

Integrative Pain Blocks for the Primary Care Physician

Outcome Medical, LLC

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July 14, 2005

Common Injections done w/o fluoroscopy

- Trigger Point Injection
- Greater Occipital Nerve Block
- Paravertebral Nerve Block (except in upper thorax and neck)
- Intercostal Block
- Peripheral Nerve blocks
 - Median nerve, ulnar nerve
 - Femoral nerve
 - Ankle

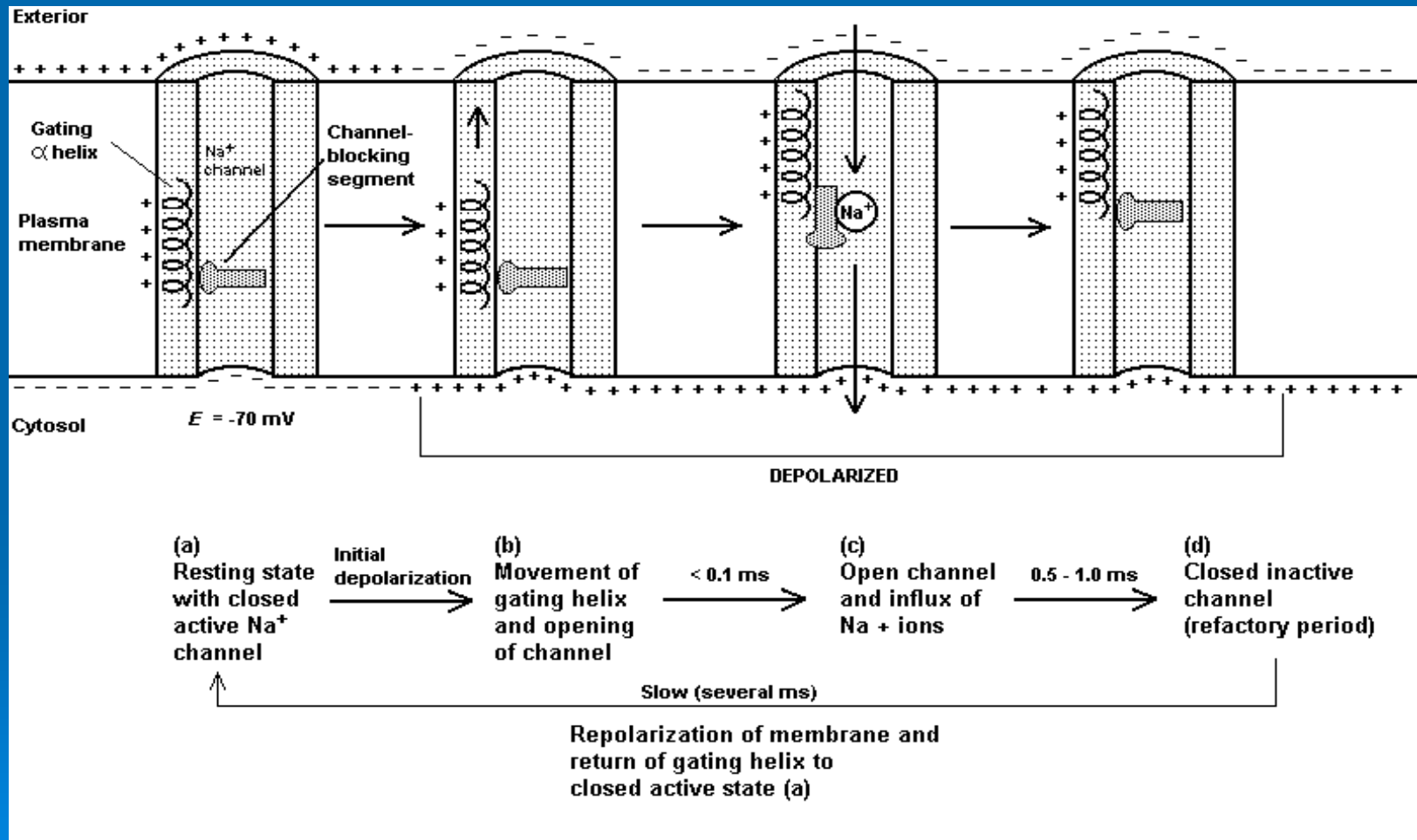
Common Injections which are typically done w/fluoroscopy

- Selective nerve root block (SNRB)
- Medial branch blocks (nerve to facet)
- Facet block
- Paravertebral Nerve Block in upper thorax and neck
- Stellate ganglion block & lumbar sympathetic block

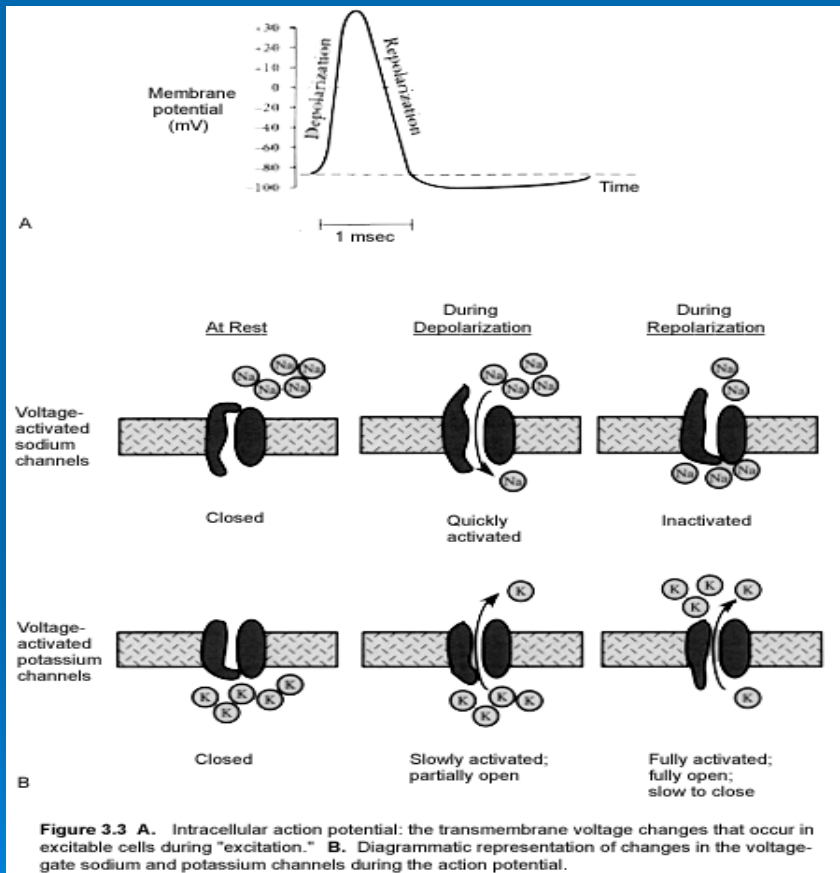
Hyperpolarization vs. Depolarization Block

- LA block → Hyperpolarization
 - Gates locked closed → no metabolic activity
- Electroanalgesia block → depolarization
 - Gates locked open → + metabolic activity
- Combined LA/Electroanalgesia Block
 - Synergistic results
 - ? Mechanism
 - Iontophoresis?
 - What would be the most effective study we could design to prove this to the regulators ASAP?

Voltage-Dependent Gates



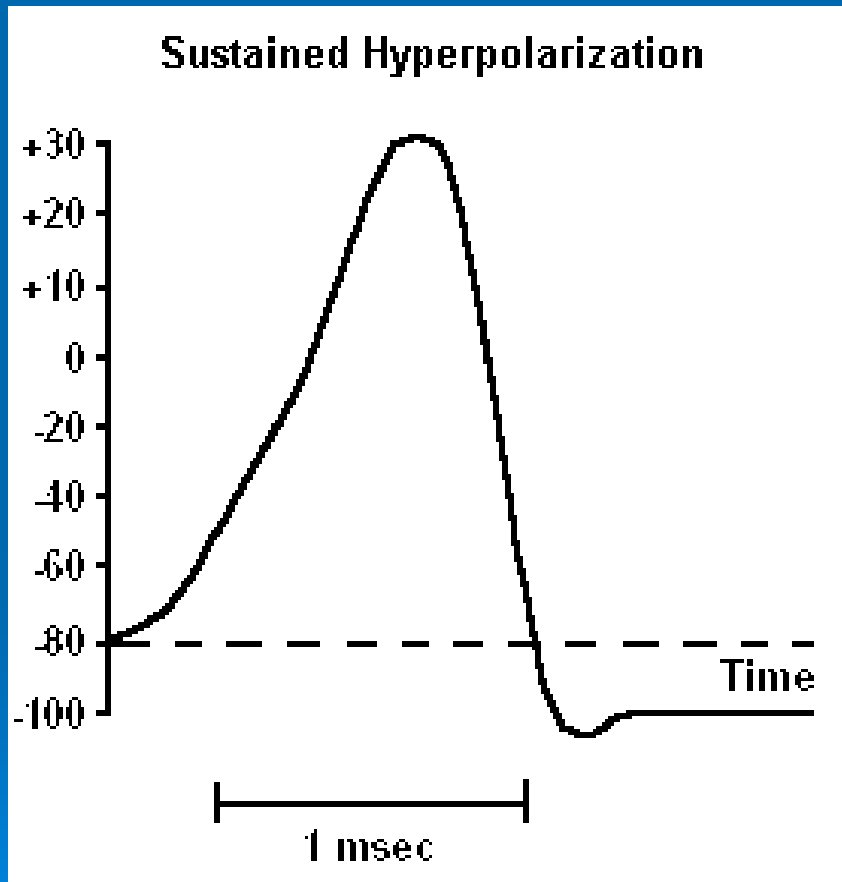
Sodium & Potassium Voltage-Dependent Gates



➤ Sustained Depolarization = Gates locked open → Metabolic activity

➤ Sustained Hyperpolarization = Gates locked closed → No Metabolic activity

Sodium & Potassium Voltage-Dependent Gates



- Sustained Hyperpolarization = Gates locked closed No Metabolic activity

Effects of Integrated Block

- Paravertebral block has the effect of causing the following –
 - Selective nerve root block (SNRB)
 - Medial branch blocks (nerve to facet)
 - Facet block

Trigger Point Injection

- Identification of Trigger Point
 - Painful tender point
 - Typical Radiating pattern
 - Pain, radiation reproduced with palpation
 - Taut muscle band
 - Jump sign

Trigger Points: Pathophysiology

- Initial muscle injury/overload → rupture of SR → release of ionized Ca^{++} → sustained vigorous contraction → small band of muscle → depletion ATP → local contraction & electric silence → local ischemia/hypoxia + release of algogenic substances (Histamine, PG, 5-HT) which sensitize nociceptors
- Viscous Feedback cycle
 - ↑ muscle tension, SNS activity, local ischemia
 - Becomes self sustaining → localized fibrosis

Trigger Point Injections: Technique

➤ Prep skin

- Betadyne x 2; alcohol wipe

➤ Prepare Injectate

- 5 or 10 cc needle
- Local anesthetic +/- buffered with bicarbonate
 - 1 cc bicarb in 10 cc xylocaine
 - 0.1 cc bicarb in 10 cc marcaine
- Sarapin
- +/- steroid

Trigger Point Injections: Technique

- Appropriately position patient
 - Sitting patient – watch for vasovagal reaction
- Identify trigger point
 - Gloved hand, feel for taut band
 - Point that reproduces pain, referral pattern
- Insert needle (#25 or smaller)
 - Feel for taut band
 - Point that reproduces pain, referral pattern
- Apply Electroanalgesia w/Sanexas device per protocol

Trigger Point Injections: Technique

- Inject 3 cc Injectate
- “Needle” the taut band x 4-5 times, remove needle
- Massage with gloved hand
- Apply moist heat x 10 minutes
- Stretching instructions
 - 5 times x next three days
- Follow w/electroanalgesic block
- RTC 1 week later

Trigger Point Injections: Billing

- Trigger point ICD-9 729.1
- 1-2 muscles CPT 20552
- 3+ muscles CPT 20553
- Sarapin, marcaine CPT J3490
- Heat, moist CPT 97010
- Therapeutic Activities 97530

Anatomy

- Greater Occipital Nerve
 - Fibers from C2 nerve root
- Lesser Occipital Nerve
 - Fibers from C2, C3 nerve roots
- Third (Least) Occipital Nerve (TON)
 - C3 dorsal ramus
 - Travels with GON (slightly medial)

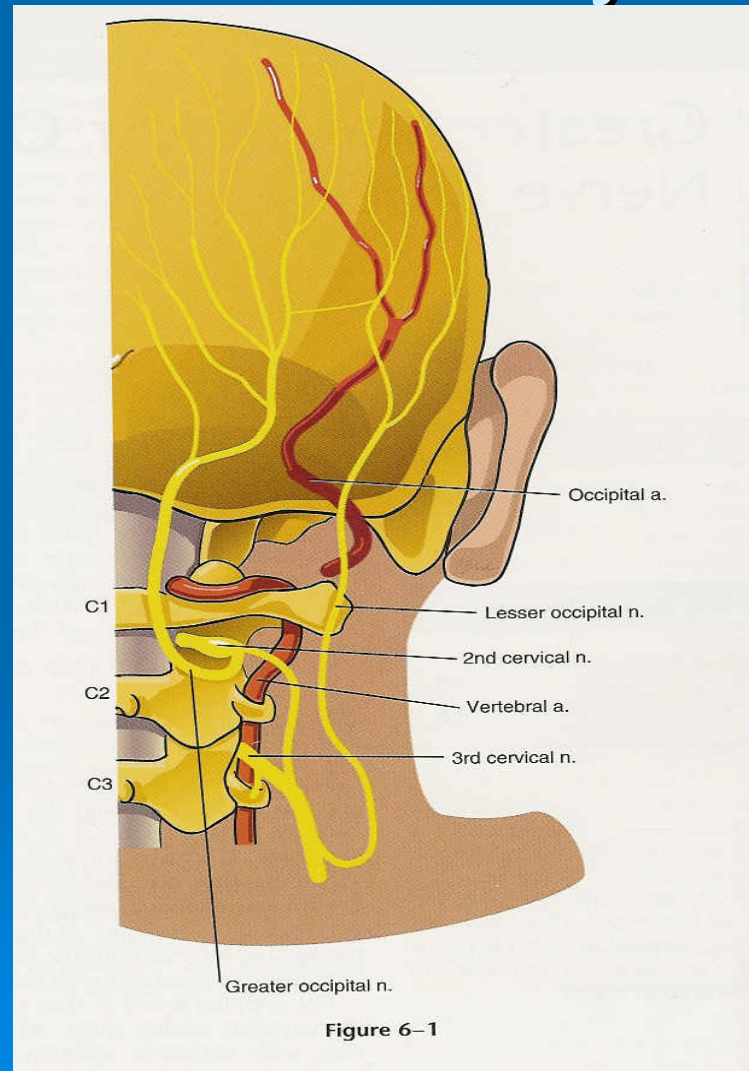
Anatomy

- Suboccipital nerve
 - Dorsal ramus of C1
 - Innervate A-O joint
 - Wide referral area
- C2 spinal nerve & DRG
 - Very close to A-A (C1-C2) joint
 - Referral area is point on ipsilateral nuchal ridge
 - Radiates occip→parietal, temporal, frontal & periorbital regions
 - Innervate A-A & C2-3 z-joint (minor contribution)

Anatomy

- TON (dorsal ramus of C3)
 - Close to & major contribution of innervation to C2-3 z-joint
 - Typical primary referral pattern (see Dwyer, 1990 chart – next slide)
 - Referred to frontotemporal & periorbital regions
 - Most vulnerable to whiplash trauma
 - Majority of H/As resolve within one year of trauma
 - However
 - Chronic H/A patients have experienced substantial relief after discectomy at levels as low as C5-6

Greater Occipital Nerve Block: Anatomy



Greater Occipital Nerve Block

➤ Greater Occipital Nerve

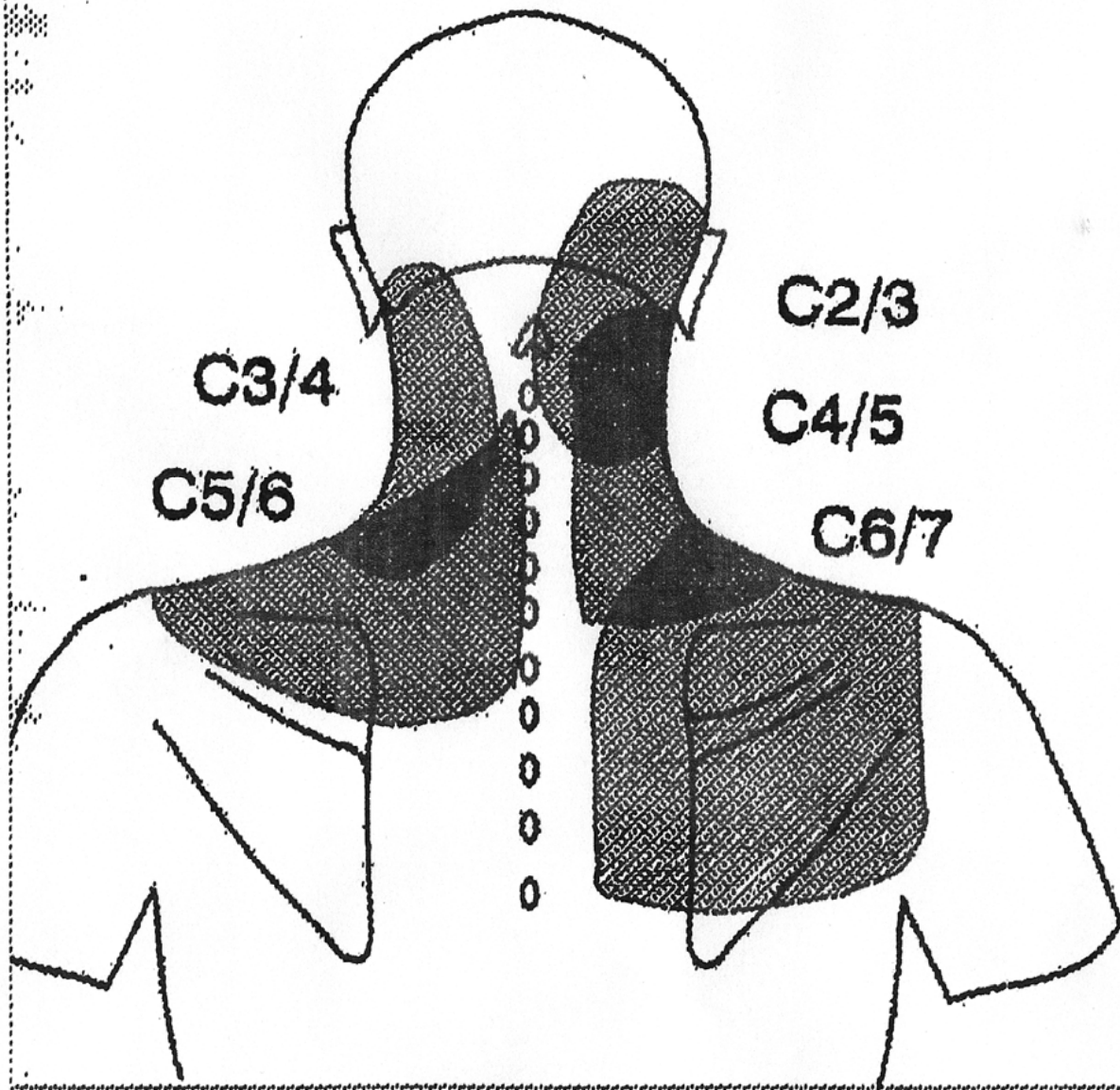
- Origin
 - dorsal primary ramus of C2
 - Some fibers from TON
- Pierces fascia along superior nuchal ridge along w/occipital artery (landmark)
- Supplies medial portion of posterior scalp as far anterior as vertex

Greater Occipital Nerve Block: Technique

- Prep w/betadyne & alcohol
- Solution of marcaine 0.5% + depomedrol
- GONB technique
 - 2 cm lateral to bony protuberance at midline
 - Feel for artery w/gloved hand
 - Direct needle rostrally, SQ course
 - Redirect in medial and lateral directions
 - Inject 2-5 cc (texts differ here)
 - Avoid foramen magnum !!
- Apply Electroanalgesia w/Sanexas device per protocol

Lesser Occipital Nerve Block: Technique

- LONB Technique
 - Direct GONB needle laterally and slightly inferiorly
 - Inject an additional 1 cc to 3-4 cc
- Alternative method – direct injection near mastoid notch
 - Direct needle in lateral and rostral direction
 - Inject an additional 1 cc to 3-4 cc
- Apply manual pressure, cold packs after injection
- Apply Electroanalgesia w/Sanexas device per protocol



Z-Joint Pain

Typical distribution of pain referred from each cervical Z-joint when stimulated in normal volunteers

Modified from Dwyer et al, 1990

Paravertebral Nerve Block: Indications

- Fibromyalgia
- Diabetic Peripheral Neuropathy
- Post herpetic neuralgia
- Acute pain emergencies
 - Lumbar compression fracture
 - Acute herpes zoster
 - Ca pain while awaiting definitive procedure
- Postop pain

Paravertebral Nerve Block: Outcome Medical Protocol

➤ Primary Diagnoses

- Fibromyalgia
- Neuropathies of any cause
- LBP w/ or w/o Sciatica

➤ Technique

- Bilateral L4, L5 lumbar paravertebral injection
- Treatment with Sanexas dual channel device

Paravertebral Nerve Block: Anatomy

- Two main distributions
 - Lumbar Plexus - T12 through L4
 - Sciatic nerve – L5 through S2
- Recurrent branch – SVN
 - Spinal ligaments, meninges, vertebra
- Anterior & Posterior Ramus
 - Posterior Primary Ramus
 - Medial branch – facets & multifidus muscles
 - Lateral branch – skin & lateral erector spinae muscles
 - Anterior Primary Ramus
 - Courses laterally and inferiorly to body of psoas muscle
 - Somatic innervation to lower abdominal wall, groin, portions of genitalia, portions of lower extremity

Paravertebral Nerve Block: Technique

➤ Positioning

- Prone, w/pillow under abdomen to slightly flex lumbar spine
- Palpate spinous process of level (usually L4,L5)

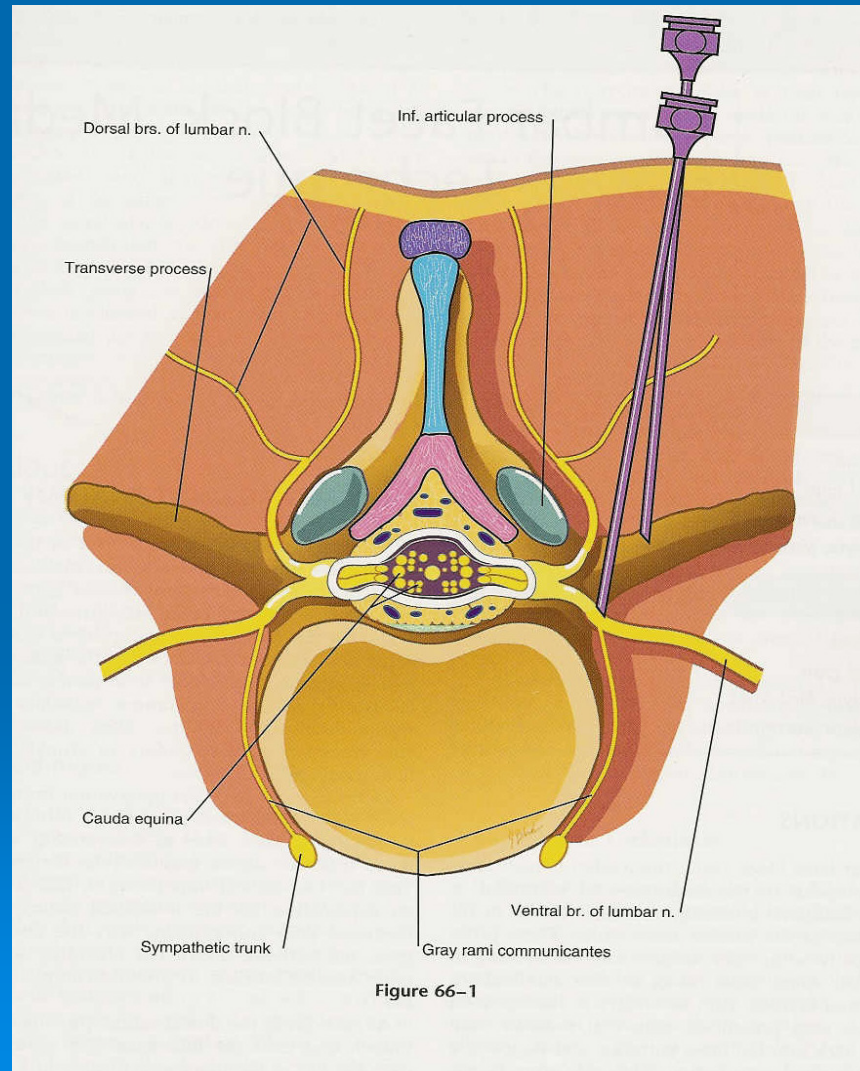
➤ Prep skin

- 25 gauge, 1½ inch spinal needle attached to 10-12 cc syringe
- Heavier patients use 2 ½ inch needle (max)

Paravertebral Nerve Block: Technique

- Injection target
 - 1.5 inches lateral to spinous process at level of spinous process (see vertebral model)
- Technique
 - Advance needle approx. 1.5 inches, contact bone
 - Withdraw needle slightly, redirect inferiorly
 - Slowly advance $\frac{1}{2}$ to $\frac{3}{4}$
- Apply Electroanalgesia w/Sanexas device per protocol

Paravertebral Nerve Block: Technique



Intercostal Nerve Block

- Can be safely done in office, but need emergency equipment available
- Anatomy
 - Each neurovascular bundle travels from anterior ramus of spinous nerve in groove under respective rib
 - Often must block three levels to get level of interest
 - Dermatomes
 - T4 – nipples
 - T7 – Xiphoid
 - T10 – Umbilicus
 - T12, L1 – Inguinal region

Intercostal Nerve Block

➤ Procedure

- Use 25 gauge needle, 1 ½ inches long
- Palpate rib(s) carefully – beware of obese pt
- Position on rib depends on treatment goal
 - Rib fractures
 - Herpetic neuralgia
 - Always want to be proximal to lesion
- Advance needle carefully over known location of rib; do not advance more than ¾ inch (use common sense)

Intercostal Nerve Block

➤ Procedure

- Touch rib, and “walk off” rib inferiorly about 1 cm (be careful - no more)
- If you cannot find rib, cautiously probe w/25 gauge needle
- Aspirate, then inject 5 cc of LA at each level

Intercostal Nerve Block - Complications

➤ Pneumothorax

➤ Local anesthetic toxicity

- Of all procedures, systemic uptake of LA into blood stream is greatest with this one
- Recommend not using concentration greater than Marcaine 0.25% or Xylocaine 1%
- Maximum LA anesthetic doses should be known
 - Xylocaine – 500 mg w/epi; 700 mg w/o epi
 - Marcaine – 225 mg w/epi; 175 mg w/o epi
 - Multiply % x 10 to get dose in mg

Upper Thoracic and Cervical “Blind” Blocks

- As you venture north, more caution is required
- The neck is known as “Tiger Country”
- “First of all, Do no Harm...”

Supplemental Considerations

- Examples of fluoroscopic blocks
 - Lumbar & Cervical SNRB (TF ESIs)
 - Caudal
 - Cervical CESIs
 - Lumbar Facet injections
 - Lumbar & Cervical Medial branch blocks
 - Lumbar sympathetic blocks
 - RF probe placement
- Short treatise on Electroanalgesia

ElectroAnalgesia History

- FM ElectroAnalgesia (1996)
- FM/AM ElectroAnalgesia (1997)
- Random Signal Generation (1999)
- Harmonic ElectroAnalgesia (2003)
- Integrative Block (2004)

ElectroAnalgesia Benefits

- Electric modality of pharmaceutical strength
- Can obtain pharmacologic effects
- Specific, but not highly specific, target
- Electrodes of varied size, shape and configuration
- Stereotactic application capability

ElectroAnalgesia Effects

- Neuron Function: *Imitation*
- Neuron Function: *Exhaustion*
- Neuron Function: *Interruption*

ElectroAnalgesia Classification

- **Stimulatory Class**

- Physiological effects induced by *repeated* action potentials in excitable cells (depolarization and subsequent repolarization activity)

- **Multi-Facilitory Class**

- Physiological effects induced *without* action potentials (NO depolarization and repolarization activity)

Stimulatory Class Analgesia

- Counter-irritation
- Neuropeptide Release

Multi-Facilitory Class Analgesia

- Neuron Block (sustained depolarization)
- Pain Mediator (metabolite) Redistribution
- Cell Membrane Repair (cAMP)

ElectroAnalgesia Outcomes

- **cAMP Normalization**

- Up to 500% increase in intercellular cAMP via sustained cell membrane depolarization
- Clarence Cone MD, Ph.D. University of Virginia

- **Post-Hyperactivity Depression**

- Prolonged, hypo-excitabile state of nerves arising from relatively short duration electroanalgesia treatment

Robert Schwartz, MD Medical University of South Carolina

ElectroAnalgesia Outcomes

- pH normalization
- Hormone/ligand activity imitation
- Trophic improvement
- Improved membrane permeability
- Immune system support via improved cell-to-cell communication
- Cell repair and normalization

FDA Indications for Use

- Management and symptomatic relief of chronic (long term) *intractable* pain
- Adjunctive treatment of acute, post-traumatic pain
- Adjunctive treatment of post-surgical pain

- Relaxation of muscle spasms
- Prevention or retardation of tissue atrophy
- Increasing or improving blood circulation
- Neuromuscular reeducation
- Immediate post-surgical use to prevent phlebothrombosis
- Maintaining or increasing range of motion

FDA Contraindications

- Manifest thrombosis
- Thrombophlebitis
- Cardiac demand pacemaker
- Acute danger of hemorrhage
- Disturbances in cardiac rhythm
- Avoid direct high-dose stimulation over carotid sinus
- In acute tetany, exercise caution in dosing (intensity)
- Acute inflammatory processes caused by bacterial or viral infections

Electroanalgesia – Types of Blocks

- Electric nerve block
- Combined nerve block
 - Standard local anesthetic block with electric nerve block done immediately post LA block
- Physical medicine (rehab) use

Electroanalgesia - Acceptance

- Widely accepted in California
- Use of device consistent with ACOEM guidelines
 - Reference - Letter of medical necessity (2)
- Well accepted CPT codes
- New CPT code being requested by manufacturer through Medicare & AMA/CPT assistant

Electroanalgesia - Acceptance

- This treatment has gone through the Utilization Review process and has been accepted by the following insurance companies
 - Genex
 - Liberty Mutual
 - State Comp
 - Cambridge

Electroanalgesia - Coding

- Electric nerve block CPT code 64999, accepted by CPT assistant
 - Current payment by insurance carriers (see EOBs)
 - Reference - AMA letter 12/13/1999
- Physical medicine CPT codes 97032, 97016, 97112
 - Reference – EOBs supplied

Electroanalgesia Block

- Effective
 - 70% short term
 - 50% days to weeks
 - Reference – Schwartz et al Electric Sympathetic Block: Current theoretical concepts & clinical results. J. Back & Musculo Rehab 1998; 10: 31-46
- Safe
 - No risk of spinal headache, paralysis, nerve damage, aborting procedure
 - No aversion by patient (does not hurt)

Electroanalgesia Block

- Cost effective
 - Done in office
 - Done by physician or PA
 - Cost (Epidural):
 - \$500 vs. \$1400 - \$3300
 - Reference – Economic Benefits for Insurance Companies: Electroanalgesia Nerve Blocks vs. Epidurals
 - Similar data for other blocks

Electroanalgesia Block - Effectiveness

- Schwartz paper (SGB)
- Osteoarthritis – European study
 - N = 200
 - Uses “horizontal therapy”, not as effective as Sanexas
 - Introduction is intellectual property of inventor of Sanexas device
 - Reduced short term drug use to zero
 - VAS improvement @ 12 months
 - Excellent – 0
 - Sufficient to good – 94%
 - Insufficient – 6%

Alternative Technique – use of Stealth Needle (Gabor Racz)

- Special needle designed by Racz and marketed by Epimed
- Blunt tipped needle with side port
- Insert at nuchal ridge, place medial direction into superior obliquus muscle
- Requires fluoroscopy to rule out vascular, foramen magnum placement → muscular “blobbogram” required
- Inject large volume (10cc) 0.25% marcaine