

Objectives:

After completing this lecture you should be able to:

1. Describe the signs or symptoms that a patient will have when given a diagram/picture that depicts the lesioned area.
2. Describe the area along the neuraxis that has been lesioned if given the patient's signs and symptoms.

Outline:

I. Spinal cord lesions

- A. Spinal cord hemisection (Brown-Squard syndrome)
- B. Syringomyelia
- C. Vitamin B12 neuropathy
- D. Amyotrophic Lateral Sclerosis (Lou Gehrig's disease)
- E. Posteriorl Column disease (Tabes Dorsalis)
- F. Poliomyelitis
- G. Anterior Spinal artery thrombosis

II. Brainstem

- A. Medial Medullary syndrome
- B. Lateral Medullary syndrome
- C. Horner's syndrome
- D. Medial Pontine syndrome
- E. Medial Midbrain syndrome

Lesions, Lesions, Lesions!!!

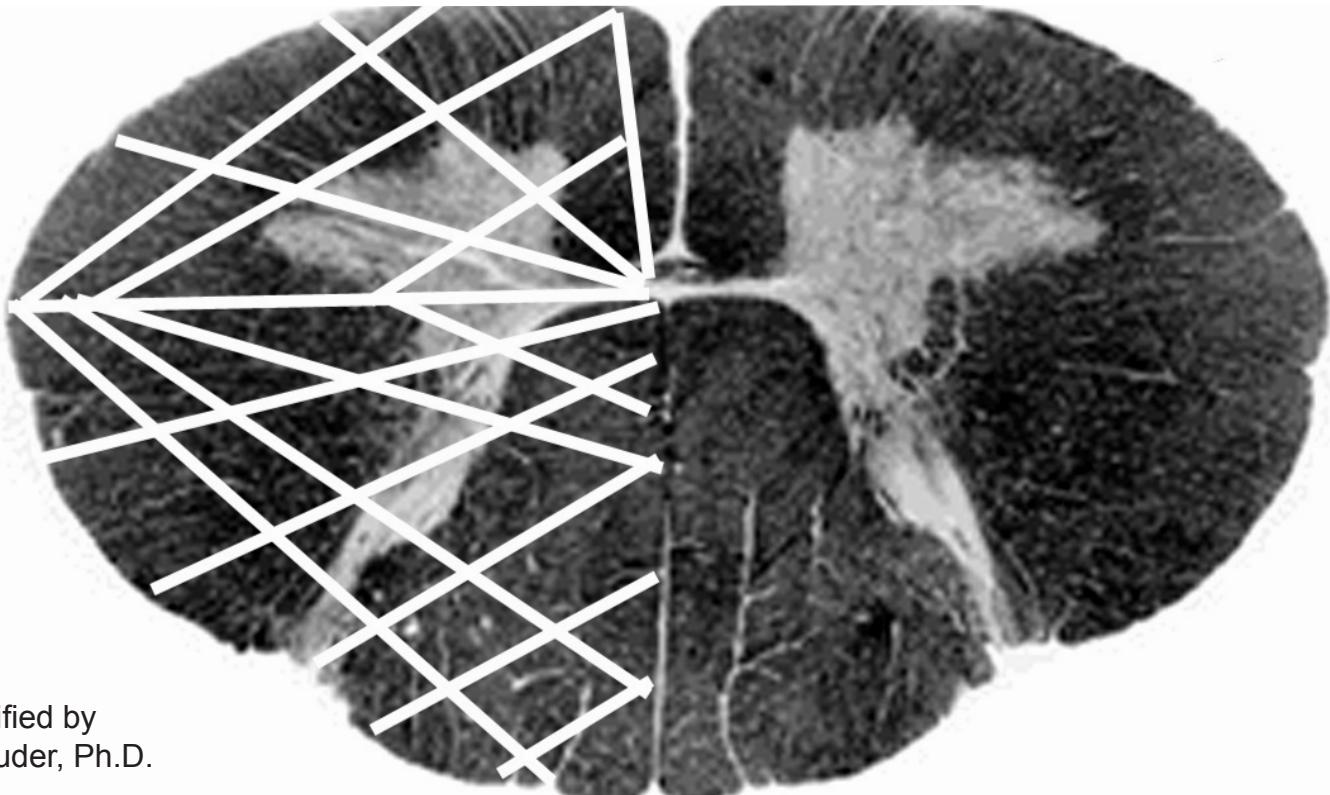
Lesions
B. Puder, Ph.D.

Now that we know our intrinsic neuroanatomy, some major somatosensory and motor pathways, and cranial nerve pathways, we can start to lesion these areas and pathways and describe the signs and symptoms that the patient will demonstrate. OR we can describe the signs and symptoms of the patient and then determine where the lesion is along the neuraxis.

Let's start with spinal cord lesions and work our way to the brainstem.

But first, what is a lesion?? A lesion is anything bad that can happen to the nervous system. For example, lack of blood supply, tumors, trauma, diseases, genetic disorders.

Spinal cord hemisection a.k.a.Brown-Sequard syndrome



Modified by
B. Puder, Ph.D.

Structures Affected:

1. Gracile and Cuneate fasciculus
2. Lateral corticospinal tract
3. Anterolateral system (spinothalamic tract)

Clinical Manifestations:

1. Ipsilateral loss of fine touch, positional and vibratory sense below this lesion (name SC level)
2. Ipsilateral spastic paresis below lesion (name the SC level)
3. Contralateral loss of pain and temperature below lesion (name the SC level)
4. If hemisection is between spinal cord levels C1 - T2, there will be a Horner's syndrome as well.

Syringomyelia



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Structures Affected:

1. Anterior white commissure
2. Anterior (ventral) horn

Clinical Manifestations:

1. Bilateral loss of pain and temperature at this level only (name the SC level)
2. Flaccid paralysis at this level only (bilaterally) name the SC level

Vitamin B12 Neuropathy



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Structures Affected:

1. Posterior funiculi
2. Posterior and anterior spinocerebellar tracts
3. Lateral corticospinal tracts

Clinical Manifestations:

1. Loss of tactile, vibratory, position sense below lesion (name the SC level)
2. Loss of motor coordination (ataxia)
3. Spastic paresis (name the SC level)

Amyotrophic Lateral Sclerosis
(ALS - NOT the P&T pathway)
a.k.a. Lou Gerig's disease



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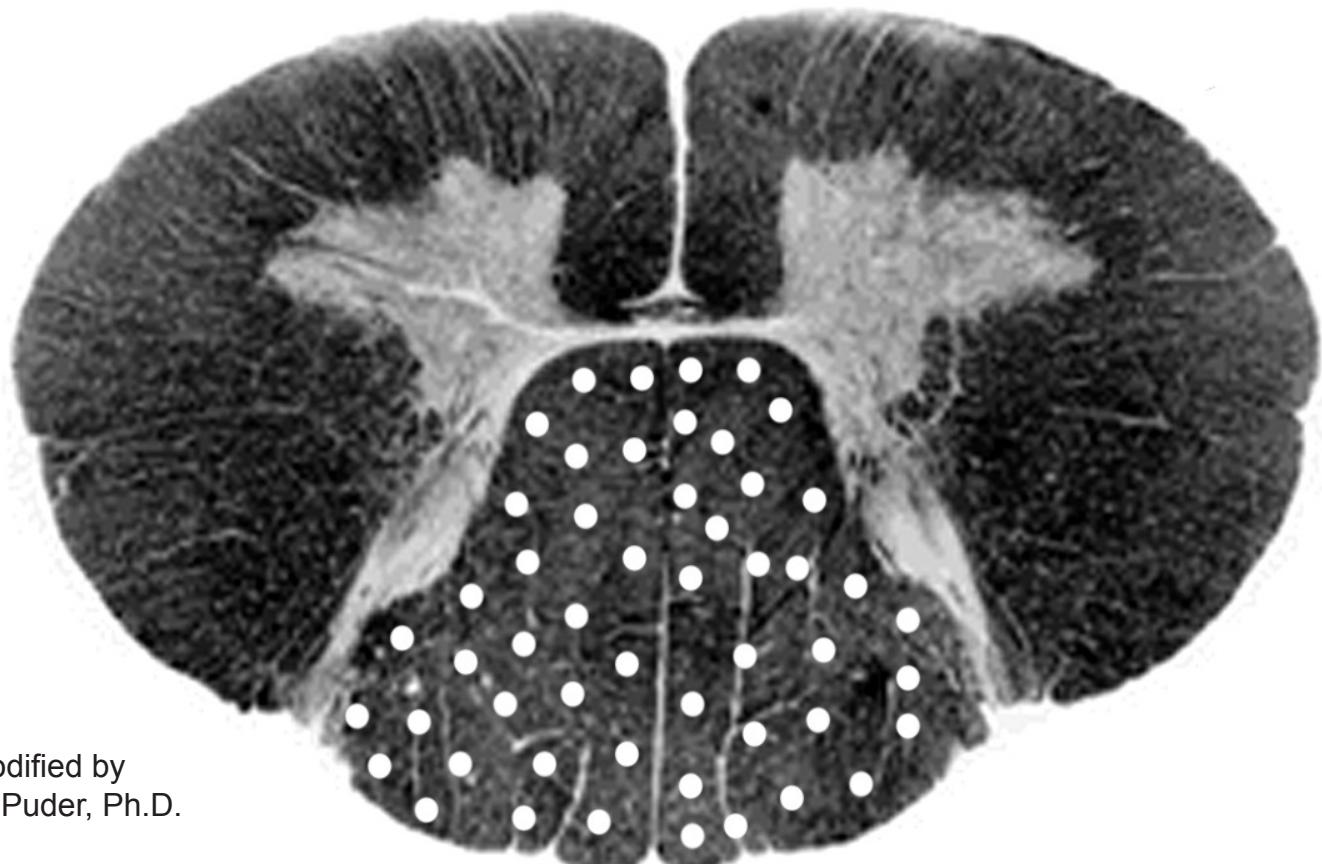
Structures Affected:

1. Lateral corticospinal tracts
2. Anterior horn

Clinical Manifestations:

1. Spastic paresis below lesion (name the SC level)
2. Flaccid paralysis at this level only (name the SC level)

Posterior Column Disease a.k.a. Tabes Dorsalis



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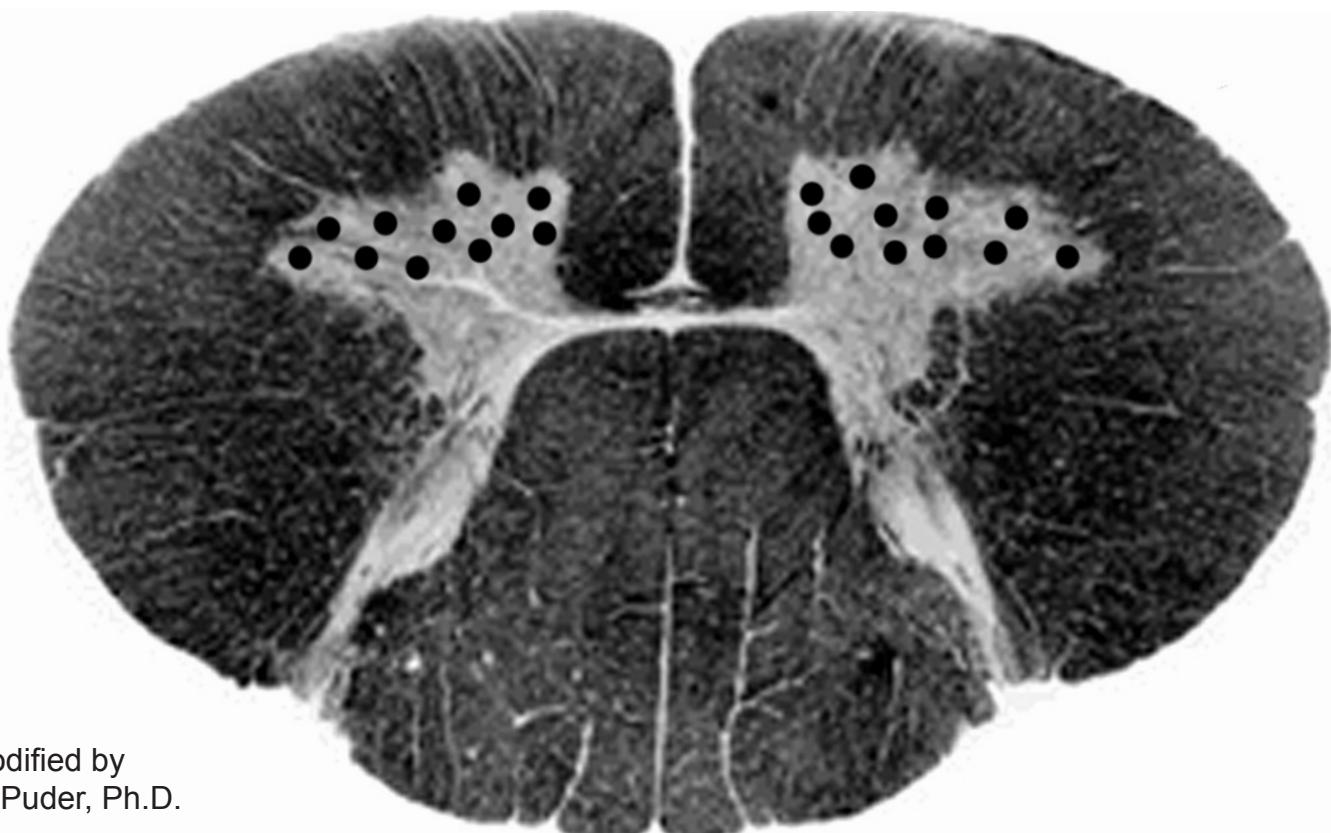
Structures Affected:

1. Posterior funiculi

Clinical Manifestations:

1. Loss of tactile, vibratory and position sense below the lesion (name the SC level)

Poliomyelitis



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Structure Affected:

1. Anterior horns

Clinical Manifestations:

1. Flaccid paralysis at this level (name the SC level)

Anterior Spinal Artery Thrombosis



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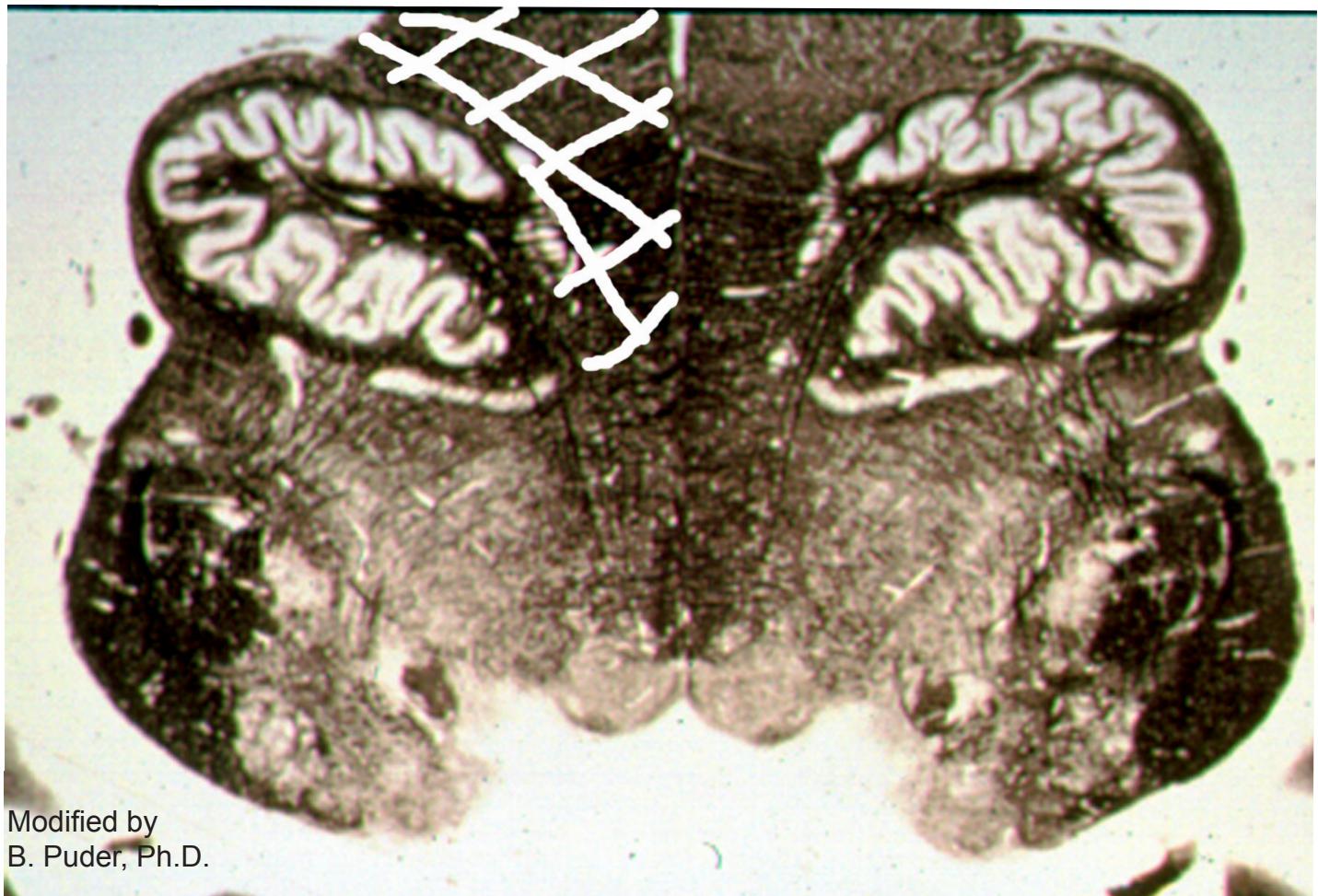
Structures Affected:

1. Anterior horns
2. Lateral Corticospinal tracts
3. Anterolateral system (spinothalamic tracts)

Clinical Manifestations:

1. Flaccid paralysis at this level (name the SC level)
2. Spastic paresis below lesion (name the SC level)
3. Loss of pain and temperature below lesion (name the SC level)

Medial Medullary Syndrome



Structures Affected:

1. Pyramids (corticospinal tracts)
2. Medial Lemniscus
3. Hypoglossal nerve roots

Clinical Manifestations:

1. Contralateral hemiparesis of body
2. Contralateral loss of tactile, vibratory and position sense to the body
3. Ipsilateral flaccid paralysis of the tongue

Lateral Medullary Syndrome

a.k.a. Wallenberg's syndrome, PICA syndrome



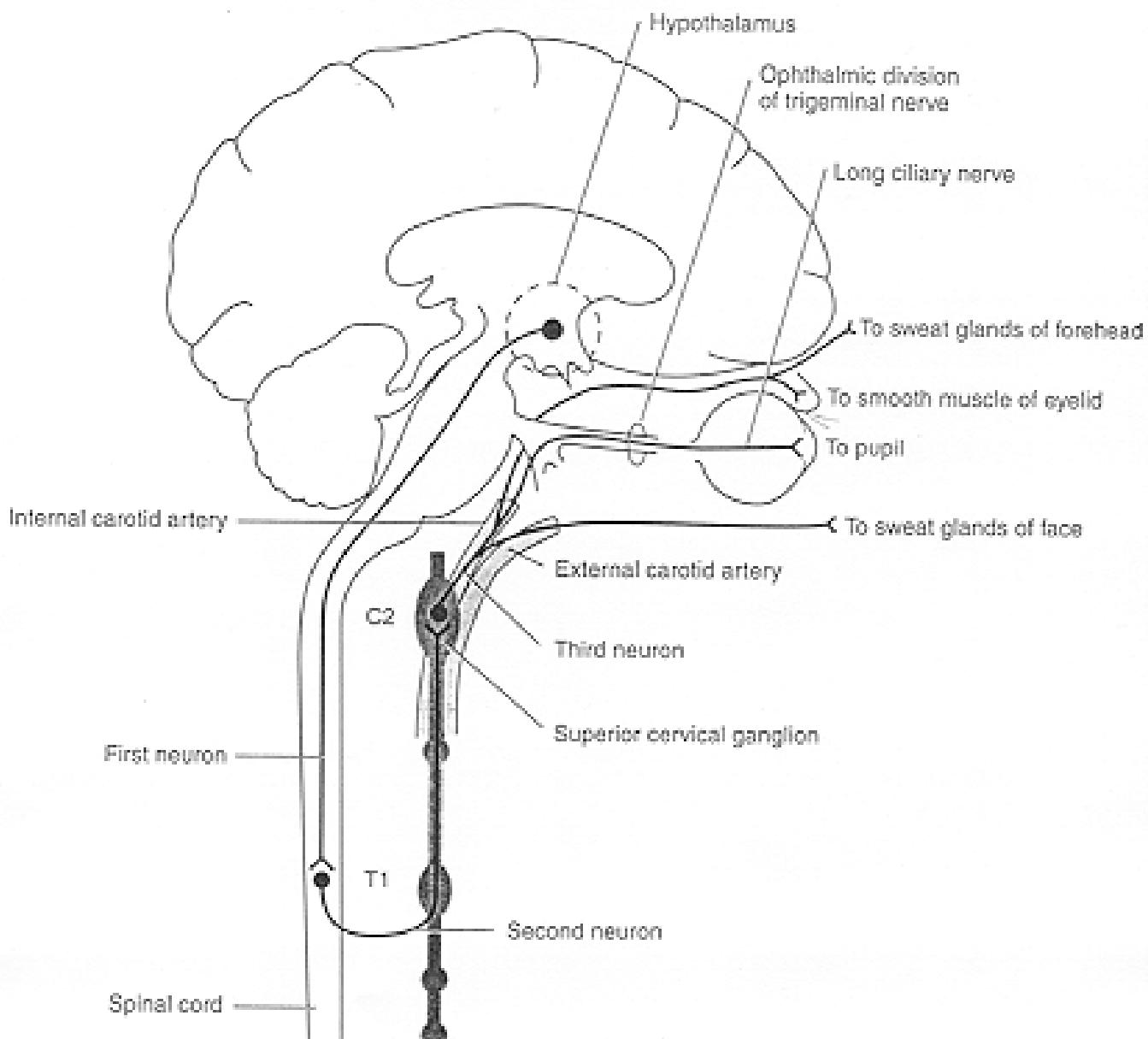
Structures Affected:

1. Inferior cerebellar peduncle
2. Nucleus ambiguus
3. Anterolateral system
4. Spinal trigeminal nucleus and tract
5. Lateral tectotegmentospinal tract
6. Vestibular nuclei

Clinical Manifestations:

1. Ipsilateral cerebellar signs (ataxia,dysmetria)
2. Ipsilateral flaccid laryngeal and pharyngeal paralysis (loss of gag reflex, dysarthria, dysphagia)
3. Contralateral loss of pain and temperature from the body
4. Ipsilateral loss of pain and temperature from the face
5. Horner's syndrome (ptosis, miosis, hemianhydrosis)
6. Nystagmus, nausea, vomiting, vertigo

Horner's syndrome



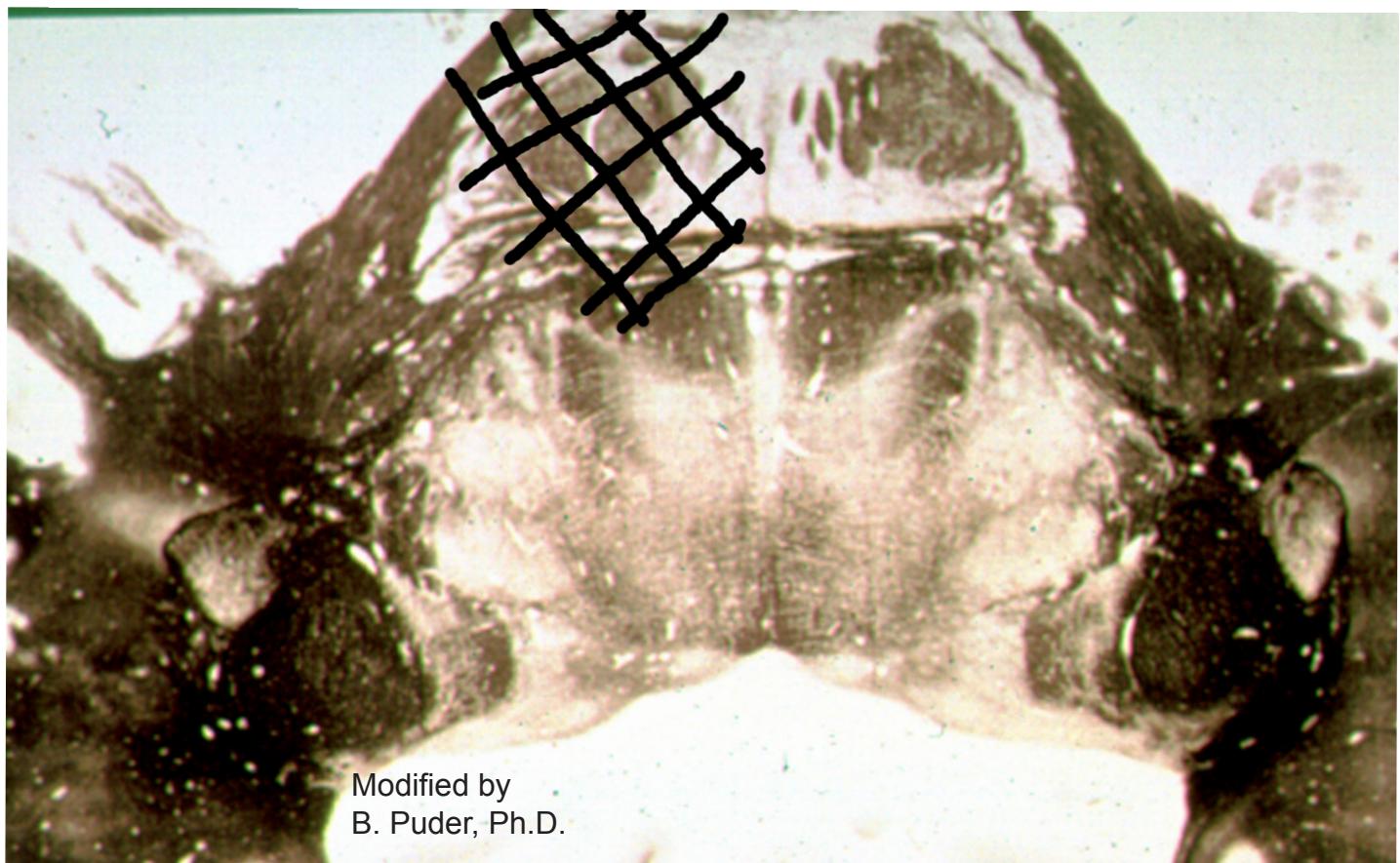
Horner's syndrome - a lesion to the sympathetic pathway to the face

The hypothalamus ultimately controls both the sympathetic and parasympathetic nervous systems. The axonal projections from the hypothalamus are called the tectotegmentospinal tracts. For sympathetic innervation, this tract travels through the brainstem and cervical spinal cord. It synapses on the intermediolateral nucleus (IML) at the thoracic T1 level. The cell bodies in the T1 IML project their axons up the chain ganglion and synapse in the superior cervical ganglion where these cell bodies send their axons around the carotid artery and back into the head.

A lesion anywhere along this pathway will cause loss of sympathetics to the face. Symptoms include ptosis (droopy eyelid), miosis (constricted pupil), anhydrosis (dry and flushed face).

If the lesion is in the lateral medulla, there will also be a Wallenberg's syndrome as well.

Medial Pontine syndrome



Structures Affected:

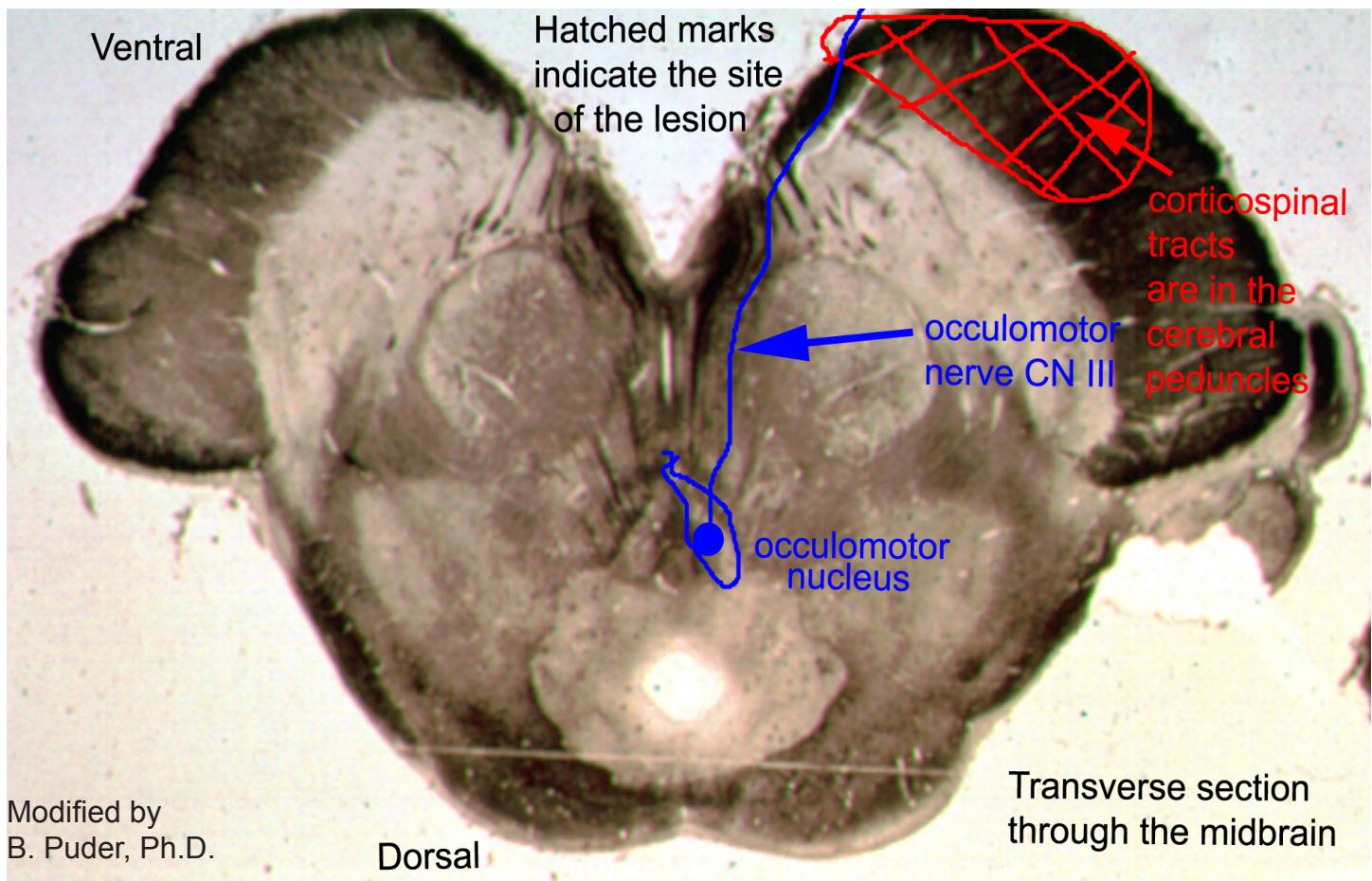
1. Abducens nerve root fibers
2. Corticospinal tract
3. Corticobulbar tracts
4. Medial Lemniscus

Clinical Manifestations:

1. Ipsilateral flaccid paralysis of lateral rectus muscle
2. Contralateral hemiplegia of body (hyperreflexia, spastic paralysis, Babinski sign)
3. Facial weakness
4. Contralateral loss of tactile, vibratory and position sense to the body

Medial Midbrain syndrome

a.k.a. Weber's syndrome, or Superior Alternating Hemiplegia



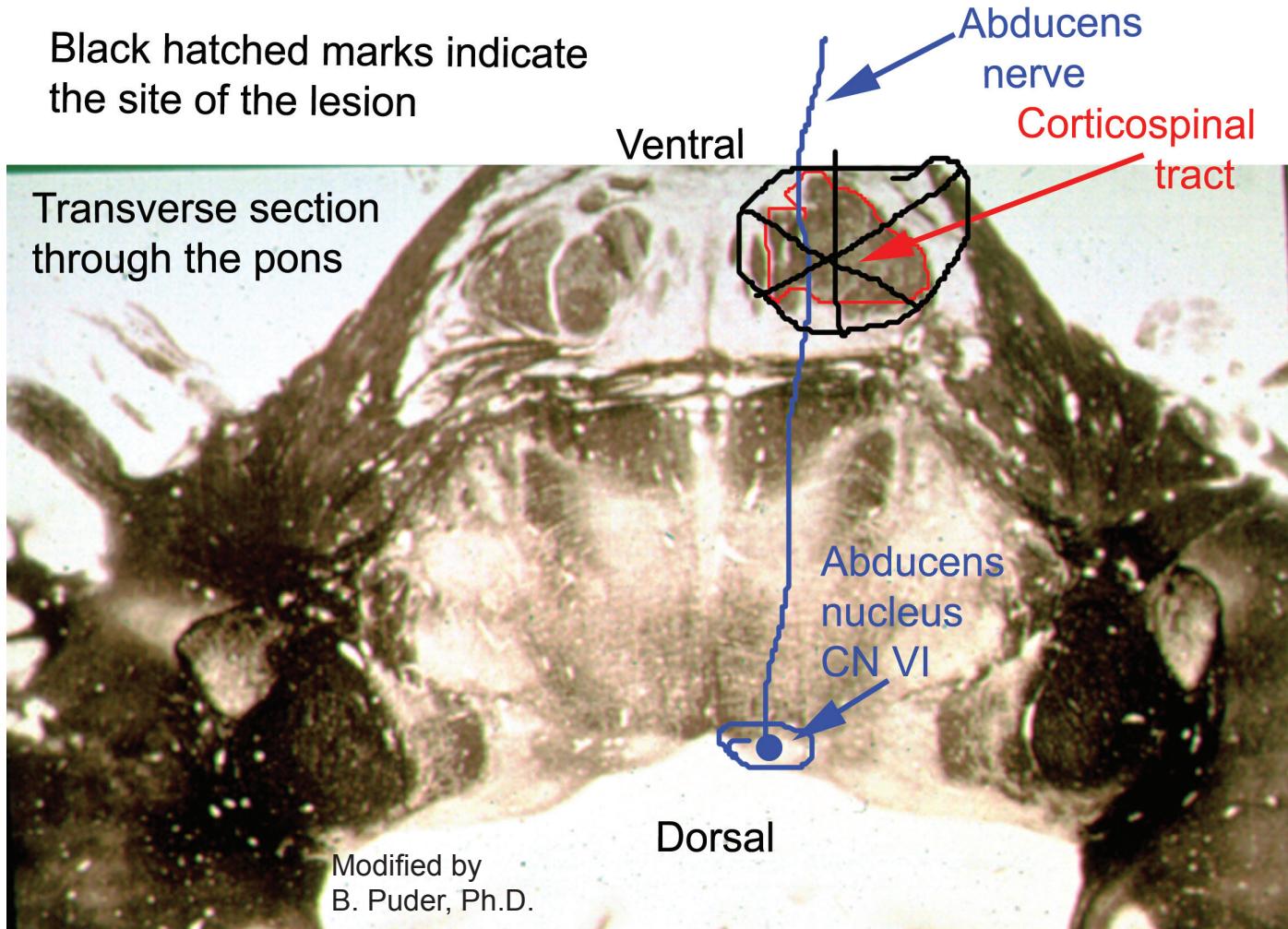
Structures Affected:

1. Oculomotor nerve root fibers
2. Corticospinal tracts

Clinical Manifestations:

1. Ipsilateral flaccid paralysis of medial rectus, inferior rectus, inferior oblique, superior rectus and levator palpebrae superioris muscles (eye will deviate laterally and inferiorly)
2. Contralateral hemiplegia of the body (hyper reflexia, spastic paralysis, Babinski sign)

Middle Alternating Hemiplegia



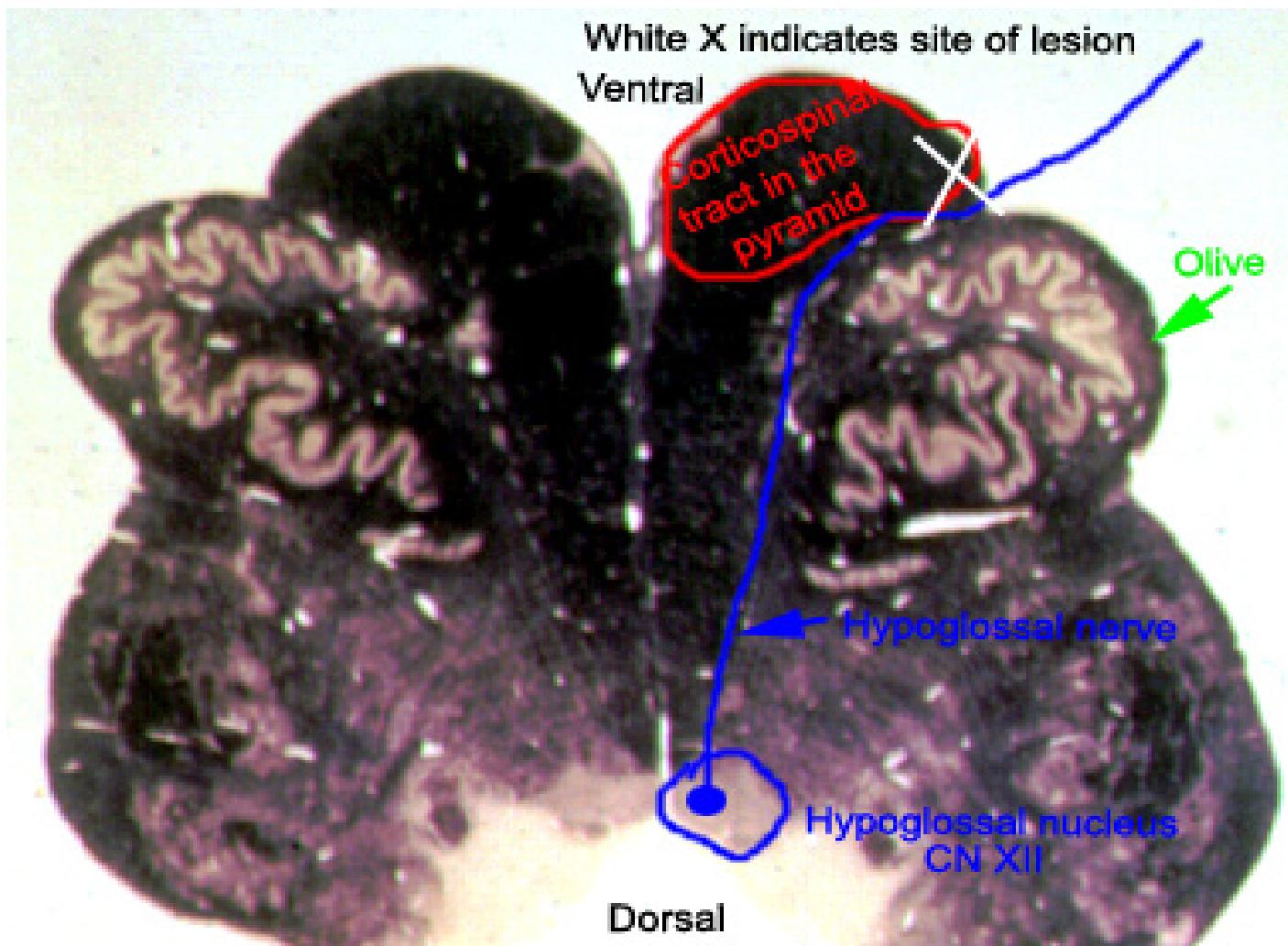
Structures Affected

1. Abducens nerve
2. Corticospinal tracts

Clinical Manifestations

1. Ipsilateral eye will deviate medially
2. Contralateral hemiplegia of the body (spastic paralysis, Babinski sign, hyperreflexia)

Inferior Alternating Hemiplegia



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B. Puder, Ph.D.

Transverse section through the medulla

Structures Affected

1. Hypoglossal nerve
2. Corticospinal tracts

Clinical Manifestations

1. Ipsilateral tongue muscles affected
Tongue will deviate to lesioned side
2. Contralateral hemiplegia of the body
(spastic paralysis, Babinski sign, hyperreflexia)