MASSACHUSETTS PAIN INITIATIVE

PRESENTS

PAIN MANAGEMENT FROM RESEARCH TO YOGA

OCTOBER 10, 2019

MARRIOTT COURTYARD, MARLBOROUGH, MA

AGENDA

7:30 AM- 8:15 AM Registration and breakfast / Visit Vendors

8:15 AM – 8:30 AM – Business Meeting

8:30 AM – 9:15 AM Jianren Mao, MD

Clinical Implications of Opioid Induced Hyperalgesia

9:15 AM – 10:45 AM Joji Suzuki, MD

Principles of Motivational Interviewing

10:45 AM - 11 AM Break / Visit Vendors

11 AM – 12:00 PM Antje Barreveld, MD

A Pain Management Perspective: Abdominal and Pelvic Pain

12:00 PM – 1:00 PM Lunch / Visit Vendors

1:00 PM – 2:00 PM James O'Brien, MD

Pain and Sleep

2PM – 2:15 PM Break

2:15 PM – 3:30 PM Jacquelyn Orent- Nathan. APRN- BC

Pain Education and Yoga: Changing Lives with Movement and Neuroscience

3:30 PM – 3:45 PM - Questions and Evaluations

Clinical Implications of Opioid-Induced Hyperalgesia

Jianren Mao, MD, PhD

Richard J. Kitz Professor of Anesthesia Research
Harvard Medical School, Harvard University

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Director, MGH Center for Translational Pain Research
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Disclosure of Conflict of Interest

None

ACHIEVEMENTS

New additions to various categories of pain medications

- Opioid analgesics
- NSAIDs; COX-2 inhibitors
- Ion channel (Ca^{++}, Na^{+}) blockers
- Antidepressants (TCA, SSRI, SNRI)
- Triptan drugs (5-HT1b, 1d receptor agonists) for migraine *
- Others (gabapentin, pregabalin) *

ACHIEVEMENTS

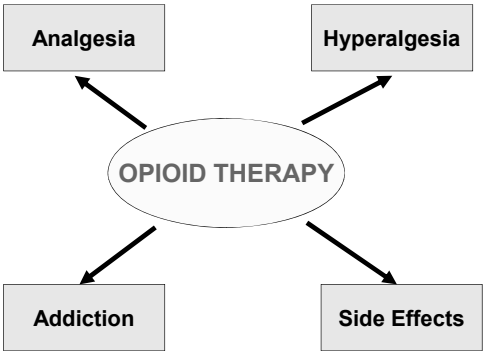
Innovative drug delivery methods and interventional procedures

- Topical agents (lidocaine, diclofenac, capsaicin)
- Intrathecal pump (opioid, local anesthetic, clonidine, baclofen)
- Neuro-modulation (spinal cord and deep brain stimulation)
- Transcutaneous electrical nerve stimulation (TENS)
- Others (RFL, sympathetic block, ESI, IDET, etc.)

ACHIEVEMENTS

Improvement in acute and postoperative pain management

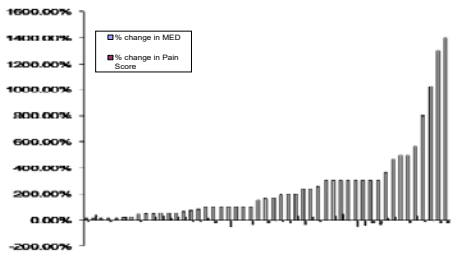
- PCA (patient-controlled analgesia)
- Regional nerve block
- Neuraxial block (epidural, spinal)
- Medication (ketorolac – an intravenous NSAID)



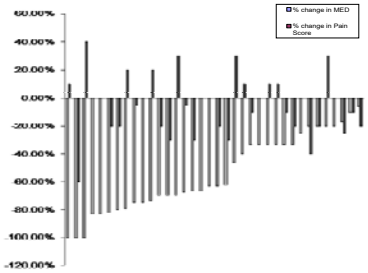
Does opioid dose adjustment change clinical pain score?

<u>An analysis of a subgroup of over 100 chronic pain patients</u>

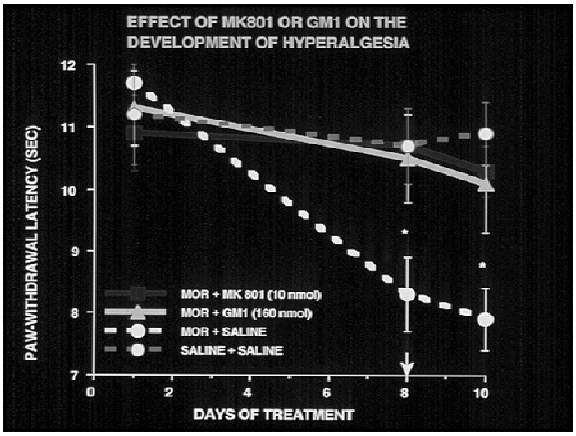
Opioid Dose Increase and Pain Score Change

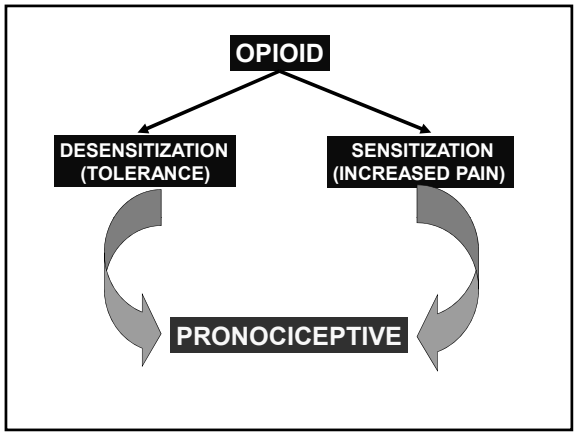


Opioid Dose Decrease and Pain Score



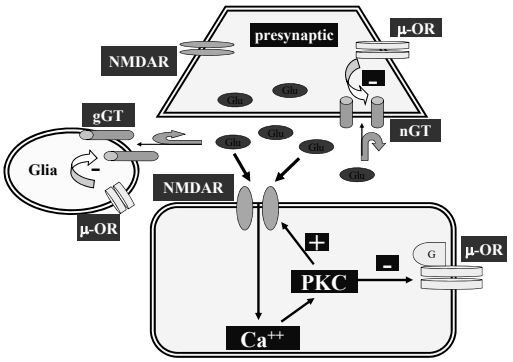
Opioid-Induced Hyperalgesia





NEURAL & MOLECULAR MECHANISMS

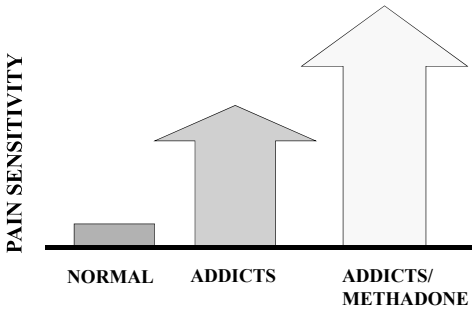
- **Dynorphin**
- **Descending faciliation**
- **Alpha-2 Adrenergic receptor**
- **Glutamatergic system**



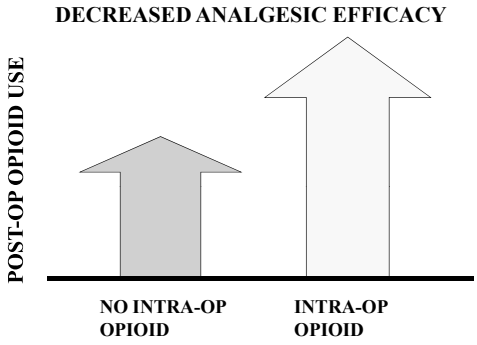
REPEATED OPIOID EXPOSURE

↓

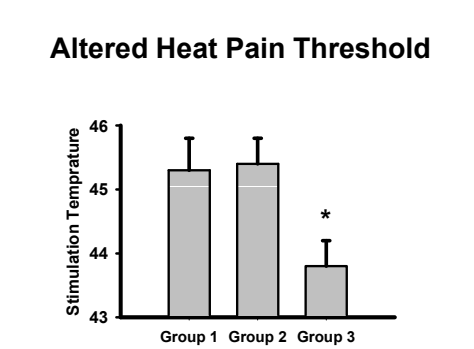
A PATHOLOGICAL PAIN STATE



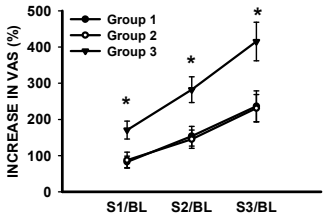
Martin & Inglis, 1965; Ho & Dole, 1979; Compton et al., 2001

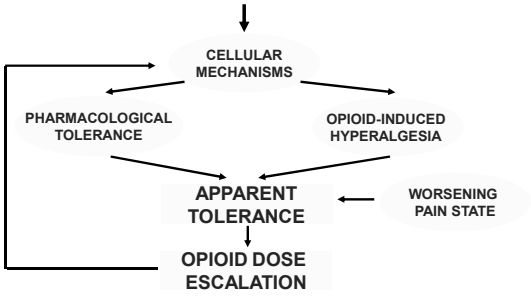


Cooper et al., 1997; Vinik & Igor, 1998; Guignard et al., 2000



Exacerbated Temporal Summation of Second Pain (Windup)





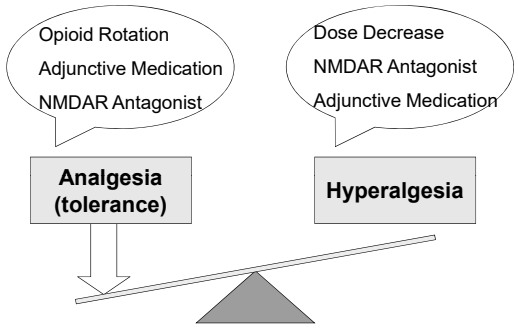
	OIH	Opioid tolerance
Exacerbated temporal summation of second pain	Yes	No
Decreased pain threshold	Yes	No
Decreased pain tolerance	Yes	No
Opioid dose (the higher, the more likely)	Yes	Yes
Duration of opioid therapy (the longer, the more likely)	Yes	Yes
Dose escalation	Limited improvement in clinical pain	Improvement in pain relief
Dose reduction	Improved opioid analgesia	Reduced opioid analgesia
Pain quality	Spontaneous, burning, diffuse pain similar to neuropathic pain	No change from pre-existing pain
Pain location	may ↑ dermatome distribution of the pre-existing pain	No change (from pre-existing pain)
Pain intensity	Similar to or greater than pre-existed pain	Similar to preexisted pain condition

Category I

- *Low dose*
- *Initial titration phase*

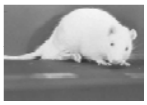
Category II

- *High dose; Long-term use*
- *Little change after dose titration*
- *Change in pain pattern*
- *Buprenorphine; methadone*



RELEVANCE: rat ≠ human

No complaint (affect, emotion)
No secondary gain
No comorbidity
No addiction
No legal issues
No illicit drug abuse
No socioeconomic challenge



FUTURE DIRECTION

Animal models and assessment tools

We must consider pain-related comorbidities in animal models (e.g., depression, anxiety, drug addiction)!

Explore and validate new assessment tools (e.g., conditioned place preference; concurrent assessment of nociceptive and comorbid behaviors)

PAIN ASSESSMENT TOOL

Bench

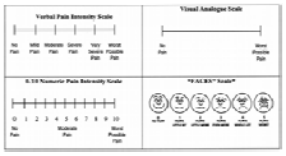
Evoked response

Clinical

Pain rating

Pain questionnaires

Quantitative sensory testing



WHAT DOES PAIN SCORE TELL US?

VAS: 10/10

VAS: ??

ACKNOWLEDGEMENT

NIH Grants

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MGH Center for Translational Pain Research

Lucy Chen, Shihab Ahmed, Yi Zhang, Charlen Malarick, Lindsey Seefeld, Mary Houghton, Christy Santana, Kristin Hilaire, Backil Sung, Grewo Lim, Shuxing Wang, Qing Zeng, Liling Yang, Yang Chang, Gabriel Rusanescu, Hyagine Kim, Yinghong Tian, Wei Zhang, Song Li, Jin Xu, Yonghui Tan, Masashi Ueda, Shuzhuo Zhang, Zerong You, Matthew McBride, Michael McCabe, Katherine Pokrass, Trang Vo, Abigail Sara Cohen, Cynthia Retamozo

Principles of motivational interviewing

Joji Suzuki MD
Director, Division of Addiction Psychiatry
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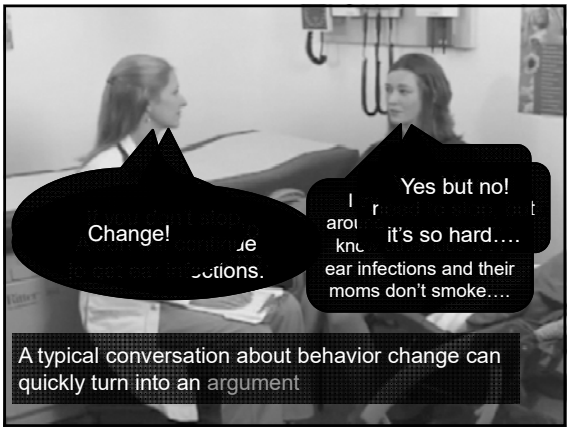
Member, Motivational Interviewing Network of Trainers

Disclosures

I have no financial conflicts of interest to disclose



A typical conversation about behavior change can quickly turn into an argument

*reducing or stopping alcohol, drugs, or tobacco, changing dietary habits, exercising, taking medication, checking blood sugar, keeping appointments, going to psychotherapy, flossing, getting a colonoscopy...

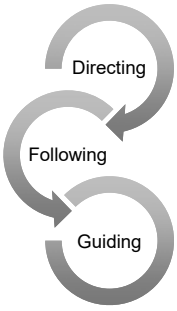
You would rather
feel less frustrated
and
be more effective
in helping patients change

What is Motivational Interviewing?

A **guiding** style of communication

Particular focus on the language of change

Evoking the patient's own reasons for change



The Effectiveness and Applicability of Motivational Interviewing: A Practice-Friendly Review of Four Meta-Analyses

Brad Lundahl
University of Utah
Brian L. Burke
Fort Lewis College

	Weak Comparison groups		Strong Comparison groups	
	Effect Size	Difference in success rate (%)	Effect Size	Difference in success rate (%)
Burke et al 2003	0.35	17	0.04	2
Hettema et al 2005	0.27	13	0.32	15
Vasilaki et al 2006	0.40	19	0.27	13
Lundahl et al 2009	0.28	14	0.09	5

Lundahl and Burke J Clin Psychol 2009

Motivational Interviewing, Enhancement, and Brief Interventions Over the Last Decade: A Review of Reviews of Efficacy and Effectiveness

Carlo C. DiClemente, Catherine M. Corno, Meagan M. Graydon, Alicia E. Wiprovnick, and Daniel J. Knoblach
University of Maryland, Baltimore County

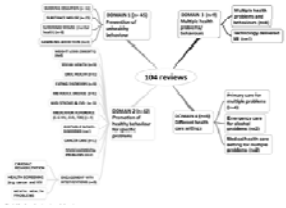
- 144 articles on MI for SUD, 34 review papers, 6 Cochrane reviews
- Reviews support the use of MI across of substance use, but strongest evidence for:
  - Alcohol
  - Tobacco
  - Marijuana
  - Gambling
- Not sufficient evidence for:
  - Methamphetamine
  - Opioids
- MI is better than no treatment and as good as other active treatments!

PLOS ONE

Effectiveness of Motivational Interviewing on adult behaviour change in health and social care settings: A systematic review of reviews

Helen Frost, Pauline Campbell, Margaret Maxwell, Fiona M. O'Carroll, Stephen U. Dombrowski, Brian Williams, Helen Cheyne, Emma Coles, Alex Pollock

- 104 reviews
- 39 Meta-analyses
- Moderate quality evidence for mainly short-term (<6 months) statistically significant small beneficial effects
- Alcohol use, substance use, and increasing physical activities



Frost et al PLOS One 2018

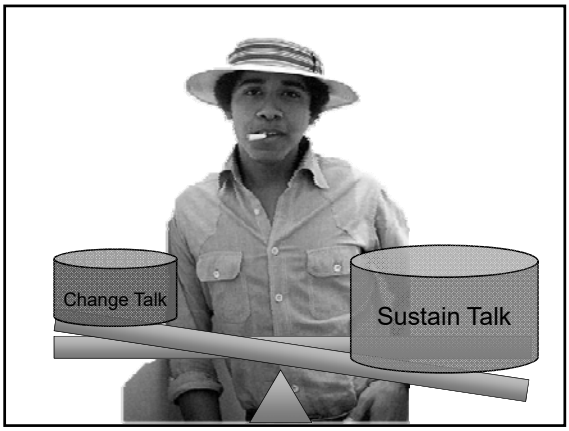
But ultimately, patients themselves have to find the internal motivation to change

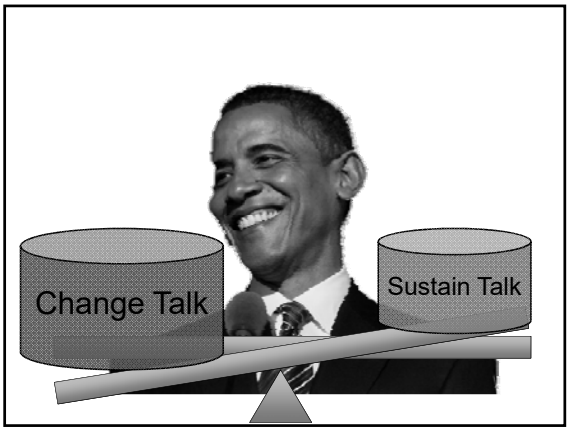
But we can't directly see internal motivation

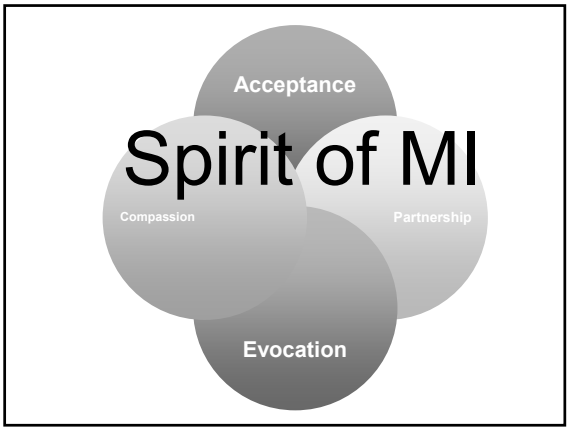
Most patients are ambivalent about most unhealthy behaviors.

If pushed to change, patients who are ambivalent often go to the other side of the ambivalence

Instead, the goal of MI is to evoke change talk



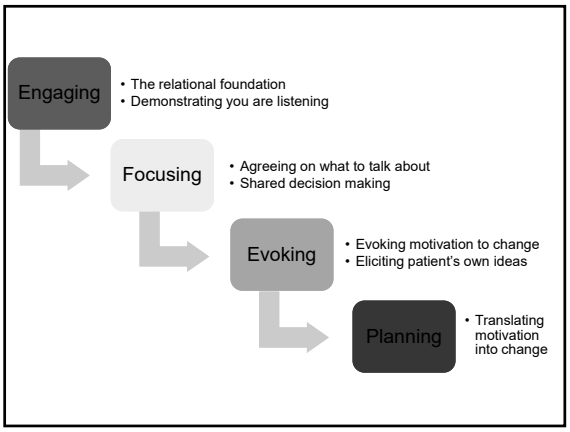


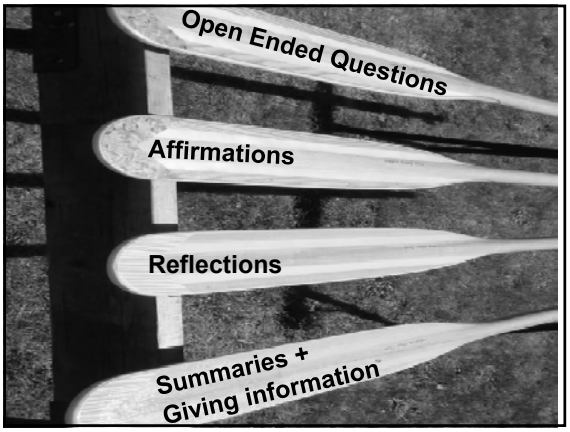


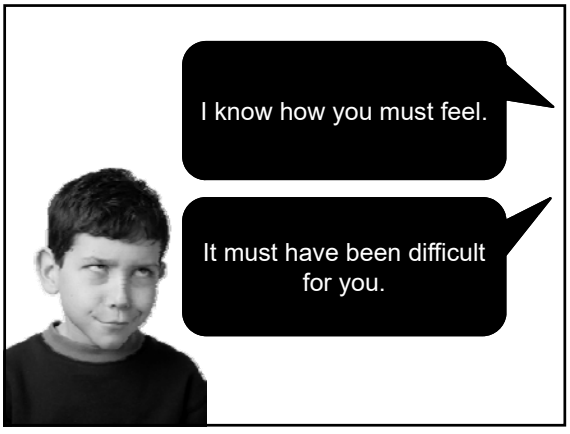
The spirit of MI must be demonstrated

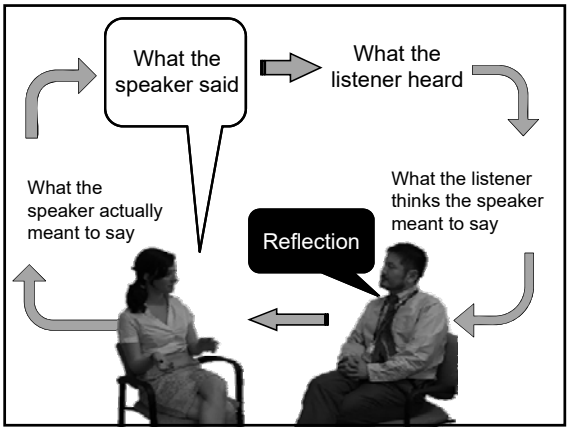
- Setting agendas <u>together</u>
- Asking permission (or ask what they already know) before giving advice or information (ask-tell-ask)
- Demonstrating you are listening to what the patient is saying
- Respecting patient's ability to make decisions, even if you disagree
- Reinforcing personal choice and responsibility
- Affirming positive qualities and efforts to change
- Treating patients as experts about their own live
- Avoiding:
  - Threats of negative consequences
  - Arguing for change
  - Use of judgments
  - Giving advice without first asking permission or asking what they know

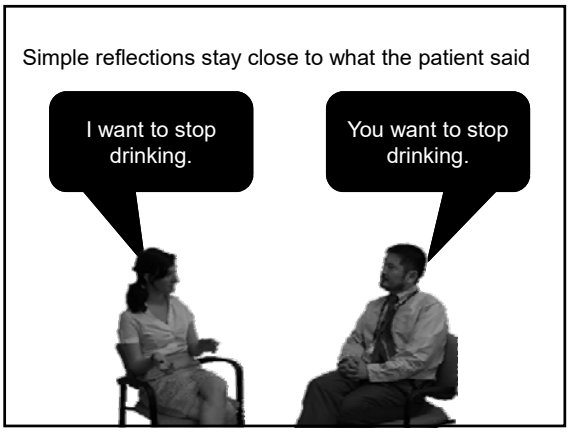
Respecting patient's choice does <u>NOT</u> mean you agree!!!

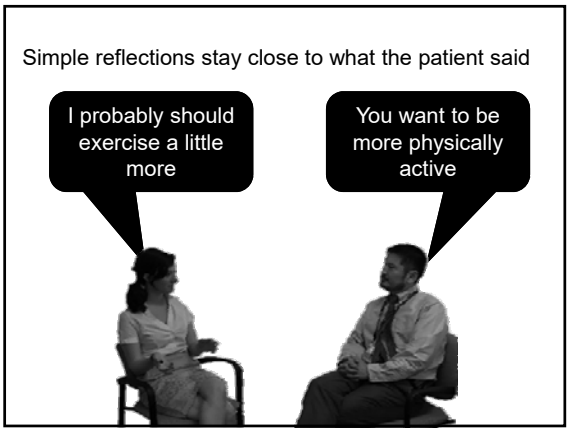


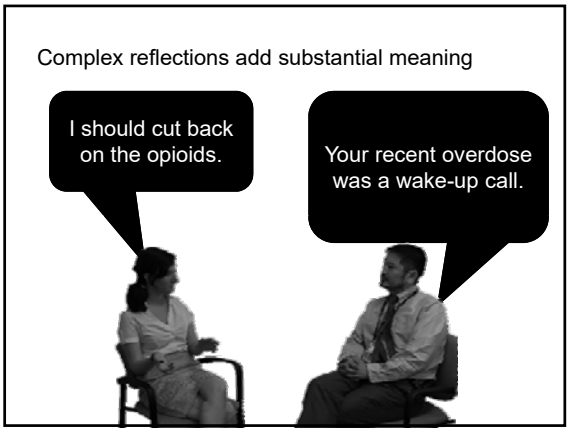


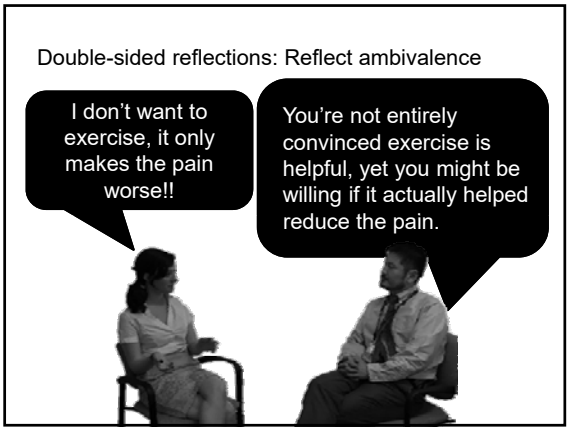










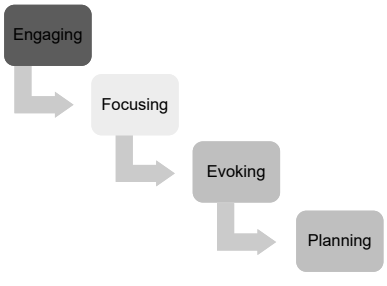


Double-sided reflections: Reflect ambivalence

Double-sided reflections: Reflect ambivalence

Amplified reflections: Exaggerating

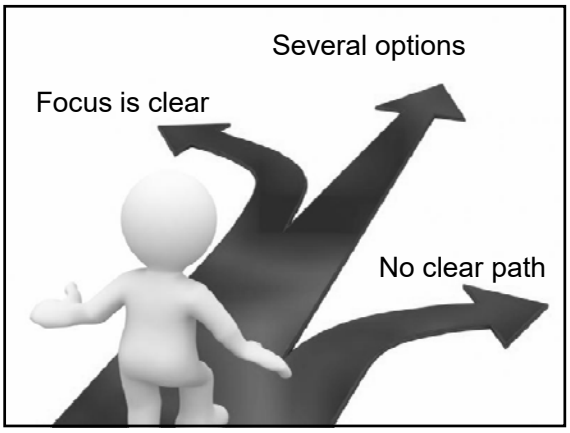
Summaries

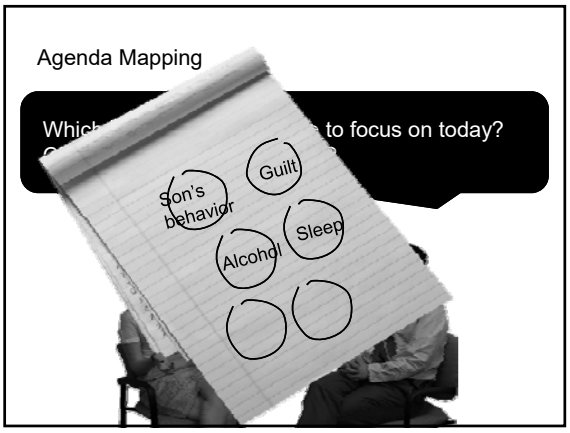


Focusing

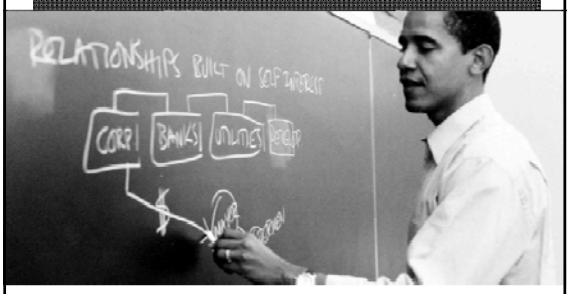
Finding the Horizon

Ongoing process of seeking and maintaining direction





Giving Information or Advice (Ask-Tell-Ask)



Giving Information or Advice (Ask-Tell-Ask)

Ask
1) Ask permission, or what they already know

Tell
2) Provide information or give advice

Ask
3) Ask what they think of that information

Giving Information or Advice (Ask-Tell-Ask)

Ask
1) "Would it be ok if I shared some thoughts I have about drinking?"

Tell
2) "For a man, drinking more than 14 beers a week on average can be harmful to your health."

Ask
3) "What are your thoughts about that?"

Giving Information or Advice (Ask-Tell-Ask)

Ask
1) "May I share with you my approach to therapy?"

Tell
2) "I like to work collaboratively with my patients, and our time together is going to be about what you need."

Ask
3) "What are thoughts about that?"

Giving Information or Advice (Ask-Tell-Ask)

Ask

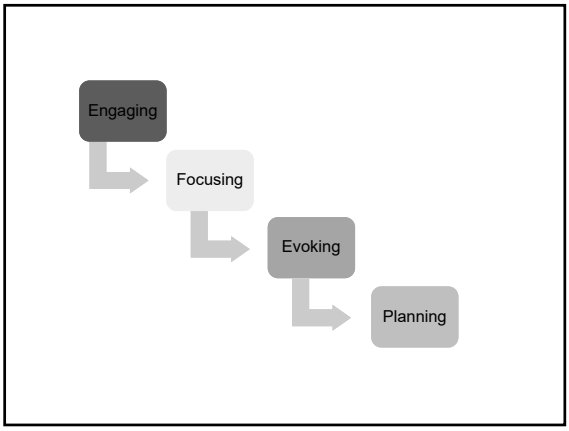
1) "What is the most important issue for us to discuss today?"

Tell

2) "Great, we will definitely address your concerns about the pain. I also want to make sure we have a chance to discuss your blood test from last visit."

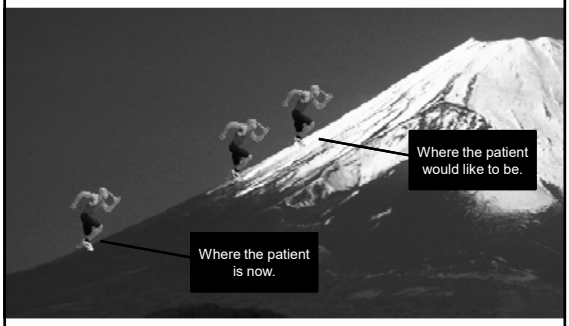
Ask

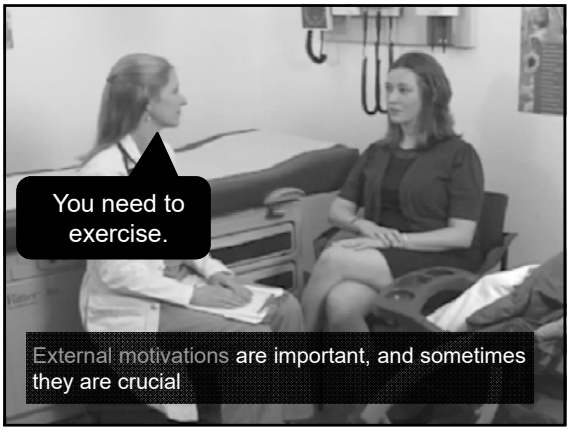
3) "Would that be ok with you?"



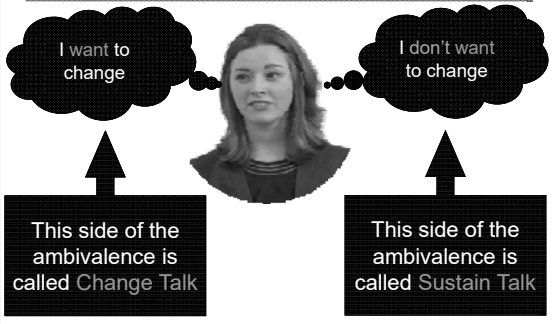
Evoking

Increasing motivation





Most patients are ambivalent about most unhealthy behaviors.



If pushed to change, patients who are ambivalent often go to the other side of the ambivalence

Instead, the goal of MI is to evoke change talk

Change Talk (DARN-CAT)

D: Desire → I want to…, I wish…, I'd like to….

A: Ability → I could…, I know I can…., I could try….

R: Reason → I want to change because…..

N: Need → I should…, I need to…., I must….

C: Commitment → I will…., I promise to…., I guarentee…

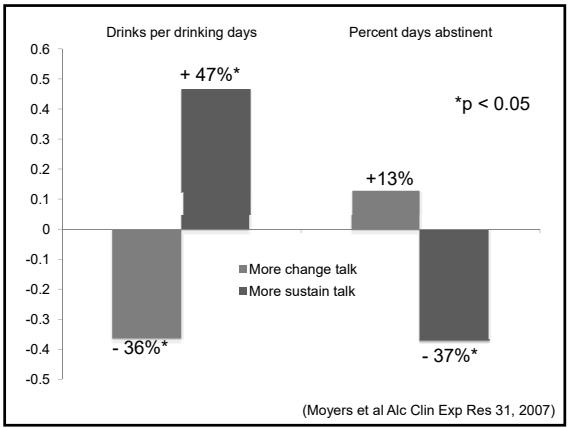
A: Activating → I am ready to…., I am willing to…

T: Steps Taken → I've tried…

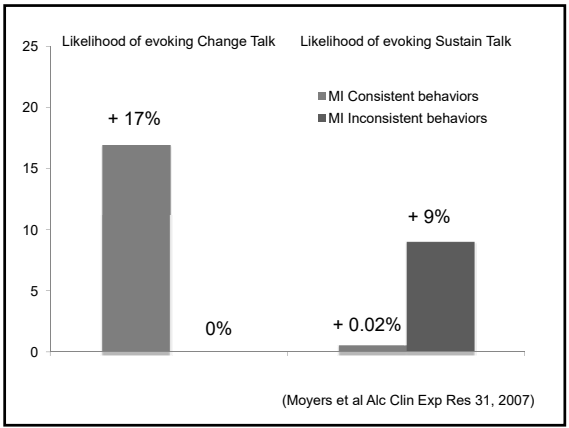
Exercise

1) You will hear a statement
2) Applaud if you think it was "Change talk"
3) Keep silent if you think it was "Sustain talk"

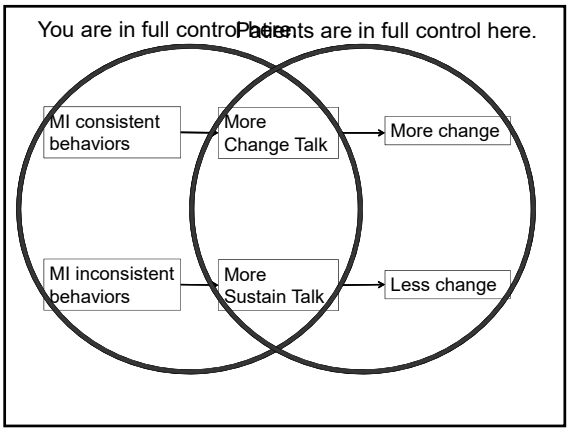
Change Talk
D: Desire → I want to stop smoking
A: Ability → I could lose weight if I tried
R: Reason → I want to be healthier
N: Need → I need to stop heroin
C: Commitment → I will exercise more
A: Activating → I am ready to quit
T: Steps Taken → I've been to detox

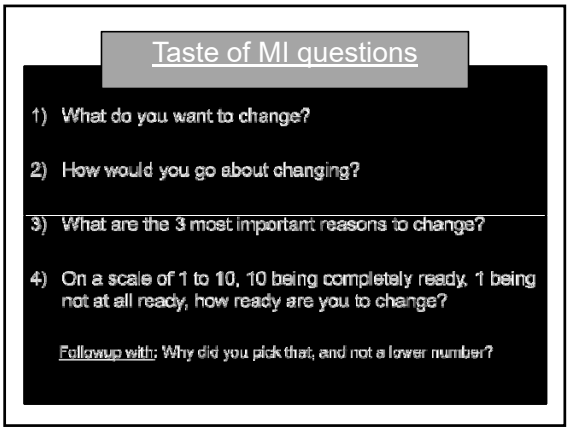


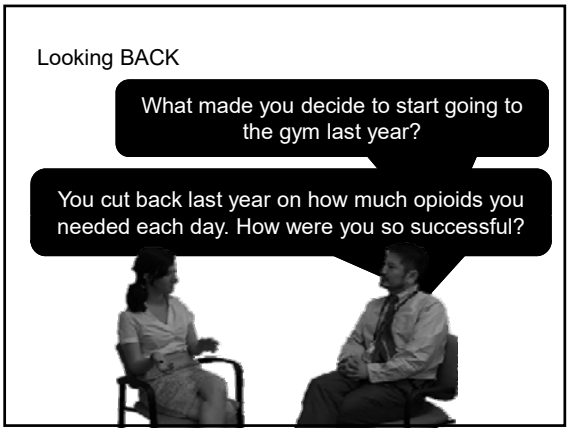
(Moyers et al Alc Clin Exp Res 31, 2007)

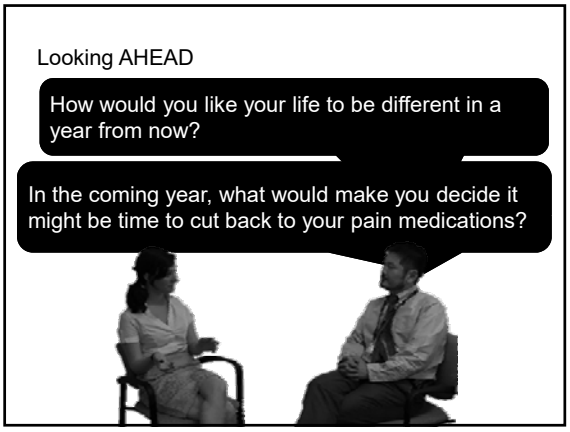


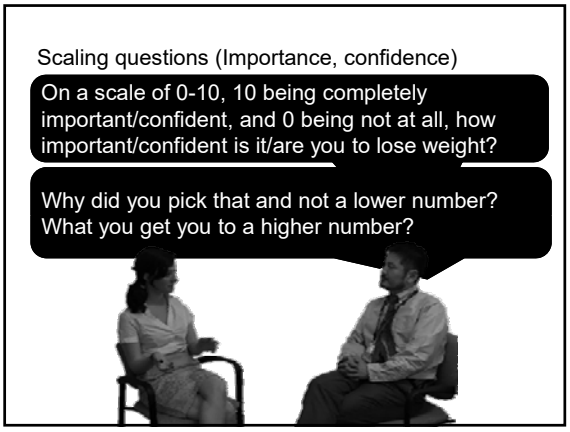
(Moyers et al Alc Clin Exp Res 31, 2007)



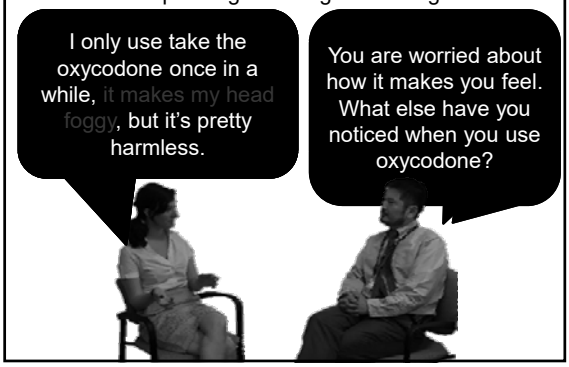




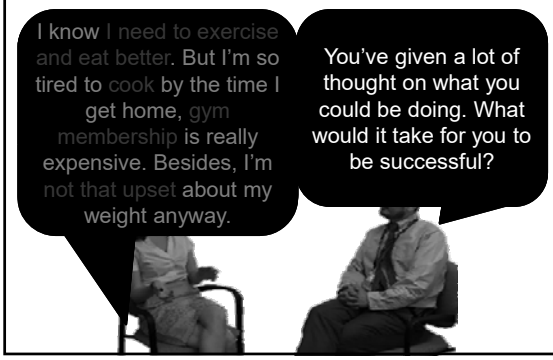


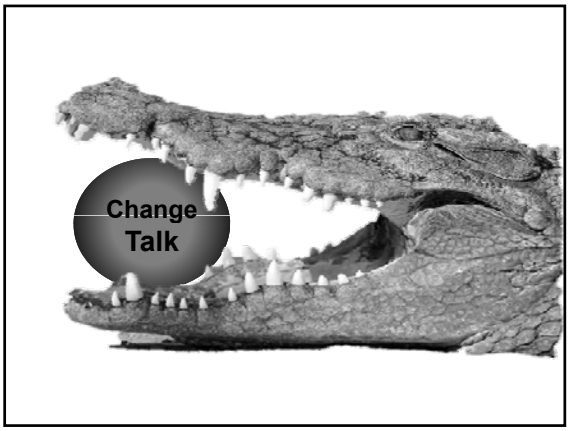


Selective responding to strenghten change talk



Selective responding to strenghten change talk



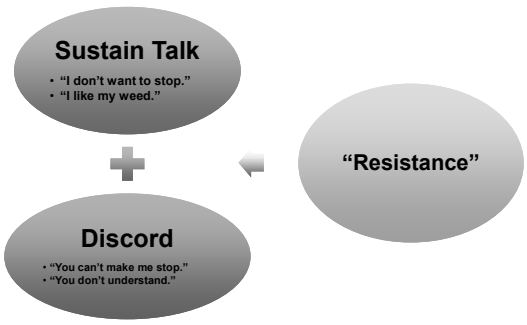


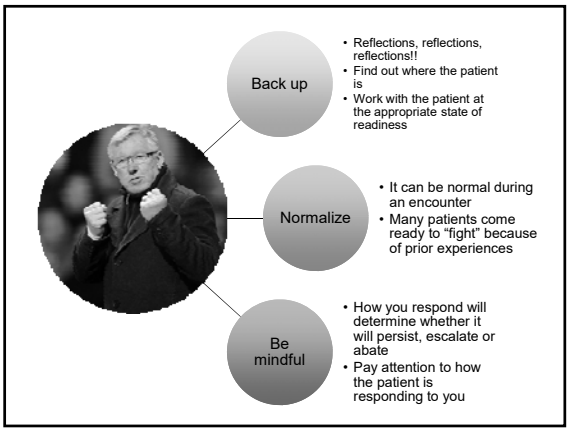
Elaboration
- "Tell me more."
- "Why did you decide to make that change?"
- "What are some examples?"

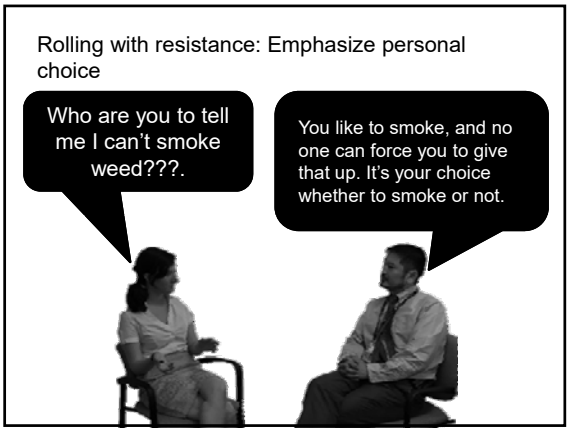
Affirm
- "You want to set a good example to your daughter."
- "It takes a lot of strength to make those changes."
- "You are committed to making these changes."

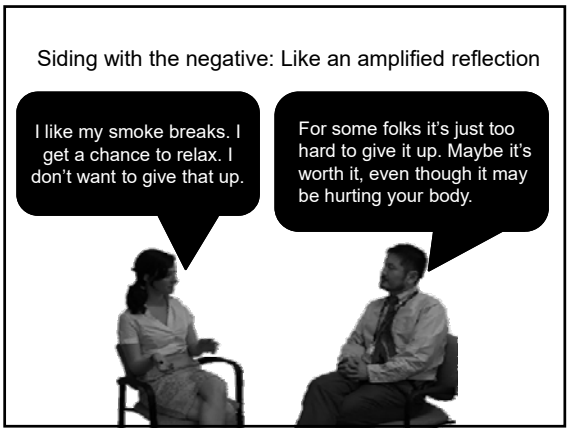
Reflect
- "It sounds like you are ready to stop using heroin."
- "You're going to try jogging again."
- "The recent heart attack really opened your eyes."

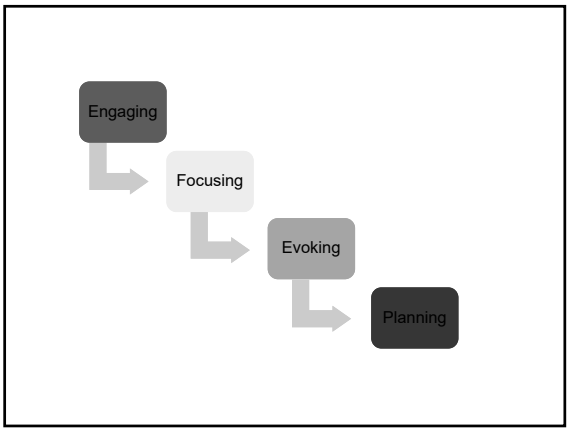
Responding to Discord and Sustain Talk

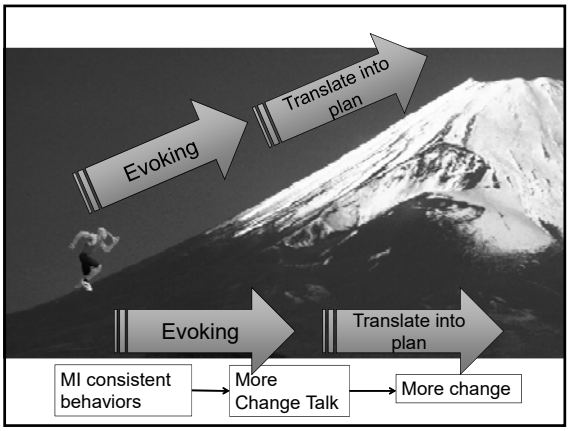


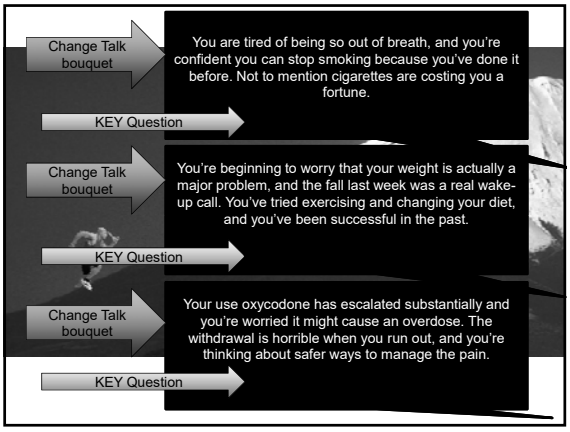


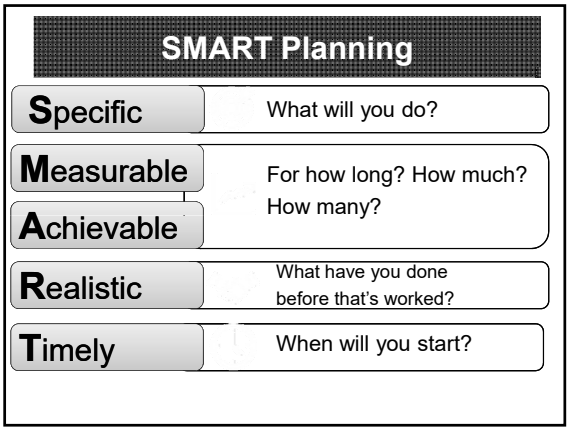










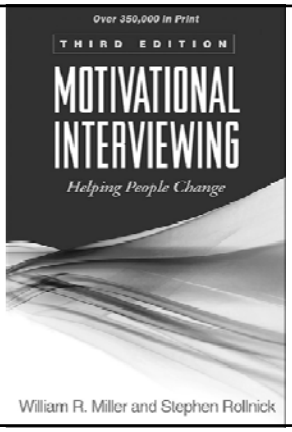


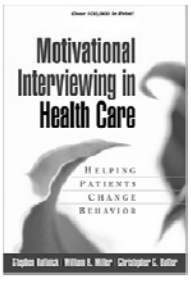
SMART Planning

Specific	Walk to the park and back in the evenings, Mondays and Wednesdays
Measurable	Walk for 10 minutes
Achievable	
Realistic	Has done this before, and confident about succeeding with plan
Timely	Start tonight

You would rather
feel less frustrated
and
be more effective
in helping patients change

Practice	Feedback	Additional training
Practice is necessary. MI is a **skill**, not knowledge	Recording an interview for review. Not what you think you said, but what you actually said	Workshop training
Take risks by practicing a new skill. We ask our patients to be courageous too	Real-time observation and feedback if feasible.	Coding training
Critically important to listen to how patients respond	MI learning groups to get feedback from other practitioners.	Train-the-trainer (MINT)





http://www.motivationalinterviewing.org/

MI Learning Group
- Does not have to be run by an expert, just a committed group of people!
- Monthly or bimonthly meetings
- Focus on skill development through practice, audiotape review, or case discussions
- Rosengren's MI skill workbook

Be a champion for your organization or group

How will <u>you</u> sustain your practice?

References

Kini et al. Interventions to improve medication adherence: A review. JAMA 320 (23): 2461-2473, 2018

DiClemente et al. Motivational interviewing, enhancement, and brief interventions over the last decade: A review of reivews of efficacy and effectiveness. Psychol Addict Behav 31(8): 862-887, 2017

Lundahl et al The effectiveness and applicability of motivational interviewing: a practice-friendly review of four meta-analyses. J Clin Psychol 65(11): 1232-1245, 2009

Lundahl et al Motivational interviewing in medical care settings: A systematic review and meta-analysis of randomized controlled trials. Patient Education and Counseling, 2013

Frost et al Effectiveness of motivational interviewing on adult behavior change in health and social care settings: A systematic review of reviews, PLOS One 13(10), 2018

Pelvic Pain: a Pain Management Perspective

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Newton-Wellesley Hospital, Pain Management Center
September 2016

Image by: katerina eremeeva

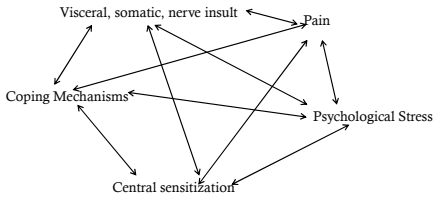
Disclosures

None

Learning Objectives

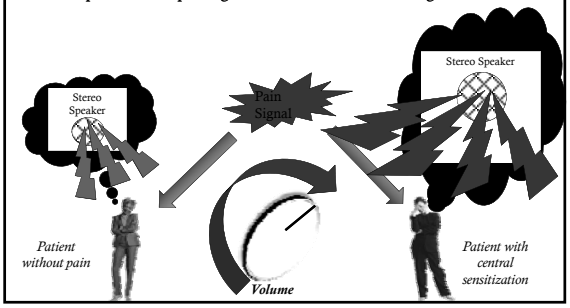
- List 3 "alternative" history and physical exam questions to supplement your assessment of a woman with pelvic pain.
- Describe the complex peripheral and central nervous system and biopsychosocial contributors to pelvic pain.
- Define 4 categories of multimodal treatment options for pelvic pain.

Pain is Complicated…

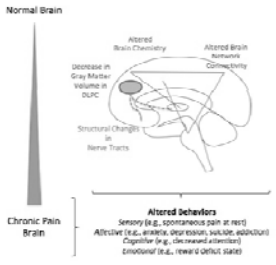


Central Sensitization

- This can be thought of as if the patient's pain perception "***volume control setting" is turned up too high.*** A patient *without* pain would interpret the same pain signal at a lower "volume" setting.



Chronic pain → CNS changes (functional, morphological, chemical)



Borsook D. A future without chronic pain: neuroscience and clinical research. Cerebrum. May 2012

Impact of Chronic Pain on the Brain – Statistically Significant Decreased Grey Matter Density

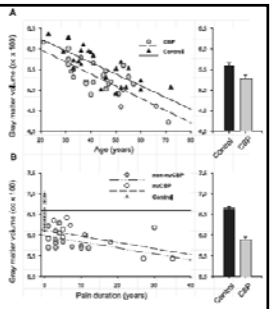


Figure 1. Decreased whole-brain cortical gray matter volume in CBP subjects. Skull-normalized sensorimotor gray matter volumes are shown for CBP subjects and matched control subjects. A, Gray matter volumes as a function of age. The difference in intercepts corresponds to an average decrease of 30 cm³ in gray matter volume in CBP compared with the normal subjects. B, Gray matter volumes as a function of pain duration, after correcting for age and gender. Individual control subjects are shown at pain duration = 0. myCBP and non-myCBP CBP patient data are represented separately. The horizontal line is the mean volume for controls. Individual whole-brain gray matter volumes in CBP subjects are all below the mean volume for controls. Group-averaged gray matter volumes (mean ± SEM) are shown in the right bar graph, before (top) and after (bottom) correcting for age and gender. Lines are best linear fits for each group.

Apkarian et al. Chronic back pain is associated with decreased prefrontal thalamic and gray matter density. Journal of Neuroscience, 2004

Co-existing Central Pain Disorders with Pelvic Pain

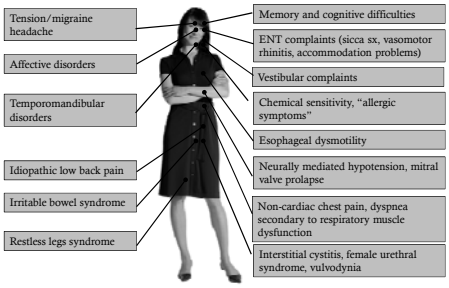
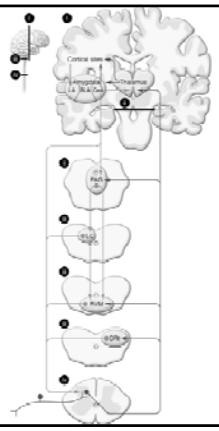


Diagram adapted from:
Clauw DJ. "Chapter 26: Fibromyalgia" in Bonica's Management of Pain. 4th edition. Lippincott Williams & Wilkins. 2010



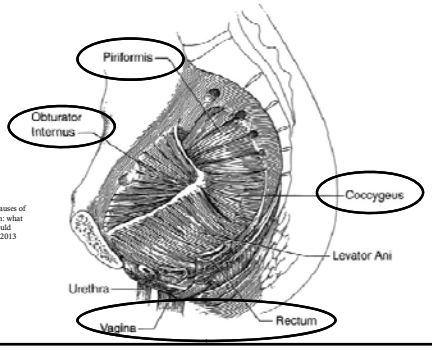
Pain Transmission– ascending and descending pathways → targets for treatment

http://www.u.arizona.edu/~michaelo/

Discussion Outline

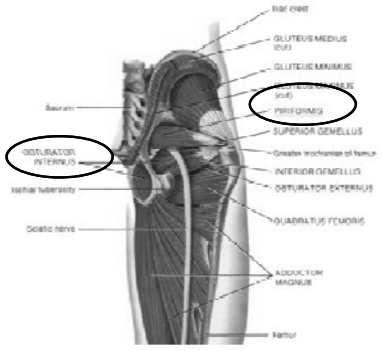
- Pain terminology
- Pain history – what questions to ask beyond the pelvis
- Pelvic pain questionnaires
- Physical examination
- Case discussions to illustrate a pain management perspective to evaluating and treating pelvic pain
- Multidisciplinary and multimodal management

Some Anatomy – Pelvic Muscles

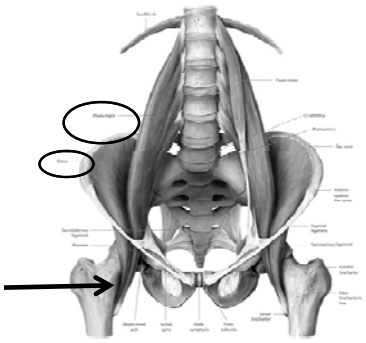


Gyang A et al. Musculoskeletal causes of chronic pelvic pain: what a gynecologist should know. OB & Gyn 2013

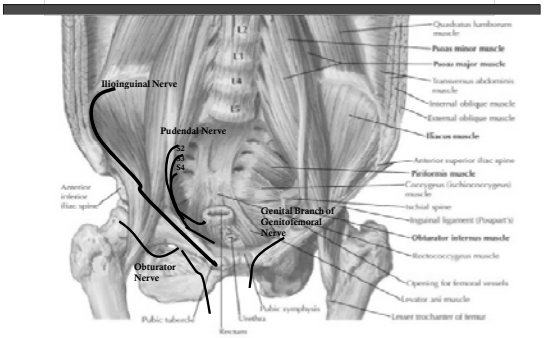
And more "pelvic" muscles



More "pelvic" muscles

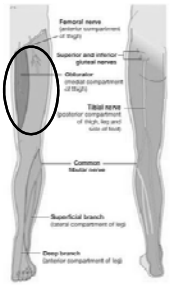


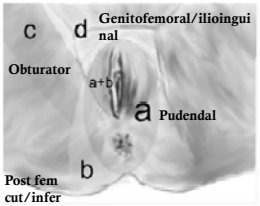
Muscles and Nerves of the Pelvis



http://www.slideshare.net/yasirjameel/lower-limb-anatomy-hip-and-thigh

Sensory Distribution





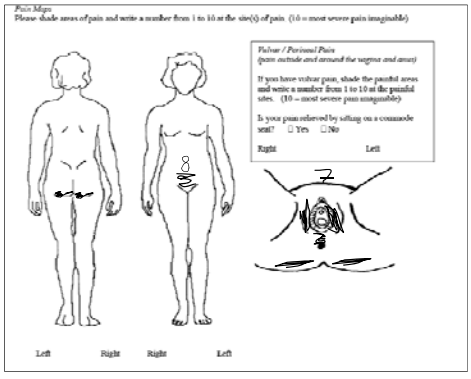
Post fem cut/infer clunealwww.kegel8.co.uk/glossary/term/obturator-nerve/

History – Questions to Ask

- OPQRST
- Function
- GYN
- Urinary
- GI
- Musculoskeletal
- Psychological history

www.iasp.org

Pelvic Pain Questionnaires



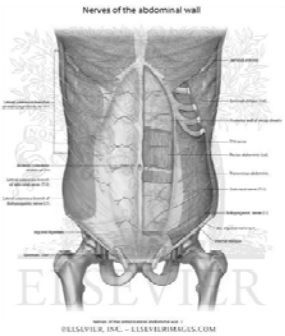
Physical Exam Highlights

- Have the patient point to where she thinks the pain "comes from" and focus on examining that area
- If history accurate enough then vaginal exam not always necessary → rely on OB/GYN colleagues to detect any abnormalities
- Skin exam (surgical scars)
- Sensory exam (?allodynia, ?numbness, etc.)
- Musculoskeletal exam including strength testing and joint range of motion and palpation of lower back and muscles
  - Don't forget a hip exam…

Case 1 – Endometriosis

- 37 G2P1 miscarried and trying to conceive with endometriosis and cyclical pain but also pain throughout her cycle. Has had frequent ED visits for acute pain.
- Pain better on OCPs and no pain during pregnancy
- No vaginal pain, no GI symptoms
- Physical exam with abdominal wall tender points lateral to rectus muscle on the left ~ T11 and T12
- How to manage?

Abdominal Cutaneous Nerves



Abdominal Cutaneous Nerve Entrapment (ACNES)? A diagnosis to always consider

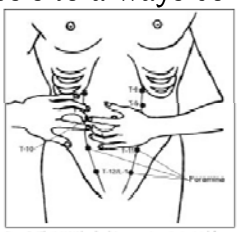


Figure 2. "That's it!" When localizing pain, patient points left index finger, for example, to T-10 opening. Clinician reaches in from lateral side to confirm location is a neuromuscular foramen.

Image from: Appelgate WB. Abdominal Cutaneous Nerve Entrapment Syndrome (ACNES): a commonly overlooked cause of abdominal pain. The Permanente Journal 2001.

Anterior Cutaneous Nerve Entrapment (ACNES)

- Frequently missed diagnosis in patients with heavily worked-up GI and pelvic pain
- Can be a result of another primary pain problem such as endometriosis or from weight loss, weight gain, abdominal wall contraction 2/2 pain, or simply idiopathic…
- Often a missed diagnosis in the pediatric population
- Diagnostic nerve block simple and safe diagnostic tool and potentially therapeutic (with steroid…). Pending results could consider radiofrequency lesioning
- Combine with pelvic PT, myofascial relaxation, lidoderm patches
- Surgical neurectomy successful for refractory cases…

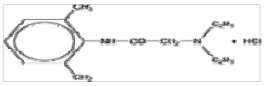
- **Boelens OB et al. Randomized clinical trial of trigger point infiltration with lidocaine to diagnose anterior cutaneous nerve entrapment syndrome. Br J Surgery 2013**
- **Boelens OB et al. A double-blind, randomized, controlled trial on surgery for chronic abdominal pain due to anterior cutaneous nerve entrapment syndrome** Ann Surg 2013

Centralized pain?

- Endometriosis can cause a generalized neuropathic pain syndrome; direct infiltration of nerves by ectopic implants
- Constant pain signaling can lead to central sensitization
- Identify strategies to break the pain signaling cycle – but limited medications options while trying to get pregnant
- One option (if not pregnant): Intravenous lidocaine at time of maximal pain
- Cross-over trial in 18 women…

So what about intravenous lidocaine?

- Old, cheap drug beneficial in neuropathic pain conditions, fibromyalgia
- Short half-life but beneficial effects persist beyond drug half-life (likely 2/2 inhibition of perpetuation of pain signaling, "pain reset)
- Pfizer Fellowship in Pain Medicine to study effect of IV lidocaine on endometriosis pain at BWH
- Cross-over trial (benadryl as active placebo)
- Administered around menses



Case 2 – Interstitial Cystitis

- 22F with interstitial cystitis with severe, constant, debilitating pelvic pain
- Has been on escalating doses of oxycodone 60-80mg/day and diazepam 5mg TID; recent dilaudid after laparoscopic surgery *(negative for pathology)*
- Unable to go back to nursing school
- Lies in bed most of the time in terrible pain
- How to proceed??

Opioid-induced Hyperalgesia? Chemical Coping?

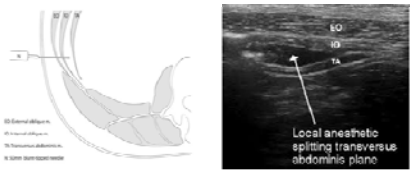
- Opioid-induced hyperalgesia is a well-studied and now widely accepted phenomenon, compounded by tolerance and decreased opioid efficacy; dose at which this can occur not determined – case-dependent
- This patient is quite young to be on such high doses of medications
- Intensive coordination with primary care, psychology/psychiatry for additional probing and coping mechanisms, and possibly pharmacist to help with a wean is warranted

Case 3 – LLQ pain

- 29F > 12 months post-partum with chronic LLQ that started after c-section
- Complicated c-section course (perforated bladder, large blood loss)
- Noticed pain immediately after awakening from GA
- Unable to work. Has trouble taking care of child. Completely run down by the pain.
- Has had extensive GI and GYN work-up. Scheduled for laparoscopic surgery despite no clear suspicion for endometriosis or other clear gyn pathology…
- Exam significant for LLQ pin-point pain lateral to c-section scar, + allodynia

ACNES? Neuroma? Neuralgia? Nerve Injury?

- Goal is to differentiate abdominal wall pathology versus intraabdominal or intrapelvic pathology
- Consider trigger point/nerve block to abdomen at point of maximal pain versus transversus abdominis plane nerve block to isolate abdominal wall nerves



http://pie.med.utoronto.ca/OBAnesthesia/OBAnesthesia_content/OBA_blocks_module.html

Case 4 – Interstitial Cystitis

- 73F who since her teenage years has had extreme bladder pain, urinates > 50 times per day
- Pain radiates to vagina and rectum; describes as burning and spasm pain
- Unable to sit down, often drives on a bed pan to help relieve pressure off of her vagina and rectum
- Has thoughts of not living any more
- Has asked a urologist to take out her bladder

Complex, Centralized Pain with Neuropathic and Myofascial components

- Multimodal approach needed
- Medication management (oral agents +/- suppositories)
- Injection management for pelvic floor spasm – consider obturator internus muscle injection; Pudendal nerve blocks
- Psychological care
- Relaxation techniques
- Pelvic floor physical therapy??
- Urologic care
- Support Group…

Does meditation really work?

YES!

Meditation helps to separate the sensation of pain from the thoughts about pain.

Functional Magnetic Resonance Imaging (fMRI) can identify areas in the brain that influence a patient's pain perception. This 2011 study demonstrated that after four-days of mindfulness meditation training, meditating in the presence of noxious (painful) stimulation significantly reduced pain-unpleasantness by 57% and pain-intensity ratings by 40% when compared to rest. fMRI images further illustrate how meditation deactivates pain signaling and activates pain modulating centers in the brain that help to decrease pain.

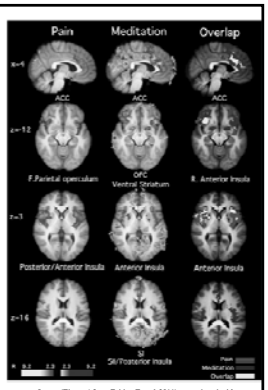


Image (Figure 4 from Zeidan F *et al.* 2011) reproduced with written permission from Dr. Fadel Zeidan, Wake Forrest School of Medicine
Zeidan F,*et al.* J Neurosci. 2011; 31(14):5540-8.

Case 5 – Groin/pelvic pain

- 35F with h/o IC s/p multiple injection therapies now self-catheterizes, s/p hysterectomy for dysmennorhea, with left groin pain radiating to pelvis and inner leg
- Physical exam: diffuse suprapubic tenderness, surgical scars without allodynia and well-healed, vaginal trigger points, left groin pain with abduction and flexion of hip, generalized left groin pain with palpation
- How do you proceed? Consider diagnostic nerve block or hip injection versus MRI versus MR arthrogram?

Dermatomes around the hip and pelvis – pain referral patterns

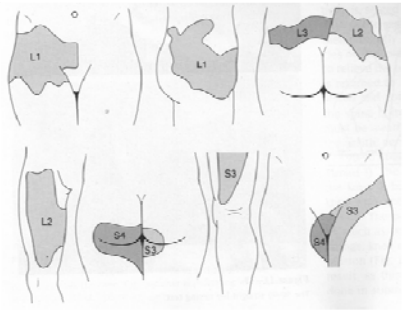


Image courtesy of Dr. Joanne Borg-Stein

Musculoskeletal Considerations in Pelvic Pain

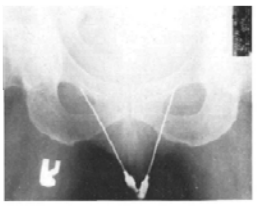
Muscular
- Pelvic floor muscle spasm
- Abdominal wall myofascial pain (trigger point)
- Muscular strains and sprains
- Rectus tendon strain
- Faulty or poor posture

Skeletal
- Compression of lumbar vertebrae
- Early articular hip disorders
- Acetabular labral tears
- Developmental hip dysplasia
- Hip osteoarthritis
- Low back pain
- Neoplasia of the spinal cord or sacral nerve
- Spondylosis
- Degenerative joint disease
- Fibromyalgia
- Chronic coccygeal pain
- Femoral acetabular impingement

Others
- Hernias: ventral, inguinal, femoral, spigelian
- Neuralagia of iliohypogastric, ilioinguinal, or genitofemoral

Gyang A et al. Musculoskeletal causes of chronic pelvic pain: what a gynecologist should know. OB & Gyn 2013

Consider Obturator Nerve Block



Br J Anaesthesia 1969

FIG. 1

Antero-posterior radiography of position of needles in obturator nerve block. Tip of needles located beneath the middle third of superior pubic ramus. Site considered correct.

Case 6 – Vaginal Pain

- 48 female with Hep C with worsening left-sided vaginal/perineal pain over the last years
- Pain started without any clear preceding event; not avid cyclist
- Denied any particular stressors or abuse at the time of her worsening pain
- Extensive work-up has been negative
- Pain affects her work and personal relationships

How to proceed in treating her vaginal pain?

- Good history and physical exam
- Vaginal exam to look for trigger points
- Consider multi-modal approach:
  - Pelvic floor spasm? Consider pelvic floor muscle injections
  - ?Pudendal neuralgia? Consider diagnostic nerve block
  - ?Radiates into medial thigh? Obturator nerve injection?
  - Vaginal trigger points and spasm? Consider suppository anti-spasmodics (e.g. diazepam 5mg PV BID) or vaginal trigger point injections
  - Neuropathic meds (eg gabapentin, pregabalin, TCA)
  - Behavioral modifications
  - **Pelvic PT**

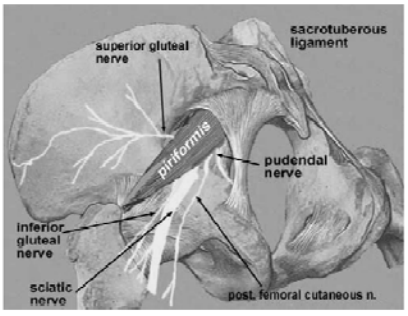
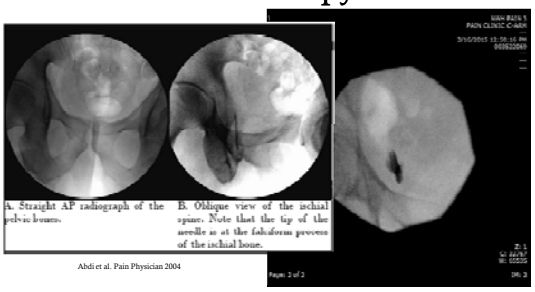


Image courtesy of Dr. Joanne Borg-stein

Pudendal Nerve Block with Fluoroscopy



A. Straight AP radiograph of the pelvic bones.

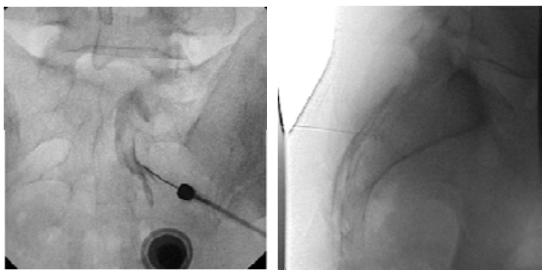
B. Oblique view of the ischial spine. Note that the tip of the needle is at the foraminal process of the ischial bone.

Abdi et al. Pain Physician 2004

Pulsed Radiofrequency Lesioning

Masala *et al.* 2014

Transforaminal S2-3-4 Injection



http://radiopaedia.org/cases/s2-nerve-root-block

Case 7 – Post-vaginal Mesh Chronic Neuropathic Pain

- 35F G2P2 with mild urinary stress incontinence underwent vaginal sling with vaginal mesh
- Immediately after surgery awoke with severe vaginal pain radiating to inner and posterior thighs
- Missing work, significant depression and anxiety developed, Marriage to wife falling apart, 11 year old daughter demonstrating somatization/pain behaviors
- Has tried multiple neuropathic medications with minimal relief
- Mesh removed with minimal improvement > 2 years after surgery but pain remained; vaginal injections brief relief

Spinal cord stimulator? Pudendal/peripheral stimulator?

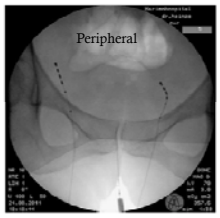
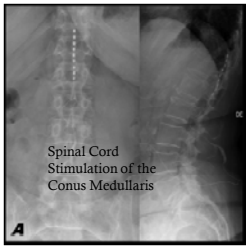


Fig. 3 X-ray of implantation result of quadripolar tined leads at the pudendal nerve on both sides. The sphincter EMG needle projects between the leads for elicitation of the specific pudendal signal and the PNTML

Heinze *et al.* 2014



Buffenoir *et al.* 2015

Multidisciplinary Management

- **GYN** – hormonal therapies, family planning, surgical evaluation, etc.
- **Medications** – anti-inflammatories (NSAIDs, acetaminophen), antispasmodics (PO or PV/PR), neuropathic agents, anxiolytics, antidepressants, topical agents (lidoderm patch), suppositories, GI and GU medications …….. Opioids…..
- **Interventional Techniques** – diagnostic and therapeutic; ?Role of peripheral/spinal nerve stimulator implantations?
- **Psychological Care, Behavioral Management, Coping Strategies**
- **Pelvic Floor and Musculoskeletal Physical Therapy**
- **Non-pharmacologic therapies**: biofeedback, acupuncture, Reiki, relaxation techniques, meditation
- **Other provider consults** (urologist, gastroenterologist, physiatrist, etc.)
- **Support groups** (online media, in person)

Thank you!

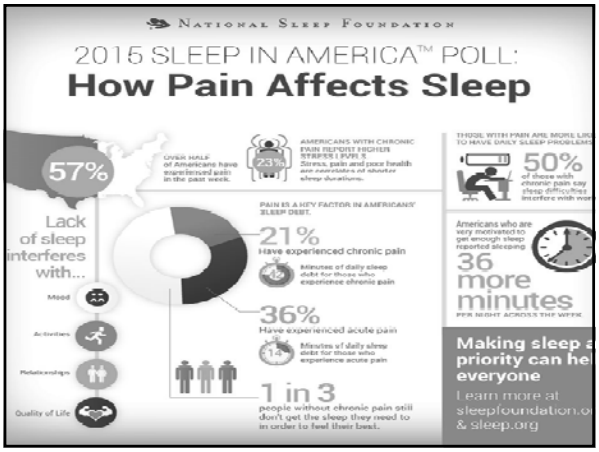
- Any questions? abarreveld@partners.org

Image by: katerina eremeeva

THE INTERSECTION OF SLEEP AND PAIN

James O'Brien, MD, FCCP, FAASM
Medical Director, ProHealth Physicians Sleep Centers
Medical Director, Boston SleepCare Center

WHERE ARE WE?



SLEEP AND PAIN

- The chicken and the egg theory……
- Pain causes alterations in sleep continuity and sleep architecture.
- Disturbances in sleep affect pain.

SLEEP AND PAIN

- Research is ongoing and exploring this fascinating and dynamic relationship.
- How does sleep deprivation induce hyperalgesia?
- How does sleep deprivation counteract the analgesic effects of opiods and their mechanism of action.
- BIDIRECTIONAL Relationship is likely.

BIDIRECTIONAL EFFECT

↓ SLEEP = ↑ PAIN

↑ PAIN = ↓ SLEEP

KEY CONCEPTS TO BE MINDFUL OF

- It appears sleeping well may result in better coping skills.
- Conversely, the association of Sleep with Pain and vice versa, reinforces a "negative attitude and negative thoughts"

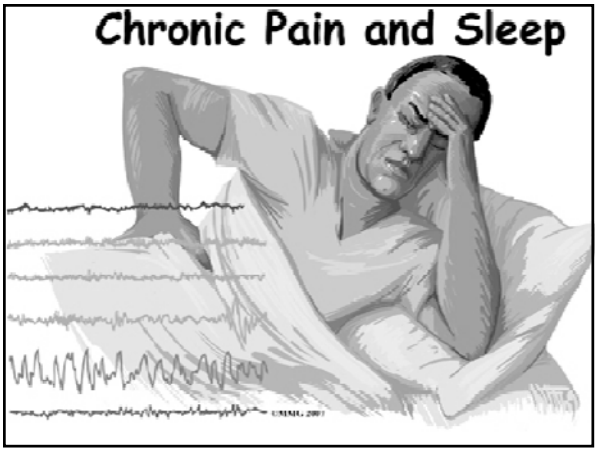
SLEEP AND PAIN INTERFACE

- Sleep disturbances are higher in patients with chronic pain than in the general population.
- 50-89% of chronic pain patients complain of poor sleep quality
- Most common symptoms described in patient with pain include***: insomnia, nonrestorative sleep and EDS.***
- Most common sleep abnormalities include: **sleep** fragmentation, decreased sleep efficiency and reduced SWS.
- Primary sleep disorders are often present:
  sleep apnea, RLS, PLMD and insomnia.

Sleep and Pain 2007 Giles Lavigne

WHY IS THAT?

- It appears that insufficient or poorer quality sleep alters the opioid/serotonin pathways in the brain and results in a lowering in the threshold for perceiving pain.
- A stimulus that might appear to be slightly uncomfortable may now feel quite severe without any change in the actual degree of noxious stimuli.



SLEEP HOMEOSTASIS- ESSENTIAL FOR HEALTHY LIFE

- Healthy sleep requires that we regularly achieve cyclical periods of NonREM and REM sleep that are uninterrupted and are of a sufficient duration to meet or individual physical and mental requirements.
- REM mentally restorative
- Non REM physically restorative

ASSESSMENT OF PAIN PATIENT

- Sleep Quality: screening

Sleep Diary-- circadian issues, insufficient sleep

ESS

RLS

Insomnia

Stop-Bang

Medication list (OTC included)

SLEEP IN A PAIN PATIENT

- Contains increased Stage 1 and Stage 2
- Little of no SWS

SLEEP GENERATION AND PAIN CONTROL AREAS

- NonREM sleep originates from the hypothalamus and the basal forebrain
- Both of these areas contain active GABA neurons and are involved in sleep-wake states as well as pain control.
- REM sleep is controlled primarily within the brainstem and overlaps with the area dedicated to pain control (filtering out painful sensations).

ONGOING CHALLENGES

- The side effects from pain management that impact sleep and the integration of physical, psychologic and environmental factors is quite complex within this patient population.
- Efforts to induce sleep in patients with chronic pain can both contribute to or mask the presence of a sleep disorder.
- Self medicating efforts intended to self-treat Insomnia or EDS often complicate their pain management, sleep quality and in many cases contribute to a delay in their sleep treatment.

COMPLEX POLYPHARMACY IN A PAIN PATIENT

- Increased number of medications that new referrals are taking.
  - OTC's sleep aids (diphenhydramine, melatonin)
  - Anti-inflammatory (NSAID's)
  - Narcotics analgesics
  - Muscle relaxants
  - Antidepressants (TCI's, SSRI's, SSNRI's)
  - Benzodiazepines
  - Anti-Spasmodics
  - Anti-Convulsants
  - Non-benzo benzodiazepines
  - Atypical Antipsychotics

"SLEEP IS A PAIN" PATIENT ANECDOTES

- "I must be your toughest patient!!!!"
- "I know I sleep well cause I dream a lot"
- "If it weren't for the pain, I'd sleep great"
- "Sleeping pills don't even touch me anymore"
- "I don't know why I'm even here"
- "My wife should be here….not me!"
- "It wasn't a good sleep test", I slept great at the sleep lab"

SOME RESPONSES TO SLEEP/PAIN ANECDOTES

- "Sleeping pills help you sleep through those moments when you are not breathing normally during sleep….."
- "Narcotic pain meds can sometimes help you forget to breath when you are sleeping….."
- If current hypnotic dosing is greater than the PI recommends, then you have more going on than just primary insomnia……

SOME RESPONSES TO SLEEP/PAIN ANECDOTES

- If previous escalating dosing schedules didn't work, then consider a reduction in dose! (more is not always better) and may lead to more side effects.
- Drug-centric mentality is common: "can you give me something to fix-it"….."I'm really bad"……."No,no, don't change-it….searching for the "Silver Bullet"
- The "tail is wagging the dog" scenario

FIBROMYALGIA

- 2/3 of the 15,350 Norwegian women studied were diagnosed with FM had preexisting sleep problems.
- Sleep disorders predicted the development of FM 10 years later
- Sleep Problems increase the risk, worsen the prognosis and influence the daily fluctuation in clinical pain.

• Mork PJ Sleep problems and risk of fibromyalgia. Arthritis Rheum 2012;64 (1) 281-284

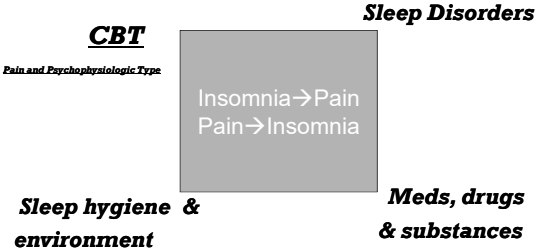
LOTS OF PAIN AND NO SLEEP

ONGOING CHALLENGES

Paradoxic insomnia or "sleep state misperception"
Patients state they sleep terribly, but actually their sleep is far better than their perception!
Most commonly seen in insomnia and fibromyalgia patients.

"Paradoxic sleep"or "I don't have a sleep problem" Patients state they sleep just fine, but actually their sleep is far worse than their perception!
Most commonly seen in SA and PLMD patients. ?impact on neurocognitive function and collusion by hypnotics & pain meds.

PAIN→SLEEP SLEEP→PAIN



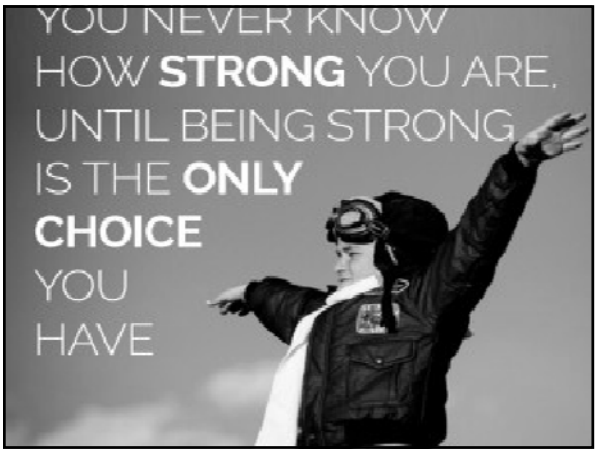
COGNITIVE BEHAVIORAL THERAPY

- Learning how to initiate sleep…….finding ***alpha*** again.
- Organized, perfectionist, worrier, list maker and natural leader.
- Neurocognitive impairments often impair the CBT process and requires an effort to find some leverage or clinical scenarios to help motivate someone to take action and stop worrying.

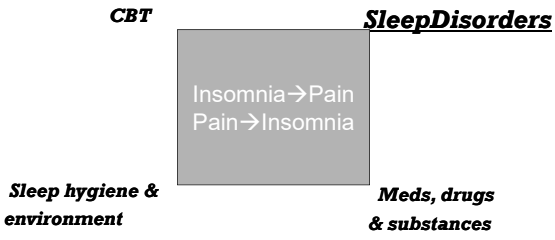
ACT -1 Acceptance and Commitment Therapy serves to improve sleep using mindfulness and acceptance-based approaches
Ung, Ulmer, Manber Behavorial Res Ther 2012 Nov.

- Part of the therapeutic goal is to alter, then gradually modify their own label from "I'm a pain patient" to "I have a sleep disorder that is interfering with my pain management!" – thus shifting their paradigm towards wellness, not victim.

YOU'D BE SURPRISED WHAT LENGTHS PEOPLE WILL GO TO NOT FACE WHAT IS REAL AND PAINFUL INSIDE THEM.



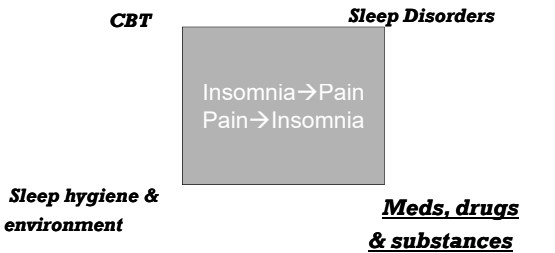
PAIN→SLEEP SLEEP→PAIN



SLEEP DISORDERS IN PAIN PATIENTS

- Insomnia – psychophysiologic type (organized perfectionist, chronic worrier, list maker and natural leader
- RLS/PLMD (caffeine, smoking, stimulants, SSRI's, low ferritin)
- OSA (hx of snoring, witnessed apneas) "dreaming alot"
- CSA/Complex Sleep Apnea (no snoring, irregular breathing)
- Circadian Rhythm Disorders (delayed > advanced)

PAIN→SLEEP SLEEP→PAIN



IMPACT ON SLEEP OF NON PRESCRIPTION SUBSTANCES

- Nicotine– stimulate properties; ?reduces SWS.
- Caffeine-- stimulate properties; increases Stage1 and sleep fragmentation. Aggravates RLS and PLMD in susceptible individuals.
- Alcohol– relaxant; facilitates sleep initiation, and reduces REM, but increases subsequent arousals (aldehydes). Relaxes upper airway nuscles resulting in snoring or SRBD in susceptible individuals.
- Marijuana– decreases REM, increase SWS
- Diphenhydramine– sedation, long half life, rapid tolerance.
- Melatonin–chronobiotic hormone derived from pineal glands.
- Valerian-- weak GABA agonist

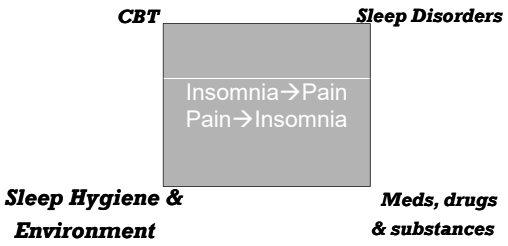
IMPACT OF MEDICATIONS ON SLEEP QUALITY

- Opiates- reduce SWS and REM stage sleep, lower threshold for obstructive and central sleep apnea in susceptible patients.
- Benzodiazepines– reduce SWS, lower threshold for SRBD; long half-life.
- Non-benzodiazepines—no impact on sleep architecture; shorter half-life.
- Sedating antidepressants- (tricyclics, SSRI, SSNRI, atypical antipsychotic) decreases total REM stage sleep and lowers threshold for limb movements in susceptible patients; long half-life for a "hypnotic".

IMPACT OF MEDICATIONS ON SLEEP QUALITY

- Stimulants—may reduce REM and Stage 2 sleep
- Alerting Agents– no significant changes in sleep architecture
- NSAIDS- no evidence of sleep quality changes
- Antiepileptic's- increase SWS and no REM effect
- Melatonin- no impact on sleep architecture

PAIN→SLEEP SLEEP→PAIN

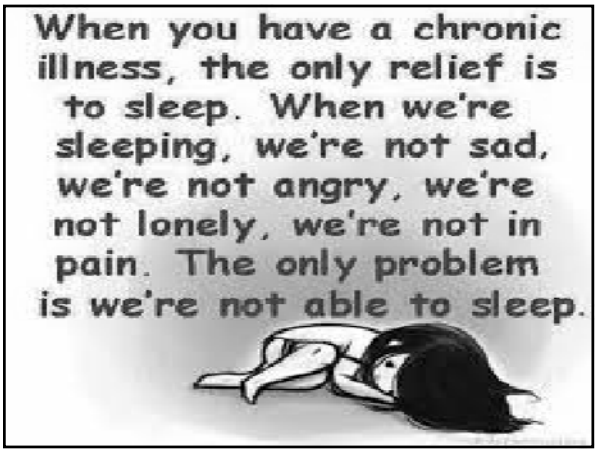


SLEEP HYGIENE ISSUES

- "Caffeine doesn't touch me"
- Impact of ambient lighting and melatonin secretion.
- TV marathons……. aka their "lucent binky"
- Wearing ear buds with vocal music.
- Texting, Tweeting, using Social media throughout the night.
- Clock watching in bed.
- Pets, dogs and other animals in bed.
- Snoring bed partner.

ADDITIONAL RANDOM THOUGHTS-SEESAW CONCEPT

- Patients must be reminded often of the importance of ongoing sleep hygiene efforts, (Not just to try them), but that the use of certain indicated meds and substances can, in certain patients, contribute to sleep disorders, impact sleep quality and undermine the role of CBT.
- Maintain vigilance for the common sleep disorders in pain patients.
- "the ruts that some people make"- victim position and need to repackage themselves or re brand themselves…… "pain is a part of who I am, **not** all I am!"
- "If you want something different to happen, then be open to doing something differently."



ACTUAL CASE STUDY

SLEEP IS A PAIN

A TYPICAL SCENARIO AT THE INTERSECTION OF PAIN AND SLEEP

- A patient with chronic psychophysiologic insomnia, RLS, a smoker and a drinker, who suffers with chronic pain that requires narcotic analgesics and muscle relaxants that appeared to correlate with the start of loud snoring, teeth grinding and witnessed apneas, which appeared at the same time as their insomnia and RLS symptoms appeared to improve.
- Subsequent PSG revealed OSA and CPAP titration revealed complex sleep apnea with centrals events that failed to respond to both CPAP & BiPAP therapy.
- ASV titration study was ordered, and found to be successful in addressing the CSA and OSA present.

A TYPICAL SCENARIO AT THE INTERSECTION OF PAIN AND SLEEP

- Subsequently, the RLS symptoms lessened with the reduction in caffeine/nicotine intake, but the patient was started on an SSNRI for pain, and some symptoms of RLS reemerged. Ferritin level was 30, and not >50ng/ml.
- Also, subsequently, their psychophysiologic insomnia returned…….and was managed initially with a short acting hypnotic and CBT was started in order to address both their chronic insomnia and pain issues.
- Pain patients are medically complex, requiring dynamic management especially with interrelated sleep disorders.
- PEELING the ONION in the world of "sleep and pain" usually stinks at first.

A TYPICAL SCENARIO AT THE INTERSECTION OF PAIN AND SLEEP

- Further reductions in evening pain meds (narcotic analgesics) ensued, and after many months of aggressive med management, and including injections, nerve blocks and CBT, these efforts correlated with improved daytime symptoms and sleep quality.
- Rare snoring was now reported when not wearing ASV.
- Subsequent split night study revealed the Dx of only mild OSA , which CPAP appeared to be adequate therapy. There were no Central events present and rare PLMD was noted while on Fe supplements and reduced caffeine and nicotine intake.

RECENT PAIN AND SLEEP ARTICLES

- Chronic opioid therapy contributed to significant ventilatory failure while awake and SDB in 46% of pain patients.

  Rose etal, J Clin Slep Med, Aug 2014

- Take home message: expect challenging clinical histories and sleep studies in this patient population.

RECENT PAIN AND SLEEP ARTICLES

- Increased risk of CVD events in elderly on opioid medication. Study saw significant Sleep Apnea (with ½ of the patients demonstrating CSA) which resolved following the discontinuation of opioid medication. Schwarzer etal, PAIN , June 2015.
- Take home message: expect SDB in elderly patients, who are on opioids for pain.

THANK YOU!

Pain Education and Yoga

Changing Lives with Modern Pain Science And Movement

Jackie Orent-Nathan, APRN-BC
Pain Management
Derry Medical Center
Derry, NH

Objectives

- Understand the Neuromatrix Theory of Pain
- Appreciate how pain sufferers can use that theory to influence their pain
- List an evidence based physical modality that is effective in reducing pain and disability

Disclosures

none

Today's Journey

- Structure of Group Medical Visit Model
- Value of Modern Pain Science Education
- Review of Old Pain Science
- Discuss Modern Pain Science
- Explain Pain: Understanding Pain using tools from Lorimer Moseley and David Butler
- Yoga Practice for Pain Management
- Patient Testimonials

Group Medical Visit Model

- Group has similar medical needs or conditions
- Meet for an extended appointment with a health care provider

Group Medical Visits

"...is Medicare payment for CPT code 99213, or other similar evaluation and management codes, dependent upon the service being provided in a private exam room or can these codes be billed if the identical service is provided in front of other patients in the course of a shared medical appointment?"

From AAFP website

Group Medical Visits

The response from CMS was

"...under existing CPT codes and Medicare rules, a physician could furnish a medically necessary face-to-face E/M visit (CPT code 99213 or similar code depending on level of complexity) to a patient that is observed by other patients. From a payment perspective, there is no prohibition on group members observing while a physician provides a service to another beneficiary." The letter went on to state that any activities of the group (including group counseling activities) should not impact the level of code reported for the individual patient.

Group Medical Visits

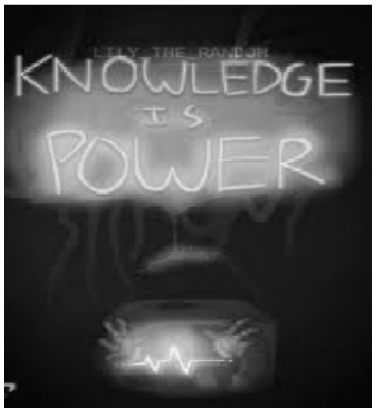
Some private payers have instructed physicians to bill an office visit (99201-99215) based on the entire group visit. For compliance purposes, we recommend that you ask for these instructions in writing and keep them on file as you would any other advice from a payer.

Where each individual patient is provided a medically necessary, one-on-one encounter, in addition to the time in the group discussions, there should be no problem in billing for the visit based solely on the documented services provided in a direct one-on-one encounter.

Modern Pain Science and Yoga Group Medical Visit Format

90 minute class

- 45 minutes: pain education
- 45 minutes: movement: gentle yoga/meditation



Modern Pain Science Education

8 studies comprising 6 high-quality RCTs, 1 pseudo-RCT, and 1 comparative study involving 401 subjects

CONCLUSIONS: For chronic MSK pain disorders, there is compelling evidence that an educational strategy addressing neurophysiology and neurobiology of pain can have a positive effect on pain, disability, catastrophization, and physical performance

Louw A, Diener I, Butler DS, Puentedura EJ. (2011). The effect of neuroscience education on pain, disability, anxiety, and stress in chronic muscuskeletal pain, *Arch Phys Rehabil.* Dec;92(12):2041-56.

Modern Pain Science Education

one-to-one education session for chronic LBP patients (n=121)

Evaluation: relationship between change in pain cognition
- survey of pain attitudes (SOPA)
- pain catastrophising scale (PCS)

Evaluation: change in physical performance
- (measured by the straight leg raise (SLR) and standing forward bending

Results: There was a strong relationship between cognitive change and change in straight leg raise (SLR) and forward bending (r=0.88 and 0.79, respectively, P<0.01), mostly explained by change in the conviction that pain means tissue damage and catastrophising

Moseley GL.(2004) Evidence for a direct relationship between cognitive and physical change during an education intervention in people with chronic low back pain. *Eur J Pain.Feb;*8(1):39-45

Modern Pain Science Education

Neurophysiological Pain Education for Patients With Chronic Low Back Pain
A Systematic Review and Meta-Analysis

- **AIM**
  - evaluate the effect of neurophysiological pain education (NPE) for patients with CLBP, measured through pain, disability and behavioral attitudes. A second aim was to investigate the effect of different types of NPE in order to identify the effective type for different subgroups of CLBP patients
- **Conclusion**
  - moderate evidence supporting the hypothesis that NPE has a small to moderate effect on pain and low evidence of a small to moderate effect on disability immediately after the intervention. NPE has a small to moderate effect on pain and disability at 3 months follow-up in patients with CLBP.

Tegner, H. et al.(2018). Neurophysiological Pain Education for Patients With Chronic Low Back Pain: A Systematic Review and Meta Analysis. *The Clinical Journal of Pain*. Volume 34 - Issue 8 - p 778–786

Gate Control Theory

Melzack and Wall

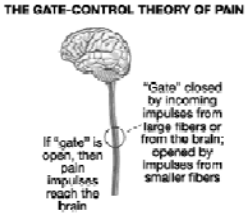
- Pain messages from the PNS activate
  - small unmyelinated C-fibers
  - Large myelinated A-B fibers send messages about harmless stimuli
- Psychological factors play a role in modulating nociceptive inputs
  - Attention, past learning, an understanding of the meaning of the situation
- Brain is not changeable

Melzack, R.(1993) Pain and the brain, *APS Journal* 2(3): 172-174,reprinted from the Department of Psychology, McGill University, Montreal, Quebec, Canada

Gate Control Theory

Melzack and Wall

- GATE: substantia gelatinosa (dorsal horn in the spinal cord)
  - Large-fiber activity inhibits (or closes) the gate
  - small-fiber activity facilitates (or opens) the gate
  - descending fibers could also modulate this gate

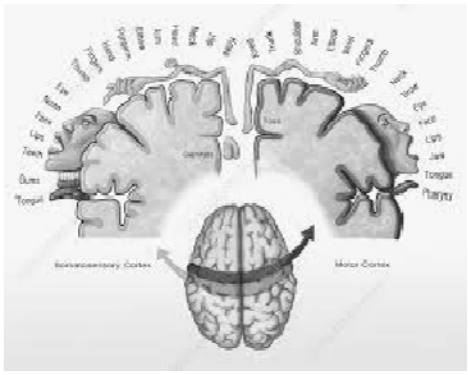


From the Gate Control Theory to the Neuromatrix Theory

Ronald Melzack

- Neuromatrix (widely distributed neural network in the brain)
  - Active neuromatrix that underlies perception of the body
  - Neuromatrix representing the missing limb produces an abnormal pattern of nerve impulses

Melzack, R.(1993). Pain and the brain. *APS Journal* 2(3): 172-174, 1993 reprinted from the Department of Psychology, McGill University, Montreal, Quebec, Canada



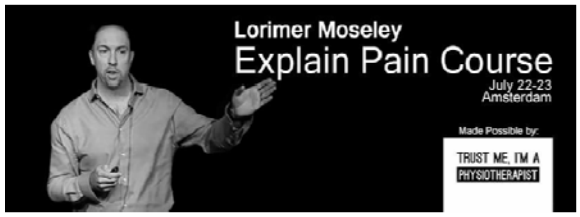
Neuromatrix Theory
Ronald Melzack

- Central Nervous System is where pain is produced and that multiple parts of the brain and spinal cord work together in response to stimuli from the body and environment to create the experience of pain
- The brain and spinal cord are what produce pain, not tissue damage

Modern Pain Science

Pain is about protection against threats to our survival

Body in mind – the role of the brain in chronic pain' at Mind & Its Potential 2011



EXPLAIN PAIN
Lorimer Moseley & David Butler

We do not have pain receptors or pain nerves, we have danger sensors

Various sensors are embedded in the membrane of neurons to detect danger

Danger sensors detect:

- mechanical forces
- chemical forces
- temperature changes

What's more important than danger messages coming from the body is what your brain thinks those messages mean

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- Pain relies on many different factors and it is the brain that decides whether something hurts or not, 100% of the time, with NO exceptions
- Pain relies on CONTEXT (location, situation, setting, beliefs, values, understanding, knowledge)

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- The brain holds many virtual bodies
  - Virtual bodies let us know where our actual body is in space
  - Phantom limb pain
    - The virtual leg and the relationship of the leg to the rest of the body is still represented in the brain

Butler, DS, Moseley L. (2013) *Explain Pain.* Adelaide, Australia: Noigroup Publications.

EXPLAIN PAIN
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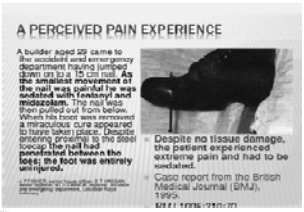
Pain and the state of the tissues of the body have a variable relationship

Damaged tissue does not always cause pain

Pain does not always reflect damage

Lorimer Moseley 'Body in mind the role of the brain in chronic pain' at Mind & Its Potential 2011



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Anything that suggests you need protecting takes pain up

Anything that suggests you don't takes pain down

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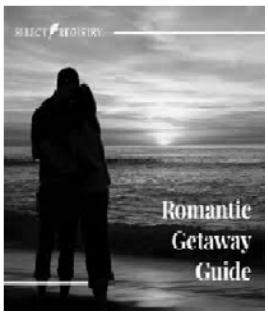

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DIM= *danger in me*
- Anything that is dangerous to your body tissues, life, lifestyle, job, happiness, your day to day function–a threat to who you are as a person

SIM=*safety in me*
- Anything that makes you feel stronger, better, healthier, more confident, more sure and certain

Moseley, G.L., Butler, D.S. (2017) Explain Pain Handbook. Adelaide, Australia. Noigroup Publications

EXPLAIN PAIN

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- DIM Examples:
  - Belief that my body is deteriorating
  - Hearing that my new MRI shows degeneration
  - Thinking that pain is just going to keep getting worse
  - Believing that movement will cause more damage
  - Avoiding movement/moving abnormally
  - Believing that everyone in my family is destined to have back pain/deteriorating joints
  - Depressed/anxious mood
  - Seeing pictures of my wrecked car from the accident that led to my chronic neck pain

Table 2

Age-specific prevalence estimates of degenerative spine imaging findings in asymptomatic patients[a]

	Age (yr)						
Imaging Finding	20	30	40	50	60	70	80
Disk degeneration	37%	52%	68%	80%	88%	93%	96%
Disk signal loss	17%	33%	54%	73%	86%	94%	97%
Disk height loss	24%	34%	45%	56%	67%	76%	84%
Disk bulge	30%	40%	50%	60%	69%	77%	84%
Disk protrusion	29%	31%	33%	36%	38%	40%	43%
Annular fissure	19%	20%	22%	23%	25%	27%	29%
Facet degeneration	4%	9%	18%	32%	50%	69%	83%
Spondylolisthesis	3%	5%	8%	14%	23%	35%	50%

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- SIM examples:
  - Hearing that my MRI does not show any dangerous findings
  - Understanding my pain
  - Knowing that age related changes in my spine are normal and don't correlate with my pain
  - Believing that I have control over my pain
  - Spending time with caring family members/friends
  - Feeling optimistic
  - Understanding that movement is helpful
  - Listening to music

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You will have pain when your brain concludes that there is more credible evidence of danger related to your body than there is credible evidence of safety

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NEUROPLASTICITY/BIOPLASTICITY

- Brains are capability of adapting/Systems are capable of adapting
  - My Brain and other body systems adapted to protect me from danger and became overprotective
- Bioplasticity got me into chronic pain and Bioplasticity can get me out
  - My brain and other body systems can adapt back to a normal state of protection if I remove DIMS and add SIMS

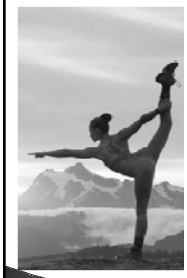
Moseley, G.L., Butler, D.S. (2017) Explain Pain Handbook. Adelaide, Australia. Noigroup Publications

Healthy Lifestyle Topics

Sleep
Nutrition (anti-inflammatory diet, weight management)
Physical activity
Stress Management
Loneliness/lack of connection
Loss of purpose/joy

YOGA

Mind-body and exercise practice that combines breath control, meditation, and movements to stretch and strengthen muscles



A study published in Annals of Internal Medicine found that among 313 people with chronic low back pain, a weekly yoga class increased mobility more than standard medical care for the condition

- Practicing Yoga also improves mood and psychosocial well-being

Tilbrook, H.E.(2011). Yoga for Chronic Low Back Pain: A Randomized Trial. *Ann Intern Med.*;155(9):569-578.

Yoga for Back Pain

With few exceptions, previous studies and the recent randomized control trials (RCTs) indicate that yoga can reduce pain and disability, can be practiced safely, and is well received by participants. Some studies also indicate that yoga may improve psychological symptoms, but these effects are currently not as well established.

Douglas G. Chang,1, Jacquelyn A. Holt,1 Marisa Sklar,3 and Erik J. Groessl, (2016) Yoga as a treatment for chronic low back pain: A systematic review of the literature, *Orthop Rheumatol.* Jan 1; 3(1): 1–8.

Yoga and Gray Matter

- Regular practice of yoga may have:
  - neuroprotective effects against whole brain age-related GM decline
  - more weekly regular yoga practice is associated with larger brain volume in areas involved in bodily representation, attention, self-relevant processing, visualization, and stress regulation

Villemure,C. Čeko,M,. Cotton,V.A., Bushnell, C. (2015) Neuroprotective effects of yoga practice: age-, experience-, and frequency-dependent plasticity, *Front Hum Neurosci.*; 9: 281.

Mindfulness and Brain Changes

Participation in MBSR is associated with changes in gray matter concentration in brain regions involved in:

- learning and memory processes
- emotion regulation
- self-referential processing
- perspective taking

Hölzel,B.K. et al. (2011). *Mindfulness practice leads to increases in regional brain gray matter density, Psychiatry Res.* Jan 30; 191(1): 36–43.