Pain and The Brain*

Post Traumatic Headache

*(Pain Sensor Organ)

Michael F. Martelli, Ph.D

Concussion Care Centre of Virginia

http://villaMartelli.com

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PHENOMENOLOGY OF PAIN:
A BIOPSYCHOSOCIAL CONCEPTUALIZATION

- **IASP: "an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage"**
- **Complex Multidimensional SUBJECTIVE EXPERIENCE**
  - **SENSORY VS AFFECTIVE**
  - **ACUTE VERSUS CHRONIC**
  - **PAIN MAINTENANCE PATTERNS**

PAIN DISTINCTIONS

Chronic

- > 6 months
- Ambiguous Connections Between CNS and Injury Site
- Useless Old Information
- Perpetuates Maladaptive Protection

Acute

- < 6 months
- Relatively Discrete Neuroanatomic Connections to Injury Site
- Useful New Information
- Survival Value Signaling Need for Corrective Action

CHRONIC PAIN: THE FACTS

- Approximately 5% is Psychogenic
- Approximately 20% or Less is Exaggerated, Malingered and/or Primarily Psychological
- Correlates Between Physical Signs and Pain Complaint are Generally Weak
- With Time, Pathways Connecting Injury Site to CNS change and Lead to Emotional Distress, Energy Decrease and Neurohormonal changes
- Basal Ganglion and Limbic System Hypoperfusion is Typically (Always?) Found
- Cognitive Deficits (subjective and objective) are Frequently Found

CHRONIC PAIN: THE FACTS *(continued)*

- Depression is a Common Sequelae
- Cognitive Deficits are Associated with Major Depression and Appear Similar to Those Seen With Moderately Severe Diffuse Brain Injury
- Women are More Likely to Complain of Pain
- Certain Cultural Groups Complain More
- Depressed Complain More
- 33% Never Seek Treatment
- 35 to 75 Million Americans Are Afflicted
- Most Patients Do Not Improve After Legal Settlement

HEADACHE...

- ***A Pain in the Brain that can drive you Insane***

Unknown Author

Alice in Wonderland?

Headache and Post Traumatic Headache (PTHA)

- HA - one of the most common somatic complaints seen in general medical practice
- PTH, or HA following trauma to head, brain and/or neck (or PTH) - most common post traumatic symptom after mild TBI, whiplash
  - Incidence of early or "acute": 50 - 90%
  - Incidence at 6 mos (chronic PTH): 15 - 45%
  - Incidence at 4 years: 10 - 20%
- PTHA is more Treatment Resistant
- Brain Injury now considered least likely cause of PTH

ETIOLOGIES

- CEREBRAL, CRANIAL &/OR CERVICAL INJURY
- CATEGORIES
  - Musculoskeletal
  - Vascular
  - Mixed
  - Neuroma / Neuritic
  - Other Causes
- SOURCES OF HEAD PAIN
  - Intracranial
  - Extracranial

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SYMPTOMS ASSOCIATED WITH PTHA

- PHOTOPHOBIA
- PHONOPHOBIA
- COGNIPHOBIA?
- TINNITUS
- BLURRED VISION
- SLEEP DIFFICULTIES
- IRRITABILITY
- COGNITIVE IMPAIRMENT

POST CONCUSSION SYNDROME: Symptoms

- Fatigue
- Sensory Sensitivity
- Attentional Difficulties
- Memory Difficulties
- Sleep Disturbances
- Irritability
- Depression & Anxiety
- Dizziness / Balance Disturbance

OVERLAPPING POST TRAUMATIC DIAGNOSES

- Post Concussion Syndrome
- Post Trauma Syndrome
- Accident Neurosis
- Post Trauamatic Headache

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Posttraumatic Headache (PTH) and Neuropsychological Performance

Martelli, Grayson and Zasler, 1999`

- Given sensitive neuropsychological measures, significant neuropsychological effects often found
- Information processing speed and complex attention are most frequently observed
- Cognitive flexibility, verbal associative fluency and learning deficits often noted and may be secondary.
- Other chronic pain: More chronic pain and more pain related symptomatology typically produce impaired performances on select neuropsychological tests

Posttraumatic Headache (PTH) and Neuropsychological Performance

Martelli, Grayson and Zasler, 1999 (continued)

- Abnormal SPECT findings are typical in persons with many chronic pain syndromes.
- Pattern of neuropsychological impairments appeared similar to that produced by MTBI, posing a differential diagnostic dilemma. Validity and utility of neuropsychological test based inferences regarding brain injury necessarily depend on assurances that the effects of chronic headache and other chronic pain symptoms are taken into consideration.

Relationship of Pain, Cognition and TBI *Nicholson, 2000*

- Effect of pain, acute or chronic, with or without possible MTBI, most evident on aspects of attention, memory, speed of processing, and executive control (cf. MTBI).
- Numerous functional neuroimaging studies indicate disruption of brain processes
- Differential diagnosis concerns greatest in suspected TBI with pain problems
- Previous studies of MTBI, esp. PPCS, may have been confounded by pain related problems

Relationship of Pain, Cognition and TBI *Nicholson, 2000 (continued)*

- **Problems discriminating cognitive - behavioral effects of brain injury from pain, other factors, potentially limits utility of neuropsych assessment**
- **Considerable variability in studies noted, along with confounding effect of associated problems such as fatigue, depression, anxiety, medication side effects, or other factors.**
- **Onset, maintenance, exacerbation or severity of pain problems may be related to a process of central sensitization associated with psychological factors or pre-existing vulnerability**

Chronic Pain & Neuropsychological Functioning: *Hart, Martelli and Zasler, 2000*

- Cognitive impairment associated with higher pain intensity, involvement of head and neck areas ("cervicoencephalic syndrome")
- Studies tended to support an association between cognitive impairment and other concomitant symptoms: mood change, increased somatic awareness, sleep disturbance, and fatigue.
- Further studies needed to clarify variables mediating impact of pain on neuropsychological functioning and the unique role of various symptoms often associated with chronic pain.

Review of Reviews of Effect of Pain on Neuropsychological Functioning

Martelli, Zasler, Nicholson and Hart, 2001 (JCMC)

- **Pain and pain related symptomatology can, often do produce impaired neuropsychological performances: attentional capacity, processing speed, psychomotor speed, executive functions.**
- **Pattern of neuropsychological impairment appears similar to that in MTBI.**
- **Functional neuroimaging abnormalities consistent with observed cognitive decrements**
- **In cases of putative MTBI, pain and concomitants must be considered.**

Review of Reviews of Effect of Pain on Neuropsychological Functioning

Martelli, Zasler, Nicholson and Hart, 2001 ***(continued)***

- CPain doesn't always cause cognitive impairment
- Neurophysiologic changes are probably pain reactive, not irreversible
- Associated symptoms (e.g., depression, sleep disturbance, fatigue), & premorbid coping vulnerabilities, likely play a predominant role in mediating impact of Cpain on cognitive functioning
- Cpain and its concomitants represent a source of performance variance and caution is warranted in interpreting decrements in neuropsychological test scores as signs of neurologic sequelae of brain disease or injury in patients with chronic pain

Traumatic Disability Syndromes & NEUROSENSITIZATION Syndrome

(Miller, 1997; 1998; 1999; 2000)

- **Frequently Comorbid and Treatment Refractory Syndromes**
  - ►**Post Concussion Syndrome**
  - ►**Post Traumatic Stress Disorder**
  - ►**Chronic Pain**
  - ►**Depression**
  - ►**Multiple Chemical Sensitivity**

Traumatic Disability Syndromes & NEUROSENSITIZATION Syndrome

(Miller, 1997; 1998; 1999; 2000)

- **Effect of Repeated Stimulation on CNS**
  - ►**Kindling vs. Habituation**
    - **Habituation: continuous or short interval stimulation effect**
    - **Kindling: extended interval subthreshold stimulation summating as seizure, with permanent changes in CNS excitability resulting in susceptibility to intermittent stress, and spontaneity (amygdala)**

Traumatic Disability Syndromes & NEUROSENSITIZATION Syndrome

(Miller, 1997; 1998; 1999; 2000)

- **Chronic Pain:**
  - **Activation of closed neural circuits in the limbic system** ***(e.g., cingulum bundle, fornix, anterior thalamic neuclei, cingulate cortex, hippocampus, mammilary bodies and back to the anterior thalamic neuclei or somatosensory thalamus)*** **during initial exposure to painful stimulation induces a sensitized state within the limbic system, enhancing responses to subsequent stimuli.**

Traumatic Disability Syndromes & NEUROSENSITIZATION Syndrome

(Miller, 1997; 1998; 1999; 2000)

- **Post Traumatic Stress Disorder:**
  - **Sensitization by fear associated with traumatic stress produces excitability changes in amygdaloid neurons, in turn influencing a variety of limbic and brainstem structures involved in the somatic and autonomic expression of fear and anxiety**
    - **e.g., reduced activation threshold of locus coeruleus resulting in increased norephinephrine output**
    - **elevated medocortical dopaminergic neuron activation**

Traumatic Disability Syndromes & NEUROSENSITIZATION Syndrome
(Miller, 1997; 1998; 1999; 2000)

- **Conceptualization of interaction based on a pattern of maladaptive positive feedback that eventuates in a pathological outcome based on neuroplasticity at, at least the following:**
  - **Neuropsychological: coritical perceptual-evaluative vs. Limbic emotional-reactive**
  - **Neurophysiological: synaptic reorganization or kindling, and electrophysiologic sensitization**
  - **Molecular-genetic: alteractions in intracellular third messenger systems leading to longer-term changes in neuronal functioning, including in experience and behavior.**

Traumatic Disability Syndromes & NEUROSENSITIZATION Syndrome

(Miller, 1997; 1998; 1999; 2000)

- Psychotropic and Pain Medications are often First Stop Gap Measures
- Psychotherapy is the Treatment of Choice for most cases of Traumatic Disability Syndromes
- Dubovsky (1997): psychotherapy relationship "splints" the neurophysiological regulatory mechanisms, providing a repeated corrective stabilization that eventually allows normal functioning
- Martelli (2000): "Calming the Catastrophic Reaction" through Integrated Combination Treatments

NEUROSENSITIZATION Syndrome: Treatment Implications
(Miller, 1997; 1998; 1999; 2000)

References

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Kinesiophobia/ Cogniphobia

- Derived in response to observations by health care treatment specialists of significant avoidance responses in the treatment of chronic back pain
- Defined as the unreasonable or irrational fear of pain and painful reinjury upon physical movement.
- Cogniphobia subsequently proposed as an unreasonable or irrational fear of headache pain or painful reinjury upon cognitive exertion. Phobic responses to pain (or pain phobias), as unhealthy pain maintaining habits, are a major contributor to pain related disability. Cutoff score of 37 discriminates clinically significant levels of avoidance conditioned pain related disability (ACPRD).

Cogniphobia *(continued)*

- **C-Scale Sample Items:** ...make the cause of my head pain worse if I concentrate too much; ....HA telling me that I have something dangerously wrong; ...at risk for the rest of my life; ...being careful not to concentrate too hard or too long is the safest thing I can do ...not safe for a person with a condition like mine to engage in too much thinking and concentrating; No one should ever concentrate on difficult mental tasks when s/he is in pain
- **ACPRD is treatable and can be eliminated through combination therapies:**
  - **Reeducation**
  - **Graduated exposure, cognitive reinterpretation and systematic desensitization, and**
  - **Promotion of adaptive attitudes and treatment participation /cooperation.**

ASSESSMENT OF PSYCHOLOGICAL MEDIATORS OF PAIN: A STRESS & COPING MODEL

- INDIVIDUAL PATIENT VARIABLES
  - Comorbid Coping Vulnerabilities
    - PTSD
    - Reactive Depression, Anxiety, etc.
    - Associated Psychosocial Stresses
  - Premorbid Coping Vulnerabilities
    - VDRS

PSYCHOLOGIC ASSESSMENT

- Domain Specific Pain Coping Measures
  - Hendler (Mensana) Screening Test
  - Kinesiophobia - Cogniphobia Scales
  - Pain Assessment Battery (PAB)
  - Multidimensional Pain Inventory (MPI)
    - Section 1 assesses pain severity, interference, support, pain severity, life control and affective distress.
    - Section 2 assesses significant others' responses with punishing, solicitous, and distracting responses.
    - Section 3 assesses activity levels with household chores, outdoor work, activities away from home, social activities and general activities

Mensana Clinic Test Discrimination Success: "Organic" versus "Functional" Back Pain

($X^2 = 133$: $p<0.0001$)

Physiogenic

3	**146/155 =** **94%**	**43/57 =** **75%**	**6/39 =** 15%
2			
1	**9/155 =** 6%	**14/57 =** 25%	**33/39 =** 85%
0	0 Objective 17	Mixed 21	Exaggerating 30

Test Scores - Categories

PSYCHOLOGIC ASSESSMENT

- **Domain Specific Pain Coping Measures**
  - **Cogniphobia Scale** *(Sample Items)*
    - I'm afraid that I might make the cause of my head pain worse if I concentrate too much
    - My head pain is telling me that I have something dangerously wrong
    - My accident/injury has put my head & brain at risk for the rest of my life
    - Headaches always mean I have an injury or have done something to make it worse
    - I'm afraid that I might make my medical condition worse by concentrating too much or being too mentally active
    - Simply being careful not to concentrate too hard or too long is the safest thing I can do to prevent my pain from worsening
    - Pain lets me know when to stop concentrating so that I don't injure myself
    - It's really not safe for a person with a condition like mine to engage in too much thinking and concentrating
    - No one should ever concentrate on difficult mental tasks when s/he is in pain

PSYCHOLOGIC ASSESSMENT

- **Psychoemotional Measures**
  - **Zung Depression Inventory**
    - Measures Cognitive, Affective, Psychomotor and Neurovegetative Symptoms of Depression
  - **MMPI *(Sample Derived Information)*:**
    - **Pattern 1:Willingness to Emit Pain Behaviors**
    - **Pattern 2: Distress/Discomfort About Illness ("How comfortably sick?")**
    - **Pattern 3: Poor General Coping Skills (Are other problems making pain behaviors reinforcing?)**
    - **Pattern 4: Depression Complicating Pain Symptoms (mostly in the elderly)**
    - **Pattern 5: Tension (and sympathetic arousal) contributing to Pain**
    - **Pattern 6: Predicting Treatment Outcome**

The	Vulnerability	To Disability	Rating	Scale	General Version
Increased Complaint Duration	**Complaint Inconsistency / Vagueness**	**Previous Treatment Failure**	**Collateral Injury / Impairment**	**Pre/ Comorbid Medical History**	**Medication Reliance**
0= <6Months	0=Little	0=Insignificant	0=Insignificant	0=Insignificant	0=Little
1= <12Months	1=Mixed	1=Mixed	1=Mild/Moderate	1=Mild to <Moderate	1=Moderate
2= >12Months	2=Mostly Inconsistent	2=Mostly or All Failures	2=Significant	2=Significant	2=Significant
Especially with expectation of chronicity, poor understanding of symptoms;	Multiple, vague, variable sites; anatomically inconsistent; Sudden onset without accident or cause; not affected by weather; performing no work or chores, or avoiding easy tasks but performing most hobbies, enjoyments; pain only ocassional;	Especially with complaint of treatments worsening pain or causing injury, and expectation that future treatments will fail;	Especially if silent and involving adaptation reducing impairments;	Seizure disorder; Diabetes; Hypertension; Brain injury or stroke or other neuro- logic insult or vulnerability (esp. if undiagnosed); Pre- injury medication reliance; Older; Etc.	>4X/Week Narcotic, Hypnotic or Benzo-diazepine tranqulizer; Perceived inability to cope without medication;
Severity of Current Psychosocial Stress	**Psychological Coping Liabilities**	**Victimization Perception**	**Social Vulnerability**	**Illness Reinforcement**	**VULNERA-BILITY SCORE**
0=Non-significant	0=Few	0=Little	0=Little	0=Little	
1=Mild/Moderate	1=Mild/Moderate	1=Mild/Moderate	1=Mild/Moderate	1=Mild/Moderate	_____ Total Points (Max: 22)
2=Significant	2=Significant	2=Significant	2=Significant	2=Significant	
Sum of Personal, Social, Financial, Emotional, Identity, Activity Stresses, Life Disruption, Premorbid Coping Style Disruption, etc. and including Injury/ Impairment X Coping style incongruence; Persistent premorbid psychosocial stress levels;	Premorbid, Comorbid: Depression; Post-Traumatic Anxiety; Somatization (& Repressive) Defenses; Emotional Immaturity/ Inadequacy With Poor Coping Skills; Hypochondriacal Traits (e.g., post-injury MMPI-3 > 85; preinjury > 70); Passive Coping Style; Childhoo	Externalized "Blame" for accident, disability, etc.; Percieved Mistreatment; Anger, Fear, Resentment, Distrust regarding accident, treatment, understanding (family, employer, doctors, etc - esp. given charactero-logic tendencies regarding victimization,	Lack of Family Support, Resources, Romantic Support (esp if recent conflict, divorce); Lack of Community Support / Resources / Involvement; Lack of Employer, Co-worker, Insurance Manger Support; Etc.	Secondary Gain: Attention, support in a dependency prone person; Avoidance of stressful or displeasing life or job responsibilities or demands (esp with recent or imminent job / job duty changes or reorganization); Financial Compensation (esp. if litigati	Preliminary Interpretive Guidlines Scores of 13 or Above Suggest High Vulnerability to Chronic Disability

Martelli, 1996

Central Desensitization Options

Countering Central Sensitization

- **Desensitizing Central Nervous System (CNS) Medications**
  - Anti-epiletic drugs, Tizanidine HCL, Amytal)
- **Desensitizing Peripheral Nervous System (PNS) Med's**
  - muscle relaxants; homeopathics?)
- **Desensitizing CNS Psychophysiologic Procedures**
  - EEG Biofeedback or EEG Driven Stimulation (EDS)
  - CranioElectrotherapy Stimulation (CES)
  - Sensory Desensitization / Reprocessing Psychotherapy
  - Adjunctive AudioVisual Stimulation (AVE)
  - Transcranial Magnetic Stimulation (TMS)
  - Anterior Cingulate Gyrus Stimulation
- **Desensitizing PNS Psychophysiologic Procedures**
  - EMG, EMG, Temp. Biofeedback; Relaxation, TENS, VNS, Massage, Palliative Modalities, Heat/Cold, etc.

Central Desensitization Options
(continued)

- **Desensitizing Behavioral Activity Procedures**
  - Graduated Exposure / graduated activity programs / Pacing
  - Exposure Desensitization Interventions, systematic desensitization, etc.; Pacing
- **Desensitizing Psychotherapeutic Procedures**
  - Emotional desensitization of catastrophic reaction to injury and pain and other fears and trauma;
  - Splinting of emotional reactions; calming the catastrophic reaction;
  - Emotional reaction systematic desensitization;
  - Sensory desensitization / reprocessing psychotherapy

J Head Trauma Rehabil 2001 Jun;16(3):260-74

Flexyx neurotherapy system in the treatment of traumatic brain injury: an initial evaluation.

Schoenberger NE, Shif SC, Esty ML, Ochs L, Matheis RJ.

- Objective: To conduct a preliminary experimental evaluation of the potential efficacy of Flexyx Neurotherapy System (FNS) in the clinical treatment of traumatic brain injury (TBI).
- 12 Pts with mild to moderate TBI, >12 mos post, with reported substantial residual cognitive difficulties,
  - Randomly assigned to treatment or a wait-list control
  - 25 sessions of FNS treatment.
- Significant improvement in reports of Depression, Fatigue, other problematic symptoms, some measures of Cognitive functioning, meaningful improvement in Ococcupational and Social functioning.

J Clin Psychol 2001 Jul;57(7):933-52

Treatment of fibromyalgia incorporating EEG-Driven stimulation: A clinical outcomes study.

Mueller HH, Donaldson CC, Nelson DV, Layman M.

- Thirty patients (1990 Am Coll. Rheumat. criteria for FS)
- Initial treatment with EDS until reported noticeable improvements in mental clarity, mood, sleep.
- Self-reported pain, after EDS, changed from vaguely diffuse to more localized, and was treated with short course of P.T. oriented therapies
- Significant improvments in psychological and physical functioning indices, FS symptom ratings, and EEG activity noted n pre- to posttreatment and extended follow-up comparisons
- EDS appeared to be the prime initiator of therapeutic efficacy
- Future research is justified for controlled clinical trials and to better understand disease mechanisms

Brain and Pain Conclusions

- Together, the results of these two studies, along with a lot of other support, strongly suggest that:

- The brain is indeed the most important regulatory organ in the body
- Injury to the brain through trauma, as well as disruption of the brain's usual electrical patterns and functioning by physical trauma and subsequent sequelae such as chronic painand its concommitants can disrupt normal functioning
- The electrical activity patterns (and associated blood metabolism patterns) of the brain can be normalized through different treatments
- Normalization of the brain's electrical activity (and blood metabolism) patterms can produce significant improvements in symptoms associated with disrupted brain activity patterns

IMPLICATIONS FOR PSYCHOLOGIC AND BEHAVIORAL TREATMENT

- COMPONENTS OF PSYCHOLOGICAL AND BEHAVIORAL TREATMENTS
  - RESTORING PSYCHOPHYSIOLOGIC AND BEHAVIORAL CONTROL
- MULTICOMPONENT APPROACHES WORK BEST

Treatments for Posttraumatic Headache

- Patient education
- Biofeedback - Psychophysiologic Self Control
- Cognitive behavioral
- Operant treatment
- Medication management
- Social / assertiveness training
- Imagery and hynosis
- Relaxation training
- Habit reversal
- NeurophysiologicTX
- Combination Tx's
  - CBT & Biofeed.
  - Medical & Behav.

Patient Education for PTH

- Patient education consists of the following:
  - What criteria constitute PTH
  - Who diagnoses PTH
  - Individualized symptoms and possible treatments
  - How one's lifestyle affects/exacerbates PTH
  - Adaptive vs. maladaptive coping strategies and personality styles
  - Realistic expectations regarding treatments

Biofeedback for PTH

- Research began in the early 1970's
- EMG (Electromyography) Biofeedback teaches control (pathophysiologic resetting) of muscle tension in the face, neck, and shoulders
- Thermal biofeedback teaches control of fingertip temperature, which can reduce intensity of vascular headaches
- 53% improvement when using biofeedback for chronic PTH patients

Relaxation training for PTH Patients

- **Progressive Muscle Relaxation:** e.g., muscle tension - relaxation contrasts in major muscle groups in order to elicit muscle relaxation
- Autogenics
- Meditation
- Diaphragmatic breathing
- Pacing
- Adjunctive Procedures (e.g., CES, AVS)

Operant Treatments for PTH

Martelli, Grayson & Zasler (1999)

- "The operant model hypothesizes that pain- related behaviors may be positively reinforced by desirable consequences (e.g., sympathy, nurturance) and simultaneously negatively reinforced by avoidance of aversive consequences (e.g., undesirable work or social obligations)."
- "Treatment based on the operant model requires altering environmental contingencies to eliminate pain behaviors (e.g., verbal complaints, inactivity) & reward "well" behaviors (e.g., exercise, increased activity level).

Cognitive-Behavioral treatments for PTH

- Address, replace maladaptive beliefs and unrealistic expectations concerning pain
- Presumed muscle tension reduction via:
  - ► Reducing maladaptive beliefs, thereby
  - ► Reducing stress reaction, thereby
  - ► Reducing muscle tension, pain intensity, pain perception / vigilance, pain-->stress--> pain cycle
- Attention-diversion techniques
- Combined CBT Psychophysiologic TX

Social and Assertiveness Skills Training for PTH Patients

- Goal: to communicate needs more directly to encourage fulfilling needs via healthier means
- Outcome: increase the likelihood that needs are fulfilled more effectively and efficiently, thereby reducing negative emotional reactions which produce physiological arousal and increased headache pain

Imagery and Hypnosis for PTH

- General relaxation procedure for pain management
  - Visualize the pain
  - Focus on altering the image to reduce pain
  - Example: Visualize a ball during a trance and imagine the ball "bursting" to relieve pressure, thereby releiving pain
    - Significant improvement demonstrated after 7 sessions
    - Maintenance at one-year followup appointment

Habit Reversal for PTH

- Goal = to help facial pain patients to detect, interrupt, and reverse maladaptive habits (e.g., maladaptive head/jaw posture, jaw tension, negative cognition)
- The main premise is that patients learn specific skills to reverse habits and the stressful thoughts accompanying and precipitating these habits
- Awareness training
- Facial exercises

Habit Reversal for PTH

- Never rest head/jaw/neck on hands
- Never sleep on stomach - sides or back only
- Avoid all hard and sticky, chewy foods
- Support head with headrest, high back chair, wall, etc., when tired
- Pace to avoid head / neck soreness or fatigue
- ~~If neck is really tired, and high backs don't help, consider using (only occassionally, with your doctor's order) a neck brace to support your head~~

Habit Reversal for PTH *(continued)*

- Avoid letting your neck/jaw get sore. Take a preventive approach by using breaks, monitoring muscles and palpating them to test for developing tension, soresness, interrupting clenching, resting for short periods, making effort to relax the muscles, use breathing exercises, etc.
- Before sleep, make deliberate effort to relax facial muscles, using breathing and relaxation exercises
- Consider a bite guard for nighttime use
- Consider using a CranioElectrotherapy Stim. (CES) or TENS Device, as well as specialized relaxation exercises, self hypnosis, Light/ Sound relaxation devices, etc

Pacing Self Control Habit

Every day, on a regular basis, every two hours:

- **(1) Rate Your Pain at the Present Moment!**

❑ **Have you felt increasing discomfort or hurting in your neck, back or shoulders in the last two hours?**

❑ **" " " increasing difficulty performing any activity?**

❑ **" " " increasing frustration, worry or anger?**

KEY: *Some Vulnerability* = "Yes" to 1 question, or unsure

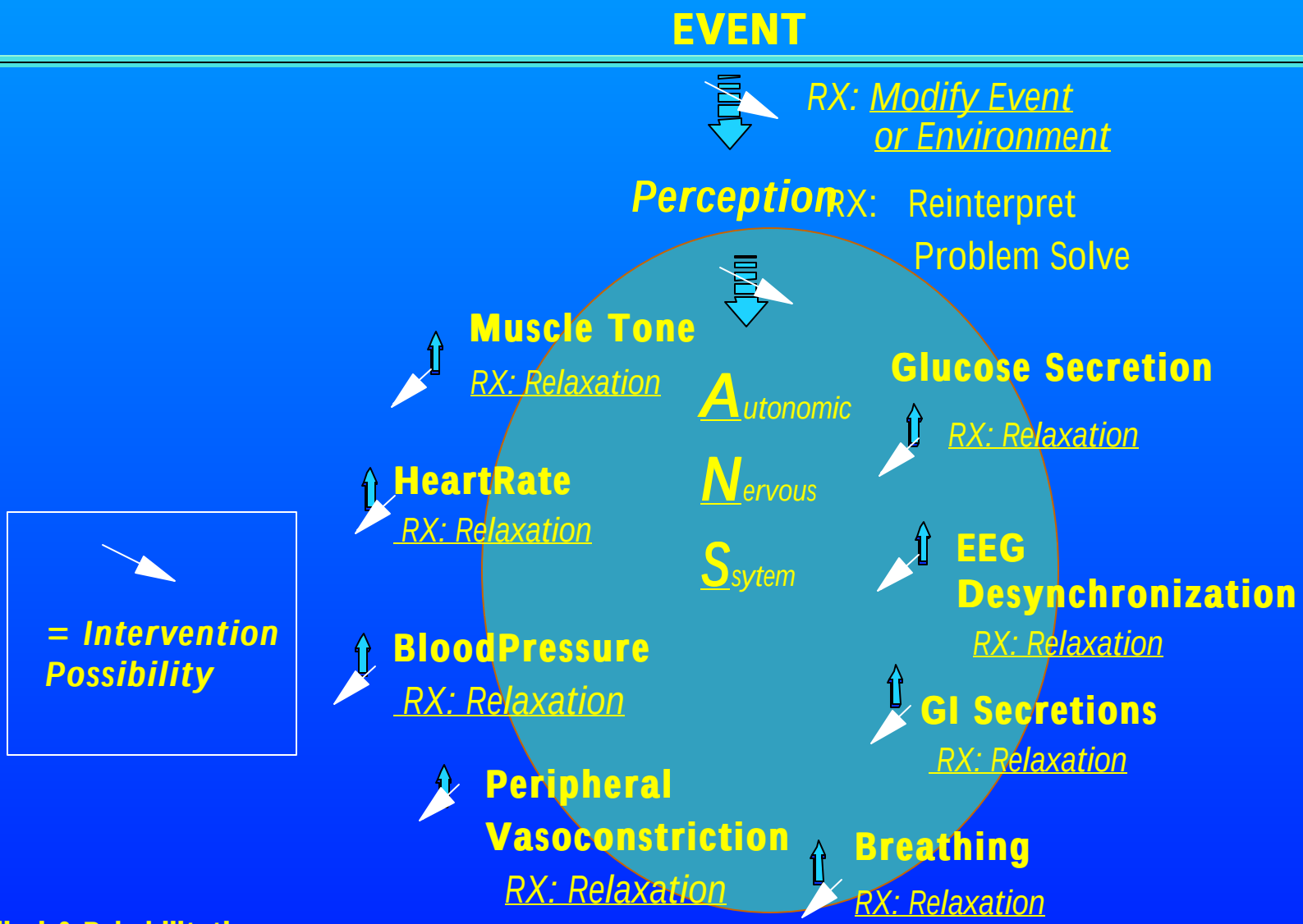
***High Vulnerability* = "Yes" to more than 1**

- **Adjust Your Daily Activities Accordingly!**
  - ► ***Some Vulnerability*: Engage in some Muscle Irritating Activities in moderation, with pacing, but be sure to include some Muscle Relieving Activities as well**
  - ► ***High Vulnerability*: Limit Muscle Irritating Activities (do few, pace, go very slowly) and engage mostly or only in Muscle Relieving Activities**

Activity Effects on Muscles

Muscle Relieving Activities	*Muscle Irritating Activities*
➢ Slow Down/ Pace/ Slow & Even ➢ Relaxation/ Breathing ➢ Naps ➢ eating Pad Soft ➢ Calming Music ➢ Position Change	➢ Physical Activity / Overactivity ➢ Physical Strain, Pulling, Tugging ➢ Stress & Worry ➢ Riding in Car ➢ Standing Staying in Same Position

PHYSIOLOGIC STRESS RESPONSE

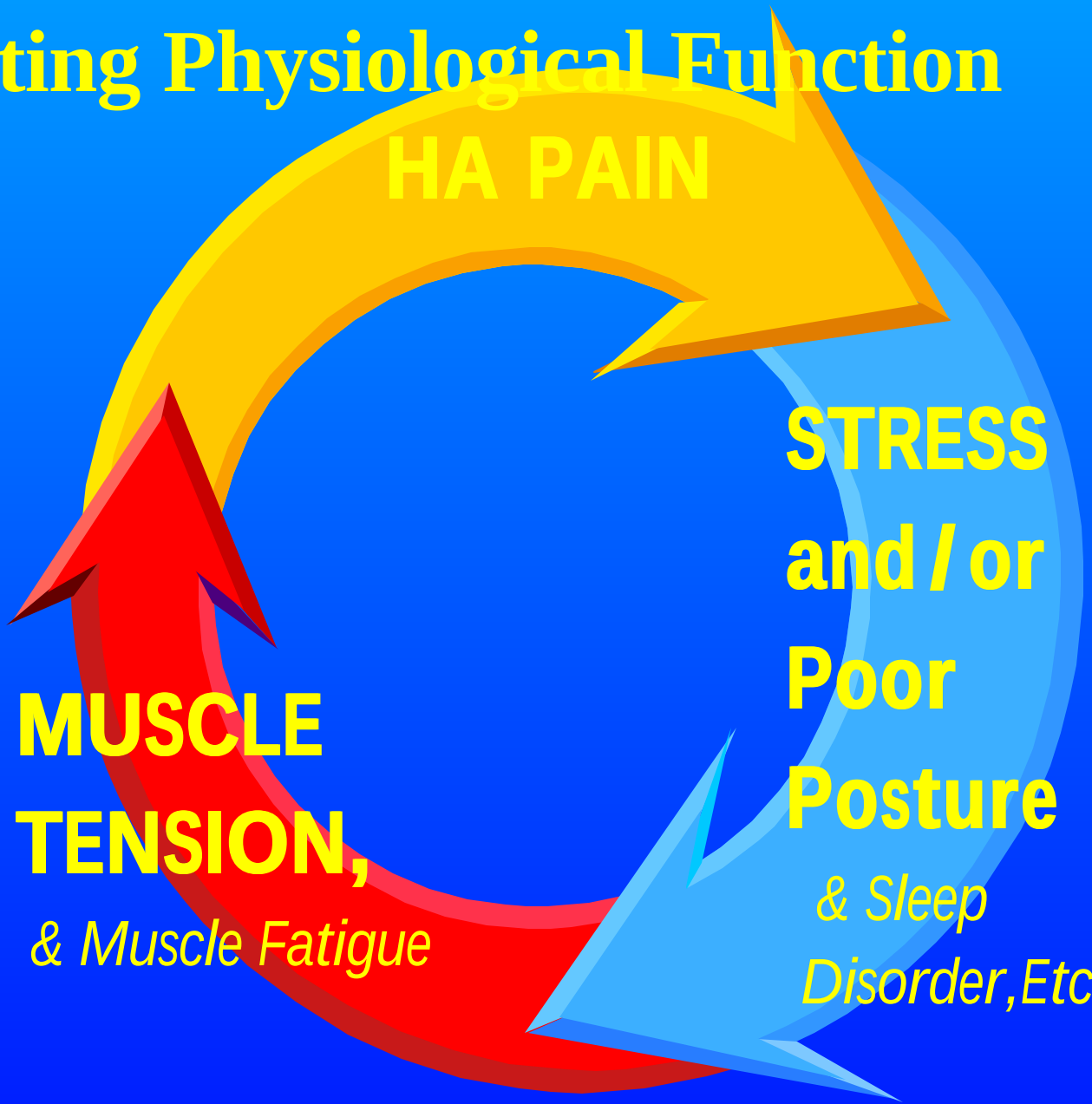


Medical & Rehabilitation
Neuropsychology Service
Concussion Care Centre of Virginia

PAIN PERPETUATION CYCLES:
Resetting Physiological Function

PAIN PERPETUATION CYCLES:

Resetting Physiological Function



PAIN PERPETUATION CYCLES:
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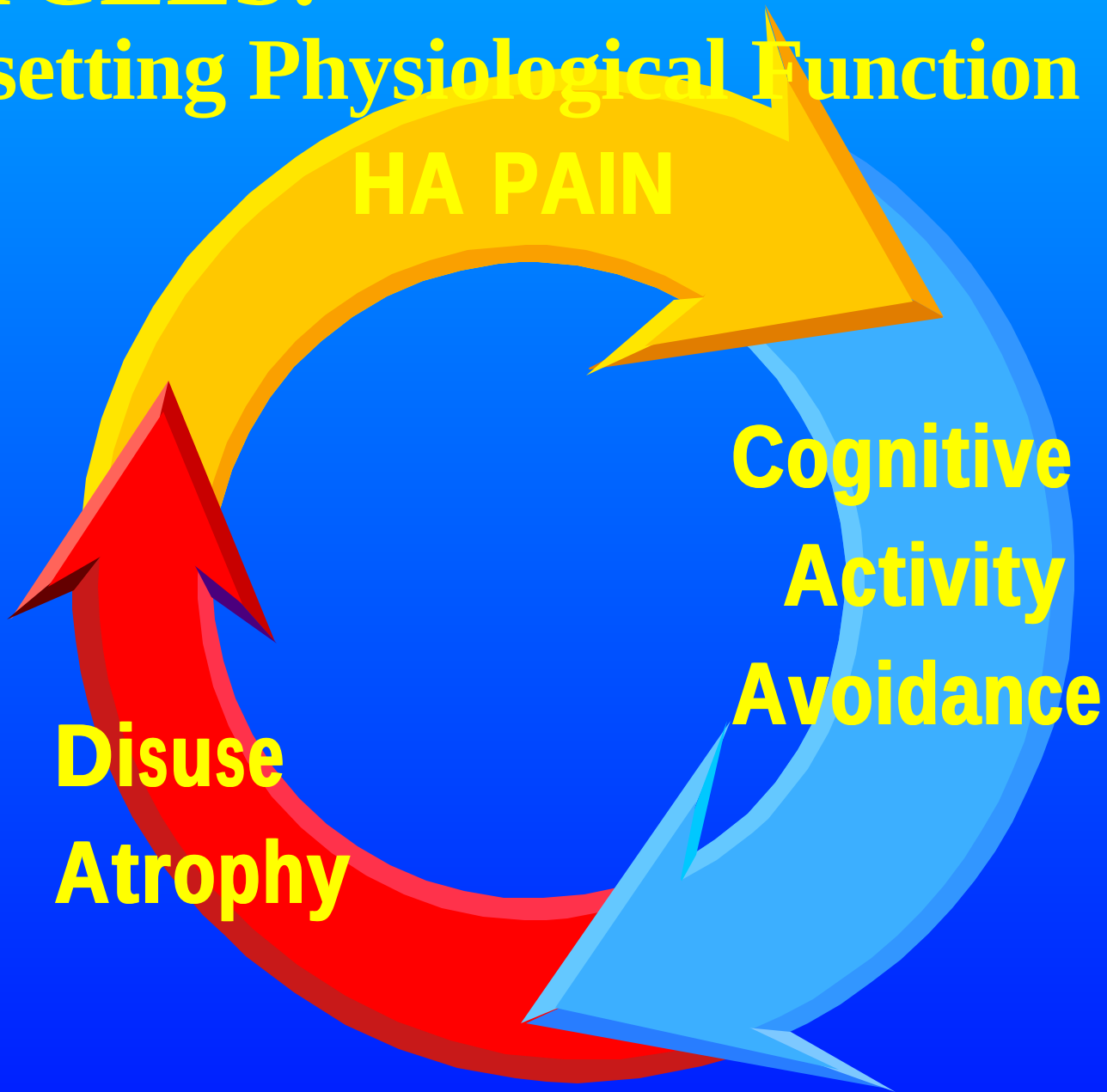
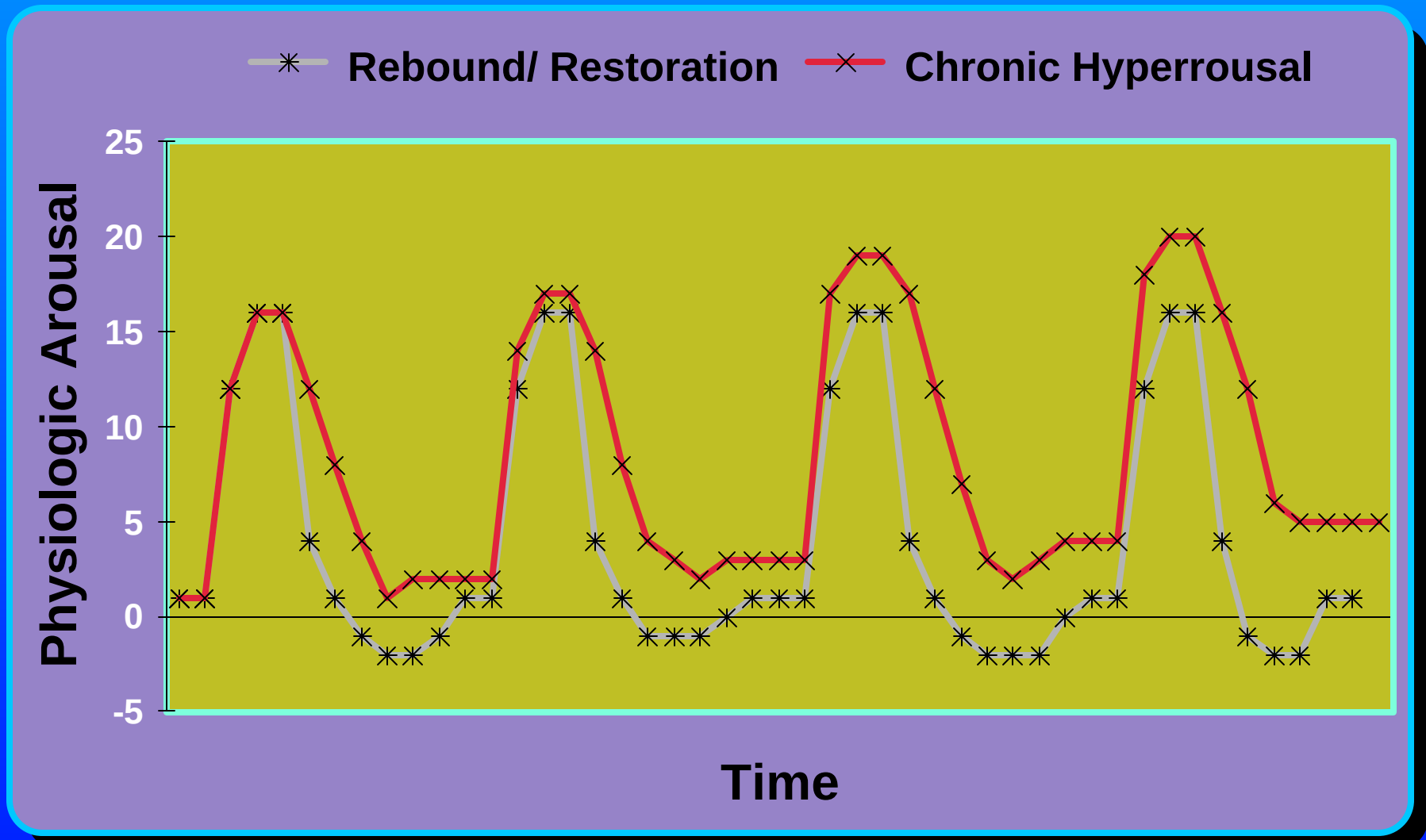


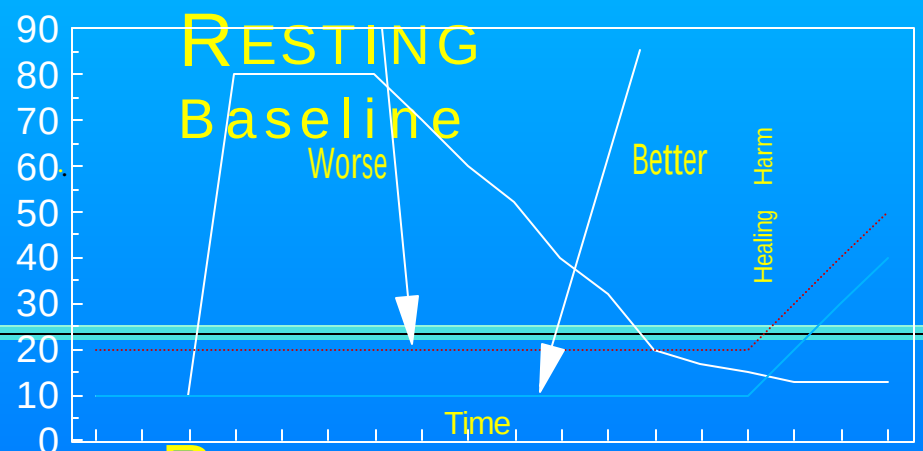
PAIN PERPETUATION CYCLES:
Over-Under-Activity Disability Pattern

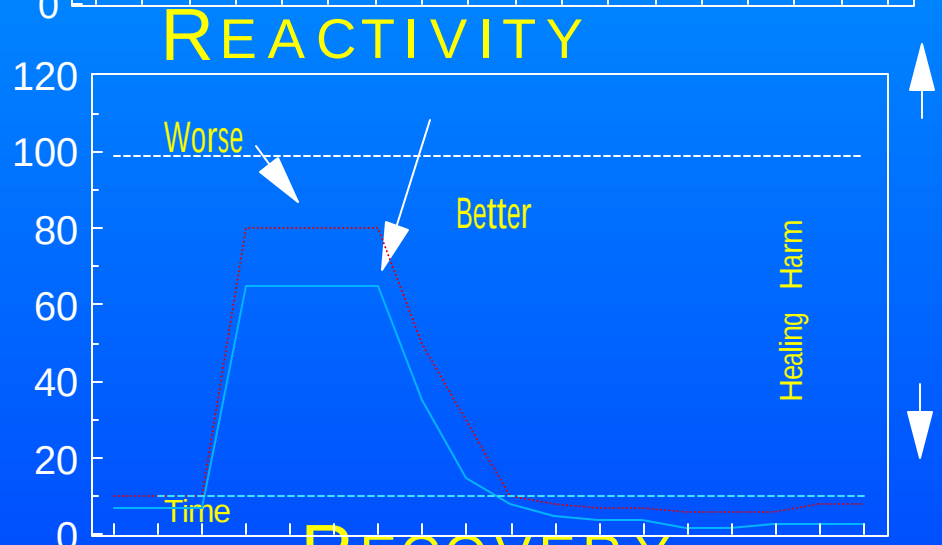
RX:

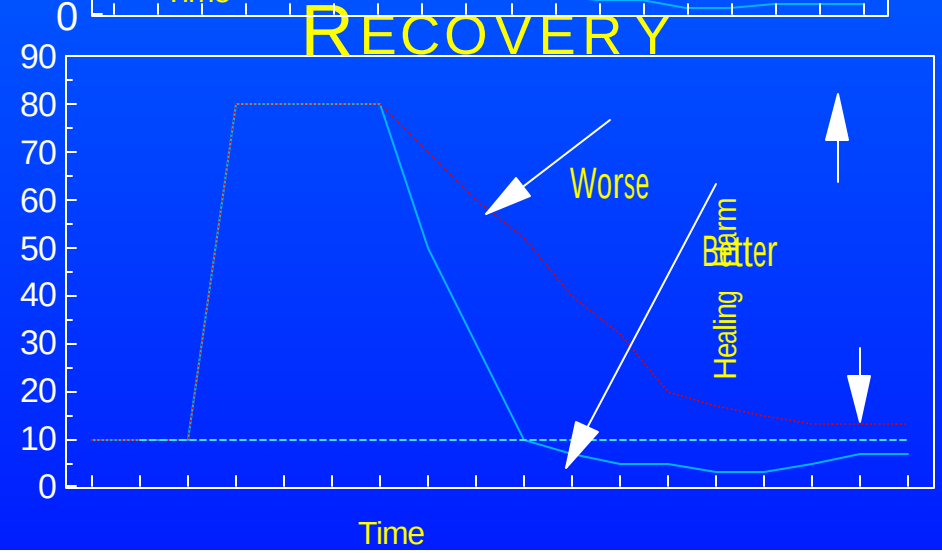
Chronic Stress and Disease

Pathophysiologic Resetting









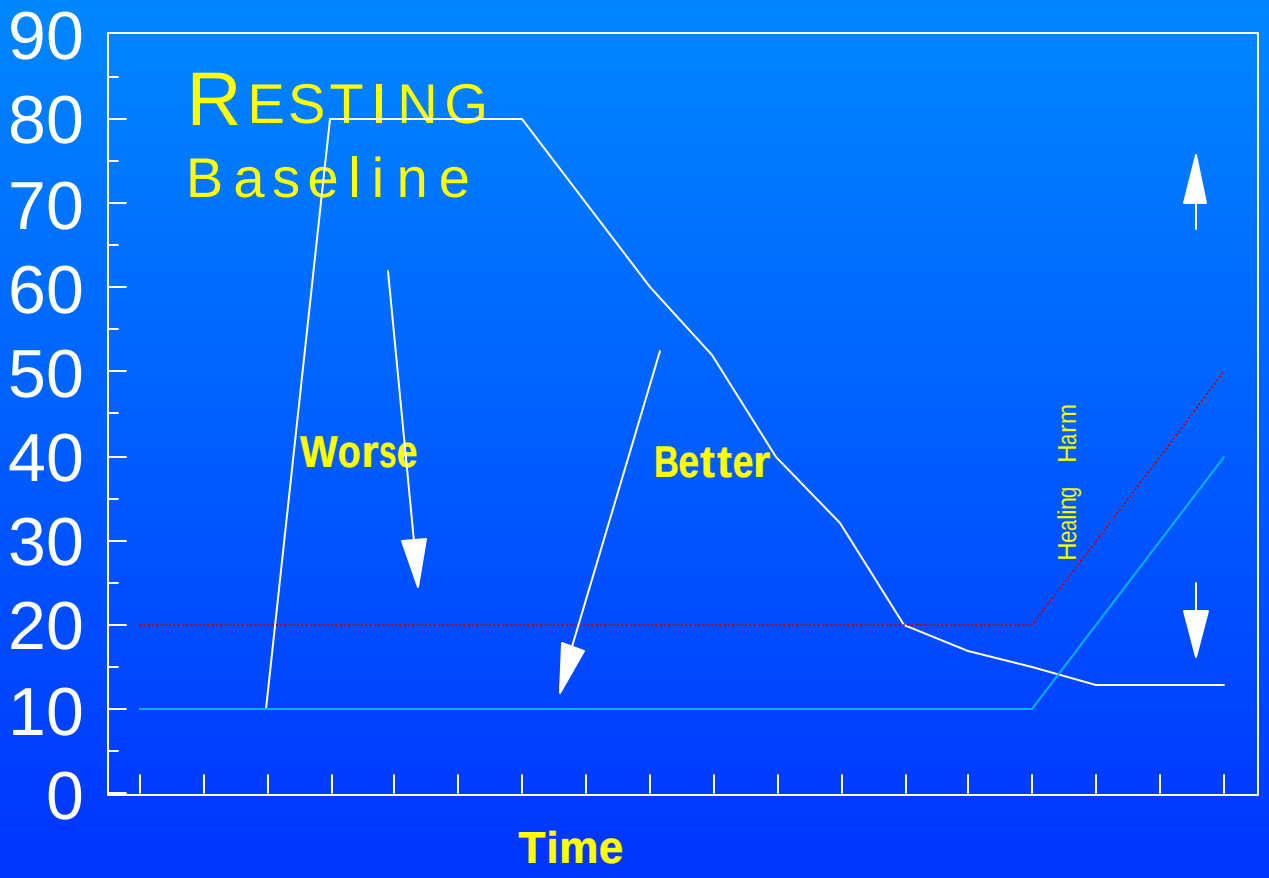
The Basics: The 3 R's *of Self Control*

RESTING Baseline refers to the usual state of physiological & emotional arousal - for example, level of muscle tension, heart rate, electrical activity in the brain, or more general level of stress or emotional distress. Decreasing resting baseline level of physiological or emotional arousal provides increased protection against the harmful effects of stress by establishing a healthier regular resting state and a buffer against future stresses.

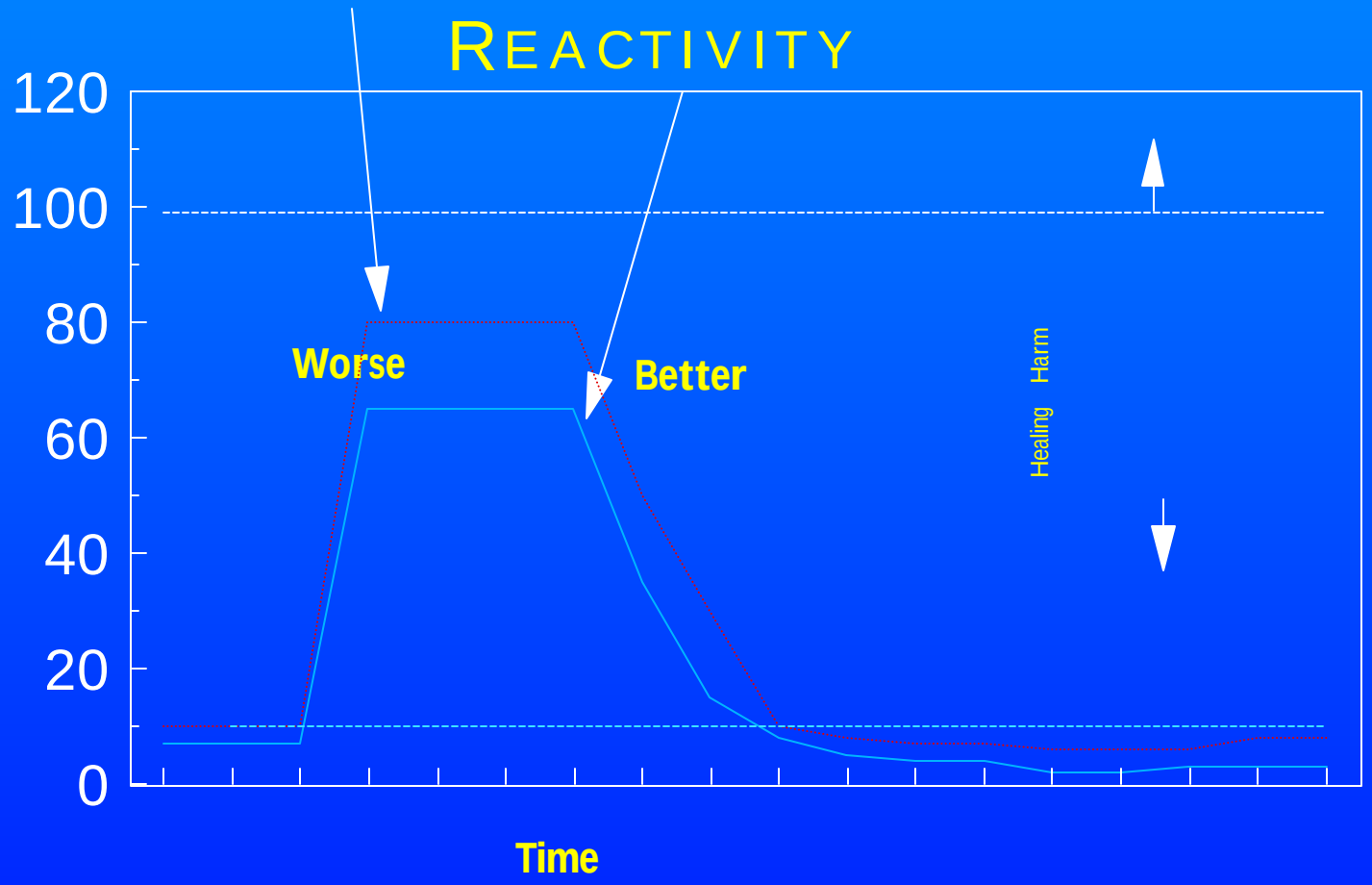
REACTIVITY to stressful events refers to the strength of increases in physiological variables such as heart rate, muscle tension or blood pressure, or the level of increased emotional arousal in response to stressful events. Decreasing our reactivity to stresses in the environment by controlling elevations in individual physiological channels & emotional status is another way of reducing the harmful effects of stress on our bodies and emotions.

RECOVERY refers to the length of time required for reducing physiological and emotional reactions to normal levels after stress responses. Learning to more quickly reduce our physiological and emotional responses reduces the harmful effects that come from prolonged stressful reactions and helps produce greater rebound & restoration of general physiological and emotional health. More importantly, it facilitates a habit of healthy recovery after stress that will lower long term physical and emotional distress and promote improved health and resistance to continuing streaawa are encountered in everyday life.

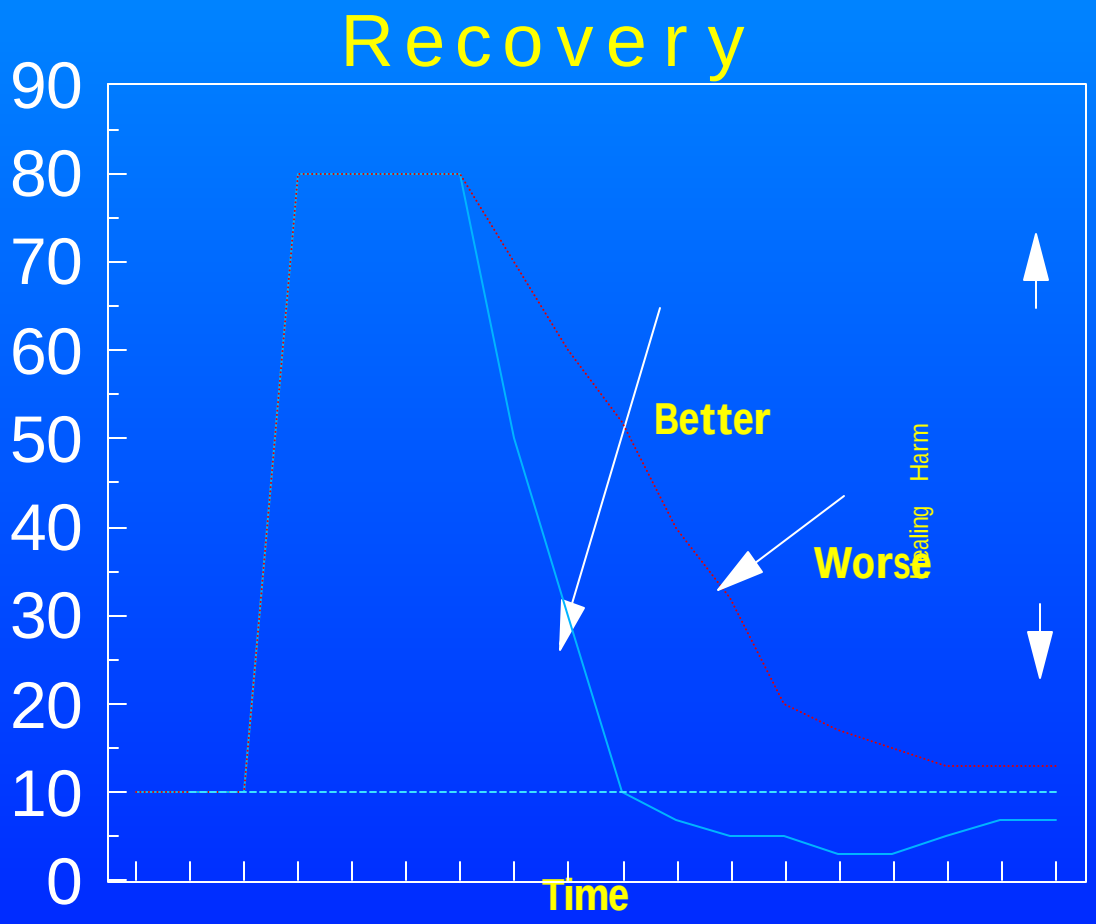
The Basics: The 3 R's *of*
Physiologic Self Control: ***First R***



The Basics: The 3 R's *of Physiologic Self Control:* ***Second R***

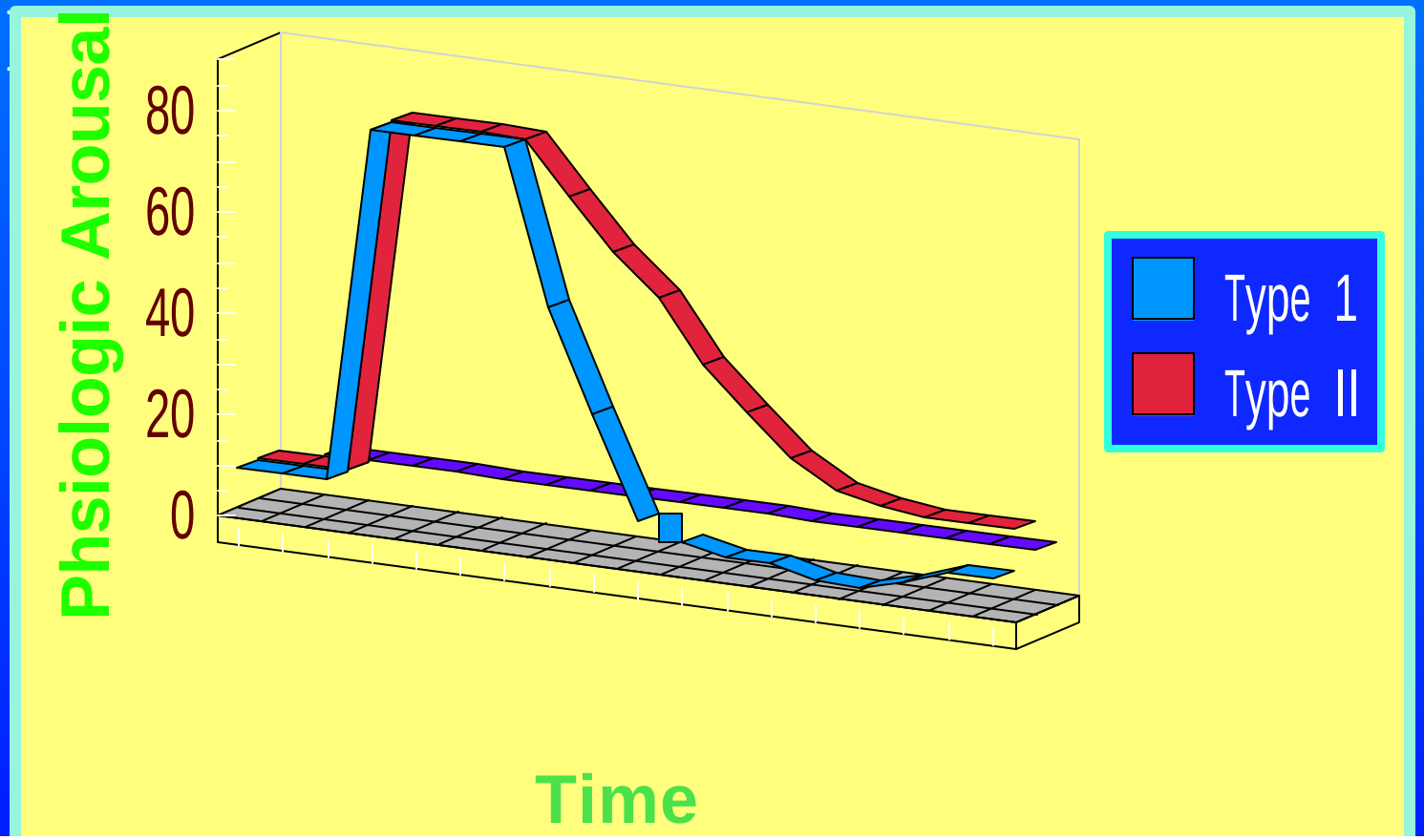


The Basics: The 3 R's *of Physiologic Self Control:* ***Third R***

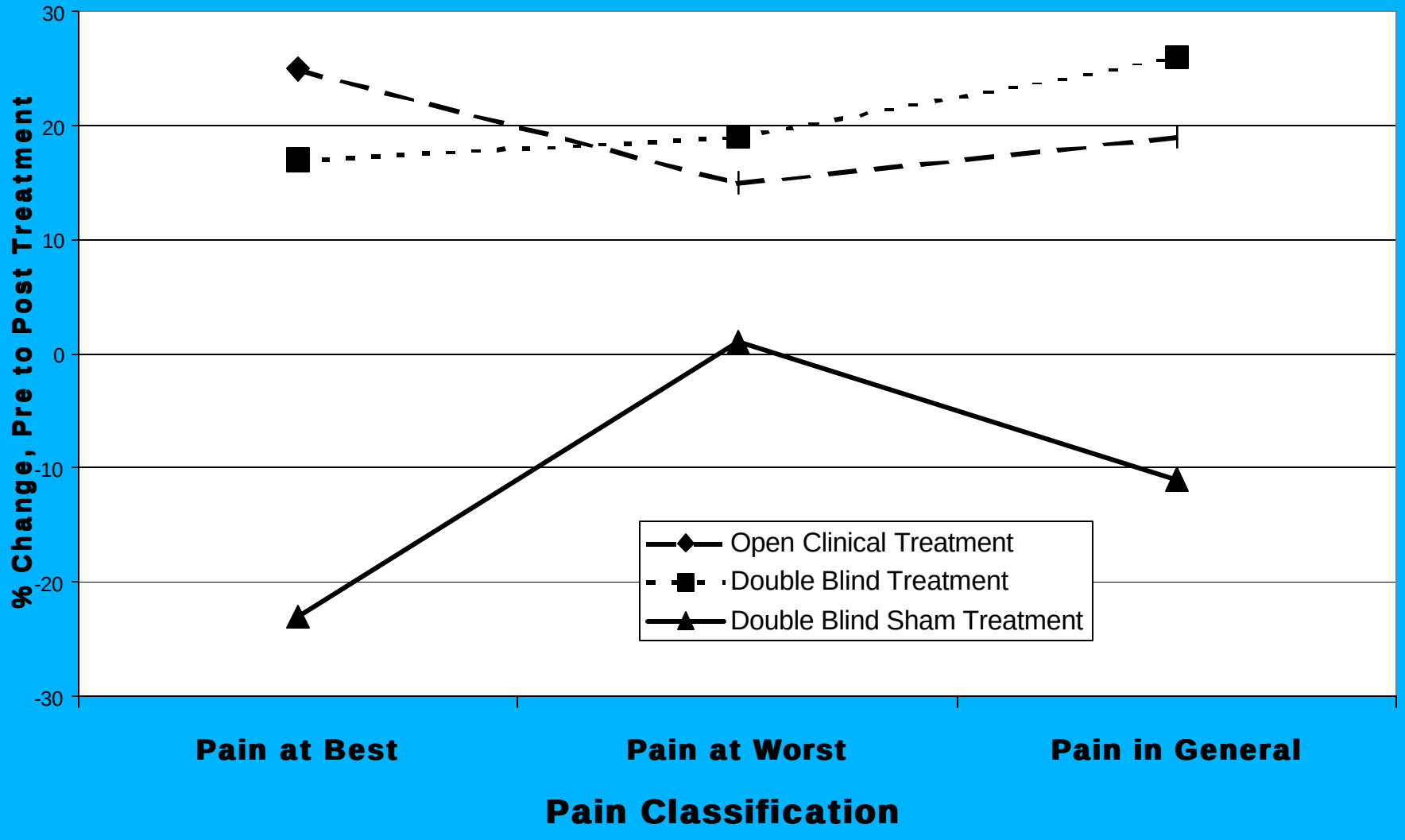


PATTERNING: Physiologic Response Habits

- Type I (Good) versus Type II (Bad) Stress
- Type I versus Type II Stress Response

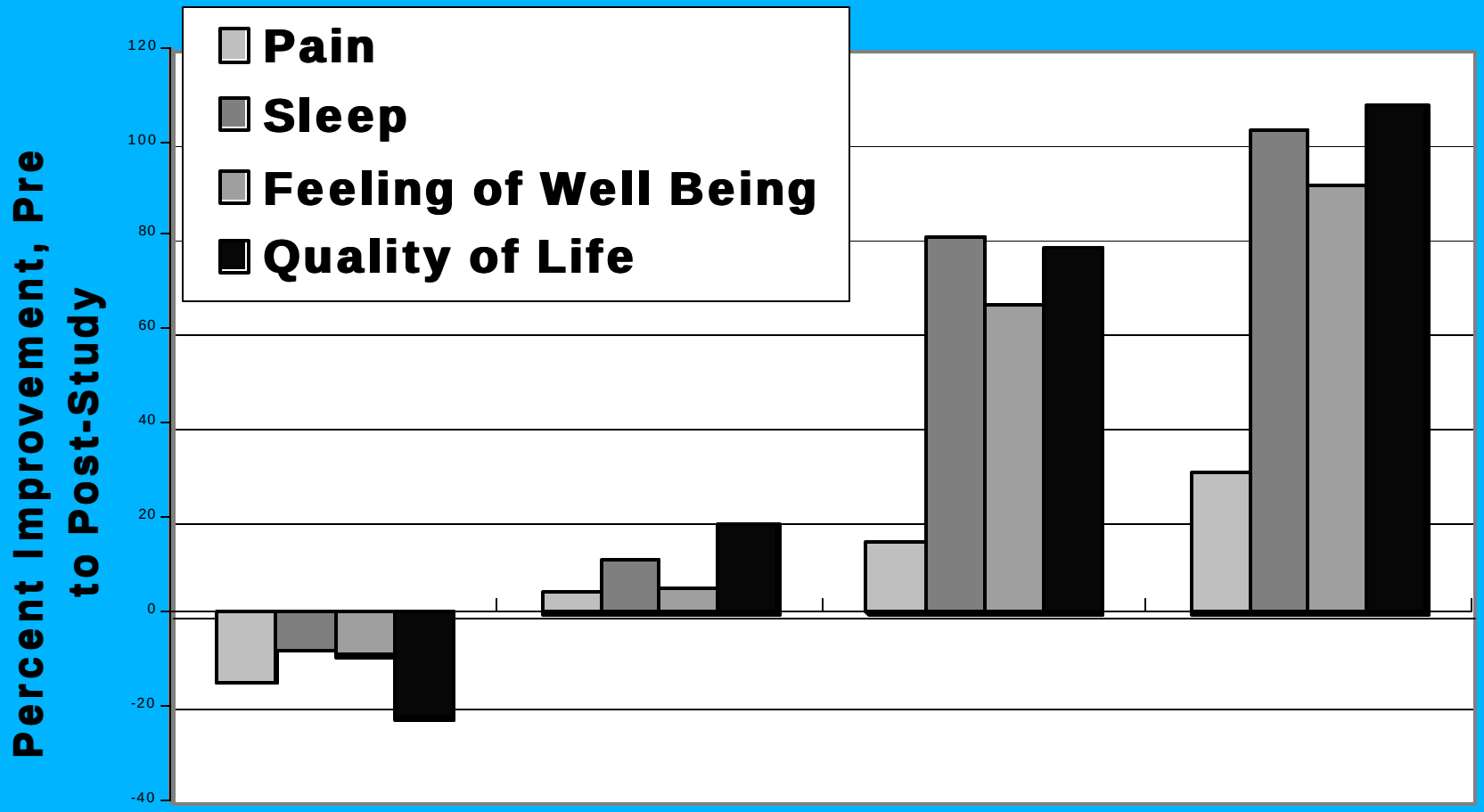


The Effect of Microcurrent Treatment on Chronic Spinal Pain



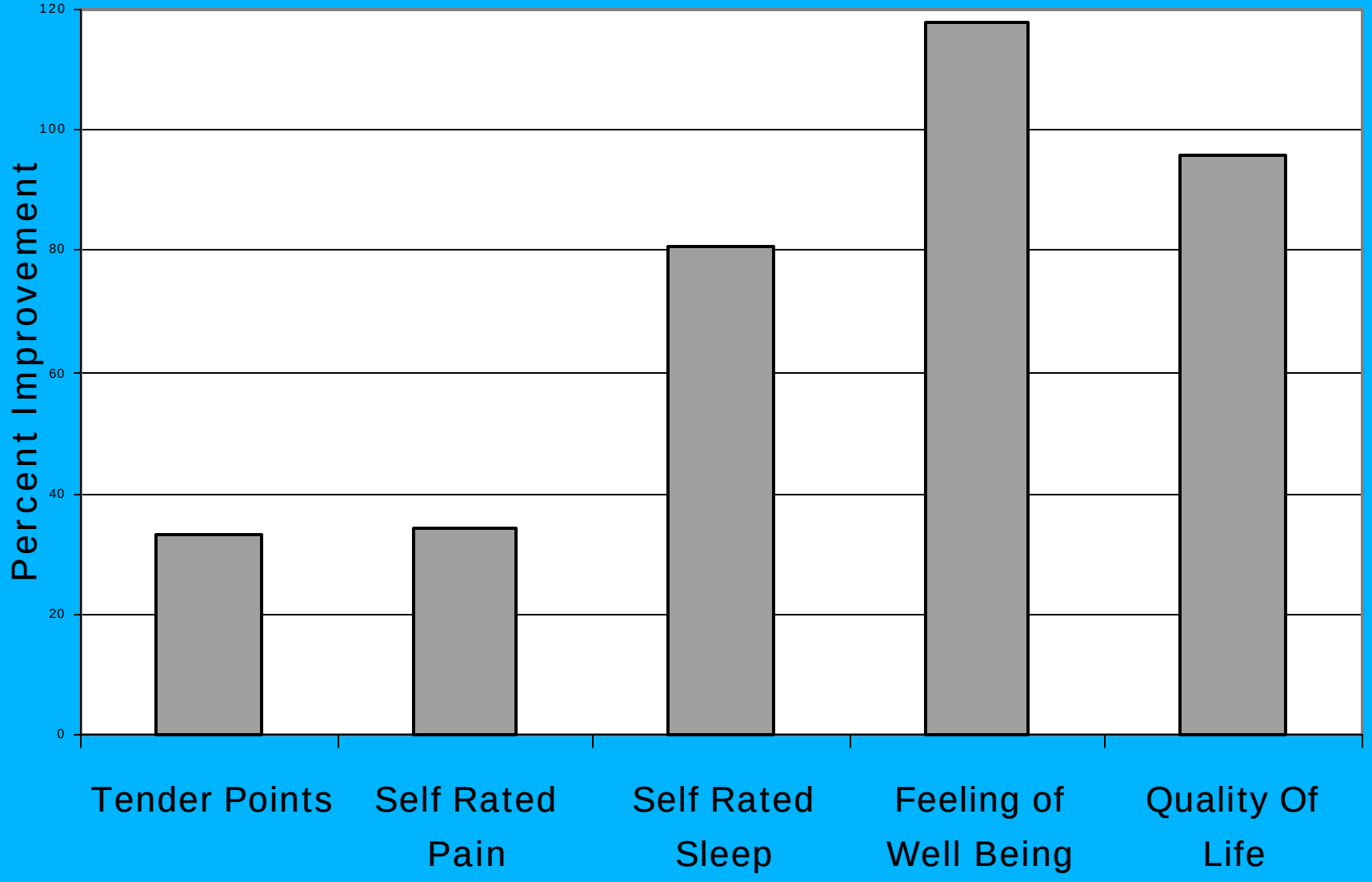
•From DL Kirsch, RB Smith (2000)

Response of Patients on Self Rating Scales
AIMA Fibromyalgia Study



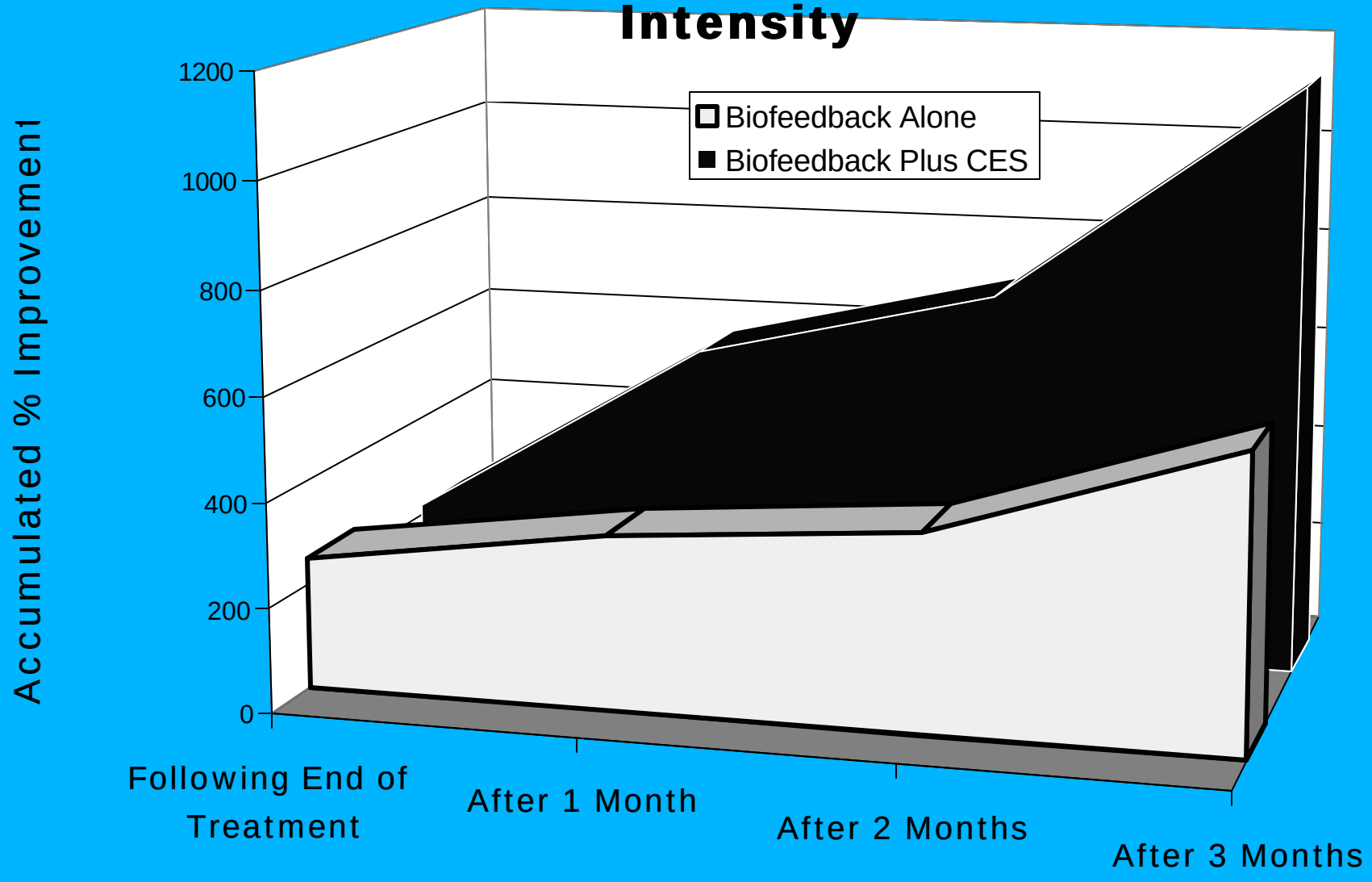
•From DL Kirsch, RB Smith (2000)

Changes in Fibromylgia Patients following Three Weeks of Alpha-Stim CES Treatment



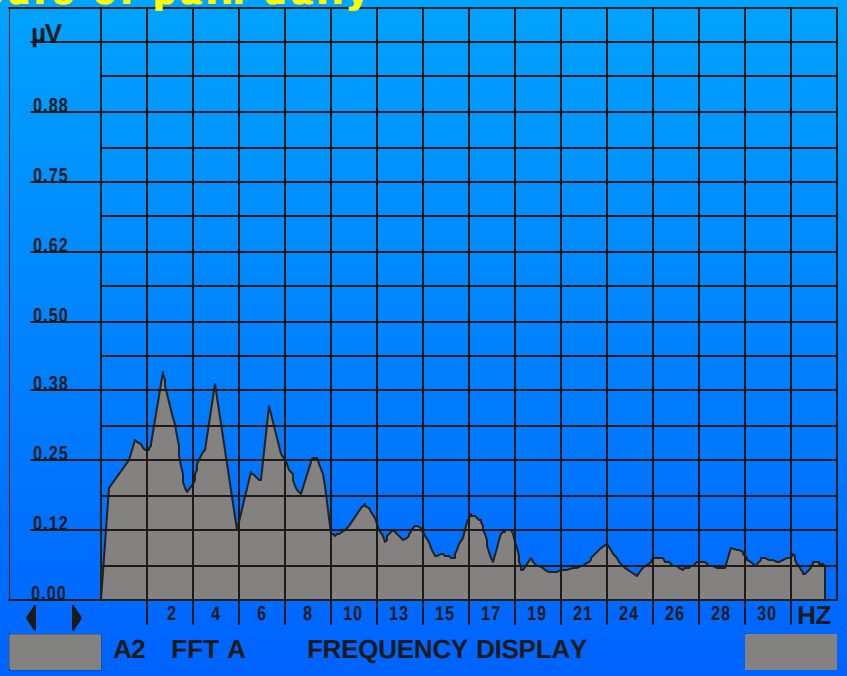
•From DL Kirsch, RB Smith (2000)

Frequency of Migraine Headaches, Times Intensity

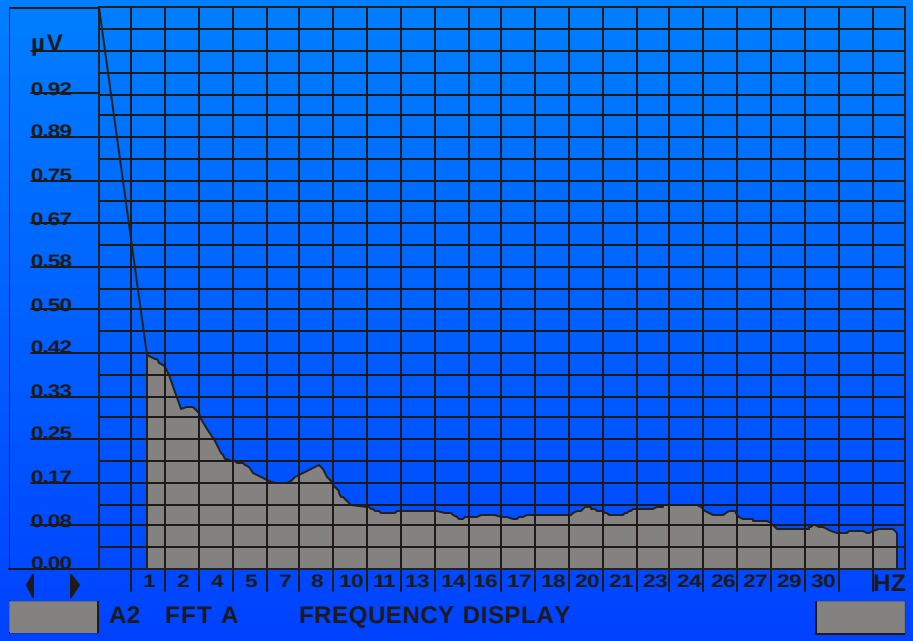


•From DL Kirsch, RB Smith (2000)

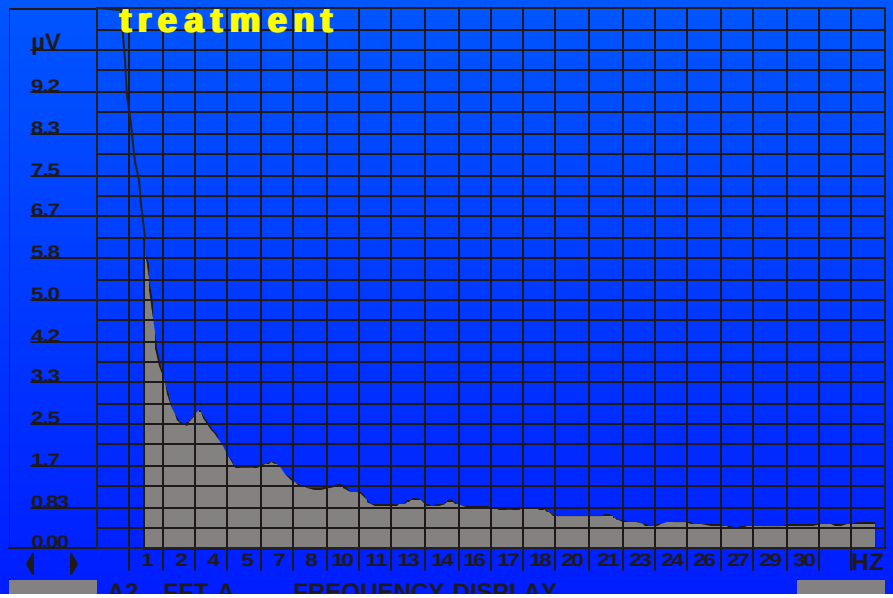
FFT of a typical chronic pain patient: degenerative joint disease for > 2 years. >= 8 hours of pain daily



2 min averaged EEG RMS Fast Fourier Transform in a typical pain-free patient: amplitudes on vertical axis; EEG frequency on horizontal.



FFT of the EEG of same pain patient following 10 min CES treatment

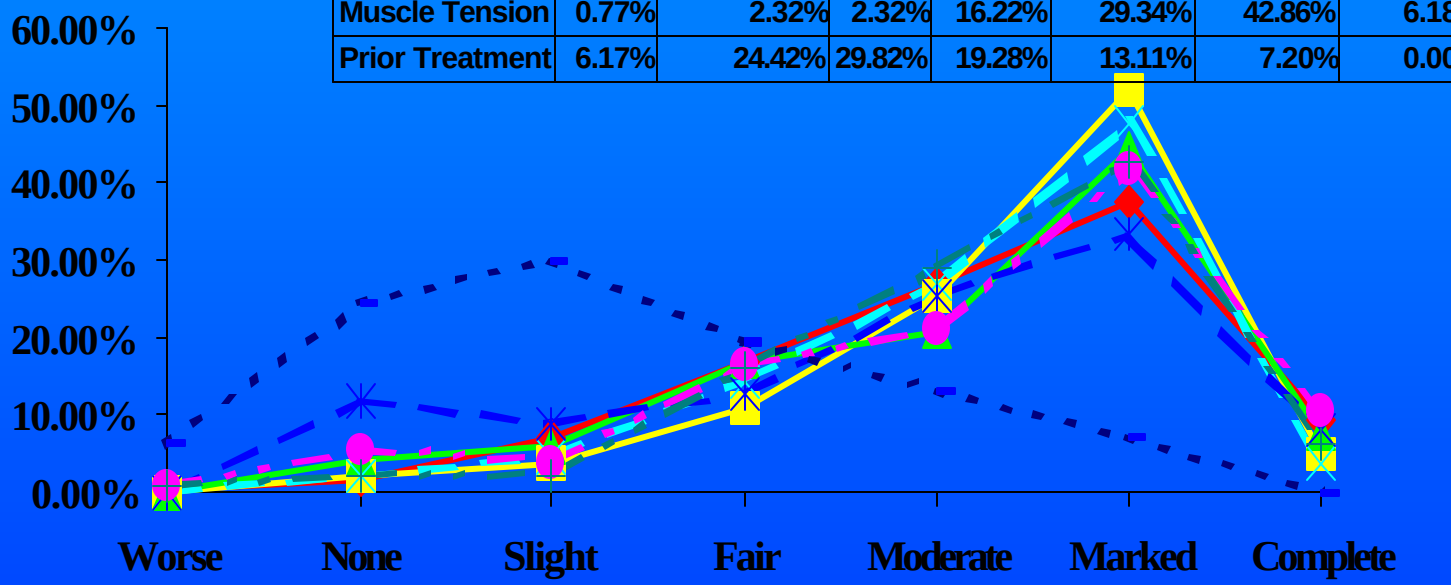


•From DL Kirsch, RB Smith (2000)

CES Post Marketing Survey

(N=1,414)

	Worse	None	Slight	Fair	Moderate	Marked	Complete
Pain	0.35%	1.75%	6.99%	16.78%	26.92%	37.76%	9.44%
Anxiety	0.00%	2.29%	4.01%	11.17%	25.50%	51.86%	5.16%
Depression	0.00%	4.35%	5.98%	16.85%	20.65%	44.57%	7.61%
Stress	0.00%	2.32%	4.63%	14.29%	27.03%	47.88%	3.86%
Insomnia	0.00%	11.85%	8.89%	12.59%	25.19%	33.33%	8.15%
Headache	0.66%	5.30%	3.97%	16.56%	21.19%	41.72%	10.60%
Muscle Tension	0.77%	2.32%	2.32%	16.22%	29.34%	42.86%	6.18%
Prior Treatment	6.17%	24.42%	29.82%	19.28%	13.11%	7.20%	0.00%

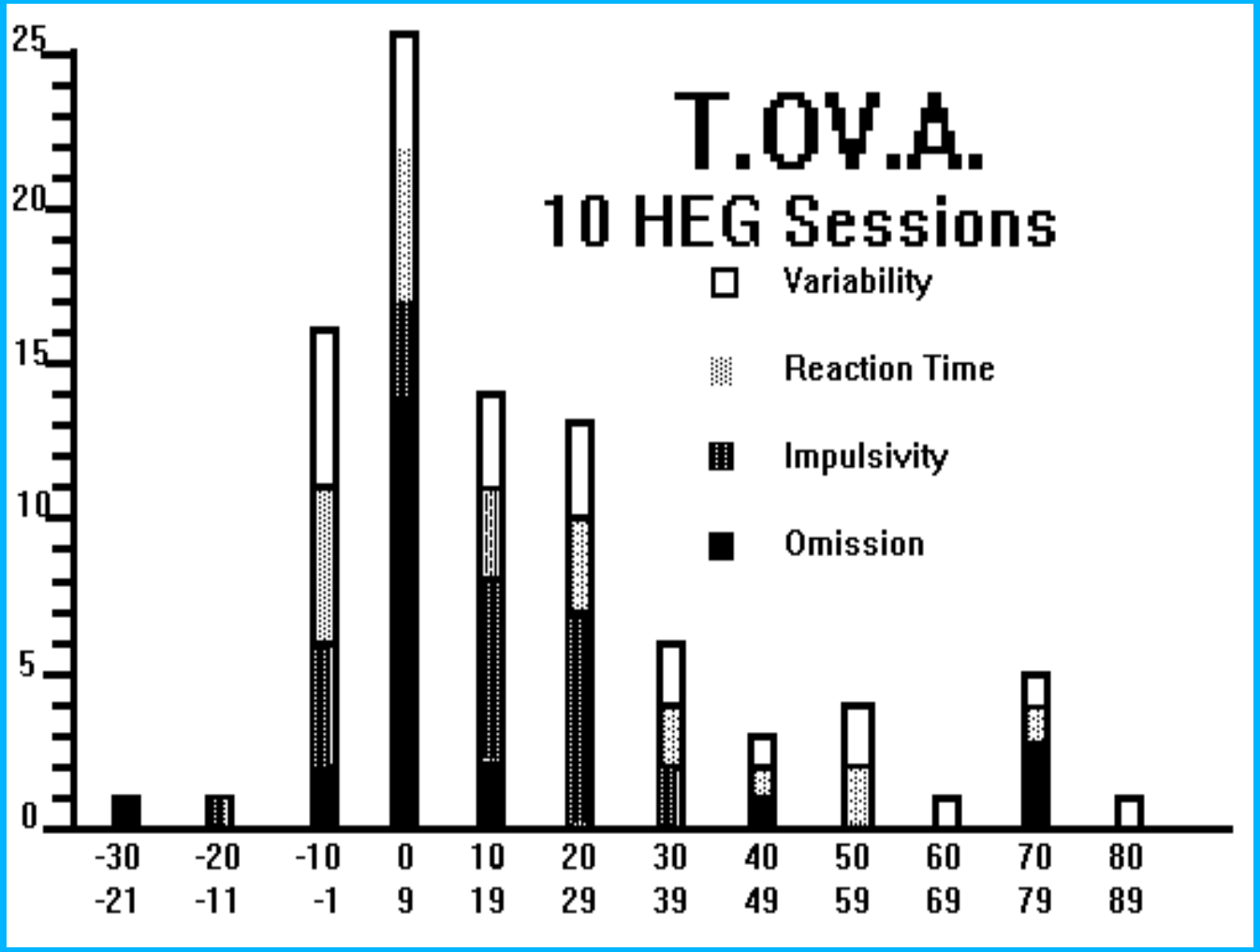


IIIa. Brain Blood Flow Biofeedback: Intentional Increase of Cerebral Blood Oxygenation

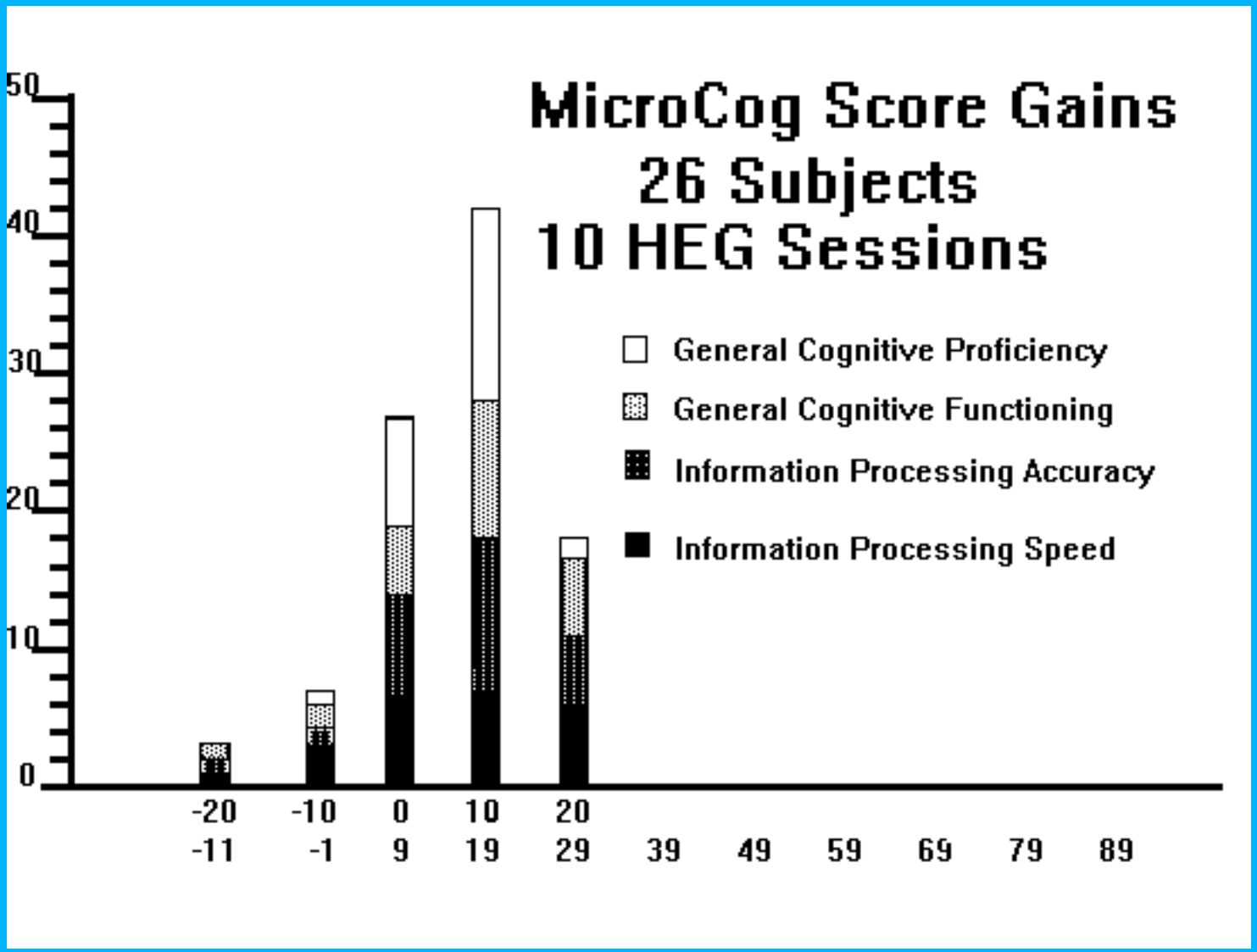
Hershel Toomim, et al, Biocomp Research Institute, UCLA

- Intentional enhancement of (rCBO2) in specific cerebral locations as a localized brain exercise.... study shows increased vascularity, activated capillary beds, improved cognitive function.
- PET, SPECT & fMRI studies using have located regional cerebral oxygenation (rCBO2) patterns associated with specific cognitive functions and dysfunctions. (2-5).
- Pre-post analysis revealed significant relationship between repeated rCBO2 exercise and improvement of brain function as measured by the T.O.V.A. (Inattention, Impulsivity, Reaction time, and Reaction time variability)... 13 point avg. T.O.V.A. gain vs control group after ten treatment sessions.

Contribution of T.O.V.A variables to distribution of experimental gains



Histogram of contribution of cognitive MicroCog global variables to experimental gai



CONCLUSIONS:

The authors find the evidence strongly suggests a new dimension of brain therapy resulting from an easily implemented ability to direct blood to deficient areas. Application to stroke, depression, schizophrenia, autism, chronic fatigue, epilepsy, traumatic brain injury, and memory loss need active pursuit. Increasing the effectiveness of blood borne medications at required brain locations is a possibility. These remain to be studied under controlled conditions.

... inexpensive, portable instrument system comprising HEG... simple application... the ease of learning control of cortical blood oxygenation/flow, make its practical use in therapy simple and convenient....We do not know that such exercise is always beneficial, but unwanted side effects are negligible in our experience. Its attributes and effects provide therapists, physicians and scientists the means to explore and develop an extensive new field in both therapeutic and basic research.

ADD

- Recommendations for Performing Neuropsychological Evaluations for Persons With Chronic Pain
- PTH Impairment -Packard

THE END

That's all Folks!!