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Physical interventions for pain

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Aims

- To discuss the evidence for physical interventions eg.heat, cold, TENS (and anything else) for pain management

Aims

- Prevalence of the use of physical interventions for pain in palliative care

- Take a closer look at the evidence for heat, cold, TENS, massage

What's your practice ?

Physical interventions

- The American National Comprehensive Cancer Network (ANCC) recommends the use of non-pharmacological interventions if pain scores remain at 4 or above on a 10 point scale after the pharmacological treatment has been re-evaluated and modified (Swarm et al 2010)

The gate control theory

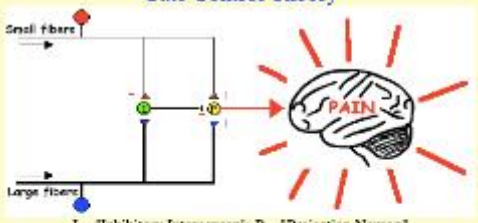
BRITISH JOURNAL OF ANAESTHESIA

Volume 88, Number 6, June 2002

Editorial I

Gate Control Theory of pain stands the test of time

Gate Control Theory



I = "Inhibitory Interneuron" ; P = "Projection Neuron"
- = inhibition (blocking); + = excitation (activation)

Let's go through the theory step by step:

1. Without any stimulation, both large and small nerve fibers are quiet and the inhibitory interneuron (I) blocks the signal in the projection neuron (P) that connects to the brain. The "gate is closed" and therefore NO PAIN.
2. With non-painful stimulation, large nerve fibers are activated primarily. This activates the projection neuron (P), BUT it ALSO activates the inhibitory interneuron (I) which then BLOCKS the signal in the projection neuron (P) that connects to the brain. The "gate is closed" and therefore NO PAIN.
3. With pain stimulation, small nerve fibers become active. They activate the projection neurons (P) and BLOCK the inhibitory interneuron (I). Because activity of the inhibitory interneuron is blocked, it CANNOT block the output of the projection neuron that connects with the brain. The "gate is open", therefore, PAIN!!

Which physical therapies do patients use?

- Observational study of 1000 European patients with breakthrough cancer pain (Davies et al 2013)
  - 65.5% patients identified an intervention that 'usually' improved breakthrough pain
  - In 232 cases this was a non-pharmacological intervention
  - In 120 cases this was a combination of pharmacological & non-pharmacological
  -

Intervention	No. of patients
Heat	107
Cold	22
Rubbing / massage	36
TENS	14

Which physical therapies do patients use?

- Study of 25 hospitalized patients with heart failure
  - 36% used heat
  - 20% used cold
  - 8% used massage

HCP's attitudes

- Analysis of registered nurses (n 49) and student nurses (n 64) attitudes and use of physical therapies
  - 69% RNs had a strong belief that PT worked but only half felt adequately educated to use / suggest them
  - 59% SNs had a strong belief that PT worked and three quarters felt adequately educated

The evidence

- Limited evidence in palliative / supportive / end of life care

REVIEW PAPER

A systematic review: non-pharmacological interventions in treating pain in patients with advanced cancer

Minna Hökkä, Pirjo Kaakinen & Tarja Pölkki

- Evidence taken from cancer, chronic pain (MSK studies), elderly care literature
- Some Cochrane reviews
- Some conflicting evidence

The evidence

Cold - mechanisms

"benumb the part" and "arrest the circulation of blood through it" *Arnott J. (1849)*

- Reduces the temperature of the skin and muscles
- Causes vasoconstriction
- Reduces oedema
- Slows the delivery of inflammatory mediators thus reducing inflammation

Cold

- Induces local anaesthetic
- Decreases activation threshold of tissue nociceptors and the conduction velocity of nerve signals
- Cold application considered to have greater potential for restorative, therapeutic effect (beneficial for muscle injury)
- Generally used in the acute phase of an injury

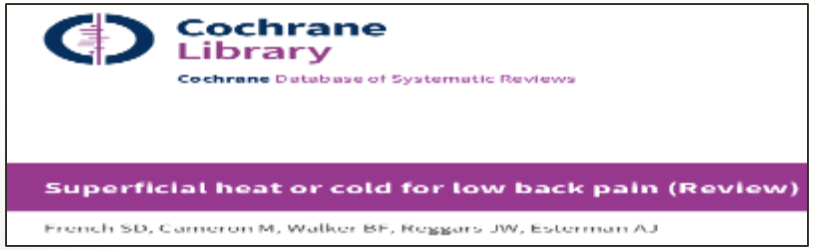
Cold

- No studies on cold interventions highlighted in the SR on cancer pain

- 1 study (general review paper in elderly care) compared ice + exercise and heat + exercise for RA shoulder pain and found no difference between groups

Cold

- Studies investigating ‘cold’ interventions are mainly in low back pain
- Cochrane SR: 3 poor quality trials
- “No conclusions can be drawn about the use of cold therapy”



Heat – mechanisms

- Topical heat increases local blood flow through vasodilation
- Increase metabolic processes (can help healing, waste clearance)
- Can help muscles that are stiff and painful but not acutely inflamed
- (might) Result in inhibition of painful sensations at the level of the spinal cord (gate control theory)

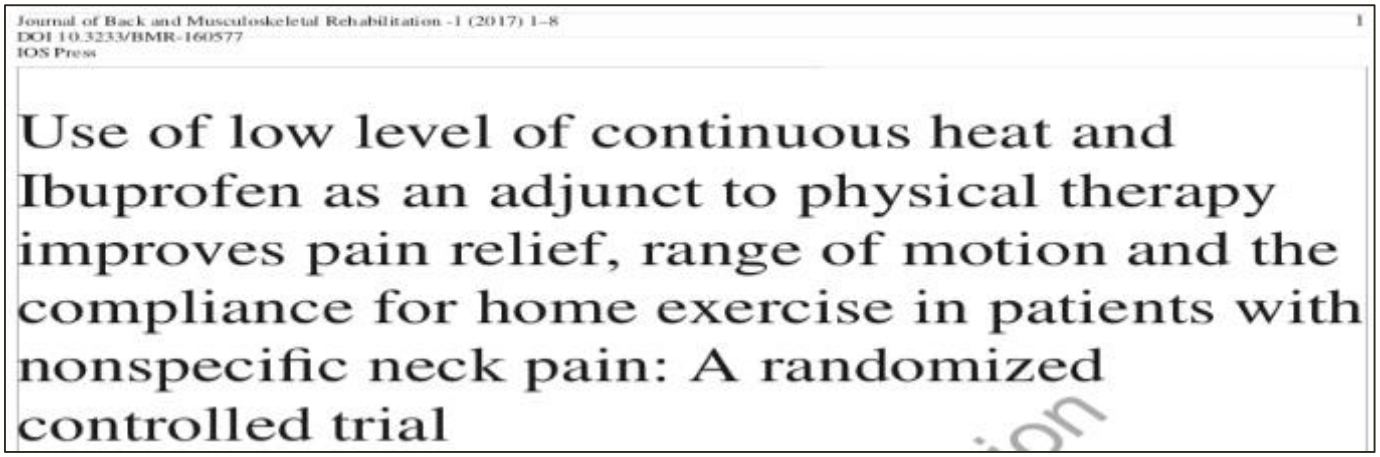
Heat

Heat

- SR in cancer patients : 1 study (RCT) using warm water foot baths or no warm water foot baths to assess the effect on pain, mood & relaxation
  - small study, no significant differences between experimental and control

- No other studies identified for heat and cancer pain

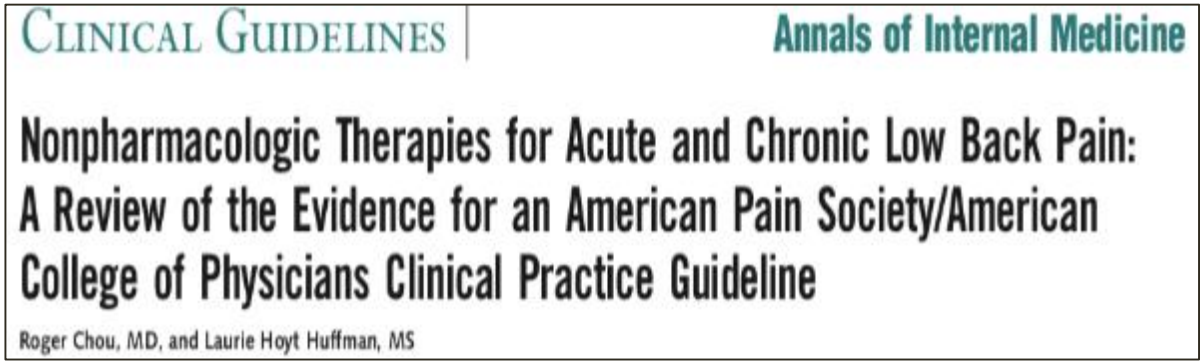
Heat


Journal of Back and Musculoskeletal Rehabilitation -1 (2017) 1–8
DOI 10.3233/BMR-160577
IOS Press

Use of low level of continuous heat and Ibuprofen as an adjunct to physical therapy improves pain relief, range of motion and the compliance for home exercise in patients with nonspecific neck pain: A randomized controlled trial

- 92 patients with non-specific neck pain
- Intervention group used heat neck wrap for 6 hours prior to completing 1 hour of exercise per day
- Outcome measures included VAS, ROM assessments & compliance with exercise programmes
- Results : both LLCH alone and with ibuprofen showed an improvement in all outcome measures compared to control

Heat


CLINICAL GUIDELINES | Annals of Internal Medicine

Nonpharmacologic Therapies for Acute and Chronic Low Back Pain: A Review of the Evidence for an American Pain Society/American College of Physicians Clinical Practice Guideline

Roger Chou, M.D. and Laurie Hoyt Huffman, MS

- For acute low back pain superficial heat has good evidence for moderate benefits
- Effects are not long lasting but they may improve the ability to exercise which has been shown to be beneficial

Heat

- Heated wrap therapy (8 hours) reduced pain after 5 days
- Heated blanket (25 min) significantly reduced low back pain immediately, relief not long lasting
- Heat wrap provided better relief at 1 day and 4 days compared to paracetamol and ibuprofen

Heat

- The addition of exercise is beneficial, heat may improve ability to exercise
- Some of the main trials in the review were industry funded
- Reported AE minimal, generally being mild skin irritation

Conclusion:

"There is moderate evidence in a small number of trials that heat wrap therapy provides a small short-term reduction in pain and disability in a population with a mix of acute and sub-acute low-back pain, and that the addition of exercise further reduces pain and improves function"

Massage

- SR in patients with advanced cancer
  - 4 papers (controls included simple touch, social attention)
  - Massage lasted 30-50 minutes on average
    - 322 patients, massage statistically significant, did not reach clinical significance
    - 30 patients, effects of massage had short, intermediate, long term benefits
    - 72 patients, massage improved pain over time
    - 18 patients, massage + exercise improved pain immediately but effect not sustained

Massage

Article

Meta-Analysis of Massage Therapy on Cancer Pain

Integrative Cancer Therapies
2015, Vol. 14(4) 297–304

DOI: 10.1177/1534735415572885
ict.sagepub.com
SAGE

Sook-Hyun Lee, MS[1], Jong-Yeop Kim, KMD, MS[1], Sujung Yeo, KMD, PhD[1], Sung-Hoon Kim, KMD, PhD[1], and Sabina Lim, KMD, PhD[1]

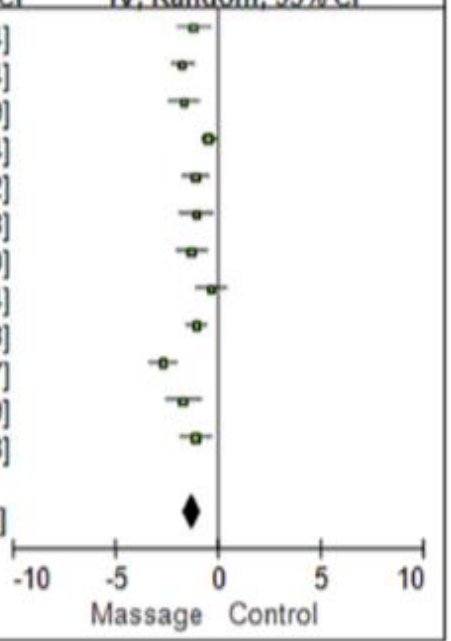
- Reviewed RCTs that compared massage to 'usual care' for patients with pain related to treatment side effects, primary cancer or metastases
- 12 studies, 559 subjects
- Tools across studies : VAS, BPI, NRS, PPI

Massage

Study or Subgroup	Massage Mean	SD	Total	Control Mean	SD	Total	Weight	Std. Mean Difference IV, Random, 95% CI
Chang 2001	-1.8	1.27	16	-0.6	0.42	12	7.6%	-1.16 [-1.98, -0.34]
Jane 2011	-1.6	1.13	34	-0.2	0.14	33	9.3%	-1.71 [-2.27, -1.14]
Kim 2008	-0.8	0.61	19	-0.03	0.19	18	8.0%	-1.65 [-2.41, -0.89]
Post-White 2003	-2.2	1.56	61	-1.6	1.13	45	10.4%	-0.43 [-0.82, -0.04]
Smith 2002	-2.2	1.56	20	-0.9	0.64	21	8.6%	-1.08 [-1.74, -0.42]
Soden 2004	0.32	0.23	13	0.78	0.55	13	7.5%	-1.06 [-1.89, -0.23]
Sohn 2005	-0.83	1.01	15	0.38	0.86	17	7.9%	-1.26 [-2.03, -0.50]
Stephenson 2000	-14.92	10.55	13	-11.69	8.27	13	7.9%	-0.33 [-1.10, 0.44]
Toth 2013	-1.4	0.99	55	-0.5	0.35	23	9.6%	-1.04 [-1.56, -0.53]
Tsay 2007	-4.68	3.31	30	8.5	6.01	31	8.3%	-2.67 [-3.37, -1.97]
Weinrich 1990	-0.8	0.57	14	-0.1	0.07	14	7.2%	-1.67 [-2.55, -0.79]
Wikie 2000	-1	0.71	15	-0.4	0.28	14	7.8%	-1.07 [-1.85, -0.28]
Total (95% CI)			305			254	100.0%	-1.25 [-1.63, -0.87]

Heterogeneity: $Tau^2 = 0.32$; $Chi^2 = 42.70$, df = 11 ($P < 0.0001$); $I^2 = 74\%$

Test for overall effect: $Z = 6.42$ ($P < 0.00001$)



- Massage was effective for pain regardless of cause
- Reflexology most effective
- No long term follow up studies

Massage

- Conclusion:
  - Massage can be effective in reducing pain immediately but effects do not appear to be sustained
  - No adverse events reported

Massage

- Qualitative studies
  - helped to ‘distract’ from the frightening experience of pain
  - helped relaxation
  - helped confirm the patient was being cared for

Transcutaneous electrical nerve stimulation (TENS)

- TENS involves using low intensity electrical stimulation to areas of the body using pads applied to the skin

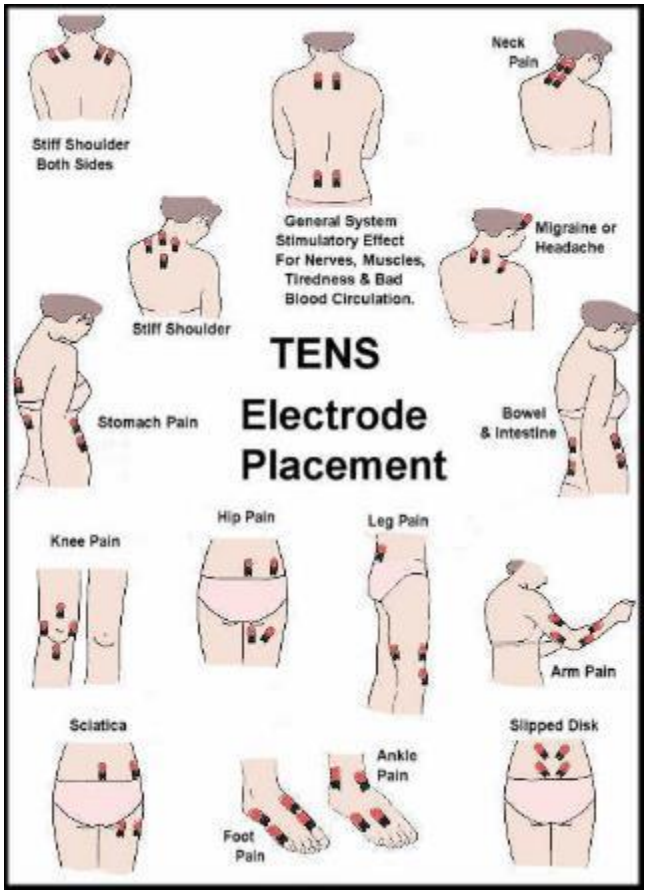
- High frequency TENS is considered above 50HZ
- Low frequency TENS is considered below 10HZ

- TENS is thought to work via the gate control theory and may have an impact on the release of endogenous opioids

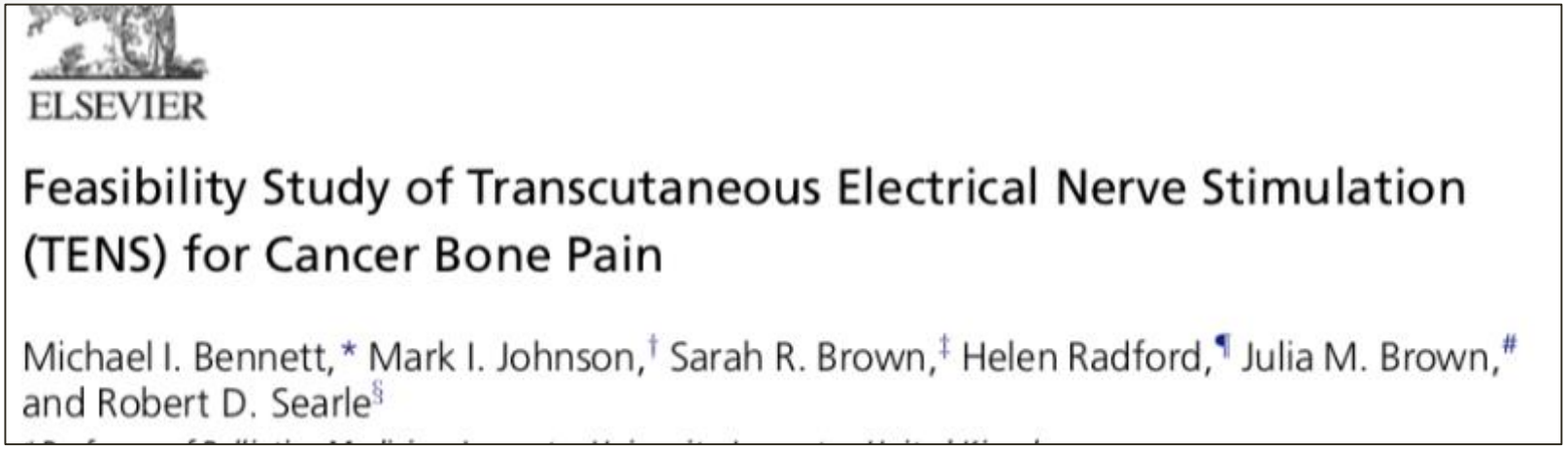
- Optimal effects are suggested when the frequency is adjusted to achieve ‘ a strong but comfortable sensation’

TENS - contraindications

- PPM
- Patients who are unable to report benefit or unpleasant sensations
- Broken or irritated skin in the area of the electrodes



TENS for cancer pain



ELSEVIER

Feasibility Study of Transcutaneous Electrical Nerve Stimulation (TENS) for Cancer Bone Pain

Michael I. Bennett,* Mark I. Johnson,† Sarah R. Brown,‡ Helen Radford,¶ Julia M. Brown,# and Robert D. Searle§

- 19 participants with bone metastases
- Participants received active and placebo TENS for one hour at the site of pain in a randomized crossover design
- Numerical rating and verbal rating scales were used to measure pain: at baseline, 30 and 60 minutes after TENS application
- Pain was measured at rest and on movement (a specified painful movement)

TENS for cancer pain

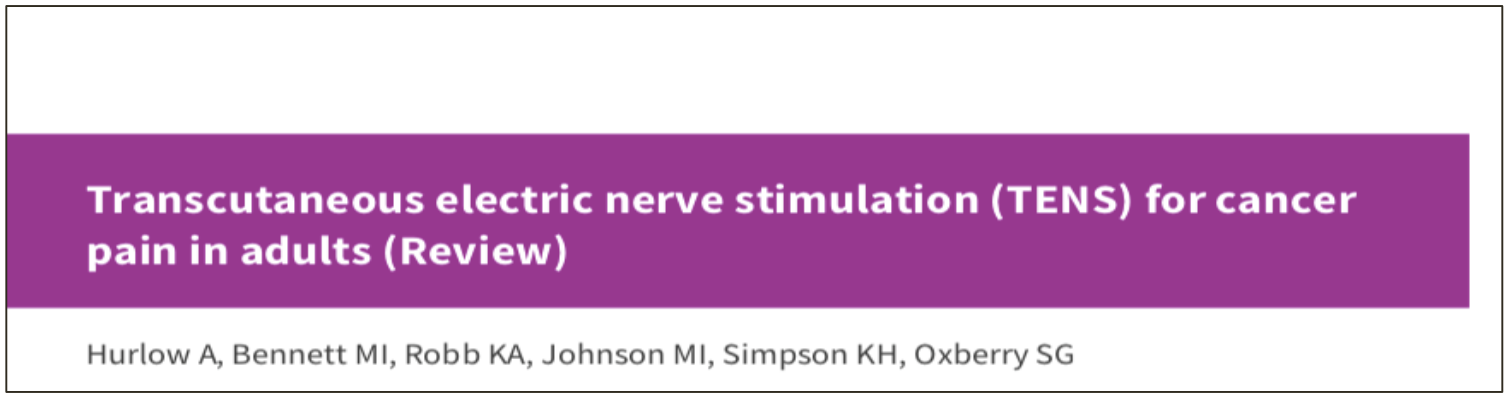
- Verbal pain relief scores on movement:
  - Good / very good pain relief:12/19 active TENS
  - Good / very good pain relief: 5/19 placebo TENS

- Verbal pain relief scores at rest:
  - No difference in active or placebo

- Results suggest that TENS has the potential to decrease pain on movement more than pain at rest

- Patients with incident type pain in Davies et al (2013) were more likely to report the success of a non-pharmacological intervention

TENS for cancer pain



- 3 studies
- No evidence to suggest TENS is effective
- Weak evidence that TENS improved pain on movement in patients with cancer bone pain

- Need to improve blinding by with better ‘sham’ TENS

TENS for chronic pain

[Overview of Reviews]

Transcutaneous electrical nerve stimulation (TENS) for chronic pain - an overview of Cochrane Reviews

- Review of studies using TENS for chronic pain (ie pain lasting more than 3 months, excluding headache or migraine)
- Due to low quality evidence, unable to state if TENS is effective in relieving pain in people with chronic pain
- Unable to state that TENS had a positive impact on disability, HR QOL, or the use of medications
- Adverse events generally related to minor skin irritation

In summary

- Limited evidence for the efficacy of physical therapies in the treatment of pain
- Some evidence for heat which may help alone or aid the ability to exercise / mobilise
- Some low quality evidence for massage
- Reporting of adverse events for these therapies does suggest they are safe