Fibromyalgia Doesn't Have to be the “F-word” of Medicine Anymore:
Harnessing Current Scientific Understanding to Guide Patients to Effective Therapies

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The Science of Fibromyalgia:
Learning objectives

- Review the most up to date science on pathophysiology of fibromyalgia including fight or flight nervous system dominance and disrupted sleep patterns
- Understand how myofascial trigger points contribute to fibromyalgia pain
- Describe how faulty pain volume controls in the brain worsen fibromyalgia pain.
What Is Fibromyalgia (FM)?

- Widespread musculoskeletal pain
- Fatigue
- Tenderness in multiple soft tissue anatomic locations
- Normal labs and imaging

Other Cardinal Symptoms

- Unrefreshing sleep
  - “No matter how much sleep I get, I feel exhausted in the morning”

- Cognitive disturbance "fibrofog"
  - Short-term memory
  - Word recall
  - Difficulty multi-tasking

Diagnosis by Exam: 1990 FM Diagnostic Criteria

- Pain on palpation with 4 kg of force in ≥ 11 of 18 defined tender points (widespread pain)
- Pain on both sides of the body
- Axial skeletal pain (cervical spine, anterior chest, thoracic spine, or low back pain) must be present
- Pain above and below the waist

Diagnosis by Survey: 2016 Revisions of 2010 ACR Diagnostic Criteria

- Eliminates tender point examination
- Combines points from two different symptom surveys
- Widespread pain index
  - In how many areas has the patient had pain (over the last week)?
- Symptom Severity Scale:
  - Fatigue, waking unrefreshed, cognitive symptoms
  - Symptoms present at similar level ≥ 3 months
  - Generalized pain, defined as pain in at least 4 of 5 regions, is present.

Who does fibromyalgia affect?

- Estimated 2-3% of U.S. population
- 80% female
- Ages 20-50
- Strong familial component
- 50% environmental and 50% genetic risk

Genetic Predisposition + Trauma = Fibromyalgia

- “Physical trauma in the preceding six months is significantly associated with the onset of fibromyalgia.”
- MVA – especially whiplash
- Physical or sexual assault
- Emotional trauma- divorce, life-threatening illness
- Combat
What causes the symptoms of fibromyalgia?

- "overactivity of pain-sensing nerves"
- faulty volume control of pain signals
  - Brain loses ability to suppress pain signals
  - Spinal cord amplifies pain signal
- "Central sensitization", central nervous system becomes more sensitive to pain


Neuronal Hyperactivity During Painful Stimulation

- Primary somatosensory cortex
- Primary somatosensory cortex (decrease)
- Secondary somatosensory cortex
- Superior temporal gyrus
- Inferior parietal lobule
- Cerebellum

Source: Bi et al. Functional magnetic resonance imaging evidence of augmented pain processing in fibromyalgia. *Neuroimage. 2012 Aug 1;63(1):324-31

FDA-approved medications for fibromyalgia

- Anticonvulsants – pregabalin (Lyrica), others like gabapentin used "off-label"
  - decrease pain amplification in spinal cord
  - turn pain volume down
- SNRI antidepressants duloxetine (Cymbalta), milnacipran (Savella)
  - boost serotonin and norepinephrine levels in brain
  - increase central inhibition of pain
• This is where current medical knowledge of average health care provider, even pain specialists, ends.

• But central sensitization is only the tip of the iceberg in fibromyalgia, and does NOT explain
  – fatigue
  – brain fog
  – unrefreshing sleep
  – or why it is the muscles that hurt in particular

• For that, we have to go the beginning…

Trauma triggers a fight or flight response

• In fibromyalgia this response does NOT shut off

• Hypothalamus becomes stuck in the “danger” mode permanently

• Fight or flight system (sympathetic nervous system) gone haywire

• Heart rate variability studies and tilt table testing show “relentless sympathetic hyperactivity”


Chain reaction of fibromyalgia

Constant state of fight or flight

Muscle tension

Myofascial pain and trigger points
Muscles in fibromyalgia

- Constant muscle tension—even while sleeping
- Pressure gauge needles increased pressure fibromyalgia muscles compared to healthy controls
- Increased EMG amplitude at rest in fibromyalgia patients muscles compared with controls

Kokebie R, Aggarwal R, Kahn S, Katz RS. Muscle tension is increased in fibromyalgia: Use of a pressure gauge. ACR abstracts 2008 S 685

Both muscles and fascia contribute to tension and pain

- Fascia is a connective tissue network
- Surrounds both individual and groups of muscles
- Highly sensitive to pain
- Contracts to give muscles extra strength
- Strong connection to fight or flight nervous system


BMC Musculoskeletal Disorders

Research article

Muscle modifications in fibromyalgic patients revealed by surface electromyography (SEMG) analysis
Laura Bazzichi¹, Marco Dinì¹, Alessandra Rossi², Silvia Corbianco³, Francesca De Feo¹, Camillo Giacomelli², Cristina Zirafa¹, Claudia Ferrari Bruno Rossi³ and Stefano Bombardieri¹

Results: PDF absolute values and the so-called fatigue index (FI) were significantly lower (p < 0.001) in both muscles studied in FM patients (PDF: 93.3 ± 11.4; FI: 1.10 ± 0.80) with respect to healthy controls (PDF: 138.2 ± 24.4; FI: 2.41 ± 1.1) and a smaller reduction in the percentage values of PDF was observed in FM patients vs controls (27.0% vs 38%). A significant correlation was found between the SEMG parameter decrement of normalized median frequency (PMF) (%) and seriousness of FM (evaluated by means of tender points).

Conclusion: We have found some interesting muscle modifications in FM patients with respect to healthy controls, regarding PDF, CY and FI values which resulted significantly lower in FM patients suggesting they are able to react muscle fatigue.

Liptan GL. Fascia is missing link in our understanding of the pathology of fibromyalgia. J Bodyw Mov Ther. 2010 Jan;14(1):3-12
**Fascia:** connective tissue that envelopes muscles

**Connective tissue that’s left after muscle cells dissolved**

**Evidence for inflammation in fascia**


Myofascial trigger points

- Hyper-irritable, taut band or knot in muscle
- Can occur in any muscle under strain
- Involves muscle and surrounding fascia

Myofascial trigger points

- Very common in fibromyalgia
- One study found an average of 12 myofascial trigger point in subjects with fibromyalgia, with healthy controls having one or none. (Alonso-Blanco 2011)
- Important muscle pain generators
- Tight fascia/muscles more prone to "knotting up" (myofascial trigger points)

Chain Reaction of Fibromyalgia Pain

- Constant state of fight or flight
- Muscle pain
- Central sensitization

Trigger a relaxation response

- deep slow belly breathing
- guided relaxation
- meditation/mindfulness practices
- biofeedback therapy
- yoga
- exercise

Myofascial release therapy

- slow manual traction and prolonged assisted stretching
- breaks up painful adhesions and trigger points

- myofascial release therapy and self-care
- trigger point injections
- gentle stretching
- yoga/restorative or yin
- gentle exercise
Myofascial release for FM

Effects of myofascial release techniques on pain, physical function, and postural stability in patients with fibromyalgia: a randomized controlled trial

Adelaida Maria Castro-Sánchez, Guillermo A Matamoros-Péjarro, Manuel Arroyo-Morales, Manuel Saavedra-Hernández, Cayetano Fernández-Sola and Carmen Moreno-Lorenzo


Castro-Sanchez et al . 2011

- 20 weeks myofascial release therapy
- Compared to sham ultrasound
- Significant improvement in pain and tender points
- Pain reduction persisted at 1 and 6 months post-intervention

Exercise Tips

“Start low and go slow”

- Warm up is key (warmup video at youtube.com/drliptan)
- Low impact- walking, recumbent bike, ellipticals
Anticonvulsants and SNRIs

Use of opiates, other than tramadol, not supported by studies

Long-term, daily high dose opiates shown to make central sensitization worse

Low-dose naltrexone (LDN)

**LDN Better Option To Lower Central Sensitization**

- Low dose naltrexone acts on specific receptors on glial cells to quiet their activity
  - Sending them back to “hibernation”
  - Lowers glial release of inflammatory and excitatory chemicals
- LDN essentially acts as anti-inflammatory in the central nervous system


**Abnormal Sleep**

- Fight or flight (sympathetic nervous system) activity remains high all night and correlated with interrupted and poor quality sleep
- Alpha-wave intrusion “awake brain waves” seen in deep sleep
- Moldofsky reproduced symptoms in healthy volunteers by interrupting deep sleep


NORMAL SLEEP ARCHITECTURE

DEEP SLEEP: NORMAL

DEEP SLEEP: ALPHA INTRUSIONS
Constant state of fight or flight

- Poor quality sleep
- Fatigue and brainfog

- Sleep hygiene
- Minimize medications that cause sleep disruption (e.g., opiates, benzodiazepines, ETOH)
- Medications to improve sleep quality
- Rule out comorbid sleep disorders

Ensure no additional sleep disorders:
Order a sleep study when appropriate

Many patients with fibromyalgia have an additional sleep disorder.

- 1/3 of female patients have Restless Legs Syndrome
- 44% of male patients have sleep apnea
- 26 of 27 women with fibromyalgia had at least mild sleep-disordered breathing

Meds That Improve Sleep Quality

Three categories:
- Deep sleep promoters: Anticonvulsants (pregabalin, gabapentin) and GABA\(_B\) agonists (baclofen) have some mildly positive effects on sleep quality
- Sympathetic NS blockers: muscle relaxants, anti-adrenergics, antipychotics
- Sedatives: Z-drugs and sedating antidepressants

References: