So what happens if or when perceived DANGER outweighs TISSUE DAMAGE...?
Central Sensitization, Learned Neural Pathways, and Neursomatic Symptoms

Because, YES - we are too often confusing perception for nociception...
Neuroplasticity: Changes in neural pathways & synapses which are due to changes in behavior, environment & neural processes… aka PRACTICE

“Neurons that fire together, wire together. Neurons that fire apart, wire apart."

The essence of LEARNING, PRACTICE, and creating efficiency via NEURAL PATHWAYS
Neural Pathways are Everywhere
Physiologic, NOT Pathologic
Pain from Learned Neural Pathways is REAL
(and VERY common)
Learned Neural Pathways – Key Findings

- **History and Physical Exam:**
  - Multiple Sx/systems, wax/wane, migratory, >3months
  - Fatigue, sleep, memory, headaches, & mood disturbances
  - Inconsistent exam & testing

- **Complex & multifactorial issues**
  - **Present:** Ongoing life STRESSors
    - Psychosocial: Low socioeconomic status; low job satisfaction, Depression/Anxiety, Bipolar, “stuck”, hopeless
  - **Past:** Difficult ,“unhappy” childhood, ACEs, PTSD, prior Sx
  - **Personality:** Driven, empaths, internalizers
What is “Stress”? 

- “Stress a specific response by the **body** to a stimulus, as **fear or pain**, that disturbs or interferes with the normal physiological equilibrium of an organism.” Or, “physical, mental, or emotional strain or tension.” > Dictionary.com

- “Stress is a nuerosomatic reaction to remedy actual or potential **powerlessness**.” > McClanahan.com

  - 1 - **Present stressors** (the most common)
  - 2 - **Past / Childhood** (the most powerful)
  - 3 – **Personality** (the most insidious)
The Stress (Powerlessness) Response

- Autonomic (automatic) Nervous System
  - Brain’s “thermostat” for survival, protection against stressors
    - Stress Response = fight, flight, freeze
    - Relaxation Response = rest, digest, repair
  - Detecting and responding to threat; returning to safety
  - Completely unconscious, involuntary

- Small doses promote fitness, growth, maturity, competence
  - But “WATCH YOUR RPM’s!!” – we’re not built to drive 80 in 3rd gear!!

- And what if you’re forced to…?
  - Unremitting powerlessness = Toxic Stress = Trauma, ACEs
The ACE Study

ACE Questionnaire

- Before the age of 18, did you experience…?
  - 1. Recurrent physical abuse
  - 2. Recurrent emotional abuse
  - 3. Contact sexual abuse
  - 4. Substance abuser in the household
  - 5. An incarcerated household member
  - 6. Family member who was chronically depressed, mentally ill institutionalized, or suicidal
  - 7. Mother was treated violently
  - 8. One or no parents (divorce counts!)
  - 9. Physical neglect
  - 10. Emotional neglect

How would you feel about a child you love growing up the same way you did?
Figure.—Prevalence of frequent headaches by Adverse Childhood Experiences (ACE) score and gender. Estimates adjusted for age, race, and educational attainment; trend in increasing prevalence by ACE score is significant for both men and women ($P < .001$).

PTSD → Pain

Fibromyalgia – 55% had PTSD
• FM+PTSD = More pain, emotional distress, life interference, & disability

ACE Study (Lanius, 2010): “We believe that here is a key to what in mainstream epidemiology appears as women’s natural proneness to ill-defined health problems like fibromyalgia, chronic fatigue syndrome, obesity, IBS, and chronic non-malignant pain syndromes. In light of our findings, we now see these as medical constructs, artifacts resulting from medical blindness to social realities and ignorance of the impact of gender.”
Internal Pressures → Internal STRESS RESPONSE (self-imposed powerlessness!)

- Overly conscientious
- Sense of duty
- Excessive worry
- People pleasing
- Joy undeserved
- Assume external problems
- Overly empathetic & caring
- Self-critical
- Self-pressured, High expectations
- Religious, moral
- Internalizes Emotions
- Exclusionary for doing things for themselves
- Female
Simple, yet revolutionary concept...

- If **powerlessness** causes real, physiologic change through an involuntary, autonomous Stress Response...
  
  - …then the perception of danger in ANY form, including beliefs, stressors & unresolved emotions, can create real PAIN by *triggering NEURAL PATHWAYS*  
    
    ▶ Via the Autonomic Nervous System

- **Neural pathways can be LEARNED**  
  
  ▶ **Pavlovian** = “associative learning” = MindBody / placebo  
    
    ▶ **Habituation** of pathways in the subconscious; a/w triggers
So if *some* Sx are caused by Neural Pathways, does that change their Diagnosis...?

Tension Myoneural Syndromes (TMS)
Mindbody Syndromes (MBS)
Psychophysiologic Disorders (PPD)
Neurosomatic Symptom Disorders (NSD)

**Defined:**
Conditions that cause real physical Sx and excess anxiety, but which are not due to pathological or structural abnormalities and are not fully explained by testing. These Sx are **caused** by activated neural pathways in the nervous system as a result of learned triggers and emotional & psychosocial stress.

(www.TMSwiki.org)
Rather than assuming something is wrong, that you are “broken”, or that your body is just too old, heavy, weak, scarred, degenerative…
  - I.E. ONLY considering tissue damage…

Also consider if and why your brain could be habitually protecting you (from past, present, personality), but may be healthy!!
  - I.E. pain that is caused by neural pathways
  - Put Sx in context of one’s whole life…

So what’s next…?!?
Have patients start w/ their own story…
Suspecting/Diagnosing Neurosomatic Symptoms (Sx):

- **Onset:**
  - Sx persist long after usual tissue healing;
  - Sx started w/o injury, accrued during one season of life;
  - STRESS alongside Sx onset (”What else was going on…?”)

- **Prior/Palliating/Provoking:**
  - Sx worsen when stressed and improve at random moments or when not thinking about them (fun, vacation, distractions)
  - Sx only *temporarily* minimized (days to wks) after some kind of Tx: massage, chiro, acupuncture, herbs, supplements
  - Sx worsen depending on setting or WHO is around
Suspecting/Diagnosing Neurosomatic Sx:

- **Radiation (Location):**
  - Sx shift locations from day-to-day; spread over time
  - Sx are in a symmetric distribution pattern Rt to Lft, involve entire side of the body, involve both UE and LE,

- **Severity:**
  - Often variable intensity or quality; non-physical wax/wane

- **Timing:**
  - Sx vary w/ the time of day, seasons, or holidays.
  - Triggered by things not related to pathology: weather, foods, smells, sounds, light, computer screens, specific movements, etc
Suspecting/Diagnosing Neurosomatic Sx:

- **PMH**
  - Hx of numerous other/prior neurosomatic Sx or CSS
  - Numerous specialties w/ disparate Dx’s (incluing CAM)

- **PSH**
  - Often many prior interventions: surgeries, injections
  - Arthoscopies, disectomies, ex laps, GI scopes,

- **Social Hx:**
  - **Present:** Life stressors, Low SES, race, “stuck” (home/work/church)
  - **Past:** Difficult, “unhappy” childhood; ACEs, PTSD,
  - **Personality:** Driven, empathic, internalizers
Review of systems
For each of the following, check yes if you have had this symptom or condition and indicate the year it began; check again if it is still present.

<table>
<thead>
<tr>
<th>Yes?</th>
<th>Began when</th>
<th>Still present?</th>
</tr>
</thead>
<tbody>
<tr>
<td>X</td>
<td>1987</td>
<td>yes</td>
</tr>
<tr>
<td></td>
<td>2015</td>
<td></td>
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<tr>
<td>X</td>
<td>1987</td>
<td>yes</td>
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<td>X</td>
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<td>yes</td>
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<td>X</td>
<td>1987</td>
<td>yes</td>
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</tbody>
</table>
**History of stressors**

Please **make a check** which of the following occurred around the time your symptoms (Sx) began or has occurred recently or is currently present:

<table>
<thead>
<tr>
<th>Occurred when Sx began</th>
<th>Recent or Current</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Illness or death in your family or friends</td>
<td>[X]</td>
</tr>
<tr>
<td>2. Divorce or marital problems</td>
<td>[X]</td>
</tr>
<tr>
<td>3. Legal problems</td>
<td></td>
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<tr>
<td>4. Accident or injury</td>
<td></td>
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<tr>
<td>5. New relationship or marriage</td>
<td>[X]</td>
</tr>
<tr>
<td>6. Difficulties at work or change in job or business</td>
<td>[X]</td>
</tr>
<tr>
<td>7. Gain of a new family member or change in the family structure</td>
<td></td>
</tr>
<tr>
<td>8. Change in financial situation</td>
<td>[X]</td>
</tr>
<tr>
<td>9. Change in living situation</td>
<td>[X]</td>
</tr>
<tr>
<td>10. Violent experiences</td>
<td></td>
</tr>
<tr>
<td>11. Changes in sexual functioning or other issues regarding sex</td>
<td></td>
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</tbody>
</table>
Personality Traits

Please check if you would you describe yourself as:
1. Having low self-esteem
2. Being a perfectionist
3. Having high expectations of yourself
4. Wanting to be good and/or be liked
5. Frequently hostile and/or aggressive
6. Frequently feeling guilt
7. Feeling dependent on others
8. Being conscientious
9. Being hard on yourself
10. Being overly responsible
11. Often responsible for others
12. Having rage or resentment
13. Often worrying
14. Being sad
15. Have difficulty making decisions
16. A rule-follower
17. Have difficulty letting go
18. Cautious, shy, or reserved
19. Tend to hold thoughts and feelings in
Suspecting/Diagnosing Neurosomatic Sx:

- **PFH**
  - FHx of numerous other/prior neurosomatic Sx or CSS
    - Mom w/ migraines, Dad back pain; alcoholism, mood d/o
  - Numrous specialties w/ disparate Dx’s (incluing CAM)

- **Meds**
  - Psychotropics: SS-/SNRI, Benzo’s, sleep
  - Neuro: Anticonvulsant/-migraine, vertigo
  - CV: BP meds, anti-arrhythmic, autonomic down-regulation
  - GI/GU: acid-reducers, anti-spasmodics
  - MSK: NSAIDs, opiates/analogs, patches
  - Alt: many supplementns, CBD/THC, “other” substances…
Suspecting/Diagnosing Neurosomatic Sx:

- **Physical Exam**
  - Very often INCONSISTENT – daily vs inter-examiner
  - Hyperalgesia, allodynia
  - Normal testing otherwise

- **Testing**
  - Labs
    - Usually WNL; inconsistencies often refuted b/w providers
    - Extensive ancillary testing: sensitivities, gut flora, hair/urine
  - Imaging
    - Frequently numerous studies; many “Normal Abnormalities”
    - “It’s just a matter of time…” “You’ll know when to call…”
What patients need to “get”…

- Your Sx are REAL, but not a sign of damage
  - Physiology vs pathology / hurt ≠ harm

- Your nervous system has been sensitized and is involuntarily producing Sx
  - Sx are due to neural pathways, not tissue damage, activated via unconscious autonomic patterning

- Most people have Sx like these, at times
- This is not your fault
- You can get better
Reprogramming the Brain

- **Identify the SOURCE:** structural vs neurosomatic PW; understand the CNS can cause and perpetuate pain; embrace the beginnings of HOPE

- **Reduce FEAR:** make the brain safe; STOP NPW repetition by worry & attention given to pain; challenge Sx & assumed triggers; **MINDFULNESS** & self-compassion; self-pressure

- **Life Change / Increase Activity:** reengage life w/o fear; act w/ assertiveness; hurt ≠ harm; poke the bear; talk to the pain!

- **Emotional (re)Processing:** initiate healing of deeper wounds; identify and express buried emotions via writing or psychoTx; find meaning in the journey & protection of pain; love/forgiveness/letting go; reclaim peace/gratitude/joy/LIFE
TO CONCLUDE...
Summary

• Pain is the **Output**...not the Input
• Nociception IS NOT Pain
• Risk Factors Are Psychosocial
  – NOT Biomechanical
Pain Facts / Summary

- **All pain is real** (but is produced **BY** the brain > not tissue)
  - No distinction b/w “real/physical” vs “fake/mental”

- **However, DIAGNOSIS of CAUSE is critical**
  - Tissue damage vs Neural Pathway (or mixed…)

- **You are not your X-Ray or MRI…!!**
  - Injuries heal & “scar tissue”, obesity, & arthritis often don’t hurt  *(Even weather fronts and gluten!)*
Pain Facts / Summary

- **Tissue damage/nociceptive/inflammatory pain:**
  - Responds **WELL** to body-based Tx: PT, bodywork, surgeries, injections!

- **Neurosomatic Pain:**
  - Due to neurological & psychological **SENSITIZATION**
    - Responds **POORLY** to body-based Tx
  - Pavlovian Conditioning prominent = Triggers
    - Sx/Triggers should be CHALLENGED – don’t just assume disease!!

- The **Pain Experience** - always augmented by **POWERLESSNESS**
  - Present, Past, and Personality…

- **Neurosomatic Sx = LEARNED → Can be UNLEARNED!**
  - Desensitization, Deconditioning, Mindfulness, Experiential Tx, EAET
Neurosomatic Symptoms

(aka: TMS, MBS, PPD, NSD)

**Chronic Pain Syndromes**
- Migraine headache
- Tension headache
- TMJ syndrome
  - Neck pain
  - Whiplash
  - Vulvodynia
- Fibromyalgia
- Myofascial pain
- Chronic tendonitis
- Repetitive stress injury
- Chronic abdominal pain
- Back/sciatic pain
- Foot pain
- Pelvic Floor Hypertonic D/O

**Autonomic Nervous System**
- Postural orthostatic tachycardia
- Irritable bowel syndrome
- Functional dyspepsia
- Interstitial cystitis / PBS
- CRPS

**Other**
- Tinnitus
- Rhinitis
- Insomnia
- Dizziness
- Paresthesias
- Poor memory
- Chronic fatigue
- Hypersensitivities
- Spasmodic dysphonia
- Globus hystericus
- Non-cardiac CP
- Chronic hives
- Restless leg
- Depression
- Anxiety
- PTSD
- OCD
- MVP

Clauw FM
Schubiner 2012
Further Resources

Please use flash drive handouts!!

www.TMSwiki.org

www.painpsychologycenter.com

www.unlearnyourpain.com
Credit

- Many thanks to David Kohn, DO; Alicia Batson, MD; Kevin Cuccaro, MD for presentation help.

- Articles/sources referenced within presentation:
  - www.cdc.gov (search ACEs Study)
  - www.acestoohigh.com
  - www.avahealth.org
Osteopathic Tenets

- The AOA’s House of Delegates’ approved “Tenets of Osteopathic Medicine” - the underlying philosophy of osteopathic medicine.
  - The body is a unit; the person is unified of body, mind, spirit.
  - The body is capable of self-regulation, self-healing, and health maintenance.
  - Structure and function are reciprocally interrelated.
  - Rational treatment is based upon an understanding of the basic principles of body unity, self-regulation, and the interrelationship of structure and function.
Pain/Opioid Stats (cdc.gov; JAMA)

- **US OD Deaths**: 52,404/y in ’15 // 64,070/y in ’17
  - 175 people per day; 1 person every 8 minutes
- **70-90% of Opioid addicts started w/ Rx for Pain**

- **TN has the 2\textsuperscript{nd} highest opioid/BZD Rx rate**
  - 51 HC, 21 Oxy, AND 22 Xanax for \textit{EVERY} person ≥ 12y/o
- **Overdose deaths > 1000/year (>highway deaths)**
  - 210% increase ’99-’10 (“only” 127% nationwide)
- **Neonatal Abstinence Syndrome** (∼10x ↑: 174 in ’05 // 1607 in ’14)
- **Opioids now primary substance of abuse > EtOH**
Western Medicine’s Painful Beginnings

- **Pain = Tissue Damage**
  - Trauma, Neoplasm, Infection, Autoimmunity, Metabolic

- **Pain as the “5th Vital Sign”**
  - Just increase the opiates! “True pain” = addiction is impossible

- **Medicalization of Sx – by Drs. AND Pts. – The CARTESIAN Model**
  - The Mechanic (surgery) Model
    - Drs...“I can fix that! We can rebuild him...!”
    - Patients... “Doc, do that thing I read about! Make it stop! Fix me!”
  - Pain as a Dx...? [Fever as a Dx...?]

- **+PRESSURE! - Time/economic crunch, politics, litigation/tort, Big Pharma, etc**
  - Drs: High Responsibility + Low Efficacy = BURNOUT! > (jerks)
  - Pts: Low Efficacy + Frustration = HOPELESSNESS! > (anxious and pushy)
DOCC program:

- A framework that breaks pain into its component parts. There are 3 aspects of a successful outcome: 1) Learning about chronic pain 2) Every aspect of pain must be addressed at the same time 3) The patient takes complete control of their care.

- The source of pain may be:
  - Structural—an identifiable lesion with matching symptoms
  - Non-structural/soft tissues—the supporting muscles, tendons, discs, and ligaments have an abundance of pain fibers that can remain chronically inflamed
  - The central nervous system may “short circuit” and can cause pain without an identifiable source—the Mind Body Syndrome (MBS).

- The only receptor of course is your brain. The perception of pain is affected by:
  - Sleep
  - Stress
  - Medications
  - Life outlook—chronic pain destroys your ability to look out and up
  - Education—by not having enough knowledge and a plan you feel trapped
  - Physical conditioning
Pain is multifactorial

The Brain creates pain from many factors:
- This is often why different people have different amounts of pain even with similar injuries.
- It is also why your pain can change day to day.
- Have you ever noticed that stress can increase your pain?
- Have you ever noticed that pain can fluctuate when you are sick (immune)?
- Have you ever noticed that pain can be different depending on your location (context)?
- Are you ever noticed the Fear of pain increases your sensitivity at the dentist?

Have you noticed that children will often look to their parents after they fall and before they cry? They are considering the meaning of their fall. Are the signals sent to their brain something they need to worry about?
**Pain is about Sensitivity**

- In the chart on the left you can see that in a healthy state there is a close relationship between pain and tissue damage.
- But also notice that pain can be active before tissue damage occurs.
- Again, this is because pain functions as an alarm to prompt you to do something.
- We can stress tissue and when we get close to our damage threshold we might experience pain.
- When we go past this threshold of stress we might then experience tissue damage.

**A Sensitive system has lowered thresholds**

- When pain persists we change our pain thresholds.
- No longer is the pain threshold close to where our damage threshold is.
- People start to feel pain sooner with less stress placed on the body.
- It doesn’t even have to be physical stress. Other stressors can lead to the pain experience.
Childhood Stress
a
Predictor of Pelvic Pain

Blinded, observational study
25 women with chronic pelvic pain compared to 30 women being seen for tubal ligation or infertility and no pain
Diagnostic Laparoscopy showed **no significant differences in severity or type of pelvic pathology**
Chronic pelvic pain patients showed significantly higher prevalence of major depression, substance abuse, adult sexual dysfunction, somatization and h/o childhood and adult sexual abuse.

Anger ➔ Headache, FM

> 171 headache sufferers, 251 controls (Controlled for anxiety & depression)

> Holding anger in was most predictive of HA status

> While considered more “socially acceptable” to hold anger in, research has suggested that high levels of anger in have the greatest negative influence on physiological health.
So what’s next…?!?
Have patients start w/ their Own Story…

**KNOWLEDGE**

- Contextualize **POWERLESSNESS** w/ your Sx, b/c this is where your nervous system feels **UNSAFE** and will protect you!

- **Present**: Overwhelmed, “stuck”, bad boundaries, hopeless
  - When Sx began/flared, what **ELSE** was going on…?

- **Past**: Did you have a happy childhood? **What's your ACE Score?**
  - When Sx began/flared, what **ELSE** was going on…?

- **Personality**: Perfectionism, self-pressure, people-pleasing?
  - How would I feel if I could hear how your inner critic treats you?