Progressive inhibition of neuromuscular structures (PINS) technique

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Progressive inhibition of neuromuscular structures (PINS) is a technique that can be included in the osteopathic manipulative treatment repertoire. It relies on knowledge of anatomy and neuromuscular physiologic features as well as on standard forms of osteopathic palpatory diagnosis and treatment. It is a variant of the inhibition technique that has been taught as an osteopathic manipulative technique for many years, and it bears some resemblance to other manual medicine techniques. The emphasis of the approach is the determination of the alteration of the tissues due to dysfunction, delivering treatment based on palpatory evaluation and patient feedback. Two related points are initially chosen, followed by a progression from one to the other. Relationships to similar techniques are also discussed. Theoretical as well as selected practical applications are presented.

(Key words: inhibition, progressive inhibition of neuromuscular structures, osteopathic manipulative treatment)

Many osteopathic treatment modalities have been developed in the 100-plus years of the profession. Several are adaptations of other methods. The selection of the appropriate one depends on several elements, including skill, suitability, efficacy, ease of use, and expected outcome. Progressive inhibition of neuromuscular structures (PINS) is a new approach to the use of the inhibition technique.

The author first began to treat his own headaches more than 20 years ago using pressure on various portions of the scalp. Headaches related to suboccipital symptoms also appeared to be related to supraorbital pain that usually followed eyestrain. All the symptoms could occur independently and were worsened by stress. Manual pressure exerted at several sensitive points appeared temporarily effective but were followed within seconds by pain in the secondary adjacent regions of the scalp. However, when these secondary points were likewise pressured, patterns seemed to develop. Similar symptoms of cephalgia that developed in some of the author’s family and friends were likewise treated with some success.

After enrolling in the New York College of Osteopathic Medicine, the author began to learn more about osteopathic manipulative treatment (OMT). Gradually, the rationale and the utilization of the technique in situations other than cephalgia were determined. Similarities to other methods of treatment were also noted.

Inhibition

The PINS technique has its foundations in the osteopathic modality of inhibition. According to the glossary of osteopathic terminology, the term inhibition describes “steady pressure to soft tissues to effect relaxation and normalize reflex activity.” As an intervention for musculoskeletal dysfunction, inhibition is perhaps one of the oldest methods of OMT.

Inhibition as a technique typically is performed by using the fingers or other body parts to exert constant mild to moderate pressure on regions of muscle in spasm. The intention is to decrease the tonicity of the muscles and the symptoms that the patient has relative to this muscular state. Generally, inhibition is directed at relatively large muscles. It is also used, especially in the thoracic region, with the intent to reduce sympathetic innervation to musculoskeletal or visceral target organs. In the suboccipital and sacral regions, the intention switches toward resetting parasympathetic activity. Also, treatment may be moved about several locations to reduce all the relevant dysfunctions. A.T. Still included inhibition and stimulation methods in some of his early writings.

As a young man, Still treated his own chronic headaches with the rope-swing method. This method may represent inhibition as well as a positional intervention.

Inhibition for various conditions, both somatic and visceral, was described and illustrated by one of Still’s students, Eduard Goetz, DO. Selected photographs in Dr Goetz’s handbook demonstrate and detail the treatment of several locations, including the orbital and suboccipital regions. Pressure is applied singly to each of the points for a few minutes. A more extensive description appeared in The Principles of Osteopathy, by Dain L. Tasker, DO, and was accompanied by a rationale as to its effectiveness. Tasker described the ability of inhibition applied by an osteopathic physician to lessen hyperactivity, alter the reflex arc, remove the lesion, and bring about some alterations deep to or distant from the location of the applied pressure.

Osteopathic point and pressure techniques

Several passive direct and indirect systems of treatment of somatic dysfunction exist. Many utilize standard points and...
diagnoses as fulcrum or monitoring locations. Constant palpation at the points allows both physician and patient to obtain feedback as to the success of the treatment. Jones’ strain-counterstrain technique\(^1\) localizes a tender point and then positions the patient into a direction of ease. Most of the diagnostic points are named for spinal segments, bony landmarks, ligaments, or muscles. Even so, the treatment positions appear to be related to shortening, therefore relaxing, muscles and ligaments. In theory, actively stimulated flower spray and annulospiral fibers of the muscle spindle mechanism are reset.

Facilitated positional release (FPR)\(^2\) uses an activating force, usually compression or torsion, after initially positioning the region in neutral. The osteopathic physician then further brings the somatic dysfunction into the directions of ease. Both strain-counterstrain and FPR theoretically utilize the same neurophysiologic mechanism. However, because of forced shortening of all muscle components caused by the facilitating force, a release occurs within seconds instead of in a minute and a half. The localization of a tender point in both FPR and the strain-counterstrain system is solely for the purpose of monitoring.

The recently described Still technique\(^10\) shares many similar applications to these two previously described techniques. Richard Van Buskirk, DO, attributed the writings of Charles Hazard, DO, as well as Still himself, as the sources for the method. Articulatory movements toward the barriers follow positional treatment and the utilization of forces into the freedoms.

Functional technique\(^3\) utilizes the diagnostic points to define the somatic dysfunction that exists at that level relative to the two adjoining vertebrae. The physician directs the region into a position of ease along several axes with a respiratory component added. Other osteopathic manipulative techniques use the monitoring points as sites where some form of pressure is exerted to relieve dysfunction. The intent goes beyond monitoring. Torque unwinding,\(^2\) as developed and taught by Elaine Wallace, DO, is one such technique. Theoretical “cubes” are superimposed onto regions of the body. Truamas introduce forces that sometimes follow winding paths that result in the distortion of the tissues, especially the fascia. The physician’s fingers direct rhythmic, intermittent pressures centrally from contralateral faces of the cubes for the purpose of balancing these fascial elements.

Various other fascial release techniques\(^3\) use point contacts as references, contact points, and/or diagnostic reflections. Trigger band technique\(^1\) is a method used with the intention of changing the pathologic cross-linkages of fascial bands through the use of deep pressure along certain connective pathways. Leon Chaitow\(^12,13\) described the development of neuromuscular technique by two of his relatives, Stanley Lief and Boris Chaitow. The method consists mostly of localization of points reflecting dysfunction treated by pressure, followed by deep stroking or rolling of the tissue (or both).

Chapman’s point treatment\(^14\) also works with standardized points on the surface reflecting a neurologic/endoctrine/lymphatic internal alteration. Circular pressures are applied rhythmically to nodular findings that are related to visceral conditions.

### Other point and pressure systems

Typical inhibition also shares some similarities with other manual medicine systems of treatment. Cyriax method,\(^15\) trigger point therapy,\(^16,17\) acupressure,\(^18,19\) reflexology, rolling, and shiatsu\(^20,21\) share common components: the physician presses on the patient’s soft tissue with the intent to bring about a persistent alteration. Almost all these methods rely on a system of points that are used for diagnosis or treatment (or both).

Although primarily a proponent of joint mobilization and massage, James Cyriax, MD, discussed the use of a pinching technique on several locations to bring about a relaxation and stretching of tissue as well as a relative hyperemia. Developed by Janet Travell, MD, trigger point therapy recognizes the relationship between a damaged myofascial nexus and a remote referral point. Using a combination of needles, vaporcoolant spray, and the injection of anesthetics or anti-inflammatory agents, the physician locates and interrupts the aberrant patterns. Manual application of trigger point therapy theoretically breaks apart the restricted soft tissue. This requires the application of deep pressure on selected points. Myotherapy consists of another manual version of the trigger point concept. Primary points, as well as satellite points, are treated for short intervals several times per day over several sessions.\(^22,23\) Stretching is also incorporated after the treatment.

Acupressure, like the better-known acupuncture, utilizes similar surface points that represent reflections of visceral changes. The point locations follow the traditional oriental concept meridians. The technique generally involves circular motions as well as the application of pressure. Generally, one or two points are treated at any given time.

Ida Rolf, PhD, was apparently strongly influenced early in her life by osteopathic medicine.\(^24\) She utilized one aspect, the exertion of pressure on regions of the body, as the tool to reestablish symmetry and more normal function. The extent of deeply applied pressure in this modality exceeds that which is commonly used in inhibition. This usually results in some initial discomfort on the part of the patient. There is a heavy emphasis on approximating ideal symmetry and alignment. Followers of Dr Rolf also integrated these approaches with other modalities involving movement patterns (Hellerwork, Astar-Patterning).

Shiatsu, one of the oldest forms of manual therapy, usually involves relatively heavier pressures for a short duration. Reducing tissue tension is a means of increasing “the circulation of vital energy.”\(^1\) The amount of force, especially in the hands of a traditional practitioner, is intense and of short interval (10 pounds for 10 seconds), as opposed

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to the lower, steady force used in inhibition. The sequencing of points for specific conditions is based on energy flows throughout the body. Some points are adjacent, and others are distant to the primary location.

Reflexology correlates treatment points with certain visceral organs that are reflected onto resonant areas on the hands, feet, and ear. In theory, the name has more to do with the functional contribution to the integrity or energy component of the organ than the actual physical structure.

PINS method
Many portions of the previously cited systems have merit and application in several clinical situations. PINS shares some similarities with several of these. The use of pressure and of localizing points are but two of the components. The uniqueness of the PINS system is its versatility, which is based on the physician’s ability to utilize anatomic and clinical knowledge of and to develop treatment. Knowledge of the typical courses of nerves, fascial bands, and muscles, augmented by clinical decision-making skills, are necessary for accuracy. Thorough treatment of contiguous muscles, understanding “watershed” areas of innervation (the overlapping zones where more than one nerve can contribute to sensory and motor innervation), and a sequencing of treatment make the PINS system more effective. The osteopathic physician must also be aware of the frequent possibility of anatomic variability. Patients participate in the treatment by describing the amount of pain sensitivity as well as the change that occurs as treatment progresses. PINS is not a stand-alone system; it is to be used with other methods of OMT.

System of application
There are a few considerations in the development of a diagnostic and treatment protocol using PINS:
- The physician must examine the patient and determine the relationship between the patient’s symptoms, somatic dysfunctions, and the soft tissue findings.
- The “S-T-A-R” determinants of somatic dysfunction25 include Sensitivities changes (or the more traditional “tenderness”) on palpation; Tissue texture changes; Asymmetry; and Restriction of motion.
- Complaints of pain are an indication that there is a problem. These do not necessarily localize the level or even the side of dysfunction.
- A sensitive point is determined in the immediate region of the patient’s dysfunction and/or complaints by palpation.
- Using knowledge of anatomic structures, another point is located distal or proximal to the point that is found in the region of the patient’s symptoms. In the case of nerve distribution of an extremity, one point will be closer to the trunk while the other will be closer to the end of the extremity. The physician makes the determination of the two ends of the pattern. When the diagnosis reveals that a muscle is involved, the primary and end points are found in the muscle bellies and at the attachments. The second point, the end point, should have some alteration of sensitivity as well. Sometimes the patient has complaints that seem (to the patient) to occur in two or more apparently unrelated regions. This indicates a problem.
- Of the two points, the one that is more sensitive is the primary point. At the other extreme is the end point. An example is a sensitive point at the supraorbital notch, typically found in frontal headaches. A second, less sensitive point may be found in the suboccipital region on the same side of the head. The first, more sensitive point is the primary point, and the other is the end point.
- A muscular, fascial, or neurologic connection alone or in combination between the primary point and the end point, which may be more distal or more proximal, is determined.
- Using knowledge of anatomy, the physician draws a connection between the two points, especially the following:
  - nerve innervation—direct connections; overlap or “watershed” regions of innervation;
  - muscle origins and insertions—overlap; contiguity;
  - fascia—specialized (dural attachments, fascia lata); septums; overlaps;
  - ligamentous attachments—relationships to muscles; relationships to nerves;
  - bones—construction of joints; lever action.
- Using the pad region of a finger on each hand, the physician exerts pressure on both points (primary and end points) simultaneously and with equal amounts of force. The pressure should be just sufficient to elicit a mild to moderate increase in sensitivity. Patients may automatically assume that the point that is more sensitive is receiving more pressure. Reassurance should be given to the patient that the reason for the asymmetry is the apparent dysfunction or hyperactivity of the involved tissue. Occasionally, patients state that they can tolerate greater pressure than that which is induced. It is not necessary to increase the pressure. Because of the chronicity of some muscular dysfunctions, patients may experience sensations other than sensitivity or in combination with pain.
- Determine the soft tissue response to pressure. A muscle that has been hypertonic is usually more sensitive to pressure than the same muscle on the contralateral side. A muscle that has been hypertonic for an appreciable amount of time is usually larger than that on the contralateral side.
- The fact that a muscle is larger does not necessarily indicate dysfunction. Increased usage or side preference, such as in sports activities that preferentially utilize muscles in an asymmetric manner (bowling, archery), usually leads to hypertrophy.
- A hypertonic muscle that has been so for some time may not be as sensitive to pressure, due to the chronicity. The
finding of a more sensitive but less hypertonic muscle indicates a problem, but it does not necessarily indicate the laterality of the problem. Both sides can be dysfunctional, but to varying degrees. In this case, the clinician should initially decide to treat the tissue in greater dysfunction, not necessarily the one that is more sensitive.

- The patient should be in a comfortable position in which the muscle is not actively utilized (postural muscles are not utilized while the patient is in a supine position). A muscle that has a greater degree of firmness is probably in greater dysfunction and, likewise, more sensitive. Predicting this aspect prior to securing confirmation from the patient indicates to the patient that the physician is able to localize and appreciate the patient’s complaint. This acts to validate the patient’s condition and the physician’s diagnostic ability.

- Maintain constant pressure on the point with lesser sensitivity (end point) throughout the treatment.

- Initiate pressure on the point with greater sensitivity (primary point).

- Request that the patient note the initial amount of sensitivity. The patient can provide feedback if the sensation at the sensitive point decreases or increases. When inhibition is used properly, there is usually a transient initial increase followed by subsequent decreases. Ultimately, the sensitivity may disappear totally. The duration can vary from several seconds to minutes.

- After approximately 20 to 30 seconds, pressure is simultaneously placed on a new location. The physician uses another finger of the same hand to locate a secondary point. If he/she used the index finger on the primary point, the middle finger can be used to palpate the secondary point. The secondary point is usually approximately 2 to 3 cm away from the primary point and in the direction of the end point. Typically this follows the predicted course of the innervating nerve, along the direction of the muscle fibers, or follows fascial planes.

- Equal pressure is exerted on the primary and secondary points. The patient is requested to determine which of the two points (primary vs secondary) is more sensitive. (The physician should identify the primary point as the “first” point before putting any pressure on a secondary point, and then identify the next point as the “second” point for the patient.) If the second point is more or equally sensitive than the first, pressure is relieved and removed from the first point (primary), and then constant pressure is maintained on the second (secondary) sensitive point for 20 to 30 seconds. Apparently, sensitivity of the initial (primary) or subsequent points does not have to completely resolve for the treatment to be successful. The amount of time depends on the soft tissue response. Initial pressure usually causes a more intense response both in tension and sensitivity that returns to a baseline after a few seconds as aforesaid.

If the primary point persists as the more sensitive of the two contiguous points, then pressure is maintained at the location of the primary point. The physician moves the finger pressing on the secondary point more laterally or medially until a point is found that has more or the same sensitivity as the primary point. Pressure is released from the primary point and maintained on the secondary point as described previously. The secondary point then becomes the new “first” point in the continuing sequence of treatment toward the end point. The clinician should wait the 20 to 30 seconds of inhibiting any point before searching for a new point. If no secondary point can be located despite searching in a 2-cm radius from the primary point, then the physician continues to maintain pressure on the primary point (or the “new” primary point) for another 30 seconds. In all probability, the point has not received enough time or pressure to be adequately inhibited.

- The process is continued successively until the ultimate “second” point is 2 cm from the end point, which has received inhibition throughout the process.

- Once the final two points are being inhibited, the physician can determine the amount of tension that persists at the end point location. The end point may not have greatly decreased in intensity, or it may have discontinued in sensitivity altogether.

- If the end point remains persistent, the physician can choose to treat the residual component in whatever manner he or she wishes. An end point previously identified as a sensitive point and unsuccessfully treated with another modality may now be more amenable to treatment; strain-counterstrain, FPR, muscle energy, balanced tension techniques, or some other modality may be used. Single-segment somatic dysfunctions that were difficult to position or resistant to thrust technique may now be more responsive to high-velocity/low-amplitude (HVLA) or other articulatory technique.

- PINS technique can be the sole approach to the dysfunctions that were found or can be used in conjunction with any modality of OMT. The determination of this is dependent on:
  - persistence of the dysfunction or related components after treatment;
  - ability of the physician to perform other modalities of treatment;
  - ability of the patient to accept additional treatment.

- Occasionally, soreness or other symptoms may persist despite sufficient treatment. The physician should determine the termination of treatment for the individual session. Overtreatment can be as debilitating as undertreatment.

- Patients may limit types of treatment. This may be due to fears or reactions that they have had to previous types of treatment. Some may have had no reaction but dislike an element of the modality, for example, “popping” secondary to HVLA technique.

- The somatic dysfunction is reassessed.

- The patient is advised that despite the relative comfort of the treatment, there may be posttreatment reactions, including transient soreness, aches, and fatigue. Bruising can occur in patients who are prone to this or if excessive pressure has been used. Generally, all
of these reactions resolve in 24 to 48 hours.

**PINS application**

**Case study 1**

A 25-year-old female osteopathic medical student presented with chief complaint of a migraine headache. She had been treated for musculoskeletal complaints by another osteopathic physician who was unavailable the day she presented to the clinic. The headache was sharp and focused near the right orbit, with radiation to the right frontal and temporal regions. She had nausea, blurring of vision, increased lacrimation, and neck stiffness. The pain had begun a few days before and was unrelied by the use of nonsteroidal anti-inflammatory drugs (NSAIDs), sleep, or frequent doses of sumatriptan succinate, which she took orally. She stated that she took between 21 and 30 sumatriptan succinate pills per month. Loud sounds, light, and certain food smells seemed to worsen the chief complaint. There were no other visual, auditory, or olfactory complaints or associations with the headache. The current episode appeared to be unrelated to her menses, as her previous menstrual period was 2 weeks prior.

Medical history relative to the chief complaint was significant for paresthesias to the upper extremities secondary to a motor vehicle accident 2 months earlier. She was the driver of a vehicle that had been struck from behind while stopped at a traffic light. She had seen the other vehicle approaching and braced herself for impact. There was also a history of transient hematochezia, occasional vaginitis, coccygodynia, and allergic rhinitis. She had neck pain, shoulder pain, low back pain, and abdominal pain. When she was 12 years old, she fell and struck the top of her head, and she reported that she had had migraines ever since. Family history was significant in that other members of the family had migraines; a brother had allergies; and her mother had “colon problems.” The patient drank two glasses of wine once per week and denied using recreational drugs or tobacco. She had a tonsillectomy, rhinoplasty, and sinus cauteterization.

Other medications included fexofenadine hydrochloride, oral contraceptives, acetaminophen/aspirin/caffeine, ibuprofen, and the aforementioned sumatriptan—the last three taken episodically for headaches. She had been to the emergency room several times for treatment of unrelieved migraine headaches.

Cranial nerve, sensorimotor, and reflex testing results were normal. Results of other neurologic and orthopedic evaluation procedures were unremarkable. Although the patient had several tender points, there was not a pattern indicating fibromyalgia as a component of the patient’s condition. Examination of the head, neck, chest, and abdomen revealed no abnormalities, with the exception of photophobia. Vital signs were stable, and the patient was alert and oriented for all modalities. Examination resulted in findings of somatic dysfunctions as follows:

- **cranial:** occipitotantal compression; right condylar compression; restriction of frontal, right parietal, and right temporal bone motion during flexion; occipitomastoid suture restriction on the right; cranial rhythmic impulse of 4; left sidebending-rotation pattern; facial asymmetry (right narrow orbit; flattened nasolabial fold left; deviation of nose; etc); sensitive point at the supraorbital ridge; restriction of the right temporomandibular joint.

- **cervical:** occipitotantal extended, sidebent right, rotated left; atlantoaxial rotated right; C2 extended, sidebent right, rotated right; C3 extended, sidebent left, rotated left; C6 sidebent right, rotated right; C7 sidebent right, rotated right; spasm of the right trapezius; spasm of the right sternocleidomastoid.

- **thoracic and rib:** spasm of the right levator scapula; spasm of the left scalene muscles; right first rib elevation; myofascial restriction of the hyoid and anterior strap muscles; multiple thoracic type II somatic dysfunctions.

- **lumbar:** L5 flexion sidebent right, rotated right; thoracolumbar paravertebral muscle spasms.

- **sacrum and pelvis:** unilateral sacral shear on the right; right anteriorly rotated ilium; right piriformis tender point; Chapman points along the iliobibial band on the right; restriction of the coccyx and pelvic diaphragmatic restriction on inhalation.

Diagnoses included cephalgia (migraine); cervical, thoracic, head, lumbar, sacrum, and pelvic somatic dysfunctions; and strain. The patient was clearly anxious regarding her condition. All symptoms may have been exacerbated by recent and upcoming school examinations. Many of the patient’s symptoms were present before her recent motor vehicle accident.

Much of the treatment that was performed on this visit was similar to that which had been done before for the patient. Muscle spasms were treated with a combination of muscle energy, soft tissue myofascial techniques, FPR, inhibition, and various direct and indirect fascial release methods. Tender points were treated with strain-counterstrain and fascial release. Type II somatic dysfunctions were managed by HVLA and low-velocity articulation techniques. Cranial dysfunctions and restrictions received indirect techniques such as distraction and balancing, and direct techniques such as compression of the fourth ventricle, lifts (frontal and parietal) and v-spread. Single- and two-person techniques with both indirect balancing and compression of the fourth ventricle were performed singly and in tandem from the occiput and the sacrum. All of these interventions were successful, relieving most of the somatic dysfunctions and complaints with the exception of the chief one, cephalgia—complaints of the “migraine headache” persisted.

A different approach was added to the other customary treatment. Sensi tive points at the supraorbital ridge at the trochlear notch and in the suboccipital region persisted. The author placed his left hand beneath the patient’s head and neck. The left middle and index fingers exerted direct pressure on the patient’s right occipital sulcus region (Figures 1, 2, and 3). Simultaneously, pressure was exerted on the right orbital sensitive point with the author’s right third finger.
Figure 1. Primary point palpation of supraorbital ridge.

Figure 2. Inhibition of supraorbital ridge and suboccipital regions (lateral view).

Figure 3. Inhibition of supraorbital ridge and suboccipital regions (coronal view).

Figure 4. Inhibition of primary and secondary points.

Figure 5. Inhibition of primary, secondary, and end points.
Figure 6. Trigeminal innervation of the face and head.

Figure 7. Overlapping innervation of the scalp with the occipital and trigeminal nerves.

Figure 8. Innervation of the posterior region of the head.

Figure 9. Pattern of inhibition points in a patient with cephalalgia (case study 1).

Figure 10. Typical inhibition patterns of the face and head.
The patient indicated that this latter point was more sensitive than the posterior one. The pressure also seemed to worsen her ophthalmic symptoms. Pressure was maintained for approximately 30 seconds on the anterior, primary point. Then a second point superior to this was simultaneously pressed with the same amount of pressure as the first, utilizing the second finger of the same hand. Pressure in the suboccipital region was maintained constantly throughout. The patient was requested to identify which of the two anterior points was more sensitive, to which she responded that the second was more so. Pressure was then maintained on this second point and released on the first. This was then maintained for 30 seconds before a third point was identified approximately 2 cm superior to the second point (Figures 4 and 5). The third point was identified as more sensitive than the second. Pressure was then relieved from the second point and maintained on the third. The same pattern was followed progressively along a parasagittal line over the frontal, parietal, and occipital bones until a final point was identified 1 cm superior to the end point that was being inhibited in the suboccipital region throughout. These two points were treated with a combination of cervical strain-counterstrain, FPR, low-velocity, and then HVLA techniques to the suboccipital region. Previously during this session, these techniques were unsuccessful or could not be performed because of the patient’s symptoms. All the patient’s symptoms completely resolved.

The patient followed up with her usual osteopathic physician. The technique of progressive inhibition of scalp/head sensitive points was carried out on subsequent visits when necessary and was similarly successful. The patient reported that she had also tried the technique on herself with positive results.

Often, the technique proved effective in aborting what she believed was the beginning of a migraine headache. She also reported that when the results were less than optimal, she could take a sumatriptan pill to improve symptoms to a greater extent. The patient reduced her medication use from 21 to 30 pills per month to 2 to 3 pills per month, and this has remained so for several months.

The differential diagnosis of cephalgia is complex and complicated by overlapping symptoms and findings. Also, all headaches have elements of muscle contraction. The OMT of migraine headaches also appears to be more successful when initiated during the prodromal phase or during relatively symptom-free intervals. When considering irritation and inflammation of the cranial dura, the osteopathic physician must keep in mind that the first branch of the trigeminal nerve innervates the frontal region and that the posterior fossa receives a good portion from the upper cervical region. Generally, treatment during the full-blown cephalgia component of migraine may be more effective in reducing rather than eliminating the symptoms. Muscle tension/contraction headaches can mimic some of the typical migraine symptoms as well as occur simultaneously with migraines. In seeking treatment for any headache, patients seek out many means of intervention. Pharmacologic interventions such as NSAIDs and vasoconstrictive medications are frequently the first or most frequently tried interventions. Other self-treatments include beverages, foods, or pills that contain caffeine. These treatments are often successful in limiting or eliminating headaches, but they have also been implicated in recurrences. It is possible to experience a rebound effect when the medication levels go below a critical level. Rather than eliminate headaches, there may be a greater likelihood of recurrences.

The technique of progressively inhibiting discovered sensitive points approaches cephalgia of this type from a neuromusculoskeletal model. In this case, the location of the initial point is at the exit of the ophthalmic division of the trigeminal nerve. The same nerve innervates both the dura and the forehead. There are other considerations, such as the attachment of the superior oblique muscle near this site, as well as sympathetic influences from the upper cervical spine postganglionic fibers. Several branchings of the ophthalmic division of the trigeminal nerve (Figure 6) occur, but all project more cephalad along the frontal region. Basically, they track upward unilaterally into the parietal region and are responsible for sensory appreciation from this region. There is a “watershed” region at the galea aponeurotica (Figure 7) where the effect of the greater occipital nerve (Figure 8) begins to also innervate the skin and musculature. This nerve, comprising the C2 and C3 nerve roots, perforates the fascia and suboccipital muscles and controls sensory and motor innervation to most of the occipital region. Inhibition and other treatments to the suboccipital region were crucial to the completion of the treatment.

The results of the procedure (Figure 9) demonstrate a pattern that progressed from orbit to occiput along a typical parasagittal line. In some cases, the direction may vary and include other divisions or subdivisions of the trigeminal nerve (Figure 10). Depending on the findings, the approach may be more anteriorly, beginning in the suboccipital region and proceeding to the frontal-orbital region. It is also not unusual to find that one of the subsequent points, especially in the region of the vertex of the head, refers pain toward the initial primary point. This should be taken as a positive sign that the procedure is locating and treating the component factors of the dysfunction.

**Case study 2**

A 72-year-old man presented with chief complaints of pain in the left lower extremity, Parkinson’s disease, and osteoarthritis. The primary symptom was sharp, almost constant, and radiated from the left hip toward the knee and ankle. The progression of his Parkinson’s disease had been slow and primarily expressed by stiffness. This, in combination with his arthritis, made some activities difficult to perform. He had a head forward and stooped posture and moderate bradykinesia. The chief complaint had further altered his walking pattern by adding a limp to his already shuffling gait. Radiography re-
vealed moderate degenerative joint disease, which was apparently symmetric involving both hips. The patient denied any bowel or bladder symptoms.

Examination revealed equal restriction of motion of both hips. Patrick’s test (fabere sign) and flexion, adduction, and internal rotation ranges of motion, as well as extension, were equally limited and equivalent for both hips. Sacroiliac motion was likewise limited, with the left side demonstrating greater limitation, and a left unilateral sacral shear was noted. The ilia demonstrated equal mobility or relative lack thereof, and the legs appeared to be of equal length. Moderate somatic dysfunctions were noted throughout the lumbar, thoracic, and cervical regions. Results of sensorimotor and deep tendon reflex testing of the lower extremities were within normal parameters. Strain-counterstrain tender points were noted in the left gluteal, piriformis, mid-pole sacral, and iliotibial band. A posterior fibular head was also noted on the left.

Treatment was performed on one occasion, using techniques such as strain-counterstrain, muscle energy, balanced ligamentous tension, and other means of fascial release. Attempted mobilization utilizing HVLA of the fibular head was unsuccessful. The iliotibial band was also treated with ultrasound both during that office visit and along with other physical medicine modalities during physical therapy sessions that the patient attended twice weekly. The patient’s symptoms persisted.

The same clinical and palpatory findings were noted on the next visit 1 week later, at which time the PINS technique was used. The primary point was localized at the greater trochanter. With the end point designated as overlying the fibula head, successive points were found along the tensor fascia lata/iliotibial band (Figures 11, 12, and 13). The last in the series was a final point that was approximately 2 cm proximal to the end point. Pressure was maintained for 30 seconds simultaneously on the two points. The patient reported that the pain was reduced by at least 50% along the lower extremity. The fibula head was then mobilized successfully with HVLA, after which the patient stated he had only a small amount of residual discomfort. The improvement persisted at least 1 week, at which time the patient returned to the Academic Health Care Center. The symptoms were present to a much lesser degree and limited to a single tender point near the left greater trochanter. This was easily treated with only strain-counterstrain technique.

**Mechanism of action**
The mechanism by which inhibition works can only be supposed, as is the case with many other modalities of OMT. Sufficient experimentation has not been performed for many manipulative modalities. The understanding of processes of injury, as well as treatment, is typically based on the most likely combination of relevant physiologic and anatomic components.

Accommodation, or habituation, is a process wherein a stimulus of a constant level, even if initially irritating, becomes less so over time. At first, the subject may be acutely aware of the intrusion or pressure. The local tissue also reacts by initially increasing in tension. Gradually, these reactions decrease and may disappear altogether as the system adapts. Involvement of the reticu-
lar formation as a screen is but one component. Other occasions where accommodations to stimuli occur include relative nonawareness of body contact with eyeglasses, tight belts, stiff clothing, and uncomfortable shoes, as well as constant auditory and visual stimuli (a refrigerator in the kitchen or sounds from a nearby railroad often fail to get our attention unless the sounds deviate from the usual). There may also be a process where the spinal cord acts as a mediator in this habituation by acting as a "brake" when sensory overload occurs.28(pp130-131)

Pressure placed on points near the greatest sensitivity or at the location of the symptoms may act as counterirritants. Large, fast-conducting afferents gate transmission in the dorsal horn and collateral fibers in the substantia gelatinsa or adjacent interneurons, then inhibit the transmission of pain via the spinothalamic tract.29 In this manner, pressure acts as a stimulant to neighboring tissue, reducing the sensitivity of the original tender point. This is similar to the effect of scratching in the region of an itch.

Another theory is that inhibition by the nature of a sustained pressure is related to an ischemia of the immediate tissue. Metabolites that were produced from the local tissue damage and prolonged contraction are released.30 Ordinarily, tissue that has been damaged demonstrates a decrease in circulation in a progressive fashion. Immediate or acute injury results in hyperemia and congestion. There is infiltration of vasoactive substances that appear primarily capable of dealing with tissue injury. If injury persists or there is a pattern of reduced function, trophic changes occur. The soft tissue becomes more fibrotic and demonstrates decreased circulation by blanching. The application of therapeutic pressure to cause a relative ischemia does not initially make sense. It can be postulated that, following pressure, the ischemia reduces the capacity of the nociceptive receptors to process. Once the pressure is removed, existing waste products, as well as those produced during the tenure of the pressure, are washed away by the resultant hyperemia after release. This can be likened to a damming of the local vessels, a buildup of pressure, then sudden washing away as the compression is released.

A muscle in dysfunction may appear to be in its neutral position, but the increased tonicity indicates activity of the muscle spindle mechanisms. As a means of protection, the annulospiral and flower-spray afferents react to either contraction of the nuclear bag and chain fibers or the stretching of these. The contractile status of these intrafusal fibers is directly under the influence of the gamma motoneurons. These specialized muscular fibers lie deep to and occur in parallel with the larger extrafusal fibers. Stress, anxiety, pain, cold, and other general components are among those factors that increase the sensitivity and gain of these fibers. Sudden, unexpected stretching, as well as overstretching of the intrafusal fibers, also initiates activity of the special sensory flower-spray and annulospiral fibers. This results in a reflex action at the spinal cord segment and activation of the alpha motoneuron resulting in contraction of the larger extrafusal muscle fibers. This circuit is protective and is apparently present to prevent disruption of the muscle when the possibility of tearing exists. When the gamma gain is set too high, the spindle activity reacts earlier in the stretch, to a higher degree than necessary, or is inappropriately maintained longer than is necessary.28(pp113-117),31(pp26-50),32

Much in the same way as stretching is used before and especially after exercise to prevent contractions, inhibition may add a gentle stretch that allows resetting of the stretch receptors.33 Localized pressure, such as is applied in inhibition, introduces a stretch in a region of a few centimeters without challenging the whole muscle. The amount that is initially irritating is at a subcritical level, but once the small component is overwhelmed, an adjacent area can subsequently be inhibited. In this manner, PINS may be a very effective method because it deals with components in building for the completion of the treatment.

Some authors have described myotendinous changes that are usually characterized by increased tone, thickening, resistance, and decreased plasticity.29(pp117-118) These occur within the muscle and are particularly tender when the muscle is palpated perpendicular to the direction of the fibers, using pressure that should ordinarily not be irritating. However, changes in these fibers can be palpated from the origin to the insertion while other nonpathologic fibers located in the same muscle parallel do not show the same pattern of irritation. These tender bands can be found in patterns that are similar to trigger points and appear to be related to relatively nontraumatic events. A latency period follows in which only one site is irritable and then is followed by the rest of the muscle and attachments becoming irritable. This may explain some of the correlative locations between Jones strain-counterstrain tender points and Travell trigger points. Differences in quality between the two may represent a matter of duration and degree of the dysfunction.

A complementary muscular reflex system is that of the Golgi tendon system. Unlike the muscle spindles, the Golgi tendon system is set in series and is located in a netlike fashion in the tendon. The tendon, being the least contractile component of a muscle unit, has sensory fibers that become relatively stretched during muscular contraction. They also become activated by passive stretch of the whole unit. Unlike the muscle spindle, Golgi tendon organs influence the alpha motoneuron via an inhibitory interneuron and bring about relaxation of the muscle as a whole. Also known as the clasp-knife reflex, the results can be dramatic and sudden. When muscles are hypertonic, an intervention whereby initial stretch results in further contraction is then followed by resultent relaxation.34 This system is the most probable when one considers more direct-active techniques, such as muscle energy, and in passive stretch interventions where the region is held at a pathologic barrier for a significant amount of time.

Impaired flow can be of vascular, lymphatic, or neuronal origin. Pressure
on the axon can impair the transport of necessary neuropeptides and other substances.\textsuperscript{35} The speed with which this flow naturally occurs is forty to several hundred mm/day,\textsuperscript{36} rates that apparently would be too slow to explain any immediate effect. However, some of the persistence of the effect with PINS and any other soft tissue treatment of somatic dysfunction may be due to alleviation of the pressure on nerves.\textsuperscript{36}

As has been previously described, the persistence of somatic dysfunction can occur despite adequate treatment. Sometimes the breakthrough in successful treatment comes with the recognition of the connection of various apparently unrelated elements. If one postulates that some dysfunctions support others, then failure to recognize and treat these allows for continuation or recurrence. The more symptomatic elements get the attention while the supportive ones remain in the background. Using the analogy of a reverberating circuit, all elements must be “shut down” to eliminate the process. Often on first presentation, the osteopathic physician can and should focus on the region of the chief complaint. If there is good resolution, there may be little or no need for repetitive treatment. However, when treatment results in only temporary relief, then the physician must dig further. PINS, as a treatment modality, offers an additional means of analyzing and treating such persistent dysfunctions.

**Contraindications and side effects**

Repeated use of PINS has demonstrated few contraindications and side effects. When considering the presence of localized inflammation or infection, these may be worsened by pressure within the immediate region. The etiologic factors in these instances would preclude the use of PINS or any other technique that may cause more damage. Reasonable intervention would then possibly include lymphatic or other fluid techniques instead. If sensitive points persist after the resolution of the inflammatory or infectious process, PINS could be applied to treat any residual sensitive points. Because the pressure applied is just enough to ensure a response of sensitivity, the likelihood of injury should be minimal. As with all manipulative interventions, there is always a possibility that temporary symptoms may develop, such as aches that generally begin within 24 hours, generally are vague, and usually resolve by 48 hours. The intensity is usually less than that experienced by the patient prior to treatment; localization varies; and the duration is relatively brief.

**Discussion**

PINS is a variant of the more traditional approach to using inhibition. It utilizes the standard methods of palpation and other techniques of osteopathic diagnosis while also offering a unique and additional advantage. As a technique, it follows a theoretical framework while allowing for adaptations based on the palpation findings. PINS can be used solely or in combination with other methods of OMT. It bears some similarities to previously described methods, but it is distinctive enough to warrant inclusion as an individual method of osteopathic manipulation. The determination of primary and end points as well as of the intervening points is based on knowledge of physiology and anatomy. Analysis of alterations from the norm, the patient’s subjective responses, and the use of appropriate low-level force to inhibit specific connected locations leads to reduction of the underlying etiology. A final resolution, which may be sufficient, results from successful application of the technique. If there are still remnants of the dysfunction, repetitive treatment with PINS, followed by other osteopathic manipulative techniques, can be employed. Previously ineffective treatment modalities can then be tried again and may be found more effective.

The amount of time needed to perform PINS can be anywhere from 2 to 10 minutes, depending on the process of locating and treating the number of points. This may seem time-consuming when one considers that other point techniques, such as FPR, take a few seconds, and strain-counterstrain typically takes 90 seconds. However, when these and other interventions are of limited success with recalcitrant dysfunction, having alternative means that connect the components of the structure and function is an advantage. As a theoretical and practical model, PINS meets the criteria for recognition of the interrelatedness of these two factors, as well as the unity of the person, that forms the foundation of osteopathic philosophy. PINS, by removing inappropriately maintained reflexes, restrictions, and abnormal function, can be another tool by which osteopathic physicians facilitate the patient’s intrinsic function. In effect, this also maximizes the individual’s self-healing and repair functions. When the need or situation dictates and other means have been disappointing, the time invested is worth the effort. All this is to be determined by the physician. Determination of the primary and end points of the intervention delineates the course of action.

**References**


34. Korr IM. The nature and basis of the trophic function of nerves: outline of a research program. JAOA 1967;66:74-78.
