

THE CERVICAL SPINE

An Osteopathic Approach

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DISCLOSURES

There are no actual or potential personal, financial or legal conflict of interest in relation to this program or presentation





LEARNING OBJECTIVES

- Participate in the Osteopathic Workshop



Cervical Region Anatomy Review



TERMINOLOGY

Vertebral motion of the superior vertebrae on inferior vertebrae: Rotation (R) Ex: C2 refers to C2 in relation to C3

Anatomic Position: Neutral (N)

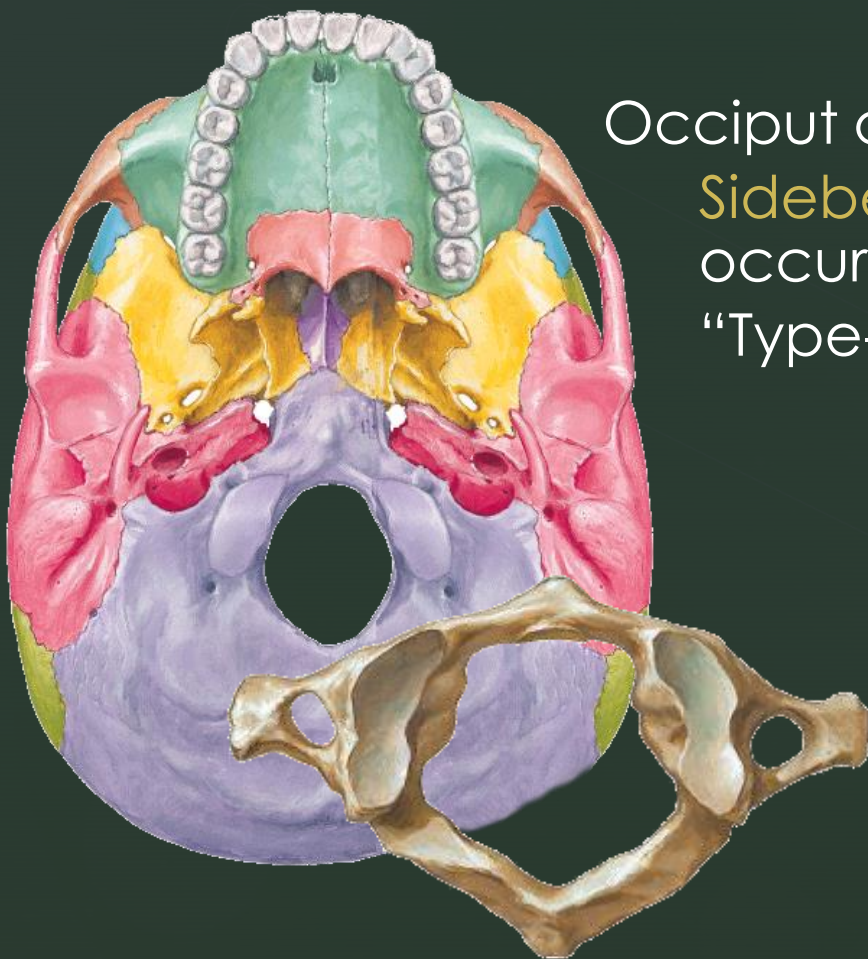
Forward bending: Flexion (F)

Backward bending: Extension (E)

Lateral Flexion: Sidebending (S)



OCCIPITO-ATLANTO (OA) JOINT



Occiput on C1 “Atlas”

Sidebending and rotation
occur to opposite sides

“Type-1-like”



ATLANTO-AXIAL (AA) JOINT



Articulation of C1 on C2

- C1 - "Atlas"
- C2 - "Axis"

Primary motion: **Rotation**

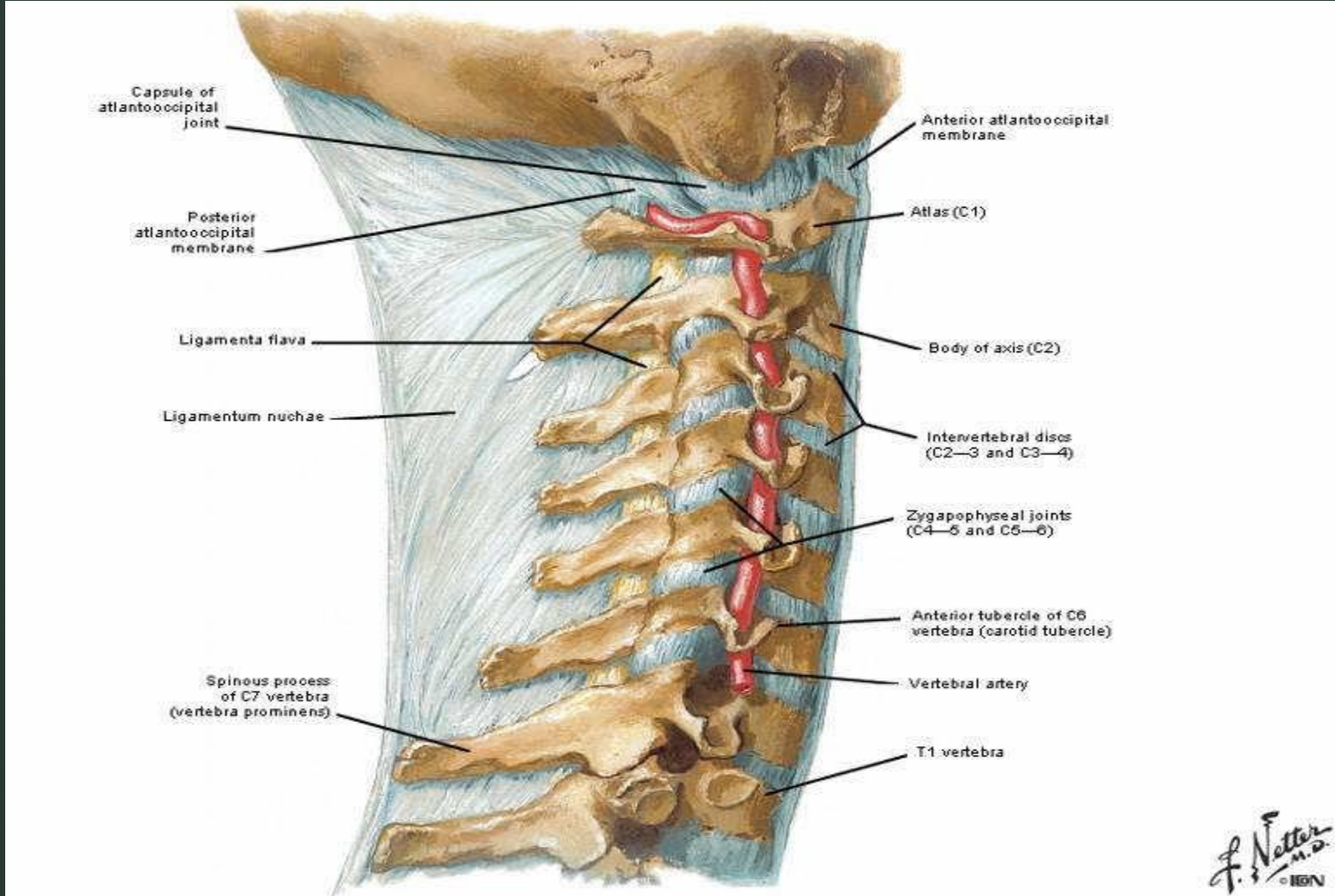
C1 "Atlas" articulates with **Dens** of C2 "Axis"



The Osteopathic Workshop



Vertebral Artery



Vertebral Artery

- Normal vertebral arteries can narrow as much as 90% of their luminal size on the contralateral side to cervical rotation
 - This is exacerbated in extension(backward-bending)!

▶ Occipito-Atlantal (C₀-C₁) *Test in Flexion & Extension*



Sidebend Left/Rotate Right



Sidebend Right/Rotate Left

▶ Atlanto-Axial (C₁-C₂)



Rotation Left



Rotation Right

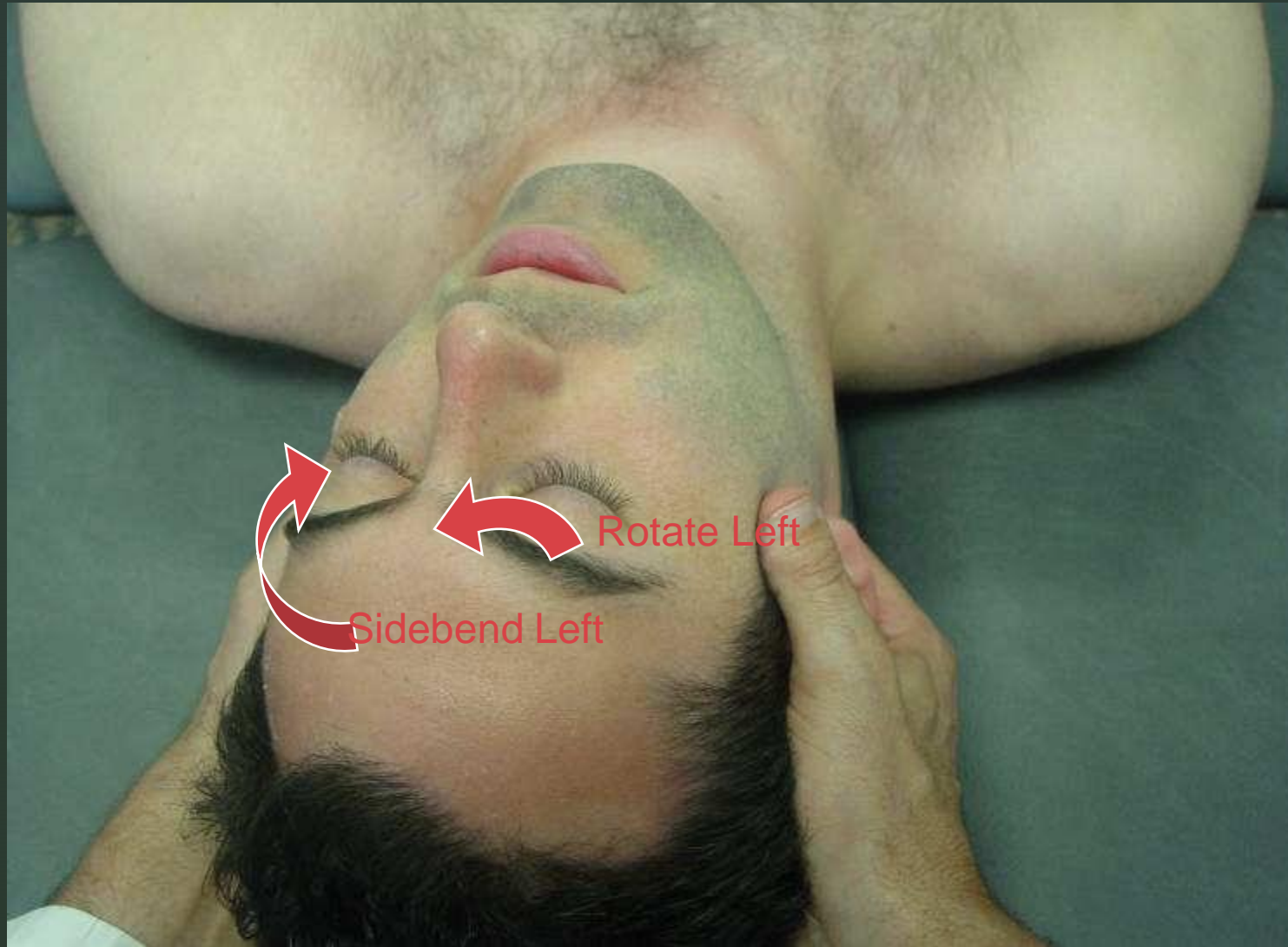
Sidebending Right- Translation Left C2/3-7



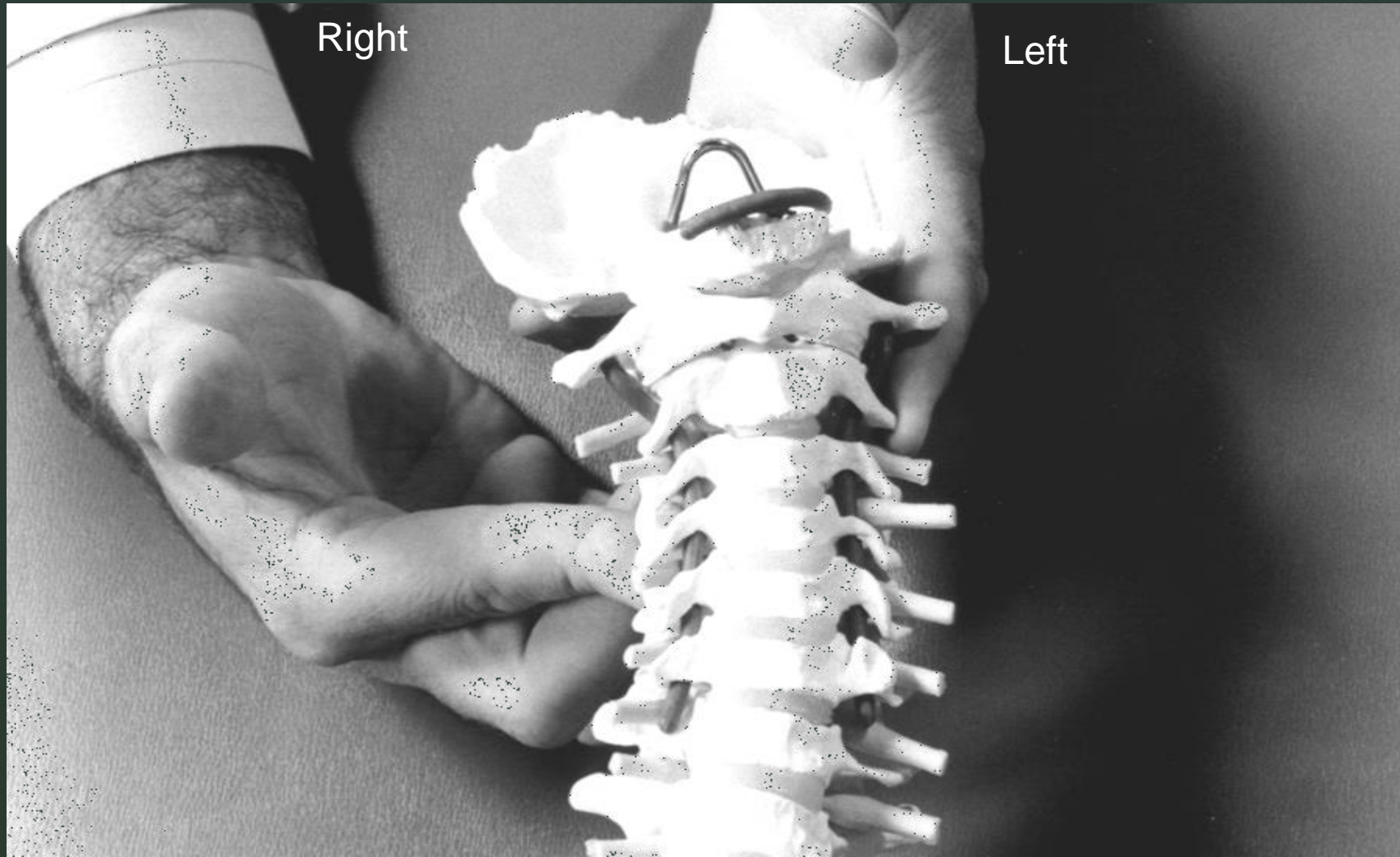
Sidebending Left-Translation Right C2-7



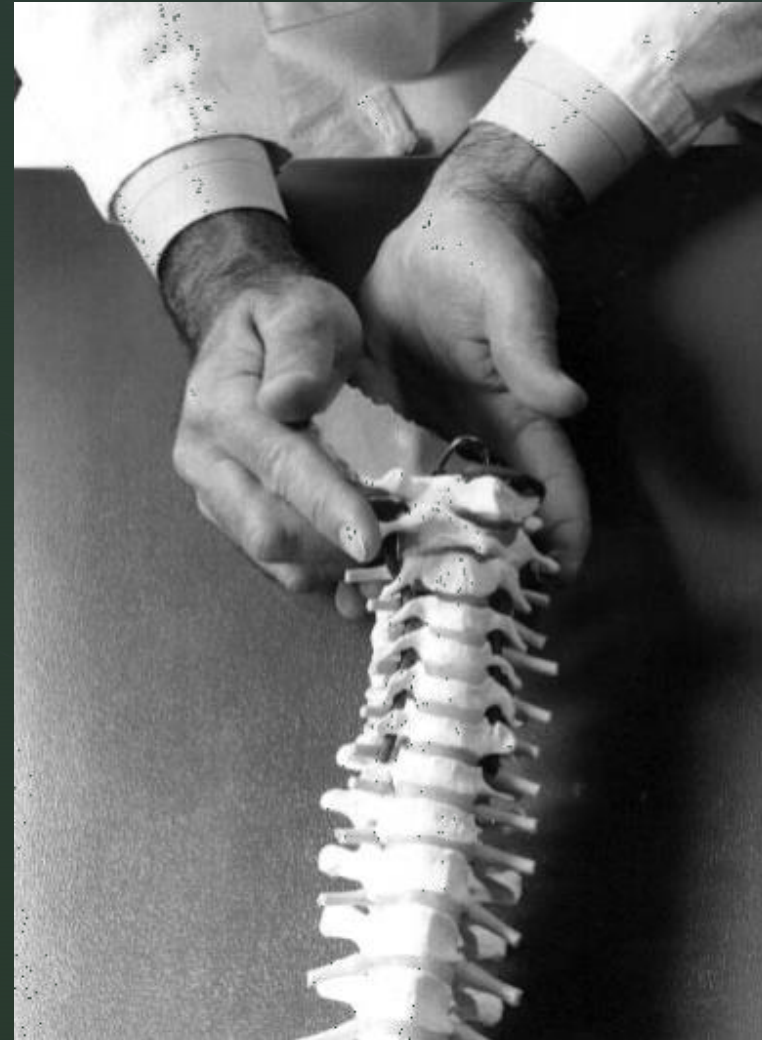
▶ Sidebend and Rotation Left



▶ Translation Left/Sidebending Right



▶ Rotation Left @ C1 on C2



DIAGNOSIS OF SOMATIC DYSFUNCTION

- T.A.R.T. is used in diagnosing somatic dysfunction. The following signs are assessed during the osteopathic examination:
 - **T** – Tenderness
 - **A** – Asymmetry (static finding)
 - **R** – Restricted range of motion (dynamic finding)
 - **T** – Tissue texture changes

BARRIERS TO MOTION

Anatomic Barrier

- The limit of motion imposed by anatomic structure (limit of passive motion)

Physiologic Barrier

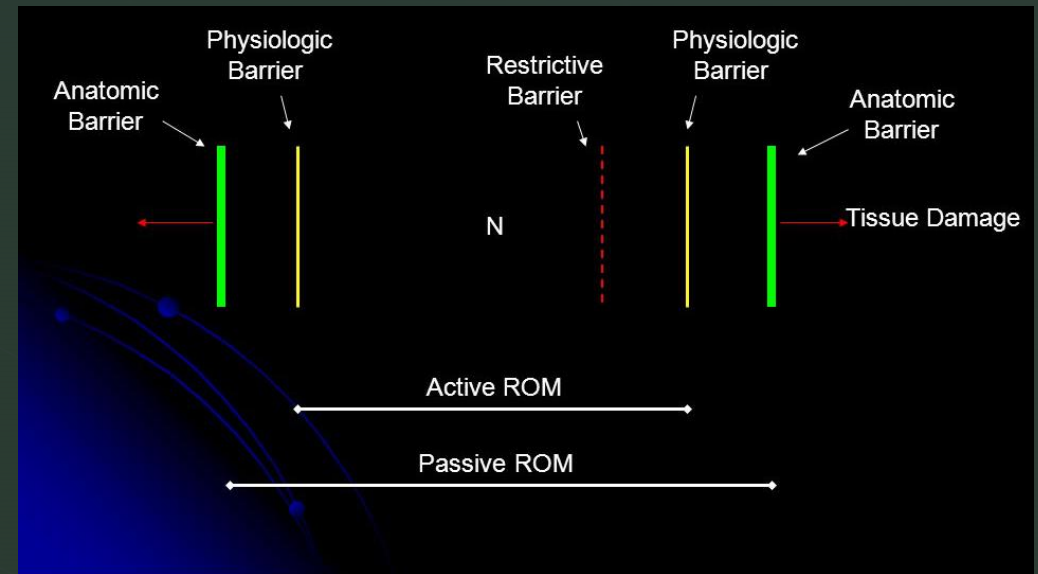
- The limit of active motion

Restrictive Barrier

- The functional limit within the anatomic and physiologic range of motion which abnormally diminishes the normal physiologic range of motion

Pathologic Barrier

- Permanent restriction of joint motion associated with pathologic changes of tissues (i.e. Osteophyte)



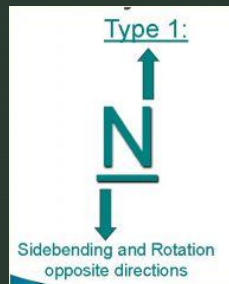
FREYETTE'S LAWS OF PHYSIOLOGIC MOTION

1st Law: Type I

Neutral
Several Segments (3 or more)
Sidebending/rotation opposite
Rotation into the convexity
Postural

2nd Law: Type II

Hyperflexion/hyperextension
1-2 Segments
Sidebending/rotation to the same
side
Rotation into the concavity
Traumatic



FE.

FREYETTE'S LAWS OF PHYSIOLOGIC MOTION

3rd Law

Inducing motion in one plane reduces or modifies the motion in the other two planes

OSTEOPATHIC MANIPULATIVE TREATMENT (OMT)

Direct	Indirect
<ul style="list-style-type: none">• Myofascial Release• Cranial (children)• Still• HVLA• Muscle Energy• Soft Tissue• LVMA/Articulatory• Springing	<ul style="list-style-type: none">• Myofascial Release• Cranial (adult)• Still• Counterstrain• FPR• LAS/BLT

OMT CONTRAINDICATIONS

Muscle Energy

- Muscle Tear
- Fracture
- Severely Ill

HVLA

- Absolute
 - Fracture
 - Metastasis
 - Rheumatoid Arthritis (AA)
 - Down Syndrome (AA)
- Relative
 - Rheumatoid Arthritis
 - Osteoarthritis
 - Osteoporosis
 - Disc Herniation

OSTEOPATHIC MANIPULATIVE TREATMENT (OMT)

- Myofascial Techniques • Longitudinal stretch • Perpendicular stretch • Mobilization (figure eight, traction) • Suboccipital tension release
- Soft Tissue Techniques • OA Suboccipital Release • Longitudinal Stretching • Perpendicular Stretching
- Counterstrain
- Muscle Energy
 - MET for OA • Same set up as HVLA into all three planes of motion. • 3-5 seconds of isometric contraction. • Post isometric relaxation stretching. • Repeat. • Final stretch
 - for AA • AA is rotational only • Flatten AP curve. • Rotate to barrier. • Patient rotates into ease (dysfunction.)
- HVLA
 - Glide head on condyles into Flexion or Extension barrier. • Sidebend to barrier. • Rotate to barrier. • Short rotational thrust through barrier in direction of ipsilateral eye
 - for AA • Flatten AP curve (DO NOT Flex.) • Rotate to barrier. • Short Thrust through rotational barrier

COUNTERSTRAIN

- Find tenderpoint
- Position of comfort (70-100%)
- Hold for 90 secs (120 secs for ribs)
- Slow, passive return to neutral
- Recheck tenderpoint
 - Anterior points usually treated with flexion
 - Posterior points usually treated with extension

Tender Point	Location	Treatment Position
AC1	Posterior surface of mid-ramus	RA
AC2 – AC6	Anterior transverse process	F SA RA
AC7	Clavicular attachment of SCM	F ST RA
AC 8	Sternal attachment of SCM	F SA RA

COUNTERSTRAIN

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- Slow, passive return to neutral
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Tender Point	Location	Treatment Position
PC1 Inion	On Inion	F
PC1 lateral	Midway between inion and mastoid	E SA RA
PC2 lateral	Within semispinalis capitis muscle	E SA RA
PC2 midline	Superior aspect of spinous process	E SA RA
PC3 midline	Infero-lateral to C2 spinous process	F SA RA or F ST RAW
PC4 – PC8 midline	Inferior aspect of spinous process	E SA RA

ATLANTO-OCCIPITAL (OA) JOINT FLEXION/EXTENSION

Occipito-Atlantal Evaluation (continued)

Fig. 7.16.A, B. Flexion and extension at the occipito-atlantal joint.

The occipital condyles slide on the lateral masses of the atlas.

(Reprinted with permission from Kapanji IA. *The Physiology of the Joints*, Vol. III. Churchill Livingstone, 1974.)

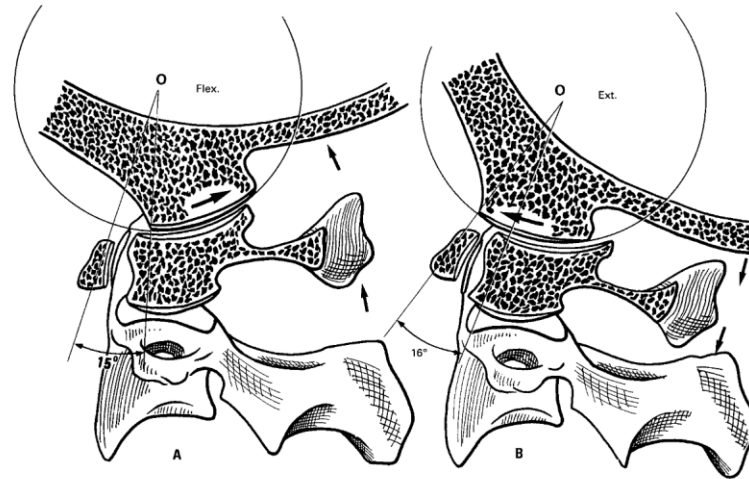


Fig. 7.16.A. Flexion at the occipito-atlantal joint.

During flexion the occipital condyles recede on the lateral masses of the atlas and, at the same time, the occipital bone moves away from the posterior arch of the atlas. As the latter movement is always associated with extension in the atlanto-axial joint, the posterior arches of the atlas and axis become more widely separated. Flexion is limited by the tension developed in the articular capsules and the ligaments (the posterior atlanto-occipital membrane and the posterior cervical ligament).

Fig. 7.16.B. Extension at the occipito-atlantal joint.

During extension the occipital condyles slide anteriorly on the lateral masses of the atlas. At the same time the occipital bone moves nearer to the posterior arch of the atlas and, as the atlanto-axial joint is also extended, the posterior arches of the atlas and axis are approximated. Extension is limited by the impact of these three bony pieces. During forced extension the posterior arch of the atlas can be caught as in a nutcracker and fractured. The total range of flexion and extension for the OA joint is 15 degrees. The atlanto-axial joint contributes another 17 degrees to total neck flexion and extension (about 135 degrees).

OA DIAGNOSIS

Positioning: grasp the patient's head with both hands, with the fingertips of the index and middle fingers over the **occipital articulations**

- The **OA** joint will be assessed in the **neutral**, **flexed** and **extended** positions
- Perform **translation**
 - Right translation = Left sidebending
 - Left translation = Right sidebending
- Diagnosis = position of ease (e.g., OA **FRLSR**)



MUSCLE ENERGY FOR OA

Diagnosis: OA XRLSR or XRRSL (where X = flexed or extended)

- Position patient against the **restrictive barrier**
- Support the patient's head the same hand positioning as diagnosis
- Have the patient **sidebend their head away** from the direction you are sidebending them for 3-5 seconds
 - Complete relaxation
- Establish **new barrier**
- Repeat 3-5 times
 - Final stretch then retest



MUSCLE ENERGY FOR FLEXED OA

Diagnosis: OA FRLSR or FRRSL

- Position patient against the **restrictive barrier**
- Support the patient's head with one hand and position the other's fingers **beneath their chin**
- Have the patient nod their **chin into your fingers** for 3-5 seconds
 - Complete relaxation
- Establish **new barrier**
- Repeat 3-5 times
 - Final stretch then retest



MUSCLE ENERGY FOR EXTENDED OA

Diagnosis: OA ERLSR or ERRSL

- Position patient against the **restrictive barrier**
- Support the patient's head with one hand and position the other's fingers on the **front of their chin**
- Have the patient nod their **chin into your fingers** for 3-5 seconds
 - Complete relaxation
- Establish **new barrier**
- Repeat 3-5 times
 - Final stretch then retest



AA DIAGNOSIS

Positioning: markedly **flex** patient's head forward to reduce rotation in lower vertebrae

- Passively **rotate** patient's head to the motion barrier on each side
- Compare **degree of restriction** in rotation to **right** and **left**
- Diagnosis = position of ease (e.g., AA RL or RR)



MUSCLE ENERGY FOR AA

Diagnosis: AA RL or RR

- Position patient against the **restrictive barrier**
- Support the patient's head using the same hand positioning as diagnosis
- Have the patient **rotate their head away** from the direction you are rotating them for 3-5 seconds
 - Complete relaxation
- Establish **new barrier**
- Repeat 3-5 times
 - Final stretch then retest



MUSCLE ENERGY AND THE OCULOCEPHALOGYRIC REFLEX

Eye movements affect the cervical musculature as the body attempts to follow the lead provided by eye motion

Diagnosis:

OA FRLSR or FRRSL
AA RL or RR



- Position patient against the **restrictive barrier**
- Have the patient look to the **opposite** of the barrier for 3-5 secs
 - Complete relaxation
- Establish **new barrier**
- Repeat 3-5 times
 - Final stretch then retest

MUSCLE ENERGY FOR C2-C7

Diagnosis: C2 FRRSR

- Position patient against the **restrictive barrier**
- Have the patient **rotate their head away** from the direction you are rotating them for 3-5 seconds
 - Complete relaxation
- Establish **new barrier**
- Repeat 3-5 times
 - Final stretch, retest



Regional Testing (Clinical Pearls)

- If flexion-extension limitation with less sidebending/rotation loss, think
 - OA
- If a patient presents with neck pain and on physical exam demonstrates only rotational limitation, think
 - A-A dysfunction
- If mostly sidebending limitation with some limitation of rotation, think
 - C2-7



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