

Pain Management: Rationale for the BioPsychoSocial Perspective

MI-CCSI

David A. Williams, Ph.D.

Professor of Anesthesiology, Medicine, Psychiatry and Psychology
Associate Director, Chronic Pain and Fatigue Research Center

Co-Director, Research Development, Michigan Institute for Clinical Health Research (MICHHR)

Director, Network-based Research Unit, MICHHR

University of Michigan Medical Center

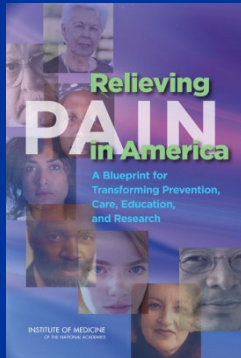
Ann Arbor, Michigan

Disclosures

- Consultant to Community Health Focus Inc.
- Past-President of the American Pain Society
- Funded for research by NIH

There will be no use of off-label medications in this presentation.

Chronic Pain Numbers



100 Million People
- US

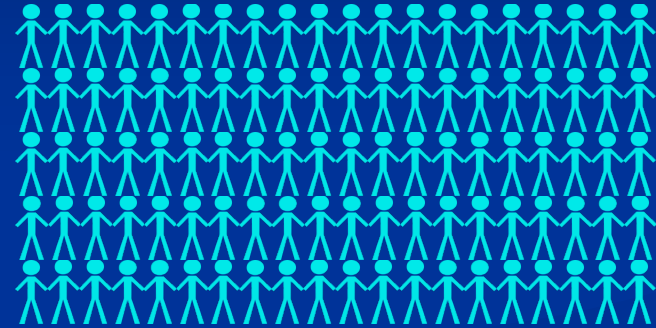


150 Million
- 37 Countries

Eccleston, C., Wells, C. (2017).
European Pain Management.
Oxford University Press

More people have Chronic Pain than Diabetes, Heart Disease, and Cancer Combined

Chronic Pain 100 Million



Diabetes 29.1 Million



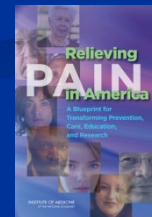
Heart Disease 27.6 Million



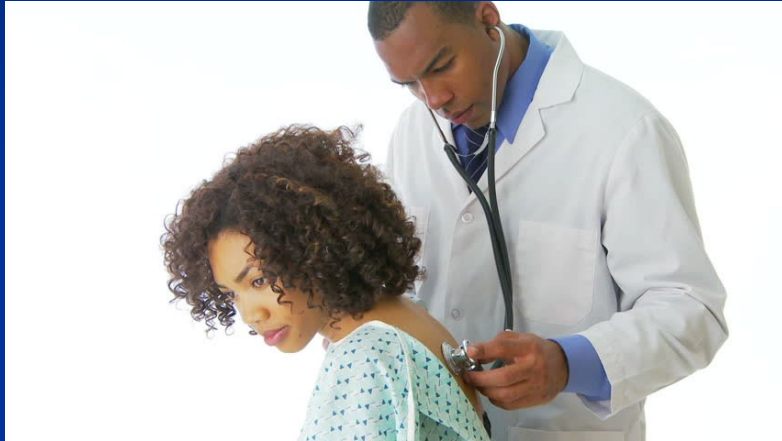
Cancer 13.7 Million



 = 1 Million individuals



Most Pain Care Visits occur within Primary Care



Peterson K, et al.. VA ESP Project #09-199; 2017.

Primary Care Physicians Receive Little Training in Pain Management

- 80% of American Medical Schools have no formal pain education
- Those that do, report 5 or fewer hours
 - Emphasis of education is often cellular and subcellular rather than interpersonal or social in nature
- Only 34% of physicians reported feeling comfortable treating chronic pain
 - Only 1% found it a satisfying practice

Survey of Primary Care Physicians treating Chronic Pain

- 34% no longer accepted new patients with chronic pain
- 79% currently prescribe opioids for chronic pain
- 72% of physicians lacked alternative treatments to opioids
- 87% of patients were unwilling to try non-pharmacological treatment

Pain Medicine Versus Pain Management: Ethical Dilemmas Created by Contemporary Medicine and Business

John D. Loeser, MD† and Alex Cahana, MD, PhD*†*

Biomedical Model
Interventional
Pain Medicine

- Procedure Driven
- Focus on curing/fixing

Patient is passive recipient

Biopsychosocial model
Interdisciplinary
Pain Management

- Focus on multidisciplinary teams
- Focus on pain management

Patient is active participant

How good is our black bag for treating chronic pain?



Treatment	Impact on Chronic Pain
Long term opioids	32% reduction
Pain drugs generally (across classes)	30% - 40% get 40% - 50% relief
Spinal fusion	75% still have pain
Repair herniated disk	70% still have pain
Repeat Surgery	66% still have pain
Spinal cord stimulators	61% still in pain after 4 yrs. average pain relief 18% across studies



GENERAL & SELECTED POPULATIONS SECTION

Are Invasive Procedures Effective for Chronic Pain? A Systematic Review

Wayne B. Jonas, MD,* Cindy Crawford,[†] Luana Colloca, MD, PhD,[‡] Levente Kriston, PhD,[§] Klaus Linde, MD, PhD,^{||} Bruce Moseley, MD,^{||} and Karin Meissner^{||,***}

*Integrative Health Programs, H&S Ventures, Alexandria, Virginia; [†]TLI Foundation, McLean, Virginia; [‡]University of Maryland School of Nursing and Medicine, Baltimore, Maryland, USA; [§]University Medical Center Hamburg-Eppendorf, Hamburg, Germany; ^{||}Institute of General Practice, Klinikum rechts der Isar, Technical University Munich, Munich, Germany; ^{||}Joseph Barnhart Department of Orthopedic Surgery, Baylor College of Medicine, Houston, Texas, USA; ^{||}Division Health Promotion, University of Applied Sciences Coburg, Coburg, Germany; ***Institute of Medical Psychology, LMU Munich, Munich, Germany

Correspondence to: Wayne B. Jonas, MD, Executive Director, Samueli Integrative Health Programs, H&S Ventures, 1800 Diagonal Road, Suite 617, Alexandria, VA 22314, Tel: (703) 647-7435; Fax: (703) 647-6009; Email: wayne@hsventures.org

Funding sources: Funding was provided through the support of Samueli Institute. Karin Meissner received support from the Theophrastus Foundation and the Schweizer-Arau Foundation, Germany.

Conflicts of interest: All authors have completed the ICMJE uniform disclosure form at www.icmje.org/coi_disclosure.pdf and declare no financial relationships with any organizations that might have an interest in the submitted work in the previous three years and no other relationships or activities that could appear to have influenced the submitted work. The lead author affirms that the manuscript is an honest, accurate, and transparent account of the study being reported, that no important aspects of the study have been omitted, and that any discrepancies from the study as planned have been explained.

Abstract

Objective. To assess the evidence for the safety and efficacy of invasive procedures for reducing chronic pain and improving function and health-related quality of life compared with sham (placebo) procedures. **Design.** Systematic review with meta-analysis. **Methods.** Studies were identified by searching multiple electronic databases, examining reference lists, and communicating with experts. Randomized controlled trials comparing invasive procedures with identical but otherwise sham procedures for chronic pain conditions were selected. Three authors independently extracted and described study characteristics and assessed Cochrane risk of bias. Two subsets of data on back and knee pain, respectively, were pooled using random-effects meta-analysis. Overall quality of the literature was assessed through Grading of Recommendations, Assessment, Development, and Evaluation. **Results.** Twenty-five trials (2,000 participants) were included in the review assessing the effect of invasive procedures over sham. Conditions included low back (N = 7 trials), arthritis (4), angina (4), abdominal pain (3), endometriosis (3), biliary colic (2), and migraine (2). Thirteen trials (52%) reported an adequate concealment of allocation. Fourteen studies (56%) reported on adverse events. Of these, the risk of any adverse event was significantly higher for invasive procedures (12%) than sham procedures (4%; risk difference = 0.05, 95% confidence interval [CI] = 0.01 to 0.09, $P = 0.01$, $I^2 = 65\%$). In the two meta-analysis subsets, the standardized mean difference for reduction of low back pain in seven studies (N = 445) was 0.18 (95% CI = -0.14 to 0.51, $P = 0.26$, $I^2 = 62\%$), and for knee pain in three studies (N = 496) it was 0.04 (95% CI = -0.11 to 0.19, $P = 0.63$, $I^2 = 36\%$). The relative contribution of within-group improvement in sham treatments accounted for 87% of the effect compared with active treatment across all conditions. **Conclusions.** There is little evidence for the specific efficacy beyond sham for invasive procedures in chronic pain. A moderate amount of evidence does not support the use of invasive procedures as compared with sham procedures for patients with chronic back or knee pain. Given their high cost and safety concerns, more rigorous studies are required before invasive procedures are routinely used for patients with chronic pain.

We Need to Approach Chronic Pain Differently

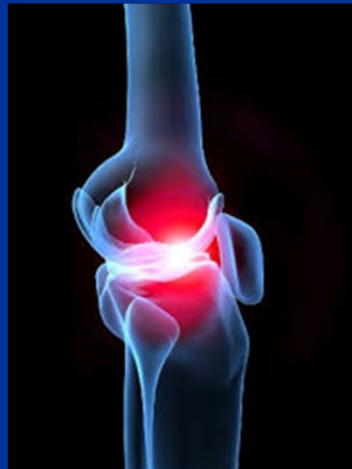


How is Pain Classified?

Time	Body Location	Suspected Etiology
Acute Vs Chronic	Head, Neck, Back, Pelvis	Cancer, Rheumatic, etc.

Newest Classification: Pain Mechanisms

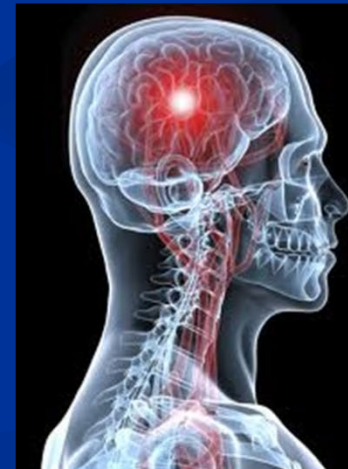
Nociceptive
Peripheral damage
or inflammation



Neuropathic



Central



¹Woolf CJ. *J Clin Invest.* 2010;120(11):3742-3744. ²Costigan M, et al. *Annu Rev Neurosci.* 2009;32:1-32. ³Dickinson BD, et al. *Pain Med.* 2010;11:1635-1653. ⁴Williams DA, Clauw DJ. *J Pain.* 2009;10(8):777-791.

Nociceptive Pain

(mechanical, thermal, chemical)



Neuropathic Pain



Peripheral

Central

Post-Stroke



Central (Nociplastic) Chronic Overlapping Pain Conditions

COPCs	US Prevalence
Irritable Bowel Syndrome	44 Million
Temporomandibular Disorder	35 Million
Chronic Low Back Pain	20 Million
Interstitial Cystitis / Bladder Pain Syndrome	8 Million
Migraine Headache	7 Million
Tension Headache	7 Million
Endometriosis	6 Million
Vulvodynia	6 Million
Fibromyalgia	6 Million
Myalgic Encephalopathy / CFS	4 Million

¹Veasley, C. et al (2015). White paper from the *Chronic Pain Research Alliance*.

Mechanisms of Pain

**Nociceptive
and
Inflammatory**

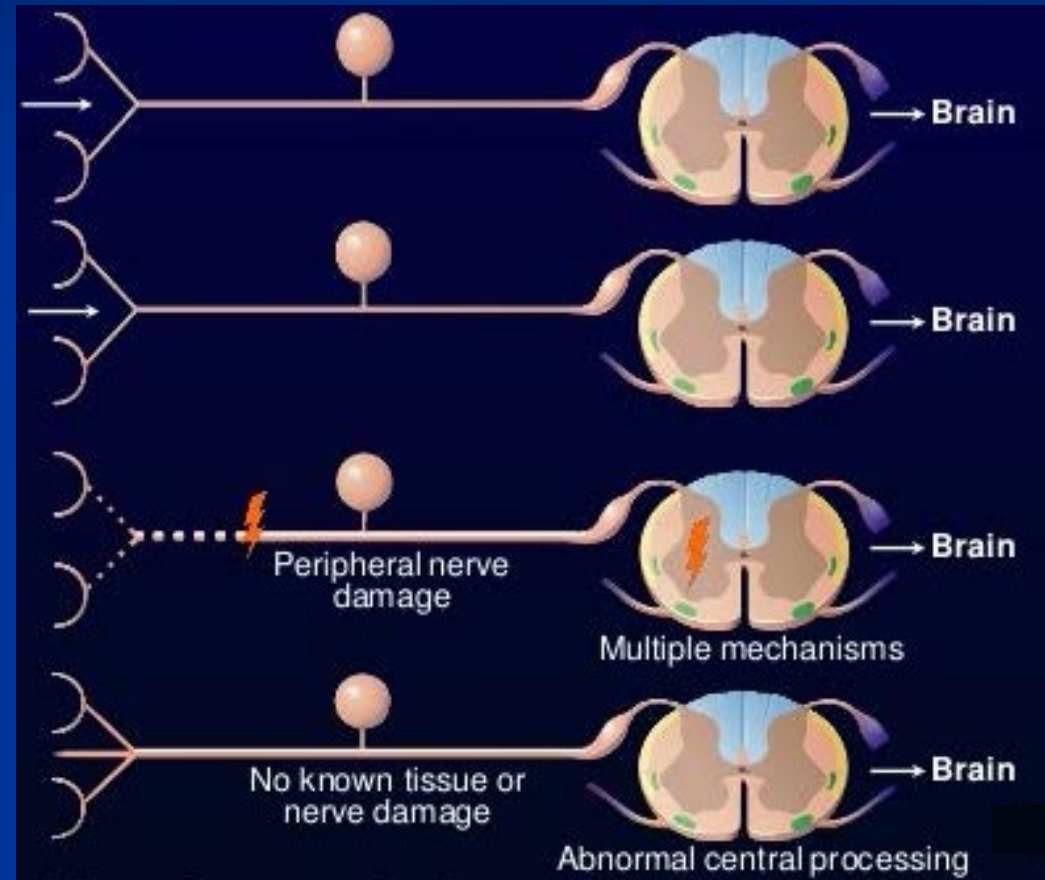
Noxious
Peripheral Stimuli

Inflammation

Neuropathic

Peripheral or
Central damage

Centrally Driven Pain



Mechanisms of Pain

**Nociceptive
and
Inflammatory**

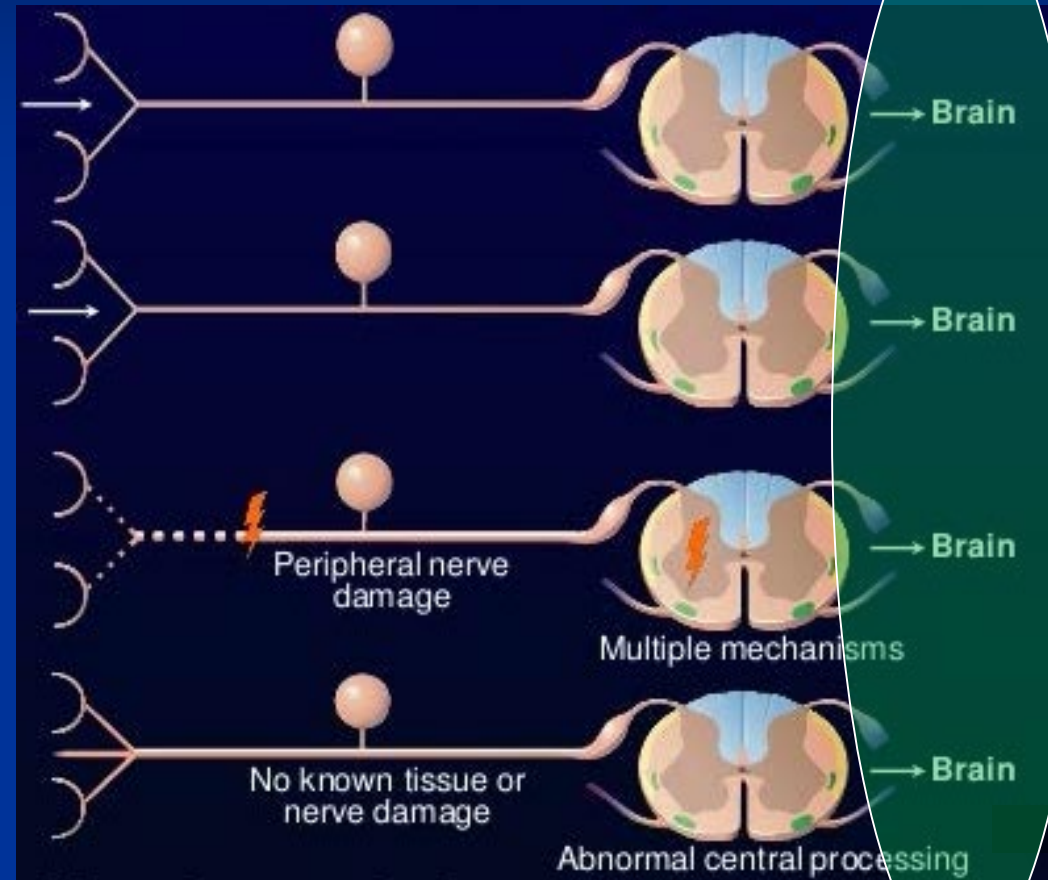
Noxious
Peripheral Stimuli

Inflammation

Neuropathic

Peripheral or
Central damage

Centrally Driven Pain



Neurobiological perspective

Brain regions associated with pain processing involve both sensory and affective/cognitive regions

- **Sensory / discriminative dimension**
 - Somatosensory cortices (S1, S2)
 - Dorsal posterior insula
- **Affective / Cognitive dimensions**
 - Anterior insula
 - Prefrontal cortex
 - Anterior cingulate cortex
 - Thalamus
 - Amygdala
 - Hippocampus



Neurobiological perspective

Brain regions associated with pain processing involve both sensory and affective/cognitive regions

- **Sensory / discriminative dimension**
 - Somatosensory cortices (S1, S2)
 - Dorsal posterior insula
- **Affective / Cognitive dimensions**
 - Anterior insula
 - Prefrontal cortex
 - Anterior cingulate cortex
 - Thalamus
 - Amygdala
 - Hippocampus



Neurobiological perspective

Brain regions associated with pain processing involve both sensory and affective/cognitive regions

■ Sensory / discriminative dimension

- Somatosensory cortices (S1, S2)
- Dorsal posterior insula

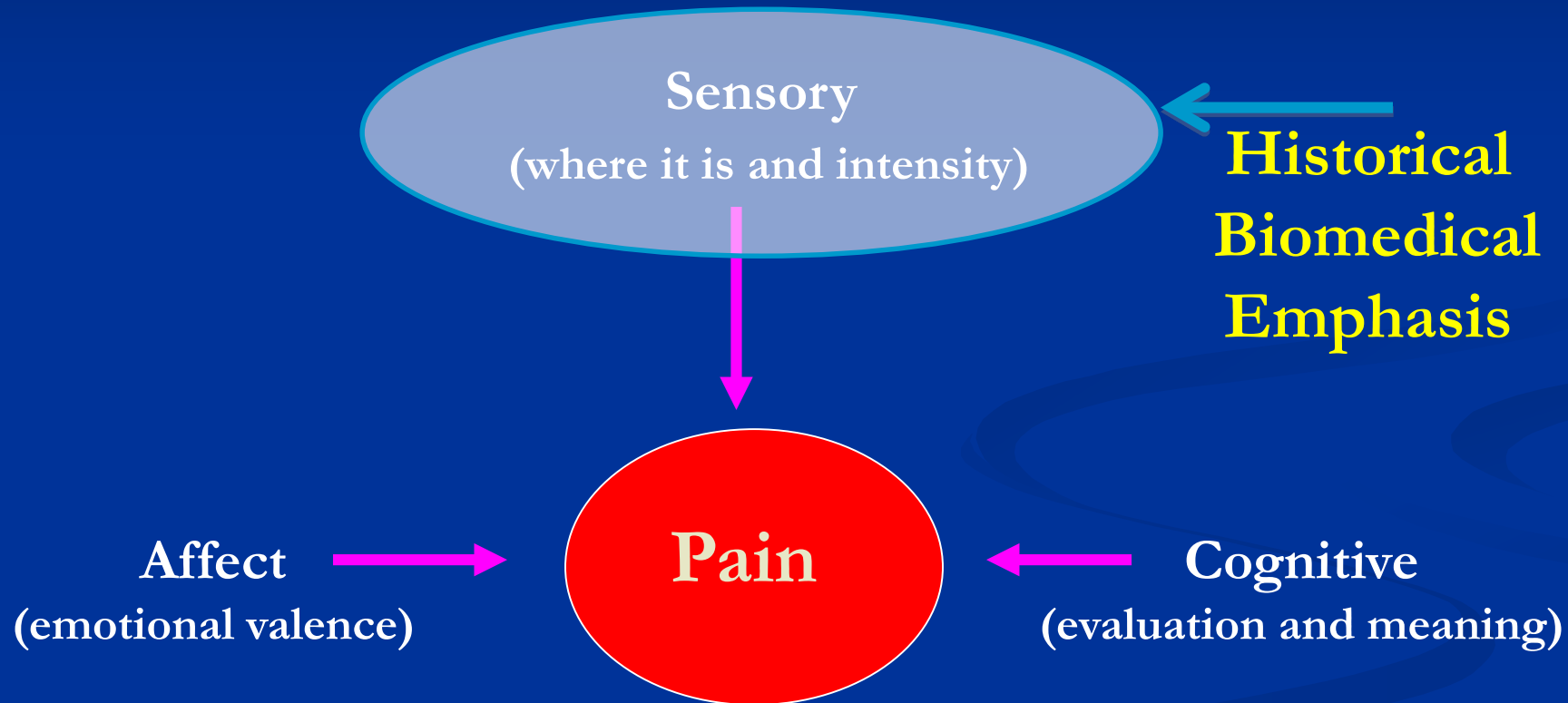
■ Affective / Cognitive dimensions

- Anterior insula
- Prefrontal cortex
- Anterior cingulate cortex
- Thalamus
- Amygdala
- Hippocampus

I still feel
pain

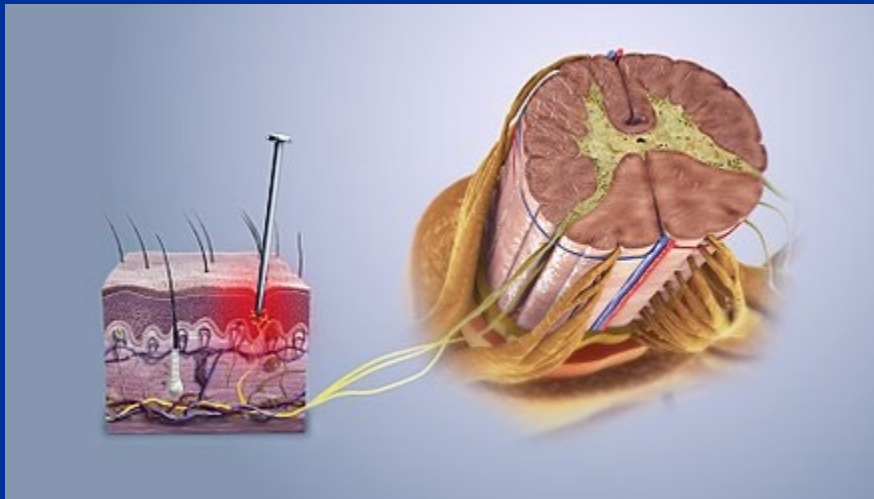


Chronic Pain has Three Components: The BioMedical Model Focuses on 1 of Them

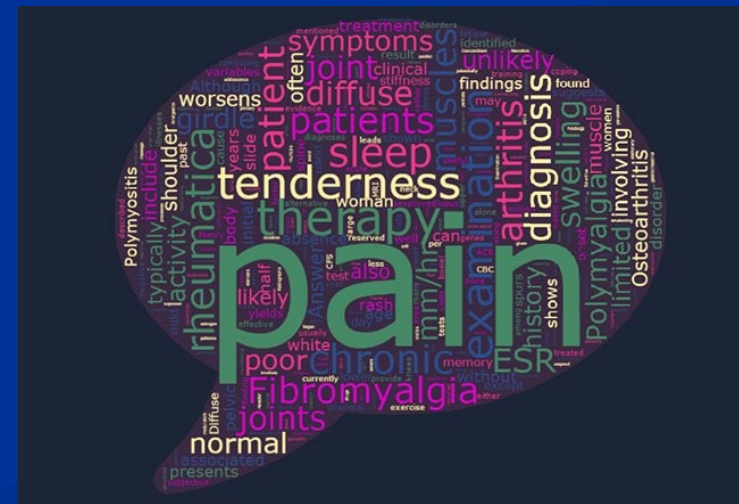


Thinking Differently about Pain

- Damaged tissue and pain are not the same thing
- Sometimes they occur together, so they seem to be the causal
- Nociception provides bodily information that may or may not be interpreted as pain



Nociception



PAIN

Thinking Differently about Chronic Pain

- Pain is a **Perceptual Experience** formed in the brain
 - Other perceptual experiences with flexible biological associations include the following:
 - hunger, itch, tickle, urinary urgency, orgasm

Thinking Differently about Chronic Pain

- Treating a perception requires different techniques than fixing damaged tissues

CNS Neurotransmitters

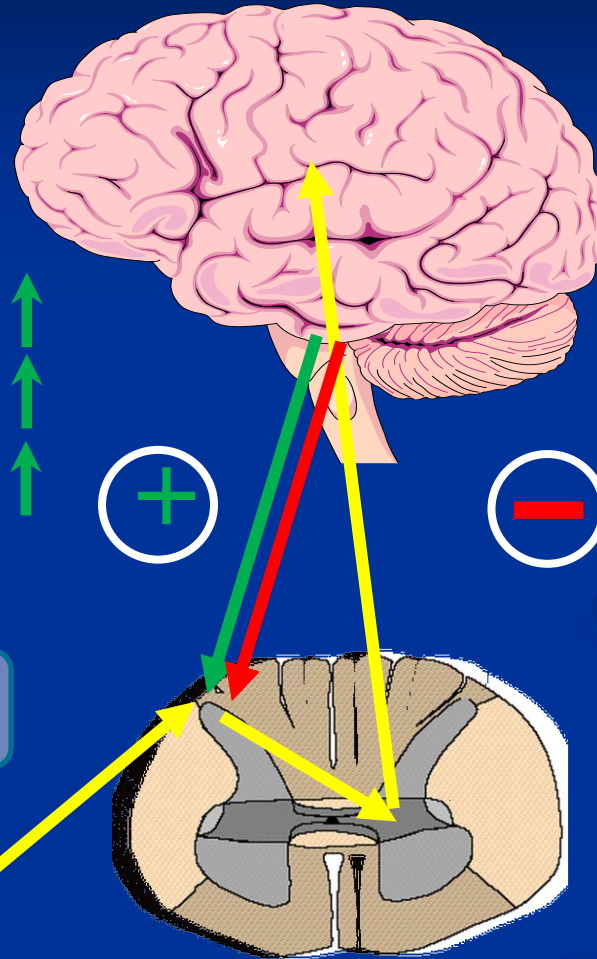
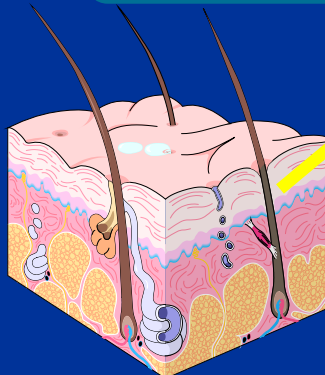
Influencing Pain

Facilitation

Glutamate and EAA
Substance P
Nerve growth factor
Serotonin (5HT_{2a, 3a})

Gabapentinoids,
ketamine

Anti-migraine drugs (–
triptans),
cyclobenzaprine



Inhibition

Descending anti-nociceptive pathways

Norepinephrine-serotonin (5HT_{1a,b}),
dopamine

Tricyclics, SNRIs,
tramadol

Opioids

Low dose naltrexone

Cannabinoids

GABA

No knowledge of
endocannabinoid
activity but this class
of drugs is effective

Gammahydroxybutyrate,
moderate alcohol
consumption

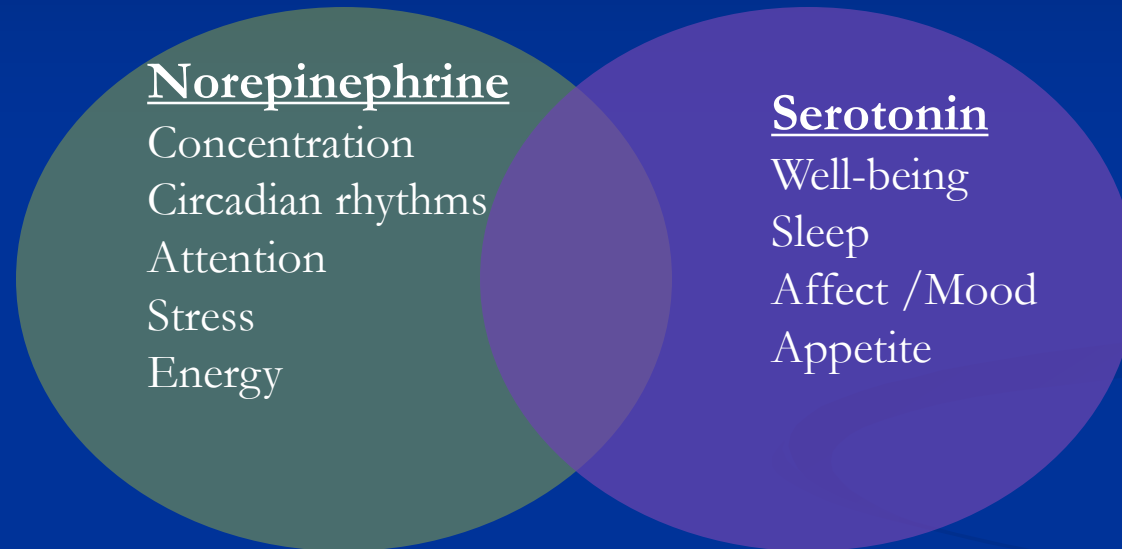
1. Schmidt-Wilcke T, Clauw DJ. *Nat Rev Rheumatol*. Jul 19 2011.
2. Clauw DJ. *JAMA*. 2014.

Neurotransmitters for Pain Processing

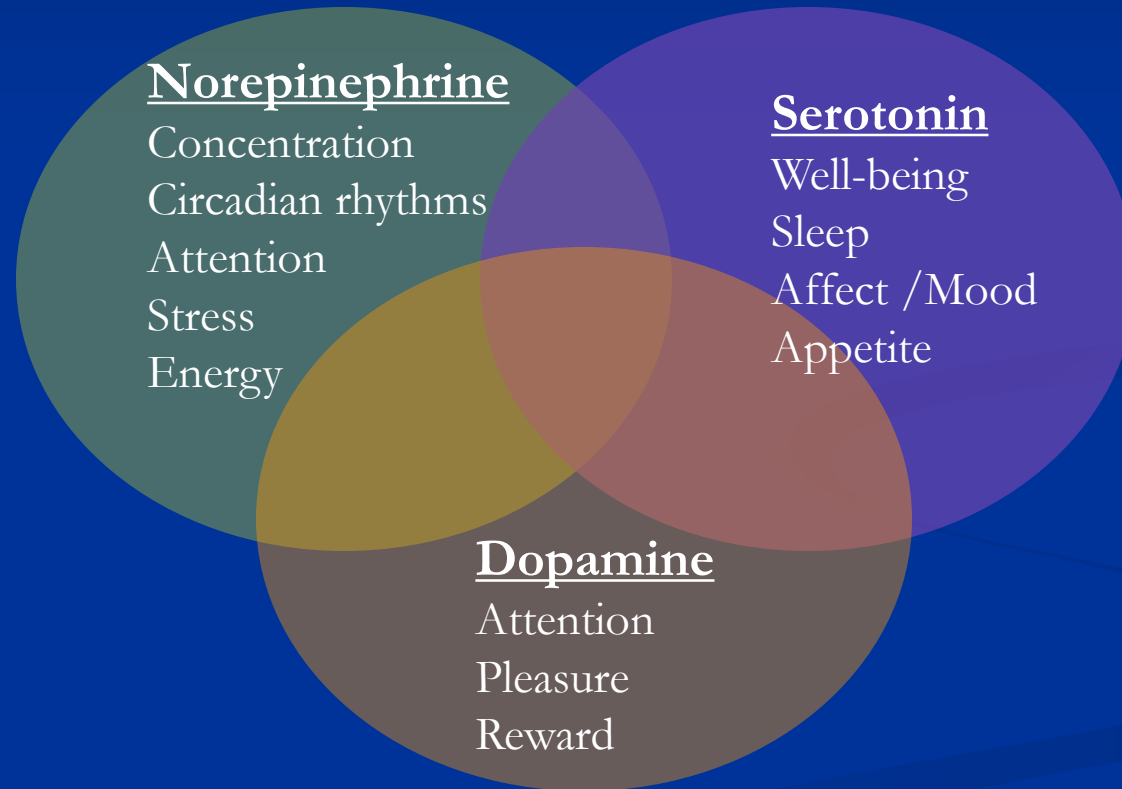
Norepinephrine

Concentration
Circadian rhythms
Attention
Stress
Energy

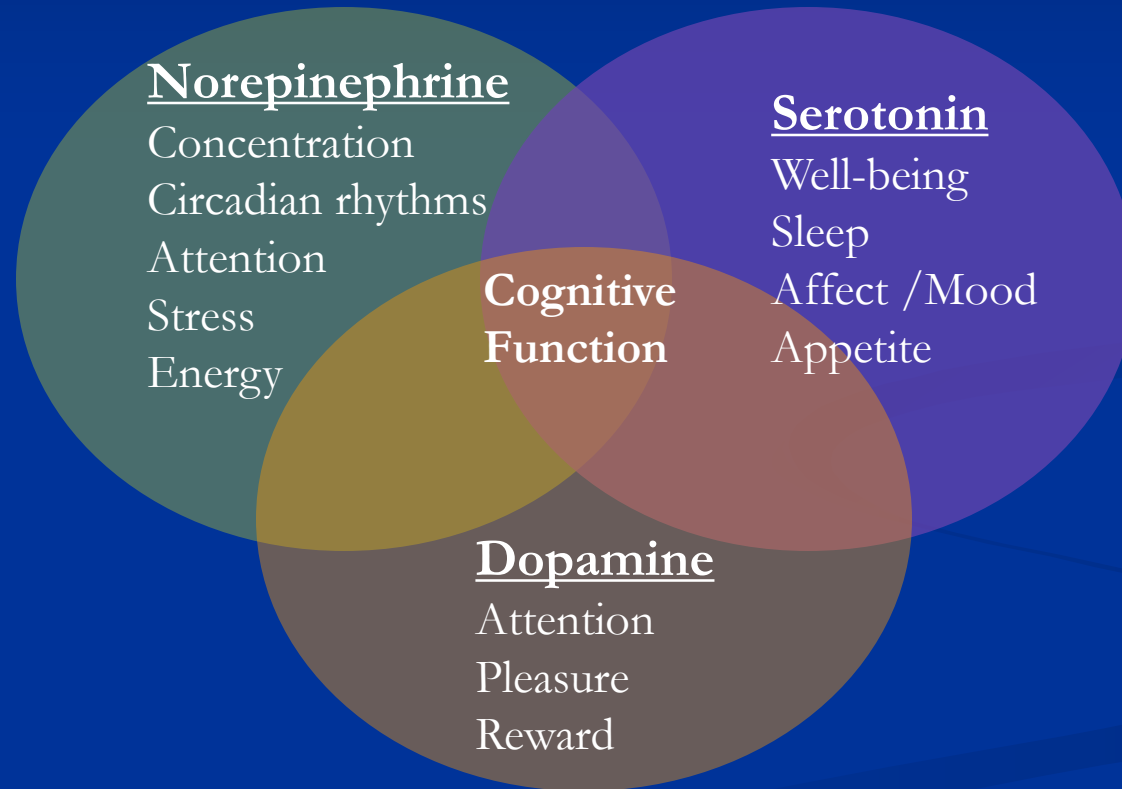
Neurotransmitters for Pain Processing



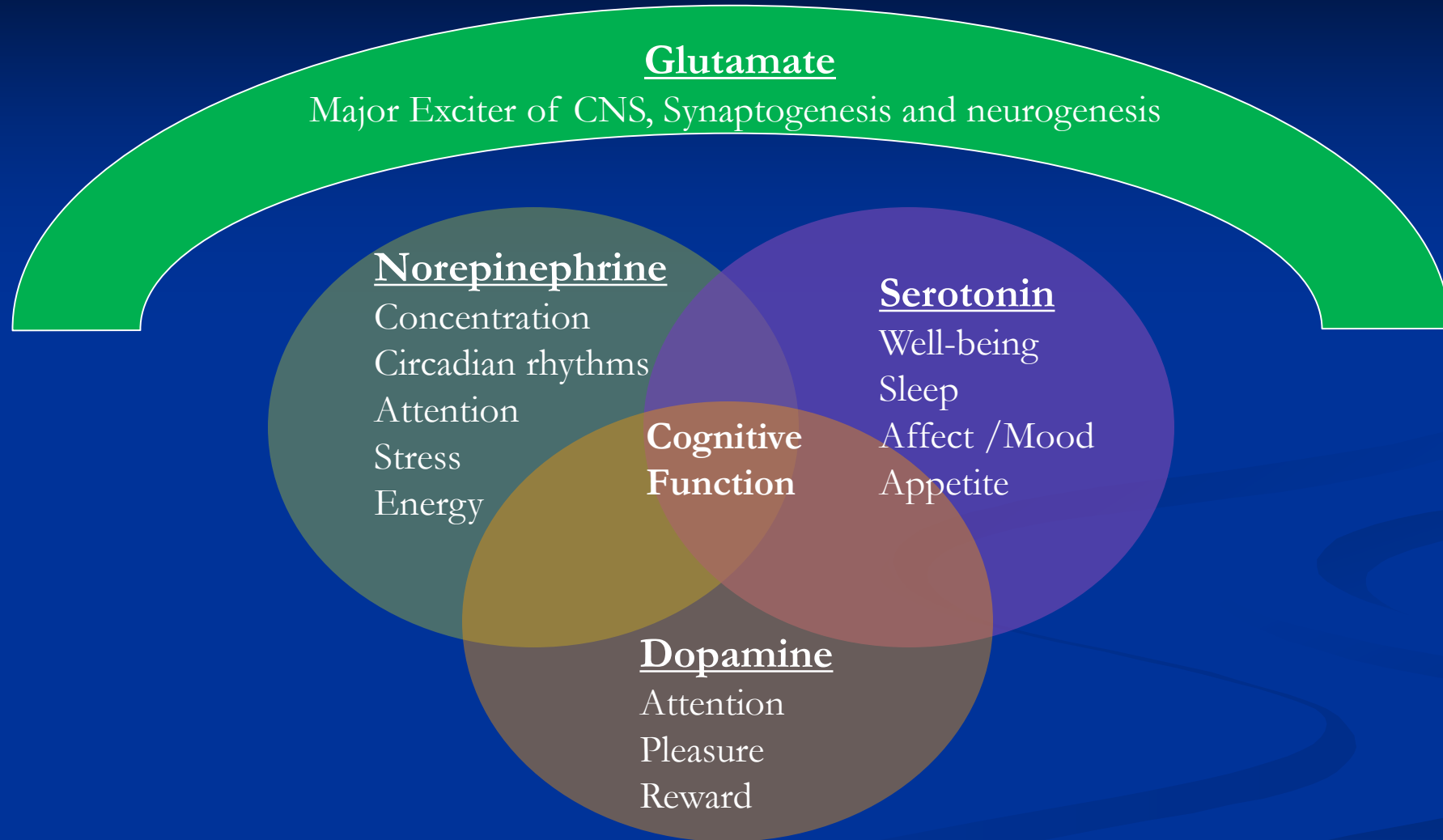
Neurotransmitters for Pain Processing



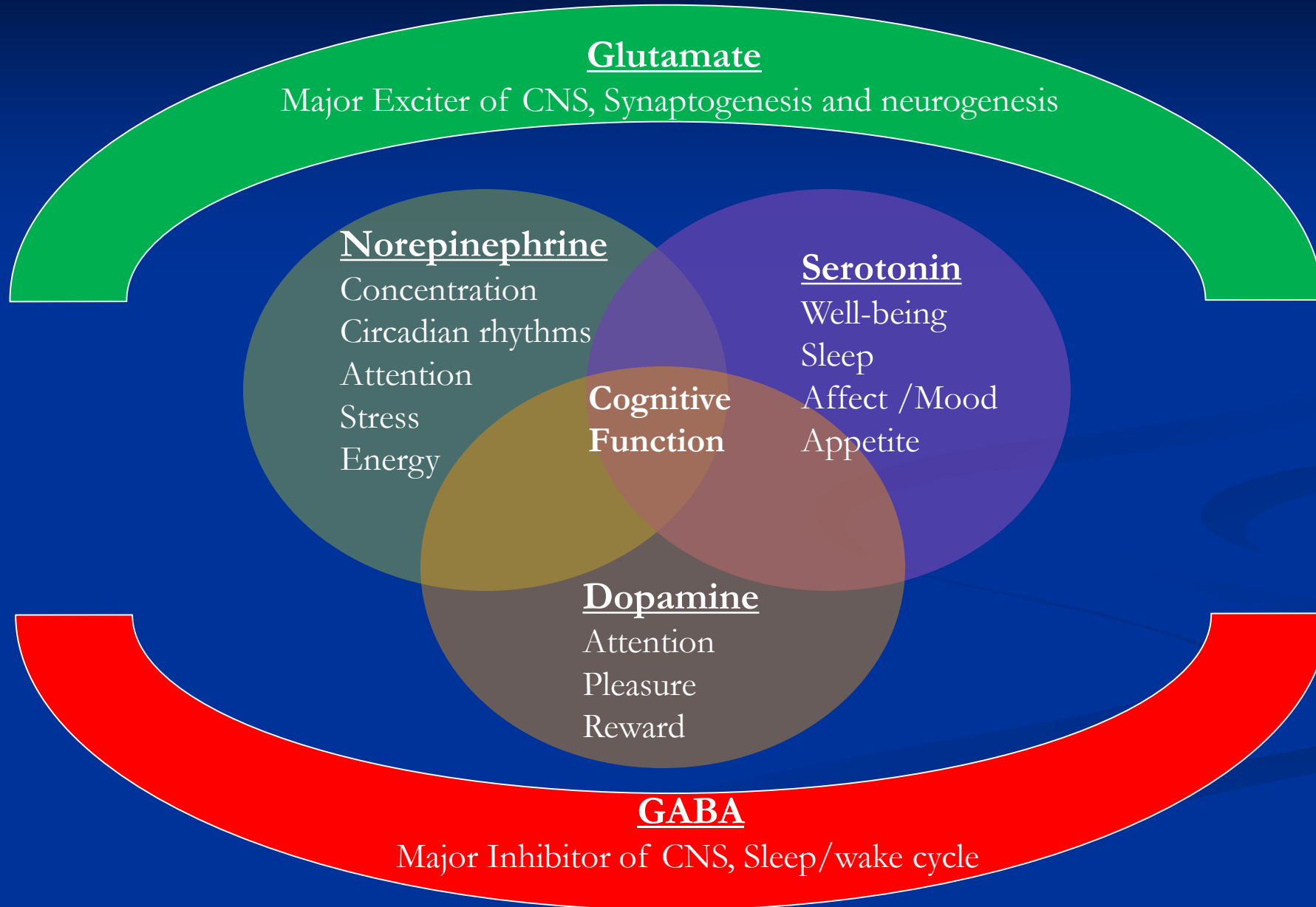
Neurotransmitters for Pain Processing



Neurotransmitters for Pain Processing



Neurotransmitters for Pain Processing



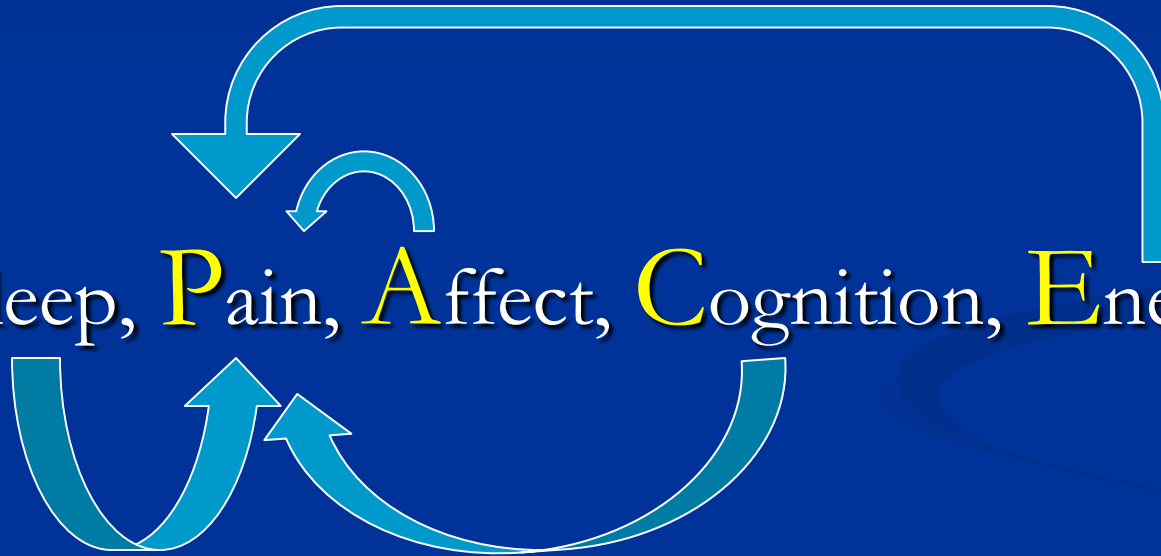
Shared Neurotransmitters Explain

- The complexity of chronic pain presentation

Shared Neurotransmitters Explain

- The complexity of chronic pain presentation

■ Sleep, Pain, Affect, Cognition, Energy



Shared Neurotransmitters Explain

- The complexity of chronic pain presentation



■ Sleep, Pain, Affect, Cognition, Energy

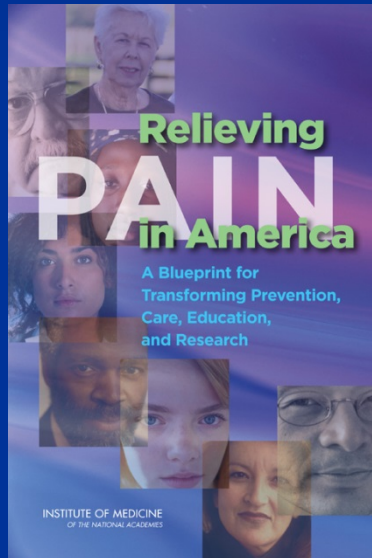
- **SPACE** represents new targets for treating pain perception

So what's a doctor to do?



Recommendations in Multiple Federal Documents

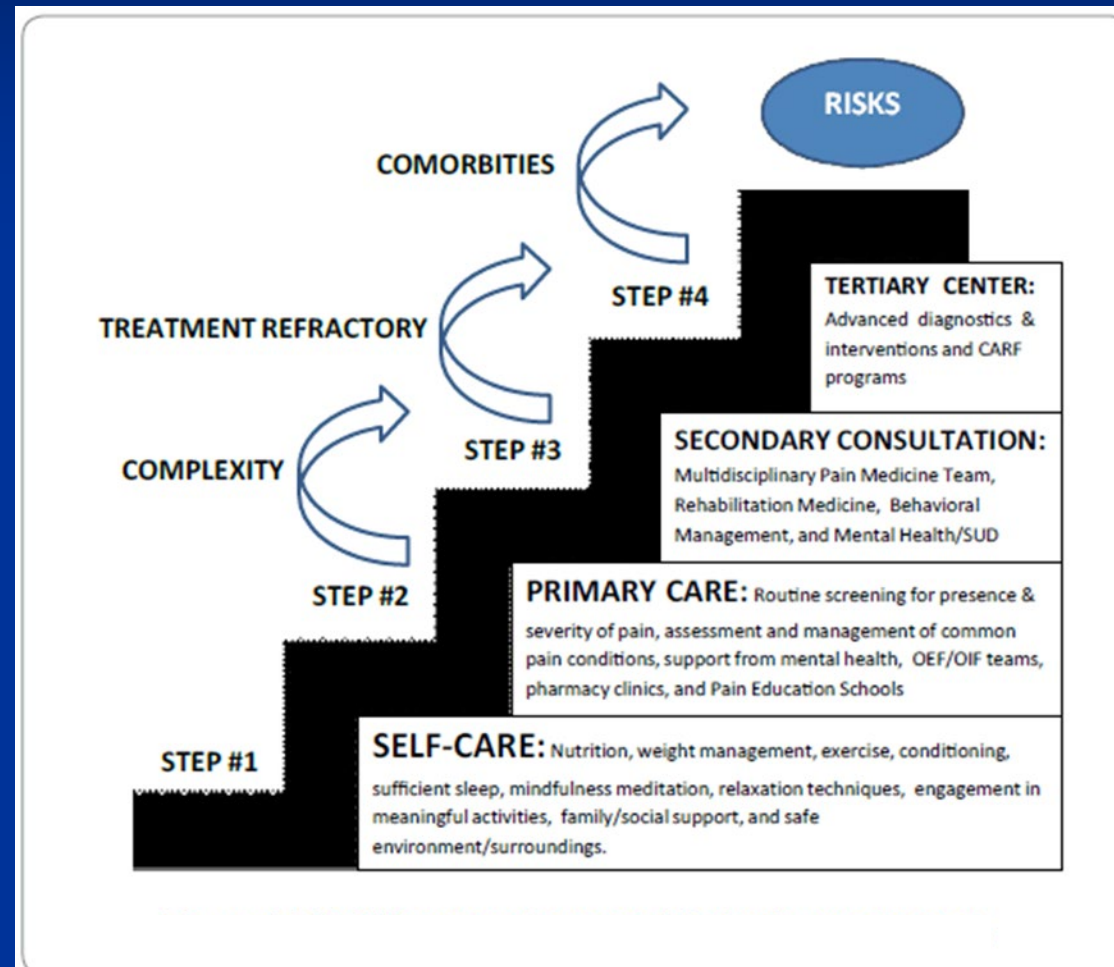
Self-Management, Evidence-Based, Patient-Centric,
Multi-Modal Pain Care



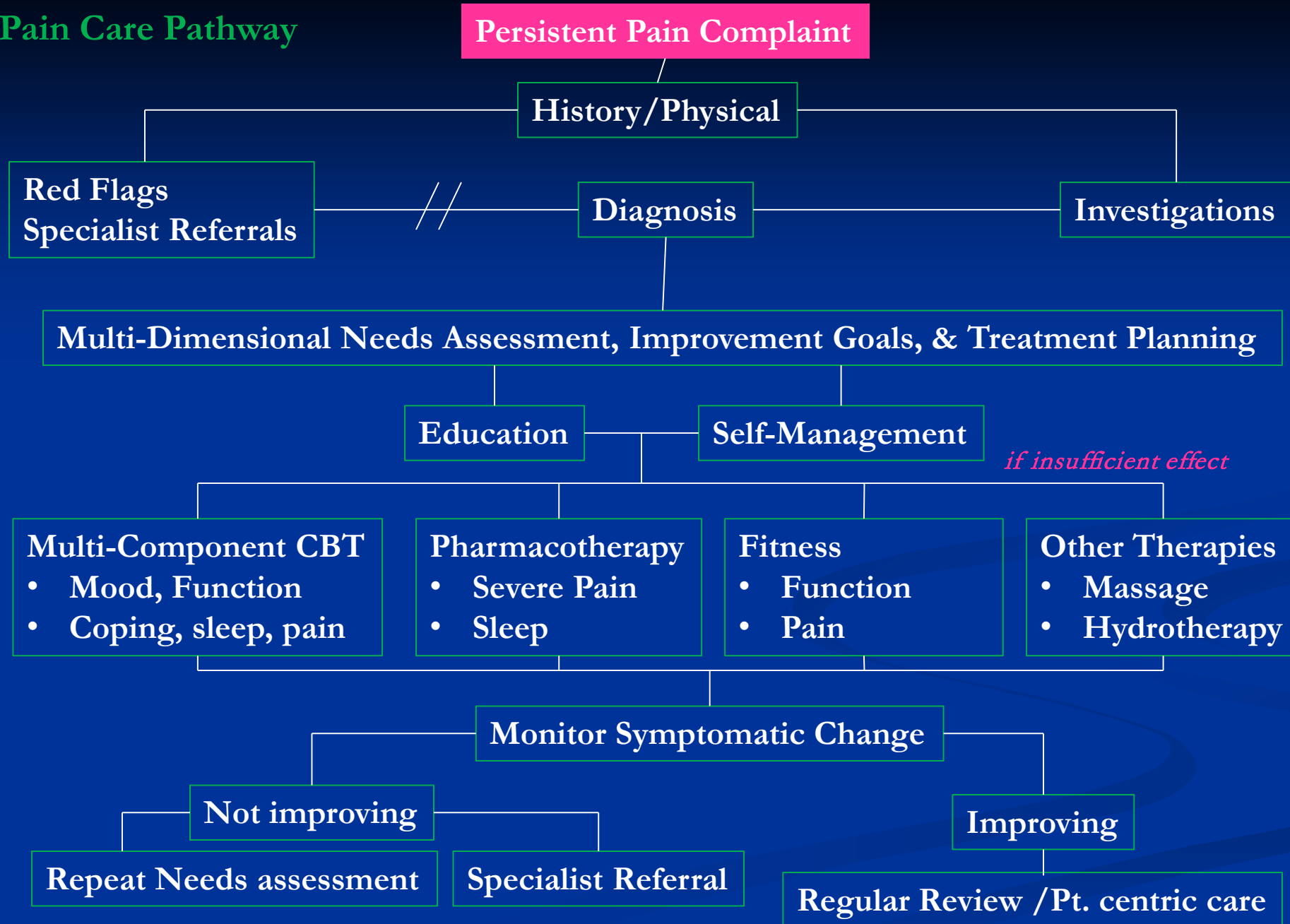
HealthyPeople.gov



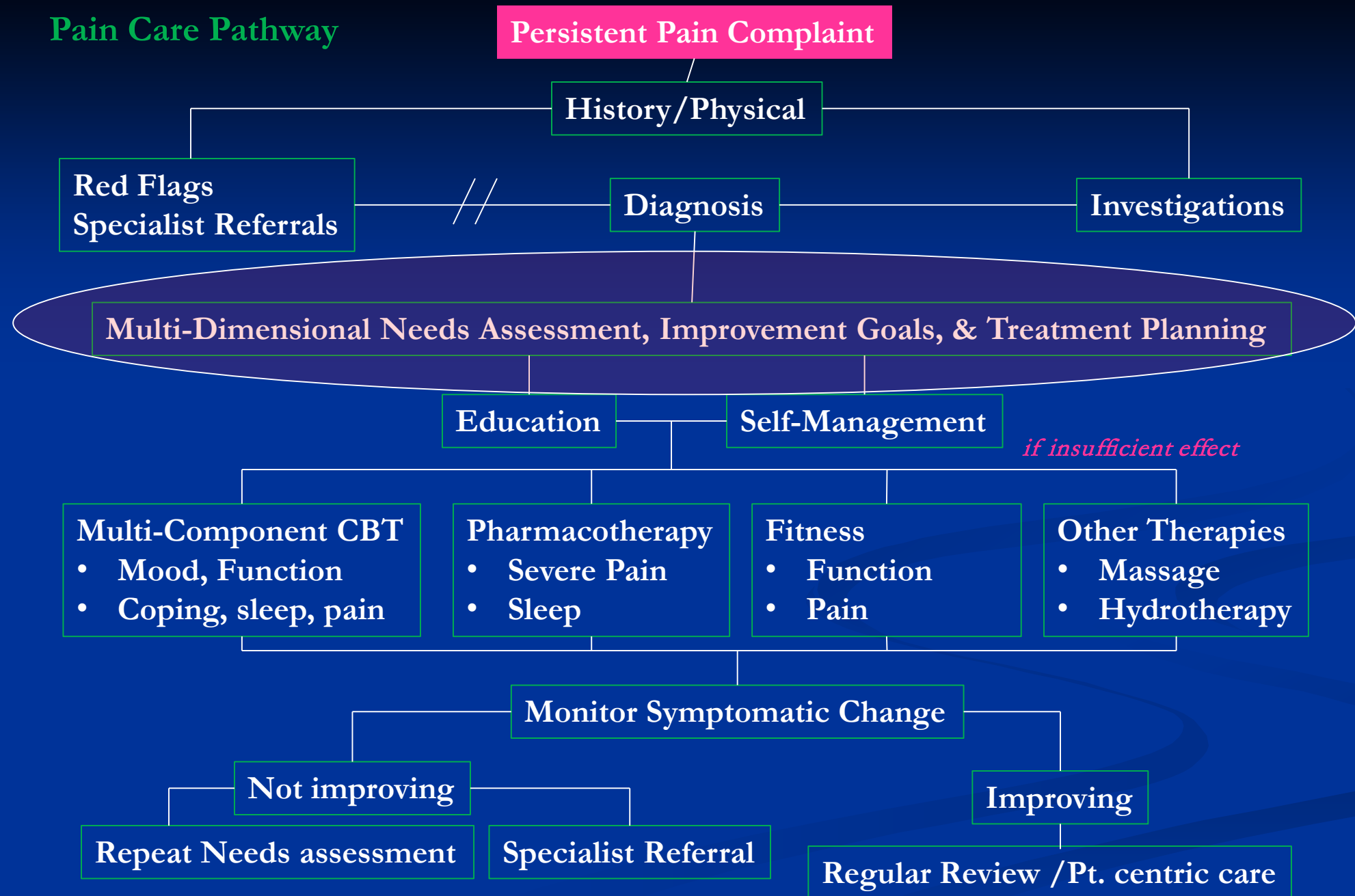
VA's Stepped Care Model of Pain Management



Pain Care Pathway



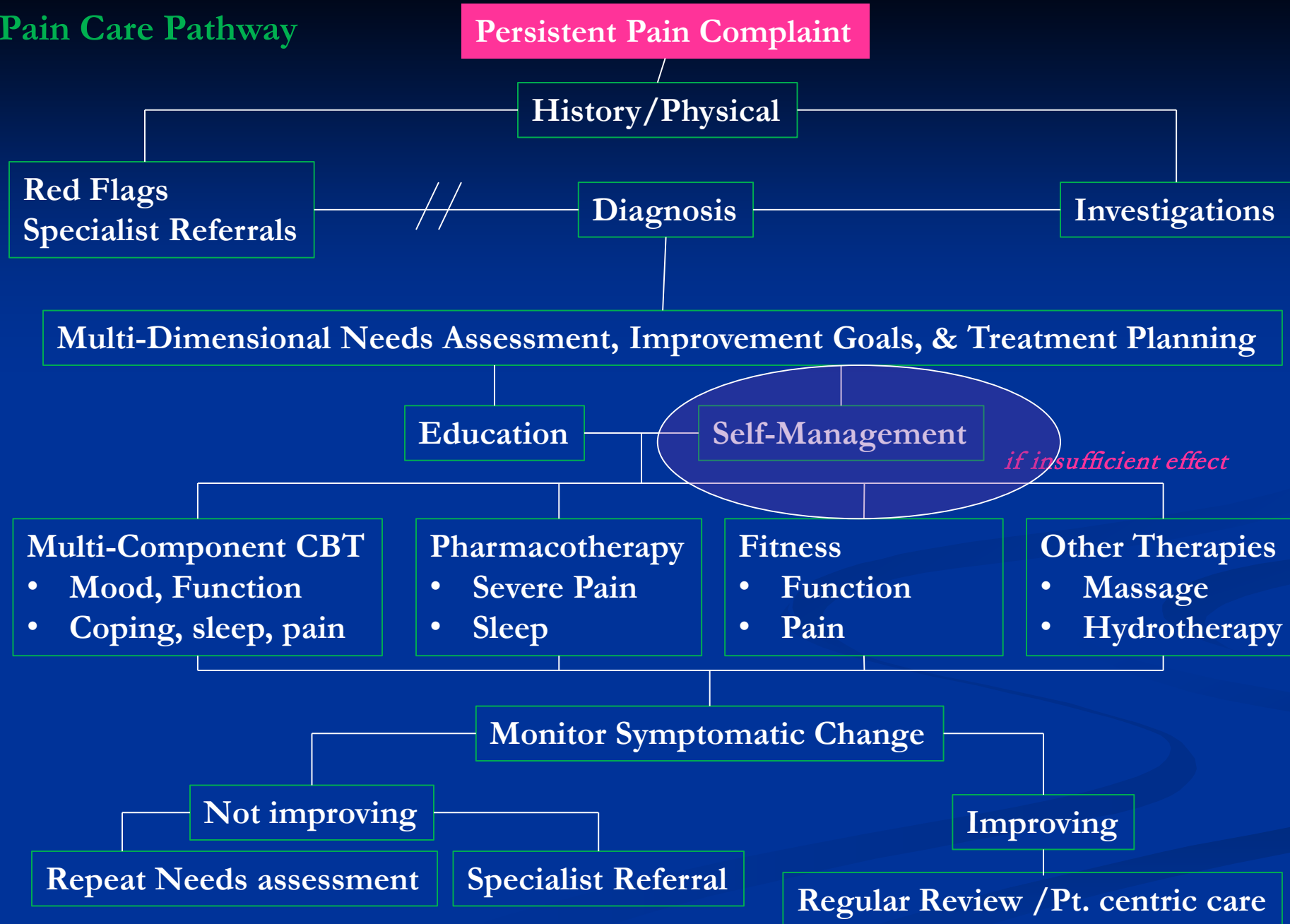
Pain Care Pathway



Mixing in Pain Perception



Pain Care Pathway



How to ERASE S.P.A.C.E.

Emotions

Reflections

Actions

Sleep

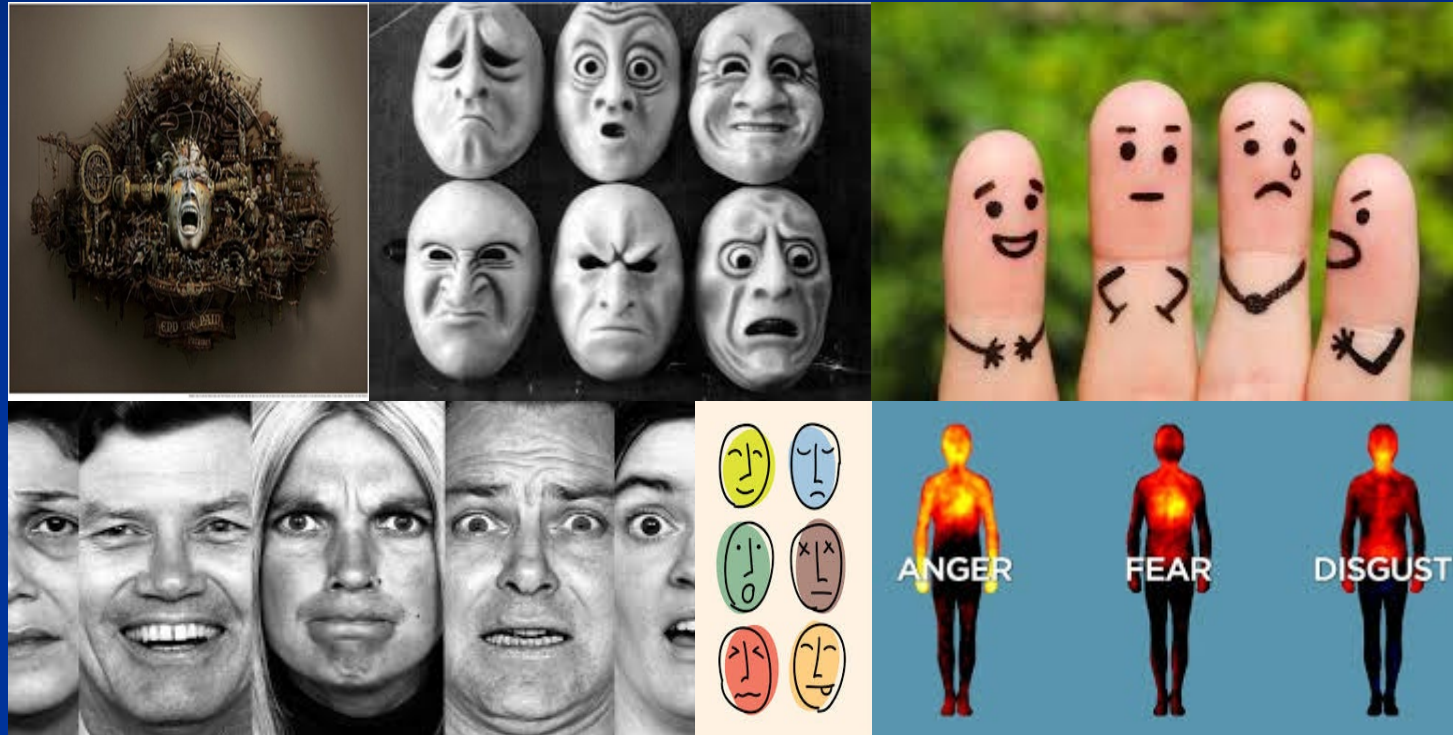
Environment



Sleep, Pain, Affect, Cognitive changes, Energy deficits

ERASE

Emotions



Altering pain perception through Emotions

Psychiatric Co-Morbidities



Psychiatric Co-Morbidity in Chronic Pain

	<u>Depression</u>	<u>Anxiety</u>
General Population:	6.6%	18.1%
Chronic Pain:	30-54%	

Kessler, RC et al (2003). JAMA, 289:3095; Kessler, RC et al (2005). Archives of Gen. Psychiatry, 62:617.
Banks et al, (1996). PsychBull, 119:95.; Eisendrath (1995), Neurology, 45:S26.

Personality Disorders in Chronic Pain Patients

Personality Disorders

gen. pop: 5%-15%

chronic pain: 51%-58%

Cluster A:

Odd/Eccentric

- *Paranoid
- *Schizoid
- Schizotypal

44%

Cluster B

Emotional/Erratic

- Antisocial
- *Histrionic
- Narcissistic
- Borderline

31%

Cluster C

Anxious/Fearful

- Avoidant
- *Dependent
- OCPD

25%

Personality Disorders

Predictive of transition from acute to chronic status

Sub clinical P.D. impacts pain and treatment compliance

Patients do not need
to be mentally ill to
have chronic pain



Approaches to Resolve Negative Affect Influencing Chronic Pain



Emotional Awareness and
Expression Therapy (EAET)



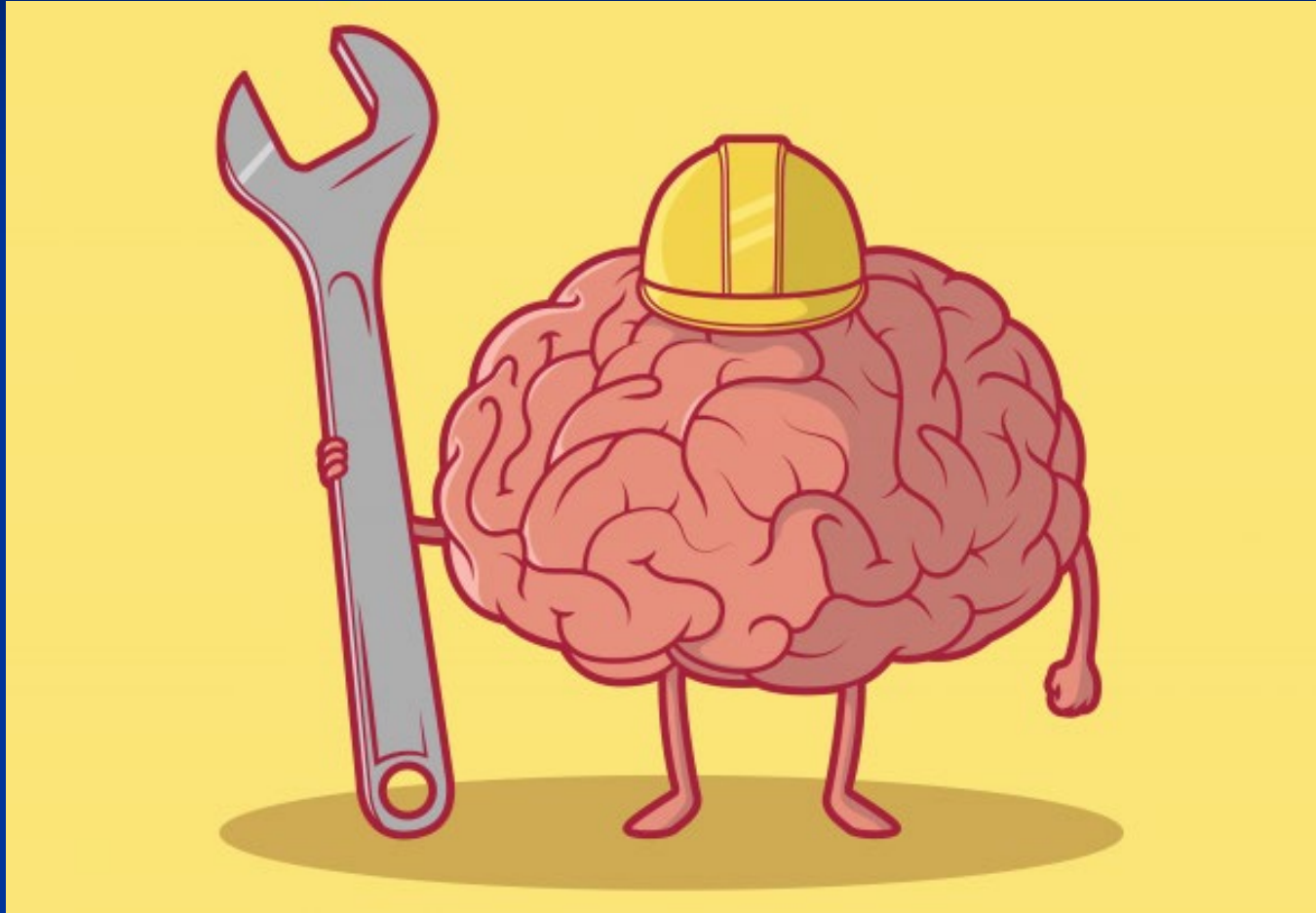
Pleasant Activity Scheduling



Traditional Psychotherapy

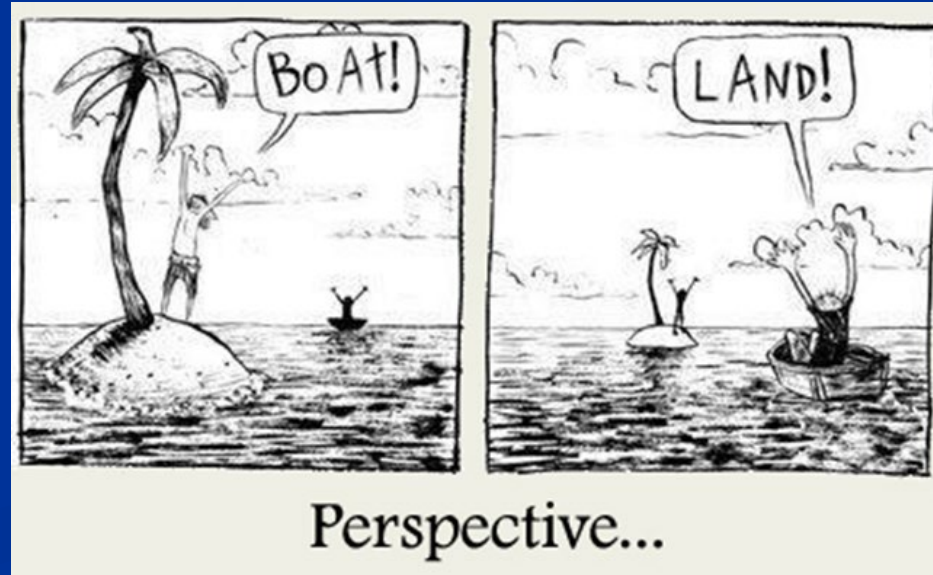
ERASE

Reflections



Using Cognition to alter pain perceptions

Reframing



The Relaxation Response



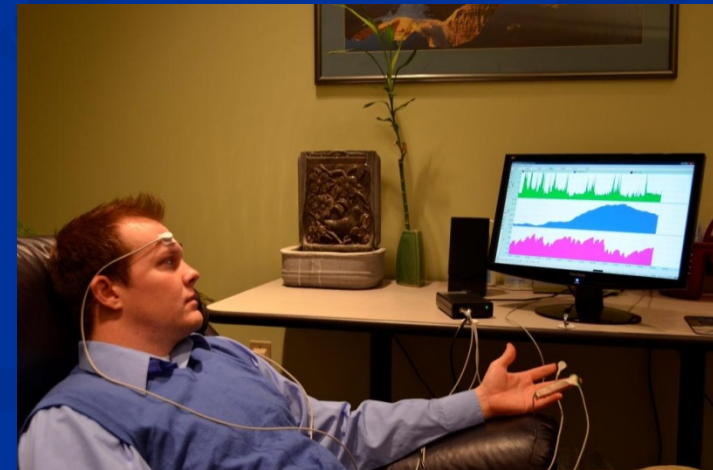
Visual Imagery



Meditation



YOGA



Biofeedback

ERASE

Actions



Using Behavior to alter pain perceptions and
provide a foundation of wellness

Exercise

- Multiple reviews and meta-analyses, and professional society guidelines recommend exercise and physical activity for the treatment of chronic pain and fatigue
- Increase Fitness
- Increase Function



Lifestyle Physical Activity



Pacing for Energy Efficiency

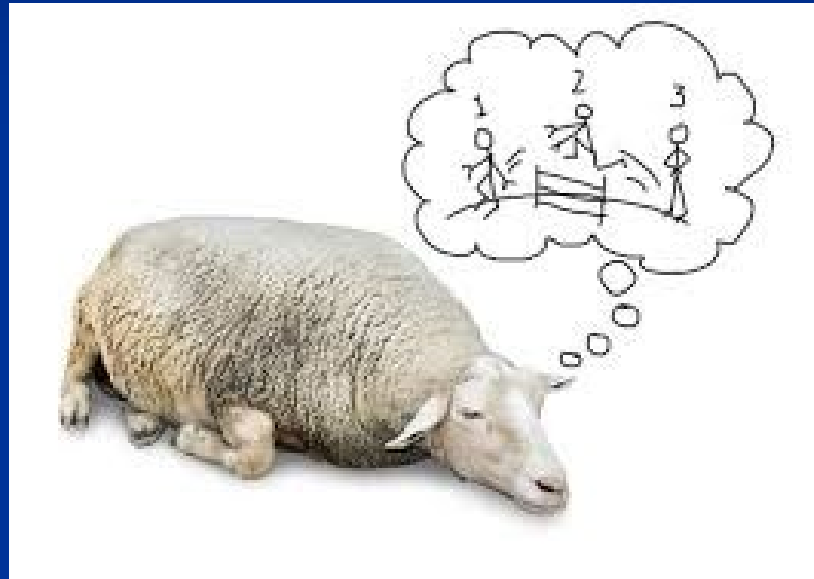


Problem Solving / Goal Setting



ERASE

Sleep



Altering Pain via Sleep

Behavioral and Sleep Hygiene Skills

Timing

Regular bed time/wake time

Sleep Behavior

Get in bed only when sleepy

Use bed for sleep

Get up after 15' if no sleep

Thermal Tips

Decline in core temp signals sleep

Exercise, warm bath before bed

Environment

Steady room temperature

Keep room dark

Ingestion

Decrease nicotine

Decrease Caffeine

Alcohol interferes with sleep

Light snack is recommended

Mental Control

Effort will not produce sleep

Avoid mental stimulation

Seek mental quiescence

ERASE

Environment



Using the Environment to alter pain perceptions
and provide a foundation of wellness

Social Challenges



Dr. -Patient



Friends



Family

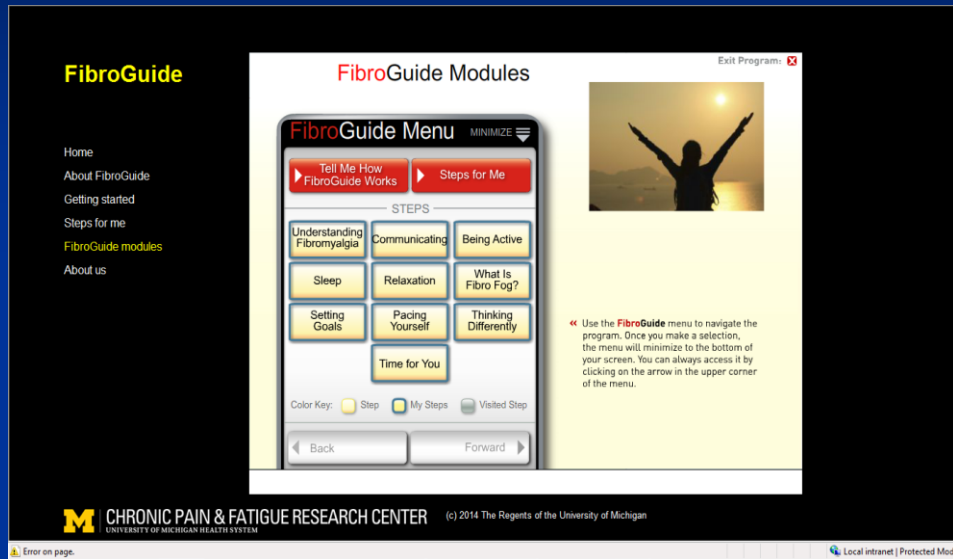


Employer and co-workers

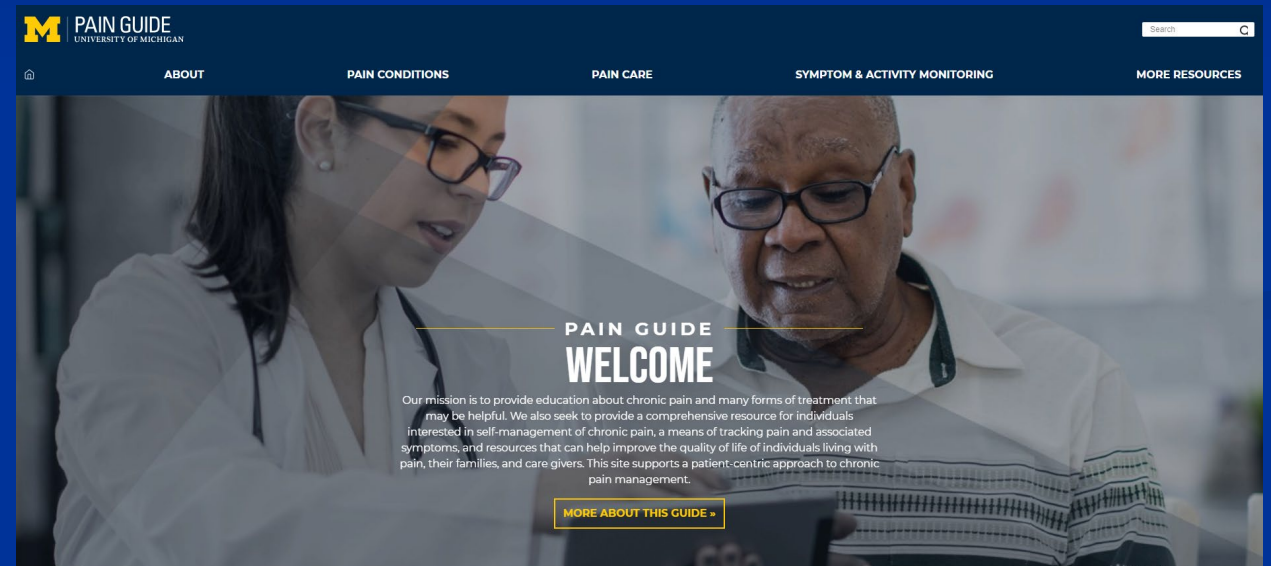
Physical Challenges



Web-based self-management

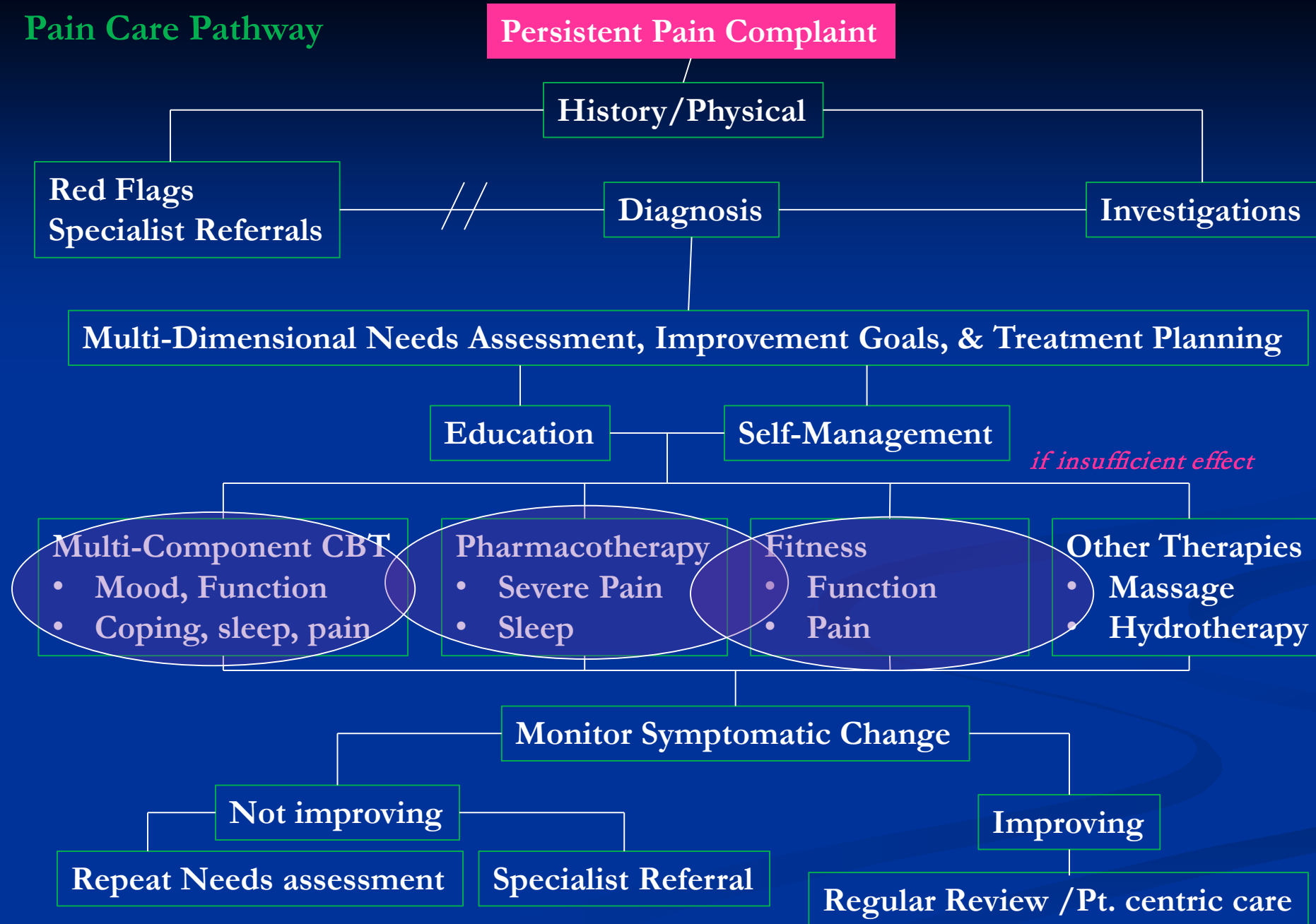


<http://fibroguide.med.umich.edu/>



Coming soon:
PAIN Guide

Pain Care Pathway



Pharmacological Therapies for Central Pain States

Strong Evidence	■ Dual reuptake inhibitors such as ■ Tricyclic compounds (amitriptyline, cyclobenzaprine) ■ SNRIs and NSRIs (milnacipran, duloxetine, venlafaxine?) ■ Anticonvulsants (e.g., pregabalin, gabapentin)
Modest Evidence	■ Tramadol ■ Older less selective SSRIs ■ Gamma hydroxybutyrate ■ Low dose naltrexone ■ Cannabinoids
Weak Evidence	■ Growth hormone, 5-hydroxytryptamine, tropisetron, S-adenosyl-L-methionine (SAME)
No Evidence	■ Opioids, corticosteroids, nonsteroidal anti-inflammatory drugs, benzodiazepine and nonbenzodiazepine hypnotics, guanifenesin

Non-Pharmacological Therapies for Chronic Pain States

Strong Evidence	■ Education ■ Aerobic exercise ■ Cognitive behavior therapy
Modest Evidence	■ Strength training ■ Hypnotherapy, biofeedback, balneotherapy
Weak Evidence	■ Acupuncture, chiropractic, manual and massage therapy, electrotherapy, ultrasound
No Evidence	■ Tender (trigger) point injections, flexibility exercise

FibroGuide and Pain Guide can serve as the foundation for CBT

FibroGuide

An Online Self-Management Program for
Individuals with Fibromyalgia

Facilitator's Manual

David A Williams, Ph.D.
Professor, University of Michigan

Adapted from Living Well with Fibromyalgia

To be used with FibroGuide.com or FibroGuide.med.umich.edu



Pain Guide

An Online Self-Management Program for
Individuals with Chronic Pain

Facilitator's Manual

David A Williams, Ph.D.
Professor, University of Michigan

Bottom Line

- 1. Pain is not located in a body part. It is a perception and needs to be treated as a perception.
- 2. Taking time to just listen to the patient's story is a necessary part of pain treatment. You will be treating the affective and social components of pain.
- 3. If you recommend self-management (exercise, relaxation, sleep hygiene etc.), ask about it with the same enthusiasm and regularity that you ask about drugs. Patients learn what you think is really important by what you ask about.