

Physical Therapy for Complex Regional Pain Syndrome (CRPS)

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Concept of Neural Control

- We are constantly responding to stimuli from inside and outside the body through complex mechanisms within the Brain, Spinal Cord, and Nerves

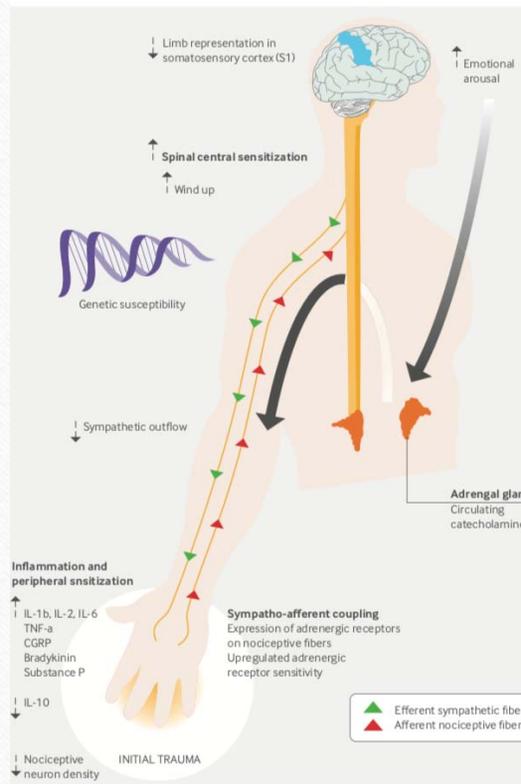
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Peripheral Nervous System

- Nerves alter their excitability or sensitivity based on what they believe is best to maintain the ability to respond to stressors to maintain homeostasis.
- Example: if your CNS anticipates cold weather it will pop in some extra temperature ions to increase excitability to cold temperature and get you to put on a jacket to stay warm, hence maintaining allostasis.

Lopez,, M., PT, DPT, OCS. (n.d.). Treatment for Low Back Pain- A Case Study and Suggested Paradigm Shift. Retrieved from <http://drjarodhalldpt.blogspot.com/2017/06/treatment-for-low-back-pain-case-study.html>

CRPS - Overview



- Initial Trauma
- Inflammation and peripheral tissues become more sensitive to future stimulus
- Substances created that mediate that something is wrong from the tissue to the brain
- Fight/Flight/Fear Emotional Arousal → Adrenal Release -- Sympathetic outflow
- Pain Memory in somatosensory cortex (S1) of the Brain
- Spinal central sensitization—body is wound up and ready to overreact to a situation; Wind up phenomenon

(Bruehl, S. (2015). Complex regional pain syndrome. *Bmj*. doi:10.1136/bmj.h2730)

Cortical disinhibition

- Refers to loss of the mechanism that lessens the painful experience
- Sensitization and cortical disinhibition drive systemic changes in the how the body reacts

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Sensitization

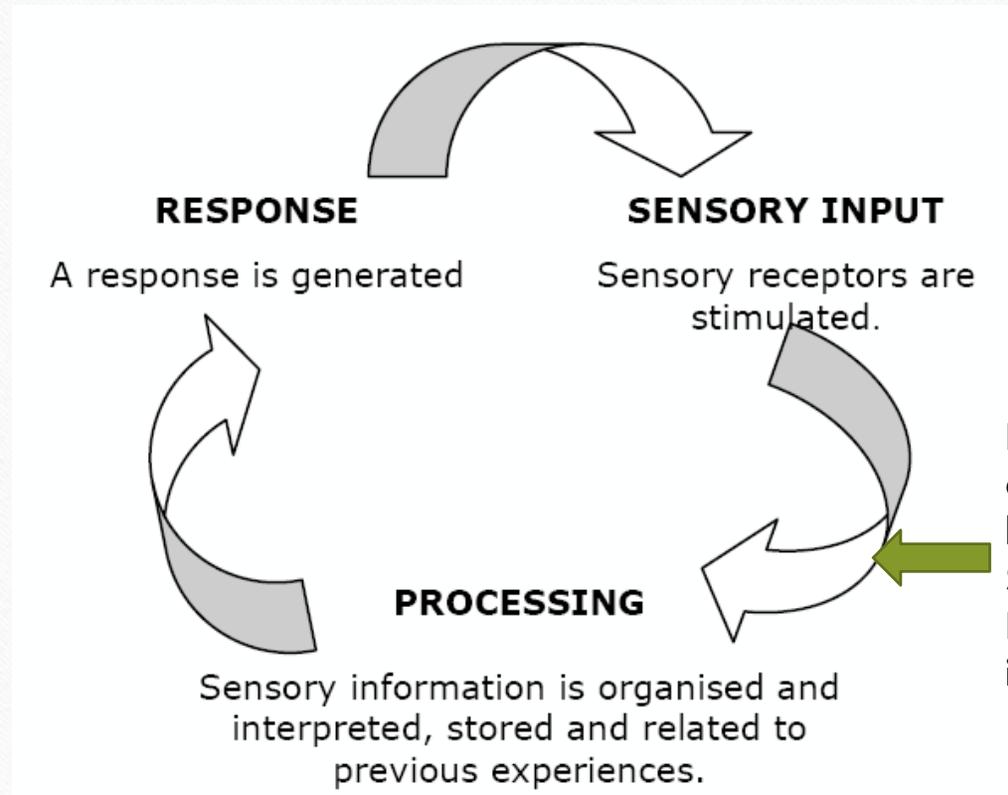
- Refers to repeated activation of “danger” receptors in the spinal cord to give an advantage by increasing sensitivity to input information through physiological changes to reflexive responses

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Sensitization

- In prolonged states, it can lead to
 - allodynia (pain with normal nonpainful stimuli),
 - hyperalgesia (heightened pain response),
 - secondary hyperalgesia (longer lasting pain response).

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In CRPS the dysfunction is between the Sensory Input and Processing of information

Pain Definition

- Pain : unpleasant sensory and emotional experience, unique to every individual, associated with actual or potential tissue damage.” –The International Association for the Study of Pain,
- Pain is the output not the input however
- Nociception is the neuropathway that tells us there is imminent or potential danger.

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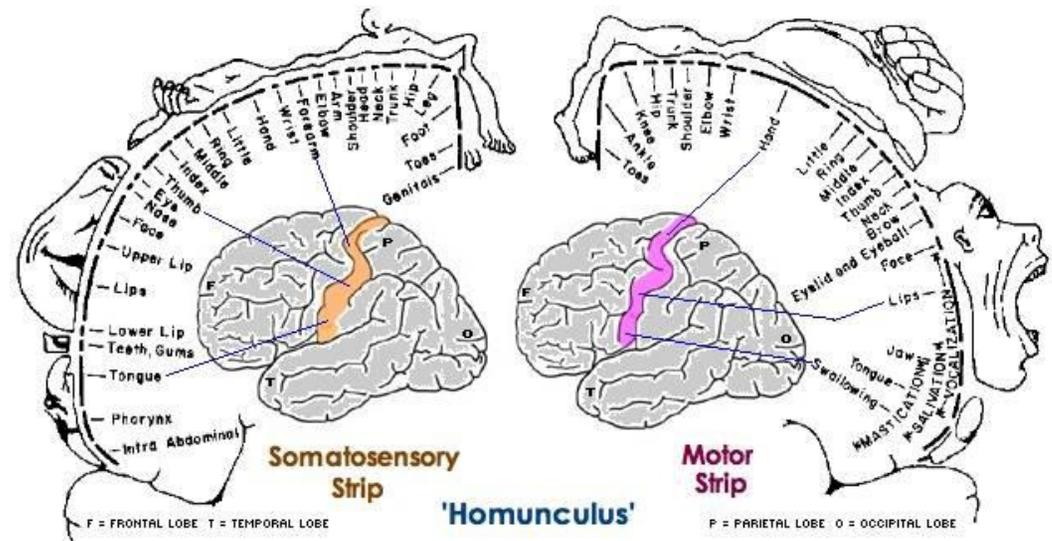
Injury can lead to Cortical Alterations

- Cortical alterations can lead to impaired proprioception, coordination, ability to distinguish left/right, and altered sensation.
- Changes can occur in acute instances, and they happen in a manner of minutes.
- In a healthy pain free individual, you have very well defined, sharp cortical maps and typically no pain – life is good.

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Use It or Lose It

- Cortical reorganization (sensitization and cortical disinhibition) of these motor and sensory networks takes place in the presence of pain/immobilization or can facilitate pain.



- Example: Prolonged sitting at work causes pain. What happens at work... you don't move, you get stressed out, you have mild hypoxia of tissues that may activate some nociceptors. etc.
- Your brain (sub conscious/conscious) will begin to correlate all this multi-sensory input as **Danger or a Threat.**
- An already impaired cortical body matrix now is under threat, so cortical reorganization starts to take place. Throw in the fear of your bulging disc, your degenerative disc disease, arthritis, and the threat escalates.
- Before you know it, chronicity has set in, and the longer the pain is there we now the greater the likelihood of more cortical reorganization.

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Allodynia

- We become sensitive to normal stimulus that we should not be sensitive to such as touch, temperature, clothing, air, or other physical stimuli
- May feel like a burning sensation,^[2] and it often occurs after injury to a site.
- Hyperalgesia : is different from Allodynia an extreme, exaggerated reaction to a stimulus which is normally painful.

Best Approach

- Biopsychosocial Perspective with interdisciplinary team is the best approach to treating RSD/CRPS
- Steven Feinberg, MD and Rachel Feinberg, PT

Feinberg, MD, MPH, S., & Feinberg, PT, DPT, R. (n.d.). How to Obtain the Best Medical Care for CRPS. *How to Obtain the Best Medical Care for CRPS*.

Interdisciplinary Team of Treatment of CRPS

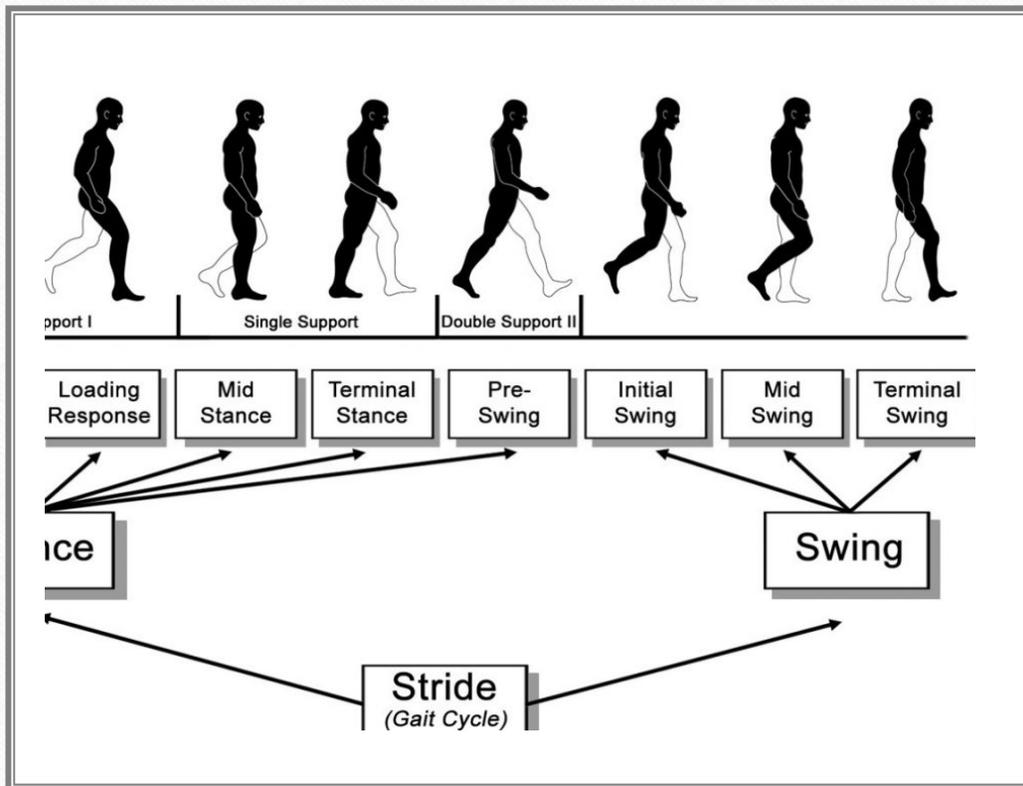
- MD/DO and delegated clinical staff
- Dietician/Nutritionist/Functional Medicine
- Psychology/Counseling—Cognitive Behavioral Therapy (CBT)
- Physical Therapy/Occupational Therapist/Speech Pathologist
- Other Health Professionals
- “Find Clinician who is focused on the Outcomes more than the Income”

Michael Wiebec, PT, MCMT, Functional Dry Needling Practitioner

What can PT do for CRPS

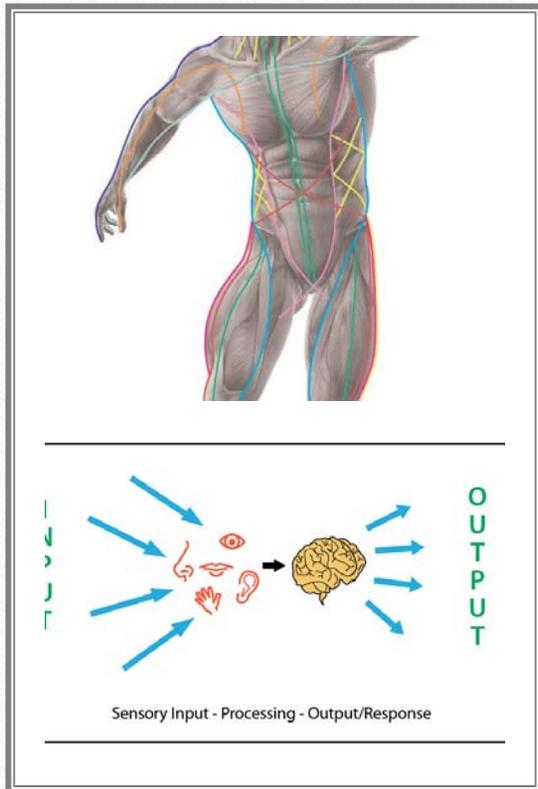
The background of the slide features a purple gradient. Overlaid on this are four black silhouettes of human figures in various dynamic, athletic poses, suggesting movement and physical therapy. The figures are positioned across the width of the slide, with one on the far left, one in the center-left, one in the center-right, and one on the far right. The text is centered over the middle of the slide.

- Movement
- Motion is the Potion
- Improve Proprioception and Neuromuscular function



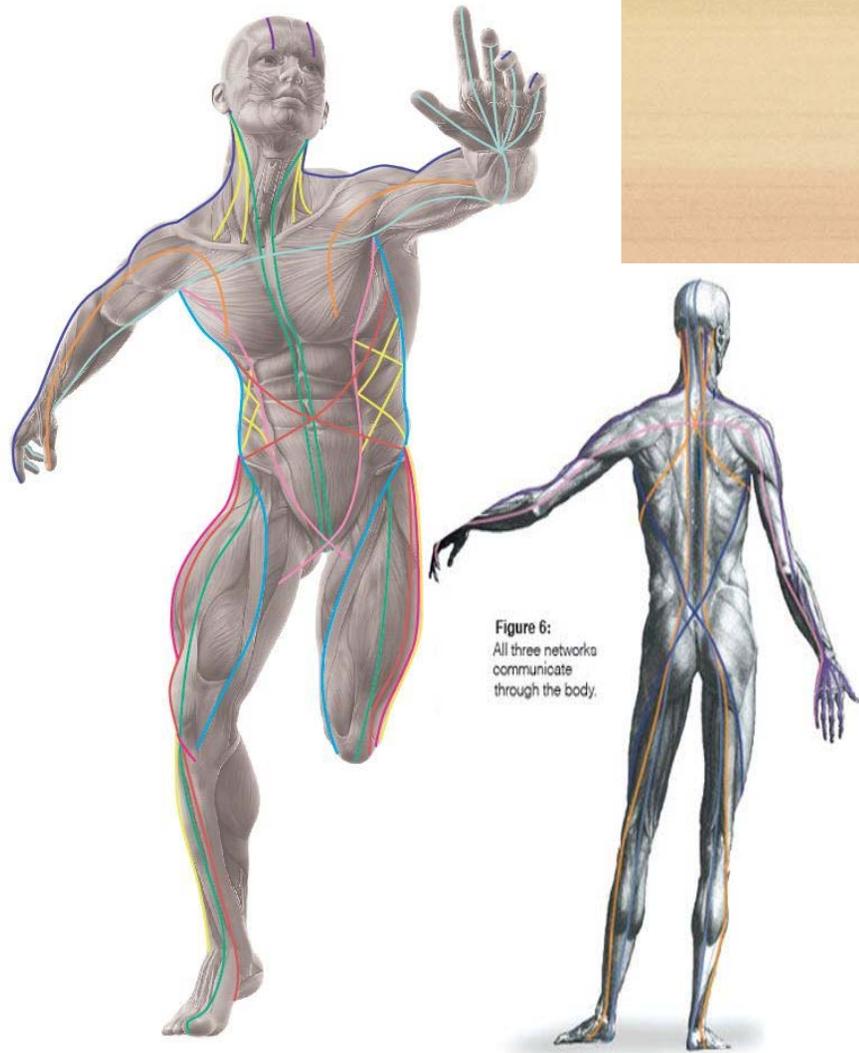
Proper Motion is Complex

- If motion was easy to understand we would not have to study it for hundreds of years.
- Starts with core, foot placement, muscular shock absorption while performing complex multi-directional motions, and reaction to multi-directional forces



Proper Motion is Complex

- Motion integrates us into our environment with use of all our senses.
- Motion is affected by our internal health.
- Sensory drives motor



- You can see here the complexity of movement
- Each line represents the way muscles pull as a group
- Proper function will consist of any variation of each of the lines pulling in any given direction at any time.

Keep This in Mind...

- Reduce the Symptoms and Change the Behavior
- The damage is not the cause of the problem...the problem is the cause of the damage; We need to find the area of Movement Aversion.
- The art to PT consists of “AMusing” not “ABusing” the patient with body movement while we practice breathing.
- The body desires to move. Live the life of perpetual motion.

Wiechec, PT, MCMT, M. (2017, October). [Quotes By Michael Wiechec, PT]. Katy, TX.

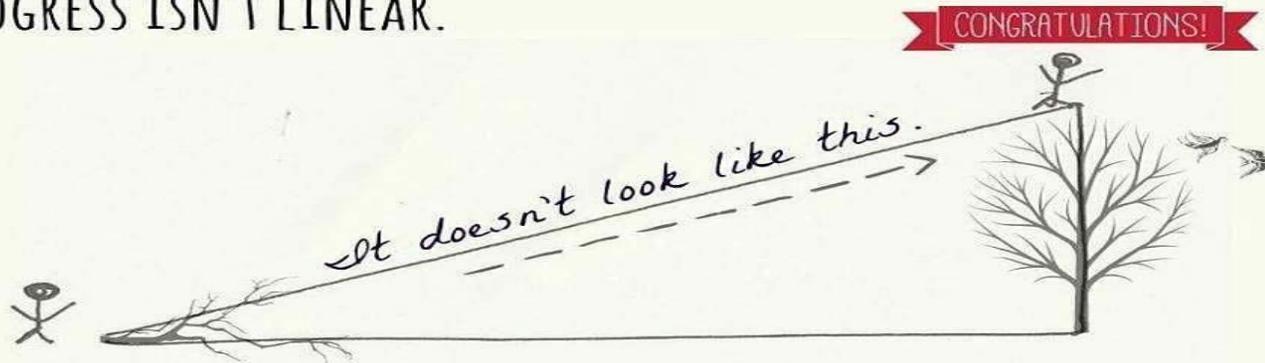
Changing the Behavior

"Tell me and I forget, teach me and I may remember, involve me and I learn."--Benjamin Franklin

"I hear I forget, I see I remember, I do I understand"-- Confucius



PROGRESS ISN'T LINEAR.



PROGRESS IS FULL OF TWISTS AND TURNS, UPS AND DOWNS, BACKTRACKS AND SIDELOOPS. I PROMISE, YOU'RE DOING GREAT.



body-peace.org

Influences to Consider with Physical Therapy

- Still's Philosophy basically says the body does the healing
- The function of nerves and muscles to move the body affects by total body health and the ability of the body to recover from injury and disease.
- Restoration of the body's maximal functional capacity enhances the level of wellness and assists in recovery from injury and disease.

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Roles

- Our role as Physical Therapist is to be a teammate to patients and not to treat disease. We need to help provide the environment for success.
- The Patient's Role is to allow the body to heal **DYNAMICALLY!**
- The patient cannot take on Pain Behaviors expecting function to improve spontaneously

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We Need to Provide the Environment for Success

- **Preparation**—Home Exercise Program and Selected isolated movements in the clinic, graded isometrics, isokinetics
- **Simulation**— Components of function addressed with Neuromuscular Re-Education
- **Practice** —functional integration, Rehearsing the desired movements
- **Carryover** — Habituation, Desensitization, Normal movement patterns and function of systems

Energy Expenditure

- Injury can affect the efficiency of movement, and fatigue us quickly even with normal activity
- Multiple minor impairments of movement of the body can give us a global exhaustion due to the necessity to overachieve with regular Activities of Daily Living

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Borg Rate of Perceived Exertion (RPE)

- This is a tool that helps the patient determine if they are overdoing it.
- Links movement Exertion to which energy phase is being used
- Helps to monitor Exertion when heartrate is controlled by medicine

The Borg Scale	
BORG	Explanation/percieved exertion
6	Zero exertion
7	Very easy
8	Minimal recognition of effort
9	Very light (Comfortable walking pace)
10	Can just start to hear your breathing
11	Conversation is easy and you feel you could run for a while at th
12	Light exertion - This is where you are deveopling your aerobic sy
13	Somewhat Hard
14	You can hear your breathing but you're not struggling
15	You can talk but not in full sentences - You are still developing th
16	Hard work - This is probably just below your anaerobic threshol
17	Very hard - Starting to get uncomfortable and you're getting tire
18	You can no longer talk because your breathing is heavy
19	Extremely hard. Your body is screaming at you to stop
20	Max exertion

Self-Regulation

- There are literally thousands of self-regulating mechanisms operative within the body at all times.
- Homeostasis is essential for the maintenance of health, and if altered by disease or injury, they need to be restored.

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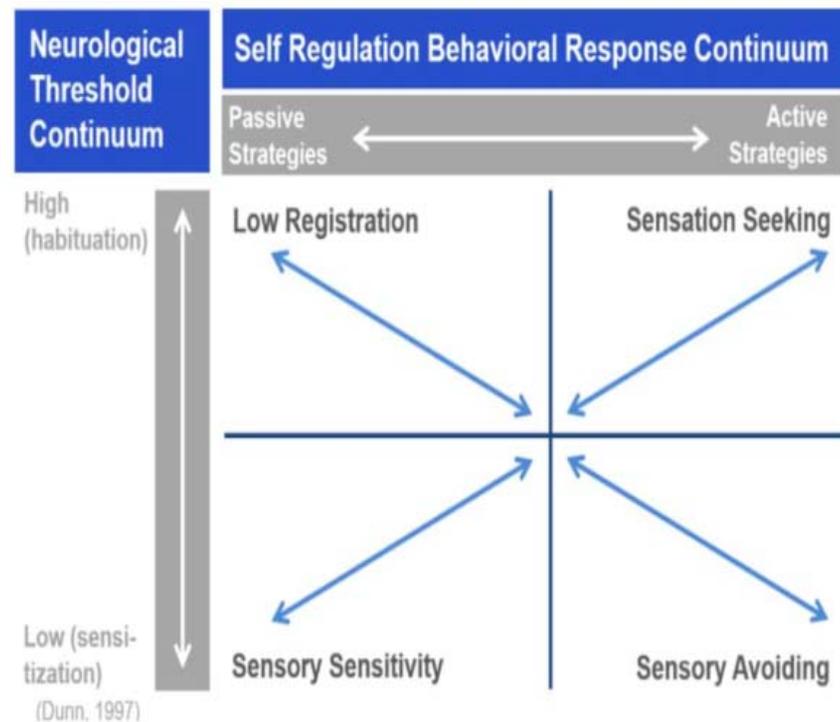
Sensitization versus Habituation

- We become sensitive to sensory stimulus; or we habituate and get use to it.
- When we are desensitizing we are habituating the tissue to function normal.

Sensory Behaviors or Dysfunctions

- SENSORY AVOIDING
- SENSORY SENSITIVE/SENSITIVITY
- SENSORY SEEKING
- LOW REGISTRATION

Dunn's Model of Sensory Processing



Sensory Integration Framework/Perspective

- Patient adapts to changing and increasingly complex environmental demands in the three-dimensional space
- “somatomotor adaptive response,”
- Intent to perform is very important; Intrinsic motivation and drive are used to interact through desired activities

Sensory Integration Framework/Perspective

- Trust and respect through interactions –No Judgement Zone
- **Activities are negotiated, and the therapist alters the task, interaction, and environment based on the patient's responses.**
- The activities are their own reward

Sensory integration Framework

- Safe environment with vestibular, proprioceptive, and tactile sensations and opportunities for motion planning.
- Activities promote integrating important learning opportunities.
- Activities promote optimal postural control in the body, oral-motor, ocular-motor areas, and bilateral motor control, including maintaining control while moving through space and adjusting posture in response to changes in the center of gravity.
- Activities promote praxis, including organization of activities and self in time and space.
- Intervention strategies provide the “just-right challenge.”

PT Techniques

- Muscle Energy Technique
- Strain CounterStrain Technique
- PNF- Proprioceptive Neuromuscular Facilitation
- Aquatic Therapy
- Myofascial Release
- Nerve Glides
- Functional Dry Needling
- Joint Mobilization

Muscle Energy Technique

- Use of positioning followed by the patient contracting the muscles in a particular manner to elicit a somatosensory retraining that can help to normalize function and all the related benefits of movement.
- Basically, it isolates the abnormal movement and retrains the component that is being performed incorrectly
- Isometrics for CRPS

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Strain CounterStrain Technique

- Use of positioning the tissue in the shortened position to relax the tissue and allow for inhibition of the message of danger occurring in the periphery.
- Many times replicates the specifically addressed joint to the position of injury
- Similar movement principles to Muscle Energy Technique except you are shortening instead of lengthening.

Jones, L. H., Kusunose, R. S., & Goering, E. K. (1995). Jones Strain-counterstrain. Boise, ID: Jones Strain-Counterstrain.

PNF- Proprioceptive Neuromuscular Facilitation

- Complex Series of Facilitation Techniques of the nervous system utilizing passive and active movement and muscle response and contraction
- Uses Rhythm, Contraction, Resistance, Quick Stretch, and Timing for Emphasis of motion; Isokinetic NMR for CRPS
- Basic principles/techniques of PNF are utilized in almost all facets of Physical Therapy

Adler, S. S., Beckers, D., & Buck, M. (1993). PNF in practice an illustrated guide. Germany: Springer-Verlag Berlin Heidelberg.

Myofascial Release

- Afferent/Input Stimulation into the Neurological System via multiple receptors in attempt to inhibit the Fight or Flight response and improve elongation of the tissues with normalization of tone and neural excitability.
- Multiple types of Myofascial Release
- I prefer to be careful and not aggressive with Myofascial Release because if the technique makes you anxious, it probably does not help CRPS
- May involve selected myofascial trigger point release

Nerve Glides

- An attempt to mobilize the nerves that have been injured through complex movements
- Very Complex and should only be done as prescribed but can be very beneficial
- Nerve glides (also known as neural flossing or nerve stretching) are exercises that aim to restore mobilization of our peripheral nerves. When a nerve is injured it won't be able to glide normally through the surrounding sheath which can cause certain symptoms.
- Nerves can be stretched carefully to reduce this inflammation or compression and ultimately allow the nerves to glide normally.
- David Butler

Diaphragm Breathing

- Relationship of Diaphragm Breathing on Core Stability
 - As we exhale the diaphragm relaxes and the transverse abdominus, obliques, and serratus posterior inferior create forced exhalation
- Relationship of Core with Pelvic Floor
- Lymphatic Drainage
 - The heart is the strongest pump but the diaphragm is the largest pump in the body in that it helps change pressures in the body and move lymphatics and blood

RESPIRATION AND THE THREE DIAPHRAGMS—Very Important

- In health, the tentorium cerebelli, the thoracoabdominal diaphragm, the pelvic diaphragm should function in a synchronous fashion. If dysfunction interferes with the capacity of any of the three, it is reasonable to assume that the other two will be altered as well.

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Why Thoracic is So Important to Treatment

- Thoracic Spine has anatomical relationship with Sympathetic Nervous system.
- All 12 segments of the thoracic spinal cord give have a relationship with preganglionic sympathetic nerve fibers which lead to viscera and other vital organs

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Basic Movements

- These activities will attempt to prepare your body for the PT techniques that will be performed
- If it hurts, don't worry, just make the motion smaller so that it does not make you anxious
- Repeated motions teach use that our motion is going to be okay

Basic Movements

- Diaphragm Breathing
- Draw Sword
- Reach over both shoulders
- Open and close the hips—seated “clamshells”

Questions?

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- PT_Adventure on Instagram

