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## ONLINE TABLE 1

## Summary Characteristics of included RCTs

Reference	Design	Type	Condition	Sample size (women)	Primary TENS comparison	Comparison interventions	TENS regimen	Primary Outcome	Secondary Outcome
Abbasi et al., 2019 <sup>1</sup>	P	Pr	Procedural - Throughout Pleurodesis	66 (NR)	TENS (HF) + Diclofenac = 33	Placebo TENS (0mA) + diclofenac = 33	Fixed 1 x 50 mins during procedure	Pain intensity (VAS)	Analgesic consumption Blood pressure, heart rate
Abelson et al., 1983 <sup>2</sup>	P	Pr	Rheumatoid arthritis	32 (26W)	TENS (HF) = 13	Placebo TENS = 13 (0mA)	Fixed 1 x 15 mins / week x 3 weeks 3 sessions	Pain intensity (VAS) Resting pain Pain on movement (grip task)	Grip strength
Abreu et al., 2010 <sup>3</sup>	P	Pr	Labour pain	20 (20W)	TENS (HF) = 10	Placebo TENS = 10 (mA barely perceptible)	PRN during labour - first stage	Pain intensity (VAS)	Time to analgesia Duration of analgesia
Acedo et al., 2015 <sup>4</sup>	P	Pr	Neck pain - chronic non-specific	64 (64W)	TENS (LF, burst, - 100pps) = 32	IFT = 32	Fixed 30 mins / day on days 2, 3, 5 3 sessions	Pain intensity (VAS)	Muscle relaxation (EMG microV)
Adedoyin et al., 2005 <sup>5</sup>	P	Pr	Osteoarthritis - knee	46 (28W)	TENS (HF) + Exercise = 15	IFT + Exercise = 16 Exercise alone (SoC, no TENS) = 15	Fixed 2 x 20min / week x 4 weeks 8 sessions	Pain intensity (NRS)	WOMAC
Ahmed, 2010 <sup>6</sup>	P	Pr	Post-op – inguinal hernia repair	60 (0W)	TENS (HF) + paracetamol + diclofenac as needed = 30	Placebo TENS (0mA) + paracetamol + diclofenac as needed = 30	Fixed 2 x 30 mins / day x 5 days 10 sessions	Pain intensity (VAS)	Analgesic consumption Assessment of serum cortisol level
Ahmed et al., 2020 <sup>7</sup>	P	Pr	Diabetic neuropathic pain	30 (19W)	TENS (LF, AL-TENS) + aerobic exercise = 15	Repetitive transcranial magnetic stimulation (rTMS) + aerobic exercise = 15	Fixed 1 x 20 mins / day x 5 days 10 sessions	Pain intensity (VAS)	Blood β-endorphin level
Alcidi et al., 2007 <sup>8</sup>	P	Pr	Osteoarthritis - knee - acute	40 (35W)	TENS (HF) = 20	Electromagnetic radiation = 20	Fixed 1 x 20 mins /day x 5 days 5 sessions	Pain intensity (VAS)	Lequesne's index for knee OA
Ali et al., 1981 <sup>9</sup>	P	Pr	Post-op – abdominal	40 (24W)	TENS (HF) + Demerol = 15	Placebo TENS (0mA) + Demerol = 10 Demerol + No TENS (SoC, no TENS) = 15	PRN 48h Post-operation	No primary outcome	Analgesic consumption Vc FRc arterial PO2
Alizade and Ahmadizad, 2009 <sup>10</sup>	P	Pr	Back pain – low, chronic	24 (24W)	TENS (HF) + NSAIDs (ibuprofen and diclofenac) = 8	NSAIDs (ibuprofen and diclofenac) + exercise = 8 NSAIDs (ibuprofen and diclofenac, SoC, no TENS) = 8	Fixed 30 mins / day x 3 days / week x 5 weeks	No primary outcome	Modified Oswestry low back pain disability questionnaire

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Allais et al., 2003 <sup>11</sup>	P	Pr	Migraine - transformed	60 (60W)	TENS (HF, MF, LF) = 20	Infrared laser therapy = 20 Acupuncture = 20	15 sessions Fixed 30 mins / day x 5 day / week x 2 weeks 10 sessions	No primary outcome	Number of days with headache per month
Alm et al., 1979 <sup>12</sup>	P	E	Post-op – podiatric surgery		TENS (HF) = 50	Placebo TENS (0mA) =25 Control Group (patient records) = 25	PRN Mean duration 20-40 mins / treatment repeated	Pain relief (4- point category scale)	Analgesic consumption
Al-Smadi et al., 2003 <sup>13</sup>	P	Pr	Back pain – low, multiple sclerosis	15 (n/r)	TENS (HF) = 5 (110 Hz, 200 ms)	Placebo TENS = 5 (0mA) TENS (LF) = 5 (4Hz, 200 ms)	Fixed 1 x 45min / day x 3 days / week x 6 weeks 18 sessions	Pain intensity (VAS)	McGill Pain Questionnaire Roland Morris Disability Questionnaire Leeds MS Specific Quality of Life Questionnaire
Altay et al., 2010 <sup>14</sup>	P	Pr	Osteoarthritis - knee	40 (30W)	TENS (HF) = 20	Placebo TENS = 20 (0mA)	Fixed 1 x 40 min / day x 3 weeks 21 sessions	Pain intensity (VAS)	WOMAC Beck Depression Inventory Short Form 36 10 steps stairs climbing up-down time 6-minute walk distance
Alvarez-Arenal et al., 2002 <sup>15</sup>	C	E	Temporomandibular disorder – bruxism	24 (9W)	TENS (LF) = 24	Splint = 24	Fixed 1 x 45-60 mins every 2 days 15 sessions	Pain intensity on palpation (4-point scale)	Tenderness on palpation (4-point scale) Severity of TMD (pantographic reproducibility index -PRI) Joint noises associated with oral opening and closing (number of 'click' noises)
Alves Silverio et al., 2015 <sup>16</sup>	P	Pr	Dysphonic – Muscle tension	20 (20W)	TENS (LF) = 10	Laryngeal manual therapy = 10	Fixed 2 x 20mins / week x 6 weeks 12 sessions	Pain intensity (VAS)	Nordic musculoskeletal symptoms questionnaire Vocal quality - auditory perceptual analysis of voice.
Amer-Cuenca et al., 2011 <sup>17</sup>	P	Pr	Procedural pain – colonoscopy	90 (50W)	TENS (RF) = 30	Placebo TENS = 30 (0mA) No treatment (unseated) = 30	Fixed During procedure	Pain intensity (VAS and 5-point Likert scale)	Unusual or adverse events
AminiSaman et al., 2020 <sup>18</sup>	P	Pr	Procedural pain - Needle insertion - Spinal anaesthesia	60 (25W)	TENS (HF) = 30	Placebo TENS (0mA) = 30	Fixed During needle insertion procedure	Pain intensity (VAS)	Number of attempts to insert needle Duration insertion time
Angulo and Colwell Jr, 1990 <sup>19</sup>	P	Pr	Post-op – knee replacement	48 (28W)	TENS (sensory threshold) + continuous passive motion + opioids as needed (SoC, No TENS control) = 18	Placebo TENS (active <SDT) + continuous passive motion + opioids as needed = 18 No TENS + continuous passive motion + opioids as needed (SoC, no TENS) = 12	PRN 20 hours / day x 3 days	Pain intensity (VAS)	Analgesic consumption (Narcotic) Knee flexion range of motion
Ardic et al., 2002 <sup>20</sup>	P	Pr	Myofascial pain	40 (36W)	TENS (HF) + Exercise = 15	Exercises (SoC, no TENS) = 10 Electrical muscle stimulation + Exercises = 15	Fixed 1 x 20mins / day x 2 weeks 14 sessions	Pain intensity (VAS)	Pain threshold on palpation Range of motion
Arvidsson and Eriksson, 1986 <sup>21</sup>	C	E	Post-op –	15(3W)	TENS (HF) = 15	Placebo TENS = 15 (0mA)	Fixed 1 x 15-20 mins	Pain intensity (0- 20 Borg scale)	Quadriceps contraction ability (EMG)

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			knee ACL reconstruction			Epidural injection (lidocaine 2.5ug/ml) = 15	1 session	Resting pain Pain on movement (quadriceps contraction)	
Asgari et al., 2018 <sup>22</sup>	P	Pr	Procedural pain – gynaecologic laparoscopy (shoulder pain)	80 (80W)	TENS (LF) = 40	Fentanyl (SoC, no TENS) = 40	Fixed 20 mins during procedure	Pain intensity (VAS)	Analgesic consumption
Atamaz et al., 2012 <sup>23</sup>	P	Pr	Osteoarthritis - knee	203 (167W)	TENS (HF) + Exercise + Education = 37	Placebo TENS + Exercise + Education = 37 (0mA) IFT + Exercise + Education = 31 Placebo IFT + Exercise + Education = 35 Shortwave diathermy + Exercise + Education = 31 Placebo shortwave diathermy + Exercise + Education = 32	Fixed 1 x 20 mins / day x 5 / week x 3 weeks 15 sessions	Pain intensity (VAS)	Analgesic consumption (Paracetamol) Pain free range of motion Patient's satisfaction with the treatment (VAS) WOMAC Nottingham Health Profile
Aydin et al., 2005 <sup>24</sup>	P	Pr	Spasticity – SCI, lower limb pain	21 (15W)	TENS (HF) + exercise (range of motion, every morning) = 11	Baclofen + exercise (range of motion, every morning) (SoC) = 10	Fixed 1 x 15 min / day x 15 days 15 sessions	Painful spasm scale (3-point scale)	Clinical assessment of spasticity - Self-reported and clinical examination Electrophysiologic Assessment of Spasticity H-reflex
Azatcam et al., 2017 <sup>25</sup>	P	Pr	Myofascial pain	69 (38W)	TENS (HF) + Exercise (Trapezius stretching) = 23	Exercise (Trapezius stretching)(SoC, no TENS) = 23 Kinesiology taping + Exercise (Trapezius stretching) = 23	Fixed 1 x 20 mins / day x 5 days / week x 2 weeks 10 sessions	Pain intensity (VAS)	Pain threshold (algometry) Neck Disability Index Cervical range of motion
Bález-Suárez et al., 2018 <sup>26</sup>	P	Pr	Labour pain	63 (63W)	TENS (HF) = 21	Placebo TENS = 21 (0mA) TENS (MF) = 21	PRN >30 mins / treatment during labour	Pain intensity (VAS)	Care in Obstetrics Measure for Testing Satisfaction (COMFORTS) scale
Bai et al., 2017 <sup>27</sup>	P	Pr	Dysmenorrhea	134 (134W)	TENS (AF) + Ibuprofen as needed = 67	Placebo TENS (0mA) + ibuprofen as needed) = 67 (0mA)	Fixed 1 x 30 mins / day x 3 days x 3 menstrual cycles 9 sessions	Pain intensity (NRS)	Analgesic consumption (Ibuprofen) Pain relief duration World Health Organization quality of life (WHOQOL)-BREF
Baki et al., 2015 <sup>28</sup>	P	Pr	Post-op – thoracotomy	40 (15W)	TENS (HF) + tramadol PCA = 20	Paravertebral block+ tramadol PCA = 20	PRN 24 h post op	Pain intensity (VAS) • Resting pain • During cough	Analgesic consumption (Tramadol) Respiratory function FEV1, FEV1/FVC, mean arterial pressure, heart rate, saturation of oxygen
Ballegaard et al., 1985 <sup>29</sup>	C	E	Pancreatitis – chronic	16(NR)	TENS (HF, conventional followed by LF, acupuncture-like) + morphine on request = 11	Placebo TENS (NR) + morphine on request = 11	Fixed 1 x 30 mins / day x 1 week 7 sessions Repeated at each of 3 body sites	Pain intensity (VAS)	Analgesic consumption (Morphine) Treatment preference Daily assessment of well-being (VAS)

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Barbarisi et al., 2010 <sup>30</sup>	P	Pr	Post herpetic neuralgia	30 (15W)	TENS (HF) + Pregabalin = 16	Placebo TENS + Pregabalin (0mA) = 14	21 sessions Fixed 1 x 30 mins / day x 9 visits (over 4 weeks) 9 sessions	Pain intensity (VAS)	SF-McGill Pain Questionnaire Sleep interference
Barker et al., 2006 <sup>31</sup>	P	Pr	Pelvic pain – acute, during transport to hospital	62 (62W)	TENS (HF) = 29	Placebo TENS (0mA) = 33	PRN ~ 30 mins during transportation to hospital 1 session	Pain intensity (VAS)	Oscillometric blood pressure Heart rate Anxiety (VAS) Signs of sympathetic Activity (vasoconstriction/dilation of arms)
Barker et al., 2008 <sup>32</sup>	P	Pr	Back pain – low, chronic	60 (30W)	TENS (HF) = 28	Sensory discrimination training using FairMed device = 32	PRN 2 x 30 min / day x 3 weeks 21 sessions	Pain intensity (VAS) • present pain • average pain over a week • worst pain over a week	Oswestry Disability Index Functional physical tests • 5-minute walking distance • 1-minute stair climb • 1 minute standing up and sitting down from a chair Health Anxiety and Depression Scale Tampa Scale Kinesiophobia Pain Coping Scale Pain Self Efficacy Questionnaire Patient Global Impression of Change scale
Başkurt et al., 2006 <sup>33</sup>	P	E	Shoulder impingement - stage I	92 (60W)	TENS (HF) = 30	Heat (39°, SoC no TENS) = 31 Heat + TENS = 31	Fixed 1 x 20 mins 1 session	Pain intensity (VAS)	Pressure algometry (pressure pain threshold)
Bayindir et al., 1991 <sup>34</sup>	P	E	Post-op – cardiac surgery	89 (29W)	TENS (LF, burst) = 59	Placebo TENS = 30 (0mA)	Fixed 1 x 180 mins	Pain intensity (VAS)	None
Beckwée et al., 2018 <sup>35</sup>	P	Pr	Post-op – total knee arthroplasty	53 (34W)	TENS (LF, burst) + analgesics + physiotherapy (SoC) = 25	Placebo TENS + analgesics + physiotherapy (SoC) = 28 (0mA)	Fixed 1x 40 mins / day during passive mobilisation x 5 days 5 sessions	Pain intensity (VAS)	Analgesic consumption • Daily opioid analgesia • cumulative opioid analgesia • Non-opioid analgesia Range of motion - Knee flexion
Benedetti et al., 1997 <sup>36</sup>	P	E	Post-op – thoracic	324 (NR)	TENS (HF) = 103	Placebo TENS (0mA) = 106 Conventional drugs (SoC, no TENS) = 115 (Control)	Fixed 2 x 60 mins in recovery room first 12 h only 2 sessions	Pain intensity (NRS)	Analgesic consumption Time to request further analgesia.
Bennett et al., 2010 <sup>37</sup>	C	E	Cancer bone pain	24 (6W)	TENS (HF) = 24	Placebo TENS = 24 (0mA)	Fixed 1 x 60 mins 1 session	Pain intensity (NRS and VRS 4 categories) • Resting pain • Pain on movement	SF-McGill Pain Questionnaire Satisfaction questionnaire
Bergeron-Vezina et al., 2018 <sup>38</sup>	C	E	Back pain – chronic, low, non-specific	21 (11W)	TENS (HF) = 21 (maintaining pulse amplitude)	TENS (HF) = 21 (pulse amplitude fading)	Fixed 1 x 25 mins 1 session	Pain intensity (VAS)	Pain unpleasantness (VAS) Patient's Global Impression of Change scale

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Bertalanffy et al., 2005 <sup>39</sup>	P	Pr	Back pain - acute, low, during emergency transport	74 (30W)	TENS (HF) = 35	Placebo TENS = 36 (0mA)	Fixed 1 x ~30 mins during transportation 1 session	Pain intensity (VAS)	Anxiety (VAS) Oscillometric blood pressure Heart rate
Bi et al., 2015 <sup>40</sup>	P	Pr	Spinal cord injury	52 (16W)	TENS (LF) = 26	Placebo TENS = 26 (0mA)	Fixed 1 x 20mins/day x 3 / week x 12 weeks 36 sessions	Pain intensity (VAS)	McGill Pain Questionnaire
Bilgili et al., 2016 <sup>41</sup>	P	Pr	Complex regional pain syndrome	30 (16W)	TENS (HF) + contrast bath + whirlpool bath + exercise = 15	Placebo TENS (0mA) + contrast bath + whirlpool bath + exercise = 15	Fixed 1 x 20 mins / day x 15 days 15 sessions	Pain intensity (VAS) at rest	LANSS Douleur Neuropathique en 4 Questions (DN-4) Volumetric oedema (mm) Hand mobility (distance between the 2nd and 5th finger pulp and distal palmar line in cm) Range of motion - wrist Hand grip strength Duruöz Hand Index
Binder et al., 2011 <sup>42</sup>	P	Pr	Post-op – caesarean	42 (42W)	TENS (HF) + morphine PCA = 22	Morphine PCA (SoC, no TENS) = 20	PRN Over 24 hours	Pain intensity (VAS)	Analgesic consumption (Morphine) - PCA Sedation perception (VAS)
Bjersa and Andersson, 2014 <sup>43</sup>	P	E	Post-op – pancreatic surgery	20 (N/R)	TENS (HF) + SoC (medication) = 9	Placebo TENS = 11 (stimulation as low as possible) + SoC (medication)	PRN >30m/session	Pain intensity (VAS) • Resting (lying) • On movement (walking + deep breathing)	Analgesic consumption (Morphine) Quality of Recovery 40 (QoR-40) EDA infusion rate (ml/h) Total time of TENS usage in minutes during the day of EDA termination and the day after.
Bjersa et al., 2015 <sup>44</sup>	P	E	Post-op – colon surgery	30 (14W)	TENS (HF) + SoC (medication) = 24	Placebo TENS = 26 (stimulation as low as possible) + SoC (medication)	PRN >30m/session	Pain intensity (VAS) • Resting (lying) • On movement (walking + deep breathing)	Analgesic consumption (oxycodone) Time of TENS usage during the 24 hours after EDA termination Quality of Recovery 40 (QoR-40)
Bloodworth et al., 2004 <sup>45</sup>	C	E	Radiculopathy – chronic	13 (7W)	TENS (HF, conventional TENS back) = 13	Placebo TENS (0mA, back) = 13 Placebo TENS (0mA, leg) = 13 TENS (HF, leg) = 13 TENS (RF, back) = 13 TENS (RF, leg) = 13	Fixed 1 x 10 mins 1 session	Pain intensity (VAS)	McGill Pain Questionnaire Walking speed (feet per second)
Bolat et al., 2019 <sup>46</sup>	P	Pr	Procedural pain - transrectal prostatic biopsy	138 (0W)	TENS (HF) + antibiotic = 73	SoC - intrarectal administration of 60 mg lidocaine gel, an additional infiltration of 5 mL of prilocaïne and bupivacaine mixture (5 mL of 2% prilocaïne and 5 mL of 0.25% bupivacaine) = 65	Fixed During procedure	Pain intensity (NRS) • probe insertion • biopsy • post-biopsy	Biopsy times
Bono et al., 2015 <sup>47</sup>	P	Pr	Migraine / tension-type headache - Chronic	160 (127W)	TENS (HF, occipital) + acute medications = 108	Placebo TENS + acute medications = 52 (0mA)	Fixed 3 x 30 mins / day x 14 days	Pain intensity (VAS)	Analgesic consumption Headache-free days per month

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							14 sessions		Allodynia symptom check list (12-item) Migraine Disability Assessment Questionnaire Beck Depression Inventory-II Hamilton Anxiety Rating Scale
Borjesson et al., 1997 <sup>48</sup>	P	E	Angina – unstable	30 (11W)	TENS (HF) + mediation (angina/analgesia) = 14	Placebo TENS (low level stimulation <10mA on hips) + mediation (angina/analgesia) = 16	Fixed 4 x 30 mins / day plus PRN for attacks	Pain intensity (VAS) • Rest	Analgesic consumption Ischemic episodes, ECG and biochemical outcomes Treatment feasibility including AEs
Borjesson et al., 1998 <sup>49</sup>	C	E	Procedural Pain - oesophageal manometry pain	18 (10W)	TENS (HF) = 18 (at pain - neck)	Placebo TENS = 18 (active, >SDT, remote to pain - hips)	Fixed Before and during procedure	Pain intensity (11-point Borg scale) • Oesophageal distension	Hemodynamic BP, heart rate, ECG Manometric variables Oesophageal pH
Borup et al., 2009 <sup>50</sup>	P	E	Labour pain	607 (607W)	TENS (HF) + analgesics as needed = 144	Traditional analgesics (Control) (SoC, no TENS) = 149 Acupuncture + analgesics as needed = 314	PRN 20-45 mins / sessions	Pain intensity (VAS)	Analgesic consumption Non-drug requirements Duration of labour Use of oxytocin Mode of delivery Postpartum Haemorrhage Apgar score Umbilical cord blood pH value
Breit and Van der Wall, 2004 <sup>51</sup>	P	E	Post-op - total knee arthroplasty	67 (37W)	TENS (NR) + morphine PCA = 25	Placebo TENS (0mA) + morphine PCA = 22 Morphine PCA (SoC, no TENS) = 22	PRN 1 x 24h post op	Pain intensity (VAS)	Analgesic consumption • Cumulative dose morphine by PCA
Buchmuller et al., 2012 <sup>52</sup>	P	Pr	Back pain – chronic low non-specific with and without radicular pain	236 (148W)	TENS (HF+LF burst) + daily analgesic medication as required = 117	Placebo TENS (0mA) + daily analgesic medication as required = 119	Fixed 4 x 60 mins / day x 3 months ~?? sessions	Pain intensity (VAS) • Weekly	Analgesic consumption (anti-inflammatory) Roland Morris Disability Questionnaire Dallas questionnaire SF-36 Compliance with TENS treatment Quality of life
Bulut et al., 2011 <sup>53</sup>	P	Pr	Neuropathic pain – chronic peripheral	40 (23W)	TENS (HF) = 20	Placebo TENS = 20 (0mA)	Fixed 1 x 30 mins / day x 20 days 20 sessions	Pain intensity (VAS)	Pain grade (6 categories)
Bundsen et al., 1982 <sup>54</sup>	P	Pr	Labour pain	24 (24W)	TENS (HF + LF burst) = 15	Conventional analgesia, control) (SoC, no TENS) = 9	PRN >1 x 15-30 mins During Labour	Pain intensity (5-point categorical scale) • low-back / abdominal pain	Pain experience questionnaire Uterine activity Foetal and neonatal condition
Can et al., 2003 <sup>55</sup>	P	E	Knee – chronic, patellofemoral pain	30 (22W)	TENS (HF) = 16 (23 knees)	Diadynamic current = 14 (19 knees)	Fixed	Pain intensity (VAS)	Lysholm knee scoring scale and squat

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							1 x 30 mins x 4 to 5 / week x 6 weeks <30 sessions		Number of squats performed in 30 seconds 4-level activity test
Casale et al., 2013 <sup>56</sup>	P	Pr	Carpal tunnel syndrome	20 (10W)	TENS (HF) = 10	Low level laser therapy = 10	Fixed 1 x 30 mins / day x 3 weeks 15 sessions	Pain intensity (VAS)	Severity paraesthesia Median nerve distal motor latency and sensory nerve conduction velocity
Çebi, 2019 <sup>57</sup>	P	Pr	Post op - pain after impacted third molar surgery	30 (15W)	TENS (HF) = ?15	Routine care (SoC, Pharmacological - Flurbiprofen 100 mg, amoxicillin, chlorhexidine gluconate) = ? 15	Fixed 1 x 15 mins / day x 5 days	Pain intensity (VAS)	None
Celik et al., 2013 <sup>58</sup>	P	Pr	Spinal cord injury, neuropathic pain	33 (9W)	TENS (LF) = 17	Placebo TENS = 16 (0mA) = 16	Fixed 1x 30m /day x 10 days 10 sessions	Pain intensity (VAS)	None
Cetin et al., 2008 <sup>59</sup>	P	Pr	Osteoarthritis - knee	100 (100W)	TENS (HF) + hot packs + isokinetic exercise = 20 (Group 2)	Hot packs + isokinetic exercise) (SoC, no TENS) = 20 Shortwave diathermy + hot packs + isokinetic exercise = 20 Ultrasound + hot packs + isokinetic exercise = 20 Isokinetic exercise = 20	Fixed 1 x 20 mins x 3 / week x 8 weeks 24 sessions	Pain intensity (VAS) • After walk	Ambulation Activity - time (secs) to walk 50 m Lequesne index Peak torque levels (N·m) knee flexion and extension
Chandra et al., 2010 <sup>60</sup>	P	E	Post-op – thoracotomy	60 (29W)	TENS (HF) + epidural 10 ml of 0.125% bupivacaine at 2-hourly = 30	Placebo TENS (0mA) + epidural 10 ml of 0.125% bupivacaine at 2-hourly = 30	Fixed 1 x 45 mins	Pain intensity (VAS)	Systolic blood pressure Side effects.
Cheing and Hui-Chan, 1999 <sup>61</sup>	P	E	Back pain - chronic low non-specific	30 (9W)	TENS (HF) = 15	Placebo TENS = 15 (0mA)	Fixed 1 x 60 mins	Pain intensity (VAS)	Pain intensity (VAS) to electrically-evoked pain
Cheing and Luk, 2005 <sup>62</sup>	P	E	Neuropathic pain	19 (3W)	TENS (HF) = 10	Placebo TENS = 9 (0mA)	Fixed 1x 20m/day x5 days x 2weeks 10 sessions	Pain intensity (VAS)	Downey Hand Centre Hand Sensitivity Test Flexion reflex
Cheing et al., 2002 <sup>63</sup>	P	E	Osteoarthritis - knee	62 (52W)	TENS (HF) = 16	Placebo TENS = 16 (0mA) Exercise (SoC, no TENS control) = 15 TENS + Exercise =15	Fixed 1 x 60 mins/day x 5 days / week x 4 weeks 20 sessions	Pain intensity (VAS)	None
Cheing et al., 2003 <sup>64</sup>	P	E	Osteoarthritis - knee	38 (34W)	TENS (HF) = 10 (60 mins)	Placebo TENS = 8 (0mA) TENS = 10 (20 mins) TENS = 10 (40 mins)	Fixed 1 x 60 mins/day x 5 days / week x 2 weeks 10 sessions	Pain intensity (VAS) • On movement	Time of 'half-life' for analgesic effect
Chellappa and Thirupathy, 2020 <sup>65</sup>	P	Pr	Temporomandibular joint disorder	60 (NR)	TENS (HF) = 30	LLLT = 30	Fixed 1 x 15 min/day x 2 / week x 3 weeks	Pain intensity (VAS, may be categorical scale)	Range of motion Palpation
Cherian et al., 2016 <sup>66</sup> – Primary Report	P	Pr	Osteoarthritis - knee	70 (46)	TENS (AF) = 33	Standard of care = corticosteroid injections + exercises + pharmaceutical management) (SoC, no TENS) = 10	PRN mean = 27 hours / week x 3 months	Pain intensity (VAS)	Analgesic consumption Knee Society Scale (KSS) Lower extremity functional scale (LEFS)

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Secondary Reports Cherian et al., 2015 <sup>67</sup> Cherian et al., 2016 <sup>68</sup>									SF-36 Timed up and-go (TUG) 5-repetition chair rise Timed stair climb test 6-inch step test 2-minute walk test Isokinetic strength Active and passive range of motion.
Chesterton et al., 2013 <sup>69</sup>  Secondary Report Lewis, et al., 2015 <sup>70</sup>	P	Pr	Tendinitis - Lateral epicondylitis - Tennis elbow	241 (109W)	TENS (HF) + Primary care management = 121	Primary care management (exercises + education) (SoC, no TENS) = 120	PRN > 1 x 45 mins / day whenever symptoms x 6 weeks	Pain intensity (NRS)	Global change in elbow pain (5-point adjectival scale) Pain and limitation in function (patient-rated tennis elbow evaluation) Number of days of sick leave due to tennis elbow EuroQoL EQ-5D (Quality of life) SF-12 Changes in health beliefs and perceptions Adherence to treatment protocols
Chia et al., 1990 <sup>71</sup>	P	Pr	Labour pain	Sample 1: 101 (101W) Sample 2: 20 (20W) -	Sample 1: TENS (AF) = 48 Sample 2: TENS (AF) = 10	Sample 1: Inhalation analgesia = 53 (ENTONOX) Sample 2: Inhalation analgesia = 10 (ENTONOX)	PRN During labour	Pain intensity (categorical scale) Pain relief (categorical scale)	Analgesic consumption • Request Treatment failure - request to change type of treatment Duration of use of treatment Cervical dilatation and number of contractions / 10 mins
Chiou et al., 2019 <sup>72</sup>	P	Pr	Myofascial pain in neck and shoulder from spinal cord injury	64 (12W)	TENS (LF/HF, on trigger points) = 30	TENS (HF, on remote acupuncture Points) = 30	Fixed 1 x 20 mins / day x 7 days x 1 week	Pain intensity (VAS)	Short-form McGill Pain Questionnaire Hospital Anxiety and Depression Scale Pittsburgh Sleep Quality Index
Chitsaz et al., 2009 <sup>73</sup>	P	Pr	Spasticity – multiple sclerosis	59 (44W)	TENS (HF) = 29	Nortriptyline = 30	PRN >20-30 mins x 3/day x 8 weeks	Pain intensity (VAS) • Average	Intensity of sensory complaints (VAS)
Chiu et al., 2005 <sup>74</sup>	P	Pr	Neck pain - chronic non-specific	218 (149W)	TENS (HF) + infrared radiation = 78	Exercise + Infrared radiation = 67 Infrared radiation alone (warmth) = 78	Fixed 1 x 30 mins / day x 2 / week x 6 weeks 12 sessions	Pain intensity (NRS, verbal)	Analgesic consumption Northwick Park Neck Pain questionnaire Percentage subjects on sick leave Peak isometric strength neck muscles.
Cipriano et al., 2008 <sup>75</sup>	P	Pr	Post-op – cardiac surgery	45 (13W)	TENS (HF) = 23	Placebo TENS = 22 (active, >SDT-infrequent pulses)	Fixed 1 x 240mins (4h) on the third postoperative	Pain intensity (VAS) • Cough	Spirometry • vital capacity • tidal volume • respiratory rate Electrical muscle activity (EMG)
Cipriano et al., 2014 <sup>76</sup>	P	E	Post-op cardiac surgery	38 (18W)	TENS (HF) + pethidine HCl, 20 mg = 20	Placebo TENS (active, >SDT-infrequent pulses) + pethidine HCl, 20 mg = 18 (active)	Fixed 4 x 30mins/day x 5 days 5 sessions	Pain intensity (VAS)	Analgesic consumption (Opioid) Physiological measurements Mean arterial pressure



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									Femoral blood flow Femoral vascular conductance Beta-Endorphin levels Sympathetic stimulation test 6-min walking test
Coelho de Amorim et al., 2014 <sup>77</sup>	P	Pr	Osteoarthritis - knee	24 (20W)	TENS (HF) = 12	Manual therapy = 12	Fixed 1 x 20 mins / day x 3 / week x 4 weeks 12 sessions	Pain intensity (VAS)	WOMAC Stiffness Function
Cooperman et al., 1977 <sup>78</sup>	P	Pr	Post-op – abdomen	50 (36W)	TENS (HF) + analgesics as rescue (diazepam, 10 mg i.m., meperidol, 75-100 mg i.m.) = 26	Placebo TENS = 24 (0mA)	PRN x 5 days	No primary outcomes	Analgesic consumption
Coyne et al., 1995 <sup>79</sup>	P	E	Procedural pain - intravenous needlesticks	61 (35W)	TENS (HF) = 19	Placebo TENS = 21 (not described)	Fixed 1 x 12-32 mins 1 session	Pain intensity (VAS)	Pain unpleasantness (VAS)
Crompton et al., 1992 <sup>80</sup>	P	Pr	Procedural pain – cervical laser treatment	100 (100W)	TENS (HF) = 34	Local anaesthetic (SoC, no TENS) = 35 TENS + local anaesthetic (lignocaine) = 29	Fixed 1 x <20 mins (duration of procedure)	Pain intensity (VAS)	Satisfaction and utility of TENS
Cuschieri et al., 1985 <sup>81</sup>	P	Pr	Post-op – abdomen	106 (62W)	TENS (HF) + morphine = 53	Placebo TENS + morphine = 53 (0mA)	PRN 72 hours	Pain intensity (VAS)	Analgesic consumption (Morphine) Arterial blood gas analysis Pulmonary complications
Cuschieri et al., 1987 <sup>82</sup>	P	Pr	Ischaemic pain - critical leg at rest	20 (10W)	TENS (NR) + morphine = 10	Placebo TENS + morphine = 10 (0mA)	PRN 48 hours	Pain intensity (VAS)	Analgesic consumption (Morphine)
da Silva et al., 2008 <sup>83</sup>	P	Pr	Fibromyalgia	10 (9W)	TENS (HF) = 5	Hydrotherapy = 5	Fixed 1 x 40 mins/day x3/week x 3 weeks 9 sessions	Pain intensity (VAS)	SF-36 Nottingham Health Profile Beck Depression Index Finger-to-floor test (flexibility test)
da Silva et al., 2015 <sup>84</sup>	P	Pr	Post-op – liposuction	42 (42W)	TENS (HF) + analgesics (morphine + dipyrone) = 21	Placebo TENS + analgesics (morphine + dipyrone) = 21 (0mA)	Fixed 1 x 30 mins (2h after procedure 1 session)	Pain intensity (VAS)	Analgesic consumption Number and types of adverse effects McGill Pain Questionnaire Patient satisfaction
Dailey et al., 2013 <sup>85</sup>	C	E	Fibromyalgia	43 (40W)	TENS (HF) + other treatments (stable) = 43	Placebo TENS = 43 (fading) + other treatments (stable) No TENS + other treatments (stable) (SoC, no TENS) = 43	Fixed 1 x 60-75 mins 1 session	Pain intensity (VAS) • Resting pain • Pain on movement	Pressure pain threshold at tender points (algometry) Conditioned pain modulation Fatigue at rest and movement (VAS) 6 Minute Walk Test Range of Motion Sit to Stand Test Single Leg Stance
Dailey et al., 2020 <sup>86</sup>	P	Pr	Fibromyalgia	301 (301W)	TENS (MF) + routine care (pharmacology) = 103	Placebo TENS (F) = 99	PRN	Pain intensity (NRS)	Brief Pain Inventory

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						No TENS (SoC, pharmacology) = 99	At home during activity > 1 x 2 hours / day x 4 weeks	<ul style="list-style-type: none"> <li>Resting pain</li> <li>Pain on movement (during 6min walk test)</li> </ul>	Fatigue to 6MWT (NRS) and Multidimensional Assessment of Fatigue Function - International Physical Activity Questionnaire (IPAQ) short form Disease impact Quality of life Global impression of change Fear of Movement Other psychological factors
Davies, 1982 <sup>87</sup>	P	Pr	Post-op – caesarean	35 (35W)	TENS (HF) + analgesics (papaveretum i.m., paracetamol, Dextropropoxphene as required) = 21	Placebo TENS (0mA) + analgesics (papaveretum i.m., paracetamol, Dextropropoxphene as required) = 14	PRN 24 hours	Pain intensity (VAS)	Analgesic consumption (opioid)
Dawood and Ramos, 1990 <sup>88</sup>	C	E	Dysmenorrhea - primary	32 (32W)	TENS (HF) + ibuprofen if needed = 32	Placebo TENS + ibuprofen if needed = 32 (0mA) Ibuprofen (SoC, no TENS) = 32	PRN continuously for first 8 hours then PRN	Pain intensity (5 item categorical scale)	Analgesic consumption (Ibuprofen) Pain relief (5 item category scale) Menstrual symptoms including pain intensity (5 categories)
De Angelis et al., 2003 <sup>89</sup>	P	Pr	Procedural pain – hysterectomy	142 (142W)	TENS (HF) = 71	No treatment = 71	Fixed Duration of procedure	Pain intensity (VAS) during procedure	Pain relief Duration of hysterectomy CO <sub>2</sub> flow Heart rate
De Giorgi et al., 2017 <sup>90</sup>	P	Pr	Myalgia - Chronic facial (temporomandibular joint)	49 (49W)	TENS (HF) = 34	No treatment (waiting list control) = 15	Fixed 1 x 60 mins /day x 10 weeks 10 sessions	Pain intensity (VAS)	Pericranial Muscle Tenderness Score Cervical Muscle Tenderness Score
de Oliveira, 2012 <sup>91</sup>	P	E	Dysmenorrhea - primary	15 (15W)	TENS (HF) = 5	Placebo TENS = 5 (0mA) TENS (LF) = 5	Fixed 1 x 30 mins 1 session	Pain intensity (NRS)	Pain interference with daily activities (NRS)
de Orange et al., 2003 <sup>92</sup>	P	Pr	Labour pain	22 (22W)	TENS (HF) + (Bupivacaine + Sufentanyl epidural) – 11	Analgesic - (Bupivacaine + Sufentanyl epidural (SoC, no TENS) = 11	PRN	Pain intensity (VAS)	Duration of labour Frequency of hypoxia Apgar score
de Sousa et al., 2014 <sup>93</sup>	P	E	Post-partum uterine contraction pain	32 (32W)	TENS (HF) = 16	No treatment = 16	Fixed 40 mins during breast feeding 1 session	Pain intensity (NRS)	Treatment satisfaction
DeSantana et al., 2008 <sup>94</sup>	P	Pr	Post-op – inguinal herniorrhaphy	40 (0W)	TENS (HF) + Metamizole (Dipyrone) = 20	Placebo TENS (0mA) + Metamizole (Dipyrone) = 20	Fixed 12 x 30 mins at 2h then 4h Post-op	Pain intensity (NRS) • Resting pain	Analgesic consumption (Metamizole) Nausea medication consumption TENS-Related Questions
DeSantana et al., 2009 <sup>95</sup>	P	E	Post-op – laparoscopic tubal ligation	64 (64W)	TENS (HF) + medication (Ketoprofen, Hioscin plus Dipyrone and Metochlopramide) = 23	Placebo TENS + medication (Ketoprofen, Hioscin plus Dipyrone and Metochlopramide) = 21 (0mA)	Fixed 1 x 20min 1 sessions	Pain intensity (NRS)	McGill Pain Questionnaire

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						TENS (LF) + medication (Ketoprophen, Hioscine plus Dipyrone and Metochlopramide) = 20			
Dewan and Sharma, 2011 <sup>96</sup>	P	Pr	Adhesive capsulitis	50 (NR)	TENS (HF) = 25	IFT= 25	Fixed 1 x 20 mins x 2 to 3 / week x 4 weeks 10 sessions	Pain intensity (VAS)	Range of motion Constant Murley Assessment (CMA) score
Deyo et al. (1990) <sup>97</sup>	P	Pr	Back pain – chronic, low, non-specific	125 (73)	TENS (AF, HF, LF burst) = 31	Placebo TENS = 29 (0mA)  Placebo TENS + exercises = 29 (0mA) TENS + exercises = 34	Fixed 1 x 45 min x 3/day 3 sessions	Pain intensity (VAS)	Pain improvement (6-point scale) Pain improvement (VAS) Pain frequency (5-point scale) Sickness Impact profile Level of activity (self-assessed 3 categories) Straight leg raising test Schober test Use of medical providers
Dibenedetto et al., 1993 <sup>98</sup>	P	Pr	Fibromyalgia	30 (29W)	TENS (HF) = 15	S = Adenosyl-L methionine = 15	Fixed 1 x 20 mins / day at each of 4 MTPs 5 days / week x 6 weeks 30 sessions	Pain intensity (VAS)	Total tender point score • Number • Tenderness intensity (5-point scale) Pressure pain threshold (algometry) Hamilton Rating Scale for Depression Fatigue, sleep, and well-being (VAS) Laboratory tests (complete blood picture) Overall evaluation of efficacy
Dilekci et al., 2016 <sup>99</sup>	P	Pr	Tendinitis - Lateral epicondylitis	65 (43W)	TENS (HF) + SoC including NSAIDs = 30	Standard of care (SoC, no TENS) = 30	Fixed 1 x 30 mins / day 10 sessions	Pain intensity (VAS) • At rest • On movement	Patient-Rated Tennis Elbow Evaluation (PRTEE) questionnaire
Dissanayaka et al., 2016 <sup>100</sup>	P	Pr	Myofascial pain – syndrome patients with up/ trapezius myofascial trigger point	105 (58W)	TENS (HF) + SoC = 35	Standard care (SoC, no TENS) = 35 IFT+ standard care = 35	Fixed 1 x 20 mins x 2 / week x 4 weeks 8 sessions	Pain intensity (VAS)	Range of motion – cervical
Dogu et al., 2008 <sup>101</sup>	P	Pr	Myofascial pain and temporomandibular disorders	30 (28W)	TENS (HF) + rescue analgesic (paracetamol) = 14	Occlusal splint (SoC) = 16	Fixed 1 x 30 mins / day x 5 days / week x 4 weeks 20 sessions.	No pain intensity	Pressure-pain threshold (algometry) during rest and functional activities Pain and range of motion Quality of life both general and specific to masticatory functions SF-36
Domaille and Reeves, 1997 <sup>102</sup>	P	E	Post-op – coronary artery bypass	60 (0W)	TENS (HF) + 1 mg morphine PCA = 31	Placebo TENS+ 1 mg morphine PCA = 29 (0mA)	Fixed 1 x 3h	Pain intensity (VAS)	Analgesic consumption (Morphine) - PCA

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Ebadi et al., 2018 <sup>103</sup>	P	E	Back pain – chronic, low, non-specific	30 (15W)	TENS (HF) = 15	Diadynamic = 15	Fixed 1 x 15 mins	Pain intensity (VAS)	Pressure pain threshold (algometry) Depression Anxiety and Stress Scale (DASS)
Eklblom and Hansson, 1987 <sup>104</sup>	C	E	Oral – acute pain from teeth and/ or surrounding tissue	40 (17W)	TENS (HF) = 11	Placebo TENS = 5 (0mA) TENS (LF) = 11 Vibration = 8 Placebo vibration = 5	Fixed 1 x 30 mins 1 session	Pain intensity (VAS)	Thermal threshold (heat and cold)
Ekim et al., 2008 <sup>105</sup>	P	Pr	Hemiplegic Shoulder Pain	19 (8W)	TENS (HF) + Hemiplegia rehabilitation = 10	Placebo TENS (0mA) + Hemiplegia rehabilitation = 9	Fixed 1 x 20 minutes / day x 5 / week x 3 weeks 15 sessions	Pain Intensity (VAS)	Barthel Index Range of motion - upper limb
Elboim-Gabyzon et al., 2019 <sup>106</sup>	P	Pr	Post op - following Gamma-nail surgical fixation of extracapsular hip fractures	41 (32W)	TENS (HF) + SoC – physiotherapy = 23	Placebo TENS (0mA) + SoC – physiotherapy = 18	Fixed 1 x 30 mins / day x 5 days 5 sessions	Pain Intensity (NRS) • rest • during night during ambulation	Functional Ambulation Classification instrument Time to complete five sit-to-stand tests Two-minute walk test
Elserty et al., 2016 <sup>107</sup>	P	Pr	Back pain – chronic, low, non-specific	45 (31W)	TENS (HF) + exercise = 15 (pulse amplitude adjusted every 5 mins, Group B)	Exercises only (SoC, no TENS, Group C) = 15 TENS + exercise = 15 (Fixed pulse amplitude, Group A)	Fixed 1 x 40 mins x 3 / week x 4 weeks	Pain intensity (VAS)	Oswestry Disability Index (ODI) Lumbar range of motion (flexion and extension)
Emmiler et al., 2008 <sup>108</sup>	P	Pr	Post-op – open cardiac operation	60 (18W)	TENS (HF) + analgesia (pethidine and metamizole) = 20	Placebo TENS + analgesia (pethidine and metamizole) = 20 (0mA) Analgesia (pethidine and metamizole (SoC, no TENS) = 20	Fixed 1 x 60 mins then 60 mins rest then 1 x 60 mins	Pain intensity (VAS)	Analgesic consumption
Engen et al., 2016 <sup>109</sup>	P	Pr	Post-op – video assisted thoracoscopic surgery	40 (23W)	TENS (VF) + Opioids (morphine - oral) = 20	Opioids (morphine - oral) (SoC, no TENS) = 20	PRN for 48 hours after surgery	Pain intensity (VAS)	Analgesic consumption (opioids + blocks) Rating of physical status TENS satisfaction and utility
Erden and Senol Celik, 2015 <sup>110</sup>	P	Pr	Post-op -posterolateral thoracotomy	40 (10W)	TENS (HF) + analgesics (tramadol / tamoxicam) = 20	No TENS + analgesics (tramadol / tamoxicam) (SoC, no TENS) = 20	Fixed 3 x 30 mins / day x 2 days then 2 x 30 mins / day	Pain intensity (VAS) • Resting pain • During cough	Analgesic consumption (Opioid)
Erdogan et al., 2005 <sup>111</sup>	P	Pr	Post-op thoracotomy pain	116 (46W)	TENS (HF) + standard medication as needed) = 60	Placebo TENS (0mA) + standard medication as needed = 56	PRN for 48 hours then 1 x 20 mins at 3-hour intervals for 2 days 5 days in total	Pain intensity (VAS) • Resting pain • During cough	Analgesic consumption Spirometric breath functions (FEV1 and FVC) Blood gases (PaO2 and PaCO2)
Erkkola et al., 1980 <sup>112</sup>	P	Pr	Labour pain	200 (200W)	TENS (NR) + meperidine = 100	No TENS + meperidine (SoC, no TENS) = 100	PRN throughout delivery	Pain intensity (5-point categorical scale)	Pain questionnaire (no description) Desire for analgesics
Escortell-Mayor et al., 2011 <sup>113</sup> Secondary Report	P	E	Neck pain - chronic non-specific ('mechanical neck disorder')	90 (80W)	TENS (HF) + exercises and education = 43	Manual therapy + exercises and education (SoC, no TENS) = 47	Fixed 1 x 30 mins / day every 2 days total 10 sessions	Pain intensity (VAS)	Neck Disability Index SF-12 Physical Component Summary (PSC-12)

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Escortell Mayor et al., 2008 <sup>114</sup>									Mental Component Summary (MCS-12) Duration of crisis (days) General Health Questionnaire-28
Esteban Gonzalez et al., 2015 <sup>115</sup>	P	Pr	Post-op - thoracotomy (shoulder pain)	50 (10W)	TENS (HF) + analgesics (epidural - paracetamol and ibuprofen or metamizole) = 25	Placebo TENS = 25 (0mA) + analgesics (epidural - paracetamol and ibuprofen or metamizole)	Fixed 1 x 30 mins every 8 hours x 3 days	Pain intensity (VAS) • on movement	Range of motion
Eyigor et al., 2008 <sup>116</sup>	P	Pr	Osteoarthritis - Knee	45(34W)	TENS (HF) + superficial heat and exercise = 14	Control - superficial heat and exercise (SoC, no TENS) = 15  US + superficial heat and exercise = 15	Fixed 1 x 20 mins / day x 5 days / week x 3 weeks 15 sessions	Pain intensity (VAS)	20-meter walking test Lequesne index WOMAC Isokinetic muscle testing SF 36
Eyigor et al., 2010 <sup>117</sup>	P	Pr	Tendinitis – rotator cuff	40 (29W)	TENS (HF) + exercises (Codman) + Paracetamol = 20	Intra articular injection of corticosteroid (+ exercises (Codman) + Paracetamol) = 20	Fixed 5 x 30 mins / week for 3 weeks 15 sessions	Pain intensity (VAS) • Resting pain	Analgesic consumption (Paracetamol) Range of motion Shoulder disability questionnaire (SDQ) Beck depression inventory Doctors satisfaction
Facci et al., 2011 <sup>118</sup>	P	Pr	Back pain – Chronic, low, non-specific	150 (109W)	TENS (HF) = 50	No treatment (waiting list) = 50 IFT= 50	Fixed 1 x 30 mins / day x 5 days x 2 weeks 10 sessions	Pain intensity (VAS)	McGill Pain Questionnaire Analgesic consumption Duration of pain relieve post intervention
Farahani et al., 2014 <sup>119</sup>	P	E	Headache – primary	45 (20W)	TENS (NR) = 15	No treatment = 15 Neurofeedback behavioural therapy = 15	Fixed 1 x 20 mins / day x 20 days  20 sessions	Pain intensity (? VAS – 100mm)	Frequency of pain Duration of headache Blanchard headache diary
Farina et al., 2004 <sup>120</sup>	P	Pr	Upper trapezius Myofascial pain syndrome	40 (30W)	TENS (HF) = 21	Frequency modulated neural stimulation = 19	Fixed 1 x 20 mins / day x 5 days / week x 2 weeks 10 sessions	No pain intensity	Disability (NPDVAS) Myofascial trigger point characteristics Pressure pain threshold (algometry). Range of motion
Fatima and Sarfraz, 2019 <sup>121</sup>	P	Pr	Post op - Caesarean	50 (50W)	TENS (HF) + exercises + analgesics as needed = 25	TENS (LF, 4Hz) + exercises + analgesics as needed = 25	Fixed 2 x 20 mins / day x 3 days 6 sessions	Pain intensity (NRS)	Analgesic consumption
Ferraz and Moreira, 2009 <sup>122</sup>	P	E	Post-op - cardiac surgery	20 (6W)	TENS (HF) = 10	Placebo TENS = 10 (0mA)	Fixed 1 x 20 mins 1 session	Pain intensity (NRS)	Analgesic consumption
Ferreira et al., 2011 <sup>123</sup>	P	E	Post-op - thoracotomy	30 (12W)	TENS (HF) + fentanyl / bupivacaine = 15	Placebo TENS (0mA) + fentanyl / bupivacaine = 15	Fixed 1 x 60 mins 1 h after epidural on second Post-op day  1 session	Pain intensity (VAS) • Resting pain • Changing decubitus • Pain on movement	None

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								• During cough	
Ferreira et al., 2017 <sup>124</sup>	P	E	Temporomandibular disorder – chronic	40 (30W)	TENS (LF then HF) = 20	Placebo TENS = 20 (current fade away to 0mA after 40s)	Fixed 1 x 50 mins 1 session	Pain intensity (VAS)	Pressure pain threshold (algometry) EMG activity
Finsen et al., 1988 <sup>125</sup>	P	Pr	Post op - major amputation	51 (24W)	TENS (LF) + analgesics (NR) = 17	Placebo TENS + analgesics (NR) = 19 (0mA) Chlorpromazine + placebo TENS (0mA) + analgesics (NR) = 15	Fixed 2 x 30 mins / day x 2 weeks 28 sessions	No primary outcome	Analgesic consumption Presence of phantom pain (tally of yes or no answers)
Fiorelli et al., 2012 <sup>126</sup>	P	Pr	Post-op - thoracotomy	50 (19W)	TENS (HF) + morphine PCA = 25	Placebo TENS + morphine PCA = 25 (0mA)	Fixed 1 x 30 mins at 4h intervals for first 48h then 2 x 30 mins / day from day 3-5 16 sessions	Pain intensity (VAS)	Analgesic consumption (morphine-PCA) Serum cytokines measurements Respiratory function (FVC, FEV 1)
Fodor-Sertl et al., 1990 <sup>127</sup>	P	Pr	Post-op - thoracotomy	40 (7W)	TENS (HF, segmental) + medication = 16	Placebo TENS (non-segmental, placebo control) + analgesic medication = 18	Fixed 15-30 mins 6 post-operative days	No primary outcomes	Analgesic consumption
Forogh et al., 2019 <sup>128</sup>	P	Pr	Rehabilitation – following ACL surgery	70 (0W)	TENS (HF) + exercise = 35	Exercise (SoC, no TENS) = 35	Fixed 1 x 35 mins / day x 5 days / week x 4 weeks 20 sessions	Pain intensity (VAS)	International knee documentation committee (IKDC) questionnaire Range of motion
Forst et al., 2004 <sup>129</sup>	P	Pr	Peripheral diabetic neuropathy	19 (9W)	TENS (LF) = 12	Placebo TENS = 7 (0mA)	PRN >30 mins / day /leg for 12 weeks	Pain intensity (VAS)	New total symptom score (NTSS = 6) Sensory nerve threshold (temperature, vibration, pain) Neuropathy total symptom score-6 (NTSS - 6) Intensity of dysaesthesia, hypaesthesia and muscle weakness (VAS) Peripheral nerve function – vibration perception and temperature thresholds Microvascular blood flow
Forster et al., 1994 <sup>130</sup>	P	Pr	Post-op - coronary artery bypass graft surgery	45 (0W)	TENS (HF) + Analgesics (morphine/paracetamol) = 15	Placebo TENS Analgesics (morphine/paracetamol) = 15 (0mA) Control Analgesics (morphine/paracetamol), (SoC, no TENS) = 15 (no description)	PRN up to 72 hours post op	Pain intensity (NRS) • Resting pain • During cough	Analgesic consumption (Narcotic)
Fujii-Abe et al., 2019 <sup>131</sup>	P	E	Post op – Wisdom tooth extraction	44 (23W)	HF TENS (non-noxious) = 11	Placebo TENS (0mA) = 11 TENS (noxious, conditioned pain modulation) = 11 Combined TENS (non-noxious + noxious) = 11	Fixed 1 x 20 mins	Pain intensity (VAS)	None
Galli et al., 2015 <sup>132</sup>	P	E	Post-op - nephrectomy	74 (39W)	TENS (HF) + analgesics (unknown) = 37	Placebo TENS (fading) + analgesics (unknown) = 37	Fixed 1 x 60 mins	Pain intensity (NRS) • Resting pain	Respiratory muscle strength Pulmonary function Walk function

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								<ul style="list-style-type: none"> <li>• During cough</li> <li>• During pulmonary testing</li> <li>• During walking</li> </ul>	
Galloway et al., 1984 <sup>133</sup>	P	Pr	Post-op - abdominal	40 (30W)	TENS (PRN) + analgesic (Cyclimorph) as required = 14	No treatment (SoC, no TENS) + analgesic (Cyclimorph) as required = 14 TENS + analgesic Ccyclimorph) as required = 12 (Remote – non = segmental)	PRN for 48 hours	Pain intensity (VAS, Likert scale)	Analgesic consumption Wound pain discomfort (VAS)
Garcia-Perez et al., 2018 <sup>134</sup>	P	Pr	Pressure ulcers (injury)	17 (15W)	TENS (HF) + standard wound care = 9	Standard wound care (SoC, no TENS) = 8	Fixed 1 x 60 mins / day x 3 weeks total 20 sessions	No primary outcome	Pressure injury area Pressure injury healing rate Blood flow in affected lower limb Skin temperature Pain Assessment in Advanced Dementia Scale
Gerson et al., 1977 <sup>135</sup>	C	E	Post herpetic neuralgia	29 (NR)	TENS (NR) = 13	Carbamazepine + Clomipramine = 16	Fixed 1 x 15 mins / week x 4 weeks then one x 15 mins put 2 weeks x 6 weeks ? x 8 weeks too	Pain intensity (VAS).	Analgesic consumption Plasma concentrations of drugs Physical activity and mental outlook (VAS)
Ghonaime et al., 1999 <sup>136</sup>	C	E	Back pain - low	60 (31W)	TENS (LF) + analgesics (non-opioid) as required = 60	Placebo PENS (0mA) + analgesics as required = =64 PENS + analgesics as required = = 64 Exercise therapies + analgesics as required = (SoC, no TENS) = 64	Fixed 1 x 30 mins x 3 / week x 3 weeks 9 sessions	Pain intensity (VAS)	Analgesic consumption SF-36 Physical component summary Mental component summary Quality of sleep Well-being)
Ghonaime et al., 1999 <sup>137</sup>	C	E	Back pain - Sciatica	64 (34W)	TENS (LF) + analgesics (non-opioid) as required = 64	Placebo PENS + analgesics as required (0mA) = 64 PENS + analgesics as required = 64	Fixed 1 x 30 mins / day x 3 weeks 21 sessions	Pain intensity (VAS)	Analgesic consumption SF-36 Physical activity and quality of sleep during the 24 h interval prior to each treatment session (VAS)
Gilbert et al., 1986 <sup>138</sup>	P	Pr	Post-op - inguinal hemiorrhaphy	40 (0W)	TENS (HF) + Pethidine as required = 20	Placebo TENS + Pethidine as required = 20 (0mA)	PRN	Pain intensity (VAS)	Analgesic consumption (Pethidine) Expiratory peak flow
Grabiańska et al., 2015 <sup>139</sup>	P	Pr	Back pain low	60 (NR)	TENS (HF) = 30	IFT = 30	Fixed 10 x 20 mins / day	Pain intensity (VAS)	Laitinen Pain Questionnaire
Graff-Radford et al., 1989 <sup>140</sup>	P	E	Myofascial pain and trigger point sensitivity	60 (45W)	TENS (HF) = 12	Sham Control (Stadynamics unit or Pain Suppressor unit. 0mA). = 12 TENS (LF, 2hz, 250us, >MDT) = 12 TENS (HF, 50us, SBC) = 12 TENS (Pain Suppressor, 4mA, 15Hz burst of 20Khz ,active <SDT) = 12	Fixed 1 x 30 mins 1 session	Pain intensity (VAS)	Pressure algometry
Grant et al., 1999 <sup>141</sup>	P	E	Back pain	60 (54W)	TENS (HF) = 28	Acupuncture = 32	PRN	Pain intensity (VAS)	Analgesic consumption Pain subscale of Nottingham Health Profile

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							1 x <30 mins / session and < 6h / day for 4 weeks		Spinal flexion measured from C7 to S1
Gregorini et al., 2010 <sup>142</sup>	P	E	Post-op - cardiac surgery	25 (7W)	TENS (HF) = 13	Placebo TENS (>SDT – infrequent pulses) = 12	Fixed 1 x 4 hours ?? on 3rd post-op day	Pain intensity (VAS)	Respiratory muscle strength Lung volumes and capacity
Grimmer, 1992 <sup>143</sup>	P	E	Osteoarthritis - knee	60 (37W)	TENS (HF) = 20	Placebo TENS = 20 (0mA) TENS (LF, burst) = 20	Fixed 1 x 30 mins 1 session	Pain intensity (VAS)	Stiffness change (VAS) Pain relief time (in hours) Stiffness relief time (hours) Change on knee circumference Change in knee range of motion Physiological respiratory rate, heart rate and blood pressure
Gschiel et al., 2010 <sup>144</sup>	P	Pr	Osteoarthritis – knee (gonarthrosis)	45 (32W)	TENS (AF) = 25	Placebo TENS (0mA) = 20	PRN >2 x 30 mins / day for 3-weeks	Pain intensity (VAS)	SF-36 WOMAC Lysholm score
Gunay Ucurum et al., 2018 <sup>145</sup>	P	Pr	Shoulder impingement syndrome	79 (65W)	TENS (NR) + exercise = 20	Exercise (SoC, no TENS) = 19 IFT + Exercise = 20 US + Exercise = 20	Fixed 1 x ?? mins x 3 / week x 4 weeks 12 sessions	Pain intensity (VAS)	Short Form-36 (SF-36) Disabilities of the Arm, Shoulder and Hand questionnaire (DASH)
Guo and Jia, 2005 <sup>146</sup>	P	Pr	Fibromyalgia	66 (45W)	TENS (HF) = 22	Routine medication (SoC, no TENS) = 22 EA = 22	Fixed 1 x 30 mins / day for 20 days [repeated for another 20 days] ?? 40 sessions	Pain intensity (VAS)	Analgesic consumption
Hamza et al., 1999 <sup>147</sup>	P	Pr	Post-op - gynaecological	100 (100W)	TENS (HF) + morphine PCA = 25	Placebo TENS + morphine PCA = 25 (0mA) TENS (LF) + morphine PCA = 25 TENS (AF) + morphine PCA = 25	Fixed 1 x 30 mins at intervals of 2 h or longer while patient awake	Pain intensity (VAS)	Analgesic consumption (PCA morphine) levels of sedation, fatigue, discomfort and nausea
Hanfny and El-Bigawy, 2004 <sup>148</sup>	P	Pr	Dysmenorrhea – primary	30 (30W)	TENS (HF) = 15	Acupressure = 15	Fixed 1 x 20 mins x 3 days x 3 menstrual cycles	Pain intensity (6-point scale)	Pain relief (5-point scale)
Hansson and Ekblom, 1983 <sup>149</sup>	C	E	Orofacial pain – acute	62 (36W)	TENS (HF) = 22	Placebo TENS (0mA) = 20 TENS (LF, burst) = 20	Fixed 1 x 30 mins 1 session	Pain intensity (5-point verbal scale)	None
Hansson et al., 1986 <sup>150</sup>	P	E	Post-op - oral	28 (16W)	TENS (HF) + naloxone = 6	TENS (LF, burst) + naloxone = 7 Vibration + Naloxone = 7 Naloxone = 8	Fixed 1 x 45 mins 1 session	Pain intensity (5-point verbal scale)	None
Hargreaves and Lander, 1989 <sup>151</sup>	P	E	Post-op dressing changes following abdominal surgery	75 (34W)	TENS (HF) + meperidine and morphine = 25	Placebo TENS (0mA) + meperidine and morphine = 25 No treatment (+ meperidine and morphine, SoC, no TENS) = 25	Fixed 1 x 15 to 60 mins depending on duration of dressing change 1 session	Pain intensity (VAS) • During dressing change	Analgesic consumption (prescription and administration)
Harrison et al., 1986 <sup>152</sup>	P	Pr	Labour pain	150 (150W)	TENS (HF+LF burst) = 76	Placebo TENS = 73 (0mA)	PRN During labour	Pain intensity (5-point scale)	Analgesic consumption Hours pf labour Mode of delivery Pain relief reported by the midwife (5-point scale)



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Hart et al., 2012 <sup>153</sup>	P	Pr	Rehabilitation - Anterior cruciate ligament	30 (10W)	TENS (HF) + exercise = 10	Exercise alone (SoC, no TENS) = 10 Cryotherapy + Exercise = 10	PRN Daily x 2 weeks and during in clinic exercise session	Pain intensity (VAS)	Various functional outcomes for knee Tegner activity rating International Knee Documentation Committee subjective knee evaluation form. Circumferential girth (measured at mid-patella) Range of motion Quadriceps central activation
Hazneci et al., 2005 <sup>154</sup>	P	Pr	CRPS - reflex sympathetic dystrophy syndrome upper limb	30 (0W)	TENS (HF) +, contrast bathing and exercise programme = 16	Pulsed US on stellate ganglion + contrast bathing and exercise programme = 14	Fixed 1 x 20 mins / day for 3 weeks 21 sessions	Pain intensity (???) • spontaneous pain • provocative pain	Loss of mobility, muscle power Oedema
Herrera-Lasso et al., 1993 <sup>155</sup>	P	Pr	Shoulder – painful syndrome	29 (23W)	TENS (HF) + Exercises + Heat (superficial) = 15	US + Exercises + Heat (superficial) = 14	Fixed 1 x 20 mins / day x 2-5 / week 13 sessions	Pain intensity (VAS)	Range of motion
Hershman, 1989 <sup>156</sup>	P	Pr	Post op - colorectal or cholecystectomy	95 (47W)	TENS (HF) + omnopon (opiate) = 48	Placebo TENS + omnopon (opiate) (0mA) = 47	PRN 48h post-operative	No primary outcome	Analgesic consumption - Opiate Anti- emetic consumption Duration of hospital stay
Hokenek et al., 2020 <sup>157</sup>	P	Pr	Migraine – presenting to emergency department	83 (NR)	TENS (HF) + rescue medication = 39	Placebo TENS (0mA) + rescue medication = 39	Fixed 1 x 20mins	Pain intensity (VAS)	Analgesic consumption
Hou et al., 2002 <sup>158</sup>	P	E	Cervical Myofascial Pain and Trigger Point Sensitivity	71 (59W)	TENS (HF) + hot pack active ROM + stretch with spray (B5) = 9	Hot pack + active ROM + stretch with spray (SoC, no TENS) (B4) = 10 Ischemic compression + TENS (HF) + hot pack + active range of motion + = 9 Hot pack + active range of motion + ischemic compression = 12 Hot pack + active range of motion = 21 IFT+ myofascial release + Hot pack + active range of motion (B6) = 9	Fixed 1 x 20 mins 1 session	Pain intensity (VAS)	Pressure pain threshold and tolerance (algometry) Range of motion
Hruby et al., 2006 <sup>159</sup>	P	Pr	Procedure pain - Office-based flexible cystoscopy	148 (40W)	TENS (HF) = 48	Placebo TENS (0mA) = 49 No treatment (no analgesics) = 51	Fixed < 5min During procedure 1 session	Pain intensity (VAS)	International Prostate Symptom Score questionnaire Changes in vital signs and IPSS
Hsieh and Lee, 2002 <sup>160</sup>	P	E	Back pain - chronic low non-specific	133 (89W)	TENS + Medication = 49	Medication - Diclofenac (NSAID), mephenoxalone (muscle relaxant) and antacid (SoC, no TENS) = 31 PENS + medication = 53	Fixed 1 x 15 mins 1 session	Pain intensity (VAS)	Pain drawing instrument Pressure pain threshold (algometry) Quebec Back Pain Disability scale
Hsueh et al., 1997 <sup>161</sup>	P	E	Myofascial trigger points	60 (35W)	TENS (HF) = 20	Placebo electrotherapy (0mA) = 18	Fixed 1 x 20 mins	Pain intensity (VAS)	Pressure algometry (pain threshold)

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						Functional electrical muscle stimulation = 22	1 session		Range of motion
Hughes et al., 1988 <sup>162</sup>	P	Pr	Labour pain	89 (89W)	TENS (NR) + opioids rescue = 29	Placebo TENS (0mA) + opioids rescue = 30 Conventional medication, opioids (SoC, no TENS) = 30	PRN 24h	Pain intensity (VAS)	Analgesic consumption Pain relief (5-point category rank scale) Infant condition Apgar
Husch et al., 2020 <sup>163</sup>	P	Pr	Post op - thoracotomy	45 (25W)	TENS (HF) + physiotherapy + analgesics = 15	Placebo TENS (fading to 0mA) + physiotherapy + analgesics = 15 Control (SoC, physiotherapy) + analgesics = 15	Fixed 3 x 30 mins / day x 2 days 6 sessions	Pain intensity (VAS)	Analgesic consumption Pulmonary function, respiratory muscle strength
Ilhanli, 2015 <sup>164</sup>	P	Pr	chronic low back pain with lumbar disc herniation	160 (108W)	Conventional TENS (HF) Hot pack, ultrasound and exercise	Group1= Group2= Acupuncture-like TENS, Group3= Brief-intense TENS, Group4= Sham TENS.	Fixed 5 days/week for 3 weeks	Pain intensity (VAS)  Rest Movement	Ostwestry Low Back Pain Disability Questionnaire Short-Form 36 physical component Mental component Scores Modified Lumbar Schober test, Straight Leg Raising test and Femoral Stretching test
Inal et al., 2016 <sup>165</sup>	P	Pr	Osteoarthritis - knee	90 (90W)	TENS (HF) + physiotherapy (hot pack, US, exercise) = 30	Placebo TENS (0mA) + physiotherapy (hot pack, US, exercise) = 30 TENS (LF) physiotherapy (hot pack, US, exercise) = 30	Fixed 1 x 20 mins / day x 5 weeks 35 sessions	Pain intensity (VAS) • Resting pain • Pain on movement	WOMAC Walking speed (50 metres) Climbing stairs speed (ten stairs)
Isik et al., 2017 <sup>166</sup>	P	Pr	Osteoarthritis - knee	105 (80W)	TENS (HF) = 53	Leech therapy = 52	Fixed 1 x 20min / day x 5 days / week x 3 weeks (in clinic) 15 sessions	Pain intensity (VAS)	WOMAC
Jaafarpour et al., 2008 <sup>167</sup>	P	Pr	Post-op - caesarean	108 (108W)	TENS (MF) = 54	Placebo TENS (0mA) = 54	PRN 24h continuous	Pain intensity (VAS)	Analgesic consumption
Jamison et al., 2019 <sup>168</sup>	P	Pr	Back pain - chronic low non-specific	68 (41W)	TENS (HF) = 35	Usual treatment (SoC, no TENS) = 33	PRN daily x 3 months	Pain intensity (NRS) • Current pain • Average pain	Pressure algometry (PPT) Quantitative sensory testing Anxiety, depression, and irritability (NRS) Brief Pain Inventory Pain Disability Inventory (PDI) Pain Catastrophizing Scale (PCS) Hospital Anxiety and Depression Scale (HADS).
Jarzem et al., 2005 <sup>169</sup>	C	E	Back pain - chronic low non-specific	50 (21W)	TENS (NR, conventional) = 25	Placebo TENS (0mA) = 25	Fixed 3 x 20 mins 3 sessions	Pain intensity (VAS)	Range of motion Straight leg raising Sit-ups and oblique sit-ups
Jensen et al., 1985 <sup>170</sup>	P	Pr	Arthroscopic knee surgery	90 (18W)	TENS (HF) = 30	Placebo TENS (0mA) = 30 Analgesic (SoC, no TENS control) = 30	PRN < 7 days - discontinuation day measured	Pain intensity (6-point category scale)	Analgesic consumption Medicine rating Range of motion Isokinetic muscle examination Leg volume

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Jensen et al., 1991 <sup>171</sup>	P	Pr	Osteoarthritis - knee	20 (18W)	TENS (HF) = 10	TENS (LF) = 10	Fixed 1 x 30 mins / day x 5 days 5 sessions	Pain intensity (4- point Likert scale) • Resting pain • Pain on movement • Exercise induced	Analgesic consumption (NSAID)
Jones and Hutchinson, 1991 <sup>172</sup>	C	E	Post-op pain – abdominal	31 (16W)	TENS (HF, Para incision) + physiotherapy = 31	Placebo TENS ('modified placebo' remote site, leg) + physiotherapy = 31 Entonox + physiotherapy = 31	Fixed 1 x 20 mins 1 session	Pain intensity (VAS)	Respiratory function Peak expiratory flow rate
Kara et al., 2011 <sup>173</sup>	P	Pr	Post-op spinal surgery	54 (28W)	TENS (AF,) + Meperidine PCA = 25	Meperidine PCA (SoC, no TENS control) = 29	Fixed 2 x 30- 40 mins with a 3 to 4-hour rest interval	Pain intensity (VAS) • Resting pain • Pain on movement	Analgesic consumption Beck Depression Inventory Timed Up and Go (TUG) test
Kararmaz et al., 2004 <sup>174</sup>	P	Pr	Procedural pain - during extracorporeal shock wave lithotripsy	66 (42W)	TENS (HF, conventional) = 22	Placebo TENS (active, <SDT) = 22 TENS (LF, acupuncture-like) = 22	Fixed ~45-60mins throughout the procedure 1 session	Pain intensity (VAS)	Analgesic consumption (Alfentanil) Nausea and vomiting (tally of yes/no) Aldrete score Patients' satisfaction (4-point scale)
Kayman-Kose et al., 2014 <sup>175</sup>	P	E	Post-partum pain following (a) Caesarean section – post operative pain + uterine contractions (b) Vaginal delivery – post trauma pain + uterine contractions	(a) = 50 (50W) (b) = 50 (50W)	(a) TENS (HF) = 50 (b) TENS (HF) = 50	(a) Placebo TENS (0mA) = 50 (b) Placebo TENS (0mA) = 50	Fixed 1 x 30min 1 session	Pain intensity (VAS and verbal rating scale)	Analgesic consumption
Keskin et al., 2012 <sup>176</sup>	P	Pr	Back pain – low, pregnancy-related	79 (79W)	TENS (HF) = 20	Control group (no treatment control) = 21 Exercise (SoC) = 19 Acetaminophen = 19	2 x ? mins / week x 3 weeks	Pain intensity (VAS)	Roland Morris Disability Questionnaire
Kibar et al., 2020 <sup>177</sup>	P	Pr	Back pain - chronic low non-specific	123 (87W)	TENS (HF) + hot pack + exercise + rescue paracetamol = 31	Placebo TENS (Sham TENS/IFT device, 0mA) + hot pack + exercise + rescue paracetamol = 30 IFT + hot pack + exercise + rescue paracetamol = 30 TENS + IFT + hot pack + exercise + rescue paracetamol = 32	1 x 30 mins / day x 5 / week x 3 weeks 15 sessions	Pain intensity (VAS) • During activity	Lumbar range of motion (ROM) via inclinometer and modified Schober test, patient and physician global assessments. Rolland-Morris Disability Questionnaire
Kim et al., 2012 <sup>178</sup>	P	E	Pain during venous cannulation	100 (60W)	TENS (HF) = 50	Placebo TENS (0mA) = 50	Fixed 1 x 20 min before cannulation 1 session	Pain intensity (NRS)	Adverse effects
Kim et al., 2014 <sup>179</sup>	P	Pr	Myofascial pain syndrome Mixed	99 (86W)	TENS (NR) + Ketoprofen (NSAID) patch = 24	Ketoprofen (NSAID) patch (SoC) = 25	Fixed 2 x 20 mins / day x 2 weeks	Pain intensity (NRS)	Active range of motion Pressure pain threshold (algometry)

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						Heating pad + ketoprofen (NSAID) patch = 25 Topical capsaicin + ketoprofen (NSAID) patch = 25	28 sessions		Neck Disability Index (NDI) Safety
Kirupa et al., 2019 <sup>180</sup>	P	Pr	Temporomandibular joint	30 (NR)	TENS (HF) = 15	Ultrasound = 15	Fixed 1 x 15 mins / day x unclear /week x 4 weeks ? 10 sessions	Pain intensity (VAS)	None
Knobel et al., 2005 <sup>181</sup>	P	Pr	Labour pain	60 (60W)	TENS (HF, 'tablet electrode') = 20	Placebo TENS (0mA) = 20 TENS using silver spike point electrode = 20	PRN 1 x 120 mins	Pain intensity (VAS)	Analgesic consumption Epidural analgesia Pain relief (calculated from pain intensity (VAS) Discomfort (NR)
Koca et al., 2014 <sup>182</sup>	P	Pr	Carpal tunnel syndrome	75 (43W)	TENS (HF) = 25	IFT= 25 Splint therapy = 25	Fixed 1 x 20 mins / day x 5 days / week x 3 weeks 15 sessions	Pain intensity (VAS)	Symptom severity scale BCTQ Neurophysiology (median motor nerve latency and sensory nerve conduction velocity)
Kofotolis et al., 2008 <sup>183</sup>	P	Pr	Back pain - chronic low non-specific	92 (92W)	TENS (LF) = 23	Placebo TENS (0mA) = 23 Rhythmic stabilisation = 23 TENS (LF) + Rhythmic stabilisation = 23	Fixed 1 x 40-45 mins x 5 days/week x 4 weeks 20 sessions	Pain intensity (VAS/BORG)	Physical activity questionnaire Oswestry Low Back Pain Disability Questionnaire Range of motion Flexion and extension trunk endurance tests
Koke et al., 2004 <sup>184</sup>	C	Pr	Chronic pain	180 (116W)	TENS (HF, HI, >SDT) = 62	Control (HF, intensity of choice) = 60 TENS (HF, LI, SDT) = 58	PRN 30 mins (HI) or 60 mins (LI) 4 to 6 times / day x 2 weeks 56 sessions	Pain intensity (VAS)	Desire to continue (TENS continuation questionnaire)
Korkmaz et al., 2010 <sup>185</sup>	P	Pr	Shoulder pain	40 (28W)	TENS (HF) + exercise = 20	Pulsed radiofrequency + exercise = 20	Fixed 1 x 20 mins /day x 5 / week 20 sessions	Pain intensity (VAS) • Resting pain (maximum and mean) • Pain on movement (maximum and mean) • Pain at night (maximum and mean)	Range of motion Shoulder Pain and Disability Index SF-36
Kumar and Raju, 2014 <sup>186</sup>	P	Pr	Tension-type headache	36 (20W)	TENS (LF) = 17	Exercises - Progressive muscular relaxation (SoC) = 19	Fixed 1 x 15 mins / day x 7 days 7 sessions	Pain intensity (VAS)	Lakaev Academic Stress Response Scale
Labrecque et al., 1999 <sup>187</sup>	P	E	Labour pain (Low back pain)	34 (34W)	TENS (HF) = 12	Standard care (massage, whirlpool bath, mobilisation, SoC, no TENS) = 12	PRN During labour	Pain intensity (VAS)	Analgesic consumption (narcotics) Pain unpleasantness (VAS) Labour Agency Scale (LAS)

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						Intracutaneous sterile water injections (as a treatment) = 11			Labour and Delivery Satisfaction Index
Laitinen and Nuutinen, 1991 <sup>188</sup>	P	Pr	Post-op cholecystectomy	60 (53W)	TENS (HF) + Indomethacin = 20	Control opioid analgesics (SoC, no TENS or Indomethacin) = 10 Indomethacin = 10 TENS (LF) + Indomethacin = 20	Unclear > 16 hours	Pain intensity (4 point categorical)	Analgesic consumption (Opioid) Blood pressure Heart rate Respiratory frequency Reported side effects
Lang et al., 2007 <sup>189</sup>	P	Pr	Acute Posttraumatic hip pain during emergency transport	101 (58W)	TENS (HF) = 30	Placebo TENS (0mA) = 33	Fixed ~30 mins throughout transport to hospital	Pain intensity (VAS)	Anxiety (VAS) Morphometric characteristics
Langley et al., 1984 <sup>190</sup>	P	E	Rheumatoid arthritis (hand) + chronic pain (hand)	33 (24W)	TENS (HF) = 11	Placebo TENS (0mA) = 11 TENS (LF, acupuncture -like) = 11	Fixed 1 x 20 mins 1 session	Pain intensity (VAS) • Resting pain • Pain on movement (grip)	Pressure algometry (joint tenderness) Grip strength
Lauretti et al., 2013 <sup>191</sup>	P	Pr	Fibromyalgia	39 (34W)	TENS (AF, single device) + placebo TENS device = 13	Placebo TENS (0mA, 2 devices) = 10 TENS (AF, two devices) = 13	Fixed 1 x 20min every 12 h x 7 days	Pain intensity (VAS)	Analgesic consumption Quality of sleep and fatigue
Lauretti et al., 2015 <sup>192</sup>	P	Pr	Dysmenorrhea	40 (40W)	TENS (Alternating between HF continuous, LF burst) = 20	Placebo TENS (0mA) = 20	Fixed 1 x 30mins at 8 h interval x 7 days ~14 sessions	Pain intensity (VAS)	Analgesic consumption (Diclofenac) Quality of life questionnaire
Law and Cheing, 2004 <sup>193</sup>	P	Pr	Osteoarthritis - knee	34 (unclear)	TENS (HF) = 12	Placebo TENS (0mA) = 10 TENS (LF) = 13 TENS (AF 2/100pps) = 13	Fixed 1 x 40 mins / day x 5 / week x 2 weeks 10 sessions	Pain intensity (VAS) • Pain on movement	Range of motion Time-up-and-Go
Law et al., 2004 <sup>194</sup>	P	Pr	Osteoarthritis - knee	39 (37W)	TENS (HF) = 22	Placebo TENS (0mA) = 17	Fixed 1 x 40 mins / day x 5 days x 2 weeks 10 sessions	Pain intensity (VAS) • Pain on movement	Range of motion Timed-up-and-Go
Leandri et al., 1990 <sup>195</sup>	P	Pr	Post stroke - Hemiplegic shoulder pain	60 (44W)	TENS (HF) = 20	Placebo TENS (0mA) = 20 TENS (HF, LI) = 20	Fixed 3 days week x 4 weeks 12 sessions	No primary outcome	Range of motion - pain free
Lee et al., 1990 <sup>196</sup>	P	Pr	Labour pain	125 (125W)	TENS (HF continuous, LF burst) + analgesics on demand = 58	Placebo TENS (0mA) + analgesics on demand = 33 No treatment (pethidine injections and Entonox inhalation) (SoC, no TENS) = 34	PRN During labour	Pain intensity (NRS)	Analgesic consumption Pain interval TENS satisfaction questionnaire
Lee et al., 2015 <sup>197</sup>	P	Pr	Post-op Colle's fracture	36 (NR)	TENS (HF) = 18	Placebo TENS (0mA) = 18	Fixed 1 x 15min / day x 5 days	Pain intensity (VAS)	Analgesic consumption (PCS morphine and Cataflan)
Lee et al., 2019 <sup>198</sup>	C	E	Cancer pain - head and neck	41 (6W)	TENS (HF) = 40	Placebo TENS (fading) = 40 No treatment = 40	Fixed 1 x 30 mins x 1 / week 1 session	Pain intensity (VAS)	McGill Pain Questionnaire Perception of TENS effectiveness (VAS) Oral function tasks Fatigue (VAS)
Leo et al., 1986 <sup>199</sup>	C	E	Mixed pain	192 (NR)	TENS (HF, 60pps, 250us, tolerance) = 16	TENS (HF, 60pps, 50us, tolerance) = 16	Fixed 1 x 30 mins 1 session	Pain intensity (VAS)	None

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						TENS (HF, 60pps, 250us, <SDT) = 16 TENS (HF, 60pps, 50us, <SDT) = 16 TENS (HF, 60pps, 250us, SDT) = 16 TENS (HF, 60pps, 50us, SDT) = 16 TENS (LF, 3pps, 250us, tolerance) = 16 TENS (LF, 3pps, 50us, tolerance) = 16 TENS (LF, 3pps, 250us, SDT) = 16 TENS (LF, 3pps, 50us, SDT) = 16 TENS (LF, 3pps, 250us, <SDT) = 16 TENS (LF, 3pps, 50us, <SDT) = 16			
Leonard et al., 2011 <sup>200</sup>	C	E	Chronic pain - various	23 (15W)	TENS (HF, conventional) = 23	TENS (LF, acupuncture-like) = 23	Fixed 1 x 25 mins 1 session	Pain intensity (NRS)	Pain unpleasantness (NRS) The Patient Global Impression of Change (PGIC) scale
Lewers et al., 1989 <sup>201</sup>	P	E	Dysmenorrhea - primary	21 (21W)	TENS (LF, acupuncture-like) = 10	Placebo pill = 11	Fixed 1 x 30 mins 1 session	Pain intensity (VAS)	McGill Pain Questionnaire Pain rating index
Lewis et al., 1984 <sup>202</sup>	C	E	Osteoarthritis - knee	30 (22W)	TENS (HF) = 30	Placebo TENS (0mA) = 30	Fixed 3 x 30-60 mins / day x 3 weeks 21 sessions	Pain intensity (VAS)	Analgesic consumption Paracetamol intake Duration of pain relief Pain free range of motion Questionnaire of patients' opinion
Lewis et al., 1994 <sup>203</sup>	C	E	Osteoarthritis - knee	36 (21W)	TENS (HF) + placebo pills = 36	Placebo TENS (0mA) + placebo pills = 36 Placebo TENS (0mA) + Naproxen (SoC, sham TENS) = 36	PRN > 3 x 30-60 mins / day x 3 weeks	Pain intensity (VAS)	Pain relief (VAS) Pain Index for the Knee Patient Opinion of Treatment Efficacy Piper Pain Intensity Scale
Likar et al., 2001 <sup>204</sup>	P	Pr	Postop pain	30 (9W)	TENS (HF) + analgesics = 11	Placebo TENS (0mA) + analgesics = 12	PRN	Pain intensity (VAS) • At rest • On movement (abduction)	Analgesic consumption - time of taking the 1st analgesic Blood pressure, Heart rate, Respiratory rate, Side effects, .
Lim et al., 1983 <sup>205</sup>	P	Pr	Postop pain - abdominal	30 (17W)	TENS (NR) = 15	Placebo TENS (0mA) = 15	PRN	Pain intensity (VAS)	Analgesic consumption (morphine)
Lima et al., 2011 <sup>206</sup>	P	Pr	Post-op - coronary artery bypass graft	20 (10W)	TENS (HF) + usual care (Physiotherapy and analgesics) = 10	Usual care (Physiotherapy and analgesics, SoC, no TENS) = 10	Fixed 1 x 30 mins x 3 / day	Pain intensity (VAS)	Analgesic consumption Muscle strength (MIP) and expiratory muscle strength (MEP) Functional residual capacity (FRC)
Limoges and Rickabaugh, 2004 <sup>207</sup>	P	Pr	Procedural pain - Screening flexible sigmoidoscopy	90 (39 W)	TENS (HF) = 30	Placebo TENS (0mA) = 30 Verbal encouragement (SoC, no TENS) = 30	Fixed	Pain intensity (NRS, categorical scale)	McGill Pain Questionnaire 12-item questionnaire (Bloating, nausea, electrode site burning or

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							10-20 mins throughout procedure 1 session		tingling, present versus previous SFS pain comparison, and degree of procedural difficulty)
Lin et al., 2015 <sup>208</sup>	P	Pr	Shoulder pain – chronic	33 (25W)	TENS (LF, 2Hz) = 17	Transcutaneous pulsed radiofrequency = 16	Fixed 1 x 15 mins x 3 / week x 1 week 3 sessions	Pain intensity (VAS)	Serum cortisol level
Lin et al., 2019 <sup>209</sup>	P	Pr	Shoulder pain – chronic	50 (34W)	TENS (HF) = 25	Transcutaneous pulsed radiofrequency = 25	Fixed 1 x 15 mins every other day x 1 week 3 sessions	Pain intensity (VAS)	Treatment comfort level Constant–Murley shoulder (CMS) score PEG (pain, enjoyment of life, and general activity) score
Linde et al., 1995 <sup>210</sup>	P	Pr	Temporomandibular joint disk displacement	31 (26W)	TENS (HF) = 16	Flat occlusal splint (SoC, no TENS) = 15	Fixed 3 x 30 mins / day x 6 weeks 66 sessions	Pain intensity (VAS)	Frequency and intensity of complaints (6-step verbal scale) Pain-Track system (pain intensity VAS, sleep or waking hours, mealtimes)
Linn et al., 1999 <sup>211</sup>	P	Pr	Post-stroke – shoulder subluxation	40 (22W)	TENS (HF, AM) + standard care (conventional physiotherapy and occupational therapy) = 20	Standard care (conventional physiotherapy and occupational therapy, SoC, no TENS) = 20	Fixed 4 x 30-60 mins / day x 4 weeks 112 sessions	Pain intensity (5-point NRS)	Pain free range of motion Shoulder subluxation (radiological) Upper arm girth
Lison et al., 2017 <sup>212</sup>	P	Pr	Procedural pain - office hysteroscopy	138 (138W)	TENS (RF) = 46	Placebo TENS (0mA) = 46 Standard care without analgesia (SoC, no TENS) = 46	Fixed 5-30 mins throughout procedure 1 session	Pain intensity (VAS and 5-point verbal scale)	Duration of the procedure Vital parameters Vasovagal symptoms Unusual or adverse TENS events Level of satisfaction with the procedure (NRS)
Liu et al., 1985 <sup>213</sup>	P	Pr	Post-op - thoracotomy	30 (8W)	TENS (NR) = 15	Placebo TENS (active, <SDT) = 15	Fixed 1 x 20min / day x 10days 10 sessions	Pain intensity (NRS)	Passive range of motion Functional activities score
Liu et al., 2017 <sup>214</sup>	P	Pr	Migraine	110 (87W)	TENS (HF, TONS) = 22	Placebo TENS (0mA) = 22 Topiramate (SoC, no TENS) = 22 TENS (LF, TONS) = 22 TENS (AF, TONS) = 22	Fixed 1 x 30m/day x 4 weeks 28 sessions	Pain intensity (VAS)	Analgesic consumption Headache diary (frequency, headache intensity, duration) Self-rating depression scale (SDS) Self-rating anxiety scale (SAS) Headache Impact Test Patient satisfaction with treatment
Lofgren and Norrbrink, 2009 <sup>215</sup>	C	E	Fibromyalgia	32 (32W)	TENS (HF) = 16	Heat therapy (Superficial warmth) = 16	PRN 1 x >30 mins / session as needed x 3 weeks	Pain intensity (VAS, NRS)	Duration of analgesia Fibromyalgia impact questionnaire Treatment preference
Luchesa et al., 2009 <sup>216</sup>	P	Pr	Post-op coronary artery bypass graft	30 (5W)	TENS (HF) = 15	Placebo TENS (0mA) = 15	PRN 2 x 50 min / day x 5 days	Pain intensity (NRS)	Expiratory flux peak Forced vital capacity Forced expiratory volume
Lundeberg, 1984 <sup>217</sup>	C	Pr	Myalgia - chronic	36 (20W)	TENS (HF) = 9	Placebo pill = 9 EA = 9 Vibration = 9	Fixed ~ 2 x 45 mins / week x 3 weeks 6 sessions	Pain intensity (VAS)	Duration of pain relief

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Lundeberg et al., 1985 <sup>218</sup>	C	E	Dysmenorrhea - primary	21 (21W)	TENS (HF) = 21	Placebo TENS =21 (0mA) TENS (LF, burst) = 21	Fixed 1 x 45 mins 1 session	Pain intensity (VAS)	Analgesic consumption McGill Pain Questionnaire Duration of pain relief
Machado et al., 2019 <sup>219</sup>	P	E	Dysmenorrhea	88 (88W)	TENS (HF) + placebo thermotherapy = 22	Placebo TENS + placebo thermotherapy = 22 Thermotherapy (microwave diathermy) + placebo TENS = 22 TENS + Thermotherapy (microwave diathermy) = 22	Fixed 1 x 30 mins 1 session	Pain intensity (NRS)	McGill Pain Questionnaire Conditioned pain modulation test
Machin et al., 1988 <sup>220</sup>	P	E	Back pain - chronic low non-specific	30 (?NR)	TENS (HF) = 15	Placebo TENS = 15 (0mA)	Fixed 1 x 20 mins/day, unclear x days/week x 3 weeks 15 sessions	Pain intensity (VAS and verbal descriptive scale)	Pain diary information
Mahure et al., 2017 <sup>221</sup>	P	Pr	Post-op arthroscopic rotator cuff repair	37 (19W)	TENS (HF) = 21	Placebo TENS = 16 (0mA)	Fixed 4 x 45 min /day x 7 days 28 sessions	Pain intensity (VAS)	Analgesic consumption (Narcotic)
Manigandan et al., 2014 <sup>222</sup>	P	Pr	Post stroke - subluxation	24 (7W)	TENS (HF, at supraspinatus, posterior deltoid + long head of biceps) + physiotherapy + occupational therapy = 12	TENS (HF, at supraspinatus and posterior deltoid) + physiotherapy + occupational therapy = 12	Fixed 1 x 30-60mins / day x 5 weeks 35 sessions	No primary outcome	Shoulder subluxation in mm (x-ray) Pain - free range of passive lateral rotation and active shoulder abduction range of motion
Mannheimer and Carlsson, 1979 <sup>223</sup>	C	E	Rheumatoid arthritis	20 (13W)	TENS (HF) = 20	TENS (LF) = 20 TENS (LF, burst) = 20	Fixed 1 x 10 mins 1 session	Pain intensity (5-point scale)	Loading test (time patient could hold weight) Duration of analgesia
Mannheimer and Whalen, 1985 <sup>224</sup>	P	Pr	Dysmenorrhea	27 (27W)	TENS (HF) = 9	Placebo TENS (0mA) = 9 TENS (LF, acupuncture-like) = 9	Fixed 1 x 30 mins 1 session	Pain intensity (VAS)	Total number of painful days Duration of pain relief
Mannheimer et al., 1978 <sup>225</sup>	C	E	Rheumatoid arthritis	19 (17W)	TENS (HF, SBC at pain, Group 1) = 19	TENS (SDT at pain, group 2) = 19 TENS (HF, SDT at remote site, Group 3) = 19	Fixed 5 mins / day x 15 days 15 sessions	No primary outcome	Degree of pain relief Loading test (time patient could hold weight)
Mannheimer et al., 1985 <sup>226</sup>	P	Pr	Severe angina pectoris	23 (4W)	TENS (HF) + antianginal medication as needed = 12	Antianginal medication (SoC, no TENS, 'no treatment' control) = 11	Fixed 3 x 60 mins / day x 10 weeks during anginal attacks 30 sessions	Pain intensity (5-point scale)	Recovery time (min) Frequency of anginal attacks Consumption nitroglycerin Work during exercise Pulse rate, blood pressure Dyspnoea (5-point scale) Electrocardiograms
Mansourian et al., 2019 <sup>227</sup>	P	Pr	TMJ - Myofascial pain	108 (88W)	TENS (HF) + medication = NR (36)	Medication Control (SoC, no intervention) = NR (36) LLLT + medication = NR (36)	Fixed 1 x 10 mins / day x 3 / week x 3 weeks 10 sessions	Pain intensity (VAS) • at rest • on movement - variety of face and jaw movements	Mouth opening Lateral protrusive movements



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Mansuri et al., 2019 <sup>228</sup>	P	E	Musculoskeletal pain - Muscle tension dysphonia	30 (20W)	TENS (HF) = 15	Placebo TENS (0mA) = 15	Fixed 1 x 20 mins 1 session	Pain intensity (VAS)	Vocal tract discomfort scale Extended Nordic musculoskeletal symptoms questionnaire Auditory-perceptual assessment
Mansuri et al., 2020 <sup>229</sup>	P	Pr	Musculoskeletal pain - Muscle tension dysphonia	20 (20W)	TENS (LF) + vocal tract training = 10	Vocal tract training (SoC) = 10	Fixed 1 x 50 mins / day x 2 / week x 2 weeks 10 sessions	Pain intensity (VAS)	Extended Nordic Musculoskeletal Symptoms Questionnaire Vocal tract discomfort
Marchand et al., 1993 <sup>230</sup>	P	Pr	Back pain - chronic low non-specific	42 (22W)	TENS (HF) = 14	Placebo TENS (0mA) = 12 No treatment = 16	Fixed 1 x 30 mins / day x 2 / week x 10 weeks 20 sessions	Pain intensity (VAS)	Pain unpleasantness (VAS)
Mascarin et al., 2012 <sup>231</sup>	P	Pr	Osteoarthritis - knee	38 (38W)	TENS (MF) = 12	Kinesiology taping = 16 Ultrasound = 10	Fixed 1 x 20 mins / day x 2 / week x 12 weeks 24 sessions	Pain intensity (VAS)	WOMAC Range of motion - knee flexion and extension Six-minute walking test (6-MWT)
McCallum et al., 1988 <sup>232</sup>	P	Pr	Post-op decompressive lumbar laminectomy	20 (13W)	TENS (HF) = 10	Placebo TENS (0mA) = 10	PRN (NR)	No primary outcome	Analgesic consumption Plasma morphine concentrations
Melzack et al., 1983 <sup>233</sup>	P	Pr	Back pain – acute and chronic low non-specific	41 (22W)	TENS (LF) = 20	Gentle massage = 21	Fixed 2 x 30 mins / week x 5 weeks 10 sessions	Pain intensity (PPI)	McGill Pain Questionnaire Range of motion
Merrill, 1989 <sup>234</sup>	P	Pr	Post-op urologic surgery	96 (0W)	TENS (NR) + analgesics as needed = 48	Analgesics (SoC, no TENS) = 48	PRN	No primary outcome	Analgesic consumption
Miller et al., 2007 <sup>235</sup>	C	Pr	Spasticity – multiple sclerosis	32 (17W)	TENS (HF, for 8 hrs) = 32	TENS (HF, for 60 mins) = 32	Fixed 1 x 8 hours or 60 mins / day x 2 weeks 14 sessions	Pain intensity (VAS)	Global Spasticity Scale (GSS) Penn Spasm Scale (PSS) TENS experience questionnaire
Milsom et al., 1994 <sup>236</sup>	C	E	Dysmenorrhea - primary	12 (12W)	TENS (HF, HI) = 12	Naproxen (500 mg, SoC not TENS) = 12	Unclear 1 x 10 seconds repeated as necessary	Pain intensity (5-point scale)	Uterine contractility and intrauterine pressure
Moharic et al., 2009 <sup>237</sup>	P	Pr	Peripheral diabetic neuropathy	65 (NR)	TENS (HF) = 46	Pregabalin = 5 TENS (HF) + Pregabalin = 14	Fixed 1 x 3h / day x 7 days / week 3 weeks 21 sessions	Pain intensity (VAS)	Pain unpleasantness (VAS) Pain interference with daily activities and sleep (VAS) SF-36
Mondal et al., 2019 <sup>238</sup>	P	Pr	Myofascial pain	109 (86W)	TENS (HF) + + SoC (exercises + heat + medication) = 34	Ultrasound therapy + SoC (exercises + heat + medication) = 36 Trigger point injection (steroid + local anaesthetic) + SoC (exercises + heat + medication) = 39	Fixed 1 x 20 mins per trigger point / day x 2 weeks 14 sessions	Pain intensity (VAS)	Index score of trigger point after palpation Neck disability Index
Moore and Shurman, 1997 <sup>239</sup>	C	E	Chronic back pain	24 (16W)	TENS (HF) = 24	Placebo TENS (0mA) = 24 NMES = 24 NMES + TENS = 24	Fixed 1 x 5 hours / day x 2 days 2 sessions	Pain intensity (VAS)	Pain relief (VAS)
Mora et al., 2006 <sup>240</sup>	P	Pr	Renal colic in Emergency care	100 (29W)	TENS (HF) = 39	Placebo TENS (sham, 0mA) = 34	Fixed 1 x 30 mins 1 session	Pain intensity (VAS)	Anxiety (VAS) Morphometric characteristics

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Morgan et al., 1996 <sup>241</sup>	P	Pr	Procedural pain - Distention shoulder arthrography	60 (32W)	TENS (HF) + Lignocaine = 20	Placebo TENS (active, $\leq$ SDT) + Lignocaine = 20 Lignocaine (SoC, no TENS, control) = 20	Fixed 1 x 20 mins before procedure then throughout procedure 1 session	Pain intensity (VAS)	None
Møystad et al., 1990 <sup>242</sup>	C	E	Rheumatic disease involving the temporomandibular joint.	19 (17W)	TENS (HF) = 19	Placebo TENS (0mA) = 19 TENS (LF) = 19	Fixed 1 x 30 mins 1 session	Pain intensity (VAS) • At rest • on movement	Muscle tenderness to palpation (3-point scale) Range of motion
Murray et al., 2004 <sup>243</sup>	C	E	Angina pectoris	10 (2W)	TENS (HF) = 10	Placebo pills = 10	Fixed 3 x 60 mins / day x 2 / week 10 sessions	No primary outcome	Treadmill exercise tests • exercise time • Time to maximum ST depression • Rate-pressure product at peak exercise • Time to onset of angina
Mutlu et al., 2013 <sup>244</sup>	P	Pr	Fibromyalgia	66 (66W)	TENS + Exercise (supervised) = 33	Supervised exercise (SoC, no TENS) = 33	Fixed 1 x 30 mins / day x 5 days x 5 weeks 25 sessions	Pain intensity (VAS – within FIQ)	Fibromyalgia Impact Questionnaire (FIQ) Tender point count) Myalgic pain score SF-36
Nabi et al., 2015 <sup>245</sup>	P	Pr	Peripheral diabetic neuropathy	65 (29W)	TENS (HF) = 30	Pulsed radiofrequency = 30	Fixed 1 x 20 mins every 2 days x 2 weeks 10 sessions	Pain intensity (NRS)	None
Nash et al., 1990 <sup>246</sup>	P	E	Chronic pain	200 (126W)	TENS (HF, continuous, 100pps) = 50	TENS (HF, continuous, 10pps) = 50 TENS (LF, burst, 10pps) = 50 TENS (LF, burst 100pps) = 50	PRN < 2 years	Pain intensity (VAS)	Responders ( $\geq$ 50% reduction in pain) Time to >50% reduction in pain
Navarathnam et al., 1984 <sup>247</sup>	P	Pr	Post-op cardiac surgery	31 (6W)	TENS (NR) + analgesics on demand = 14	Placebo TENS (0mA) + analgesics on demand = 17	PRN	Pain intensity (5-point scale)	Analgesic consumption Spirometry Experience of cardiac surgery (Questionnaire)
Neary, 1981 <sup>248</sup>	P	Pr	Post incisional surgical pain	200 (NR)	TENS (HF) = 100	Morphine sulphate or Meperidine Hydrochloride (SoC, no TENS) = 100	PRN 1 x 30 mins or as needed	No primary outcome	Analgesic consumption
Neighbours et al., 1987 <sup>249</sup>	P	E	Dysmenorrhea	20 (20W)	TENS (LF, acupuncture-like) = 10	Placebo pill = 10	Fixed 1 x 30 mins 1 session	Pain intensity (VAS)	Analgesic consumption McGill Pain Questionnaire Pain rating index
Nesheim, 1981 <sup>250</sup>	P	Pr	Labour pain	70 (70W)	TENS (LF, burst) = 35	Placebo TENS (0mA) = 35	PRN during labour	No primary outcome	Pain relief (4-point category scale)
Neumark et al., 1978 <sup>251</sup>	P	Pr	Labour pain	30 (30W)	TENS (NR) = 10	Pethidine (SoC, no TENS) = 5 Placebo TENS (0mA) = 5 Remote TENS (electrodes in wrong positions) = 5 No treatment = 5 (no analgesia)	Fixed 70 mins 1 session	Pain intensity (6-point scale)	None
Ng et al., 2003 <sup>252</sup>	P	Pr	Osteoarthritis - knee	24 (23W)	TENS (LF) + Education about knee care = 8	Education about knee care (SoC, no TENS) = 8 EA + Education about knee care = 8	Fixed 1 x 20 mins on alternative days x each session over 2 weeks	Pain intensity (NRS)	Range of motion Timed Up-and-Go test

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							8 sessions		
Nordemar and Thorner, 1981 <sup>253</sup>	P	Pr	Neck pain - acute cervical pain	30 (18W)	TENS (HF) + neck collar + analgesics = 10	Neck collar + analgesics (SoC, no TENS) = 10 Manual therapy + neck collar + analgesics = 10	Fixed 1 x 30 mins x 3 / week 3 session	Pain intensity (VAS) ● at rest ● on movement	Analgesic consumption Range of motion
Norrbrink, 2009 <sup>254</sup>	C	Pr	Spinal cord injury neuropathic pain	24 (4W)	TENS (HF) = 24	TENS (LF) = 24	Fixed 3 x 30 to 40 mins / day x 7 days x 2 weeks 42 sessions	Pain intensity (Borg CR-10)	Pain unpleasantness (BORG CR - 10) Global pain relief (5-point scale) Multidimensional Pain Inventory Hospital Anxiety and Depression Scale Nordic Basic Sleep Questionnaire Life Satisfaction Instrument-9 Ability to cope with pain (NRS)
Olsén et al., 2007 <sup>255</sup>	P	E	Postpartum uterine contractions	21 (21W)	TENS (HF, brief HI) = 12	TENS (HF, LI) = 8	Fixed 1 x 1 min repeated 2 times if necessary 1 session	Pain intensity (VAS)	Uterine contraction discomfort (5-point verbal scale) Discomfort from treatment (5-point verbal scale)
Olsen et al., 2019 <sup>256</sup>	C	E	Dysmenorrhea - primary	16 (16W)	TENS (HF, brief HI) = 7 (7W)	Control (SoC, no TENS, 'delayed intervention) = 9 (9W)	PRN 1 x 60 seconds repeated as needed	Pain intensity (VAS)	Analgesic consumption Limitation in physical function (VAS) Discomfort from the treatment
Oncel et al., 2002 <sup>257</sup>	P	Pr	Minor rib fracture	100 (41W)	TENS (HF) = 25	Placebo TENS (0mA) + Naproxen NSAID = 25 Naproxen NSAID (SoC, no TENS) = 25 Placebo pills = 25	Fixed 2 x 30 mins / day x 3 days 6 sessions	Pain intensity (VAS)	None
Oosterhof et al., 2006 <sup>258</sup>  Secondary reports Oosterhof et al., 2008 <sup>259</sup> , Oosterhof et al., 2012 <sup>260</sup> , Oosterhof et al., 2012 <sup>261</sup>	P	Pr	Chronic pain, various types	163 (97W)	TENS (HF) = 81	Placebo TENS = 82 (0mA)	PRN x 10 days	Pain intensity (VAS)	TENS satisfaction
Ordog, 1987 <sup>262</sup>	P	Pr	Acute traumatic pain	100 (NR)	TENS (NR) = 25	Placebo TENS (0mA) = 25 TENS (NR) + acetaminophen with codeine = 25 Placebo TENS (0mA) + acetaminophen with codeine = 25	PRN	Pain intensity (VAS)	TENS satisfaction Side effects
Ozkaraoglu et al., 2020 <sup>263</sup>	P	Pr	Back pain - low non-specific	40 (19W)	TENS (HF) + ultrasound, hot pack and exercise = 20	High Intensity Laser Therapy (HILT) + ultrasound, hot pack and exercise = 20	Fixed 1 x 20 mins / day x 5 days a week for a total of 20 sessions.	Pain intensity (VAS)	Range of motion Oswestry Disability Questionnaire Beck Depression Inventory
Ozkul et al., 2015 <sup>264</sup>	C	Pr	Neuropathic pain in patients with spinal cord injury	24 (6W)	TENS (HF) = 12	Visual illusion = 12	Fixed 1 x 30 mins / day x 5 days x 2 weeks 10 sessions	Pain intensity (VAS)	Neuropathic sign and symptoms (DNa) McGill pain questionnaire Neuropathic Pain Scale (NPS) Brief Pain Inventory

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Oztaş and Iyigün, 2019 <sup>265</sup>	P	Pr	Post-op abdominal surgery	48 (10W)	TENS (LF-HF) + Tramadol PCA + rescue Pethidine = 16	Analgesic Medication (tramadol PCA + rescue pethidine (SoC, no TENS) = 16 TAES + tramadol PCA + rescue pethidine = 16	Fixed 1 x 30 mins at 2h, 18h, 22h, 42, 46h post-op 5 sessions	Pain intensity (VAS)	Analgesic consumption (Tramadol - PCA) Nausea severity (VAS) Vomiting (frequency) Antiemetic consumption Pulmonary function tests
Ozturk et al., 2016 <sup>266</sup>	P	Pr	Post-op cardiac surgery	120 (39W)	TENS (HF) + morphine (PCA) = 40	Placebo TENS + placebo parasternal block (saline) + morphine (PCA) (Control) = 37 Placebo TENS + Parasternal block = 38	PRN 60 mins treatments with 60 mins rest as needed	Pain intensity (VAS)	Analgesic consumption (morphine - PCA) Mean arterial pressure, heart rate, and arterial blood gas analysis Duration of extubating, ICU and hospital stay Opioid-related side effects
Padma et al., 2000 <sup>267</sup>	P	Pr	Labour pain	70 (70W)	TENS (HF) = 50	Placebo TENS (0mA) = 20	PRN	No primary outcome	Pain relief (4 categories) • Subjective assessment (by the patient) • Observer Assessment • Monitoring mother and foetus • Duration of labour APGAR score
Paker et al., 2006 <sup>268</sup>	P	Pr	Knee AO	60 (NR)	TENS (HF) = NR	Intra-articular hyaluronic acid injection = NR	Fixed 1 x 20 mins / day x 5 / week x 3 weeks 15 sessions	Pain intensity (5-point scale) from WOMAC	WOMAC Lequesne Index SF-36
Palmer et al., 2014 <sup>269</sup>	P	Pr	Osteoarthritis - knee	224 (141W)	TENS (HF) + Exercise + education = 73	Placebo TENS (0mA) + Exercise + education = 74 Exercise + education + exercise (SoC, no TENS control) = 77	PRN x 6 weeks	Pain intensity (5-point scale) from WOMAC	WOMAC Maximum knee extensor torque Patient global assessment of change scale Self-efficacy for exercise
Pan et al., 2003 <sup>270</sup>	P	E	Tendinitis - Chronic calcific of the Shoulders	60 (39W)	TENS (HF) + hydrocollator pack = 28 (30 shoulders)	Extracorporeal shock wave = 32 (33 shoulders)	Fixed 1 x 20 mins / day x 3 / week x 4 weeks 12 sessions	Pain intensity (VAS)	Constant score Manual muscle test (MMT)
Park et al., 2015 <sup>271</sup>	P	Pr	Post op thyroidectomy - neck pain	100 (NR)	TENS (HF) = 50	Placebo TENS = 50 (0mA)	Fixed throughout surgery 1 session	Pain intensity (NRS) • Anterior wound pain	Analgesic consumption post-operative
Patil and Aileni, 2017 <sup>272</sup>	P	Pr	Temporomandibular disorder	36 (23W)	TENS (HF) = 18	Exercise home programme = 18	Fixed 1 x 30 mins / day x once / week x 4 weeks 1 session	Pain intensity (VAS)	Pain free range of motion masticatory muscle tenderness (VAS)
Peacock et al., 2019 <sup>273</sup>	P	Pr	Chronic pain - Various	100 (22W)	TENS (LF, AL-TENS) + SoC = 30	Tennant Biomodulator + SoC = 34 Acupuncture + SoC = 36	PRN 2 x 20min / day x 6 weeks 12 sessions	Pain intensity (VAS, as pain log)	Million visual analogue scale PTSD checklist – military Center for Epidemiological Studies - depression scale
Pietrosimone et al., 2009 <sup>274</sup>	P	E	Tibiofemoral OA	33 (16W)	TENS (HF) = 10	No treatment (control) = 12 Focal joint knee cooling = 11	Fixed 1 x 45 mins 1 session	Pain intensity (VAS)	WOMAC Quadriceps CAR

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									Peak knee extension torque with maximal voluntary isometric contractions (MVIC)
Pietrosimone et al., 2011 <sup>275</sup> Secondary report Pietrosimone et al., 2010 <sup>276</sup>	P	Pr	Tibiofemoral OA	36 (21W)	TENS (HF) + Exercises (strengthening) = 12	Placebo TENS (Fading) = 12 Exercise (strengthening, SoC, no TENS control) = 12	PRN >8 hours / day x 4 weeks 21 sessions	No primary outcome	WOMAC Quadriceps strength Peak knee extension torque with maximal voluntary isometric contractions
Pietrosimone et al., 2020 <sup>277</sup>	P	Pr	OA, knee [during therapeutic exercise]	90 (39W)	TENS (HF) + Exercises (strengthening) = 30	Placebo TENS (0mA) + Exercises Exercises = 30	PRN during all exercise sessions and during activities of daily living for 4 weeks	No primary outcomes	WOMAC Quadriceps Strength and Voluntary activation Peak knee extension torque with maximal voluntary isometric contractions
Pike, 1978 <sup>278</sup>	P	Pr	Post-op hip replacement	40 (19W)	TENS (HF) + medication (pethidine) = 20	Medication (pethidine, SoC, no TENS control) = 20	PRN > 8 hours / day	No primary outcome	Analgesic consumption (Pethidine) Pain relief (4 categories) Nausea and vomiting (frequency)
Pitangui et al., 2012 <sup>279</sup>	P	Pr	Post episiotomy pain	40 (40W)	TENS (HF) = 20	No treatment = 20	Fixed 1 x 60 mins 1 session	Pain intensity (NRS) • rest • standing • walking	McGill Pain Questionnaire TENS-related questions Functional limitations
Pitangui et al., 2014 <sup>280</sup>	P	E	Post episiotomy pain	33 (40W)	TENS (HF) = 11	Placebo TENS (0mA) = 10 TENS (LF) = 13	Fixed 1 x 30 mins pre-injection 1 session	Pain intensity (NRS) • Resting pain • Pain on movement	Treatment satisfaction TENS-related questions
Platon et al., 2010 <sup>281</sup>	P	Pr	Post-op surgical abortion	200 (200W)	TENS (HF, HI) = 100	Fentanyl i.v. (SoC, no TENS control) = 100	Fixed 1 x 1 min (repeated if necessary)	Pain intensity (VAS)	Analgesic consumption Nausea (VAS) Time in recovery ward Ramsay sedation score
Platon et al., 2018 <sup>282</sup>	C	E	Post-op gynaecologic laparoscopic surgery	93 (93W)	TENS (HF, HI) = 47	Morphine i.v. (SoC, no TENS control) = 46	Fixed 1 x 1 min (repeated if necessary)	Pain intensity (VAS)	Analgesic consumption (Opioids) Nausea (VAS) Time in recovery ward Ramsay sedation score
Prabhakar and Ramteke, 2011 <sup>283</sup>	P	E	Radiculopathy - cervical	75 (39W)	TENS (HF) + Hot fomentation + Exercises, Isometric neck (Group B) = 25	Hot fomentation + Exercises, Isometric neck (SoC, no TENS control, Group C) = 25 Cervical contralateral lateral flexion mobilization + Hot fomentation + Exercises, Isometric neck (Group A) = 25	Fixed 1 x 30 mins 1 session	Pain intensity (VAS)	Northwick Park neck pain questionnaire Neuropathic pain scale, SF-McGill Pain Questionnaire
Presser et al., 2000 <sup>284</sup>	P	E	Procedural pain - Injection of epidural steroids	90 (30W)	TENS (HF) = 30	Placebo TENS (active, <SDT) + Local anaesthetic = 30 Local anaesthetic (SoC, no TENS control) = 30	Fixed Throughout procedure	Pain intensity (VAS)	None

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Rainov et al., 1994 <sup>285</sup>	P	Pr	Post-op spinal surgery	234 (121W)	TENS (Alternating F) + analgesic medication = 126	Analgesic medication (SoC, no TENS control) = 108	Fixed 1 x 60 mins every 2 hours ? how many days?	Pain intensity (VAS)	Analgesic consumption Pain unpleasantness (VAS)
Rajfur et al., 2017 <sup>286</sup>	P	Pr	Back pain - chronic low non-specific	127 (73W)	TENS (HF) + exercise = 20	Exercise (SoC, no TENS control) = 21 TENS (LF, acupuncture = like) + exercise = 20 High-voltage electrical stimulation) + exercise = 22 IFT) + exercise = 22 Diadynamic current) + exercise = 22	Fixed 1 x 60 mins / day x 5 / week x 3 weeks 15 sessions	Pain intensity (VAS)	Modified Laitinen pain scale The Oswestry questionnaire Roland-Morris Disability Questionnaire Lasègue test Schober test Postural stability
Rajpurohit et al., 2010 <sup>287</sup>	P	Pr	Masticatory muscle pain	60 (24W)	TENS (HF) = 30	Microcurrent electrical nerve stimulation (= 30)	Fixed 1 x 20 mins / day x 7 days 7 sessions	Pain intensity (VAS)	Muscle tenderness (algometry)
Rakel and Frantz, 2003 <sup>288</sup>	C	E	Post-op abdominal surgery	33 (17W)	TENS (MF) + analgesics = 33	Placebo TENS (0mA) + analgesics = 33 Analgesics (SoC, no TENS control) = 33	Fixed 1 x 15 mins for duration of measurements	Pain intensity (NRS)	Iowa Gait Test Pulmonary status
Rakel et al., 2014 <sup>289</sup>	P	Pr	Post-op knee arthroplasty (control of pain during exercises)	317 (173W)	TENS (HF) + analgesics = 122	Placebo TENS (Fading) + analgesics = 123 Analgesics (SoC, no TENS control) = 72	Fixed 1 x 20 mins before exercise, then during exercise x 1 to 2 / day x 6 weeks	Pain intensity (NRS) • At rest • On movement	Pain catastrophizing State and trait anxiety Geriatric depression scale Knee injury and osteoarthritis outcome score Quantitative sensory testing Range of motion Gait speed test
Ramanathan et al., 2017 <sup>290</sup>	P	Pr	Pot op knee arthroplasty	116 (30W)	TENS (NR) + opioid analgesics + femoral nerve block = 58	Placebo TENS (Fading to 0mA) + opioid analgesics + femoral nerve block = 58	PRN 1 x 2 hours followed by 30 mins rest as needed for 6 weeks	Pain intensity (VAS)	Analgesic consumption Time up and go test Range of motion Knee injury and osteoarthritis outcome score SF-12
Ramos et al., 2018 <sup>291</sup>	P	Pr	Back pain - low, lumbar disc herniation	29 (14W)	TENS (HF) = 14	Exercises (segmental stabilisation, SoC) = 15	Fixed 1 x 60 mins / day x 2 / week x 8 weeks 18 sessions	Pain intensity (VAS)	LM Muscular Fatigue Fatigue Test Transversus abdominis activation capacity Oswestry Disability Index
Rani et al., 2020 <sup>292</sup>	P	Pr	Rotator cuff	76 (34W) 70 (32W) analysed	TENS (HF) + SoC + rescue meds = 35	Exercises (SoC, no TENS control) + rescue meds = 35	Fixed 1 x 20mins / day x 5 days	Pain intensity (NRS, pain item from Shoulder Pain and Disability Index)	Shoulder Pain and Disability Index
Ratajczak et al., 2011 <sup>293</sup>	P	Pr	Back pain – low, desmopathy	80 (57W)	TENS = 40	Diadynamic currents = 40 Healthy participants groups (no TENS) = 40	Fixed 1 x 30 mins / day x 5 days / week x 2 weeks 10 sessions	Pain intensity (VAS)	Functional pain index by Lequesne Range of motion

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Rawat et al., 1991 <sup>294</sup>	P	Pr	Procedural pain - during biliary extracorporeal shockwave lithotripsy	100	TENS (MF, on back) = 25	Placebo TENS (0mA, on back) = 25 TENS (MF, back and acupoints on leg) = 25 Placebo TENS (0mA, on back and acupoints on leg) = 25	PRN throughout procedure	Pain intensity (5-point scale)	Analgesic consumption
Renovato França et al., 2019 <sup>295</sup>	P	Pr	Radiculopathy – lumbar disc herniation	40 (25W)	TENS = 20	Exercises (Motor control training, SoC) = 20	Fixed 2 x 60 mins / week x 8 weeks 16 session	Pain intensity (VAS)	McGill Pain Questionnaire Oswestry Disability Index Transversus Abdominis Activation Capacity
Reuss et al., 1988 <sup>296</sup>	P	Pr	Post-op cholecystectomy	64 (50W)	TENS (HF) = 30	No treatment (+ meperidine on demand) = 34	PRN	No primary outcomes	Analgesic consumption Complications
Revadkar and Bhojwani, 2019 <sup>297</sup>	P	Pr	Dysmenorrhea	30 (30W)	TENS (HF) + rescue medication = 15	IFT + rescue medication = 15	Fixed 1 x 20mins 1 session	Pain intensity (NRS)	None
Ringel and Taubert, 1991 <sup>298</sup>	P	Pr	Migraine	57 (48W)	TENS (NR) = 31	Ergocomb (prophylactic buccal tablets for migraine) (SoC, no TENS) = 26	PRN >1 x 30 mins / day as needed for 3 months	Pain intensity (4-point scale)	Number of headache days
Robb et al., 2007 <sup>299</sup>	C	E	Chronic pain associated with breast cancer treatment	41 (41IW)	TENS (HF) = 41	Placebo TENS (0mA) = 41 Transcutaneous spinal electroanalgesia = 41	PRN >10-30 mins / day x 3 weeks	Pain intensity (NRS) – from BPI	Analgesic consumption BPI Hospital Anxiety and Depression (HAD) Scale Range of motion Patient satisfaction questionnaire
Robinson et al., 2001 <sup>300</sup>	P	E	Procedural pain – colonoscopy	33 (NR)	TENS (various F) + standard medication = 10	Placebo TENS (0mA) + standard medication = 13 Standard medication (SoC, no TENS control) = 10	Fixed 1 x 5mins pre-procedure, 1 x 5 mins during procedure, 1 x 5 mins post procedure 1 session	Pain intensity (NRS)	Post-procedure evaluation questionnaire
Roche et al., 1985 <sup>301</sup>	P	Pr	Haemophilia	36 (NR)	TENS (HF) = 28	Placebo TENS (0mA) = 8	PRN 1 x 25 mins continuous from recovery room for 5 days as needed	Pain intensity (NRS)	McGill Pain Questionnaire
Rooney et al., 1983 <sup>302</sup>	P	E	Post-op – thoracotomy	44 (17W)	TENS (HF) = 22	Placebo TENS (0mA) = 22	Fixed 1 x 25 mins 1 session	No primary outcome	Analgesic consumption – (Narcotic)
Rosenberg et al., 1978 <sup>303</sup>	P	Pr	Post-op cholecystectomy	12 (NR)	TENS (HF) + analgesics = 6	Analgesics (SoC, no TENS control) = 6	PRN 3 days as needed	No primary outcome	Analgesic consumption Pulmonary function
Rutgers et al., 1988 <sup>304</sup>	P	Pr	Postherpetic neuralgia	23 (13W)	TENS (HF) = 13	Acupuncture = 10	PRN 3 x 30 mins / week x 1 week then as needed for 6 weeks	Pain intensity (NRS)	None
Sadala et al., 2018 <sup>305</sup>	P	E	Procedural pain - during carboxytherapy	84 (84W)	TENS (HF) = 28	Placebo TENS (Fading) – 28 No treatment (Control) = 28	Fixed 1 min / puncture 1 session	Pain intensity (VAS)	None
Sahin et al., 2011 <sup>306</sup>	P	E	Cervical myofascial pain syndrome	80 (40W)	TENS (HF, conventional) = 20	Placebo TENS (Fading) = 20 TENS (LF, acupuncture = like) = 20	Fixed 1 x 30min/day x 3 / week	Pain intensity (VAS)	SF-36 Bodily pain subscale

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						TENS (LF, burst) = 20	?? no. weeks? 1 session		
Samadzadeh et al., 2017 <sup>307</sup>	P	Pr	Labour pain	120 (120W)	TENS (HF, continuous, LF, burst) + meperidine as rescue analgesia = 40	Entonox + meperidine as rescue analgesia = 40 TENS + Entonox + meperidine as rescue analgesia = 40	PRN During labour	Pain intensity (VAS)	Analgesic consumption
Sangtong et al., 2019 <sup>308</sup>	P	Pr	Osteoarthritis - knee	148 (135W)	TENS (HF) + US = 64	US = 68	Fixed 1 x 10 mins / day x 5 days x 2 weeks 10 session	Pain intensity (NRS) • At rest • On movement (walking, climbing stairs)	6-min walk test Patient global assessment Adverse events
Santamato et al., 2013 <sup>309</sup>	P	Pr	Botulinum toxin type A injection for post-stroke spasticity	32 (18W)	TENS (LF) = 16	Shock wave therapy = 16	Fixed 1 x 30 mins / day x 2 / day x 5 days 10 sessions	Pain intensity (VAS)	Spasticity scale Spasm scale
Santana et al., 2016 <sup>310</sup>	P	Pr	Labour pain	46 (46W)	TENS (HF) + routine obstetric care = 23	Routine obstetric care (SoC, no TENS control) = 23	Fixed 1 x 30 mins / day x 5 days x 2 weeks 10 sessions	Pain intensity (VAS)	Time to analgesic requirement Pain location
Saranya et al., 2019 <sup>311</sup>	P	Pr	Muscle pain – Temporomandibular Masticatory Muscle Pain	60 (42W)	TENS (HF) + jaw exercises + hot fomentation = 30	Microcurrent electrical stimulation + jaw exercises + hot fomentation = 30	Fixed 1 x 20min / day x 5 days 5 sessions	Pain intensity (VAS)	Mouth opening and functional assessment
Sayilir and Yildizgoren, 2017 <sup>312</sup>	P	Pr	Back pain - chronic low non-specific	55 (32W)	TENS (HF) = 26	Diadynamic currents = 29	Fixed 1 x 30 mins / day x 5 days/week x 2 weeks 10 sessions	Pain intensity (VAS) • Rest • On movement	Roland Morris Disability Questionnaire Oswestry Disability Index (ODI) Hand finger floor distance (HFFD)
Seo et al., 2013 <sup>313</sup>	P	Pr	Chronic myofascial pain syndrome	76 (64W)	TENS (LF, burst) + Botulinum toxin A = 38	Botulinum toxin A + electrical stimulation with muscle contraction = 38	Fixed 1 x 30 mins / day x 3 days 3 sessions	Pain intensity (VAS)	Neck Pain and Disability Scale (NPAD) Global Assessment of Improvement Scale (GAS) Pressure algometry (pain threshold)
Serry et al., 2016 <sup>314</sup>	P	Pr	Peripheral diabetic neuropathy	60 (32W)	TENS (HF) + pharmacological therapy = 20	Pharmacological therapy (SoC, no TENS control) = 20 Exercise (aerobic) + pharmacological therapy = 20	Fixed 1 x 30 mins / day x 3 / week x 8 weeks 24 sessions	Pain intensity (VAS)	Nerve conduction studies
Sezen et al., 2017 <sup>315</sup>	P	Pr	Post-op thoracotomy	87 (25W)	TENS (HF) + Analgesics (diclofenac i.m., tramadol i.v. + paracetamol i.v.) = 43	Placebo TENS + Analgesics (diclofenac i.m., tramadol i.v. + paracetamol i.v.) = 44 (0mA)	PRN During labour at 8 h intervals	Pain intensity (VAS)	Analgesic consumption Pulse rate Blood pressure Saturation Complication
Shahoei et al., 2017 <sup>316</sup>	P	Pr	Labour pain	90 (90W)	TENS (PRN) = 30	Placebo TENS = 30 (0mA) Routine care (SoC, no TENS control) = 30	PRN During labour	Pain intensity (VAS)	



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Shehab and Adham, 2000 <sup>317</sup>	P	Pr	Shoulder pain	50 (50W)	TENS (HF) + cold pack + stretching exercises = 26	Ultrasound therapy + cold pack + stretching exercises = 24	Fixed 1 x 30 mins / day x 3 to 5 / week x 3 to 5 weeks 13 sessions	Pain intensity (VAS)	Range of motion
Sherry et al., 2001 <sup>318</sup>	P	Pr	Back pain - chronic low non-specific	44 (21W)	TENS (NR) + analgesics if needed = 22	Vertebral axial decompression = 22	Fixed 1 x 10 mins / day x 20 days then 1 x 10 mins / week x 4 weeks 24 sessions	Pain intensity (VAS)	Disability (4-point scale)
Shimoji et al., 2007 <sup>319</sup>	P	E	Back pain - chronic low non-specific	28 (24W)	TENS (HF) = 9	Placebo TENS (0mA) = 8 TENS (Bidirectional modulated sine waves) = 11	Fixed 1 x 15 mins 1 session	Pain intensity NRS	None
Shimoura et al., 2019 <sup>320</sup>	P	E	Osteoarthritis - knee	50 (35W)	TENS (MF) = 25	Placebo TENS = 25 (0mA)	Fixed Details NR 1 session	Pain intensity (VAS) • on movement	Climb test Timed Up and Go (TUG) 6-minute walk test (6MWT) Knee extensor strengths 2-step test Stand-up test in the locomotive syndrome risk test.
Shoukry and Al-Ansary, 2019 <sup>321</sup>	P	Pr	Procedural pain - during Extracorporeal Shock-Wave Lithotripsy (ESWL)	60 (26W)	TENS (HF) + IV fentanyl = 30	IV fentanyl = 30	Fixed 1 treatment Duration not reported but less than 40 mins	Pain intensity (VAS)	Analgesic consumption Modified Post-Anaesthetic Discharge Scoring System adverse effect during or after the procedure Discharge time
Siemens et al., 2020 <sup>322</sup>	C	Pr	Cancer pain - advanced cancer, inpatients	25 (12W)	TENS (HF) + medication = 20	Placebo TENS (0mA) + medication = 20	PRN For 1 day Mean $\pm$ SD = 9.1+7.5h for TENS and 7 $\pm$ 5.6 for placebo 24 h washout	Pain intensity (NRS)	Analgesic consumption Brief Pain Inventory (BPI) Edmonton Classification System for Cancer Pain Douleur Neuropathique en 4 Questions 7-point verbal pain rating scale EORTC QLQC30
Sikiru et al., 2008 <sup>323</sup>	P	Pr	Pelvic pain, prostatitis - chronic	24 (24M)	TENS (HF) + antibiotics = 8	Placebo pill + antibiotics = 8 Analgesics (Ibuprofen 400mg) + antibiotics (SoC, no TENS control) = 8	Fixed 1 x 20 mins / day x 5 / week x 4 weeks 20 sessions	Pain intensity (NRS)	NIH chronic prostatitis symptom index questionnaire (pain domain)
Silva et al., 2012 <sup>324</sup>	P	Pr	Post-op cholecystectomy	42 (39W)	TENS (HF) + analgesics (Tramadol + Dipyrone) = 21	Placebo TENS (0mA) + analgesics (Tramadol + Dipyrone) = 21	PRN 1 x 30 mins / session as needed	Pain intensity (VAS, verbal NRS)	Occurrence of nausea and emesis
Silva et al., 2014 <sup>325</sup>	P	E	Post-mastectomy pain syndrome – chronic, intercostobrachial	18 (18W)	TENS (LF, burst) = 9	TENS (MF, acupuncture-like,) = 9	Fixed 1 x 10-15 mins 1 session	Pain intensity (VAS)	Electroencephalography (EEG) measures
Sim, 1991 <sup>326</sup>	P	Pr	Post-op cholecystectomy	30 (27W)	TENS (HF) + analgesics (Papaveretum) = 15	Papaveretum, i.m. on demand (SoC, no TENS control) = 15	PRN 1 x 60 mins / day? x 5 days 5 sessions	Pain intensity (VAS) • Resting pain • Coughing • Deep breathing.	Analgesic consumption Spirometer function

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Siqueira et al., 2019 <sup>327</sup>	P	Pr	Musculoskeletal pain – behavioural dysphonia	27 (27W)	TENS (LF) + vocal training	Placebo TENS (0mA) + vocal therapy	Fixed 1 x 20mins / day 12 sessions	Pain intensity (VAS)	Self-perception of musculoskeletal pain frequency (4-point Likert scale) and intensity Pressure algometry - Pain Threshold
Sloan et al., 1986 <sup>328</sup>	P	Pr	Rib fracture	24 (NR)	TENS (HF) + paracetamol + dihydrocodeine as required = 12	Naproxen + paracetamol + dihydrocodeine as required (SoC, no TENS control) = 12	PRN 2 post op days	Pain intensity (VAS)	Pain relief (VAS) Arterial blood assays Peak expiratory flow rate Treatment effectiveness (VAS)
Smania et al., 2005 <sup>329</sup>	P	Pr	Myofascial pain syndrome	53 (36W)	TENS (HF) = 18	Placebo (ultrasound turned off) = 18 Repetitive magnetic stimulation = 17	Fixed 1 x 20 mins / day x 5 days / week x 2 weeks 10 sessions	Pain intensity (Pain and disability VAS)	Pressure pain threshold (algometry) Range of motion
Smedley et al., 1988 <sup>330</sup>	P	Pr	Post-op inguinal herniorrhaphy	62 (62W)	TENS (HF) + Omnopon = 34	Placebo TENS (0mA) + Omnopon = 28	PRN 2 days continuously post op Unclear	Pain intensity (VAS)	Analgesic consumption Expiratory flow
Smith et al., 1983 <sup>331</sup>	P	Pr	Osteoarthritis - knee	30 (20W)	TENS (HF) = 15	Placebo TENS (0mA) = 15	Fixed 1 x 20 mins / day x 8 occasions over 4 weeks 8 sessions	Pain intensity (VAS)	Analgesic consumption Pain chart Sleep disturbance (VAS)
Smith et al., 1986 <sup>332</sup>	P	Pr	Post-caesarean pain	18 (18W)	TENS (HF) + analgesics = 9	Placebo TENS (0mA) + analgesics = 9	PRN Continuous with 15 mins rest for 3 days post up	Pain intensity (5-point scale)	Analgesic consumption McGill Pain Questionnaire
Sodipo et al., 1980 <sup>333</sup>	P	Pr	Post-op	30 (NR)	TENS (NR) + analgesics = 15	Narcotic medication (SoC, no TENS control) = 15	PRN 2 days post op	No primary outcome	Analgesic consumption Pulmonary function
Solak et al., 2007 <sup>334</sup>	P	Pr	Post-op thoracotomy	40 (8W)	TENS (LF) + (no morphine PCA) = 20	Morphine (PCA) (SoC, no TENS control) = 20	Fixed 1 x 30 mins / day ? x 10 days 10 sessions	Pain intensity (VAS)	Analgesic consumption (Morphine - PCA) Prince Henry pain scale Pulmonary function
Solak et al., 2009 <sup>335</sup>	P	Pr	Post-op coronary bypass grafting	100 (13W)	TENS (HF, continuously) + morphine (PCA) = 25	Placebo TENS + morphine (PCA) = 25 Morphine (PCA)(SoC, no TENS control) = 25 TENS (HF, intermittently) + morphine (PCA) = 25	PRN continuously one day Continuously = on for 24h without break Intermittently = 1h on 1 hr off	Pain intensity (VAS)	Analgesic consumption Duration operation, extubation, hospital stay Oximetry Respiratory function
Sonde et al., 1998 <sup>336</sup>	P	Pr	Post stroke – shoulder pain	44 (17W)	TENS (LF) + Physiotherapy (usual care) = 26	Physiotherapy (SoC, no TENS control) = 18	Fixed 1 x 60 mins / day x 5 days / week x 12 weeks 60 sessions	Pain intensity (VAS)	Fugl-Meyer Ashworth scale Autonomy in activities of daily living
Stepanovic et al., 2015 <sup>337</sup>	P	Pr	Post-herpetic neuralgia	222 (133W)	TENS (HF) = 36	Analgesics (SoC, no TENS control) = 38 Antiviral agents = 71 TENS + antiviral agents = 77	Fixed 1 x 30 mins / day 10 to 15 sessions	Pain intensity (VAS)	Analgesic consumption Allodynia, hyperalgesia or paraesthesia
Steptoe and Bo, 1984 <sup>338</sup>	P	Pr	Labour pain	25 (25W)	TENS (HF + LF) = 12	Placebo TENS (0mA) = 13	PRN	Pain intensity	Analgesic consumption

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							1 x 30 mins?		
Stratton and Smith, 1980 <sup>339</sup>	P	Pr	Plantar fasciitis	26 (NR)	TENS (HF) + exercise (stretching) + orthoses = 13	Exercise (stretching) + orthoses (SoC, no TENS control) = 13	Fixed 1 x 20 mins / day x 7 days x 4 weeks 28 sessions	Pain intensity (VAS)	Activities of daily living subscale of Foot and Ankle Ability Measure
Stubbing and Jellicoe, 1988 <sup>340</sup>	P	Pr	Post-op thoracotomy	40 (12W)	TENS (HF) + opioids (Papaveretum, i.v.) = 20	Papaveretum (i.v.) (SoC, no TENS control) = 20	PRN for 48 hours	Pain intensity (5-categories)	Analgesic consumption Time to transfer to oral analgesia Peak expiratory flow rate
Suh et al., 2015 <sup>341</sup>	P	Pr	Musculoskeletal pain - (various types, work-related)	47 (36W)	TENS (HF) = 24	Placebo TENS = 23 (0mA)	Fixed 1 x 60 mins 1 session	Pain intensity (VAS) • resting • on movement	Pressure pain threshold (algometry) Range of motion Fatigue (VAS) • Resting pain • Pain on movement
Talbot et al., 2020 <sup>342</sup>	P	Pr	Knee pain, Patellofemoral pain syndrome	130 (29W)	TENS (HF) + exercise (home programme) = 33	Exercise (home programme) alone (SoC) = 34  Neuromuscular electrical stimulation + exercise (home programme) = 33  Alternating Neuromuscular electrical stimulation and TENS + exercise (home programme) = 30	Fixed 1 x 20 mins / day 1 x every 2 days X 9 weeks	Pain intensity (VAS)	Lower Extremity Isometric Strength 30-Second Chair Stand Test (30-SCST) Timed Stair Climb Test (SCT) Forward Step-Down Test Six-Minute Timed Walk Test (6-MWT)
Tantawy et al., 2018 <sup>343</sup>	P	Pr	Chronic orchialgia	71 (0W)	TENS (HF) + analgesic medication = 36	Analgesic medication (SoC, no TENS control) = 35	Fixed 1 x 30 mins / day x 5 / week x 4 weeks 20 sessions	Pain intensity (VAS)	Pin prick Quality of life
Taylor et al., 1981 <sup>344</sup>	C	E	Osteoarthritis - knee	10 (9W)	TENS (Freq. PRN) = 10	Placebo TENS (0mA) = 10	PRN 1 x 30 to 60 mins or continuously / day 2 weeks at home	Pain intensity (5-point category scale)	Analgesic consumption (5 categories) Ambulation (5 categories)
Taylor et al., 1983 <sup>345</sup>	P	Pr	Post op abdominal surgery	77 (45W)	TENS (HF) + analgesics = 30	Placebo TENS (0mA) + analgesics = 22 Analgesic medication (SoC, no TENS control) = 25	Fixed 1 x 60 mins x 4 / day (q4h) x 3 post days 12 sessions	Pain intensity (NRS)	Analgesic consumption (Morphine) Physiological depression Patient ambulation Fluid intake
Thakur and Patidar, 2004 <sup>346</sup>	P	Pr	Labour pain	300 (300W)	TENS (HF) = 100	No treatment = 100 Tramadol (100mg) = 100	PRN	No primary outcome	Pain relief (5 categories) Time taken for onset of analgesic action Duration of analgesia
Thomas et al., 1988 <sup>347</sup>	P	Pr	Labour pain	280 (280W)	TENS (NR) = 132	Placebo TENS (0mA) = 148	PRN	Pain intensity (VAS)	Analgesic consumption Labour questionnaire
Thomas et al., 1995 <sup>348</sup>	C	E	Dysmenorrhea - primary	29 (29W)	TENS (HF) = 12	Placebo TENS (0mA) = 12 TENS (LF) = 12	Fixed 1 x 20 mins / day x 2 days 2 sessions	Pain intensity (VAS)	Analgesic consumption Patients perception of improvement (3 category scale) Blood loss (3 category scale) Nausea and vomiting (4 category scale) Hours of work lost (3 category scale)

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Thorsteinsson et al., 1978 <sup>349</sup>	C	E	Chronic pain	93 (53W)	TENS (NR) = 93	Placebo TENS = 93 (0mA)	Fixed 1 x treatment at each of the following (i) at painful site (ii) over main nerve bundle (iii) at remote site 3 sessions	No primary outcomes	Pain relief (4-categories) • Minnesota • Multiphasic • Personality Inventory • Duration of pain relief
Tilak et al., 2016 <sup>350</sup>	P	Pr	Phantom limb pain	26 (3W)	TENS (LF, burst) = 13	MVF = 13	Fixed 1 x 20 mins x 4 days 4 sessions	Pain intensity (VAS)	Universal pain score
Tokuda et al., 2014 <sup>351</sup>	P	Pr	Post-op abdominal	48 (19W)	TENS (HF) + Fentanyl (PCA) + No TENS (Control) = 16	Placebo TENS (fading) + Fentanyl (PCA) = 16 Fentanyl (PCA) (SoC, no TENS control) = 16	PRN 1 x 60 min/day x 3 days	Pain intensity (VAS) • Resting pain • Coughing • Seating	Pulmonary Functions
Tonella et al., 2006 <sup>352</sup>	P	E	Post-op abdominal	48 (20W)	TENS (HF) + usual care (analgesics and physiotherapy) = NR	Placebo TENS (0mA) + usual care (analgesics and physiotherapy) = NR Usual care ((analgesics and physiotherapy) SoC, no TENS control) = NR	Fixed 1 x 30 mins for one day? 1 session	Pain intensity (VAS)	Analgesic consumption
Topuz et al., 2004 <sup>353</sup>	P	Pr	Back pain - chronic low non-specific	60 (41W)	TENS (HF, conventional) = 15	Placebo TENS (0mA) = 12 TENS (LF) = 15 Percutaneous neuromodulation therapy = 13	Fixed 1 x 20 min/day x 5 days x 2 weeks 10 sessions	Pain intensity (VAS) • Resting • On movement	Low back pain outcome scale Oswestry disability index Beck Depression Inventory
Tosato et al., 2007 <sup>354</sup>	P	E	Temporomandibular disorders	20 (20W)	TENS (NR) = 10	Massage therapy = 10	Fixed 1 x 30 mins 1 session	Pain intensity (VAS)	Electromyography (EMG) measures
Treacy, 1999 <sup>355</sup>	P	Pr	Bruxism	23 (10W)	TENS (LF) = 8	Placebo TENS (0mA) = 8 Relaxation (muscular awareness training) = 8	Fixed 20 to 30 mins / day x 2 / week x 4 months 20 sessions	No primary outcome	Muscle pain from physical examination Degree of discomfort (7-point scale) EMG Cognitive-Somatic Anxiety Questionnaire Beck Depression Inventory Multidimensional health locus of control scales
Tsen et al., 2000 <sup>356</sup>	P	Pr	Labour pain	40 (40W)	TENS (MF) = NR	Placebo TENS (0mA) = NR	PRN During labour 1 session	Pain intensity (VAS)	Duration of analgesia Pin Prick
Tsen et al., 2001 <sup>357</sup>	P	Pr	Labour pain	40 (40W)	TENS (MF) = NR	Placebo TENS (0mA) = NR	PRN During labour 1 session	Pain intensity (VAS)	Duration of analgesia Pin Prick
Tsukayama et al., 2002 <sup>358</sup>	P	Pr	Back pain - chronic low non-specific	20 (16W)	TENS (LF) = 10	Electroacupuncture = 9	Fixed 1 x 15 mins / day x 2 / week x 2 weeks 4 sessions	Pain intensity (VAS)	Back pain profile Adverse events
Tucker et al., 2015 <sup>359</sup>	P	Pr	Procedural pain - bone marrow sampling	70 (32W)	TENS (HF) = 35	Placebo TENS (sub threshold) = 35	Fixed	Pain intensity (NRS)	Treatment perception questionnaire

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							throughout procedure 1 session		
Tugay et al., 2007 <sup>360</sup>	P	E	Dysmenorrhea - primary	32 (32W)	TENS (HF) = 17	IFT = 15	Fixed 1 x 20 mins 1 session	Pain intensity (VAS) • Menstrual pain • Referred lower limbs pain • Low back pain	None
Tulgar et al., 1991 <sup>361</sup>	C	E	Several painful conditions	27 (11W)	TENS (HF, conventional) = 27	TENS (LF, burst = 27 TENS (modulated frequency) = 27	Fixed 1 x 30 mins / day switch next day 3 days	Pain intensity (VAS)	None
Tulgar et al., 1991 <sup>362</sup>	C	E	Several painful conditions	14 (7W)	TENS (HF, conventional) = 14	TENS (LF, burst) = 27 TENS (high rate frequency modulation) = 27 TENS (low rate frequency modulation) = 27	Fixed 1 x 20 mins / day switch each day 4 days equals 4 tests 1 session	Pain intensity (VAS)	Duration of pain relief
Unterrainer et al., 2010 <sup>363</sup>	P	Pr	Post-op lumbar	38 (19W)	TENS + PCA = 13	Placebo TENS + PCA (control) = 11  Placebo TENS + PCA (Pre) + TENS + PCA (post) = 14	Fixed 1 x 30 mins pre-op + 1 x 8 hours post-op + 1 x 30 mins post-op day 1 2 sessions	Pain intensity (VAS)	Analgesic consumption Mini Mental State Examination The Short Cognitive Performance Test
Unterrainer et al., 2012 <sup>364</sup>	P	Pr	Post-op lumbar interbody fusion	35 (17W)	TENS (HF) + placebo PCA = 17	PCA (piritramide) + Placebo TENS (0mA) (SoC, sham TENS control) = 18	Fixed 1 x 30 mins pre-op 1 x 24 hours post up 1 session	Pain intensity (VAS)	Analgesic consumption (PCA - rescue meds)
Upton et al., 2017 <sup>365</sup>	C	E	Peripheral diabetic neuropathy	5	TENS (HF, conventional) = 5	TENS (LF, acupuncture-like) = 5	Fixed 1 x 30 mins / day x 10 days 10 sessions	Pain intensity (NRS)	McGill Pain Questionnaire Mechanical detection threshold Patient's Global Impression of Change
Vaidya, 2018 <sup>366</sup>	P	Pr	Pregnancy induced posterior pelvic pain	30 (30W)	TENS (HF) = 15	Mobilisation of sacroiliac Joint = 15	Fixed 1 x 30 mins / day x 3 / week 5 sessions	Pain intensity (VAS)	Roland Morris disability Questionnaire
Vaillancourt et al., 2019 <sup>367</sup>	P	Pr	Chronic pain - Various	18 (18W)	TENS (HF) + exercise = 7	Placebo TENS (0mA) + exercise = 8	Fixed 2 x 45mins / session x 2 / week x 4 weeks, 8 sessions	Pain intensity (NRS)	Short-Form McGill Pain Questionnaire Brief Pain Inventory Beck Depression Inventory
Valenza et al., 2016 <sup>368</sup>	P	E	Knee pain - anterior	84 (52W)	TENS = 28	No treatment = 28 Stretching = 28	Fixed 1 x 20 mins 1 session	No primary outcome	Analgesic consumption Roland Morris disability score Pressure algometry
van der Ploeg et al., 1996 <sup>369</sup>	P	Pr	Labour pain	94 (94W)	TENS (HF, continuous + LF, burst) + analgesics (pethidine/promethazine PCA) = 46	Placebo TENS (NR) + analgesics (pethidine/promethazine, PCA) = 48	PRN	Pain intensity (VAS)	Duration of stages of labour Mode of delivery, Foetal status Apgar scores

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van der Spank et al., 2000 <sup>370</sup>	P	E	Labour pain	59 (94W)	TENS (HF, continuous, burst) + Epidural (drug NR) = 24	Epidural (drug NR) (SoC, no TENS control) = 35	PRN	Pain intensity (VAS)	Analgesic consumption TENS satisfaction questionnaire
Vance et al., 2012 <sup>371</sup>	P	E	Osteoarthritis - knee	75 (46W)	TENS (HF) = 25	Placebo TENS (Fading) = 25 TENS (LF) = 25	Fixed 1 x 40 to 50 mins 1 session	Pain intensity (VAS) • Rest • On movement (Timed-up-and-go) • Heat evoked - temporal summation	Quantitative sensory testing Pressure algometry, Cutaneous mechanical pain threshold, pressure pain threshold (PPT), heat pain threshold, heat temporal summation] Timed up and go
Vitalii and Oleg, 2014 <sup>372</sup>	P	Pr	Neuropathic pain associated with spinal cord injury	21 (2W)	TENS (LF) + gabapentin = 11	Placebo TENS (no current stimulation) + gabapentin = 10	Fixed 1 x 30 mins / day x 10 days 10 sessions	Pain intensity (VAS)	Analgesic consumption
Vrouva et al., 2019 <sup>373</sup>	P	Pr	Rotator cuff	42 (20W)	TENS (HF) + kinesiotherapy	microcurrent electrical nerve stimulation + kinesiotherapy	Fixed 1 x 20 mins / day x 5 / week x 3 weeks 15 sessions	Pain intensity (NRS)	Shoulder pain and disability index (SPADI) EuroQoL-5 (Quality of life)
Walker et al., 1991 <sup>374</sup>	P	Pr	Post-op (rehabilitation - total knee arthroplasty)	48 (NR)	TENS (HF) + continuous passive motion + analgesic (various opioids) = 18	TENS (subthreshold) + continuous passive motion + analgesics (various opioids) = 18 Continuous passive motion + analgesics (various opioids) (SoC, no TENS control) = 12	PRN continuously 3 days post op	No primary outcome	Analgesic consumption
Wang et al., 2009 <sup>375</sup>	C	E	Dysmenorrhea - primary	21 (21W)	TENS (HF) = 21	Placebo TENS (0mA) = 21	Fixed 1 to 2 x 30 mins / day x 2 days	Pain intensity (NRS, 11-point scale)	Pain location Autonomic and related symptoms questionnaire SF-36
Warfield et al., 1985 <sup>376</sup>	P	Pr	Post-op thoracotomy	24 (NR)	TENS (NR) + opioids = 12	Placebo TENS (0mA) + opioids = 12	PRN Continuous stimulation x ? days	Pain intensity (NRS)	Analgesic consumption Ability to tolerate chest physical therapy (3 categories) Recovery room stay
Warke et al., 2004 <sup>377</sup>	P	Pr	Back pain – low, multiple sclerosis	15 (NR)	TENS (HF) = 5	Placebo TENS (0mA) = 5 TENS (LF) = 5	Fixed 1 x > 45 mins/day x 6 weeks >42 sessions	Pain intensity (VAS)	Roland Morris Disability Questionnaire Barthel Activities of Daily Living Rivermead Mobility Index McGill Pain Questionnaire Leeds Multiple Sclerosis Quality of Life Questionnaire SF-36
Warke et al., 2006 <sup>378</sup>	P	Pr	Back pain – low, multiple sclerosis	90 (69W)	TENS (HF) = 30	Placebo TENS (0mA) = 30 TENS (LF) = 30	PRN >2 x 45 mins / day x 6 weeks >42 sessions	Pain intensity (VAS)	Analgesic consumption McGill Pain Questionnaire Roland Morris Disability Questionnaire Barthel Index Rivermead Mobility Index Multiple Sclerosis Quality of Life-54 Instrument

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Yameen et al., 2011 <sup>379</sup>	P	Pr	Neuralgia - trigeminal	31 (20W)	TENS (HF, continuous pattern) = 16	TENS (LF, Burst) = 15	PRN x 3 weeks	Pain intensity (VAS)	None
Yesil et al., 2018 <sup>380</sup>	P	Pr	Neck pain - chronic non-specific	81 (56W)	TENS (HF) + Exercise (neck stabilisation) = 27	Exercise (neck stabilisation) (SoC, no TENS control) = 26 IFT + Exercise (neck stabilisation) = 27	Fixed 1 x 25 mins / day x 5 / week x 3 weeks 15 sessions	Pain intensity (VAS)	Range of motion Neck Disability index SF-36 Beck Depression Inventory
Yilmaz et al., 2020 <sup>381</sup>	P	Pr	Post op - inguinal herniorrhaphy	52 (3W)	TENS (HF) + intramuscular NSAID = 26	Placebo TENS (0mA) + intramuscular NSAID = 26	Fixed 5 x 30 mins / day x 1 day 5 sessions	Pain intensity (VAS)	Analgesic consumption, Newcastle Satisfaction with Nursing Care Scale Vital signs
Yilmazer et al., 2012 <sup>382</sup>	P	Pr	Procedural pain - office endometrial biopsy	65 (65W)	TENS (NR) + Oral naproxen = 33	Placebo TENS + oral naproxen (0mA) = 32	Fixed 10 mins pre and during procedure 1 session	Pain intensity (VAS)	Blood pressure and pulse Vasovagal symptoms questionnaire
Yokoyama et al., 2004 <sup>383</sup>	P	Pr	Back pain - chronic low non-specific	53 (30W)	TENS (HF) + analgesics = 18	Percutaneous electrical nerve stimulation + analgesics = 18 PENS + TENS + analgesics = 17	Fixed 1 x 20 mins / day x 2 / week x 8 weeks 16 sessions	Pain intensity (VAS)	Analgesic consumption Degree of impairment (5 categories)
Yoshimizu et al., 2012 <sup>384</sup>	C	E	Neck pain - chronic non-specific ('Shoulder and neck pain')	90 (52W)	TENS (LF) = 90	Electroacupuncture = 90	Fixed 1 x 15 mins 1 session	Pain intensity (VAS)	SF-36
Yüksel et al., 2019 <sup>385</sup>	P	E	Fibromyalgia	42 (NR)	TENS (HF) = 21	Acupuncture = 21	Fixed 1 x 20 mins 1 session	Pain intensity (VAS)	Pressure algometry pain threshold Beck Depression Inventory Fibromyalgia Impact Questionnaire
Yurtkuran and Kocagil, 1999 <sup>386</sup>	P	Pr	Osteoarthritis - knee	100 (91W)	TENS (LF) = 25	Electroacupuncture = 25 Ice massage = 25 Placebo TENS (no current) = 25	Fixed 1 x 20 mins / day x 5 / week x 2 weeks 10 sessions	Pain intensity (5 categories) • Present pain • Overall pain	50-foot walking time Quadriceps muscle strength Range of motion
Zakariaee et al., 2019 <sup>387</sup>	P	Pr	Post op - episiotomy	120 (120W)	TENS (HF) + routine care = 40	Placebo TENS (0mA) + routine care = 40 Routine care = 40	Fixed 1 x 60 mins 1 session	Pain intensity (NRS)	TENS' complications satisfaction rate
Zhang et al., 2020 <sup>388</sup>	P	E	Chronic TMJ pain (TMJ disc displacement without reduction)	20 (10W)	TENS (LF, AL-TENS) = 10	Placebo TENS (0mA) = 10	Fixed 1 x 45 mins 1 session	Pain intensity (NRS) • Movement – jaw opening and closing	Mandibular motor function using Cranio-Mandibular Evaluation System
Zhou et al., 2018 <sup>389</sup>	P	Pr	Hemiplegic shoulder pain	90 (19W)	TENS (HF) + rehab programme = 32	NMES + rehabilitation programme = 31 Conventional rehab programme (SoC, no TENS control) = 18	Fixed 1 x 60 mins / day x 5 days x 4 weeks 20 sessions	Pain intensity (NRS)	Fugl-Meyer Modified Ashworth scale Barthel Index Stroke specific quality of life scale

## 08\_OL-TABLE1\_IncludedStudies

- Design: P = Parallel group; C = Crossover.
- Type: E = Predominantly Explanatory; Pr = Predominantly Pragmatic (mixed).
- Sample: W = women
- Primary TENS intervention group as selected by reviewers: Size of sample arm '=' on enrolment; HF = high frequency >10 pps; LF = low frequency < 10pps or LF burst pattern. AF = alternating frequency, MF = modulated frequency; VF = various frequencies; burst = burst pattern of pulse delivery; HI = High Intensity TENS
- Comparison Intervention(s). Listed in reviewers' order of priority; number in trial arm '='; Placebo TENS (0mA – sham device or dead batteries); Fading = TENS current administered briefly and then turned off e.g. applied for 30 seconds and then drifted off to 0mA over a 15 second time frame; Active = Placebo TENS used currents above 0mA, >SDT- infrequent pulses = current above sensory detection threshold and time between pulses modified so that they were delivered very infrequently (e.g. inter-pulse interval adjusted from 330 ms to 33 s to avoid any analgesic effect), >SDT- TENS remote = current above sensory detection threshold and delivered at a site considered to be completely unrelated to the site of the pain; categorised as considered as standard of care (SoC)
- TENS regimen: Fixed = regimen either delivered as such or advice given to patient on regimen to use themselves; PRN = 'pro re nata', when necessary; Extracted elements of regimen as min. each session / no. sessions / day / session days / week / weeks / course of treatment (no. of TENS sessions);
- Primary outcome measures in relation to this review: Pain intensity as dichotomous or continuous data
- Secondary outcomes: Analgesic consumption – general term to encompass any time of measurement associated with analgesic medication
- Other Abbreviations: IFT=Interferential current therapy; NSAID = Non-Steroidal Anti-Inflammatory Drugs; PENS = Percutaneous electrical nerve stimulation, TONS = transcutaneous occipital nerve stimulation EA = electroacupuncture; VAS = visual analogue scale; NRS = Numerical rating scale; PCA = Patient controlled analgesia; BPI = Brief Pain Inventory LANSS = Leeds Assessment of Neuropathic Symptoms and Signs; WOMAC = Western Ontario and McMaster Universities Osteoarthritis Index; NR = Not reported

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\*Note: Reference numbering in this list relates only to studies cited in this table

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