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Evidence Citations

- Evidence citations are required for clinical presentations. List or attach evidence-based references that support the clinical practice concerns and recommendations that you will be presenting.
overview

- Acupuncture
- Massage
- Yoga and Meditation
- Diet
- Spinal Manipulation
Acupuncture

20 RCTs (2010):
Acupuncture, added to other conventional therapies, relieved pain and improved function better than conventional therapies alone for cLBP. However, effects are small.

Rubinstein: European Spine J 2010
**acupuncture**

**better** than usual care for pain and dysfunction in cLBP,

**but:**

individualized **not better** than standardized or sham

**4-arm trial;** $N = 638$

no identifiable subgroups for benefits from acupuncture

Cherkin: *Arch Intern Med* 2009

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**acupuncture vs. sham**

29 RCTs: $N = 17,922$

chronic pain conditions

ES (SD) for pain:

<table>
<thead>
<tr>
<th>Condition</th>
<th>vs. sham (ES, SD)</th>
<th>vs. no therapy (ES, SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Back or Neck Pain</td>
<td>0.23 (0.13-0.33)</td>
<td>0.55 (0.51-0.58)</td>
</tr>
<tr>
<td>Osteoarthritis</td>
<td>0.16 (0.07-0.25)</td>
<td>0.57 (0.50-0.64)</td>
</tr>
<tr>
<td>Chronic headache</td>
<td>0.15 (0.07-0.24)</td>
<td>0.42 (0.37-0.46)</td>
</tr>
</tbody>
</table>

Vickers: *JAMA Intern Med* 2012
**massage therapy**

~ 5,000 years: The Cong-Fou of the Tao-Tse  
French translation AD 1779

Pehr Henrik Ling:  
gymnastics school in Sweden in 1813

Dutch Johan Georg Mezger

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**massage**

**systematic review**

25 RCTs (2015):  
moderate evidence for pain short-term compared  
> sham best when combined with exercise and education  
> active control  
= no improvement for function

Furlan: *Cochrane Library* 2015
**massage**

Ironman Triathlon RCT
74 runners with anterior thigh pain vs. sitting rest

more effective than no intervention on the post-race recovery from pain and perceived fatigue in long-distance triathlon athletes.

Nunes, G. S: *J Physiotherapy*, 2016

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**Fig. 1 Overview of the study trials and procedures.**


Published by AAAS
- genes differentially expressed in the muscle:
  5 genes immediately after massage; 4 genes 2½ hrs later
- activated mechano-transduction signaling pathways:
  focal adhesion kinase (FAK) and extracellular signal-regulated kinase 1/2 (ERK1/2),
- potentiated mitochondrial biogenesis signaling [nuclear peroxisome proliferator-activated receptor gamma coactivator 1 α (PGC-1 α),
- mitigated the rise in nuclear factor κB (NFκB) accumulation caused by exercise-induced muscle trauma.
- no effect on muscle metabolites (glycogen, lactate)
- attenuated production of TNF-α and IL-6,
- reduced heat shock protein 27 (HSP27) phosphorylation
- thereby mitigating cellular stress resulting from myofiber injury, promoting mitochondrial biogenesis.

Crane: Sci Transl Med 2012

massage of muscular trigger points

pain below knee is not always from sciatic nerve impingement

“it seems that acupressure or pressure point massage techniques provide more relief than classic massage”

Furlan: Cochrane Library 2008
yoga + meditation

North American yogis versus matched controls
- tolerated pain >2x as long
- more gray matter (GM) in multiple brain regions
  - insular GM correlated with pain tolerance
  - insular GM volume correlated with yoga experience

Villemure: Cerebral Cortex 2013
**yoga**

Mindfulness Based Stress Reduction

8-week course developed at Pain Center in Mass Gen Hospital by John Kabat-Zinn (~4 hrs/w) non-denominational teaching based on Vipassana meditation and yoga.

**meditation**

8-week course developed at Pain Center in Mass Gen Hospital by John Kabat-Zinn (~4 hrs/w) non-denominational teaching based on Vipassana meditation and yoga.

**meta-analysis (3 RCTs)**

limited evidence that MBSR can increase pain acceptance

Cramer: BMC Compl Altern Med 2012
**meditation: how does it work?**

Greatest decrease in pain intensity → the largest ↑ in the ACC and right anterior insula activation.

Zeidan: 2011

Pain stimuli in a state of mindfulness → activation ↑ in the bilateral IPFC and ↑ in the posterior insula/S2

Gard: 2011

**sensory awareness ↑, cognitive processing ↓**

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**diet**
**tart cherries**

- RCT with 54 runners in the Hood to Coast relay
- cherry or placebo twice daily for one week prior to and the day of the race
- 2 10.5 oz bottles/day
- increase in pain 12 ± 18 mm versus 37 ± 20 mm (p < .001).

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**very low-carb ketogenic diet**

- vs traditional western diet (WD) in 10-week resistance-training program
- 25 college aged men
- lean body mass increased in both
- fat mass decreased in both.
- strength and power increased in both.
- total testosterone increased (118 ng/dl) compared to the WD (-36 ng/dl)

Wilson et al. *J Strength Cond Res* 2017
spinal manipulation

application of high-amplitude manual thrusts to spinal joints within their passive range of motion to treat specific, reversible, segmental hypomobility.

universal tradition: China, Greece, Rome, bone setters

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spinal manipulation

- Small but undeniable risk for upper neck
- Negligible risk for lower back

Recommendations for Referral:
- 3 sessions should clarify benefit
- cooperate with PT
- no rotation at Occiput/C1/C2
- no practitioners who deny risk of stroke
- not for weekly SM over years

Smith: Neurology 2003
national guidelines

**CLINICAL GUIDELINES**

Diagnosis and Treatment of Low Back Pain: A Joint Clinical Practice Guideline from the American College of Physicians and the American Pain Society

Roger Chou, MD; Anne Clauser, MD, PhD; MHA; Vincenzo Sorelli, MD; Donald Casey, MD, MPH; MBA; J. Thomas Cote Jr., MD, MPH; Paul Shekelle, MD, PhD; and Douglas K. Owens, MD, MS, for the Clinical Efficacy Assessment Subcommittee of the American College of Physicians and the American College of Physicians/American Pain Society Low Back Pain Guidelines Panel

**Recommendation 7:** For patients who do not improve with self-care options, clinicians should consider the addition of nonpharmacologic therapy with proven benefits—for acute low back pain, spinal manipulation; for chronic or subacute low back pain, intensive interdisciplinary rehabilitation, exercise therapy, acupuncture, massage therapy, spinal manipulation, yoga, cognitive-behavioral therapy, or progressive relaxation (weak recommendation, moderate-quality evidence).


www.annals.org

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specific SM
how does it work?

- MRI of facet joint: gapping after adjustment

spinal manipulation for αLBP

US guidelines
- American College of Physicians
- American Pain Society

& most international guidelines
recommend spinal manipulation for α + cLBP

“for patients who do not improve with self-care options”

- National Institute for Clinical Excellence, NICE, London

Chou & Huffman: 2007 Ann Intern Med
• **aLBP:** no clear evidence of being superior to other therapies or sham (20 RCTs)  
  
  Rubinstein: *Cochrane 2012*

  “*the decision to refer patients for SMT should be based upon costs, preferences of the patients and providers, and relative safety of SMT compared to other treatment options. Future RCTs should examine specific subgroups and include an economic evaluation.”*

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### Spinal Manipulation

**subgroup likely to benefit from SM:**

1) current episode <16 days  
2) no sciatica  
3) <19 of 42 on Fear-Avoidance Beliefs S.  
4) ≥1 hypomobile segment in L-spine  
5) ≥1 hip joint with >35° internal rotation

Flynn: *Spine 2002*
### spinal manipulation

![Graph showing ODQ Score over time for different groups](Childs: Ann Intern Med 2004)

#### PT + 2 SMs vs. PT

<table>
<thead>
<tr>
<th>group</th>
<th>(N)</th>
<th>&lt;50% ODQ</th>
</tr>
</thead>
<tbody>
<tr>
<td>SM + PT</td>
<td>(70)</td>
<td>31 / 44</td>
</tr>
<tr>
<td>PT</td>
<td>(61)</td>
<td>7 / 22</td>
</tr>
</tbody>
</table>

* p < .001 / p = .002 at 1 or 4 weeks

*Applying clinical prediction rule:*

- **OR (4w):** 60.8 (CI 5.2-704.7; p=0.001).
- **NNT with SM (if + on prediction rule)** for successful outcome at 1 week: **1.3**; at 4 w: **1.9**.

Childs: Ann Intern Med 2004
**how does it work?**

- **pain (+ stressor)**
  - appraisal of threat, harm, loss
  - emotional response: fear, helplessness, distress
  - perception

- emotion-oriented coping
  - a) catastrophizing, avoidance
  - b) ignoring, endurance

**Modification of psychological risk factors?**

**how does it all work?**

- Placebo?
- Expectancy

Treatment effects highest when concordant with patients’ expectations and preferences

Kalauokalani: Spine 2001
**conclusions**

- Benefits of many IM therapies may be **small or nonspecific**, however
- they **appear to be real** and maybe substantial enough to help patients.
- Conundrum for us who believe in EBM:
  - Should we *reject* treatments found to help through nonspecific effects?
  - or *take advantage of nonspecific effects*?

*Thank You!*