

Diabetes Management through Integrative Care

Osteopathic Manipulative Medicine for Managing Diabetes-Related Musculoskeletal Conditions

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Disclosures

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- *Has no relevant financial relationships with ineligible companies to disclose.*
- *There are no conflicts of interest related to this educational content.*



Learning Outcomes

- Recognize how Osteopathic Manipulative Medicine enhances comprehensive diabetes care.
- Implement Osteopathic Manipulative Treatment techniques to support diabetic patients experiencing musculoskeletal pain.

Diabetes basics: Definition

- **Type 1 Diabetes:** an autoimmune disease. The immune system mistakenly treats the beta cells in your pancreas that create insulin as foreign invaders and destroys them. When enough beta cells are destroyed, your pancreas can't make insulin or makes so little of it that you need to take insulin to live.
- Symptoms:
 - Urinating often
 - Feeling very thirsty
 - Feeling very hungry—even though you are eating
 - Extreme fatigue
 - Blurry vision
 - Cuts/bruises that are slow to heal
 - Weight loss—even though you are eating more

<https://diabetes.org/about-diabetes/type-1>

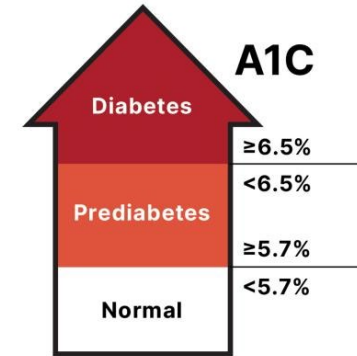
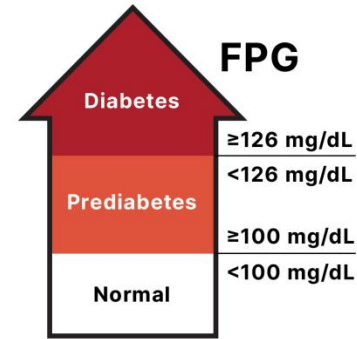
Diabetes basics: definition

- **Type 2 Diabetes:** body does not use insulin properly—this is called insulin resistance. At first, beta cells make extra insulin to make up for it. Over time, the pancreas can't make enough insulin to keep blood glucose at normal levels. Type 2 diabetes develops most often in middle-aged and older adults but is increasing in young people.
 - Symptoms:
 - Urinating often
 - Feeling very thirsty
 - Feeling very hungry—even though you are eating
 - Extreme fatigue
 - Blurry vision
 - Cuts/bruises that are slow to heal
 - Tingling, pain, or numbness in the hands/feet

<https://diabetes.org/about-diabetes/type-2>

Diabetes basics: Diagnosing

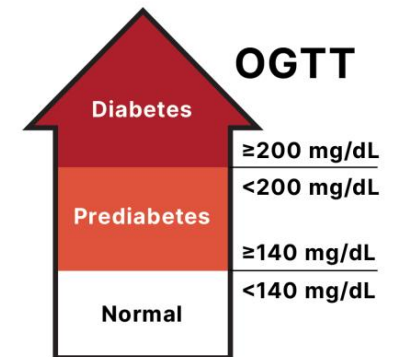
- Fasting Plasma Glucose: greater than or equal to 126 mg/dl
- Hemoglobin A1C: greater than or equal to 6.5%
- two-hour blood glucose of greater than or equal to 200 mg/dl
- Random blood glucose of greater than or equal to 200 mg/dl
- Pre-diabetes



<https://diabetes.org/about-diabetes/diagnosis>

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Diabetes basics: complications

- Cardiovascular disease (CVD)
- Chronic Kidney Disease
- Diabetes-related eye disease
- Neuropathy
- Foot complication
- Skin complications
- Oral complications (gingivitis, periodontitis)
- Hearing loss (2x the incidence, prediabetes 30% greater incidence)
- Diabetic ketoacidosis
- Stroke (2x the risk)

Don't forget: Treatment side effects

<https://diabetes.org/about-diabetes/complications>

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Also: (

Transverse
carpal
ligament

Median
nerve

Carpal tunnel
(space under
ligament)

Compressed
median nerve

Normal carpal tunnel

**Median nerve compressed
in the carpal tunnel**



Management of these musculoskeletal issues

- Standard Care:
 - NSAIDs
 - PT
 - Injections (Corticosteroids?, PRP, Stem Cells, Prolo)
 - Surgery
 - Manipulation under anesthesia
- Osteopathic Manipulative Medicine to aid in diagnosis and treatment.
 - The dreaded statement – “treat what you find”
 - Some protocols – Seven Stages of Spencer, etc.

Osteopathic Approach

- History and Physical exam
 - To include a standard musculoskeletal and neurologic exam
- Osteopathic Structural Exam
 - Tissue Texture Change
 - Asymmetry
 - Restricted Range of Motion
 - Tenderness

Acute vs Chronic

Identify Somatic Dysfunction



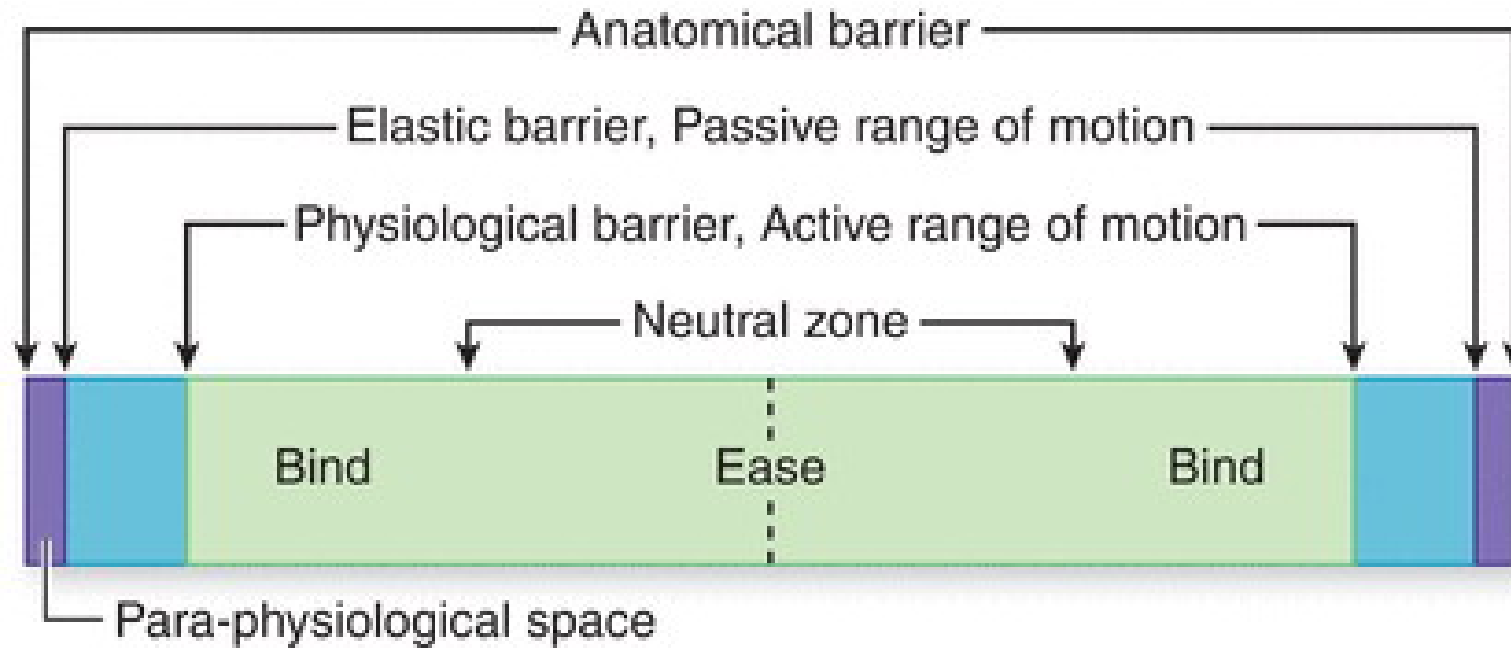
Concept Review: What is Somatic Dysfunction?

- The diagnosis that substantiates the use of OMT
- A medical diagnosis (the body is divided into 10 regions)
- T.A.R.T.
 - Must have at least two components of T.A.R.T. to make the diagnosis.

Concept Review: Somatic Dysfunction

- Impaired or altered function of related components of the somatic (body framework) system: skeletal, arthrodiarthrodial and myofascial structures, and their related vascular, lymphatic, and neural elements. Somatic dysfunction is treatable using osteopathic manipulative treatment.

Concept review: Barriers



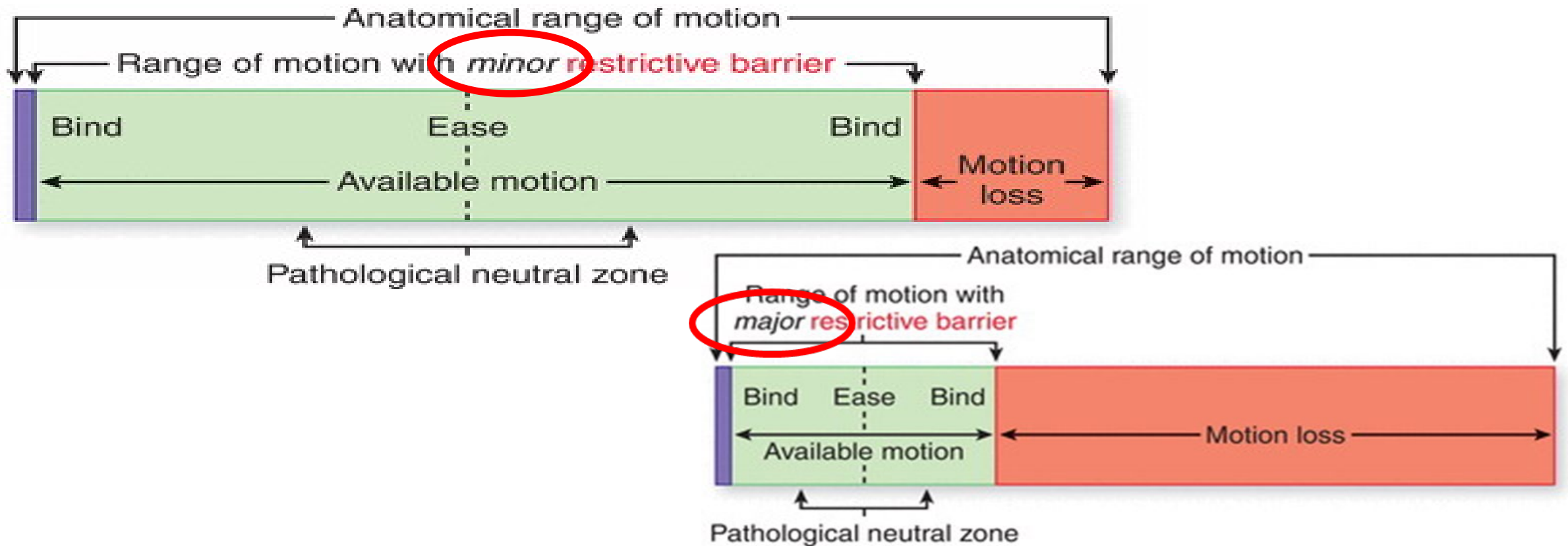
Definitions

- **Barrier:** An obstruction. A factor that tends to restrict free movement.
- **Active motion:** Movement of an articulation between the physiologic barriers limited to the range produced voluntarily by the patient.
- **Physiologic barrier:** The soft-tissue tension accumulation that limits the voluntary motion of an articulation. Further motion toward the anatomic barrier can be induced passively.
- **Elastic barrier:** The resistance felt at the end of passive range of motion when the slack has been taken out.
 - Paraphysiologic space: The sensation of a sudden “give” beyond the elastic barrier of resistance, usually accompanied by a “cracking” sound with a slight amount of movement beyond the usual physiologic limit but within the anatomic barrier.

Definitions

- **Passive motion:** Movement induced in an articulation by the operator. This includes the range of active motion as well as the movement between the physiologic and anatomic barriers permitted by soft-tissue resiliency that the patient cannot do voluntarily.
- **Anatomic barrier:** The bone contour and/or soft tissues, especially ligaments, which serve as the final limit to motion in an articulation beyond which tissue damage occurs.
- **Restrictive barrier:** An impediment or obstacle to movement within the physiologic limits of an articulation that reduces the active motion range.

Barrier Concept



Potential findings on palpatory exam

- Remembering the visceral innervation of the autonomic nervous system
 - Pancreas T5-9 (S), Vagus (PS)
- Palpation for TART changes before symptoms present.
- Chapman reflex points, pancreas of for organs associated with medication side effects.

Viscera	Sympathetic Nervous System (Spinal cord levels)	Parasympathetic Nervous System
Head and neck	T1-4	Vagus
Heart	T1-5	Vagus
Lung	T2-7	Vagus
Esophagus	T3-6	Vagus
Stomach	T5-9	Vagus
Liver	T5-9	Vagus
Gallbladder	T5-9	Vagus
Spleen	T5-9	Vagus
Pancreas	T5-9	Vagus
Duodenum (before ligament of Treitz)	T5-9	Vagus
Jejunum	T10-11	Vagus
Ilium	T10-11	Vagus
Ascending Colon & proximal 2/3 of transverse colon (between ligament of Treitz and splenic flexure)	T10-11	Vagus
Distal 1/3 of transverse colon	T12-L2	Vagus
Descending colon & Sigmoid colon (after splenic flexure)	T12-L2	S2-4
Rectum	T12-L2	S2-4
Appendix	T12	Vagus
Kidneys	T10-11	Vagus
Adrenal medulla	T10-11	Vagus
Upper Ureters	T10-11	Vagus
Lower Ureters	T12-L1	S2-4
Bladder	T11-L2	S2-4
Gonads	T10-11	Vagus
Uterus and cervix	T10-L2	S2-4
Erectile tissue of penis and clitoris	T11-L2	S2-4
Prostate	T11-L2	S2-4
Arms	T2-7	none
Legs	T10-L2	none

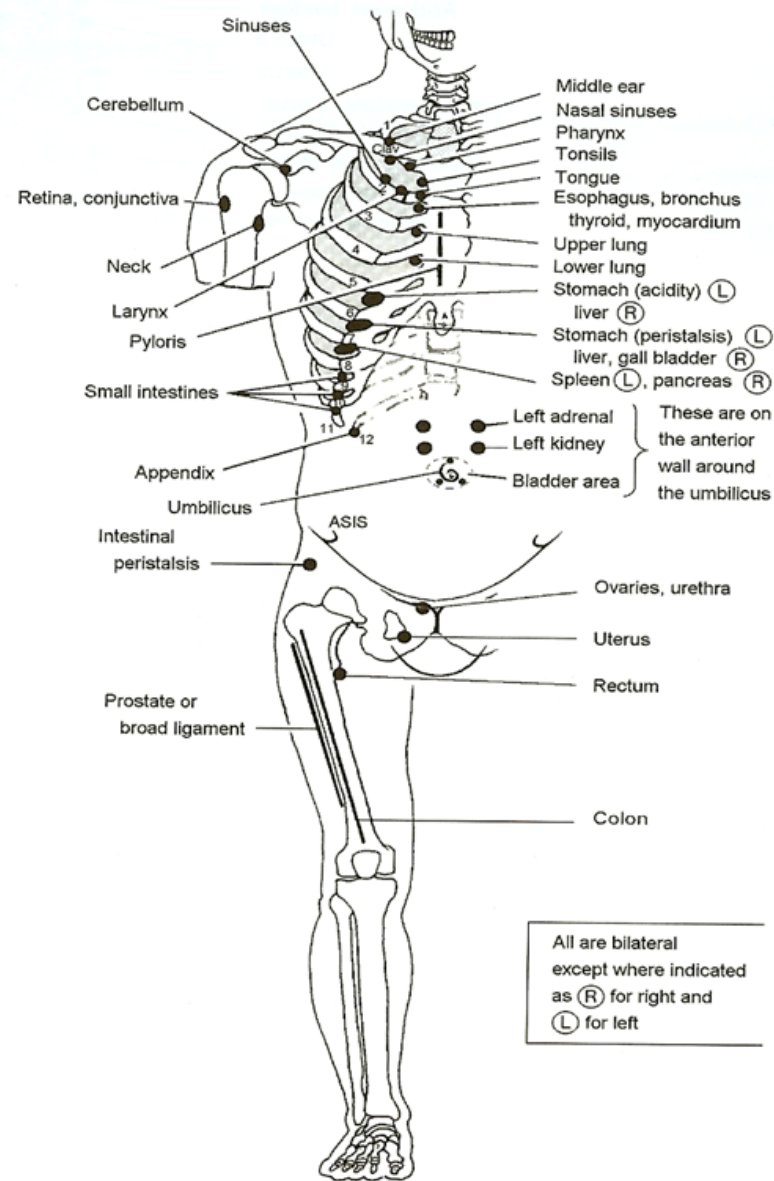


FIGURE 67.3. Chapman reflexes: anterior points. (From Kuchera ML, Kuchera WA. *Osteopathic Considerations in Systemic Dysfunction*, 2nd ed. rev. Columbus, OH: Greyden Press; 1994, with permission.)

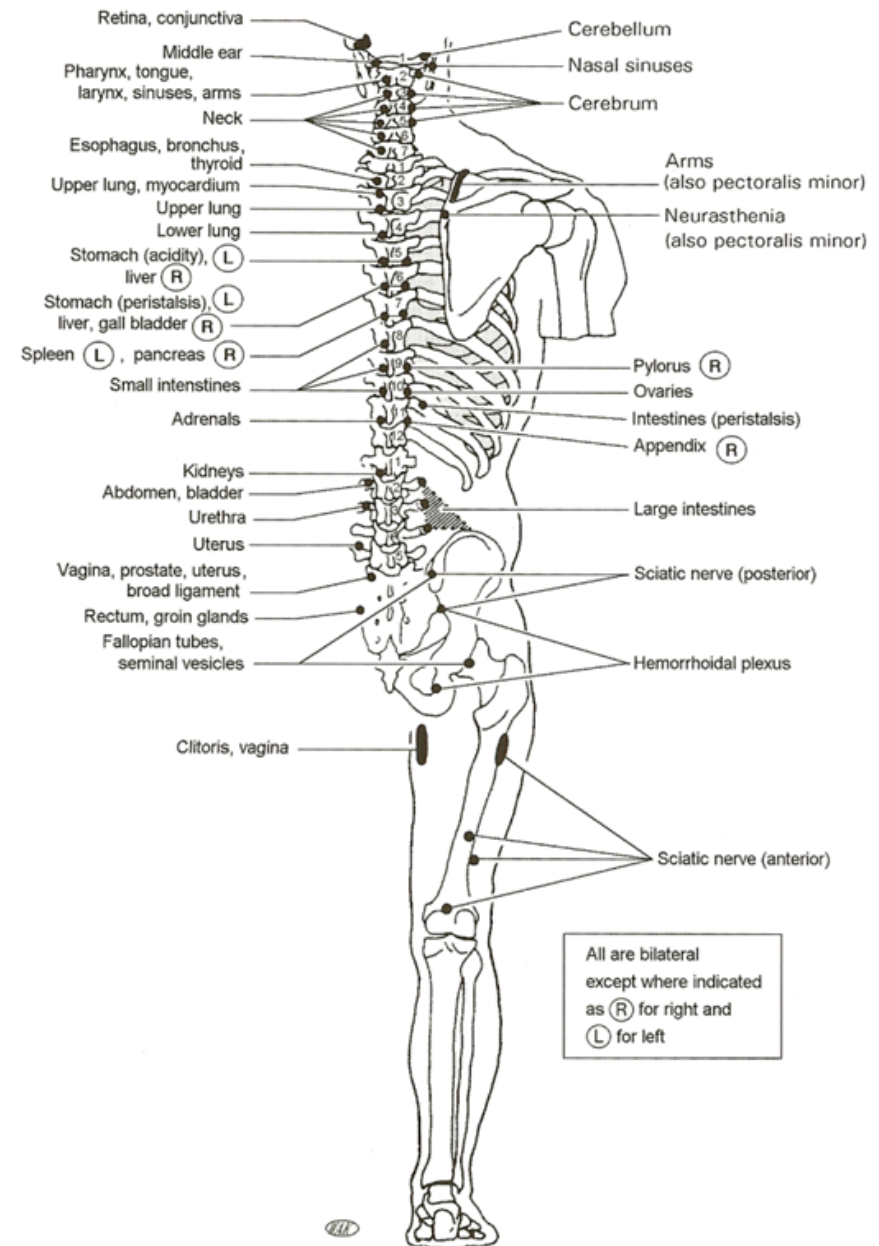


FIGURE 67.4. Chapman reflexes: posterior points. (From Kuchera ML, Kuchera WA. *Osteopathic Considerations in Systemic Dysfunction*, 2nd ed. rev. Columbus, OH: Greyden Press; 1994, with permission.)

What has been identified in the literature

- The viscerosomatic relationship was explored in a study by Licciardone et al
- Evaluated 30 different palpatory criteria in 92 patients (30 control, 62 with T2DM)
- The authors found that patients with T2DM experienced tissue texture changes **between T11 and L2 on the right side.**
- Not at the level of the pancreas, but at the level of the right kidney.
- Potentially this represents the progression of disease, such as renal dysfunction, which may predict nephropathy.

Licciardone JC, Fulda KG, Stoll ST, Gamber RG, Cage AC. A case-control study of osteopathic palpatory findings in type 2 diabetes mellitus. *Osteopath Med Prim Care*. 2007;1:6. doi:10.1186/1750-4732-1-6.

What has been identified in the literature

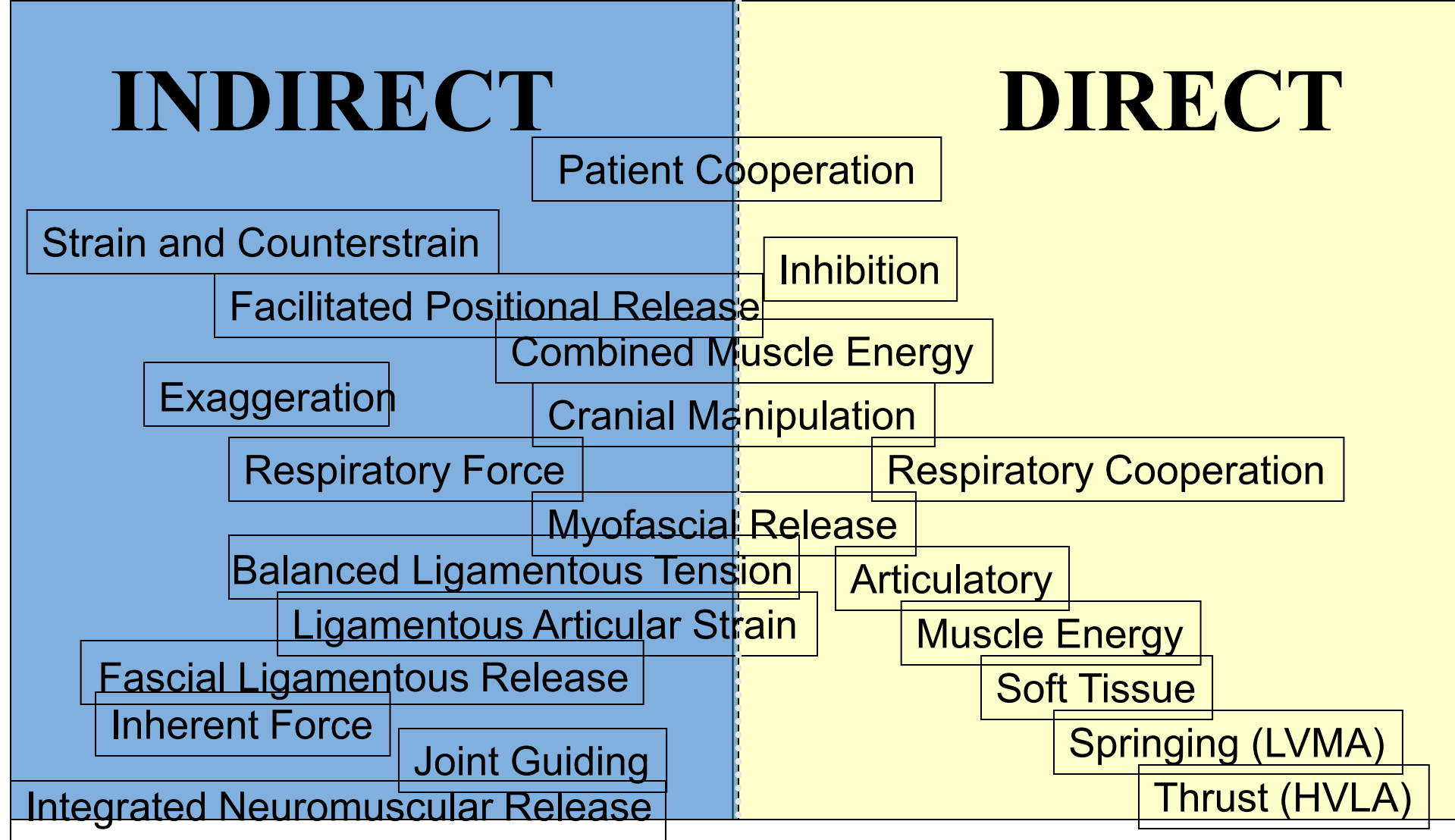
- Changes in soft tissue and fascial structures over time may be the key to initial somatic manifestations.
- A 2010 pilot study 19 of 40 patients with diabetes found that palpation of subcutaneous tissues' turgidity in the posterior cervical spine could be a tool to determine the patient's blood sugar range.
- Patients with higher random blood sugar levels demonstrated increased tissue fullness and boggiess as demonstrated by 2 of 3 measurements that reached statistical significance.
- The findings suggested that increased fluid level shifts into the extracellular compartment were due to increased glucose levels.

Nelson KE, Mnabhi AKS, Glonek T. The accuracy of diagnostic palpation: the comparison of soft tissue findings with random blood sugar in diabetic patients. *Osteopath Fam Physician*. 2010;2(6):165-169.

Osteopathic Treatment -

- Limited joint mobility, Dupuytren contracture, Diffuse Idiopathic Skeletal Hyperostosis, flexor tenosynovitis (trigger finger)
- Medication side effects:
- These are treated in the usual way we treat anyone with these conditions.
 - History and Physical – rule out surgical pathology or at least the consideration of the potential surgical intervention
 - Diagnose somatic dysfunction - palpate for TART changes/facilitated segments (viscerosomatic reflex)
Treatment approach considerations:
 - Direct: muscle energy, soft tissue/direct inhibition
 - Indirect: myofascial release, counterstrain, Facilitated Positional Release (FPR), Still technique, Balanced Ligamentous Tension/Ligamentous Articular Strain (BLT/LAS)
 - The use of HVLA is highly dependent on nature and location of the SD. Experience and skill of the physician using HVLA also influence decision making. Knowing the patients' tolerances to treatment methods is also key to that clinical decision making. There is no one size fits all approach.

Osteopathic Treatment Methods



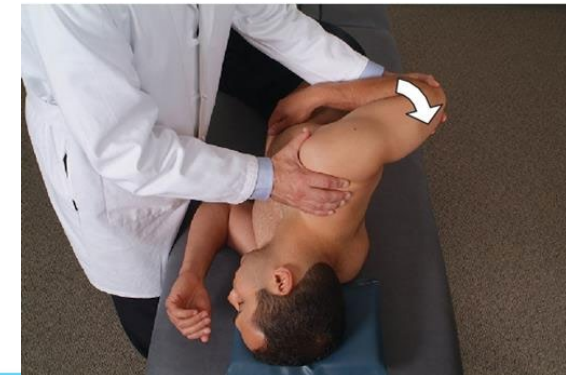
Osteopathic Treatment – Adhesive Capsulitis

Seven Stages of Spencer: a combined technique (Articulatory/MET)

1. Extension
2. Flexion
3. Circumduction/Slight compression
4. Circumduction with traction
- 5a. Abduction
- 5b. Adduction/external rotation
6. Internal rotation
7. Distraction and Abduction

Seven Stages of Spencer: 1. Extension

1. The physician stands facing the patient.
2. The physician's cephalad hand bridges the shoulder to lock out any acromioclavicular and scapulothoracic motion. The fingers are on the spine of the scapula, and the thumb is on the anterior surface of the clavicle.
3. The physician's caudad hand grasps the patient's elbow.
4. The patient's shoulder is moved into extension in the horizontal plane to the edge of the restrictive barrier.
5. A slow, gentle springing (articulatory, make and break) motion is applied at the end range of motion.
6. Muscle energy activation: The patient is instructed to attempt to flex the shoulder (black arrow) against the physician's resistance (white arrow). This contraction is held for 3 to 5 seconds.
7. After a second of relaxation, the shoulder is extended to the new restrictive barrier.
8. Steps 6 and 7 are repeated three to five times, and extension is reassessed.
9. Resistance against the attempted extension (white arrow (reciprocal inhibition) has been found to be helpful in augmenting the effect.



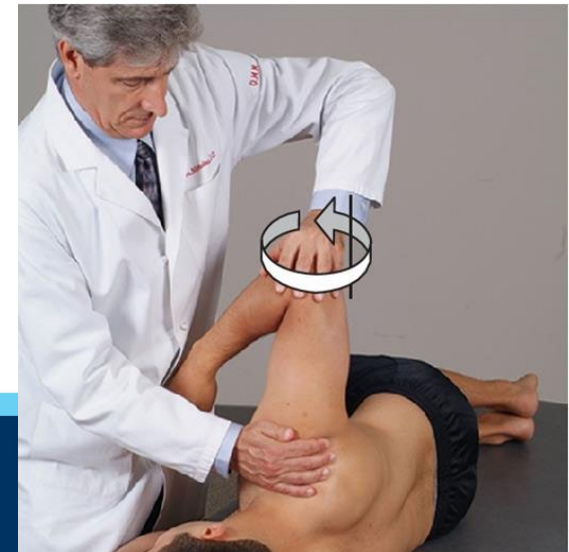
Seven Stages of Spencer: 2. Flexion

1. The physician's hands reverse shoulder and arm contact positions. The caudad hand reaches over and behind the patient and bridges the shoulder to lock out acromioclavicular and scapulothoracic motion. The fingers are on the anterior surface of the clavicle, and the heel of the hand is on the spine of the scapula.
2. Using the other hand, the physician takes the patient's shoulder into its flexion motion in the horizontal plane to the edge of its restrictive barrier.
3. A slow, springing (articulatory, make and break) motion (arrows) is applied at the end range of motion.
4. Muscle energy activation: The patient is instructed to extend the shoulder (black arrow) against the physician's resistance (white arrow). This contraction is maintained for 3 to 5 seconds.
5. After a second of relaxation, the shoulder is flexed further until a new restrictive barrier is engaged.
6. Steps 4 and 5 are repeated three to five times, and flexion is reassessed.
7. Resistance against the attempted flexion (reciprocal inhibition) has been found to be helpful in augmenting the effect.



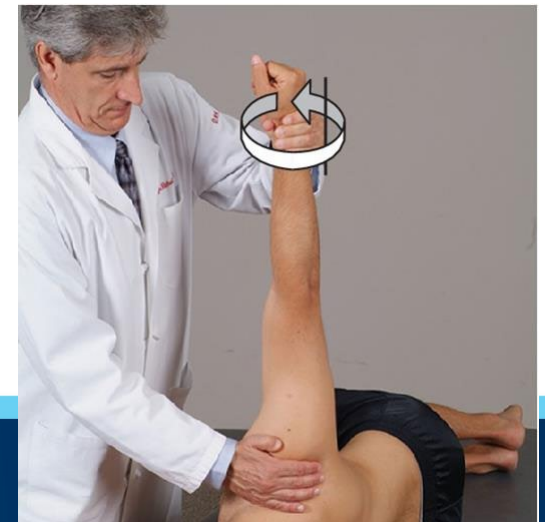
Seven Stages of Spencer: 3. Circumduction/compression

1. The original starting position is resumed with the cephalad hand.
2. The patient's shoulder is abducted to the edge of the restrictive barrier.
3. The patient's arm is moved through full clockwise circumduction (small diameter) with slight compression. Larger and larger concentric circles are made, increasing the range of motion.
4. Circumduction may be tuned to a particular barrier. The same maneuver is repeated counterclockwise.
5. There is no specific muscle energy activation for this step; however, during fine-tuning of the circumduction, it may be feasible to implement it in a portion of the restricted arc.
6. This is repeated for approximately 15 to 30 seconds in each direction, and circumduction is reassessed.



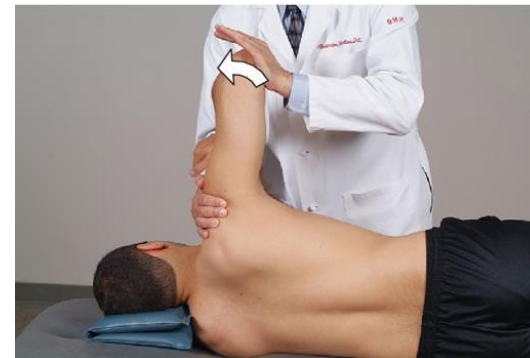
Seven Stages of Spencer: 4. Circumduction/traction

- The patient's shoulder is abducted to the edge of the restrictive barrier with the elbow extended.
- The physician's caudad hand grasps the patient's wrist and exerts vertical traction. The physician's cephalad hand braces the shoulder as in stage 1.
- The patient's arm is moved through full clockwise circumduction with synchronous traction. Larger and larger concentric circles are made, increasing the range of motion.
- The same maneuver is repeated counterclockwise.
- There is no specific muscle energy activation for this step; however, during fine-tuning of the circumduction, it may be feasible to implement it in a portion of the restricted arc.
- This is repeated for approximately 15 to 30 seconds in each direction, and circumduction is reassessed.



Seven Stages of Spencer: 5A Abduction

1. The physician's cephalad arm is positioned parallel to the surface of the table.
2. The patient's shoulder is abducted to the edge of the restrictive barrier.
3. The patient is instructed to grasp the physician's forearm with the hand of the arm being treated.
4. The patient's elbow is moved toward the head, abducting the shoulder, until a motion barrier is engaged. Slight internal rotation may be added.
5. A slow, gentle (articulatory, make and break) motion (arrows) is applied at the end range of motion.
6. Muscle energy activation: The patient is instructed to adduct the shoulder (black arrow) against the physician's resistance (white arrow). This contraction is held for 3 to 5 seconds.
7. After a second of relaxation, the shoulder is further abducted to a new restrictive barrier.
8. Steps 6 and 7 are repeated three to five times, and abduction is reassessed.
9. Resistance (white arrow) against the attempted abduction (black arrow) (reciprocal inhibition) has been found to be helpful in augmenting the effect.



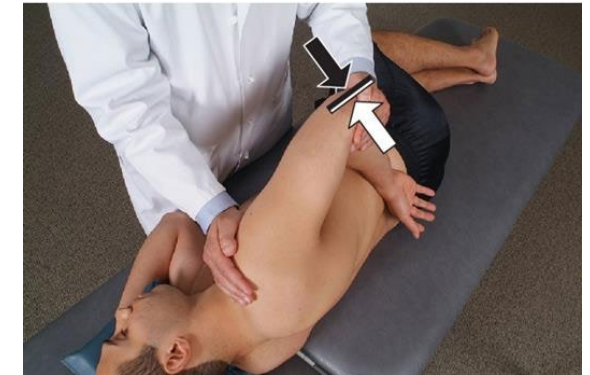
Seven Stages of Spencer: 5B Adduction/External Rotation

1. The patient's arm is flexed sufficiently to allow the elbow to pass in front of the chest wall.
2. The physician's forearm is still parallel to the table with the patient's wrist resting against the forearm.
3. The patient's shoulder is adducted to the edge of the restrictive barrier.
4. A slow, gentle (articulatory, make and break) motion (arrow) is applied at the end range of motion.
5. Muscle energy activation: The patient lifts the elbow (black arrow) against the physician's resistance (white arrow). This contraction is held for 3 to 5 seconds.
6. After a second of relaxation, the patient's shoulder is further adducted until a new restrictive barrier is engaged.
7. Steps 5 and 6 are repeated three to five times, and adduction is reassessed.
8. Resistance against the attempted adduction using the physician's thumb under the olecranon process (reciprocal inhibition) has been found to be helpful in augmenting the effect.



Seven Stages of Spencer: 6 Internal Rotation

1. The patient's shoulder is abducted 45 degrees and internally rotated approximately 90 degrees. The dorsum of the patient's hand is placed in the small of the back.
2. The physician's cephalad hand reinforces the anterior portion of the patient's shoulder.
3. The patient's elbow is very gently pulled forward (internal rotation) to the edge of the restrictive barrier. Do not push the elbow backward, as this can dislocate an unstable shoulder.
4. A slow, gentle (articulatory, make and break) motion (arrow) is applied at the end range of motion.
5. Muscle energy activation: The patient is instructed to pull the elbow backward (black arrow) against the physician's resistance (white arrow). This contraction is held for 3 to 5 seconds.
6. After a second of relaxation, the elbow is carried further forward (arrow) to the new restrictive barrier.
7. Steps 5 and 6 are repeated three to five times, and internal rotation is reassessed.
8. Resistance against the attempted internal rotation (arrows) (reciprocal inhibition) has been found to be helpful in augmenting the effect.



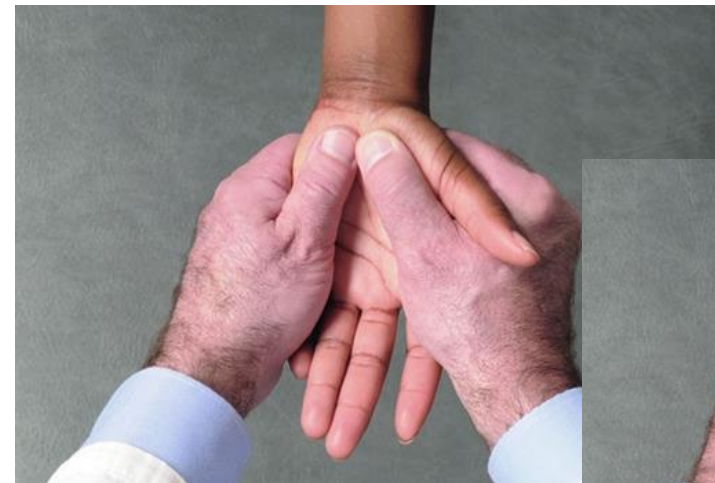
Seven Stages of Spencer: 7 Distraction in Abduction

1. The physician turns and faces the head of the table.
2. The patient's shoulder is abducted, and the patient's hand and forearm are placed on the physician's shoulder closest to the patient.
3. With fingers interlaced, the physician's hands are positioned just distal to the acromion process.
4. The patient's shoulder is scooped inferiorly (arrow) creating a translatory motion across the inferior edge of the glenoid fossa. This is done repeatedly in an articular fashion.
5. Alternatively, the arm may be pushed straight down into the glenoid fossa and pulled straight out again (arrows) with a pumping motion.
6. Muscle energy activation: Scooping traction is placed on the shoulder and maintained. While the traction is maintained (curved arrow), the patient is instructed to push the hand straight down on the physician's resisting shoulder (straight arrows). This contraction is held for 3 to 5 seconds. After a second of relaxation, further caudad traction is placed on the shoulder until a new restrictive barrier is engaged.
7. Step 6 is repeated three to five times.



Carpel Tunnel Release: (MFR)

1. The patient may sit or lie supine, and the physician stands in front of the patient or at the side, respectively.
2. The patient's hand is placed palm up in the "anatomical position."
3. The physician's thumbs are placed on the medial and lateral attachments of the transverse carpal ligament. On the thenar side, these are the tubercles of the scaphoid and trapezium. On the hypothenar side, they are the pisiform and the hook (hamulus) of the hamate.
4. The physician's fingers wrap around the dorsal surface of the wrist and direct a slight stabilizing pressure onto the carpal articulations. The physician attempts to stretch the transverse carpal ligament (flexor retinaculum) by pressing the thumbs into the volar surface of the base of the hand and pushing the thumbs apart (arrows).
5. This pressure is maintained for 20 to 60 seconds or until a release of tissue tension is detected. During this process, the physician's thumbs should not slide over the bony landmarks, skin, or superficial fascia, but remained fixed in order to accomplish the release.
6. If the patient has carpal tunnel symptoms of pain or paresthesia's during this procedure, the tension should be relaxed, and if symptoms are relieved, repeat the tension holding 20 to 60 seconds or until exacerbation of symptoms, relaxing tension again.
7. The physician reevaluates the myofascial ease-bind barriers and other related diagnostic components of the dysfunction (TART) to assess the effectiveness of the technique.



or



Foot pain (plantar): MFR

1. The patient lies supine, and the physician sits at the foot of the table.
2. The physician's thumbs are crossed, making an X, with the thumb pads over the area of concern (tarsal to distal metatarsal) at the plantar fascia.
3. The thumbs impart an inward force (arrows) that is vectored distal and lateral. This pressure is continued until the restrictive (bind) barrier is met.
4. The pressure is held until a release is palpated.
5. This is repeated with the foot alternately attempting plantar flexion and dorsiflexion.
6. The physician reevaluates the myofascial ease-bind barriers and other related diagnostic components of the dysfunction (TART) to assess the effectiveness of the technique.



Counterstrain

1. The patient lies prone, and the physician stands at the side of the counterstrain point and places his/her foot on the edge of the table.
2. The patient's knee is flexed, and the dorsum of the foot is placed on the physician's thigh.
3. The physician applies a compressive force on the patient's calcaneus to produce marked flexion of the forefoot, approximating the calcaneus and the forefoot.
4. The physician fine-tunes (more or less flexion of the forefoot) until the tenderness is completely alleviated or reduced as close to 100% as possible, but at least 70%.



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