PREGNANCY AND OSTEOPATHIC MANIPULATIVE MEDICINE: OPTIMIZING STRUCTURE TO MAXIMIZE FUNCTION

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DISCLOSURES

- Aquifer
  - DO Affinity Group Co-Chair
  - Member of Clinical Excellence Board

LEARNING OBJECTIVES

After completing this learning activity, the attendee will be able to:

1. Describe osteopathic principles as they relate to the pregnant patient, in particular the Osteopathic tenet that structure and function are interrelated.
2. Explain the viscerosomatic and lymphatic considerations that apply to the obstetrics.
3. Evaluate research of Osteopathic Manipulative Medicine and pregnancy through analysis of the PROMOTE trial.
4. Develop a strategy for addressing common somatic dysfunction in these patients and discover how utilizing simple and effective OMT in these patients leads to improved outcomes and enhanced patient satisfaction.
5. Integrate osteopathic principles to develop a unique assessment and plan for the obstetric patient.

OSTEOPATHY'S ROLE

- Pregnancy is an excellent illustration of the relationship between structure and function.
- More than half of all pregnant patients report some musculoskeletal pain during pregnancy.
- Adding osteopathic manipulative approaches to the care of pregnant patients has many benefits.
- During labor and delivery, patients are at risk for significant and potentially long-term somatic dysfunction.

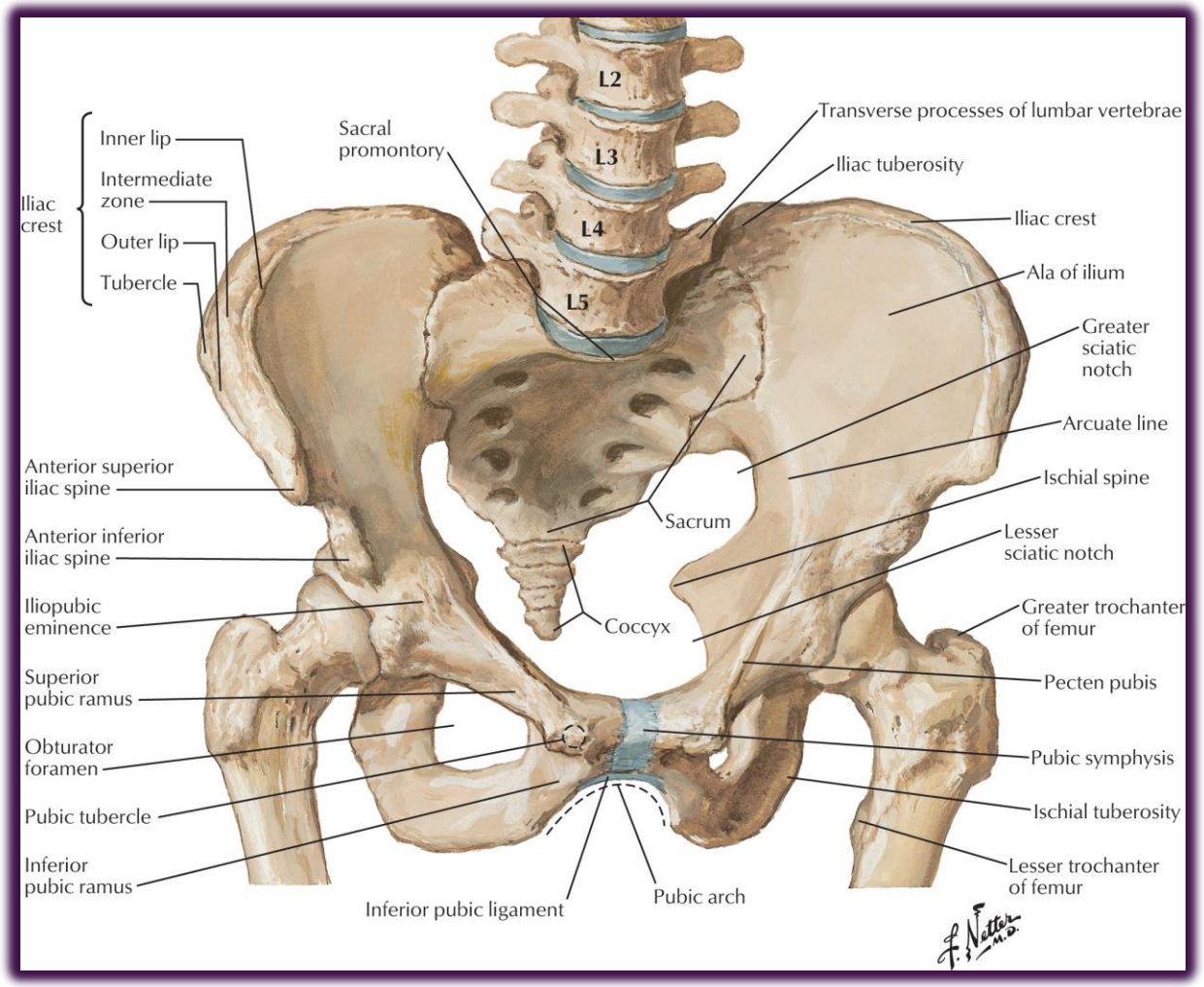
OSTEOPATHIC OBSTETRIC CARE

- Individualizes care and helps the patient to be as healthy as possible to create a successful pregnancy and labor/delivery experience.
- Includes comprehensive medical care incorporating best practices and established guidelines.
- Maximizes the pregnant patient's full health potential by addressing the structure and function of the body and respecting the inherent ability of the body to self-regulate.
- Considers the body, mind, and spirit of not only the patient, but the whole family.

STRUCTURE AND FUNCTION

- Pregnancy-related changes affect more than the pelvis.
- Mobility and maximal range of motion sets the stage for healthy pregnancy, labor, delivery, and breastfeeding.
- Relieving lymphatic congestion tackles multiple signs and symptoms.

BONY FRAMEWORK OF PELVIS



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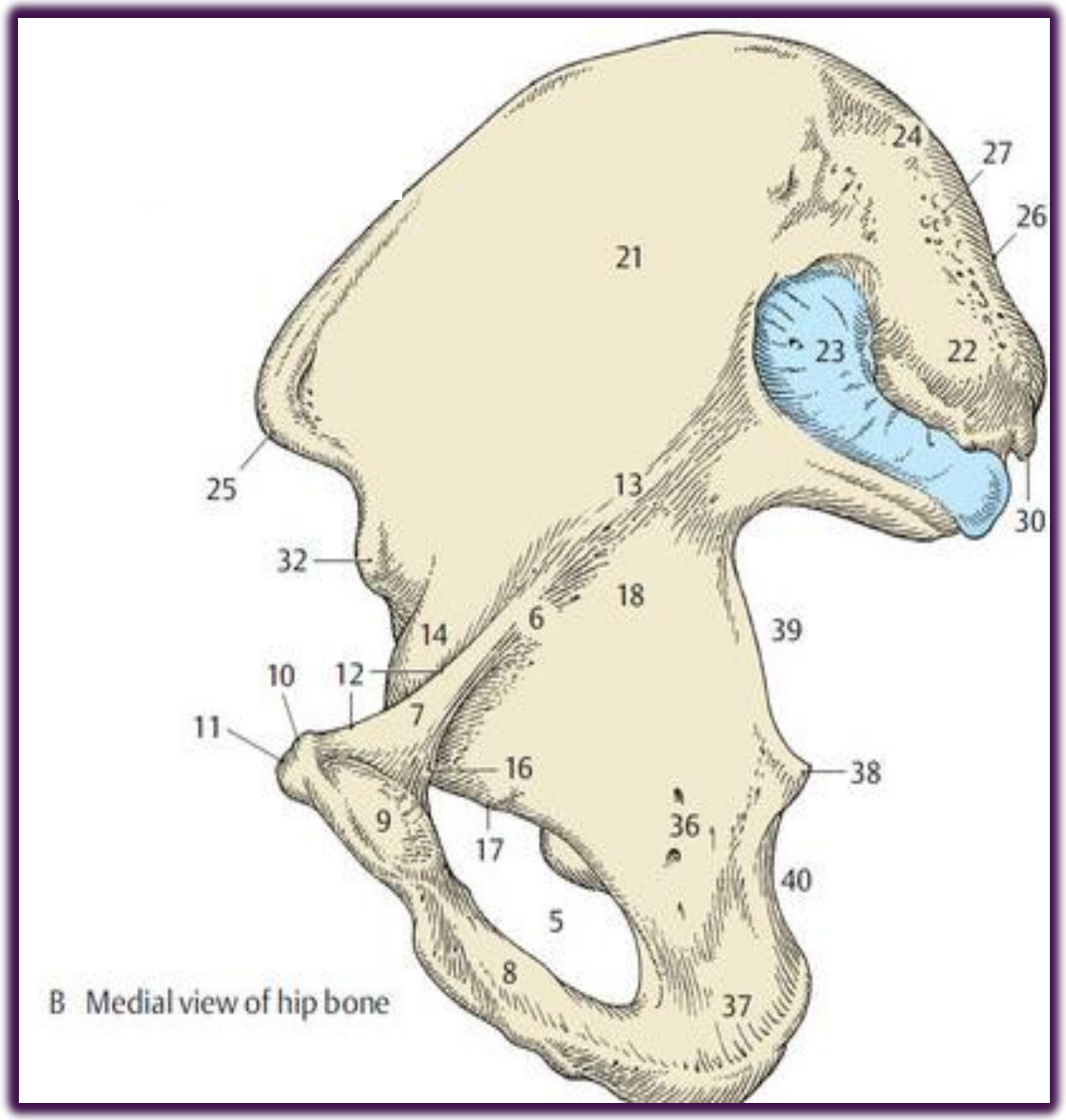
THE SACROILIAC JOINT: ILIAL ASPECT



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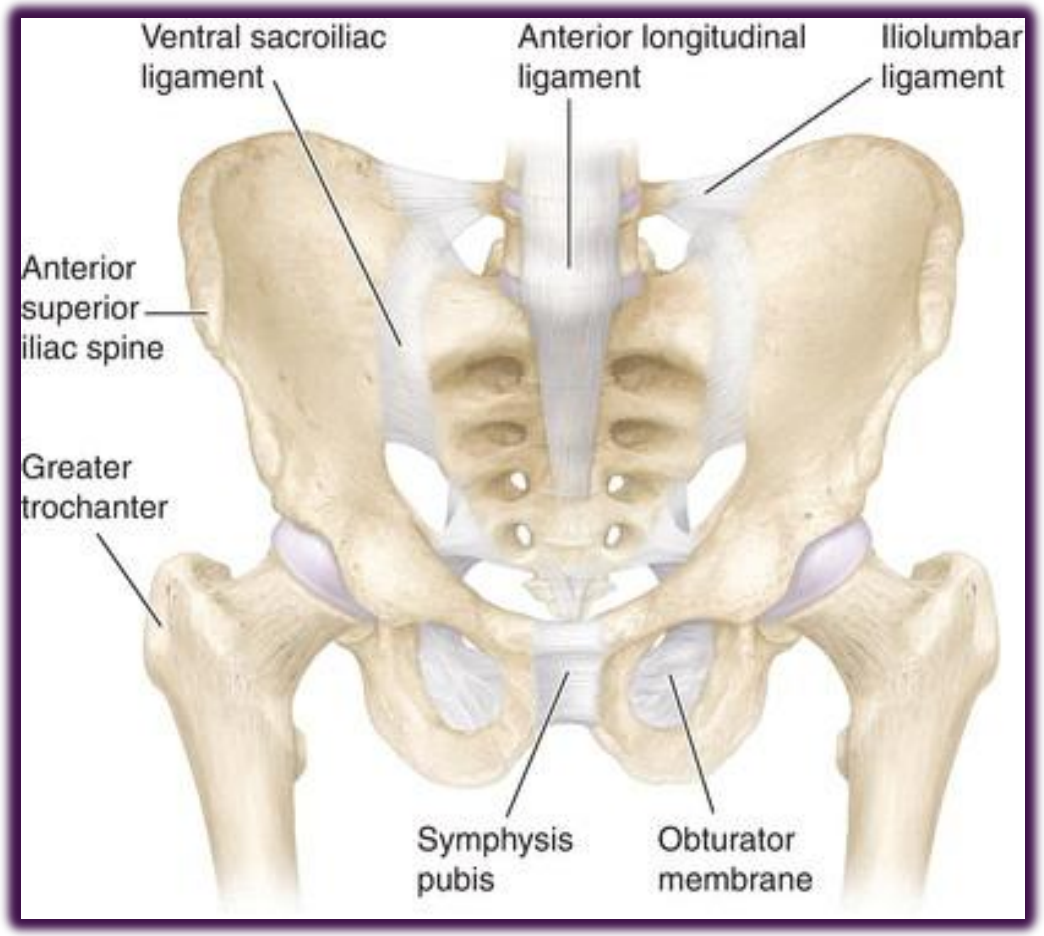
THE SACROILIAC JOINT: SACRAL ASPECT

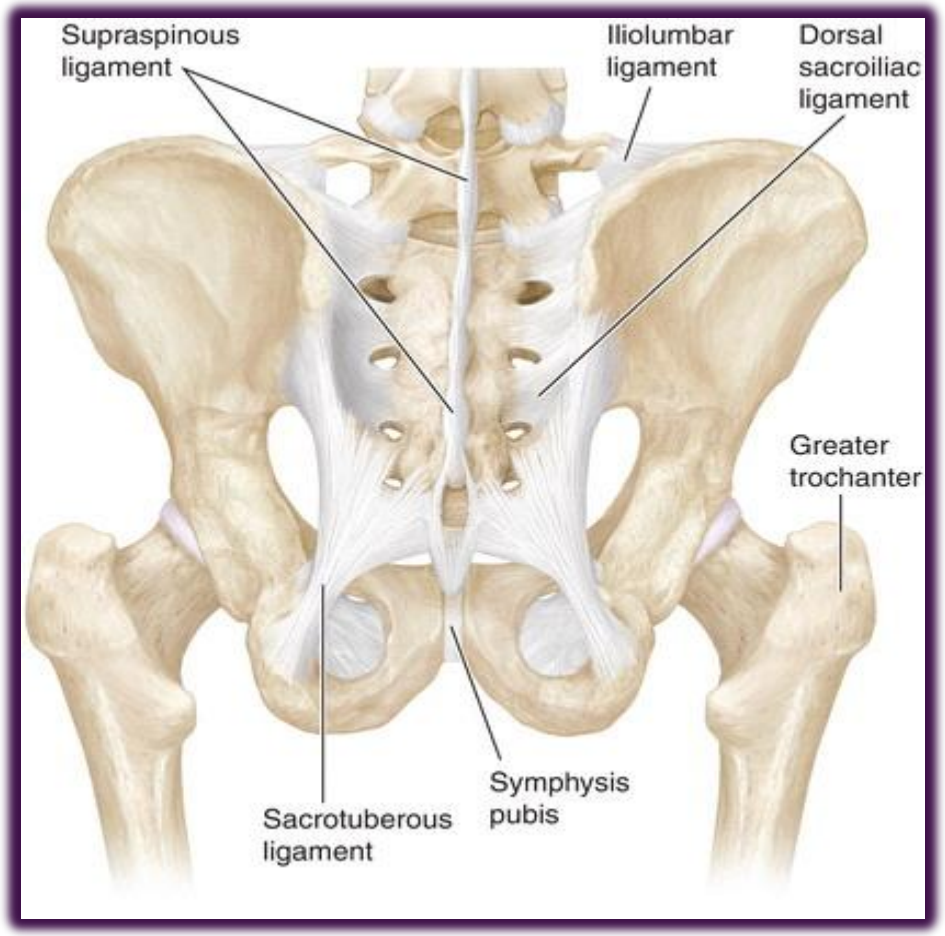
Greenman's Principles of Manual Medicine, 5th Edition. Lisa DeStefano. 2017 Wolters Kluwer.

LIGAMENTS OF THE PELVIS

- True pelvic ligaments
  - Anterior, posterior, and interosseous sacroiliac ligaments surround and stabilize the SI joint
- Accessory pelvic ligaments
  - Sacrotuberous ligament
  - Sacrospinous ligament
  - Iliolumbar ligaments

BONES AND LIGAMENTS OF THE PELVIS





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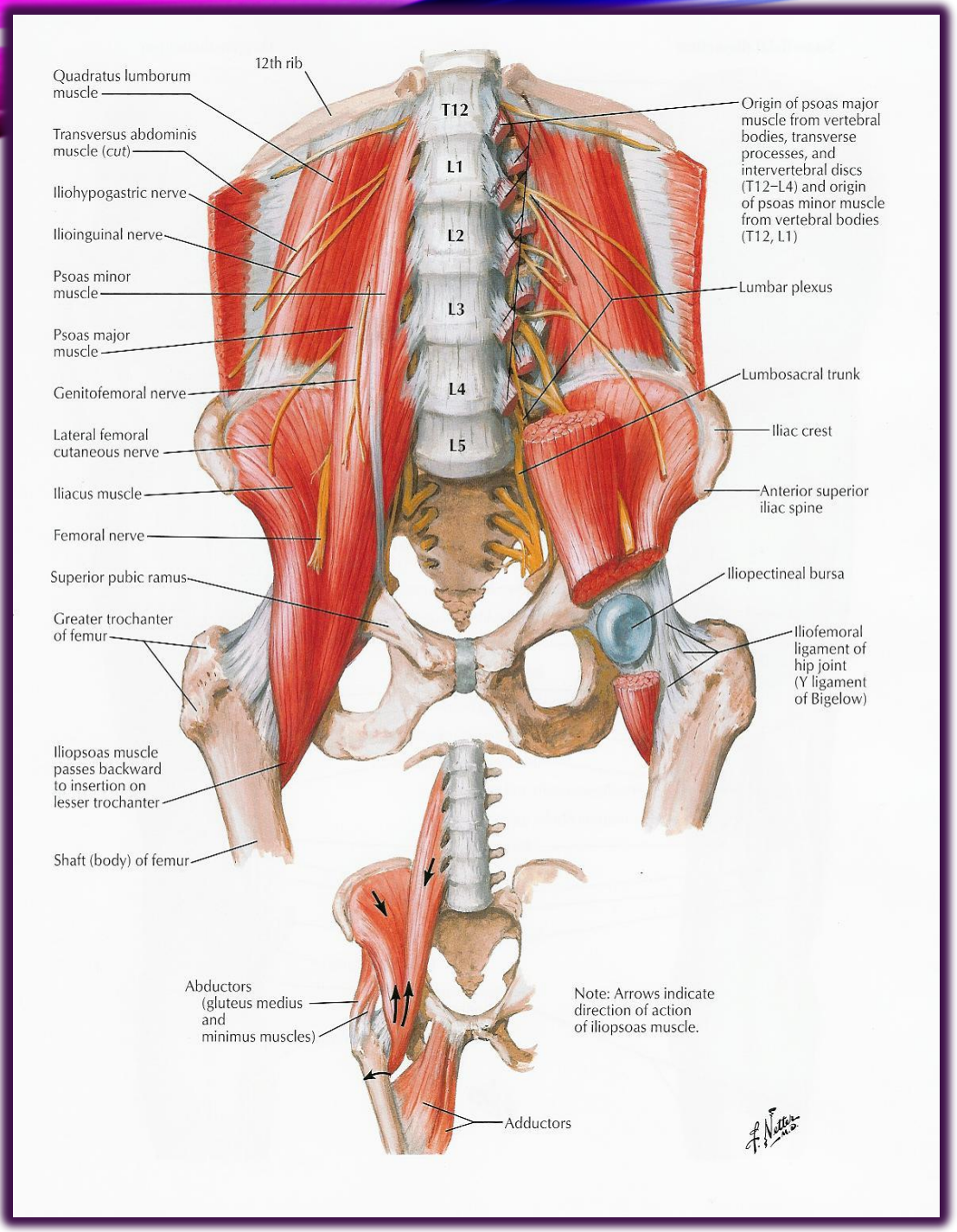
MUSCULAR ANATOMY

- Iliopsoas
- Piriformis
- Lumbar and sacral paraspinals
- Abdominals
- Pelvic diaphragm



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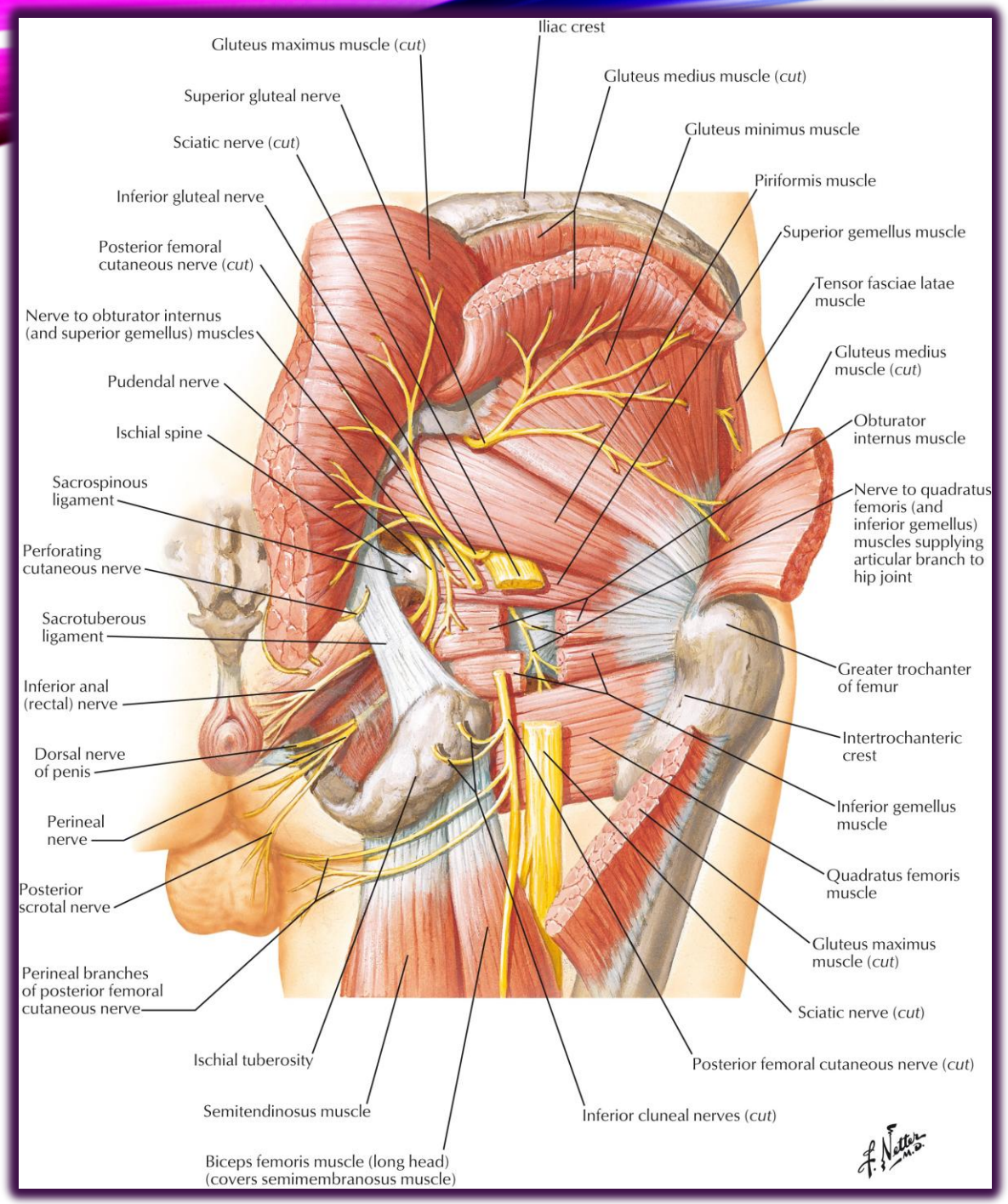

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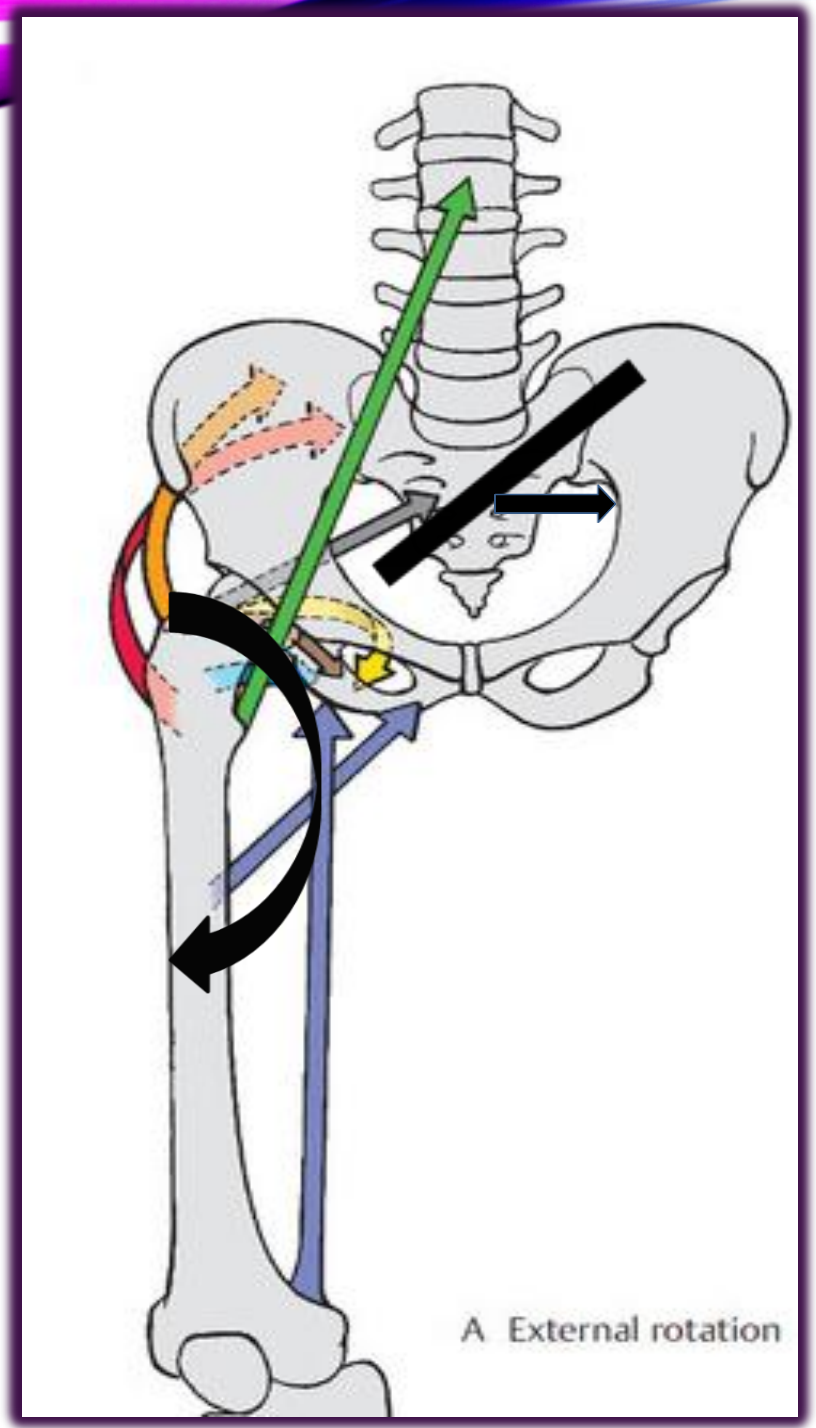
ACTION OF THE PIRIFORMIS



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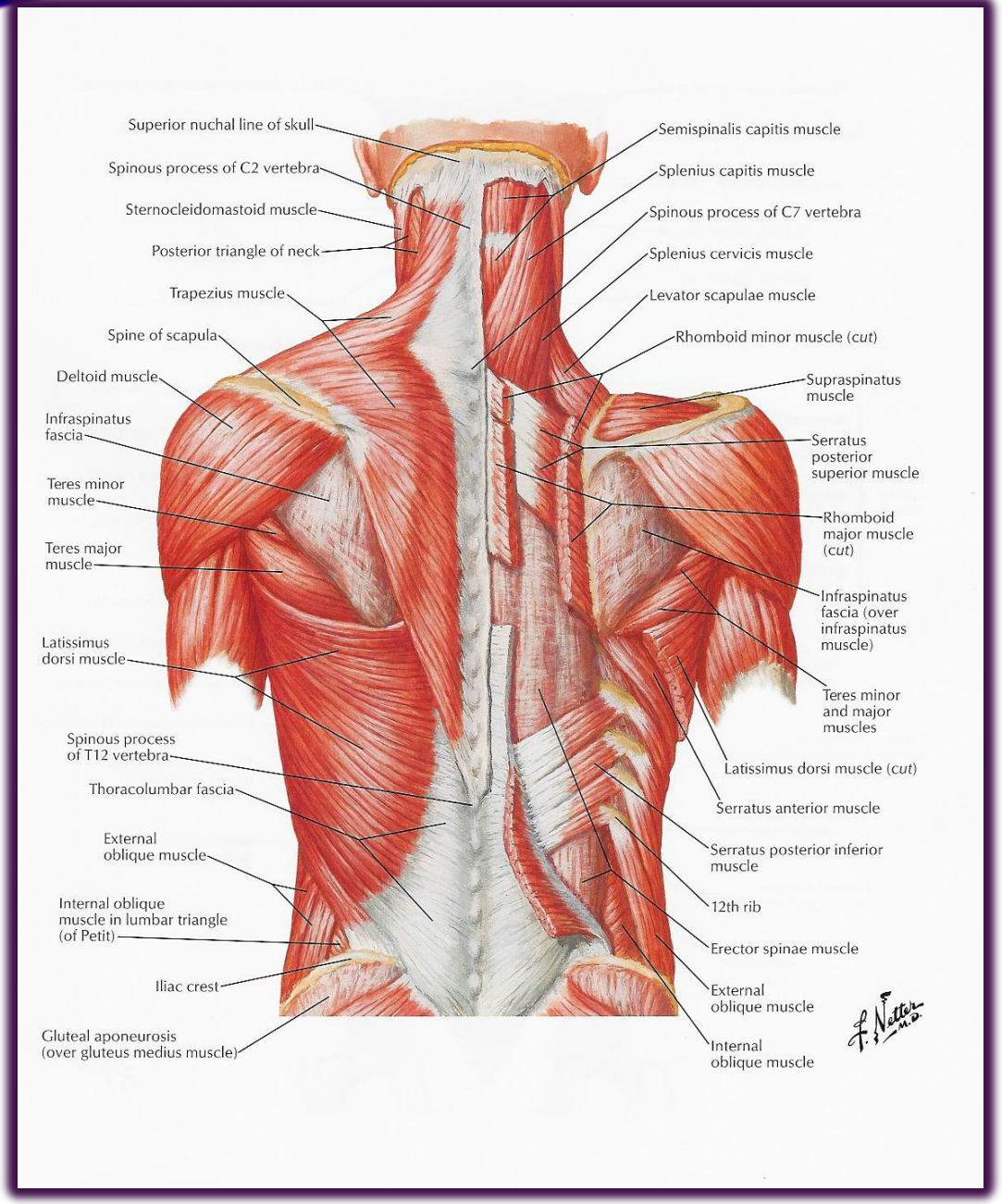
POSTERIOR MUSCLE LAYERS

- First Layer
  - Latissimus dorsi
- Second Layer
  - Serratus anterior
- Third Layer
  - Erector spinae
    - spinalis, longissimus, iliocostalis
- Fourth layer
  - Multifidus & rotatores

FIRST AND SECOND LAYER MUSCLES OF THE BACK



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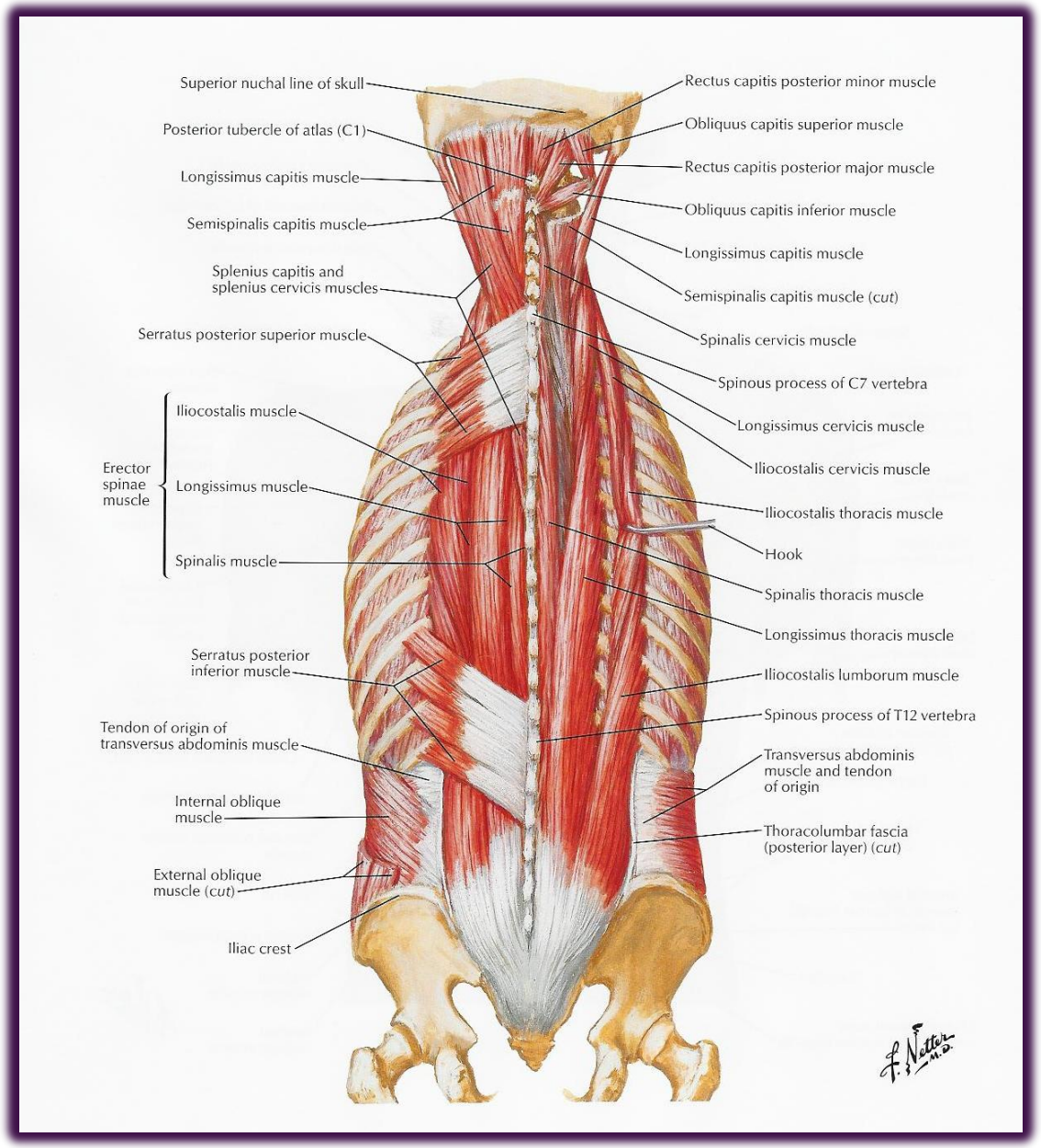
THIRD LAYER MUSCLES OF THE BACK



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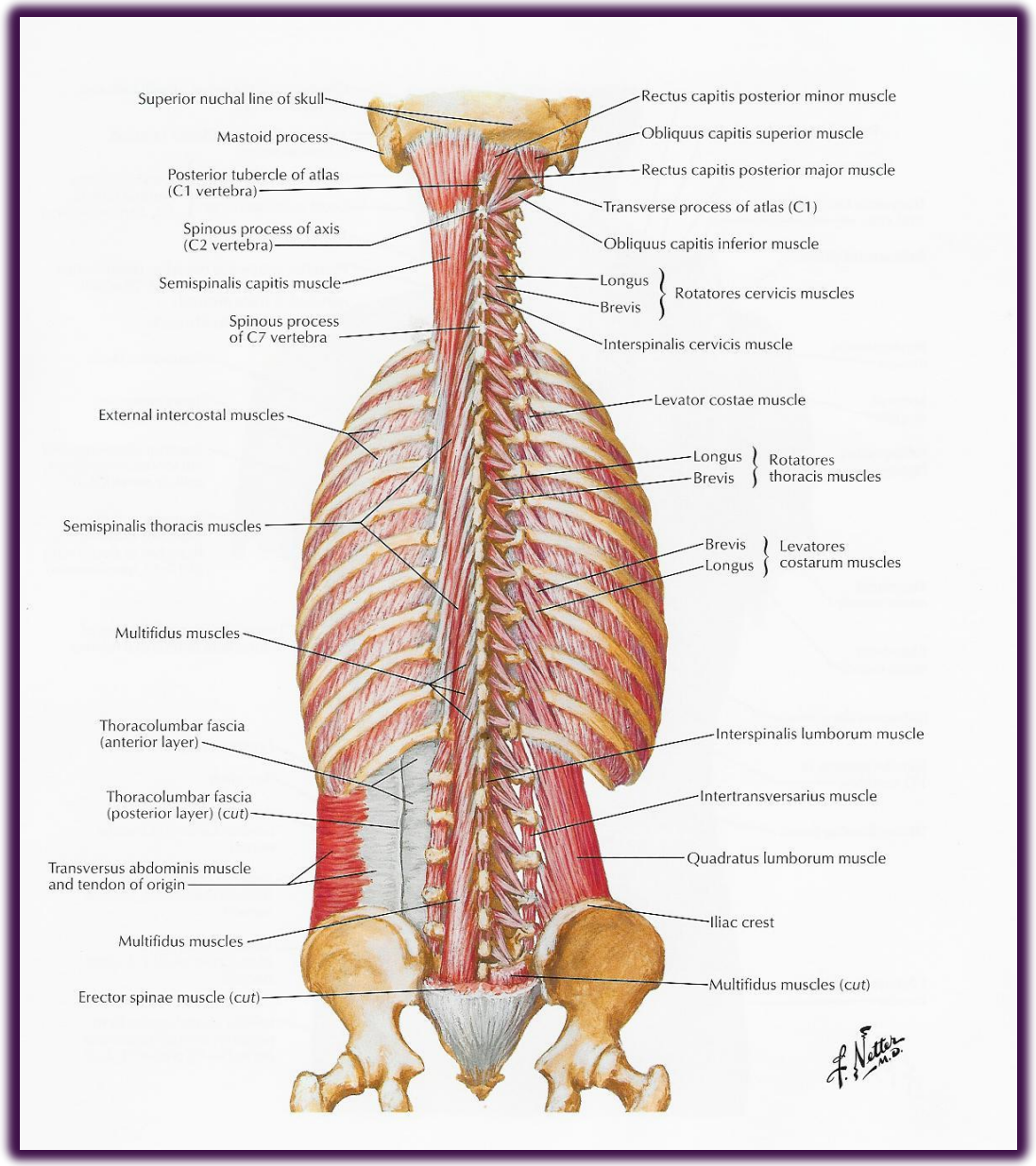
FOURTH LAYER MUSCLES OF THE BACK



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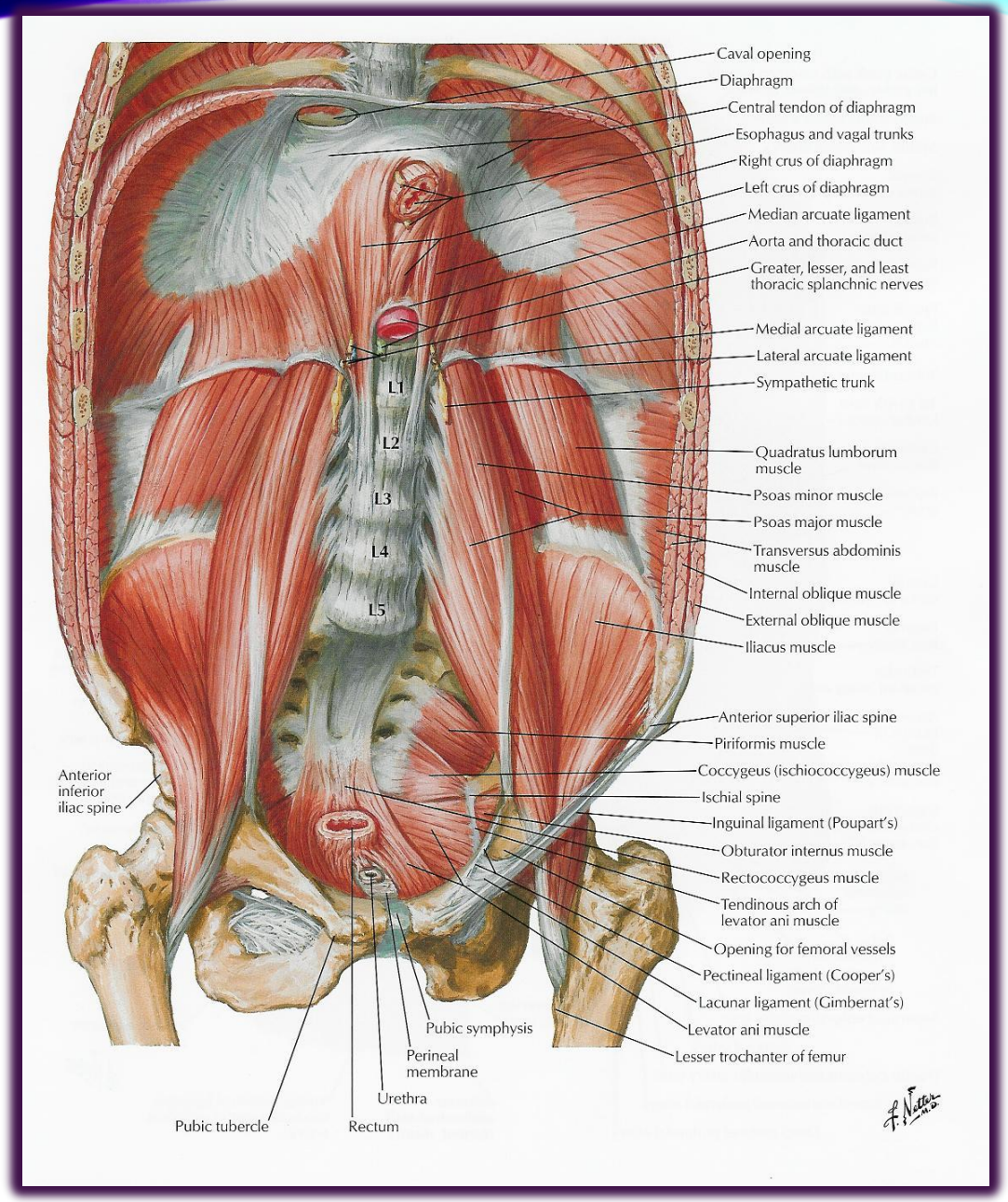
MUSCLES OF THE DIAPHRAGM, POSTERIOR ABDOMINAL WALL, AND PELVIS



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RECTUS ABDOMINUS AND LINEA ALBA

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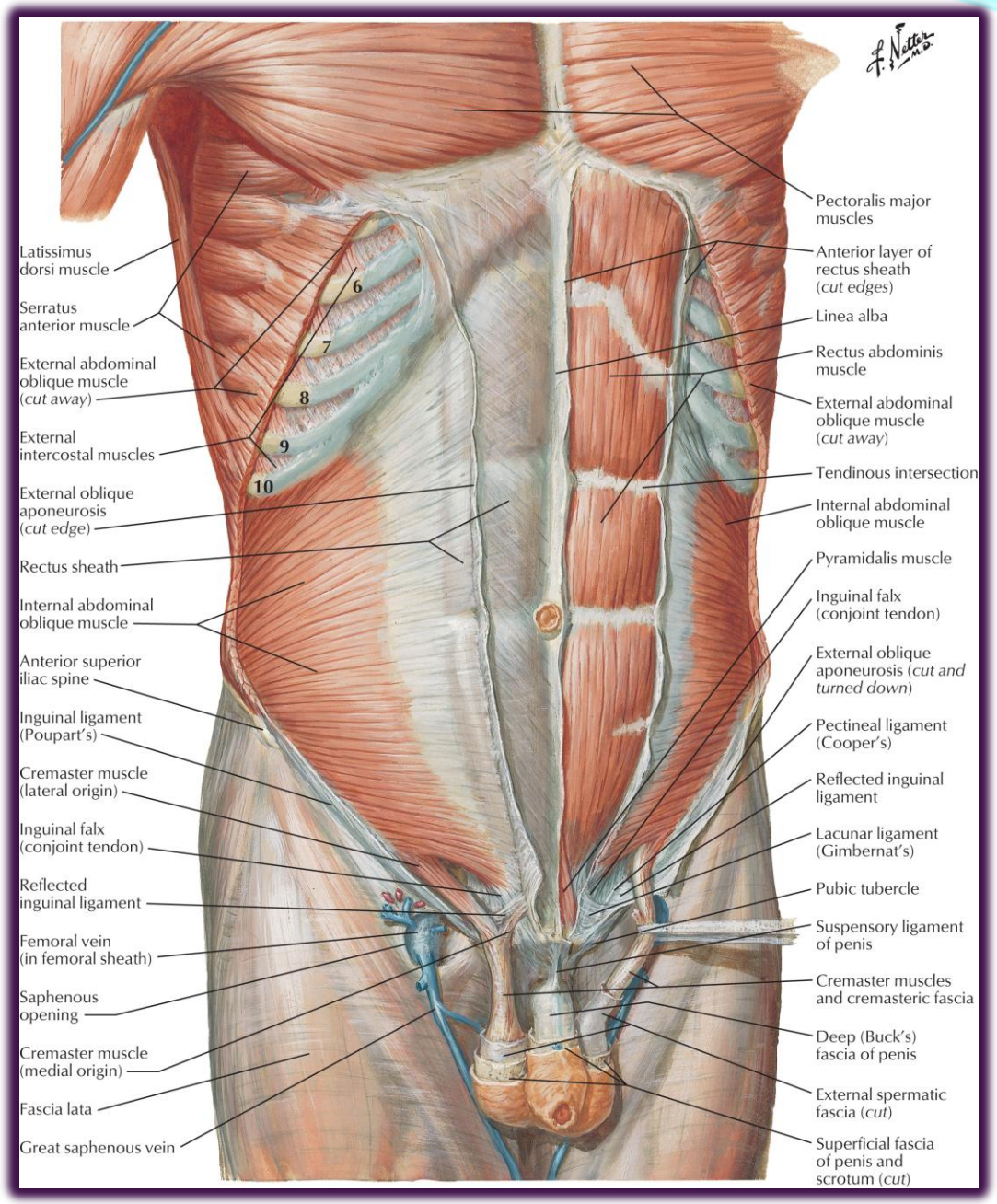
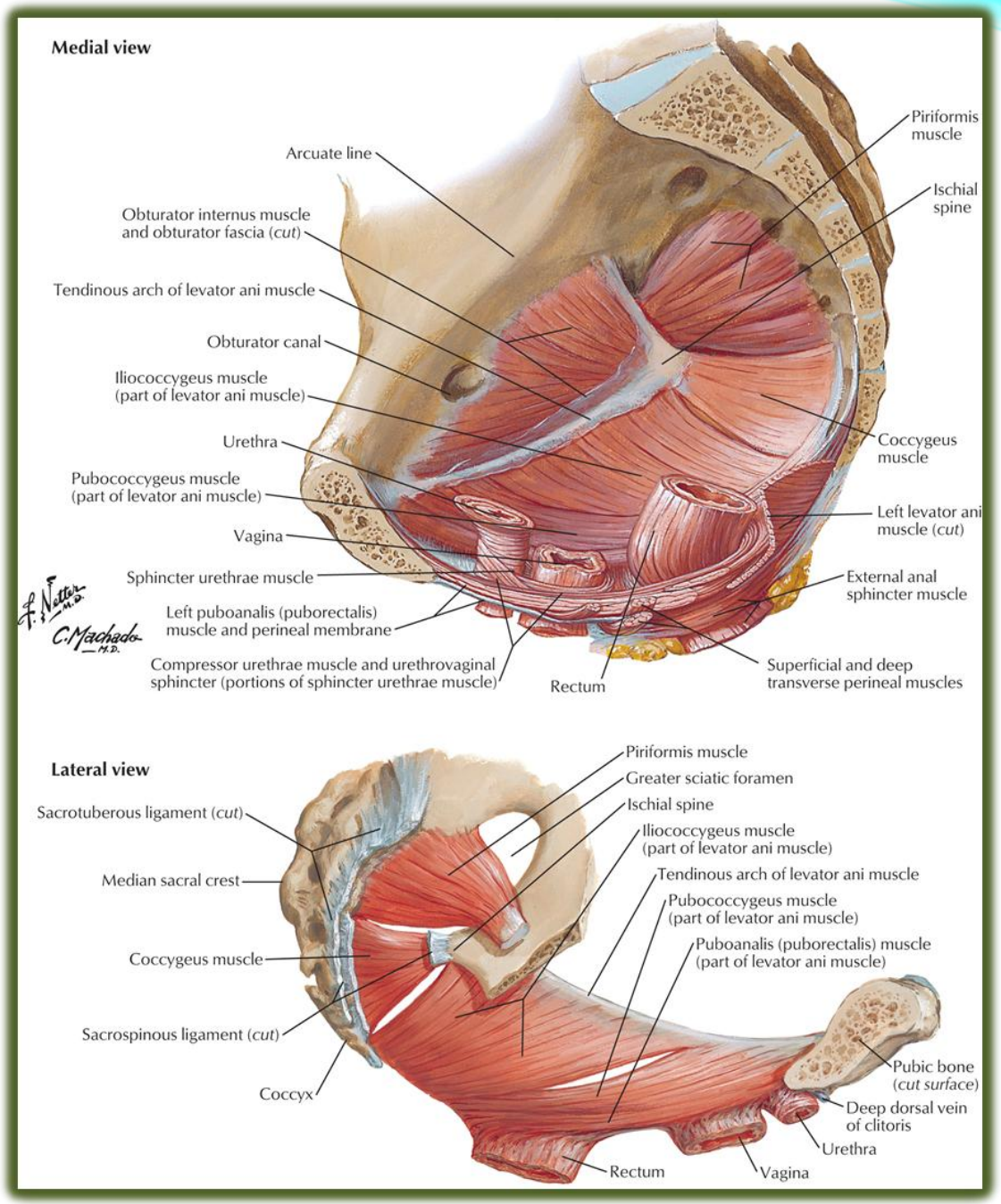


MUSCLES OF THE PELVIC FLOOR

- Primary pelvic muscles
  - Levator ani
  - coccygeus
- Secondary pelvic muscles
  - Iliopsoas
  - Obturator internus
  - Piriformis



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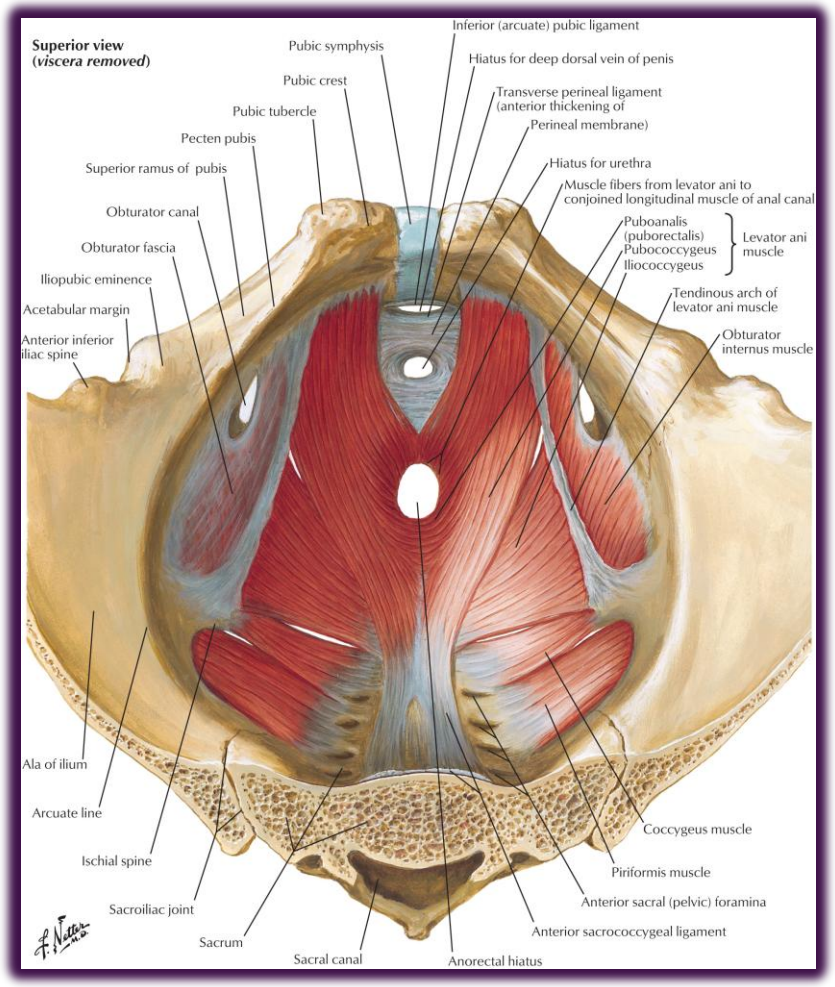
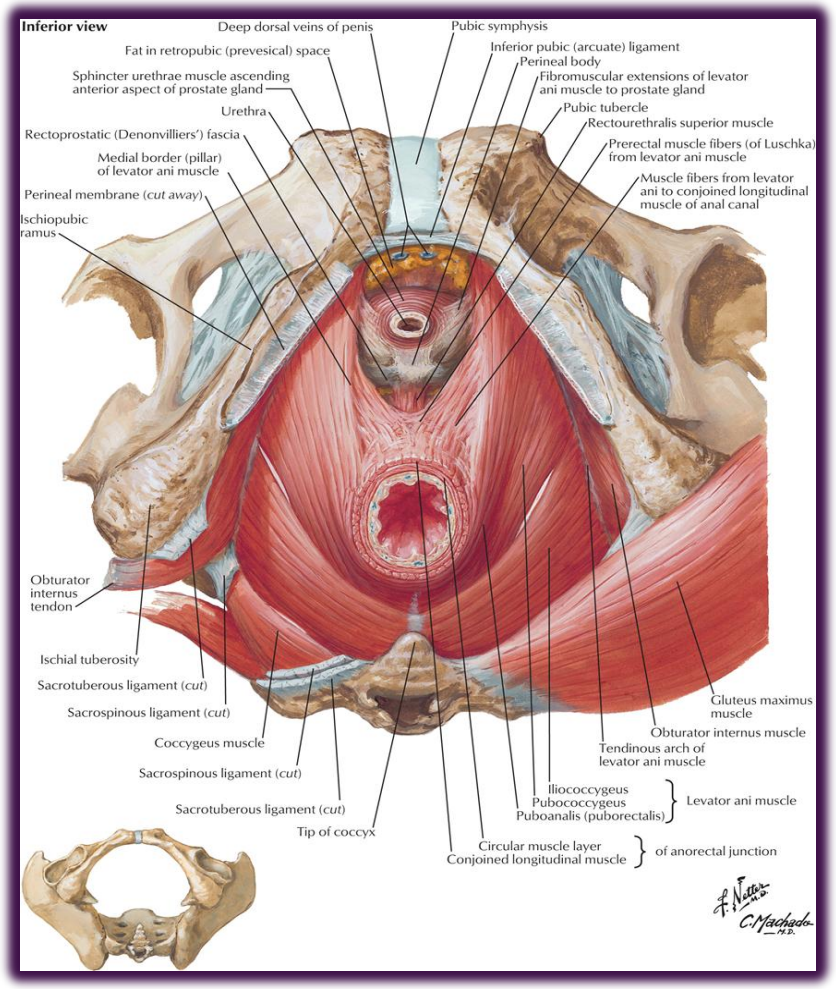
PRIMARY AND SECONDARY PELVIC FLOOR MUSCLES





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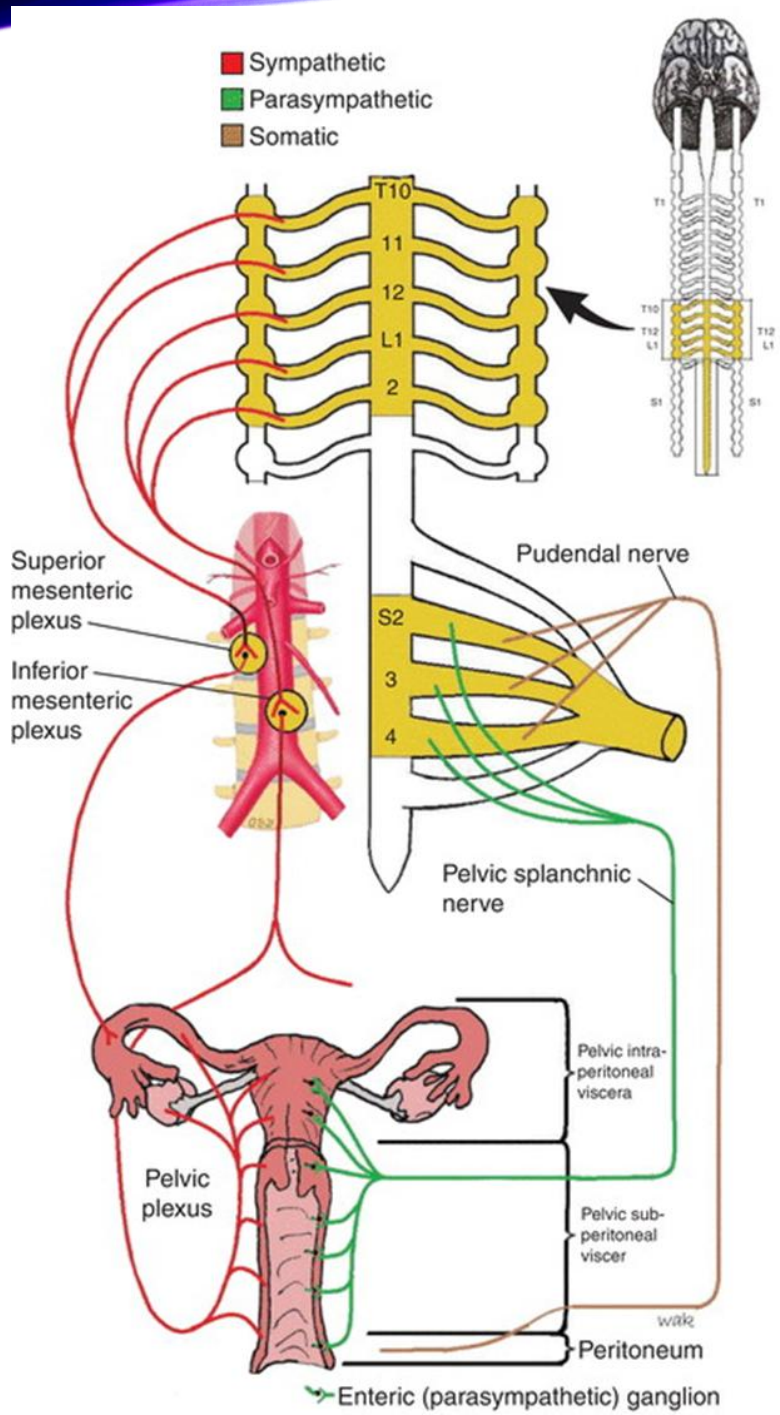
NEUROANATOMY

- Sympathetic innervation of pelvic viscera: T10-L2
  - Uterine body T12-L2
- Parasympathetic innervation: S2 – S4 (pelvic splanchnics)
- Overlap with reflex sites affecting the colon, appendix, kidneys, ureters, adrenal medulla, and bladder

INNERVATION OF THE FEMALE REPRODUCTIVE SYSTEM



Foundations of Osteopathic Medicine, 4th Edition
Exec Ed Michael Seffinger
Wolters Kluwer 2018

PHYSIOLOGICAL CHANGES

- Cardiovascular:
  - Blood volume increases 40-50%
  - Stroke volume increases 30%
  - Heart rate increases 10-20%
- Renal: GFR increases by ~ 50%
- Respiratory:
  - Oxygen demand doubles
  - Rate does not change
  - Tidal volume increases 40%
  - Residual volume decreases 20%
- Postural changes and growing uterus drag anterior thorax down while physiologic needs require increased respiratory function
- Result: Shallow breathing with decreased diaphragmatic excursion and therefore decreased movement of low-pressure fluids

CLINICAL CONSIDERATIONS

- Postural changes create significant musculoskeletal alterations.
- Changes in biomechanics affect other physiological functions.
- Growing uterus shifts center of gravity anteriorly and causes pelvis to rotate forward.
- Body compensates by extending lumbar spine and bringing shoulders back

LOW BACK PAIN IN PREGNANCY

- Risk factors: manual labor and smoking
- Prevalence of herniated discs are 1:10,000 during pregnancy (despite increased shear forces on disc).
- Postulated that back pressure in valveless spinal vein plexus is a contributing factor
- Altered mechanics and hormonally-mediated ligament relaxation can cause significant SI pain.
- Becomes pathologic when patient has pain with weight bearing and cannot maintain corrections.
- Best treatment is combination of OMT and SI support.

THE EFFECTS OF FLUID STASIS

- Malaise
- Headache
- Nausea and vomiting
- Extremity edema
- Carpal tunnel symptoms
- Hemorrhoids
- Varicosities (lower extremity, vulvar)
- Constipation
- Nasal congestion
- Pelvic pain

THE PROMOTE TRIAL

OBSTETRICS

Pregnancy Research on Osteopathic Manipulation Optimizing Treatment Effects: the PROMOTE study

Kendi L. Hensel, DO, PhD; Steve Buchanan, DO, FACOOG (Dist); Sarah K. Brown, DrPH; Mayra Rodriguez, MPH; des Anges Cruser, PhD

OBJECTIVE: The purpose of this study was to evaluate the efficacy of osteopathic manipulative treatment (OMT) to reduce low back pain and improve functioning during the third trimester in pregnancy and to improve selected outcomes of labor and delivery.

STUDY DESIGN: Pregnancy research on osteopathic manipulation optimizing treatment effects was a randomized, placebo-controlled trial of 400 women in their third trimester. Women were assigned randomly to usual care only (UCO), usual care plus OMT (OMT), or usual care plus placebo ultrasound treatment (PUT). The study included 7 treatments over 9 weeks. The OMT protocol included specific techniques that were administered by board-certified OMT specialists. Outcomes were assessed with the use of self-report measures for pain and back-related functioning and medical records for delivery outcomes.

RESULTS: There were 136 women in the OMT group: 131 women in the PUT group and 133 women in the UCO group. Characteristics at baseline were similar across groups. Findings indicate significant treatment effects for pain and back-related functioning ($P < .001$ for both groups), with outcomes for the OMT group similar to that of the PUT group; however, both groups were significantly improved compared with the UCO group. For secondary outcome of meconium-stained amniotic fluid, there were no differences among the groups.

CONCLUSION: OMT was effective for mitigating pain and functional deterioration compared with UCO; however, OMT did not differ significantly from PUT. This may be attributed to PUT being a more active treatment than intended. There was no higher likelihood of conversion to high-risk status based on treatment group. Therefore, OMT is a safe, effective adjunctive modality to improve pain and functioning during the third trimester.

Key words: low back pain, osteopathic manipulation, pregnancy

Cite this article as: Hensel KL, Buchanan S, Brown SK, et al. Pregnancy Research on Osteopathic Manipulation Optimizing Treatment Effects: the PROMOTE study. Am J Obstet Gynecol 2015;212:108.e1-9.

THE PROMOTE TRIAL PROTOCOL

- Sitting
  - Forward-leaning articulatory T-spine
- Supine
  - Cervical ST/MFR
  - OA decompression
  - Thoracic Inlet MFR
- Lateral Recumbent (R and L)
  - Scapulothoracic MFR
  - Lumbosacral ST
- Supine
  - Ab diaphragm MFR
  - Pelvis
    - AP pelvic diaphragm MFR
    - SI articulation
    - Frogleg sacral articulation
    - Innominate rotations
    - Pubic decompression
  - CV4

THE PROMOTE TRIAL SUMMARY

- Data showed that OMT protocol does not increase the risk of high-risk status and may decrease this risk.
- Protocol did not increase risk of precipitous labor, conversion to c-section, perineal laceration, meconium-stained amniotic fluid, or need for forceps or a vacuum device.
- No outcomes difference was reported among the three study groups except incidence of prolonged labor. Patients receiving OMT were able to successfully labor longer and vaginally deliver with no increased incidence of complications, including perineal laceration, episiotomy, and use of forceps or vacuum device.
- The addition of OMT appears to be safe; reduces progression of back pain and decreasing functional status throughout the third trimester.

PRENATAL AND PERINATAL OSTEOPATHIC STRUCTURAL EXAM

- Transitional areas/junctions
- Thoracic cage and diaphragm
- Lumbar spine
- SI joints
- Pelvic diaphragm
- OA
- CV4

OSTEOPATHIC MANIPULATIVE MEDICINE CONSIDERATIONS

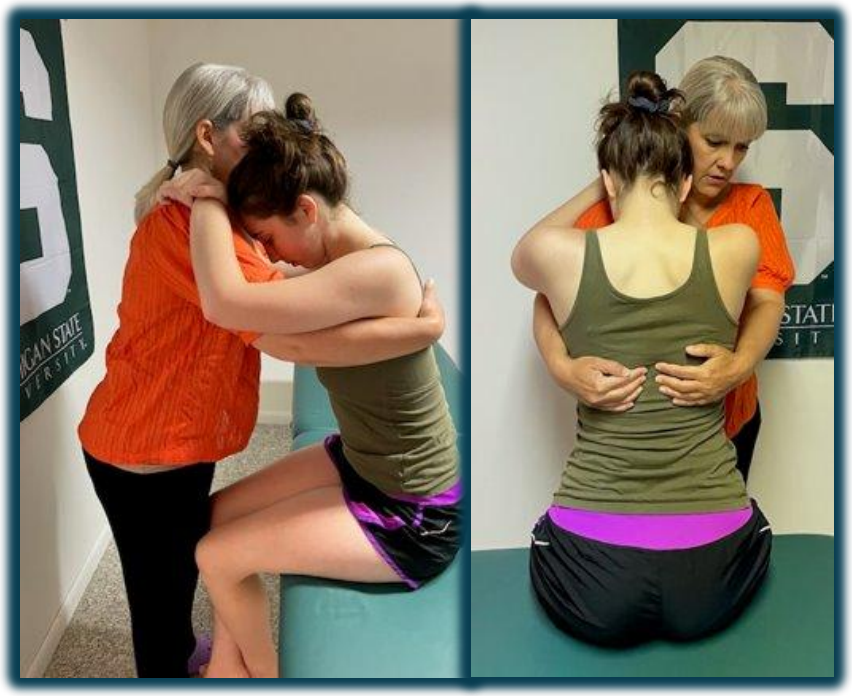
- Quick reminder on sequence of treatment
- Side lying thoracolumbar soft tissue (for paraspinals as well as rib release)
- Diaphragm doming
- Myofascial release and/or Still technique for lumbar spine
- Articulatory technique, sacral rocking, and/or BLT for sacrum
- Pelvic diaphragm release

FIRST TRIMESTER

- Adjusting to increased fluid volume
  - Fluid volume begins to increase at 6 weeks gestation
  - Total body water increases 6-8 L, and 2/3 of that is extravascular
- Hormone fluctuations
  - Progesterone
  - Relaxin reaches peak concentration at 10 weeks gestation
- The dilemma of nausea and vomiting

BALANCE THE AUTONOMICS

Sympathetics



Parasympathetics

MANAGING FLUID

SECOND TRIMESTER

- Energy levels go up
- Lumbar lordosis begins to increase
- “Round ligament pain”
- Sacroiliac joint dysfunction with sciatica becomes more common

RELEASE THE ILIOPSOAS AND SI JOINTS

THIRD TRIMESTER

- Getting ready for labor and delivery!
- Encourage mobility.
- Assess the SI joints and sacrum
- Consider SI joint support if needed.

SHEARS, ROTATIONS, AND FLARES

- Muscle energy technique
  - Seated
  - Supine
- Balanced ligamentous tension
  - Seated
  - Lateral recumbent

FROGLEG TECHNIQUE

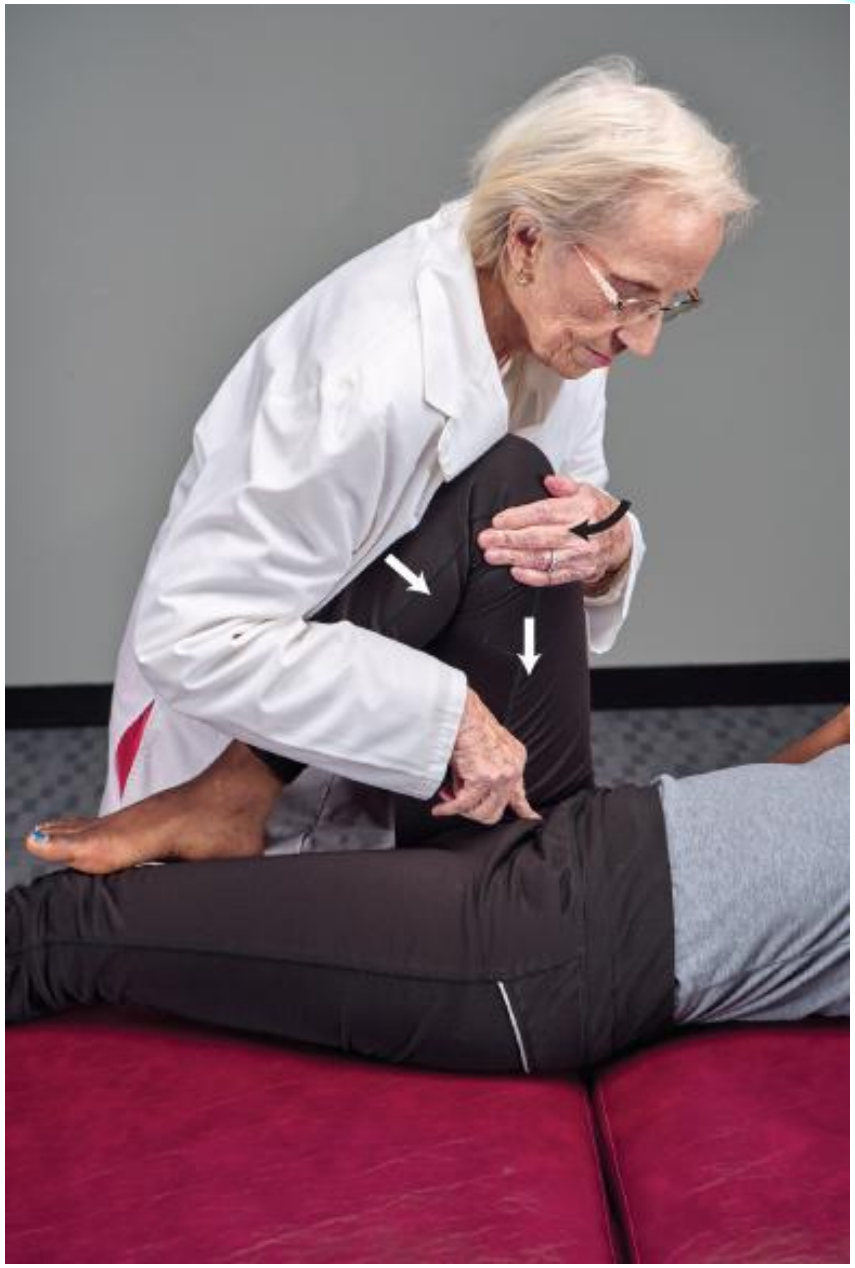
PUBIC SHEAR

MET for inferior pubic shear

MET for superior pubic shear

FPR FOR PUBIC SYMPHYSIS RESTRICTION

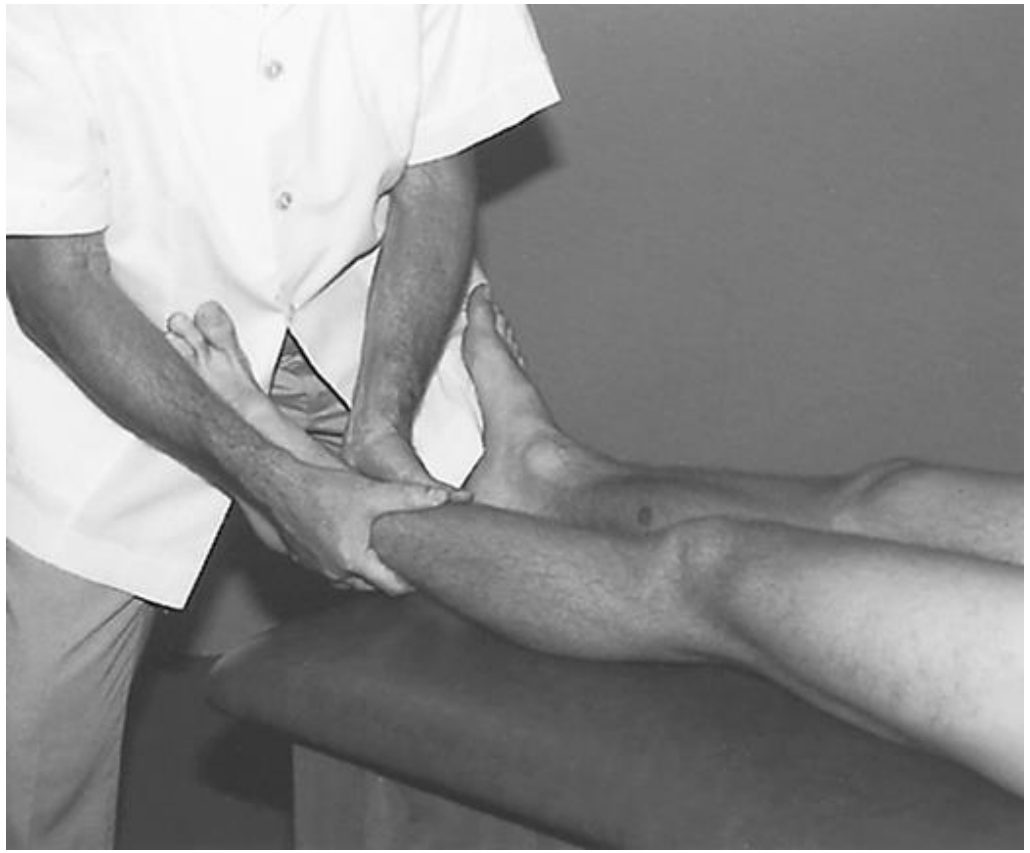
1. Patient lays supine with physician alongside facing toward the patient's head
2. Place one finger from the inside hand at the pubic symphysis to monitor motion and, using the outside hand, bend the patient’s right hip and knee to 90 degrees.
3. The physician creates a force downward toward the table through the hip joint until softening is felt at the monitoring finger
4. Using the knee as a lever, position the hip into adduction, until motion is felt at the monitoring finger.
5. The physician introduces internal rotation using the knee as a lever, which will create inferior motion the pubic symphysis. To introduce superior motion at the pubic symphysis, externally rotate the hip using the knee as a lever.
6. Hold for 3-5 seconds, release all forces
7. Recheck



DiGiovanna, E. L., Amen, C. J., & Burns, D. K. (2021). An osteopathic approach to diagnosis and treatment. Wolters Kluwer.

INNOMINATE SHEAR

MET for superior innominate shear



BALANCING THE SACRUM

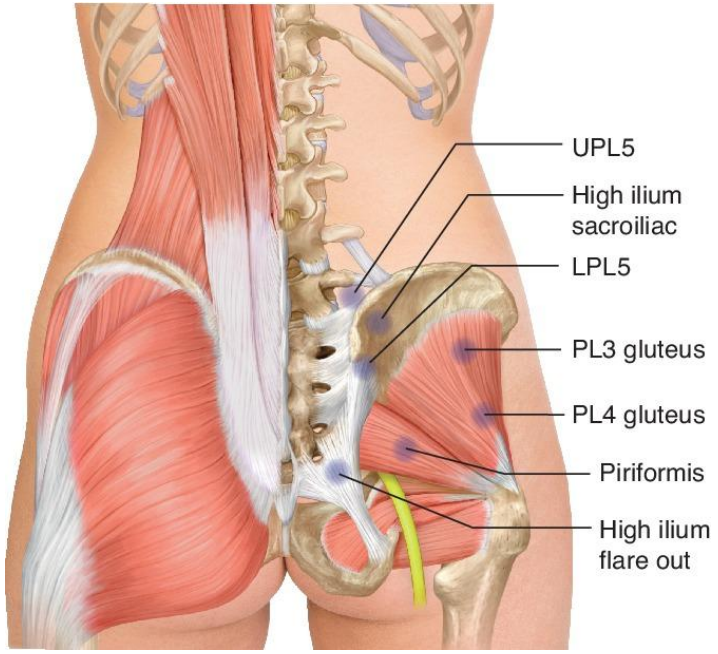
Pelvic Compression

Patient is seated.
Operator is seated behind patient.

1. Place hands on ilia bilaterally with thumbs on P.S.I.S. and sacral base, index fingers on crests; little fingers toward greater trochanters.
2. Translate (with head on patient's back) to localize desired axis.
3. Medial compression with both hands to further relax pelvis and begin unwind;
   - allow unwind until sacrum moves freely

From: **9 Counterstrain Techniques**

Atlas of Osteopathic Techniques, 4e, 2023

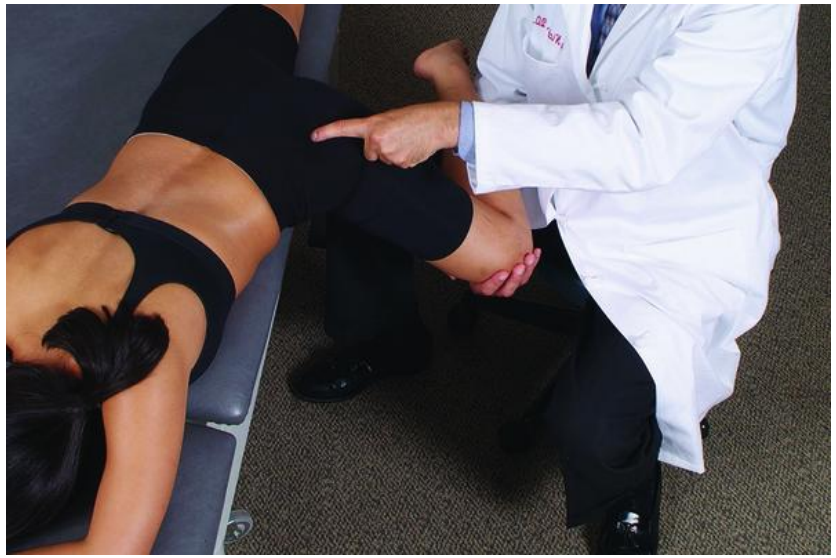


Legend:

Posterior pelvic counterstrain points.

From: **9 Counterstrain Techniques**

Atlas of Osteopathic Techniques, 4e, 2023

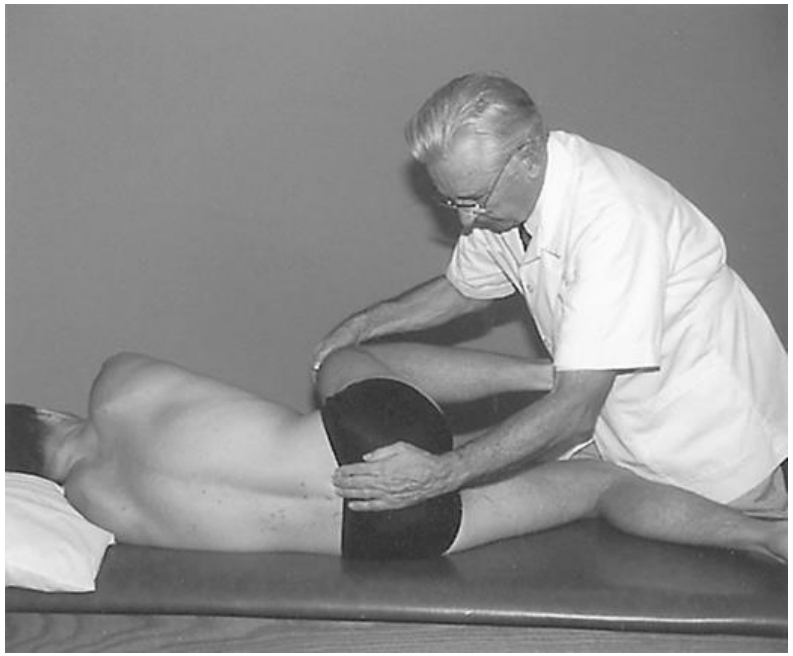


Legend:

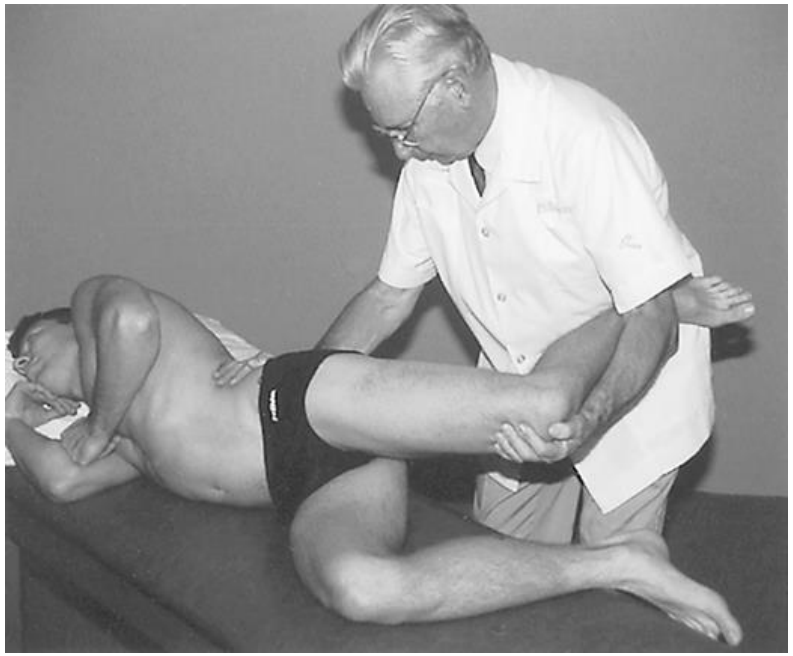
Piriformis: F abd-ABD er.

INNOMINATE ROTATIONS

MET for anterior rotation



MET for posterior rotation

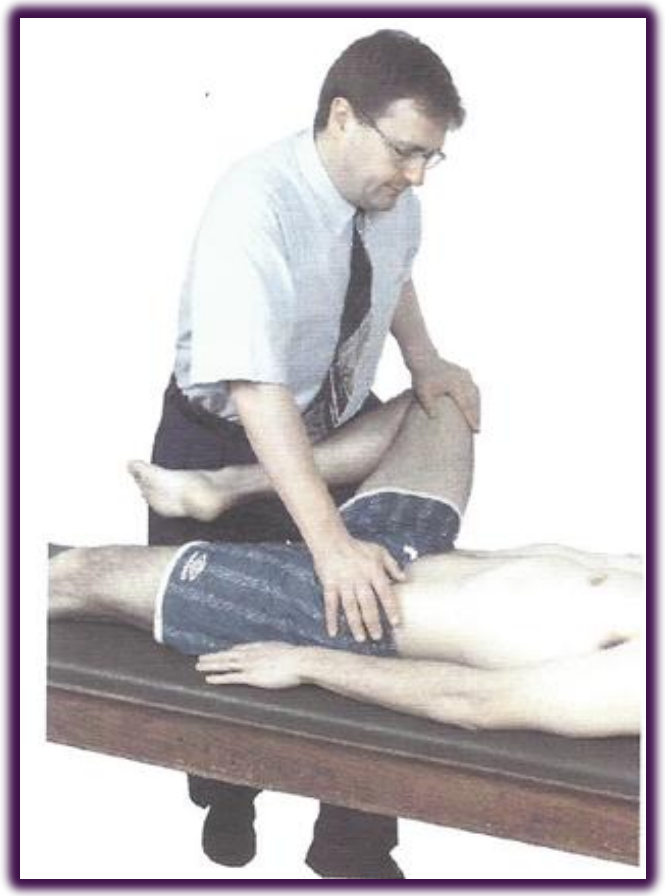


FPR LEFT POSTERIOR INNOMINATE ROTATION TECHNIQUE

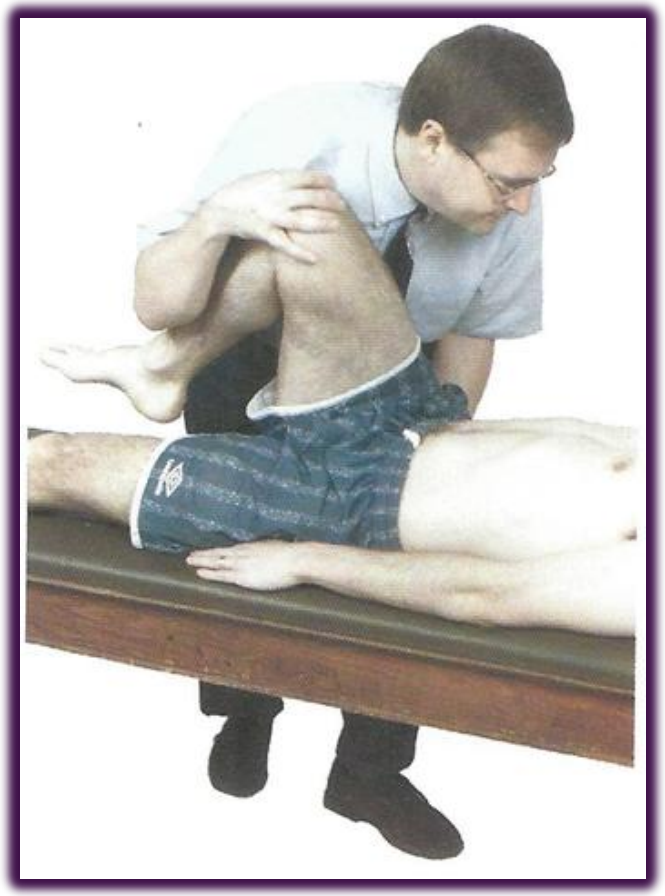
1. Patient lies on their right side with the physician standing in front of the patient at the side of the table.
2. Physician's right arm reaches under the patient's left thigh and abducts it to approximately 30 degrees while maintaining control of the limb using physician's arm and shoulder
3. Physician's left hand is placed palm down over the superior edge of the iliac crest to control motion, with the thumb controlling the ASIS.
4. The physician's right hand is positioned over the PSIS with the forearm on the posterior aspect of greater trochanter
5. Operator adds a posterior rotational force using both hands to exaggerate the position of ease
6. As rotation is introduced, the physician adds a compressive force downward toward the SI joint
7. Holds this position for 3 to 5 seconds, then releases
8. Reassess

INNOMINATE FLARES

MET for innominate inflare



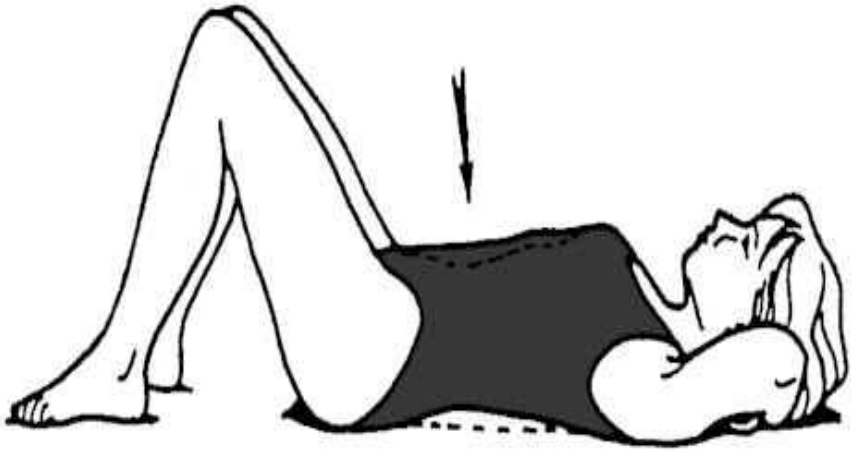
MET for innominate outflare

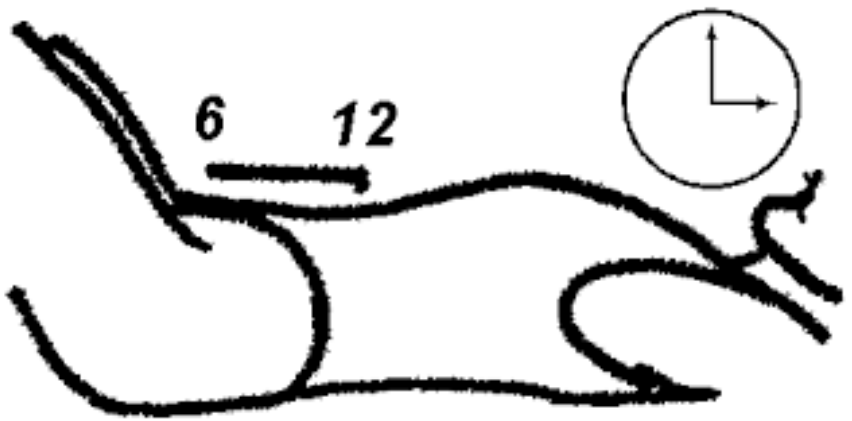


HOME ACTIVITY PRESCRIPTION

- Regular aerobic exercise, done sensibly, improves tissue compliance, fluid movement and prepares patient for delivery.
- Specific exercises directed at the sacrum and lumbar spine increase flexibility and decrease pain.
- Pelvic clocks and pelvic rocking improve flexibility and prepare for labor and delivery.

HOME EXERCISE





INTRA-PARTUM CONSIDERATIONS

- Effects of relaxin on pelvic ligaments combined with labor and delivery positions play a part in creating somatic dysfunction

LABOR

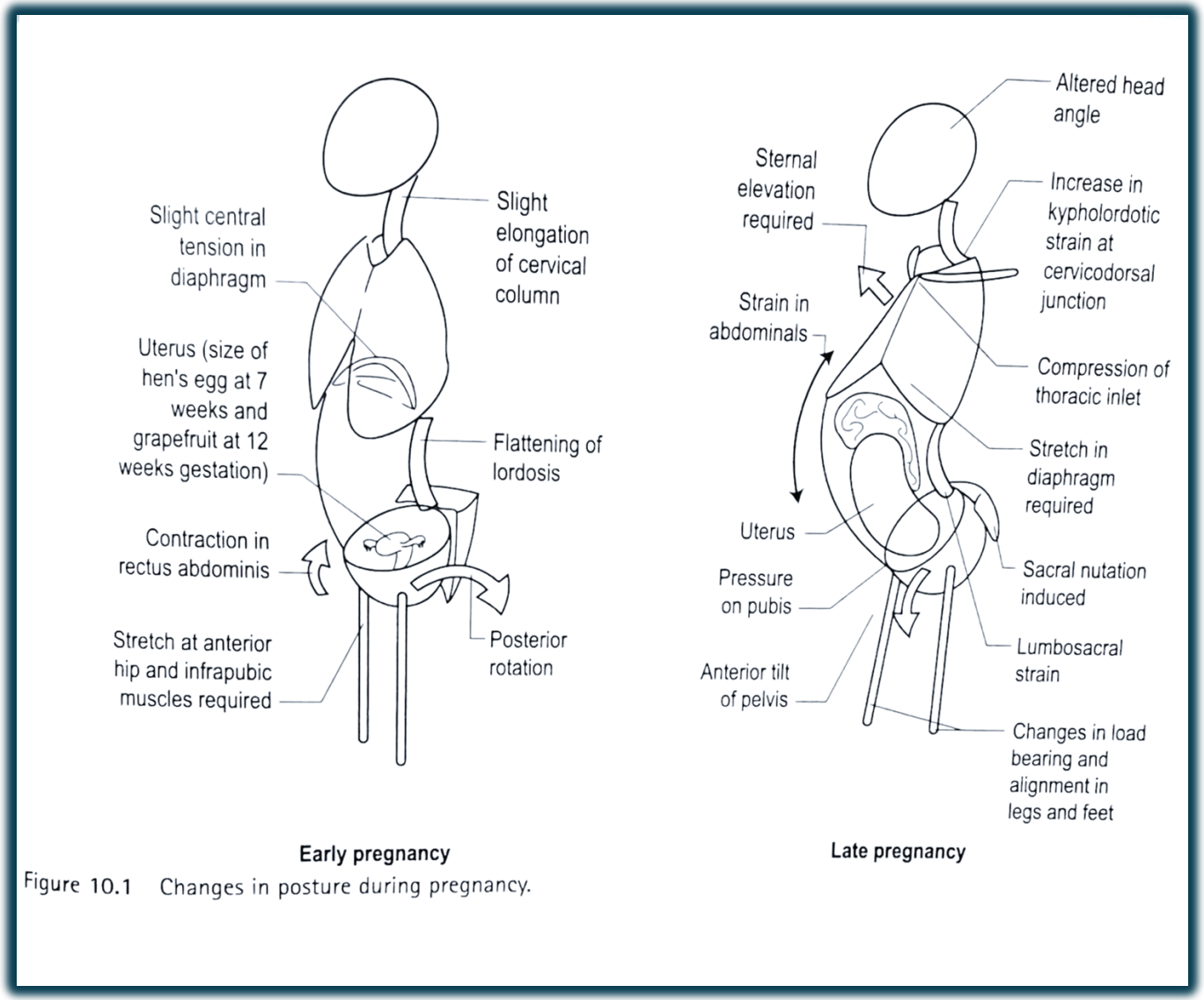


Figure 10.1 Changes in posture during pregnancy.

From Visceral and Obstetric Osteopathy Caroline Stone 2007

INTRAPARTUM AUTONOMICS

- Uterine fundus
  - Sympathetic influence: Constriction
  - Parasympathetic influence: Relaxation
- Cervix
  - Sympathetic influence: Relaxation
  - Parasympathetic influence: Constriction

STAGE BY STAGE

- Fetal Engagement and Early First Stage
  - Pelvic inlet opens
  - Sacrum counternutates
  - Lumbosacral joint flexes
  - Ilia flare outwards
- Late First Stage
  - Sacrum floats as head lowers
  - Sacrum torses and SI joints open as the ilia move with internal rotation of baby
- Second Stage
  - Pelvic outlet opens
  - Sacrum nutates
  - Lumbosacral joint extends
  - Ilia flare inwards

WORK WITH GRAVITY

- Make room for baby to descend.
- Encourage mobility as long as possible and as tolerated.
- Gentle supported sway with wide stance between contractions.
- Supported squat during contraction with breathing into pelvic floor.

FIRST STAGE: STIMULATE EFFECTIVE UTERINE CONTRACTIONS

Paraspinal Stretch-Starting Position

Paraspinal Stretch-Petrissage

FIRST STAGE: ENCOURAGE CERVICAL DILATION

Seated Sacral Rock- Counternutation

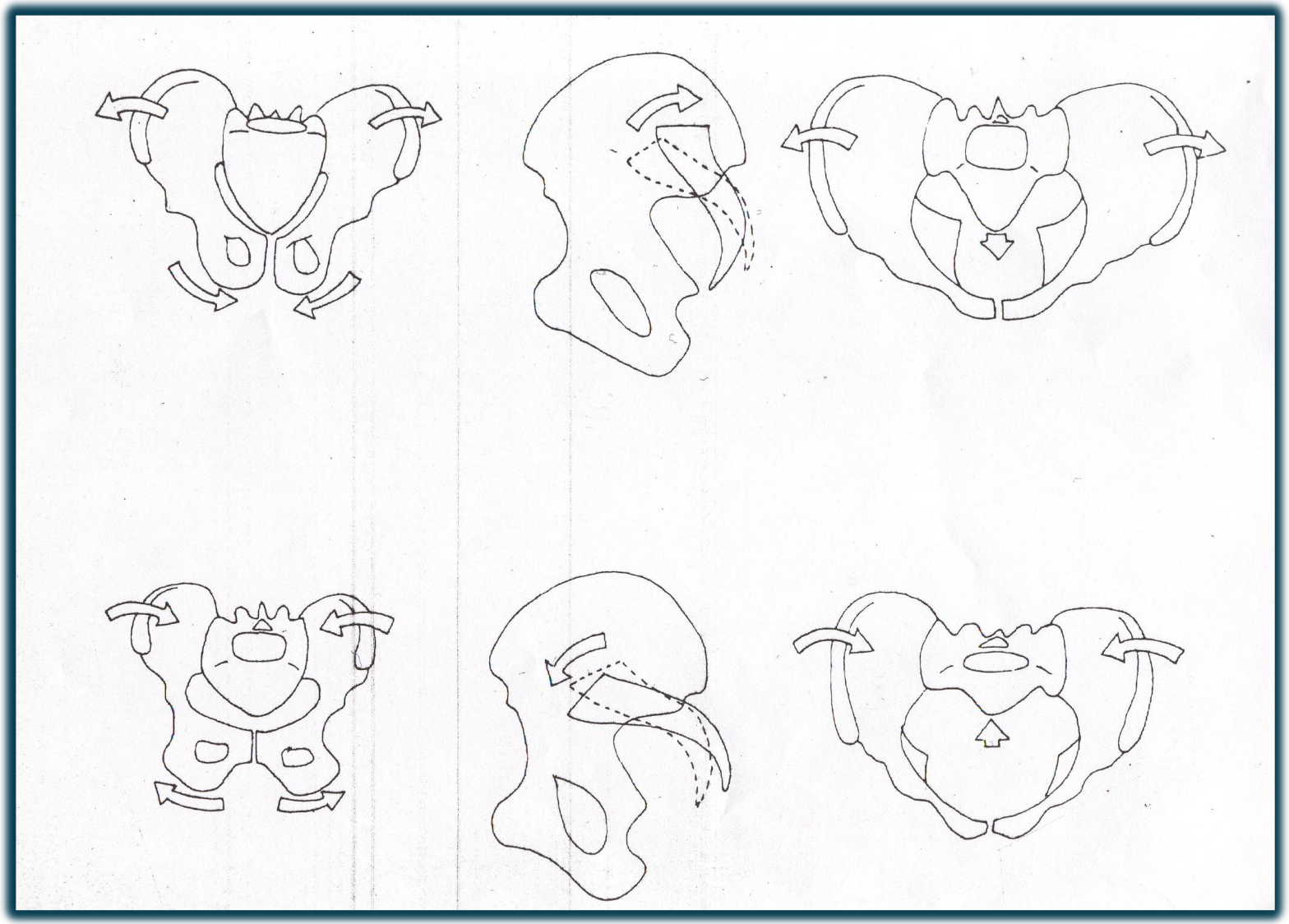
Seated Sacral Rock- Nutation

EASE BACK LABOR

Lateral Recumbent
Sacral Rock

Lateral Recumbent
Sacral Inhibition

MAKING THE TURN



SECOND STAGE OF LABOR

THANK YOU!

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REFERENCES

- DeStefano L, Bookhout M. gpmm06. Lippincott Williams & Wilkins, a Wolters Kluwer business; 2026. Accessed May 14, 2025. https://osteopathicmedicine-lwwhealthlibrary-com.proxy2.cl.msu.edu/book.aspx?bookid=3394&sectionid=0
- DiGiovanna, E. L., Amen, C. J., & Burns, D. K. *An Osteopathic Approach to Diagnosis and Treatment*. 2021. Wolters Kluwer.
- Hensel KL, Carnes MS, Stoll, ST. Pregnancy Research on Osteopathic Manipulation Optimizing Treatment Effects: The PROMOTE Study Protocol. *JAOA,* November 2016, Vol. 116, 716-724. doi:10.7556/jaoa.2016.142
- Netter, F. *Atlas of Human Anatomy, Seventh Edition*. 2019. Elsevier.
- Nicholas AS, Nicholas EA. *Atlas of Osteopathic Techniques, 4e*. Lippincott Williams & Wilkins, a Wolters Kluwer business; 2023. Accessed May 14, 2025. https://osteopathicmedicine-lwwhealthlibrary-com.proxy2.cl.msu.edu/book.aspx?bookid=3202&sectionid=0
- Seffinger, M., Executive Editor. *Foundations for Osteopathic Medicine, Fourth Edition*. 2018 Wolters Kluwer.