

The Facilitated Segment

By Erl Pettman, PT, MCPA, FCAMT
NAIOMT Co-founder

The 'facilitated segment' is an Osteopathic theory^(1,2) that attempts to explain the phenomena whereby chronic, repetitive and abnormal segmental input (from e.g., a segmental hypermobility) can create referred segmental pain and tenderness, hypertonicity of key muscles and even secondary soft tissue changes within the girdles and limbs.

It is proposed that the constant afferent barrage ultimately leads to a state of 'central segmental excitation' that, in turn, lowers the synaptic resistance and facilitates neuronal transmission. This state produces an excessive or exaggerated response from the cognitive and efferent systems serviced by the segment in question.

Cognitive Responses

Heightened sensitivity to input from sensory nerves may lead to the following:

- a) dermatomal pain
- b) increased sensitivity to cutaneous stimulation i.e., hyperaesthesia
- c) increased sensitivity to deep touch i.e., tenderness to palpation
- d) increased sensitivity to traction at the teno-periosteal junction i.e., pseudo-tendinitis

Efferent Responses

Increased efferent discharge will cause responses that may be sub-categorized in the following way:

• Extrafusal muscle response

- a) increased numbers of motor units ready for contraction at rest i.e., hypertonicity of a segmental spinal muscle (myotome) or peripheral key muscle. This leads to a palpable increase in resistance (firmness) to muscle belly palpation
- b) increased response to a simple tendon jerk reflex i.e., exaggerated reflexes
- c) increased resistance to stretch i.e., muscle stiffness or apparent tightness
- d) increased tone in the agonistic key muscle will lead to inhibition of its functional antagonist

• Intrafusal muscle response

- a) decreased length of the muscle spindle, which, together with increased sensitivity of the anulo-spiral and 'flower spray' sensory organs, will lead to an increased resistance to rapid stretch. This will predispose to antagonist muscle lesions during explosive muscular efforts e.g., athletics
- b) increased muscle spindle sensitivity will lead to a greater extrafusal muscle response i.e., exaggerated reflexes

• Autonomic (sympathetic) responses

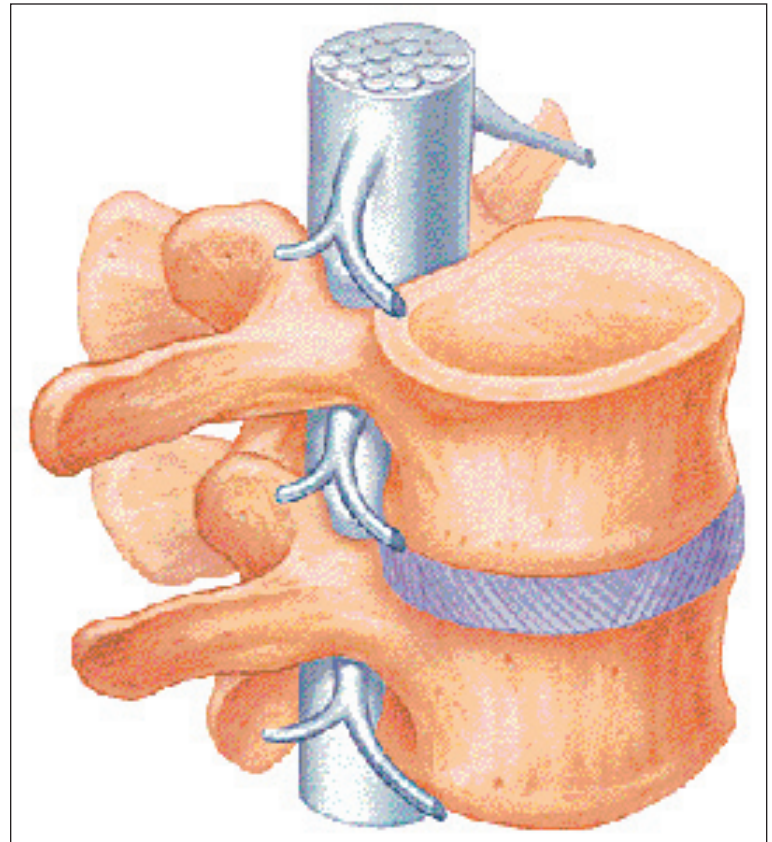
- a) decreased peripheral arterial shunting leading to coldness of the limb
- b) increased erector pili muscle activity i.e., goose bumps
- c) decreased sebaceous gland and hair follicle i.e., epidermis appears scaly and fragile
- d) changes in sweat gland activity that may include increased sweating in the hands and feet so they appear cold and clammy, or decreased sweating in the limb so skin appears cold, scaly and dry

SOME COMMON CLINICAL EXAMPLES OF FACILITATED SEGMENTS

Post-traumatic hypermobility of C2/3

Following trauma to the left C2/3 (e.g., MVA) the joint becomes fibrotic, stiff and painless. However, this alters the axis of segmental motion, eventually leading to hypermobility in the right C2/3.

Even without the right C2/3 becoming painful, segmental facilitation



will begin. The most immediate effect appears to be in making right levator scapulae hypertonic. The muscle will appear tender to palpation (especially at its scapular insertion) and resistant to stretch i.e., tight. This hypertonus inhibits its functional antagonist i.e., trapezius, and the scapula adopts an habitual posture of adduction (internal rotation of the inferior angle).

This will ultimately lead to impingement tendinitis of the intra-capsular biceps tendon and overuse tendinitis of the posterior rotator cuff muscles, especially supraspinatus.

Degenerative hypermobility of the C5/6 segment

C5/6 is possibly the commonest segment to show degenerative hypermobility and for that reason C6 facilitation syndromes present commonly to the therapist. By far the commonest is 'apparent' tennis elbow. C6 facilitation leads to referred lateral forearm pain. Also, the lateral epicondyle and the bellies of the extensor carpi radialis muscles become extremely tender to palpation. The patient often presents with a history of trivial incident trauma e.g., reaching for a mug out of a cupboard; doing laundry; writing an essay. On assessment isometric resistance of wrist

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• FROM THE EDITOR •

The following is a letter I received from a recent Level II course participant who has had an opportunity to not only use her manual therapy skills but also to teach others (Physio Technicians) in foreign lands how to become more proficient. I thought you might enjoy sharing her experience, as well, it is why I especially encourage new therapists to take Level I. (reprinted with permission)

-Bill Temes

Dear Mr. Temes,

Last June, I attended the NAIOMT Level II Lower Quadrant Course, which you instructed in Portland, Oregon. Several weeks later, as a volunteer with Health Volunteers Overseas, I was posted in Bhutan, where I have lived for the past three months. The written material which you allowed me to take as a teaching tool (scanning outline) has been invaluable. I am working at the National Referral Hospital teaching in a Physio Technician program. The Physiotherapy students receive instruction through the Royal Institute of Health for two years. After two additional years of residency at the hospital they then become posted out into rural areas. They then have to tri-

age and treat a wide range of disabilities; medical, orthopedic, and neurologic.

I have been teaching a four month section on orthopedic evaluation of the spine and extremities. My students are growing comfortable with the NAIOMT Lumbar Scan. I recently started a Back School in the ortho surgeons exam room while he is in surgery. With a line of spine patients outside the room, my students are quickly becoming adept with spinal evaluations. The main barrier to evaluation, is the National Dress; the Kira for the women, and the Gho, for the men. The Bhutanese are reluctant to remove their clothing, and the students are reluctant to ask them. Several months ago, a member of the extended Royal Family came for a Physiotherapy evaluation. My students remained spellbound waiting to see if I would ask him to remove his Gho. I did ask him to remove the Gho, and the students continued to bow throughout the evaluation.

I look forward to taking the NAIOMT cervical course when I return, and I thank you again for providing me with some excellent teaching tools. Tashi Delek! Grace Brewer Smith

'Facilitated Segment' (continued from page 1)

extension reproduces, or exaggerates the patient's pain. Full wrist flexion also increases pain. In an early facilitated segment repeated isometric resisted tests will actually relieve the patient's symptoms. Once the facilitated segment has become chronic repeated isometric testing seems to confirm a tennis elbow diagnosis. If deep transverse frictions are performed on such a patient the post treatment reaction is severe. Sometimes even during a treatment the patient may report increasing referred pain into the C6 dermatome.

Lumbo-sacral hypermobility leading to L5 facilitation

In runners this commonly leads to a diagnosis of gluteal bursitis or gluteal tendinitis.

The patient may have had steroid injections into the gluteal tendons. Typically, the first injection exacerbated the patient's symptoms at the time of the injection (increased irritation) and alleviated the pain within 24 hours (central biasing mechanism). Inevitably the pain returns within days.

On assessment the patient's pain is increased whenever the gluteus minimus or medius tendons are palpated deeply. However, frustratingly the pain cannot be reproduced with isometric resistance of hip abduction. On motion testing of the hip joint a loss of extension and internal rotation is detected (central facilitation of ilio-psoas - not segmental) and the inner quadrant is invariably painful but full (segmentally facilitated tenderness). There may, however, be evidence of an early capsular pattern of restriction.

Hopefully these examples have wetted your appetite for more examples and explanation. If so, see you at Level III!

References

¹Stoddard A. Manual of Osteopathic Practice. London,: Hutchinson; 1969.

²Korr IM. Proprioceptors and Somatic Dysfunction. J Am Osteopath Assoc 1975;74(7):638-50.

NAIOMT NEWSLETTER PUBLICATION

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Questions or comments to admin@naiomt.com

Cliff's Clicks

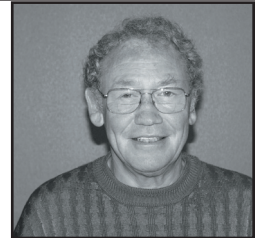
Web sites with helpful information on osteoporosis

http://www.niams.nih.gov/ne/highlights/spotlight/2005/dental_screen.htm

Scientists are a step closer in developing a new method of screening for osteoporosis in one that may reach a wider number of people sooner than current methods. Screening may be possible at the dentist's office using dental X-rays. Researchers at the University of California, Los Angeles, School of Dentistry, led by Stuart C. White, D.D.S., Ph.D., and supported in part by a grant from the National Institute of Arthritis and Musculoskeletal and Skin Diseases, investigated several ways to analyze dental X-rays for evidence of osteoporosis.

Osteoporosis is characterized by low bone mass, bone fragility and a greater risk for fracture. It is often called a "silent" disease because it has no discernable symptoms. Like other tissues in the body, bone tissue is in a state of constant flux in remodeling and rebuilding. There are many influences on bone formation and strength, such as hormones, physical exercise and diet (especially intake of calcium, phosphate, vitamin D, and other nutrients). Osteoporosis occurs when there are problems with these factors, resulting in more bone loss than bone rebuilding.

The Surgeon General's Report on Osteoporosis and Bone Health (<http://www.surgeongeneral.gov/library/bonehealth>), released in November 2004, estimates that 34 million Americans are at risk for osteoporosis.



Exam Tips

The current level II preliminary examination consists of 100 multiple-choice questions. Below is an example of one of the more challenging questions that created some difficulties for candidates -- and an explanation of the correct answer.

Question: The following plays NO role in the passive right torsional segmental stability of the lumbar spine segment (i.e right rotation of L4 on L5):

- A. outer layers of annulus fibrosis
- B. right zygapophyseal joint articular processes
- C. left zygapophyseal joint articular processes
- D. neural arch strength

Answer: B

Discussion: Factors that control torsional stresses on a lumbar segment include the outer annulus and neural arch. When the L4 segment rotates to the right on the L5 there will be compression of the LEFT zygapophyseal articular processes and relative decompression/ traction or gapping of the right side. The articular processes on the right, therefore, will NOT play a role in the control of torsional forces.

NAIOMT CLINICAL FELLOWSHIP PROGRAM NEWS

By Ann Porter Hoke, PT, OCS, FCAMT, FAAOMPT
Clinical Fellowship Director

The NAIOMT Clinical Fellowship Program, (originally Residency), was established in 1993 to bring faculty and postprofessional physical therapists together in a clinical setting for advanced training. The fellowship student has the opportunity to study within a structured 12-36 month period with internationally recognized senior faculty, highly experienced faculty, and clinical fellowship instructors who are all experienced practicing clinicians, and the majority are Fellows of the American Academy of Orthopaedic Manual Therapy (AAOMPT)

Locations & time-line

The majority of the NAIOMT Faculty is available for clinical instruction. Instruction may be at the clinical instructor's employment

NAIOMT EXAMINATION NEWS

By Shari Keyser & Ann Porter Hoke

Examination FAQs

Question: What is the average success rate for NAIOMT examinations?

NAIOMT offers a series of examinations, case histories, written and oral-practical. Those contemplating these examinations frequently ask us what are the success and failure rates.

We are pleased to share the following data collected over the last nine years. These statistics do not include the written examinations associated with NAIOMT courses taken at Andrew's University at Berrien Springs, but they report very similar success rates.

The success rates include all grades (pass, good pass and with distinction) and are rounded to whole numbers.

Average success rates for 1997-2005

- LII preliminary 98% (SD 3)
- LIII intermediate oral practical 87% (SD 6)
- LIII intermediate written 86% (SD 15)
- LIII intermediate case history 94% (SD 7)
- LIV advanced oral practical 90% (SD 11)

You can see that with good preparation and study – your odds for success are excellent!

NAIOMT Level III Intermediate Examination: case histories

Elimination of the "Re-submit Option"

NAIOMT previously had a "re-submit" option on the case history examination. On review, the NAIOMT Board of Examiners have observed during recent examination cycles that examiner consensus was reached without needing to request a re-submit from the candidate. It was also felt by the examiners, that if the case history was not presented in a professional manner (i.e. It contained multiple spelling and grammar errors), it would be rejected rather than returned for re-submission

In the past the re-submit option proved costly to NAIOMT in both time and money. By taking this stricter approach NAIOMT hopes to contain the administrative costs of the examination process and curtail increasing examination fees.

The only option for a candidate who submits an unacceptable paper will be to apply for the next examination and submit an improved version at the next examination cycle.

NAIOMT will be updating the case-history guidelines to candidates to reflect the removal of the re-submit option. These guidelines can be obtained from skseyser@naiomt.com or by calling Shari at 541 344 4777.

site, the instructor may travel to the student's site, or they may meet for a clinical education week at an independent site. The Instructor and Student design an individual time plan to progress systematically through the curriculum, examinations, clinical hours and fellowship project within the thirty-six month period, or less. The program is designed to be part-time to minimize travel and time away from home and work.

Application Process

There is a formal application process that includes the potential to transfer in some previously obtained didactic and clinical hours in related sciences, orthopaedic and manual physical therapy. The intake periods are flexible (rolling). Previous experience in orthopaedics is a requirement. The OCS certification is recommended, but not required.

CALENDAR NEWS

APTA Combined Sections Meeting
San Diego, CA. February 1-5, 2006
For details, go to: www.apta.org

NAIOMT Symposium
Portland, OR. June 10, 2006
Theme: Thoracic Spine Integration

Speakers: Senior NAIOMT faculty and special guests
Ola Grimsby, Greg Johnson and Pacific University faculty.

Information will soon be available at www.naiomt.com
June 10th is the date of Portland's famous Rose Festival Parade

APTA Annual Meeting:
Orlando, Florida, June, 21-25 2006.
For details, go to: www.apta.org

AAOMPT meeting
Charlotte, North Carolina October 19-22, 2006

Speakers: Shirley Sahrman and Jenny McConnell

More information in the new future at www.aaompt.org
Future AAOMPT meetings will be the 3rd weekend in October each year.

The North American Institute of Orthopaedic Manual Therapy Inc (NAIOMT) Fellowship Program is credentialed by the American Physical Therapy Association as a postprofessional clinical fellowship program for physical therapists in orthopaedic manual physical therapy.

ONLINE EXAMINATIONS — CLARIFICATION

We regret that online testing will not start in 2005. NAIOMT has continued to work on its bank of questions and fine-tune the technical and administrative components to ensure once we begin we have a smooth examination process. We will not begin the process until we have all the bugs removed. We appreciate your patience and will announce our plans in the next 1-2 months.