Enigmatic Trigger Points Often Cause Enigmatic Musculoskeletal Pain

David G. Simons MD, Clinical Professor
Dept. of Rehabilitation Medicine (Volunteer)
Emory University and
Medical Staff, Dekalb Medical Center,
Decatur Georgia

STAR Symposium, Columbus
22 May 2003
Sternocleidomastoid Pain Patterns

from TPM V. 1, Ed. 2, Fig. 7.1, p. 310
One reason ergonomics is so effective is that it reduces sustained contraction of muscles (Overload) and reduces repetitive movements, especially when they are forceful.

These factors are well known to activate latent (silent) MTrPs and to perpetuate the active (symptom-producing) MTrPs.
Myofascial trigger points (MTrPs) are often a major contributing cause of musculoskeletal disorders. MTrPs are often not considered in the differential diagnosis. Then, this major factor is overlooked and not treated as such. Low back pain is a typical example.
LBP, LBP and MTrP Citations listed by MEDLINE in 7 Years

Number of Citations

1996: 2 2 2 0 3 3 5
1998: 2 2 2 0 3 3 5
2000: 0 3 3 5
2002: 0 3 3 5

MTrPs <1%

Combo
MUSCULOSKELETAL PAIN

• 38% of the unselected population was in pain at any one time.*

• 98% of pain is musculoskeletal.*

• Most musculoskeletal pain originates in muscle, the orphan organ, due to trigger points.


THE ORPHAN ORGAN

NO specialty claims muscle as its organ.

• Muscle is 1/2 of the body.
• No organized emphasis on muscle pain due to MTrPs, their research, or student training.
How Often Do TrPs Cause the Pain?

30% General Practice, pain patients  
[Skootsky, et al. 1989]

74% Pain Medical Center  
[Gerwin, 1995]

85% Comprehensive Pain Center  
[Fishbain, et al. 1986]
Prevalence of Latent MTrPs in 13 Healthy Normal Controls

There was one subject with no MTrPs.

8 muscles examined in each subject

One Subject had no MTrPs

Individual Subjects
This indicates that most people have some latent MTrPs. A few have a lot of them and a few people have almost none. Symptom-producing active MTrPs are activated latent MTrPs. Therefore, some people are much more prone to develop MSD than others.
This needs to be validated by a study that relates the number of latent MTrPs to severity of MSD symptoms, or absence of them. If validated, the number of latent MTrPs in 8 test muscles, could identify this number as an important risk factor that might be useful for making work assignments.
Change in Work Status in 4 months of 108 Physical Therapy Clients (62 were complex cases)

- 97.2% of clients in paid employment reached normal work hrs. and activities. *Ietje van Stolk, PT*

- Uninterrupted Work 90%
- Increased Activities or Work hours 3.6%
- Returned to Work 3.6%
- Still Reduced Hours 1.8%
- Still Off 0.9%

Total Treatment Program including work-site ergonomics with patient ed. and Rx that emphasizes MTrPs.

97.2% of clients in paid employment reached normal work hrs. and activities. *Ietje van Stolk, PT*
## Interrater Reliability

<table>
<thead>
<tr>
<th>Studies</th>
<th>Trained Exper.</th>
<th>Untrained Exper.</th>
<th>Trained Exper.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wolfe et al. ‘92</td>
<td>●</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nice et al. ‘92</td>
<td>●, ●</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Njoo et al. ‘94</td>
<td>●, ●</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gerwin I ‘97</td>
<td>●, ●, ●</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gerwin II ‘97</td>
<td>●, ●, ●</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hsieh et al. ’00</td>
<td>●</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sciotti, et al. ’01</td>
<td>●</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- ● Poor
- ● Marginal
- ● Good

RELIABILITY
General acceptance of MTrPs has suffered from a lack of simple diagnostic criteria. Previous publications have made palpation of a taut band essential. These studies show it is one of most difficult exams for MTrPs. Simpler criteria may be sufficient, clinically.
Identifying MTrPs - History

Sudden Onset: acute muscle overload or sustained shortened position.

Insidious Onset: chronic overload, positional or repetitive strain

Good Ergonomics Prevents MTrPs

Pain aggravated by: Stretching muscle, fatiguing activities, short position.

Pain relieved by: rest, some movement

Draw a detailed pain pattern
Identifying MTrPs - Exam
No Imaging or Lab Test, Physical Only
Test: painful stretch range of motion

• Find tender spot (3 kg of pressure) in a palpable taut band (if accessible).

• + referred pain pattern = latent MTrP

• + Patient recognizes pain as familiar = active MTrP

• + Palpable nodule and local twitch = confirmatory, if needed
FIVE TREATMENTS

• TrP Pressure Release
• Contract-Relax-Release
• Reciprocal Inhibition
• Vapocoolant Spray
• Dry Needling
Motor Endplate (Synaptic Junction)

Chemical Messenger (acetylcholine)

Motor Nerve Fiber

Nerve Terminal

Synaptic Cleft

Muscle Membrane

Electrical signal causing twitch

Postjunctional membrane
Contraction Knot
Intracellular needle electrode

Normal Human Miniature endplate potentials (MEPPs)

Intracellular needle electrodes—frog

Normal

Electromyographic (EMG) Needle Electrodes—Human

Experimental

Textbook End-plate Potentials

Trigger Point EMG
One reason why electromyographers never see normal miniature endplate potentials (MEPPs).
NUMBER OF SEA LOCI

Taut Band
TrP 23
TB 0
EPZ 7

Endplate Zone
Endplates

p < 0.001
p < 0.02
Experimental Contraction Disks in Rat Muscle
Integrated Hypothesis: a 6-Link Chain

1. Abnormal ACh release
2. Sustained Sarcomere Contracture
3. Local Ischemia
4. Increased Metabolism
5. Sensitizing Substances
6. Energy Crisis

Sensitization of Nociceptors

Fig. 2-7 in Muscle Pain: Mense, Simons, Russell. Lippincott, Williams & Wilkins, 2001

Adenosine triphosphate (ATP)—severe pain.

Prostaglandin E(2) [PGE(2)]—≤ placebo.

Bradykinin (BK) + 5 Hydroxytryptamine (5-HT)+ Histamine +PGE(2)—prolonged moderate pain intensity and mild tenderness without producing unacceptable side effects.
Approved NIH protocol # CC-02-02-0245—Examine 3 Groups: (1) No MTrP, no pathological process, no symptoms. (2) A latent upper trapezius MTrP. (3) An active upper trapezius MTrP.
Preliminary results on 3 subjects in each group: “Significant biochemical differences between normal controls and active MTrPs for a number of substances”. Great potential for clarifying pathophysiology of MTrPs.

A muscle fiber is 50 μ (0.05 mm) in diameter.

Can test: <0.5 μl, 31 subst.< 100 kD

Solute exchange surface – dialyzer membrane set 0.2 mm from the needle tip.

Delivery tubes

10 μ opening
Local Twitch Response (LTR)
The LTR is a Spinal Reflex
What is CAUSING the Pain? MTrPs?

Examine the individual and find out.