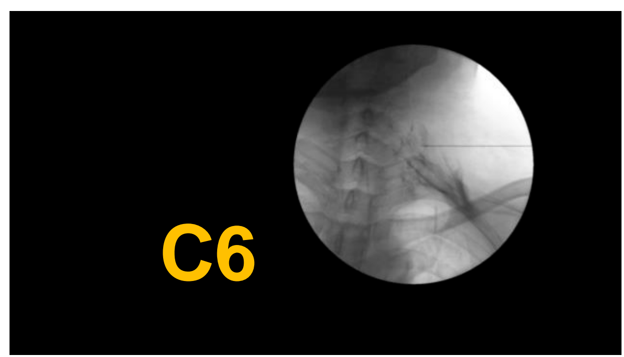
Anesthesiology. 2011 Apr;114(4):918-26.

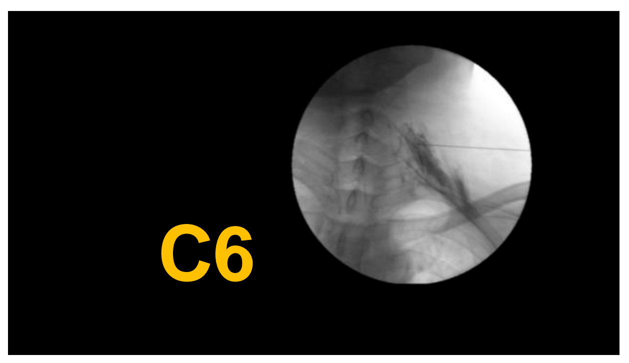


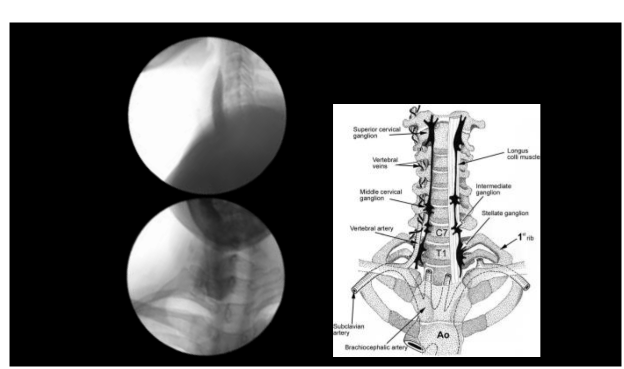
Arterial Supply to Spinal Cord
Verterbral artery
Anterior spinal artery
posterior spinal artery
Weak radicular feeders C(1-4)
Anterior radicular artery
Augmented by segmental radicular feeders
Posterior radicular artery
C5,6,7
Anterior view
Posterior view



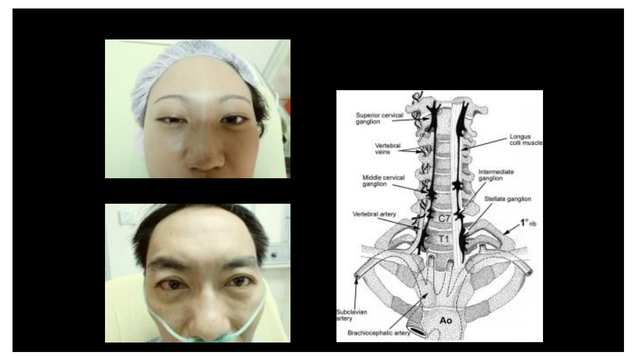

C7


C6


C6



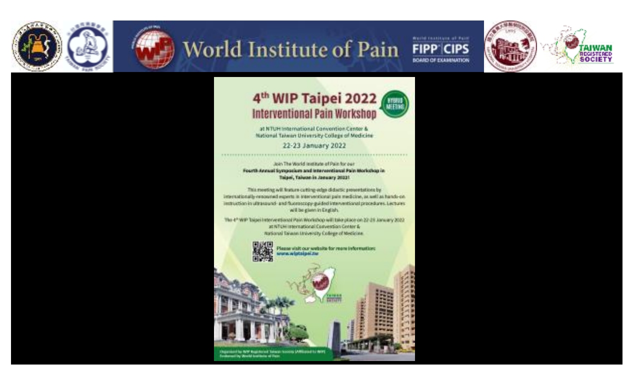
Superior cervical ganglion
Vertebral veins
Longus colli muscle
Middle cervical ganglion
Intermediate ganglion
Stellate ganglion
Vertebral artery
C7
T1
1st rib
Subclavian artery
Ao
Brachiocephalic artery


Superior cervical ganglion
Vertebral veins
Middle cervical ganglion
Vertebral artery
Longus colli muscle
Intermediate ganglion
Stellate ganglion
1st rib
C7
T1
Subclavian artery
Brachiocephalic artery
Ao

Injected
Medication

World Institute of Pain
FIPP CIPS
BOARD OF EXAMINATION
WIP Taipei Interventional Pain Workshop
& Second East-Asian FIPP/CIPS Examination
at National Taiwan University College of Medicine
17-19 January 2020

World Institute of Pain
FIPP CIPS
BOARD OF EXAMINATION
Essential Skill set to Jump Start your Pain Practice
成為疼痛專業醫師的萬用百寶箱
PE1 胡名孝 林嘉祥 Focus on Spine
PE2 蘇炯睿 劉炳塘 Focus on MSK
US1 姜義彬 吳威廷 Shoulder+ other UE joint
US2 潘健理 張凱閔 Knee+ other LE joint
Fluoro1 溫永銳 林峰盛 L spine Transforaminal IL and Disc
Fluoro2 林文瑛 唐宗詠 L spine Facet Mb SI joint Caudal


World Institute of Pain
FIPP CIPS
TAIWAN REGISTERED SOCIETY
4th WIP Taipei 2022
Interventional Pain Workshop
22-23 January 2022

World Institute of Pain
FIPP CIPS
TAIWAN REGISTERED SOCIETY
2022 Jan 22-23
Cadaveric workshop
2022 No FIPP/CIPS Exam