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# Pain management: non-pharmacological considerations

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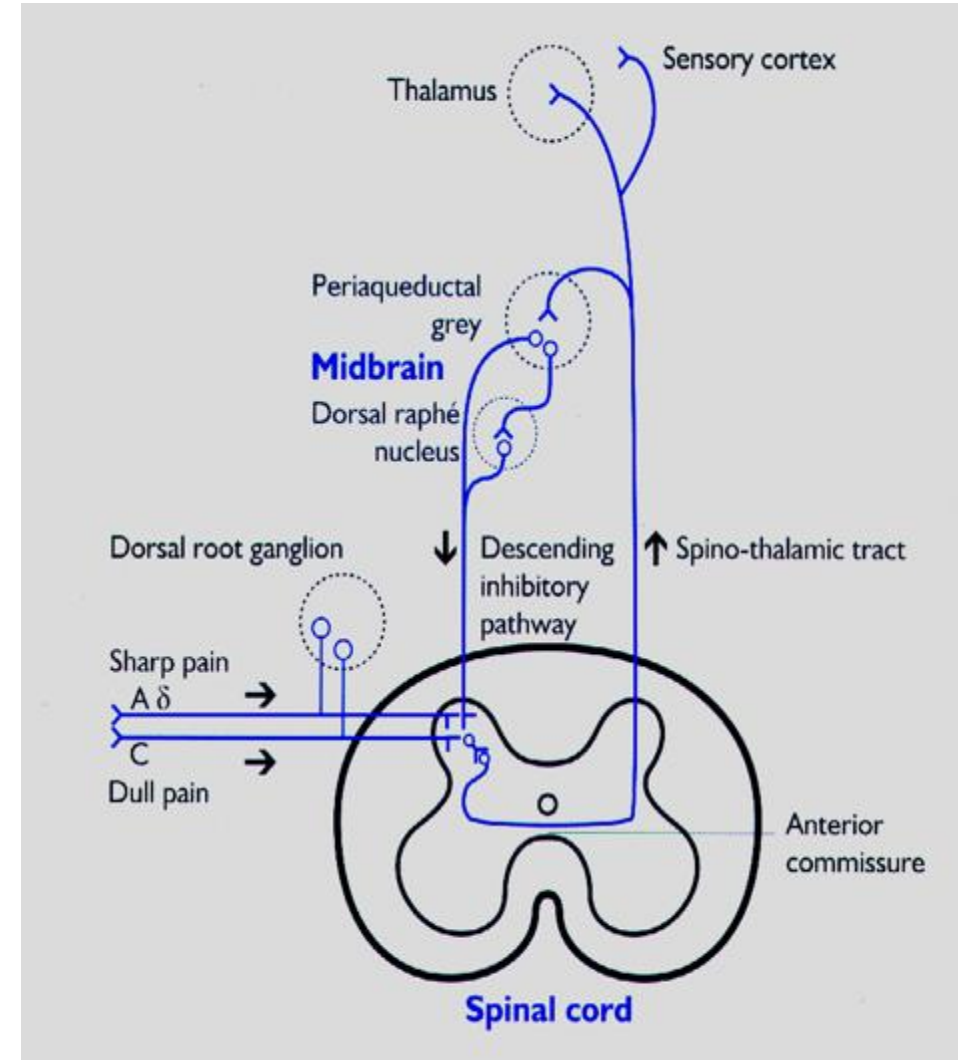


**pain**australia™  
working to prevent and manage pain

- EAG, *Safescript*, Victorian Dept. Health and Human Services
  - Advisory Committee, Drugs of Dependence, Victorian Dept. Health and Human Services
  - Advisory and educational activity for *mundipharma*, *Seqiris*, *Spectrum*
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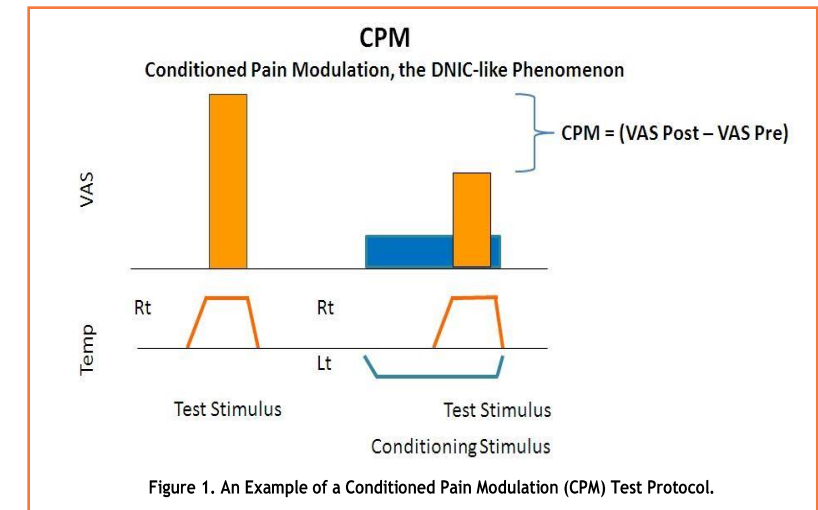
# Pain: a multidimensional experience

- **Clinical pain: sensory, affective, evaluative domains**
  - “*Nociceptive*” pain: structural
    - from tissue damage/stimulation
  - “*Neuropathic*” pain: nervous system damage
    - from nervous system pathology
  - Sensitisation (“*nociplastic*”) pain
    - up-regulation (training) of the nervous system
      - peripheral (transduction)
      - spinal (transmission)
      - supra-spinal/brain (perception)
    - down-regulation (modulation)
      - reduced descending inhibition implicated
- Most pain states have a degree of sensitisation
  - heightened sensations, emotion, meaning



# Clinical pain

- Sensitisation
  - peripheral: inflammatory mediators, nerve changes
    - primary hyperalgesia
  - spinal cord sensitisation: up-regulation (NMDA, NOS, PG's, glia activation)
    - secondary hyperalgesia
  - supraspinal sensitisation: focus, synaptic change/re-organisation
    - ? tertiary hyperalgesia
- Neurogenic inflammation: CRPS, asthma, migraines, bees stings, keloid scars, ACEI
- Behavioural change
  - sleep, mood, fear-avoidance, hyper-vigilance, social interactions
- Descending modulation
  - inhibition (e.g. CPM)
  - facilitation
- Catastrophising associated with  $\uparrow$  TS,  $\downarrow$  DINC
  - Yarnitsky D. *Pain* 2012; 153: 1193



Consider a persons nociceptive spectrum in assessing current pain

# Pain Assessment

- **Who is the person?**

- age, developmental history, medical conditions/medications, presenting pathology
- psychosocial status: depression, anxiety, pain appraisals

**yellow flags:** *psycho-social factors associated with increased risk of disability, distress*

- **What are the potential mechanisms?**

- nociceptive, neuropathic, “sensitisation” (nociplastic)
- pain site, character, radiation, ↑ factors

**red flags:** *clinical indicators of possible serious medical conditions (infection, #, Ca, etc)*

- **What is the impact?**

- biological, psychological, social

**functional state:** *ultimate goal is to restore/maximise function; multidimensional measurement required*

- **What is the expected/actual journey?**

- tissue recovery/injury
- social response/interactions

**blue/black flags:** *solicitous systems, including health care response*



**pain score or  
comfort level?**

# Anti-oxidants, supplements, low dose NTX

- Pollen extract + vitamins in bladder inflammation
  - Cai T. *Urologia* 2013; 16: epub
- Combination antioxidants in pancreatitis
  - Selenium, betacarotene, L-methionine, Vit C, E
  - less pain, improved function, QOL
    - Kirk J *Gastroenterol Surg* 2006; 10: 499
- “turmeric”
  - oral extract acts as anti-TNF
    - ? role in rheumatoid
- Low dose naltrexone: 2-6 mg/d
  - anti-neuroinflammatory, via glial cell modulation: Toll like receptor antagonist
  - concept validity; small trials + in FMS, Crohn’s disease
    - Younger J. *Clin Rheum* 2014; 33: 451



Theme Section: Emerging Therapeutic Aspects in Oncology

## REVIEW

### Curcumin: an orally bioavailable blocker of TNF and other pro-inflammatory biomarkers

Bharat B Aggarwal, Subash C Gupta and Bokyung Sung

*Cytokine Research Laboratory, Department of Experimental Therapeutics, The University of Texas MD Anderson Cancer Center, Houston, TX, USA*

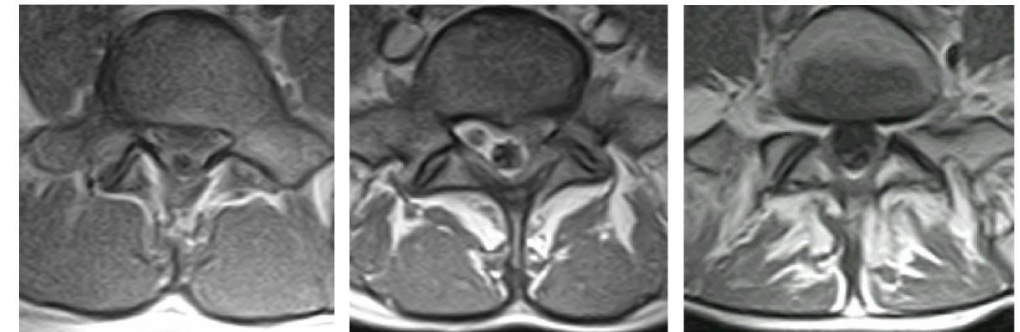
# Obesity, diet and pain

- Fair evidence of diverse plant based mediteranean or vegetarian/vegan diets lower MSK pain
  - supplements may be of benefit: marine oils, omega 3 FA, anti-oxidant fruits
  - little/no evidence for herbal teas, ginger
    - [Kurapatti M. Pain Physician 2023; 26; 527](#)
- Alpha-lipoic acid supplementation: anti-oxidant and anti-inflammatory properties
  - Improves mitochondrial function; improves diabetic control
  - RCT in mixed pan types, 400, 800 mg/d improves VAS vs placebo
    - [Esposito C. Biomed Pharmacother 2021; 144: 112308](#)
- Medications
  - Gabapentinoids, valproate and weight gain
    - plus fluid retention
  - GLP-1 Agonists in diabetics associated with reduced pain, cartilage loss, knee surgery
    - mediated via weight loss > glycaemic control
      - [Zhu H. Ann Rheum Dis 2023; 82: 1218](#)



# Obesity, diet and pain

- Redefining obesity
  - Clinical obesity: chronic, systemic disease state caused by excess adiposity
  - Preclinical obesity: without organ dysfunction or ADL limitations but increased health risk
  - BMI has limitations: waist, waist to hip/height ratio's to be considered
  - “Obesity as a disease”, not just a risk factor: research, prevention, active management
    - [Lancet Diabetes Endocrinology April 2023, Jan 2025](#)
- Strong associations of obesity and pain, recovery from injury
  - Mechanical: joint, spine forces, with micro-tissue and joint damage
  - Behavioural: sleep disorders (including OSA) and low physical activity
    - sleep disorder decreases pain inhibition; less exercise induced hypoalgesia
  - Physiological: lower pain threshold and tolerance
    - pro-inflammatory cytokines
      - [Chin S-H. \*Int J Obesity\* 2020; 44: 969](#)



Grade 0 (none)

Grade 1 (slight)

Grade 2 (severe)

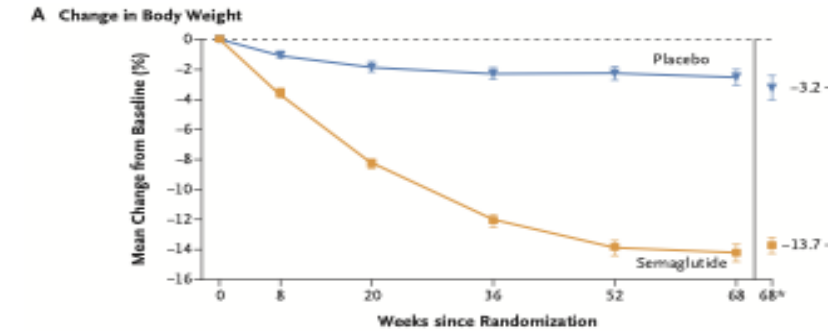
- Fat infiltration in multifidus associated with LBP.
  - [Kjaer P. \*BMC Medicine\* 2007; 5: 2](#)

# Once-Weekly Semaglutide in Persons with Obesity and Knee Osteoarthritis

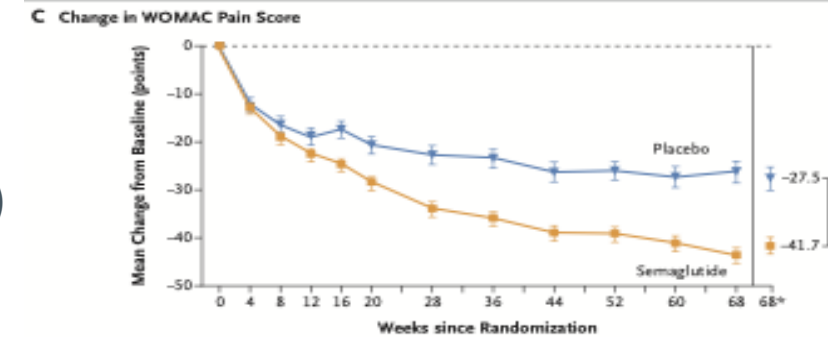
NEJM 2024  
Novo Nordisk funded

H. Bliddal, H. Bays, S. Czernichow, J. Uddén Hemmingsson, J. Hjelmæsæth, T. Hoffmann Morville, A. Koroleva, J. Skov Neergaard, P. Vélez Sánchez, S. Wharton, A. Wizert, and L.E. Kristensen, for the STEP 9 Study Group\*

- RCT for those with BMI >30 and moderate clinical and XR findings of knee OA
  - Weekly GLP-r1 agonist semaglutide 2.3 mg x 68 weeks vs placebo
  - Advice re low calorie diet and exercise provided
  - >80% women, mean BMI 40; mean WOMAC 80/100
- Weight loss: -13.7% vs -3.2%
- WOMAC pain severity: -41.7 vs 27.5
- SF 36 physical function score: +12 vs +6.5
- Positive on secondary measures including NSAID, paracetamol use (opioid excl)
- Note, correlation between weight reduction and pain improvement
  - Mechanical benefit; preclinical trials suggest anti-inflam and “anti-degradation” effects
- Previous associations with obesity: reduction WOMAC by 2 points for every 1% reduction in weight
  - Bariatric surgery may also help but no RCT



No. of Participants	136	132	127	123	120	120	136
Placebo							
Semaglutide	271	263	259	254	245	253	271





# Longitudinal relationships between habitual physical activity and pain tolerance in the general population

Arnes AP.  
*PLoS One* 2023; 18(5): e0285041

- Tromso Study, Norway: population based, 6<sup>th</sup> (2007) and 7<sup>th</sup> wave (2015), n=>10k
- Sedentary, light, moderate, vigorous exercise reported; cold pressor test
- Higher pain tolerance in vigorous group
  - cf sedentary (20s mean difference)
  - correlated to degree of activity
  - increasing activity effect over time greatest impact
- Activity benefits fade with age, ? age related reduction in CPM

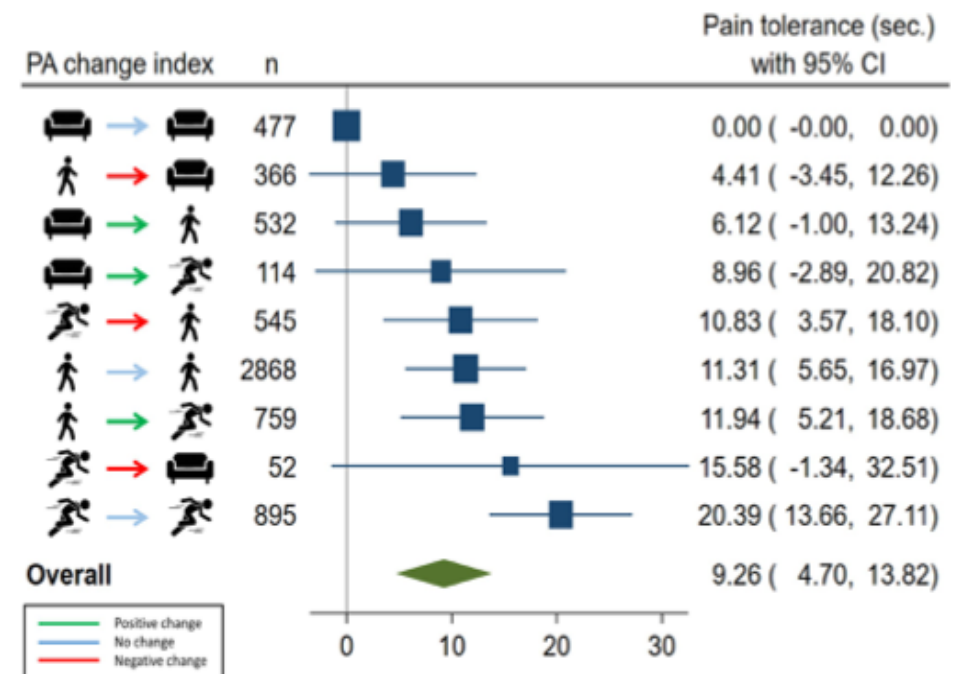


Fig 2. Relationship between groups of physical activity change from Tromso6 to Tromso7 and seconds of cold pain tolerance. Ordered by effect size. PA = physical activity; CI = confidence interval.

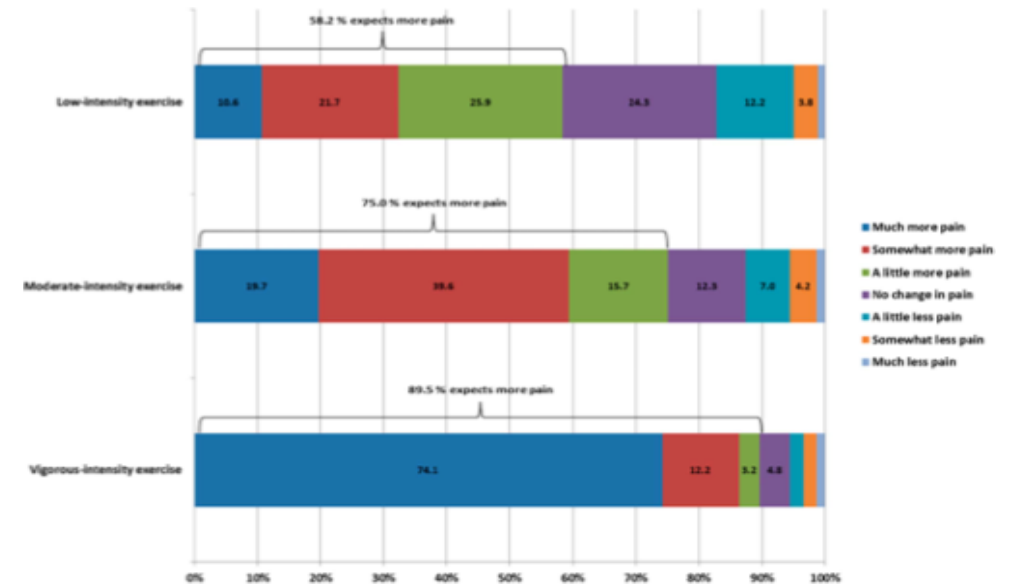
# Exercise and pain

• Vaegter H. *Pain Reports* 2020; 5: e823

- Regular exercise and physical exercise has positive effects on CV health, stress, mood, sleep, sexual health
- Reductions in pain after 8-12 weeks of exercise therapy
- Exercise induced hypoalgesia with single exercise session, regardless if aerobic or isometric
  - Pain threshold (15-20%, increased tolerance, reduced pain intensity
    - greater in exercising muscles, 5-30 mins duration
    - Intensity effect > duration for aerobic; less clear with isometric
  - Pain modulation changes: TS, CPM
    - Inconsistent re CPM
    - Exercise reduces pain unpleasantness consistently
  - Processing changes less well studied, but suggest less sensory and affective processing (evoked potentials)
    - 2 fMRI studies suggest ↑ CPM in FMS with exercise, ↓ unpleasantness of pain in athletes
- Factors influencing EIH
  - Pain associated with exercise means greater analgesic effect
  - Treatment expectations, intra-individual variability
  - Little effects of short term training, but regular exercises reporting lower pain intensity, affect; higher pain tolerance

# Exercise in people with chronic pain

- More variable outcomes, including limited hypo-algesia or can induce hyperalgesia
  - Less effective in those with widespread pain
    - ? those with pain facilitation and/or impaired CPM; evidence of  $\uparrow$  TS
  - Benefit may be greater if non-painful muscle group exercised
  - Sub-threshold exercise preferred: likely activates CPM before facilitatory responses
    - eg to 45% max HR response aerobic, sub-pain in isometric exercise
- Expectations and opioid use are influencing factors
  - Majority persons in pain clinic expect exercise to increase pain
- 2 studies suggest “more fitness, less pain” in chronic pain
  - FMS, OA: less pain response to acute pain
  - Need 8-12 weeks



# Mechanisms of impaired EIH in persons with chronic pain

- Some aspect of chronic pain interferes with EIH: ? inflammation, ? sensitisation, ? fear of movement
  - Suggest: assess cognitions/beliefs, exercise non-painful areas, educate (pain and exercise physiology)
- Opioid and endo-cannabinoid system
  - Peripheral and central effects in animal studies, less consistent in humans
- Stress induced hypoalgesia
  - Unclear in human studies
- CVS
  - HT associated with less pain, but not consistent; BP falls after exercise
- Central CPM
  - Partial evidence, may be independent
- Psychological
  - Poorly understood; athletes/exercise reduces unpleasantness > intensity
- Medication effects poorly studied: e.g paracetamol had little effect on EIH in pain free and chronic pain pts
- Structural: less inflammation, muscular tone etc

# Evidence re exercise programs

- EULAR recommends exercise for inflammatory and osteoarthropathy in setting of individualized assessment
  - General, aerobic, strength exercises positive effects on pain; less clear re yoga, tai chi
    - Geenen R. *Ann Rheum Dis* 2018; 77: 797
- Aerobic and mind-body exercises best for pain and function in hip and knee OA
  - Strength exercise moderate, mixed exercise least effective for pain but > usual care
    - suggest peripheral and central mechanisms combination important
      - Goh SL. *Sports Med* 2019; 49: 743
  - Supervised, tailored aerobic plus strengthening exercises 1hr, 2x week, 6 weeks to see benefit
    - Skou ST. *Clin Exp Rheumatol* 2019; 37: S112
- Chronic low back pain: multiple trials, techniques
  - Core stability > conventional exercise in short term; less clear re long term
    - Nwodo O. *African Health Sciences* 2022; 22: 148
  - Pilates reduces pain, lessens disability short and long term; less clear re impact on QoL
    - Yu Z. *Int J Environ Res Public Health* 2023; 20: 2850



# Questions/comments



- Chronic LBP in ex elite athletes
  - rowers > skiers > control > orienteers
  - relationship to training load
    - Foss I. *Am J Sports Med* 2012; 40: 2610



- Operating related MSK injury common
  - female > male
  - rate highest in general surgery
    - Tran M. *Plast Reconstr Sug Glob Open* 2022; 10: e4142

# Multi/Inter-disciplinary Pain Management programs

- Group vs Individual
  - co-ordinated program with PT/CP/OT/medical +/- SW, RTW
  - directed to self management of pain: moderate effect size
    - [Du S. Patient Educ Couns 2017; 100: 37](#)
- Themes
  - graded exposure (>graded activity)
  - targets fear-avoidance
    - [Lopez-de-Uralde-Villanueva I. Pain Med 2016; 17: 172](#)
  - pacing: tackle boom-bust cycling
    - OT to compliment with energy techniques
  - cognitive restructure
    - challenge catastrophic beliefs, increase self-efficacy
  - target solicitous systems
    - family therapy in adolescent pain
- Evolved over time: exercise → CBT → ACT/mindfulness
  - [Lewis G. Pain Practice 2019; 19: 767](#)



## Pain Management Programs – Which Patient for Which Program?

A guide for NSW Tier 3 and Tier 2 public health facilities providing pain programs



# Multi/Inter-disciplinary Pain Management programs

- CBT > physical alone; best results together in chronic low back pain
  - Pts understanding of pain perception, active coping, problem solving,
    - Yang J. *Pain Research Management* 2022; ID 4276175
  - Cognitive Functional Therapy: interview, personalized exercise exposure +/- biofeedback
    - Kent P. *Lancet* 2023; 401: 1866
- Acceptance-commitment behavioural approach
  - Seeks flexibility, not targeting distress or cognitions per se
    - Graham CD. *Clin Psychology Review* 2016; 46: 46
    - Volve K. *J Pain* 2022; 21: 529
  - Mindfulness: cortical control
    - Yoga, Tai Chi: motor planning activation
      - Cramer H. *Clin J Pain* 2013; 29: 450
- Online pain management programs possible but smaller effect size
  - Chew MT. *Pain Practice* 2023; 23: 664
  - <https://www.healthdirect.gov.au/chronic-pain-course-online-program>
  - <https://thiswayup.org.au/programs/chronic-pain-program/>
  - <https://www.mqhealth.org.au/about/stories/chronic-pain-relief-with-online-clinic>





# Comments/questions

- Waiting in pain
  - >6 mth wait associated with symptom progression, function ↓
  - Median wait time for pain clinic 60 days
    - large variability, rural > city, public >> private
    - telehealth availability improving
      - [Hogg M. Pain Medicine 2020; doi 10.1093](#)
- National Facility Directory
  - <https://www.pinaustralia.org.au/getting-help/pain-directory>



Brain man videos

<https://www.youtube.com/watch?v=5KrUL8tOaQs>

Tame the beast video

<https://www.tamethebeast.org>

Pain toolkit

<http://www.paintoolkit.org>