

Pain Management: Rationale for the BioPsychoSocial Perspective

MI-CCSI

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University of Michigan Medical Center

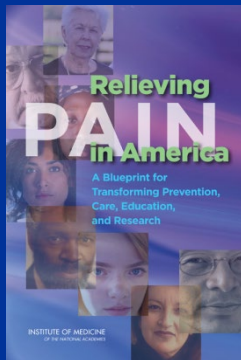
Ann Arbor, Michigan

Disclosures

- Consultant to Community Health Focus Inc.
- Consultant to Swing Therapeutics, Inc.
- Funded for research by NIH

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

Chronic Pain Numbers



100 Million People
- US

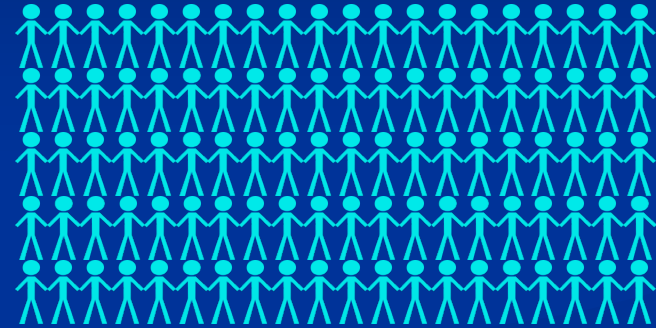


150 Million
- 37 Countries

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



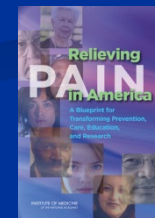
Heart Disease 27.6 Million



Cancer 13.7 Million



 = 1 Million individuals



What is Pain?

An unpleasant sensory and emotional experience associated with, or resembling that associated with, actual or potential tissue damage



What is Pain?

An unpleasant sensory and emotional experience associated with, or resembling that associated with, actual or potential tissue damage

- Pain is always a personal experience that is influenced to varying degrees by biological, psychological, and social factors.

- Pain and nociception are different phenomena. Pain cannot be inferred solely from activity in sensory neurons.

- Through their life experiences, individuals learn the concept of pain.

- A person's report of an experience as pain should be respected.

- Although pain usually serves an adaptive role, it may have adverse effects on function and social and psychological well-being.

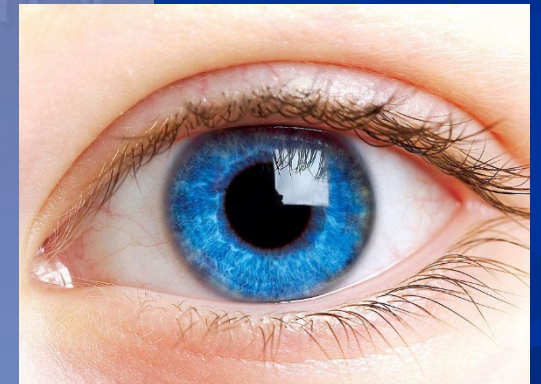
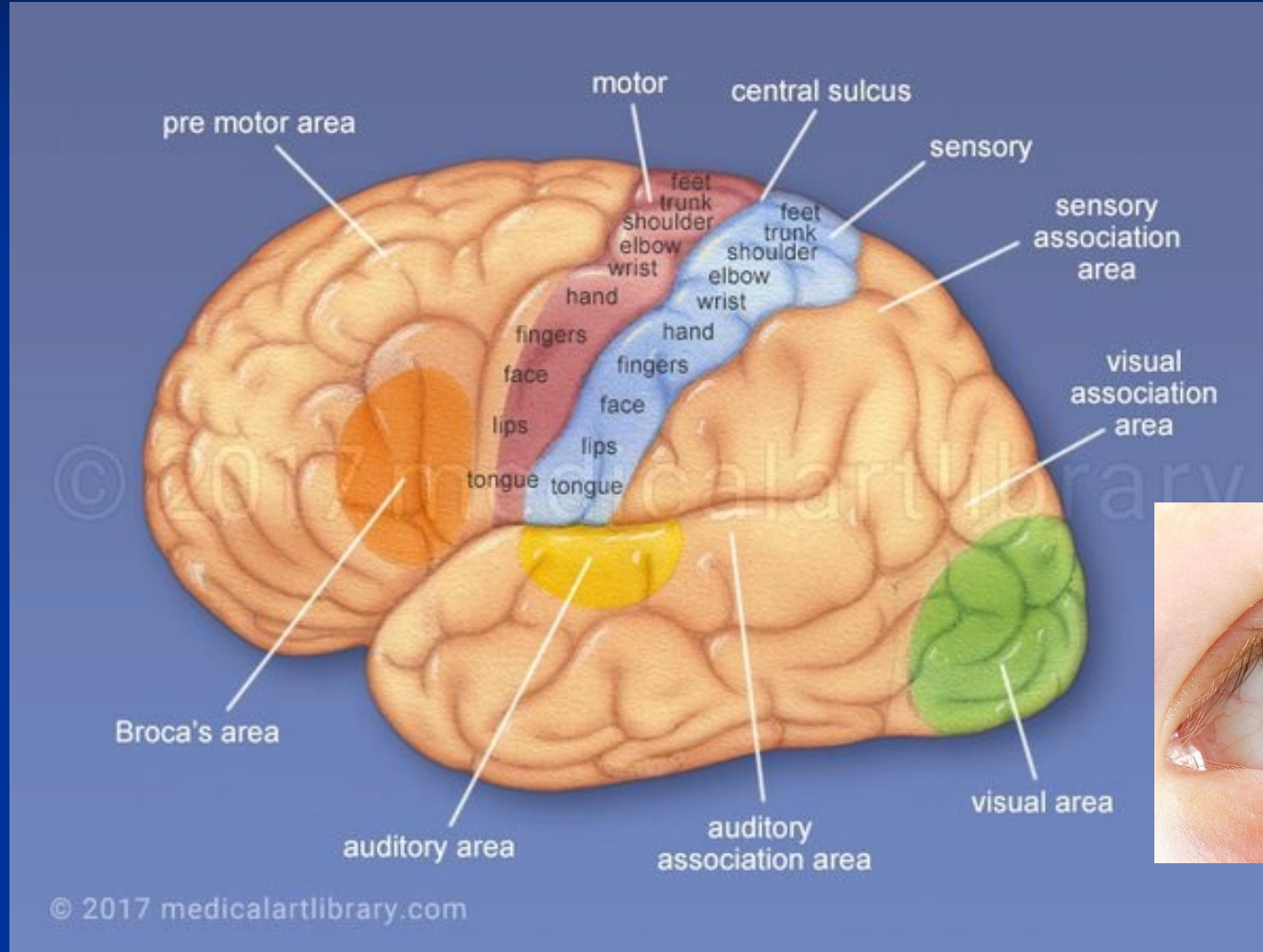
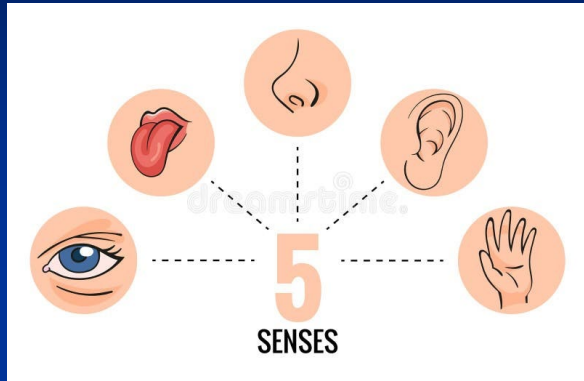
- Verbal description is only one of several behaviors to express pain; inability to communicate does not negate the possibility that a human or a nonhuman animal experiences pain.



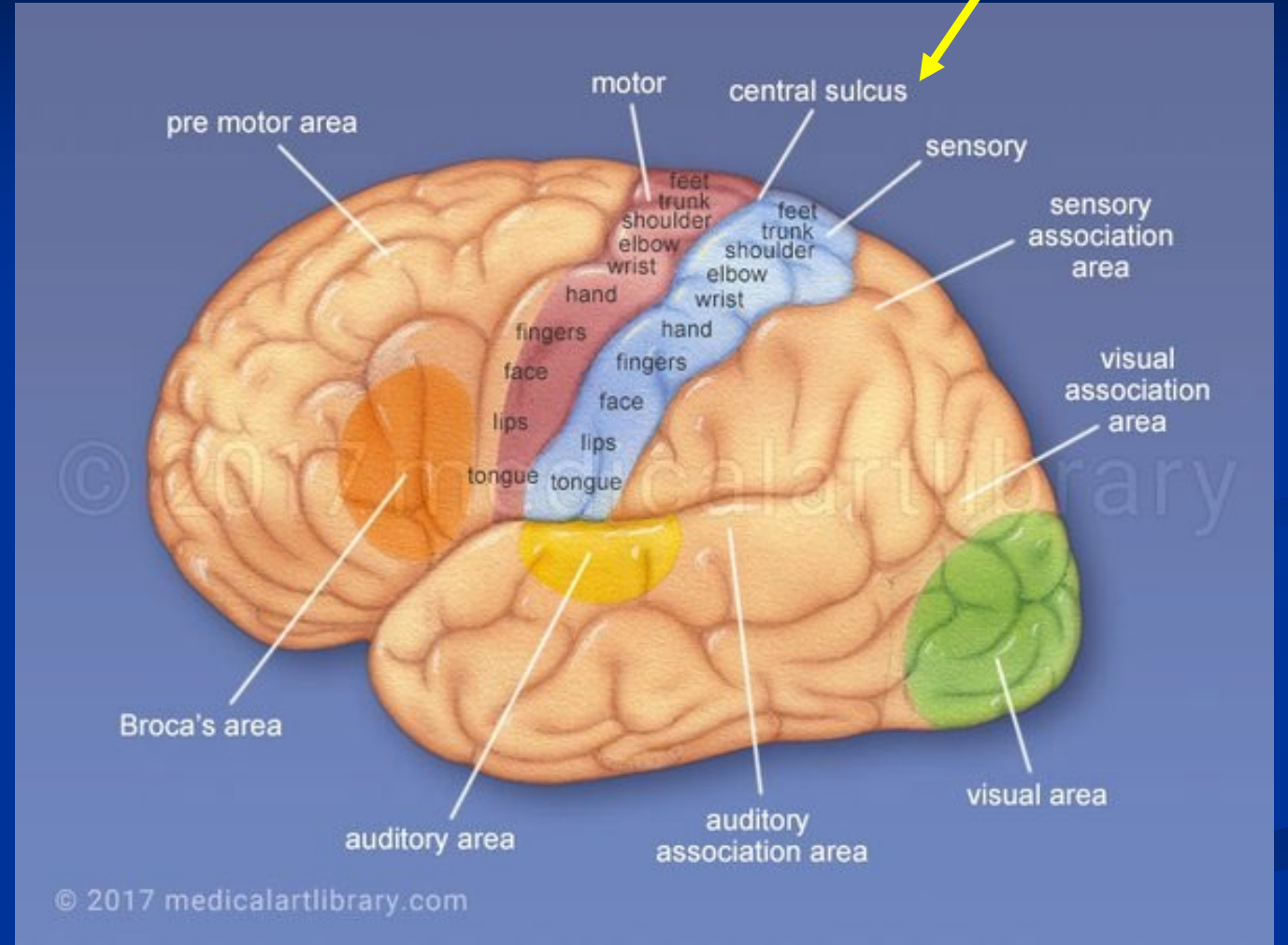
How Does Pain Happen?



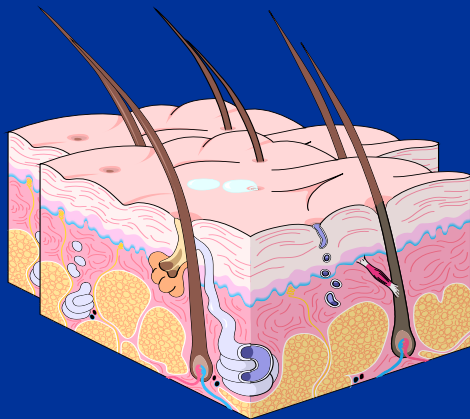
Multi-Stage Sensory Processing



Pain Processing and Location



Nociception

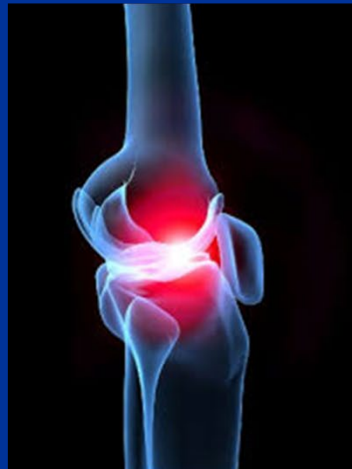


How is Pain Classified?

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

Newest Classification: Pain Mechanisms

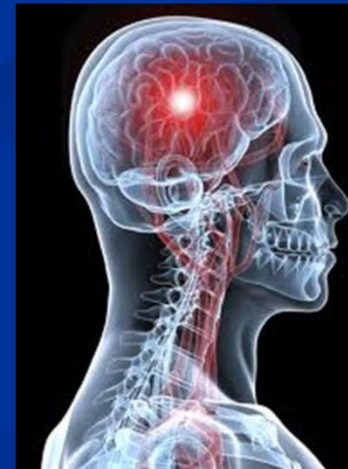
Nociceptive
Peripheral damage
or inflammation



Neuropathic



Central



Nociceptive Pain

Mechanical, Thermal, Chemical
Inflammation or Damage



Pain is well localized
Consistent with injury/damage



Classic Examples:
OA, autoimmune disorders, Cancer pain, Injury

Responsive to:
NSAIDS, injections, surgery, opioids

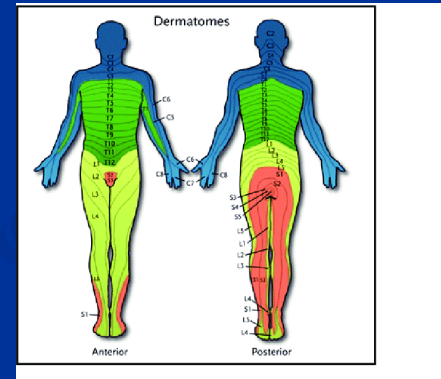


Neuropathic Pain (Peripheral or Central)

Nerve Damage or Entrapment



Peripheral nerve distribution (e.g., dermatomes)
Experienced as episodic numbness/tingling



Responsive to:

Local treatments of nerves

Surgery, injections, CNS-acting drugs

Classic Examples:

Painful diabetic neuropathy, Sciatica,
Carpal Tunnel, Post-Stroke pain



Nociplastic Pain

CNS augmentation of peripheral nociception or CNS generation

Pain is widespread

- Disproportionate to injury
- Accompanied by CNS-mediated symptoms

Responds to:

CNS acting drugs and Non-pharm treatments

Classic Examples:

- Fibromyalgia
- Chronic overlapping pain conditions (COPCS)



Chronic Overlapping Pain Conditions


 RESEARCH
 EDUCATION
 TREATMENT
 ADVOCACY

PUBLISHED BY

 ELSEVIER

The Journal of Pain, Vol 17, No 9 (September), Suppl. 2, 2016: pp T93-T107
 Available online at www.jpain.org and www.sciencedirect.com

Overlapping Chronic Pain Conditions: Implications for Diagnosis and Classification 

William Maixner,^{*,†} Roger B. Fillingim,[‡] David A. Williams,[§] Shad B. Smith,^{*,†} and Gary D. Slade^{*,†,||}

^{*}Center for Pain Research and Innovation, [†]Department of Dental Ecology, [‡]Department of Epidemiology, University of North Carolina at Chapel Hill, Chapel Hill, North Carolina.
[†]Center for Translational Pain Medicine, Department of Anesthesiology, Duke University, Durham, North Carolina.
[‡]Pain Research and Intervention Center of Excellence, University of Florida, Gainesville, Florida.
[§]Chronic Pain and Fatigue Research Center, Department of Anesthesiology, University of Michigan, Ann Arbor, Michigan.

- Term defined by the National Institutes of Health ~ 2013
- Conditions likely to co-exist sharing neurobiological underpinnings
- Conditions predominantly (or solely) affecting women
- Any number and combination of conditions is possible
- Several conditions can develop at once or gradually over years

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

COPCs ¹	US Prevalence
Irritable Bowel Syndrome	44 Million
Temporomandibular Disorder	35 Million
Chronic Low Back Pain	20 Million
Interstitial Cystitis / BPS; chronic prostatitis	8 Million
Migraine Headache	7 Million
Tension Headache	7 Million
Endometriosis (Painful)	6 Million
Vulvodynia	6 Million
Fibromyalgia	6 Million
Myalgic Encephalopathy / CFS	4 Million

Relative Weights of the Mechanisms Impact Treatment

Nociceptive

- Localized
- 1:1 relationship damage to pain
- Peripheral generator



Nociplastic

- Widespread
- Poor relationship: damage to pain
- Central generator/augmentation



Guitar and Amplifier Analogy

What Do We Know About the Central Amplifier?

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

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Neurobiological perspective

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- Amygdala
- Hippocampus

I still feel
pain



CNS Neurotransmitters

Influencing Pain

Facilitation

Gabapentinoids,
ketamine

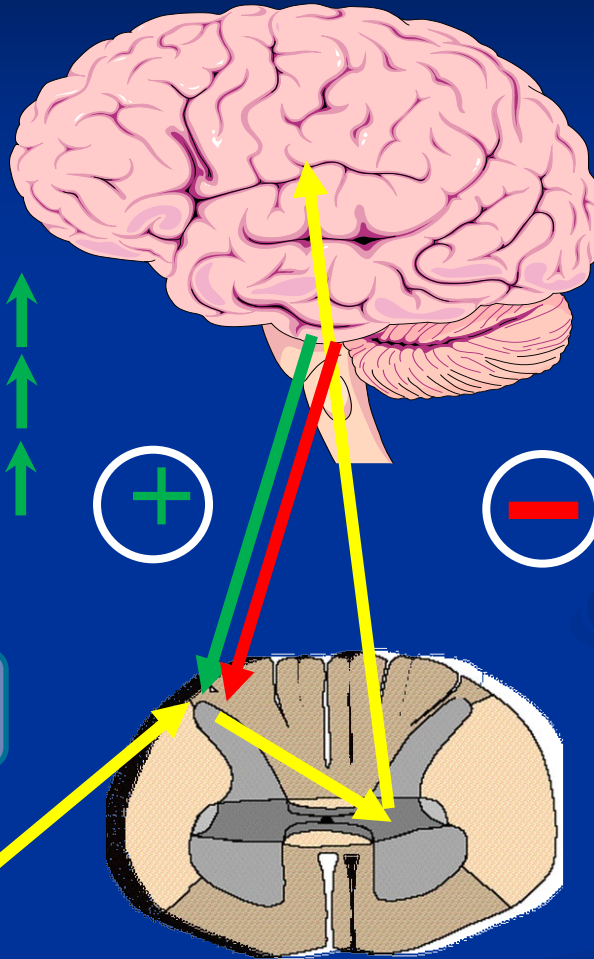
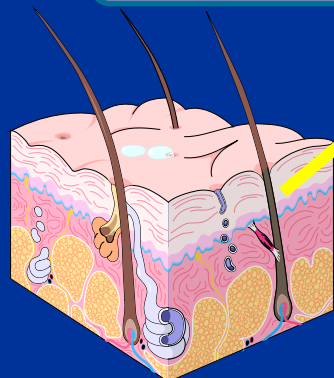
Glutamate and EAA

Substance P

Nerve growth factor

Serotonin
(5HT_{2a, 3a})

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

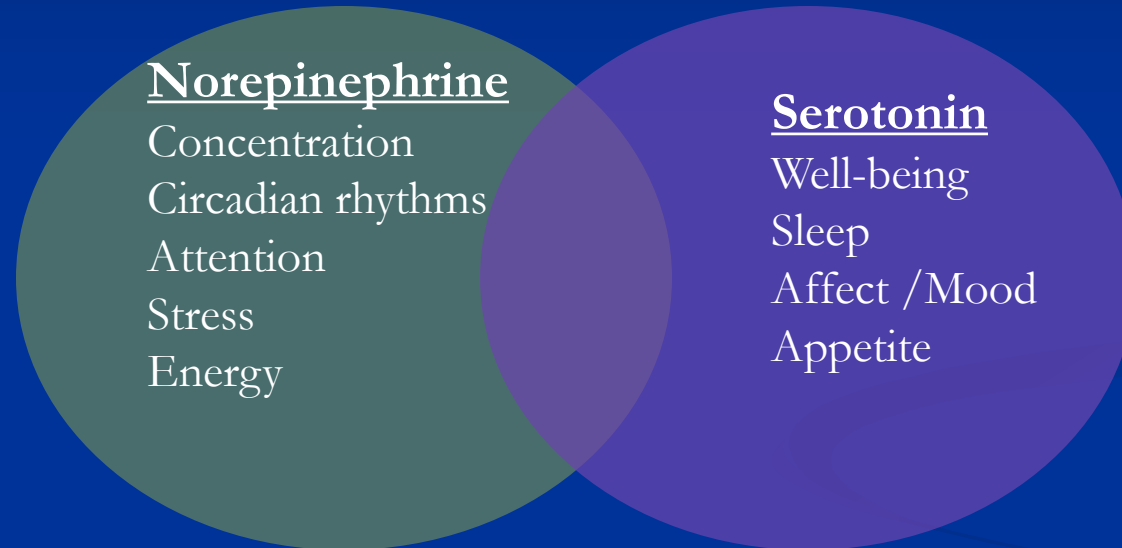
Circadian rhythms

Attention

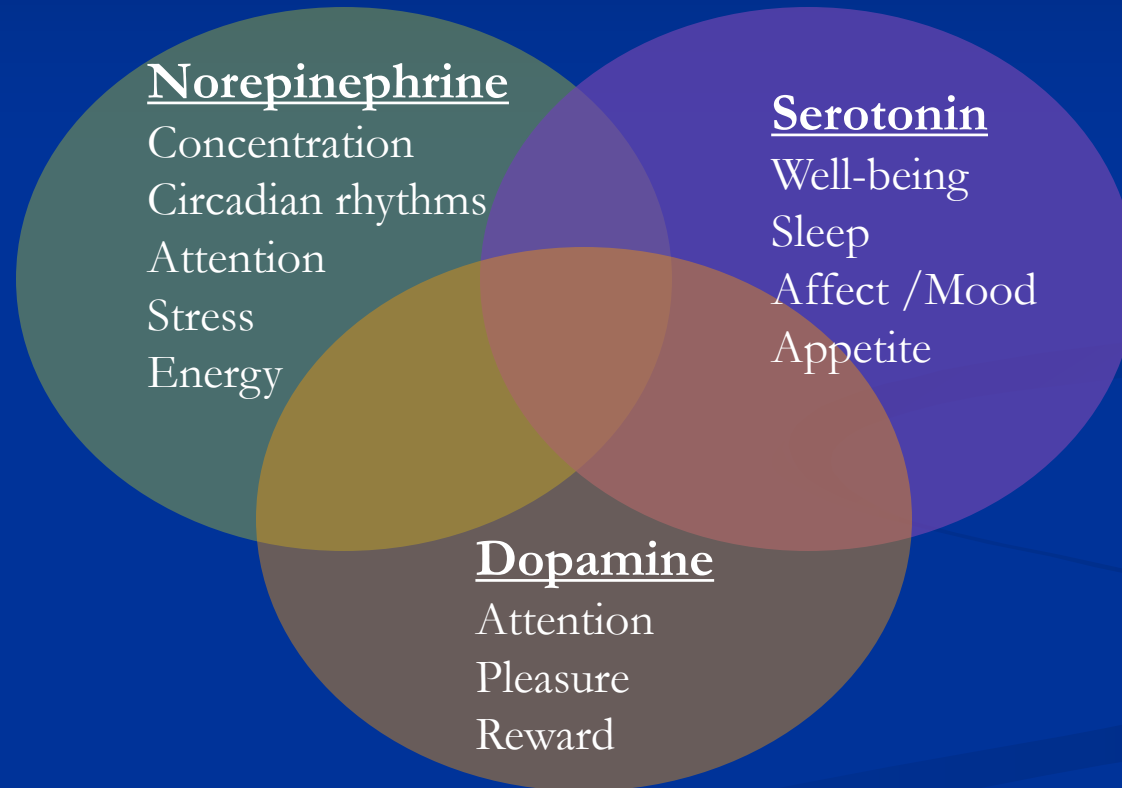
Stress

Energy

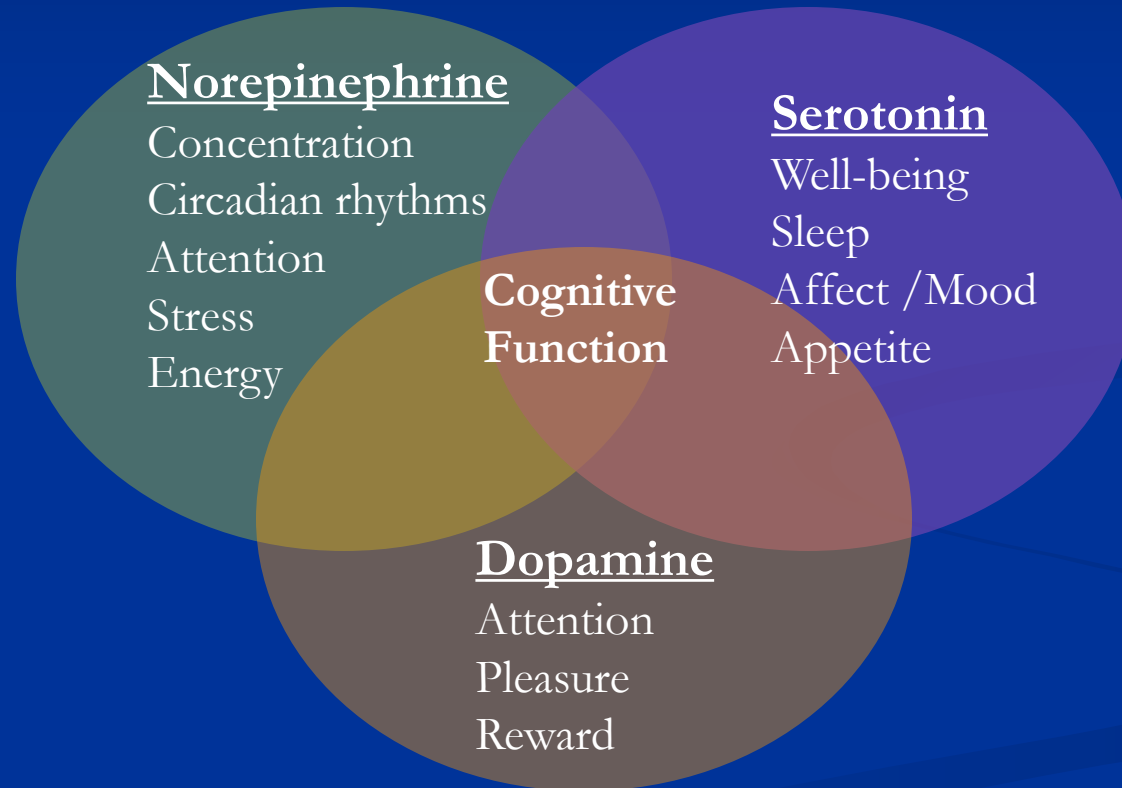
Neurotransmitters for Pain Processing



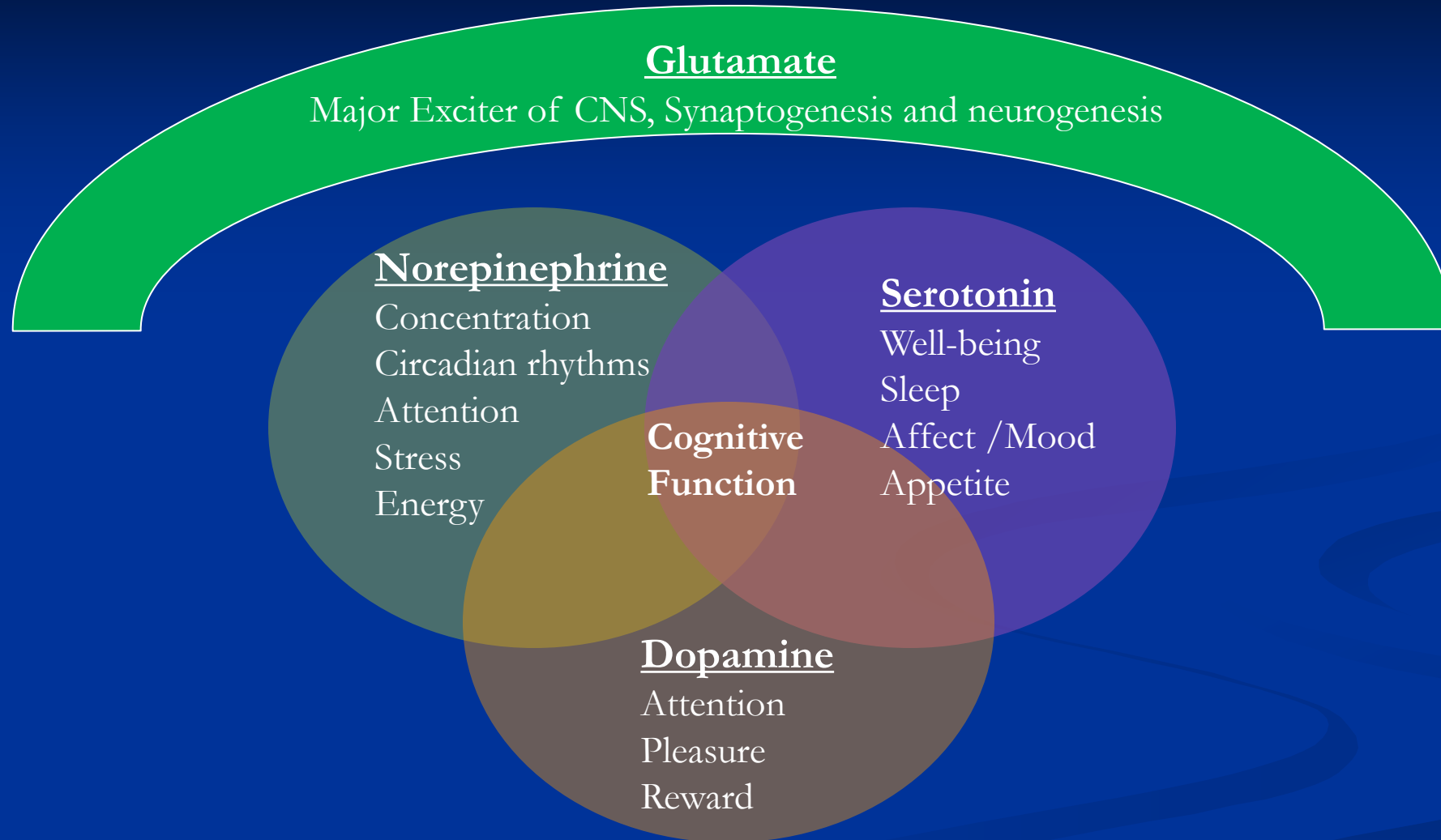
Neurotransmitters for Pain Processing



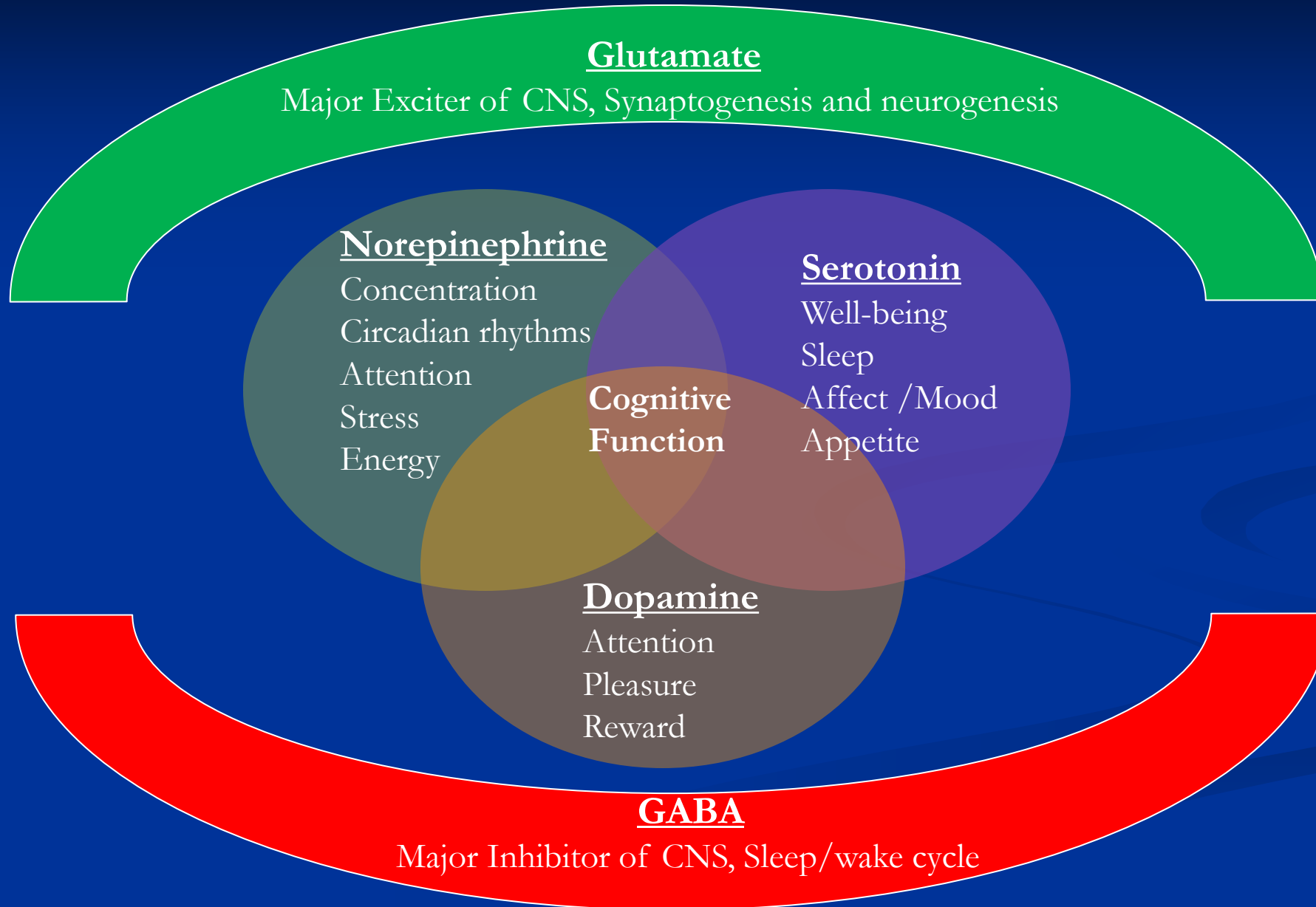
Neurotransmitters for Pain Processing



Neurotransmitters for Pain Processing



Neurotransmitters for Pain Processing



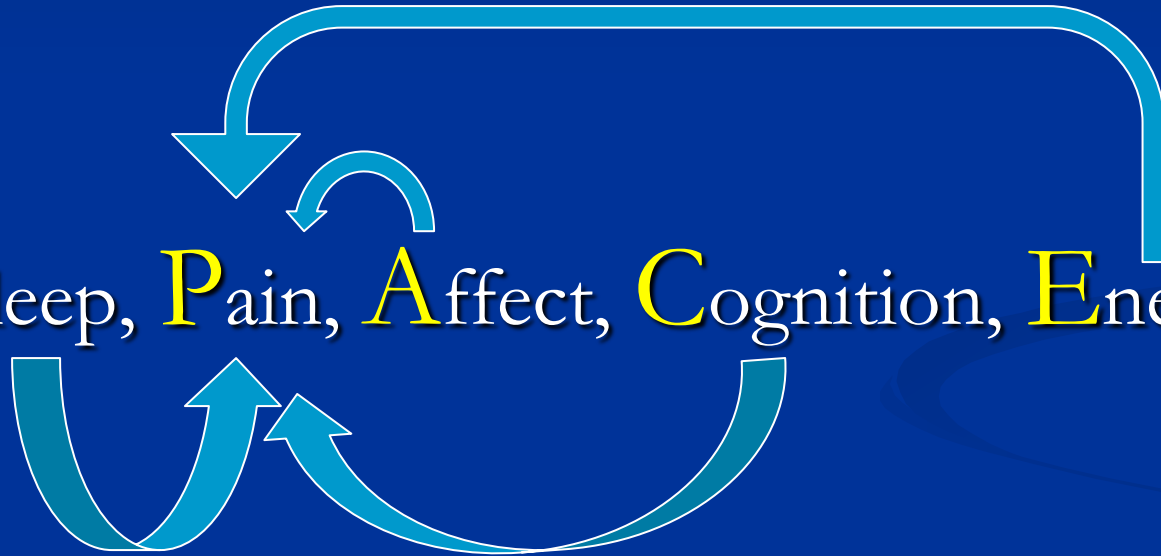
Shared Neurotransmitters Explain

- The complexity of chronic pain presentation

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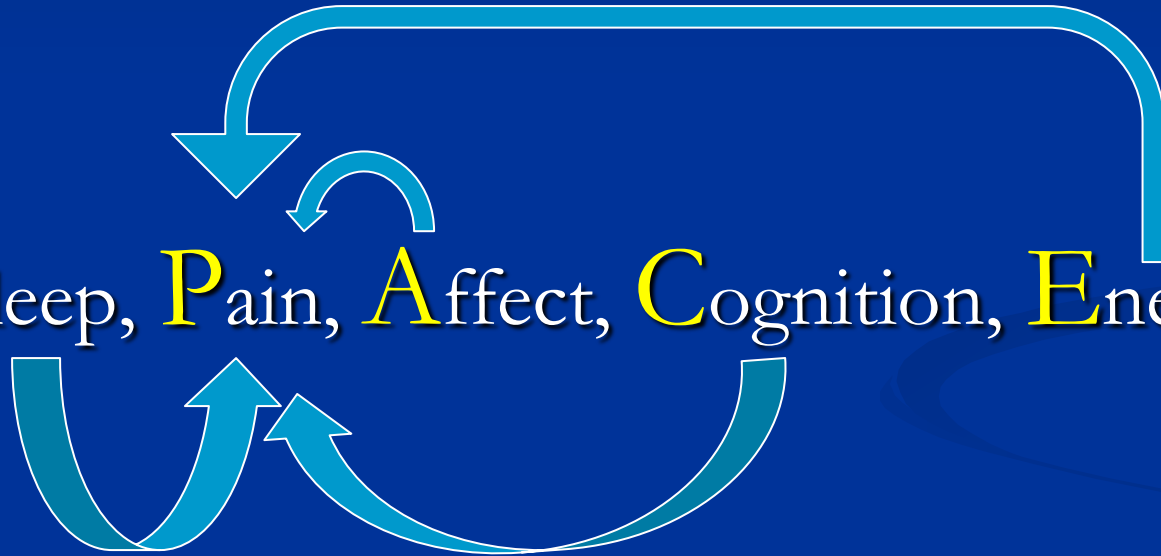
■ Sleep, Pain, Affect, Cognition, Energy



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?



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

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

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^{||,***}

Conclusions. There is little evidence for the specific efficacy beyond sham for invasive procedures in chronic pain

Pain Medicine, 20(7), 2019, 1281–1293

doi: 10.1093/pm/pny154

Advance Access Publication Date: 10 September 2018

Review Article

OXFORD

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

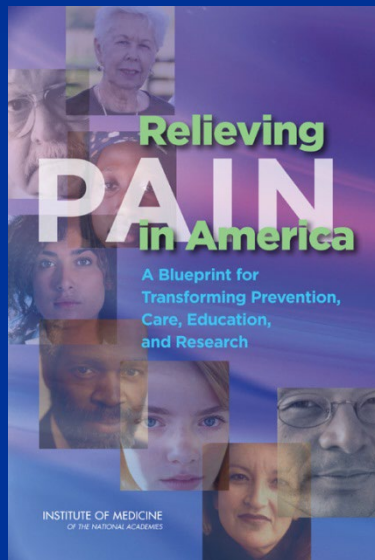
Biopsychosocial model
Interdisciplinary
Pain Management

- **Focus on multidisciplinary teams**
- **Focus on pain management**

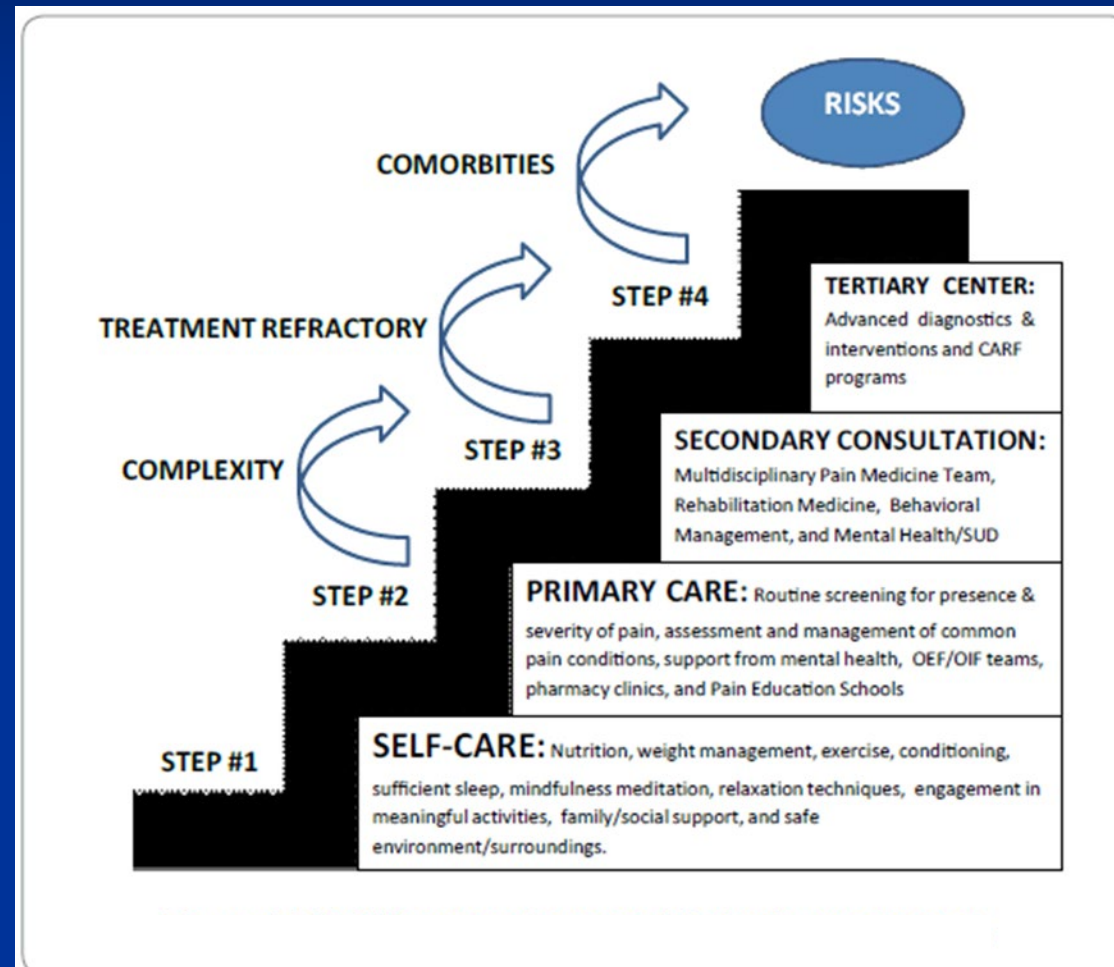
Patient is active participant

Recommendations in Multiple Federal Documents

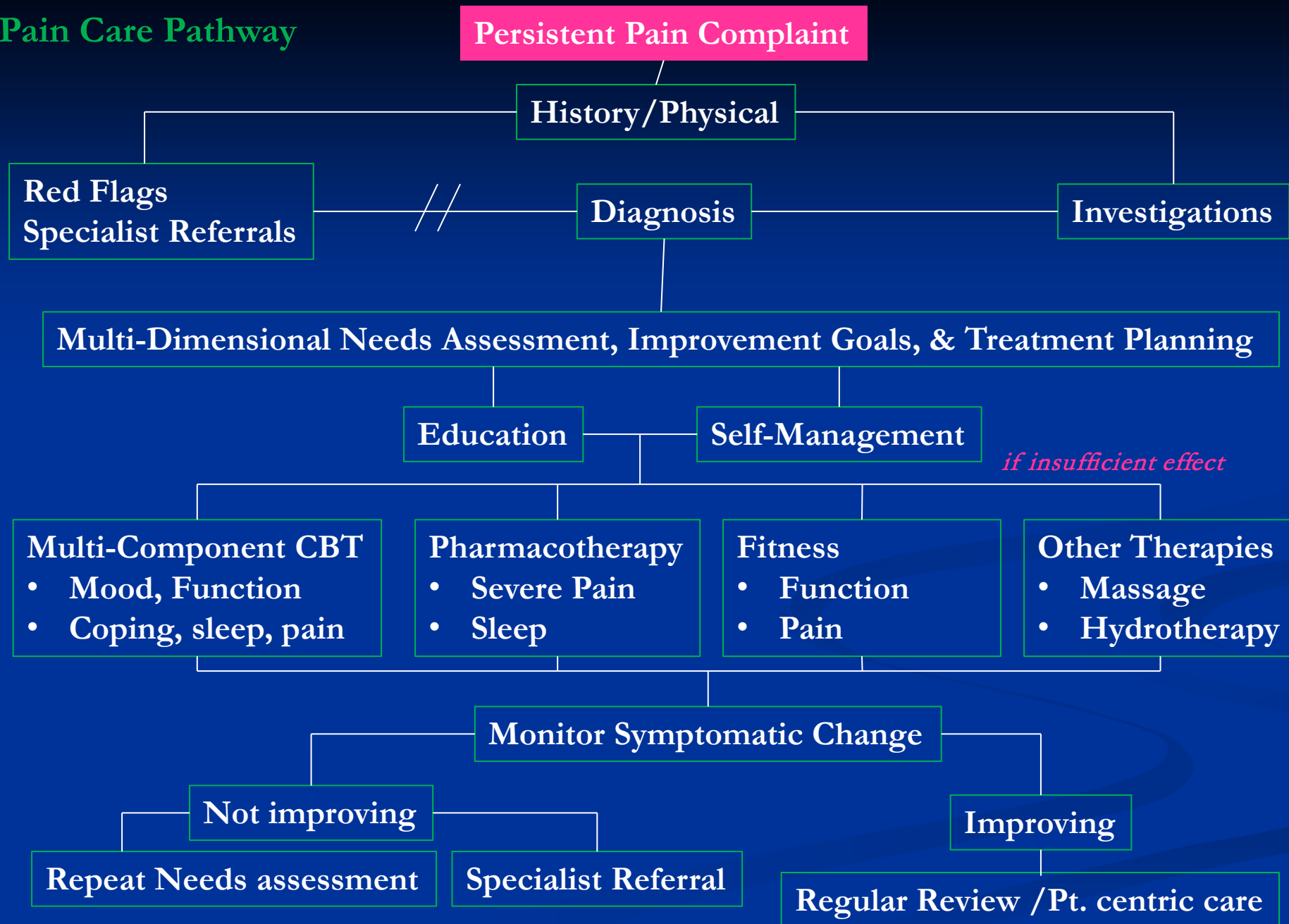
Self-Management, Evidence-Based, Patient-Centric,
Multi-Modal Pain Care



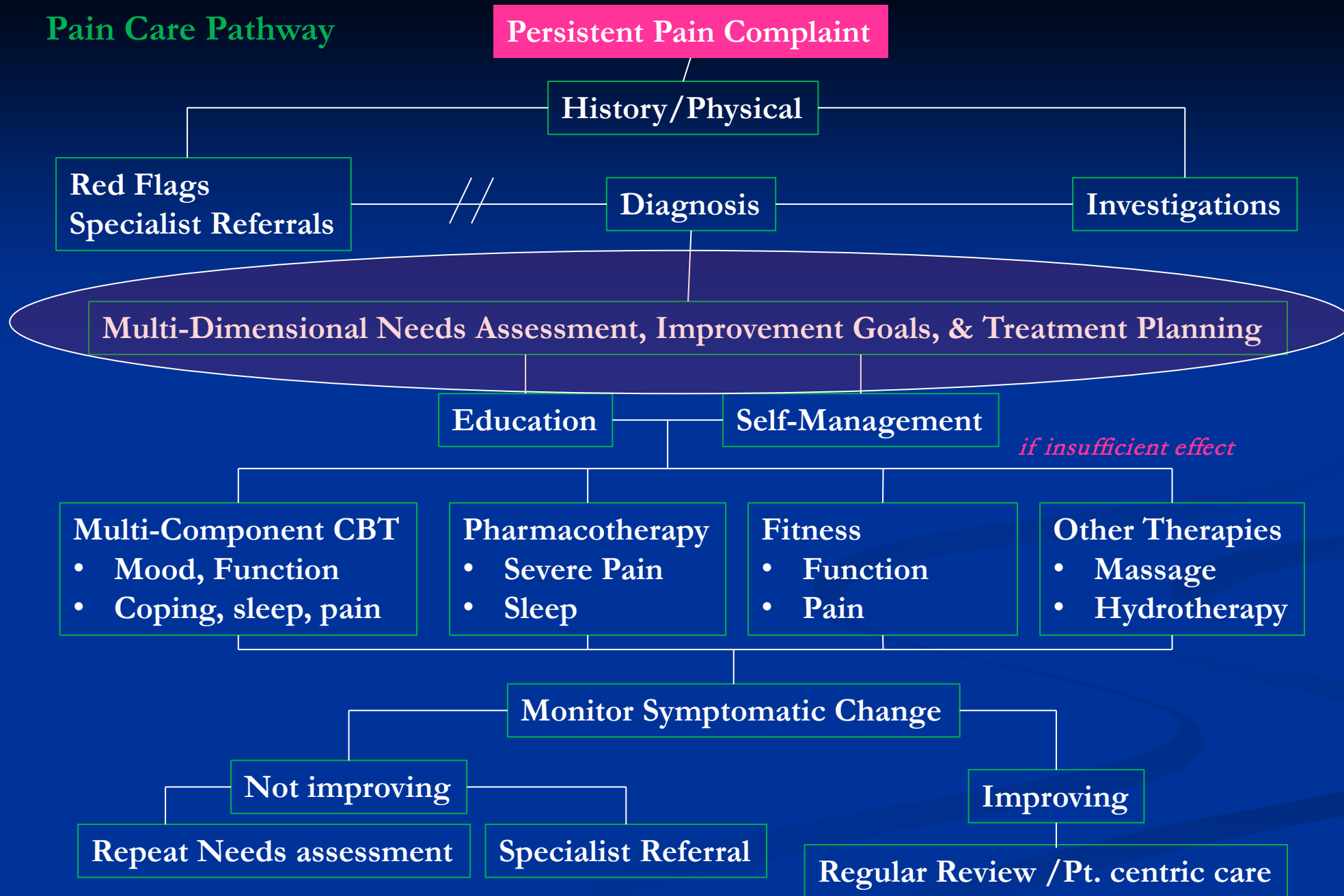
VA's Stepped Care Model of Pain Management



Pain Care Pathway



Pain Care Pathway



How Do you Assess Pain?

- Intensity
- Multi-focal (widespread)

Intensity

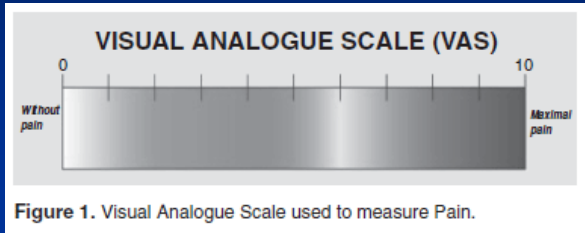
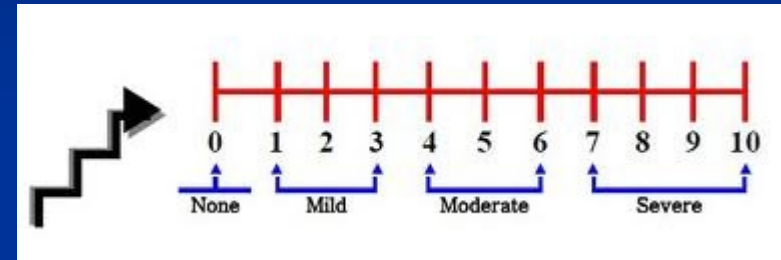
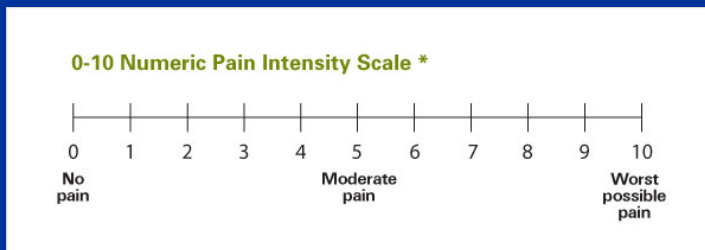


Figure 1. Visual Analogue Scale used to measure Pain.



Verbal Rating Scale: Discomfort Rating

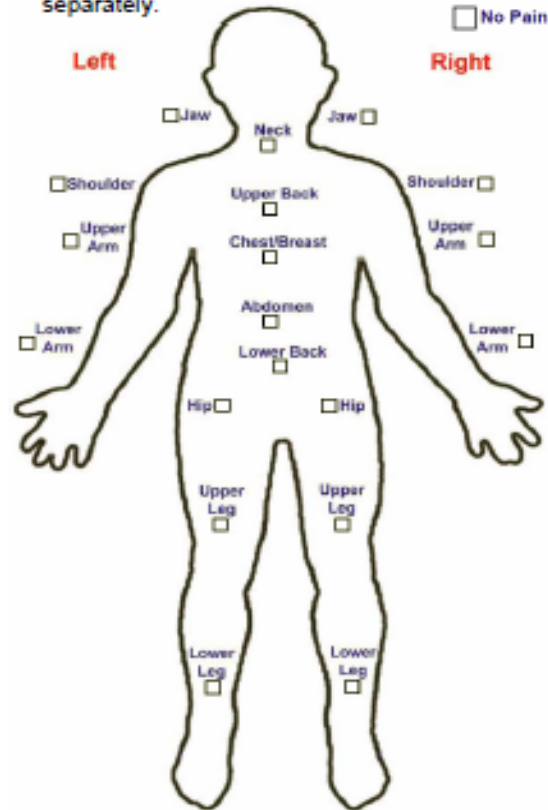
- 0- Pain or Discomfort - none
- 1- Pain or Discomfort - I am aware of it, I think about it
- 2- Pain or Discomfort - I am aware of it, I think about it but I can ignore it at times.
- 3- Pain or Discomfort - I can't ignore it, but I can do my usual activities.
- 4- Pain or Discomfort - It is difficult for me to concentrate; I can only do easy activities.
- 5- Pain or Discomfort - Such that I cant do anything.



2010/11/16 ACR criteria for FM

Fibromyalgia Symptoms (Modified ACR 2010 Fibromyalgia Diagnostic Criteria)

1. Please indicate below if you have had pain or tenderness over the past 7 days in each of the areas listed below. Check the boxes in the diagram below for each area in which you have had pain or tenderness. Be sure to mark right and left sides separately.



2. Using the following scale, indicate for each item your severity over the past week by checking the appropriate box.

No problem

Slight or mild problems: generally mild or intermittent

Moderate: considerable problems; often present and/or at a moderate level

Severe: continuous, life-disturbing problems

	No problem	Slight or mild	Moderate	Severe
a. Fatigue	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. Trouble thinking or remembering	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. Waking up tired (unrefreshed)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

3. During the past 6 months have you had any of the following symptoms?

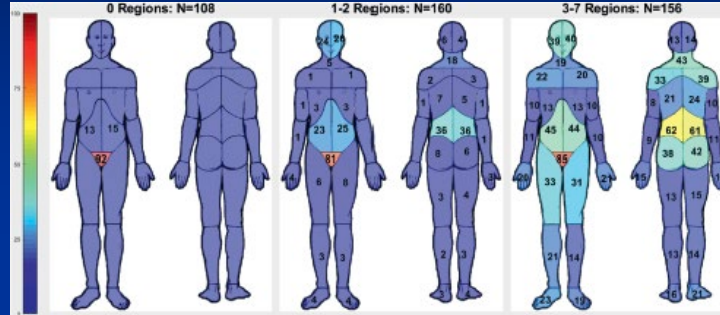
	No	Yes
a. Pain or cramps in lower abdomen	<input type="checkbox"/>	<input type="checkbox"/>
b. Depression	<input type="checkbox"/>	<input type="checkbox"/>
c. Headache	<input type="checkbox"/>	<input type="checkbox"/>

4. Have the symptoms in questions 2-3 and pain been present at a similar level for at least 3 months? No Yes

5. Do you have a disorder that would otherwise explain the pain? No Yes

1. Wolfe et. al. *Arthritis Rheum.* Jun 15 2009;61(6):715-716.
2. Wolfe et. al. *J Rheumatol.* Feb 1 2011.
3. Clauw DJ. *JAMA*, 2014.

Assessment for Treating to Mechanism



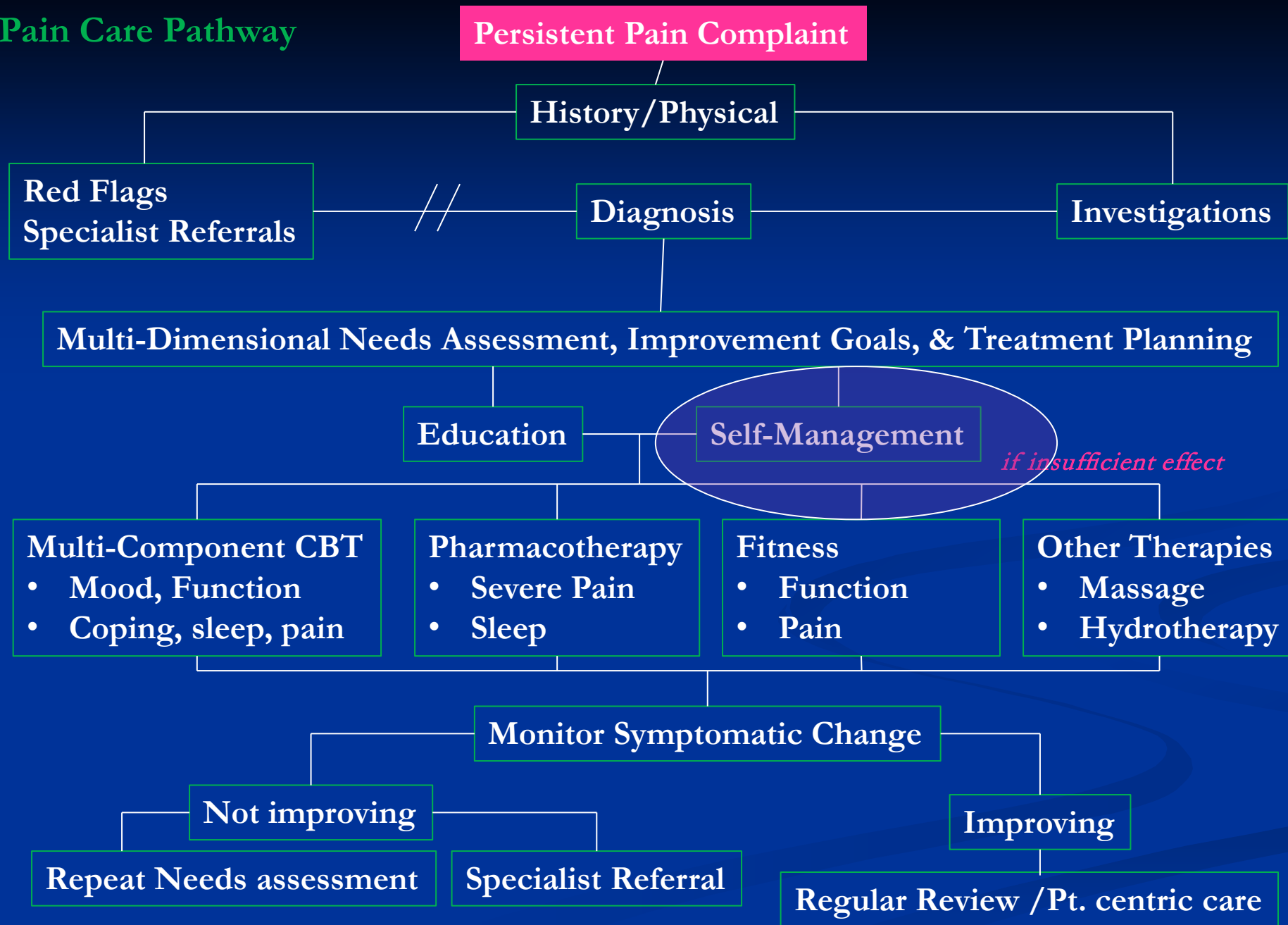
Condition	Index only	1-2 regions + index	≥ 3 + index
IC (n=424)	25%	38%	37%
C. Migraine (n=1601)	29%	26%	45%
Mixed COPCs (n=9169)	25%	75%	

Lai, HH, Jemielita, T, Sutcliffe, S., Bradley CS, Naliboff, B, Williams, DA et al. J. Urology. (2017), 198(3): 622-631.

Barad, MJ et al. Headache. (2021), 61(6): 872-881.

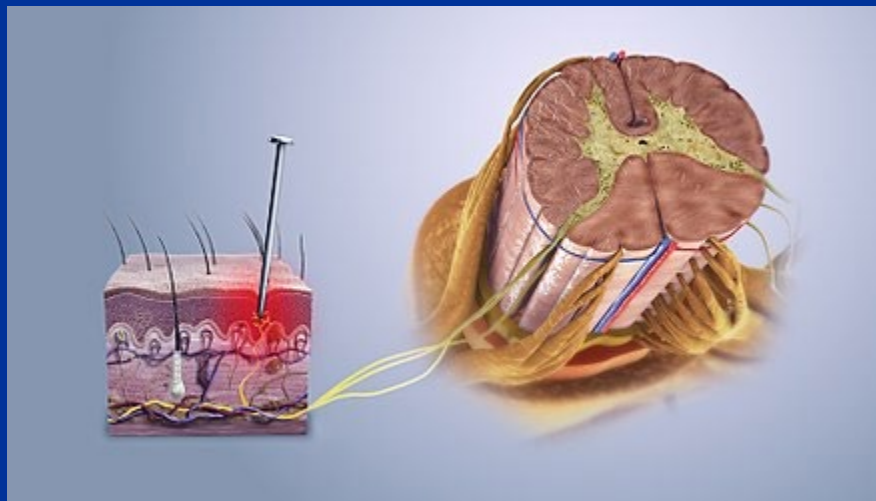
Quinlan, T A et al. Health Services Research. (2021), 56:1233-1244.

Pain Care Pathway



Thinking Differently about Chronic Pain

- Treating a perception requires different techniques than fixing damaged tissues



2 Perceptual/Behavioral Themes to Change how Nociceptive Signals get Processed as Pain

- Change the mental environment in which the nociceptive signal is being processed
- Leverage natural body rhythm patterns to regulate the body and get better functioning

Change the mental background

Pain	Pain
Pain	Pain

Visual Example

Change the mental background

Pain	Pain
Pain	Pain



Auditory Example

Change the mental background

Pain	Pain
Pain	Pain



Auditory Example

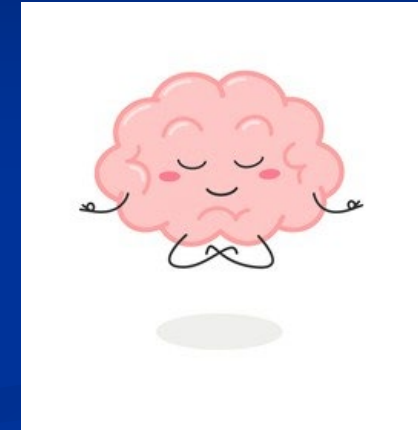
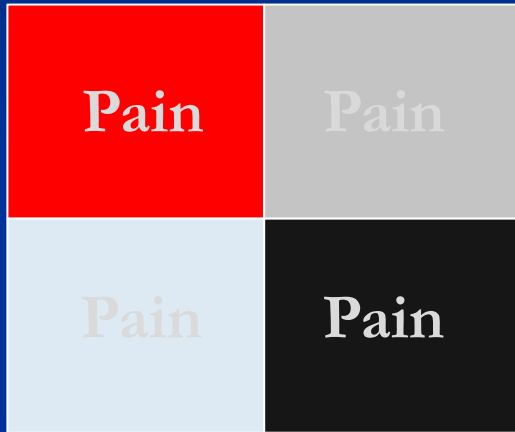
Change the mental background

Pain	Pain
Pain	Pain



Nociceptive Example

Processing nociception against a central background



Nociceptive Example

Teach your body an activity rhythm



2 weeks of consistency

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

Emotions

Reflections

Actions

Sleep

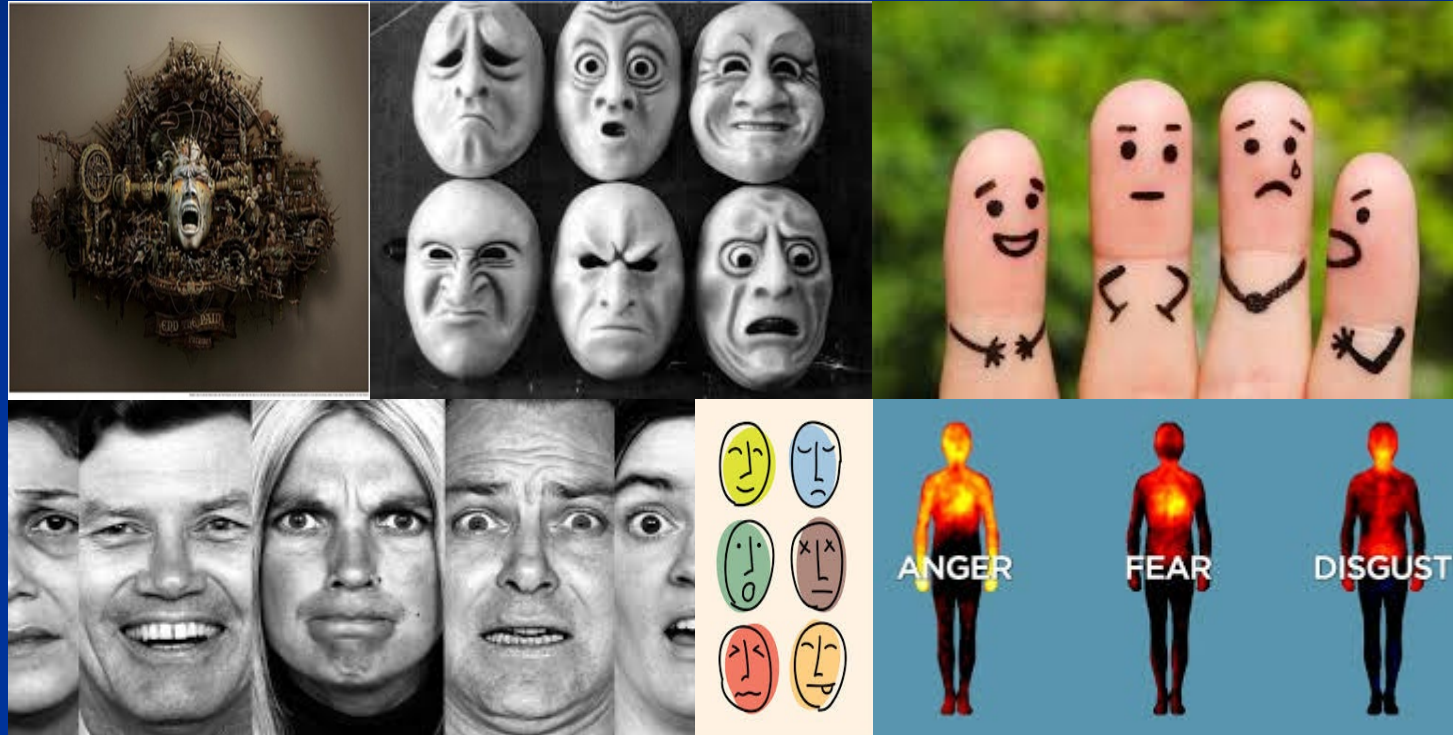
Environment



Sleep, Pain, Affect, Cognitive changes, Energy deficits

ERASE

Emotions



Altering pain perception through Emotions

Approaches to Resolve Negative Affect Influencing Chronic Pain



Emotional Awareness and Expression Therapy (EAET)



Pleasant Activity Scheduling

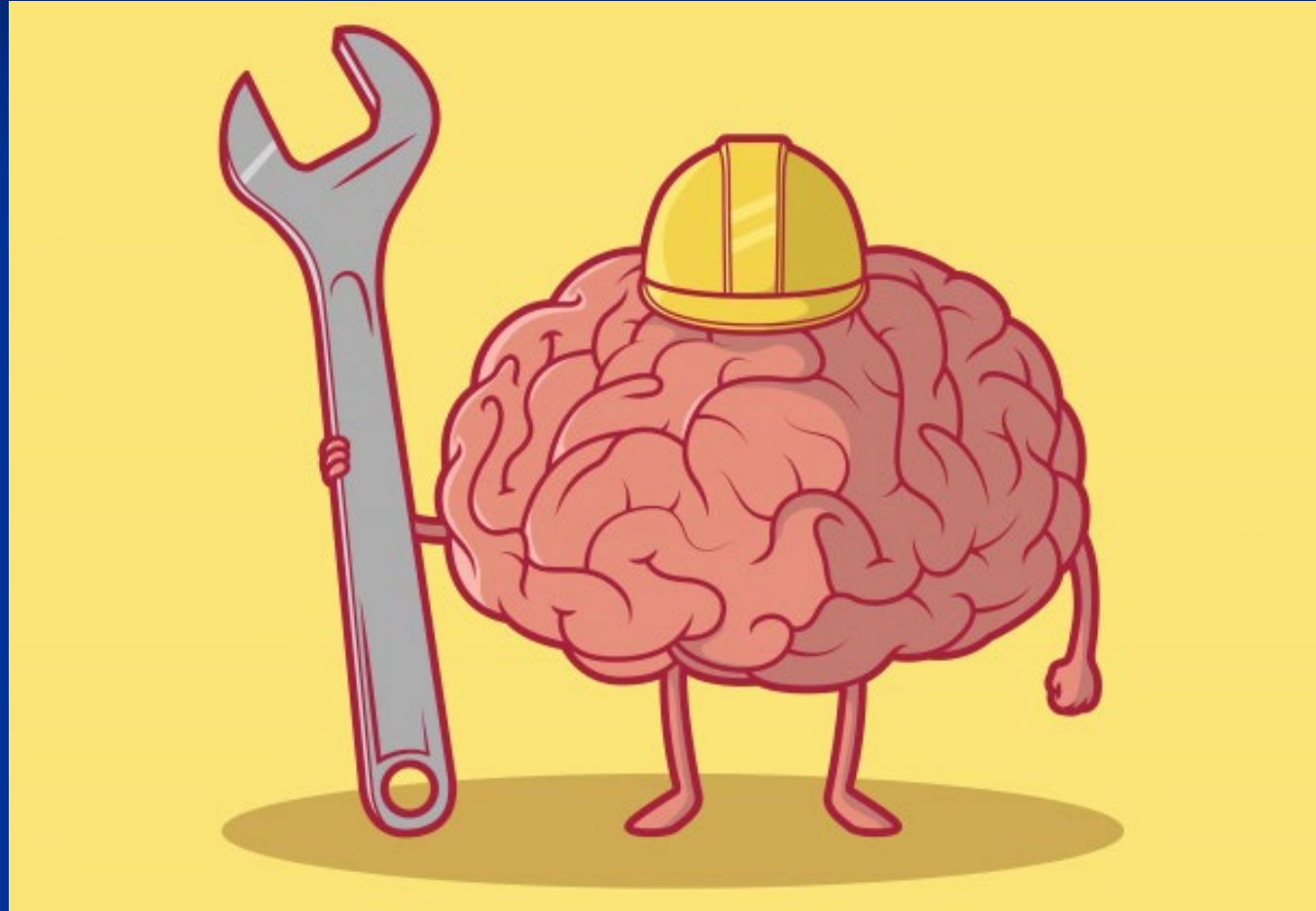


Traditional Psychotherapy

- Changes the emotional background for processing nociceptive signals

ERASE

Reflections



Using Cognition to alter pain perceptions

The Relaxation Response

– Calms the background CNS for processing nociceptive signals



PMR



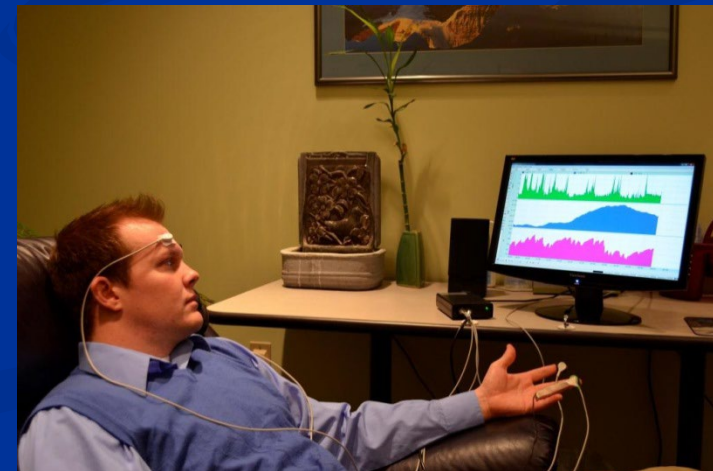
Visual Imagery



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



Rhythmic activity trains the body to expect regular activity
- muscle tone

Pacing for Energy Efficiency

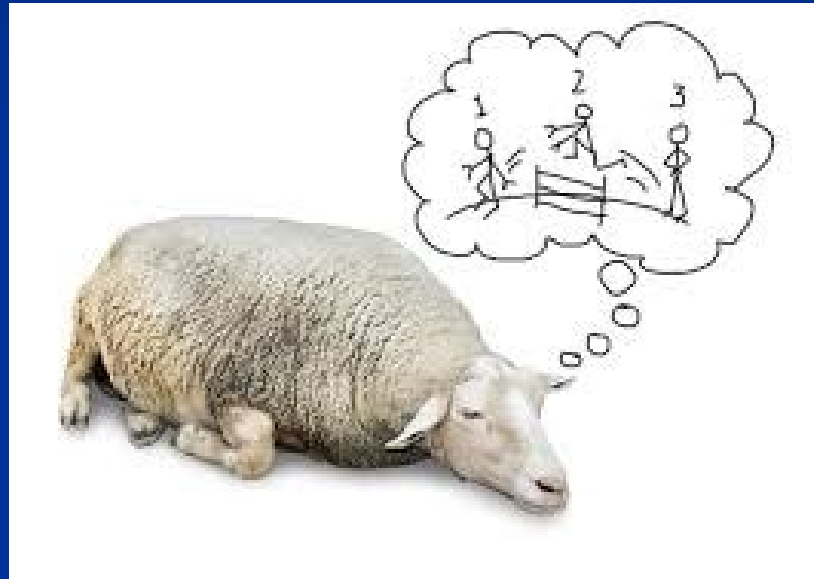


Safe Rhythmic activity teaches the body that protective flares are not needed.



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

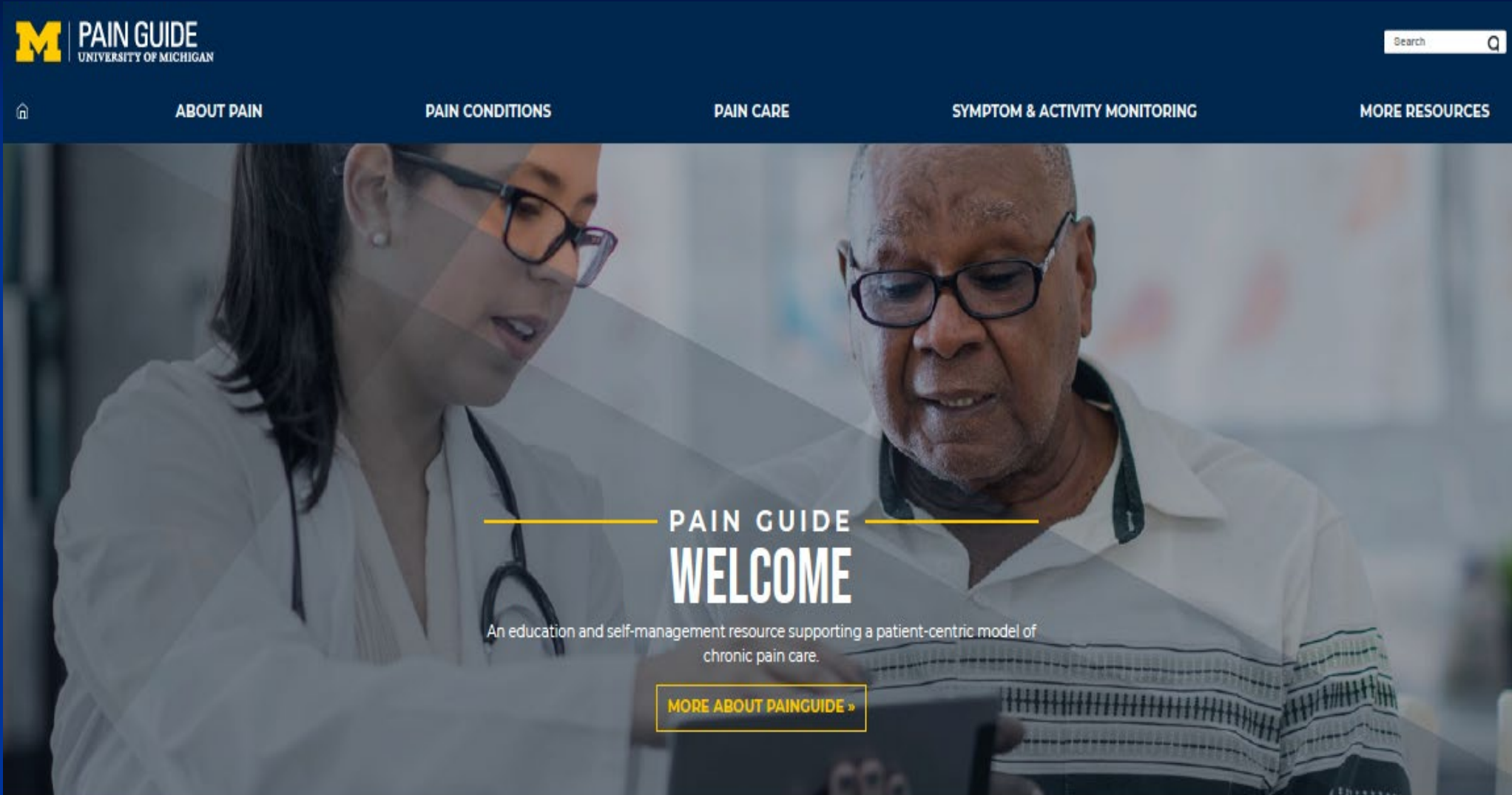


Employer and co-workers

Physical Challenges



Web-based self-management



M | PAIN GUIDE
UNIVERSITY OF MICHIGAN

Search

ABOUT PAIN PAIN CONDITIONS PAIN CARE SYMPTOM & ACTIVITY MONITORING MORE RESOURCES

PAIN GUIDE
WELCOME

An education and self-management resource supporting a patient-centric model of chronic pain care.

[MORE ABOUT PAINGUIDE »](#)

<https://PainGuide.com>

Self Care



Exercise

Exercise, when done safely, can benefit you physically and mentally. It helps prevent deconditioning of muscles which is often associated with more pain. Studies find that exercise is one of the most beneficial approaches to managing pain.

[Learn more >](#)



Pacing

People with pain often "over do" resulting in pain flare ups. Pacing can allow activities to get accomplished safely, without flare-ups, and in a manner that conserves energy (i.e., with less fatigue).

[Learn more >](#)



Nutrition & supplements

Eating a healthy diet has many benefits for everyone, however there may be some specific benefits for pain sufferers. The examination of pain and diet is an emerging literature.

[Read nutrition & supplements tips >](#)



Relaxation

Teaching the body to relax can both diminish muscle tension and decrease stress. To work properly, regular practice is needed so that the body learns a rhythm of relaxation and can relax on your command. Less tension and less stress can lead to decreased pain intensity.

[Learn more >](#)



Reframing

What we think influences how we feel and how much pain we experience. Sometimes negative thoughts become automatic and make us feel worse. Learning to reframe our thinking in realistic terms that challenge negative automatic thinking can help diminish pain intensity.

[Learn more >](#)



Managing Emotions

Emotions are integral to the production of pain. You cannot have pain without emotions. Thus anything we can do to alter the emotional content of one's brain will influence pain. Better management of stress can influence pain as well as engaging in pleasant activities. The pleasant activities will help diminish pain intensity.

[Learn more >](#)



Communication skills

Conflictual social relationships with family, friends, doctors, and employers can make pain worse. Alternatively, these same relationships can be used constructively to make pain better. Communication skills can help make social relationship work in your favor.

[Learn more >](#)



Sleep

Pain and Sleep are closely related such that poor sleep can make pain worse. These are a number of behavioral sleep strategies that can be used to get a more refreshing night's sleep.

[Learn more >](#)



Acupressure

Like acupuncture, which uses needles, acupressure is an ancient treatment that uses the pressure of one's own finger on the skin so as to help re-balance the flow of energy through the body as a means of reducing symptoms such as pain.

[Learn more >](#)



Spirituality

The belief in something "bigger," "more powerful," or "more knowledgeable" than oneself has been key to many individuals being able to successfully deal with pain. Spirituality may refer to a specific religious belief or it can be any belief that provides a source of strength and comfort to the individual with pain.

[Learn more >](#)



Ergonomics/Posture

How you sit, stand, transition and lift can either make pain worse or allow you to function even with pain. This section offers help in optimizing how you interact with your environment in ways that don't exacerbate pain.

[Learn more >](#)



Resilience

We often focus on fixing what is broken but we can't lose sight of our personal strengths that help us get through challenging times. Finding our sources of resilience can be a valuable tool for reducing pain and living a quality-filled life.

[Learn more >](#)

SYMPTOMS

Sleep

Pain

Affect

Cognitive Function

Energy / Fatigue

BEHAVIORS

Physical Activity

Pacing

Self-care Worksheets

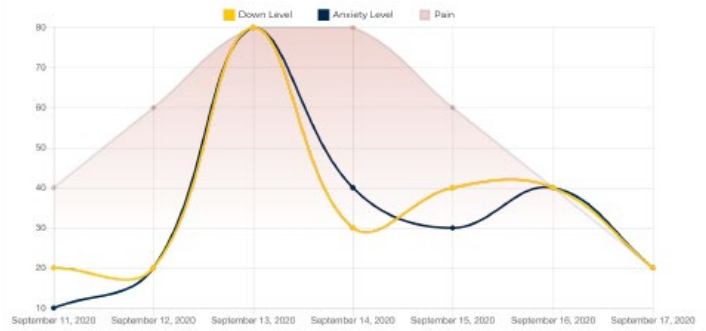
AFFECT

Week

Month

Custom

🕒 September 11, 2020 - September 17, 2020



September 17, 2020

September 16, 2020

PAIN CARE

Self Care

Professional Care

Medications

Therapies

Devices

Procedures



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.