



Global Education of Manual Therapists  
**GEMt**

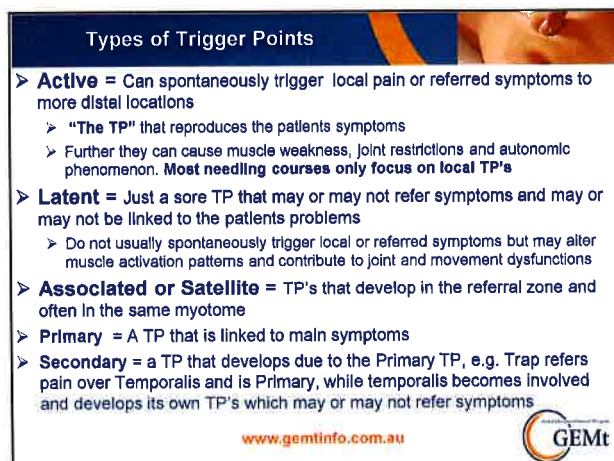
## Trigger Point Dry Needling (TDN)

Applications for Pain Management & Sports Injuries

Presented by Robert De Nardis (Physio)

**MASSAGE & MYOTHERAPY AUSTRALIA**

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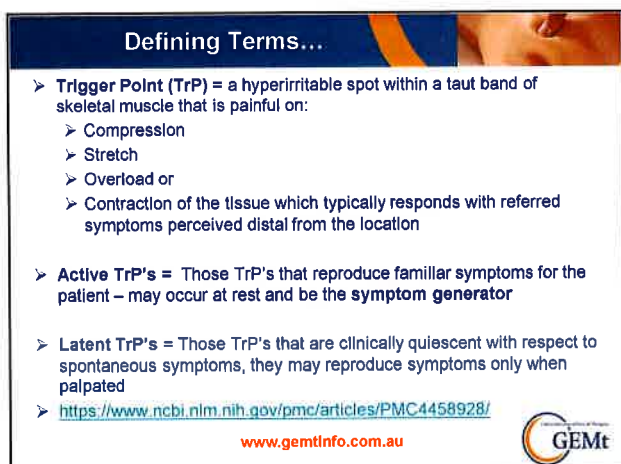


## Types of Trigger Points

- **Active** = Can spontaneously trigger local pain or referred symptoms to more distal locations
  - "The TP" that reproduces the patients symptoms
  - Further they can cause muscle weakness, joint restrictions and autonomic phenomenon. **Most needling courses only focus on local TP's**
- **Latent** = Just a sore TP that may or may not refer symptoms and may or may not be linked to the patients problems
  - Do not usually spontaneously trigger local or referred symptoms but may alter muscle activation patterns and contribute to joint and movement dysfunctions
- **Associated or Satellite** = TP's that develop in the referral zone and often in the same myotome
- **Primary** = A TP that is linked to main symptoms
- **Secondary** = a TP that develops due to the Primary TP, e.g. Trap refers pain over Temporalis and is Primary, while temporalis becomes involved and develops its own TP's which may or may not refer symptoms

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## Defining Terms...

- **Trigger Point (TrP)** = a hyperirritable spot within a taut band of skeletal muscle that is painful on:
  - Compression
  - Stretch
  - Overload or
  - Contraction of the tissue which typically responds with referred symptoms perceived distal from the location
- **Active TrP's** = Those TrP's that reproduce familiar symptoms for the patient – may occur at rest and be the **symptom generator**
- **Latent TrP's** = Those TrP's that are clinically quiescent with respect to spontaneous symptoms, they may reproduce symptoms only when palpated
- <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4458928/>

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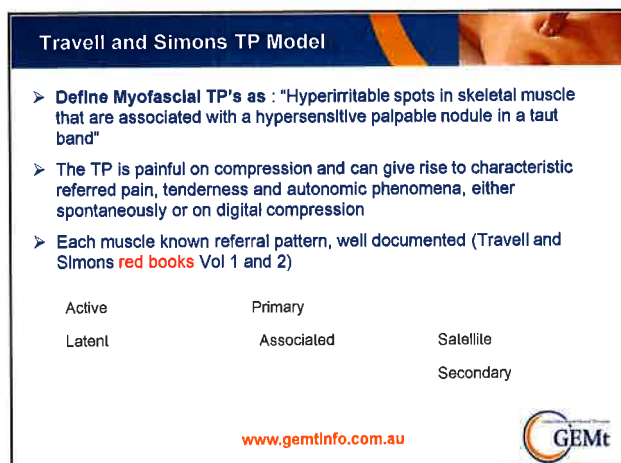
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## Defining Terms...

- **BOTH Active and Latent TrP's** have the ability to alter muscle movement patterns, function and reproduce pain and/or autonomic symptoms such as: altered sensation
- **Myofascial Pain Syndrome (MPS)** = is a common source of musculoskeletal pain and it is characterised by the presence of TrP's
- **MPS** = affects muscles and their connective tissue attachments (tendons/fascia)
- **MPS** are often under Diagnosed and affects numerous people suffering from pain

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## Travell and Simons TP Model

- **Define Myofascial TP's** as : "Hyperirritable spots in skeletal muscle that are associated with a hypersensitive palpable nodule in a taut band"
- The TP is painful on compression and can give rise to characteristic referred pain, tenderness and autonomic phenomena, either spontaneously or on digital compression
- Each muscle known referral pattern, well documented (Travell and Simons **red books** Vol 1 and 2)

Active	Primary	
Latent	Associated	Satellite
		Secondary

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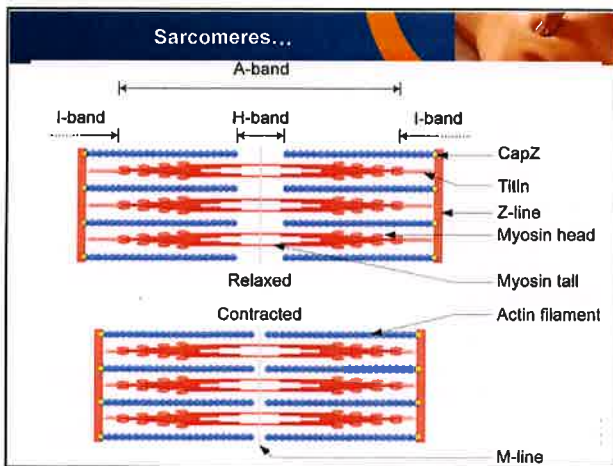
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## Myofascial Pain Syndromes (MPS)

- **MPS** is described as the **sensory, motor & autonomic symptoms** caused by Myofascial Trigger Points (MTrP's) - **Bron & Dommerholt – 2012**
- It is also a disease likely underpinning many orthopaedic conditions
- An individual contraction knot appears as a segment of a muscle fibre with contracted sarcomeres and an increased diameter
- We can palpate this under physical examination

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### TP Therapies

- **Manual Therapies (non-invasive)**
  - Massage/stretching
  - DIP = Digital Ischemic Pressure
  - Myofascial release/stripping
  - Mobes/Manips
  - McKenzie/Mulligans
- **Needling therapies (invasive)**
  - TDN
  - IMS
  - Trigger Point injections
  - Botox
  - Other invasive injections-saline, local anaesthetics,
- Therapies that produce a favorable result share the common feature of an application of a noxious stimulus
  - Some type of physical/noxious input

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### Clinical Features of Myofascial TP's

- Point tenderness on a taut muscle band
- Local Twitch Response (LTR)
- Referred pain/symptoms
- Reproduction of usual pain/symptoms
- Restricted range of motion
- Weakness without atrophy
- Autonomic symptoms

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### Why I prefer needling...

"Is this too much pressure?"

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### Diagnosis of a TP

- The diagnosis relies on finding a local tender spot within a taut muscle band
- Digital pressure reproduces recognisable symptoms - ATP
- They exhibit a local **twitch response** (LTR) or '**jump sign**' (entire body movement) on palpation or needling
- **LTR** = an involuntary spinal cord reflex contraction of the muscle fibers in a taut band following 'snapping' palpation (or needling)

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### Defining Terms...

- There are two main needling techniques utilised to Impact a Trigger Point (TrP)
- **Wet Needling** = refers to the injection of a substance into the area of TrP through a hypodermic needle with a bevelled cutting edge

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### Defining Terms...

- There are two main needling techniques utilised to impact a Trigger Point
- **Dry Needling (DN)** = refers to the insertion of a solid, threadlike needle into a Trigger Point (TrP). In addition, it can be combined with the application of an electrical current.



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### Trigger Point Aetiology

#### Precipitating & Perpetuating Factors

1. **Trauma** (contusions, sprains & strains)
2. **Mechanical** (posture, scoliosis, ergonomics)
3. **Degeneration** (O/A, Disc disease)
4. **Emotional & Psychological** (anxiety, muscle tension)
5. **Endocrine & Metabolic** (thyroid and E2 levels)

<https://www.ncbi.nlm.nih.gov/pmc/articles/PC4458928/>

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### Dry Needling



- Various sizes typically from 30mm – 75mm
- Diameters typically 0.3mm

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### Trigger Point Aetiology

#### Precipitating & Perpetuating Factors

6. **Respiratory/Hypocapnia** (shallow/rapid breathing, vasocon)
7. **Infection** (Viral or parasitic)
8. **Nutritional** (Vitamin/Mineral deficiencies)
9. **Nerve root compression** (Nerve root sensitization)
10. **Peripheral Sensitization** (nociceptive irritation)

<https://www.ncbi.nlm.nih.gov/pmc/articles/PC4458928/>

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### Defining Terms...

- **Local Twitch Response (LTR)** = or 'Jump sign' is an involuntary spinal cord reflex contraction of the muscle fibers in a taut band following palpation or needling
- A LTR has been associated with pain relief and reduction of stiffness (Hsieh et al., 2007)
- Many DN approaches advocate eliciting a LTR when needling...more on this later



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### Trigger Point Aetiology

#### 2 Major Theories

1. **Energy Crisis Theory – Ischemia - Hypoxia**
2. **Motor End Plate Hypothesis – Excessive ACh**



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## 1. Energy Crisis Theory

- Postulates that increased demands on a muscle, such as:
  - Increased trauma (macro or repeated micro)
  - Increased neural input, leads to
  - Increased Ca release from the sarcolemma and prolonged shortening of the sarcomeres, can lead to:
    - Prolonged muscle shortening
    - Compromised circulation
    - Reduced O<sub>2</sub> supply
    - Rendering cells unable to produce enough ATP to initiate the active process of relaxation

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## Bio-Chemistry summary

- Muscle **mechano-nociceptors** monitor in their peripheral or local environment:
  - The sensitizing or pain producing substances present
  - As well as the strength of any stimuli
- Damaged tissue releases chemicals responsible for the muscle soreness and pain associated with MPS
- Chemicals include:
  - Bradykinin, prostaglandins, Substance P and CGRP (causing local vasodilation, inflammation, altering cell membrane permeability leading to odema)
- Therefore the release of these chemicals can:
  - Increase local blood flow and pressure
  - Activating mechano receptors and nociceptors
  - Leading to increased local tenderness and pain

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## 2 Compelling Research articles

1. *Journal of Bodywork and Movement Therapies* (2008) 12, 371-384

**Titled: Uncovering the biochemical milieu of myofascial trigger points using in vivo microdialysis:**

2. Dar & Hicks, J. Back Musc. Rehab: 2015:

**Titled: The immediate effect of dry needling on multifidus muscles' function in healthy individuals.**



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## Shah and Gilliams

- This bio-chemical cascade leading to altered pH and influencing both local and central processing
- Painful MTrPs activate muscle nociceptors that, upon sustained noxious stimulation, initiate motor and sensory changes in the peripheral and central nervous systems
- This process is called **sensitization**, which can be both **peripheral and central**
- Sensitization of peripheral and central afferents is responsible for the transition from normal to aberrant pain perception
- The authors developed a microdialysis technique to quantitatively measure the biochemical milieu of skeletal muscle

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## Recent Research Shah and Gilliams

- Journal of Bodywork and Movement Therapies* (2008) 12, 371-384

**Titled: Uncovering the biochemical milieu of myofascial trigger points using in vivo microdialysis:**

### Summary

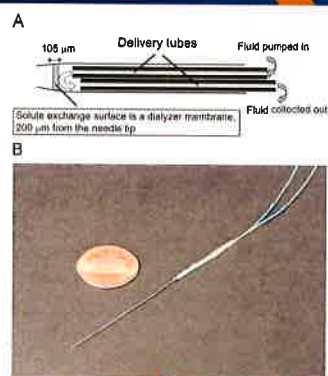
- Myofascial Pain Syndrome (MPS)
  - This article discusses muscle pain concepts in the context of MPS and summarizes microdialysis studies that have surveyed the biochemical basis of this musculoskeletal pain condition

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## Photo of actual Needle




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### Important Objective Findings

- Their results showed that the biochemical milieu of active MTrPs is different from latent MTrPs and normal (controls) tissue
- Also, the milieu changes with the occurrence of a LTR, corresponding to clinically observed decrease in pain and tenderness after MTrP release by dry needling
- Changes in analyte levels after a LTR might result from increasing local blood flow to the MTrP region, leading to a "wash out" of the pain and inflammatory mediators
- Hence the importance of obtaining a LTR during needle insertion/treatment (GEMt Directors)

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### Trigger Point Aetiology

## 2 Major Theories

1. Energy Crisis Theory – Ischemia - Hypoxia
2. Motor End Plate Hypothesis – Excessive ACh

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### APA Conference Week

1-5 October 2009  
SYDNEY CONVENTION CENTRE



- Dr. Jay Shah presented this paper along with revealing further objective and bio-physiological characteristics of Trigger Points.
  - Altered blood flow thru TP's due to altered tissue density
  - Also evident in Vibration Sonography
  - Normalized post LTR

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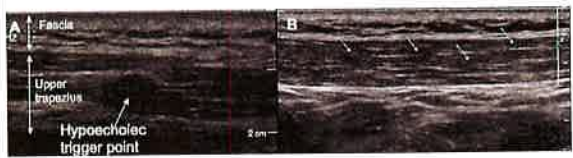
### 2. Motor End Plate Hypothesis

- The 'Motor End Plate' is where the motor nerve synapses with a muscle cell (neuro-muscular junction)
- May co-exist with the previous
- Needle EMG studies have found that each TP contains minute loci that produce characteristic electrical activity or SEA (Spontaneous Electrical Activity)
- These loci are predominately found at the motor end plate zone
- It is postulated that an increased rate of ACh is released from the nerve terminal resulting in increased action potentials (increased End Plate Noise) along the muscle cell membrane – resulting in muscle shortening

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Gray scale imaging of a trigger point in the upper trapezius. (A) An isolated MTrP appears as a well-defined focal hypoechoic nodule. (B) A series of four hypoechoic MTrPs in the upper trapezius. Reproduced with permission from Sikdar et al., 2009

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### Motor End Plate Hypothesis



Nerve Impulse → Acetylcholine Released → Muscle Contracts

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Dar & Hicks, J. Back Musc. Rehab: 2015:

### Title: The immediate effect of dry needling on multifidus muscles' function in healthy individuals.

**AIM:** To investigate the immediate effect of dry needling on lumbar multifidus muscles' function in healthy subjects.

**Method:**

- 28 subjects divided into 'Study' and 'Control' (no intervention)
- Study group = DN to Multifidus in Lx
- US used to measure Mult. Muscle thickness pre & post procedure

**Results:**

- A significant difference in % of change of muscle activation in needling group

**Conclusions:**

- An improvement of back muscle function following dry needling procedure in healthy individuals was found. This implies that dry needling might stimulate motor nerve fibers and as such increase muscle activity.

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### Contraindications to Dry Needling

- Scalp areas of infants
- Following axillary or inguinal node dissection-avoid any breakage of skin (arm) due to risk of Lymphedema (Dr Beth Baughman DuPree)
- Over rib cage or over a rib (Level 2)
- High dose anti-coagulants
- Immunosuppressed patients-Ca
- Blood donors-plasma only 4 months
- Nipples, umbilicus and external genitalia

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### Needle Safety



- An Invasive technique
- Point of entry and exit to the human body/tissue
- Blood borne pathogens

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### Complications Post Needling

- Pneumothorax
- Muscle Soreness
- Fatigue:
- Vasovagal Reaction/Fainting
- Bruising
- Needle insertion pain
- Metal allergies
- A Stuck needle
- A Broken needle
- A Forgotten needle
- **Neurovascular bundles** - knowledge of Anatomy is paramount

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### Contraindications to Dry Needling

- Consent-denied by patient
- Inadequate practical knowledge
- Local infection
- Bleeding disorders-haemophiliacs
- Pregnancy-never in 1<sup>st</sup> trimester
- Compromised equipment- sterility
- Over a joint replacement, breast implant or cardiac pacemaker

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### To Twitch or Not to Twitch?

- The debate continues in this area due to a variety of factors:
  - Research findings lagging behind clinical findings
  - Lack of Clinical & Needling experience from those conducting the research
  - A lack of understanding of how patients respond to manual therapy



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### What is GEMt Dry Needling?

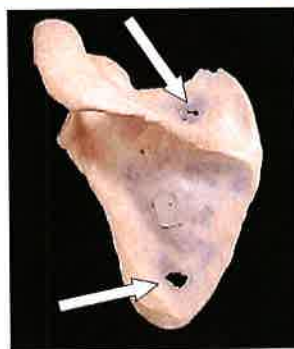
- It involves a thorough Subjective and Physical evaluation to determine the presence of Myofascial pain
- It relies on the manual handling and palpatory skills of the therapist
- It uses a fine filament needle to both assess and treat for Myofascial TP's (*The needle becomes an extension of your finger tips*)
- GEMt needlers then manipulate that needle in situ in order to elicit a Local Twitch Response and then we '*Twitch it Out*'
- Seeking a *diminishing return* for a constant stimulus
- Resulting in '*normalizing*' muscle tone
- This approach satisfies the major needling models as well as research findings

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### 4% Anatomical Anomaly



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## Shoulder



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### Posterior Shoulder



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### Scapula Osteology



- 1 = Traps
- 3 = Supraspinatus
- 4 = Lev scap
- 5=6=Rhomboids
- 7 = lats
- 8 = Teres Major
- 9 = Teres Minor
- 10 = Infraspinatus
- 11 = LH Triceps
- 12 = Deltoid



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