

Literaturrecherche Elektrotherapie und Ultraschall 2006

Legende zur Bewertung nach /erste Ziffer Evidenzgrade der Bewertung von Studien

- Ia Evidenz aufgrund von Metaanalysen von randomisierten, kontrollierten Studien
- Ib Evidenz aufgrund mindestens einer randomisierten, kontrollierten Studie
- IIa Evidenz aufgrund mindestens einer gut angelegten, kontrollierten Studie ohne Randomisierung
- IIb Evidenz aufgrund mindestens einer anderen Art von gut angelegter, quasi-experimenteller Studie
- III Evidenz aufgrund gut angelegter, nicht-experimenteller, deskriptiver Studien, wie z.B. Vergleichsstudien, Korrelationsstudien und Fallkontrollstudien
- IV Evidenz aufgrund von Berichten der Expertenausschüsse oder Expertenmeinungen und/oder klinischer Erfahrung anerkannter Autoritäten

ad Bewertung nach/2. Ziffer) Hierarchien von Studien:

1. Experimentelle Studien (z.B. Randomisierte kontrollierte Studie (**RCT**) mit versteckter Zuordnung)
2. Quasi-experimentelle Studien (z.B. experimentelle Studie ohne Randomisierung)
3. Kontrollierte beobachtende Studie
 - 3a.Kohorten Studie
 - 3b.Kontrollierte CaseFallstudien
4. Beobachtende Studien ohne Kontrollgruppe
5. Experten Meinung auf Grund der Pathophysiologie, Einzelforschung oder Konsensus

ad Bewertung nach dritter Buchstabe Evidenz der Wirksamkeit

A : Evidenzstufe A (Strong evidence): Konstante Ergebnisse in zahlreichen, hochqualifizierten RCTs.

B : Evidenzstufe B (Moderate evidence) : Konstante Ergebnisse in einer hochqualifizierten RCT und einem oder mehreren niedrig qualifizierten RCTs oder konstante Ergebnisse in zahlreichen niedrig qualifizierten RCTs.

C : Evidenzstufe C (Limited bzw. contradictory evidence) : Wechselnde Ergebnisse in zahlreichen RCTs – level 4 studies or extrapolations from level 2 or 3 studies

D : level 5 evidence or troublingly inconsistent or inconclusive studies of any level

P=positive Aussage, d.h. Wirksamkeit gegeben

N=negative Aussage, d.h. keine Wirksamkeit in der untersuchten Indikation

I=inkonklusive Aussage, d.h. Wirksamkeit unklar.

Ergebnisse :

Literatur:

a) Ergebnisse: bewertete Literatur: mittels EDV-unterstützter Literatursuche gefundene Arbeiten und Bewertungen (s.o., Stand Mai 2006, siehe Ergebnisse Punkt 1, Arbeiten bzw./Abstracts liegen in elektronischer bzw. Printversion bei):

Adedoyin RA, Olaogun MOB, Fagbeja OO.

Effect of interferential current stimulation in management of osteo-arthritic knee pain.

Physiotherapy. Vol. 88(8)(pp 493-499), 2002.

Iib/1/B/P

Ainsworth L, Budelier K, Clinesmith M, Fiedler A, Landstrom R, Leeper BJ, Moeller L, Mutch S, O'Dell K, Ross J, Radhakrishnan R, Sluka KA.

Transcutaneous electrical nerve stimulation (TENS) reduces chronic hyperalgesia induced by muscle inflammation.

Pain. 2006 Jan;120(1-2):182-7

Ib/1/B/P

Akai M, Hayashi K

Effect of electrical stimulation on musculoskeletal systems; a meta-analysis of controlled clinical trials.

Bioelectromagnetics. 2002 Feb;23(2):132-43.

Ia/1/C/I

Almeida TF, Roizenblatt S, Benedito-Silva AA, Tufik S.

The effect of combined therapy (ultrasound and interferential current) on pain and sleep in fibromyalgia.

Pain. 2003 Aug;104(3):665-72

Ib/1/B/P

Alvaro M, Kumar D, Julka IS.

Transcutaneous electrostimulation: emerging treatment for diabetic neuropathic pain.

Diabetes Technol Ther. 1999 Spring;1(1):77-80.

Iib/4/D/P

Avci S, Gunaydin R, Oztura I

Comparison of effectiveness of splint and splint with physical therapy in Carpal Tunnel Syndrome.

Ftr - Turkiye Fiziksel Tip Ve Rehabilitasyon Dergisi. Vol. 50(2)(pp 22-26), 2004.

Iib/4/D/P

Aydemir G, Tezer MS, Borman P, Bodur H, Unal A

Treatment of tinnitus with transcutaneous electrical nerve stimulation improves patients' quality of life.

J Laryngol Otol. 2006 Mar 24;:1-4

Iib/4/D/P

Baker LL, Parker K.

Neuromuscular electrical stimulation of the muscles surrounding the shoulder.

Phys Ther. 1986 Dec;66(12):1930-7.

Iib/4/D/P

Banta CA

A prospective, nonrandomized study of iontophoresis, wrist splinting, and antiinflammatory medication in the treatment of early-mild carpal tunnel syndrome.

J Occup Med. 1994 Feb;36(2):166-8.

Iib/4/D/P

Baskurt F, Ozcan A, Algun C.

Comparison of effects of phonophoresis and iontophoresis of naproxen in the treatment of lateral epicondylitis.

Clin Rehabil. 2003 Feb;17(1):96-100

Iib/4/D/P

Bender T, Bariska J, Szabo E, Kelemen J, Rigo A, Hetesi I, Zimmerman A.

Diclofenac-absorption from voltaren emulgel through iontophoresis and phonophoresis.

European Journal of Physical Medicine & Rehabilitation. Vol. 5(4)(pp 130-132), 1995.

Iib/4/D/P

Bender T, Bariska J, Rojkovich B, Balint G..

Etofenamate levels in human serum and synovial fluid following iontophoresis.

Arzneimittelforschung. 2001;51(6):489-92.

Iib/4/D/P

Berliner MN

Skin microcirculation during tapwater iontophoresis in humans: cathode stimulates more than anode.

Microvasc Res. 1997 Jul;54(1):74-80.

Iib/4/D/P

Bicer A, Ozisik S, Aksik SC, Erdogan C

Comparison of local corticosteroid injection and conventional physical therapy in management of the painful shoulder.

Turkiye Klinikleri Tip Bilimleri Dergisi. Vol. 25(4)(pp 506-512), 2005.

Iib/4/D/P

Bircan C, Senocak O, Peker O, Kaya A, Tamci SA, Gulbahar S, Akalin E.

Efficacy of two forms of electrical stimulation in increasing quadriceps strength: a randomized controlled trial.

Clin Rehabil. 2002 Mar;16(2):194-9.

Ib/1/B/P

Bracher ESB, Almeida CIR, Almeida RR, Duprat AC, Bracher CBB.

A combined approach for the treatment of cervical vertigo.

Journal of Manipulative & Physiological Therapeutics. Vol. 23(2)(pp 96-100), 2000

Iib/4/D/P

Brockow T, Schreiber U, Smolenski U, Frohlich A

Pain intensity and power densities of therapeutic ultrasound - A serial, comparative pilot study in patients with low back pain.

Schmerz. Vol. 11(6)(pp 396-399), 1997.

Ib/1/B/P

Brosseau L, Casimiro L, Robinson V, Milne S, Shea B, Judd M, Wells G, Tugwell P.
Therapeutic ultrasound for treating patellofemoral pain syndrome.
Cochrane Database Syst Rev. 2001;(4)
Ia/1/C/I

Brosseau LU, Pelland LU, Casimiro LY, Robinson VI, Tugwell PE, Wells GE
Electrical stimulation for the treatment of rheumatoid arthritis.
Cochrane Database Syst Rev. 2002;(2)
Ia/1/B/P

Brusis T, Loennecken I
[Treatment of tinnitus with iontophoresis and local anesthesia]
Laryngol Rhinol Otol (Stuttg). 1985 Jul;64(7):355-8.
IIb/4/D/P

Busse JW, Bhandari M, Kulkarni AV, Tunks E.
The effect of low-intensity pulsed ultrasound therapy on time to fracture healing: A meta-analysis.
CMAJ: Canadian Medical Association Journal. Vol. 166(4)(pp 437-441), 2002.
Ia/1/C/P

Byl NN, McKenzie AL, West JM, Whitney JD, Hunt TK, Scheuenstuhl HA.
Low-dose ultrasound effects on wound healing: a controlled study with Yucatan pigs.
Arch Phys Med Rehabil. 1992 Jul;73(7):656-64.
IIa/2/D/P

Callaghan MJ, Oldham JA, Winstanley J.
A comparison of two types of electrical stimulation of the quadriceps in the treatment of patellofemoral pain syndrome. A pilot study.
Clin Rehabil. 2001 Dec;15(6):637-46.
IIb/4/D/P

Carley PJ, Wainapel SF.
Electrotherapy for acceleration of wound healing: low intensity direct current.
Arch Phys Med Rehabil. 1985 Jul;66(7):443-6.
Ib/1/B/P

Carroll D, Moore RA, McQuay HJ, Fairman F, Tramer M, Leijon G.
Transcutaneous electrical nerve stimulation (TENS) for chronic pain
Cochrane Database Syst Rev. 2001;(3):CD003222.
Ia/1/C/I

Casimiro L, Brosseau L, Robinson V, Milne S, Judd M, Well G, Tugwell P, Shea B.
Therapeutic ultrasound for the treatment of rheumatoid arthritis.
Cochrane Database Syst Rev. 2002;(3)
Ia/1/C/I

Chabal C, Fishbain DA, Weaver M, Heine LW.
Long-term transcutaneous electrical nerve stimulation (TENS) use: impact on medication utilization and physical therapy costs.
Clin J Pain. 1998 Mar;14(1):66-73.
III/5/D/P

Chantraine A, Baribeault A, Uebelhart D, Gremion G.
Shoulder pain and dysfunction in hemiplegia: effects of functional electrical stimulation.
Arch Phys Med Rehabil. 1999 Mar;80(3):328-31.
IIa/3/D/P

Cheing GL, Hui-Chan CW.
Would the addition of TENS to exercise training produce better physical performance outcomes in people with knee osteoarthritis than either intervention alone?
Clin Rehabil. 2004 Aug;18(5):487-97.
Ib/1/B/P

Chiu TT, Hui-Chan CW, Chein G
A randomized clinical trial of TENS and exercise for patients with chronic neck pain.
Clin Rehabil. 2005 Dec;19(8):850-60.
IIb/4/D/P

Ciccone CD, Leggin BG, Callamaro JJ
Effects of ultrasound and trolamine salicylate phonophoresis on delayed-onset muscle soreness.
Phys Ther. 1991 Sep;71(9):666-75; discussion 675-8.
Ib/1/B/P

Costantino C, Pogliacomini F, Vaienti E.
Cryoultrasound therapy and tendonitis in athletes: A comparative evaluation versus laser CO2 and t.e.ca.r.therapy.
Acta Bio-Medica de l Ateneo Parmense. Vol. 76(1)(pp 37-41+64), 2005.
IIb/4/D/P

Crevenna R, Keilani M, Wiesinger G, Nicolakis P, Quittan M, Fialka-Moser V.
Calcific trochanteric bursitis: resolution of calcifications and clinical remission with non-invasive treatment. A case report.
Wien Klin Wochenschr. 2002 May 15;114(8-9):345-8.
III/5/D/P

Crevenna R, Marosi C, Schmidinger M, Fialka-Moser V.
Neuromuscular electrical stimulation for a patient with metastatic lung cancer-a case report.
Support Care Cancer. 2006 Mar 8; [Epub ahead of print]
IIb/4/D/P

Crevenna R, Mayr W, Keilani M, Pleiner J, Nuhr M, Quittan M, Pacher R, Fialka-Moser V, Wolzt M.
Safety of a combined strength and endurance training using neuromuscular electrical stimulation of thigh muscles in patients with heart failure and bipolar sensing cardiac pacemakers.
Wien Klin Wochenschr. 2003 Oct 31;115(19-20):710-4.
IIb/4/D/P

Crevenna R, Posch M, Sochor A, Keilani M, Wiesinger G, Nuhr M, Kollmitzer J, Nicolakis P, Fialka-Moser V, Quittan M.
[Optimizing electrotherapy--a comparative study of 3 different currents]
Wien Klin Wochenschr. 2002 Jun 14;114(10-11):400-4..
IIb/4/D/P

Crevenna R, Stix G, Pleiner J, Pezawas T, Schmidinger H, Quittan M, Wolzt M.

Electromagnetic interference by transcutaneous neuromuscular electrical stimulation in patients with bipolar sensing implantable cardioverter defibrillators: a pilot safety study.
Pacing Clin Electrophysiol. 2003 Feb;26(2 Pt 1):626-9.
Iib/4/D/P

Crevenna R, Wolzt M, Fialka-Moser V, Keilani M, Nuhr M, Paternostro-Sluga T, Pacher R, Mayr W, Quittan M.
Long-term transcutaneous neuromuscular electrical stimulation in patients with bipolar sensing implantable cardioverter defibrillators: a pilot safety study
Artif Organs. 2004 Jan;28(1):99-102.
Iib/4/D/P

Currier DP, Petrilli CR, Threlkeld AJ
Effect of graded electrical stimulation on blood flow to healthy muscle.
Phys Ther. 1986 Jun;66(6):937-43
Ib/1/B/P

de Kroon JR, van der Lee JH, IJzerman MJ, Lankhorst GJ
Therapeutic electrical stimulation to improve motor control and functional abilities of the upper extremity after stroke: a systematic review.
Clin Rehabil. 2002 Jun;16(4):350-60.
Ia/1/B/P

Demirtas RN, Oner C.
The treatment of lateral epicondylitis by iontophoresis of sodium salicylate and sodium diclofenac.
Clin Rehabil. 1998 Feb;12(1):23-9.
Iib/4/D/P

Dickstein R, Laufer Y, Katz M.
TENS to the posterior aspect of the legs decreases postural sway during stance.
Neurosci Lett. 2006 Jan 23;393(1):51-5. Epub 2005 Oct 3.
Iib/4/D/P

D'Vaz AP, Ostor AJK, Speed CA, Jenner JR, Bradley M, Prevost AT, Hazleman BL
Pulsed low-intensity ultrasound therapy for chronic lateral epicondylitis: A randomized controlled trial.
Rheumatology. Vol. 45(5)(pp 566-570), 2006.
Ib/1/B/P

Dziedzic K, Hill J, Lewis M, Sim J, Daniels J, Hay EM.
Effectiveness of manual therapy or pulsed shortwave diathermy in addition to advice and exercise for neck disorders: a pragmatic randomized controlled trial in physical therapy clinics.
Arthritis Rheum. 2005 Apr 15;53(2):214-22.
Ib/1/D/N

Ebenbichler GR, Resch KL, Nicolakis P, Wiesinger GF, Uhl F, Ghanem AH, Fialka V.
Ultrasound treatment for treating the carpal tunnel syndrome: randomised "sham" controlled trial.
BMJ. 1998 Mar 7;316(7133):731-5.
Ib/1/B/P

Ebenbichler GR, Erdogmus CB, Resch KL, Funovics MA, Kainberger F, Barisani G, Aringer M, Nicolakis P, Wiesinger GF, Baghestanian M, Preisinger E, Fialka-Moser V.

Ultrasound therapy for calcific tendinitis of the shoulder
N Engl J Med. 1999 May 20;340(20):1533-8.
Ib/1/B/P

El-Hadidi T, El-Garf A

Double-blind study comparing the use of Voltaren Emulgel(TM) versus regular gel during ultrasonic sessions in the treatment of localized traumatic and rheumatic painful conditions.
Journal of International Medical Research. Vol. 19(3)(pp 219-227), 1991
IIb/4/D/P

Falconer J, Hayes KW, Chang RW.

Therapeutic ultrasound in the treatment of musculoskeletal conditions
Arthritis Care Res. 1990 Jun;3(2):85-91
Ia/1/C/I

Fitzgerald GK, Piva SR, Irrgang JJ.

A modified neuromuscular electrical stimulation protocol for quadriceps strength training following anterior cruciate ligament reconstruction.
J Orthop Sports Phys Ther. 2003 Sep;33(9):492-501.
IIb/4/D/P

Flemming K, Cullum N.

Therapeutic ultrasound for venous leg ulcers.
Cochrane Database Syst Rev. 2000;(4):CD001180.
Ia/1/D/N

Gam AN, Johannsen F

Ultrasound therapy in musculoskeletal disorders: a meta-analysis.
Pain. 1995 Oct;63(1):85-91.
Ia/1/C/I

Genc A, Ozcan A, Gelecek N.

The effectiveness of piroxicam phonophoresis for treatment of stage II rotator cuff injuries.
Artroplastik Artroskopik Cerrahi. Vol. 13(1)(pp 23-26), 2002.
IIb/4/D/P

Giannini S, Giombini A, Moneta MR, Massazza G, Pigozzi F.

Low-intensity pulsed ultrasound in the treatment of traumatic hand fracture in an elite athlete.
American Journal of Physical Medicine & Rehabilitation. Vol. 83(12)(pp 921-925), 2004.
IIb/4/D/P

Gibson JN, Smith K, Rennie MJ

Prevention of disuse muscle atrophy by means of electrical stimulation: maintenance of protein synthesis.
Lancet. 1988 Oct 1;2(8614):767-70.
Ib/1/B/P

Gibson T, Grahame R, Harkness J, Woo P, Blagrove P, Hills R

Controlled comparison of short-wave diathermy treatment with osteopathic treatment in non-specific low back pain.
Lancet. 1985 Jun 1;1(8440):1258-61.
Ib/1/D/N

Gillick BT, Kloth LC, Starsky A, Cincinelli-Walker L

Management of postsurgical hyperhidrosis with direct current and tap water.
Phys Ther. 2004 Mar;84(3):262-7.

III/5/D/P

Glaser JA, Baltz MA, Nietert PJ, Bensen CV.

Electrical muscle stimulation as an adjunct to exercise therapy in the treatment of nonacute low back pain: a randomized trial.

J Pain. 2001 Oct;2(5):295-300.

Ib/1/B/P

Goats GC

Continuous short-wave (radio-frequency) diathermy.

Br J Sports Med. 1989 Jun;23(2):123-7.

IV/5/D/P

Graff-Radford SB, Reeves JL, Baker RL, Chiu D.

Effects of transcutaneous electrical nerve stimulation on myofascial pain and trigger point sensitivity.

Pain. 1989 Apr;37(1):1-5.

Ib/1/B7P

Green S, Buchbinder R, Hetrick S

Physiotherapy interventions for shoulder pain.

Cochrane Database Syst Rev. 2003;(2):CD004258.

Ia/1/B/P

Gudeman SD, Eisele SA, Heidt RS Jr, Colosimo AJ, Stroupe AL

Treatment of plantar fasciitis by iontophoresis of 0.4% dexamethasone. A randomized, double-blind, placebo-controlled study.

1: Am J Sports Med. 1997 May-Jun;25(3):312-6.

Ib/1/B/P

Guler-Uysal F, Kozanoglu E.

Comparison of the early response to two methods of rehabilitation in adhesive capsulitis.

Swiss Medical Weekly. Vol. 134(23-24)(pp 353-358), 2004. Date of Publication: 12 JUN 2004.

Iib/4/D/N

Güven Z, Coskun U, Gunduz OH, Kaptan A.

The effect of high voltage galvanic stimulation on quadriceps femoris muscle strength knee osteoarthritis.

Journal of Rheumatology & Medical Rehabilitation. Vol. 14(2)(pp 72-79), 2003.

Ib/1/B/P

Harris GR, Susman JL

Managing musculoskeletal complaints with rehabilitation therapy: summary of the Philadelphia Panel evidence-based clinical practice guidelines on musculoskeletal rehabilitation interventions.

J Fam Pract. 2002 Dec;51(12):1042-6.

III/5/D/P

Harris P.

Iontophoresis : Clinical Research in Musculoskeletal Inflammatory Conditions.

The journal of orthopedic and sports physical therapy of the American physical therapy association.

1982 (elektronische Version nicht vorhanden).

Iib/4/D/P

Hasson S, Mundorf R, Barnes W, Williams J, Fujii M.

Effect of pulsed ultrasound versus placebo on muscle soreness perception and muscular performance. Scandinavian Journal of Rehabilitation Medicine. Vol. 22(4)(pp 199-205), 1990.
Ib/1/B/P

Hasson SM, Wible CL, Reich M, Barnes WS, Williams JH.
Dexamethasone iontophoresis: effect on delayed muscle soreness and muscle function.
Can J Sport Sci. 1992 Mar;17(1):8-13.
Ib/1/D/N

Hou CR, Tsai LC, Cheng KF, Chung KC, Hong CZ
Immediate effects of various physical therapeutic modalities on cervical myofascial pain and trigger-point sensitivity.
Arch Phys Med Rehabil. 2002 Oct;83(10):1406-14.
Ib/1/B/P

Houghton PE, Kincaid CB, Lovell M, Campbell KE, Keast DH, Woodbury MG, Harris KA
Effect of electrical stimulation on chronic leg ulcer size and appearance.
Phys Ther. 2003 Jan;83(1):17-28.
Ib/1/B/P

Hsueh TC, Cheng PT, Kuan TS, Hong CZ
The immediate effectiveness of electrical nerve stimulation and electrical muscle stimulation on myofascial trigger points.
Am J Phys Med Rehabil. 1997 Nov-Dec;76(6):471-6.
Ib/1/B/P

Huang M-H. Yang R-C. Lee C-L. Chen T-W. Wang M-C.
Preliminary results of integrated therapy for patients with knee osteoarthritis.
Arthritis Care & Research. Vol. 53(6)(pp 812-820), 2005. Date of Publication: 15 DEC 2005.
Iib/4/D/P

Hurley DA, Minder PM, McDonough SM, Walsh DM, Moore AP, Baxter DG
Interferential therapy electrode placement technique in acute low back pain: a preliminary investigation.
Arch Phys Med Rehabil. 2001 Apr;82(4):485-93.
Ib/1/D/N

Hurley DA, McDonough SM, Dempster M, Moore AP, Baxter GD
A randomized clinical trial of manipulative therapy and interferential therapy for acute low back pain.
Spine. 2004 Oct 15;29(20):2207-16.
Iib/4/D/P

Itoh M, Montemayor JS Jr, Matsumoto E, Eason A, Lee MH, Folk FS.
Accelerated wound healing of pressure ulcers by pulsed high peak power electromagnetic energy (Diapulse). Decubitus. 1991 Feb;4(1):24-5, 29-34.
Iib/4/D/P

Jan MH, Chai HM, Wang CL, Lin YF, Tsai LY.
Effects of repetitive shortwave diathermy for reducing synovitis in patients with knee osteoarthritis: an ultrasonographic study.
Phys Ther. 2006 Feb;86(2):236-44.
Ib/1/B/P

Jarvinen TA, Jarvinen TL, Kaariainen M, Kalimo H, Jarvinen M
Muscle injuries: biology and treatment.
Am J Sports Med. 2005 May;33(5):745-64.
IV/5/D/P

Jenker L
Die Impulsgalvanisation des Ganglion stellatum
Wiener Med Zeitschr 1997(elektronische Version nicht vorhanden)
IIB/4/D/P

Joghataei MT, Arab AM, Khaksar H.
The effect of cervical traction combined with conventional therapy on grip strength on patients with cervical radiculopathy.
Clinical Rehabilitation. Vol. 18(8)(pp 879-887), 2004.
IIB/4/D/P

Johnson MI, Tabasam G.
A double blind placebo controlled investigation into the analgesic effects of inferential currents (IFC) and transcutaneous electrical nerve stimulation (TENS) on cold-induced pain in healthy subjects.
Physiotherapy Theory & Practice. Vol. 15(4)(pp 217-233), 1999.
Ib/1/D/N

Johnson MI, Tabasam G.
An investigation into the analgesic effects of interferential currents and transcutaneous electrical nerve stimulation on experimentally induced ischemic pain in otherwise pain-free volunteers.
Phys Ther. 2003 Mar;83(3):208-23.
Ib/1/B/P

Kahanovitz N, Nordin M, Verderame R, Yabut S, Parnianpour M, Viola K, Mulvihill M.
Normal trunk muscle strength and endurance in women and the effect of exercises and electrical stimulation. Part 2: Comparative analysis of electrical stimulation and exercises to increase trunk muscle strength and endurance.
Spine. 1987 Mar;12(2):112-8.
Ib/1/B/P

Kerem M, Yigiter K.
Effects of continuous and pulsed short-wave diathermy in low back pain.
The Pain Clinic. Vol. 14(1)(pp 55-59), 2002.
IIB/4/D/P

Kern H, Salmons S, Mayr W, Rossini K, Carraro U
Recovery of long-term denervated human muscles induced by electrical stimulation.
Muscle Nerve. 2005 Jan;31(1):98-101.
IIB/4/D/P

Khadilkar A, Milne S, Brosseau L, Robinson V, Saginur M, Shea B, Tugwell P, Wells G
Transcutaneous electrical nerve stimulation (TENS) for chronic low-back pain.
Cochrane Database Syst Rev. 2005 Jul 20;(3):CD003008.
Ia/1/C/I

Klaber Moffet J.A, Richardson P.H, Frost h, Osborn A

A placebo controlled double blind trial to evaluate the effectiveness of pulsed short wave therapy for osteoarthritic hip and knee pain
Pain 1996 : 121-127
Ib/1/D/N

Kladny B.
Physical therapy of osteoarthritis]
Z Rheumatol. 2005 Oct;64(7):448-55.
IV/5/D/P

Klaiman MD, Shrader JA, Danoff JV, Hicks JE, Pesce WJ, Ferland J
Phonophoresis versus ultrasound in the treatment of common musculoskeletal conditions.
Med Sci Sports Exerc. 1998 Sep;30(9):1349-55.
IIb/4/D/P

Konrad K.
Randomized, double blind, placebo-controlled study of ultrasonic treatment of the hands of rheumatoid arthritis patients.
European Journal of Physical Medicine & Rehabilitation. Vol. 4(5)(pp 155-157), 1994.
Ib/1/B/P

Kozanoglu E. Basaran S. Guzel R. Guler-Uysal F.
Short term efficacy of ibuprofen phonophoresis versus continuous ultrasound therapy in knee osteoarthritis.
Swiss Medical Weekly. Vol. 133(23-24)(pp 333-338), 2003. Date of Publication: 14 JUN 2003.
IIb/4/D/P

Kroeling P, Gross A, Houghton PE; Cervical Overview Group.
Electrotherapy for neck disorders.
Cochrane Database Syst Rev. 2005 Apr 18;(2):CD004251.
Ia/1/C/I

Kroeling P, Gross AR, Goldsmith CH; Cervical Overview Group
A Cochrane review of electrotherapy for mechanical neck disorders.
Spine. 2005 Nov 1;30(21):E641-8.
Ia/1/C/I

Kroling P. Gottschild S. Kober L. Wimmer G.
Ultrasound therapy of epicondylopathia humeri - Immediate and serial treatment effects on the pressure pain threshold.
Physikalische Medizin Rehabilitationsmedizin Kurortmedizin. Vol. 10(1)(pp 1-5), 2000.
Ib/1/B/P

Laufer Y. Zilberman R. Porat R. Nahir AM.
Effect of pulsed short-wave diathermy on pain and function of subjects with osteoarthritis of the knee: A placebo-controlled double-blind clinical trial.
Clinical Rehabilitation. Vol. 19(3)(pp 255-263), 2005.
Ib/1/B/P

Law PP, Cheing GL.
Optimal stimulation frequency of transcutaneous electrical nerve stimulation on people with knee osteoarthritis.
J Rehabil Med. 2004 Sep;36(5):220-5.
Ib/1/B/P

Lee JC, Lin DT, Hong C-Z.

The effectiveness of simultaneous thermotherapy with ultrasound and electrotherapy with combined AC and DC current on the immediate pain relief of myofascial trigger points.
Journal of Musculoskeletal Pain. Vol. 5(1)(pp 81-90), 1997.

Ib/1/B/P

Lehmann JF, Dundore DE, Esselman PC, Nelp WB.

Microwave diathermy: effects on experimental muscle hematoma resolution.
Arch Phys Med Rehabil. 1983 Mar;64(3):127-9.

Iib/4/D/P

Leung MCP, Ng GYF, Yip KK.

Therapeutic ultrasound enhances medial collateral ligament repair in rats.
Ultrasound in Medicine & Biology. Vol. 32(3)(pp 449-452), 2006.

Iib/4/D/P

Li LC, Scudds RA, Heck CS, Harth M

The efficacy of dexamethasone iontophoresis for the treatment of rheumatoid arthritic knees: a pilot study.

Arthritis Care Res. 1996 Apr;9(2):126-32.

Ib/1/B/P

Lichtbroun AS, Raicer M-MC, Smith RB, Katz RS.

The treatment of fibromyalgia with cranial electrotherapy stimulation.
JCR: Journal of Clinical Rheumatology. Vol. 7(2)(pp 72-78), 2001.

Ib/1/B/P

Lieber RL, Silva PD, Daniel DM

Equal effectiveness of electrical and volitional strength training for quadriceps femoris muscles after anterior cruciate ligament surgery.

J Orthop Res. 1996 Jan;14(1):131-8.

Iib/4/D/P

Liubenko DL

[*The use of ultrasound in medicine*]

Lik Sprava. 2004 Apr-May;(3-4):25-8.

IV/5/D/p

Mardiman S, Wessel J, Fisher B.

The effect of ultrasound on the mechanical pain threshold of healthy subjects.
Physiotherapy. Vol. 81(12)(pp 718-723), 1995.

Iia/2/D/P

May HU, Nippel FJ, Hansjurgens A, Meyer-Waarden K.

Acceleration of ossification by means of interferential current.

Prog Clin Biol Res. 1985;187:469-78.

Iib/4/D/P

McQuain MT, Sinaki M, Shibley LD, Wahner HW, Ilstrup DM.

Effect of electrical stimulation on lumbar paraspinal muscles.

Spine. 1993 Oct 1;18(13):1787-92.

Ib/1/B/P

Mourad PD, Lazar DA, Curra FP, Mohr BC, Andrus KC, Avellino AM, McNutt LD, Crum LA, Kliot M, Kline DG, McGillicuddy JE, Richter H-P, Tindall SC.

Ultrasound accelerates functional recovery after peripheral nerve damage.
Neurosurgery. Vol. 48(5)(pp 1136-1141), 2001.
IIa/3/D/P

Nessler JP, Mass DP.
Direct-current electrical stimulation of tendon healing in vitro.
Clin Orthop Relat Res. 1987 Apr;(217):303-12.
IIb/4/D/P

Nirschl RP. Rodin DM. Ochiai DH. Maartmann-Moe C.
Iontophoretic administration of dexamethasone sodium phosphate for acute epicondylitis: A randomized, double-blinded, placebo-controlled study.
American Journal of Sports Medicine. Vol. 31(2)(pp 189-195), 2003.
Ib/1/B/p

Nuhr MJ, Pette D, Berger R, Quittan M, Crevenna R, Huelsman M, Wiesinger GF, Moser P, Fialka-Moser V, Pacher R.
Beneficial effects of chronic low-frequency stimulation of thigh muscles in patients with advanced chronic heart failure.
Eur Heart J. 2004 Jan;25(2):136-43.
Ib/1/B/P

Nwuga VC.
Ultrasound in treatment of back pain resulting from prolapsed intervertebral disc.
Arch Phys Med Rehabil. 1983 Feb;64(2):88-9.
IIa/2/D/P

Nyanzi CS. Langridge J. Heyworth JRC. Mani R.
Randomized controlled study of ultrasound therapy in the management of acute lateral ligament sprains of the ankle joint.
Clinical Rehabilitation. Vol. 13(1)(pp 16-22), 1999.
Ib/1/D/N

Oakland C. Rapier C.
A comparison of the efficacy of the topical NSAID felbinac and ultrasound in the treatment of acute ankle injuries.
British Journal of Clinical Research. Vol. 4(pp 89-96), 1993.
Ib/1/B/P

Offenbacher M, Stucki G.
Physical therapy in the treatment of fibromyalgia.
Scand J Rheumatol Suppl. 2000;113:78-85.
IV/5/D/P

Ones K. Tetik S. Tetik C. Ones N.
The effects of heat on osteoarthritis of the knee.
The Pain Clinic. Vol. 18(1)(pp 67-75), 2006.
IIb/4/D/P

Osborne HR, Allison GT
Treatment of plantar fasciitis by LowDye taping and iontophoresis: short term results of a double blinded, randomised, placebo controlled clinical trial of dexamethasone and acetic acid.
Br J Sports Med. 2006 Jun;40(6):545-9; discussion 549. Epub 2006 Feb 17.

Ib/1/B/P

Osiri M, Welch V, Brosseau L, Shea B, McGowan J, Tugwell P, Wells G.

Transcutaneous electrical nerve stimulation for knee osteoarthritis.

Cochrane Database Syst Rev. 2000;(4):CD002823.

Ia/1/B/P

Pages I-H, Atabas E.

Modulated midfrequency electrotherapy on patients with upper limb motor dysfunction after stroke.

Physikalische Medizin Rehabilitationsmedizin Kurortmedizin. Vol. 14(6)(pp 295-299), 2004.

IIB/4/D/P

Pages I.H, Grabs E, Conradi E

Differente thermische Wirkung der Hochfrequenztherapie- Grundlagen für einen gezielten Einsatz

Phys Reh.kur Med 1994

IIB/4/D/P

Pärtan J, Schmid J und Waum F

Über die Behandlung entzündlicher und degenerativer Gelenkerkrankungen mit interferierenden

Wechselströmen mittlerer Frequenzen

Wiener klinische Wochenschrift Juli 1953(elektronische Version nicht vorhanden)

IIB/4/D/P

Pasila M, Visuri T, Sundholm A.

Pulsating shortwave diathermy: value in treatment of recent ankle and foot sprains.

Arch Phys Med Rehabil. 1978 Aug;59(8):383-6.

Ia/3a/D/P

Paternostro-Sluga T, Rakos M, Hofer C, Mayr W, Schuhfried O, Fialka-Moser V.

EMG-triggered electrical muscle stimulation for chronic brachial plexus palsy - A pilot study.

Physikalische Medizin Rehabilitationsmedizin Kurortmedizin. Vol. 12(4)(pp 203-207), 2002.

IIB/4/D/P

Pavelka K Jr, Pavelka K Sr, Svarcova J, Vacha J, Trnavsky K.

[Can one increase the analgesic effect of Mobilisin ointment by iontophoresis? Placebo controlled triple cross-over double-blind study]

Z Rheumatol. 1988 Jul-Aug;47(4):233-7.

Ib/1/B/P

Pellechia, Holly Hamel, Geraldine L

Treatment of infrapatellar tendonitis: A Combination of Modalities and transverse Friction Massage versus Iontophoresis (elektronische Version nicht vorhanden)

Journal of Sport Rehabilitation 1994

IIB/4/D/P

Perron M, Malouin F.

Acetic acid iontophoresis and ultrasound for the treatment of calcifying tendinitis of the shoulder: A randomized control trial.

Archives of Physical Medicine & Rehabilitation. Vol. 78(4)(pp 379-384), 1997.

Ib/1/B/P

Pomeroy VM, King L, Pollock A, Baily-Hallam A, Langhorne P

Electrostimulation for promoting recovery of movement or functional ability after stroke.

Cochrane Database Syst Rev. 2006 Apr 19;(2):CD003241.

Ia/1/C/I

Provinciali L, Baroni M, Illuminati L, Ceravolo MG
Multimodal treatment to prevent the late whiplash syndrome.
Scand J Rehabil Med. 1996 May;28(2):105-11.
Iib/4/D/P

Quittan M.
Management of back pain.
Disabil Rehabil. 2002 May 20;24(8):423-34.
IV/5/D/P

Rebai H, Barra V, Laborde A, Bonny JM, Poumarat G, Coudert J
Effects of two electrical stimulation frequencies in thigh muscle after knee surgery.
Int J Sports Med. 2002 Nov;23(8):604-9.
Iib/4/D/P

Reid KI, Dionne RA, Sicard-Rosenbaum L, Lord D, Dubner RA.
Evaluation of iontophoretically applied dexamethasone for painful pathologic temporomandibular joints.
Oral Surg Oral Med Oral Pathol. 1994 Jun;77(6):605-9.
Ib/1/B/P

Renzenbrink GJ, IJzerman MJ
Percutaneous neuromuscular electrical stimulation (P-NMES) for treating shoulder pain in chronic hemiplegia. Effects on shoulder pain and quality of life.
Clin Rehabil. 2004 Jun;18(4):359-65.
Iib/4/D/p

Robertson VJ, Baker KG.
A review of therapeutic ultrasound: effectiveness studies.
Phys Ther. 2001 Jul;81(7):1339-50.
Ia/1/C/P

Robinson AJ
Transcutaneous electrical nerve stimulation for the control of pain in musculoskeletal disorders.
J Orthop Sports Phys Ther. 1996 Oct;24(4):208-26.
IV/5/D/I

Romero JA, Sanford TL, Schroeder RV, Fahey TD.
The effects of electrical stimulation of normal quadriceps on strength and girth
Med Sci Sports Exerc. 1982;14(3):194-7.
Iib/4/D/P

Roques CF
[Analgesic physical therapy. Present clinical data]
Ann Readapt Med Phys. 2003 Dec;46(9):565-77.
Ia/1/C/I

Rubin C, Bolander M, Ryaby JP, Hadjiargyrou M
The use of low-intensity ultrasound to accelerate the healing of fractures.
J Bone Joint Surg Am. 2001 Feb;83-A(2):259-70.
Ia/1/A/P

Rush PJ, Shore A.

Physician perceptions of the value of physical modalities in the treatment of musculoskeletal disease.
Br J Rheumatol. 1994 Jun;33(6):566-8.

Iib/4/D/P

Sadil V, Sadil S.

[Electrotherapy]

Wien Med Wochenschr. 1994;144(20-21):509-20.

III/5/D/P

Sari H. Cakmak B. Can G.

Efficacy of physical therapy agents on quality of life and emotional status in ankylosing spondylitis.

Ftr - Turkiye Fiziksel Tip Ve Rehabilitasyon Dergisi. Vol. 49(6)(pp 8-12), 2003.

Iib/4/D/P

Scott OM, Vrbova G, Hyde SA, Dubowitz V

Effects of chronic low frequency electrical stimulation on normal human tibialis anterior muscle.

J Neurol Neurosurg Psychiatry. 1985 Aug;48(8):774-81.

Ib/1/B/P

Sherry E, Kitchener P, Smart R.

A prospective randomized controlled study of VAX-D and TENS for the treatment of chronic low back pain.

Neurol Res. 2001 Oct;23(7):780-4.

Ib/1/B/P

Smolenski UC, Jeremies KJ, Schreiber TU.

Investigation into the efficiency of ultrasound of different intensities in degenerative tendopathy of the shoulder.

Physikalische Medizin Rehabilitationsmedizin Kurortmedizin. Vol. 11(2)(pp 62-67), 2001.

Ib/1/B/P

Soroko YT, Repking MC, Clemment JA, Mitchell PL, Berg L

Treatment of plantar verrucae using 2% sodium salicylate iontophoresis.

Phys Ther. 2002 Dec;82(12):1184-91.

Iib/4/D/P

Stasinopoulos D, Stasinopoulos I

Comparison of effects of exercise programme, pulsed ultrasound and transverse friction in the treatment of chronic patellar tendinopathy.

Clin Rehabil. 2004 Jun;18(4):347-52.

Iib/4/D/P

Stein H, Lerner A.

How does pulsed low-intensity ultrasound enhance fracture healing?.

Orthopedics. Vol. 28(10)(pp 1161-1163), 2005.

Iib/4/D/P

Stevens JE, Mizner RL, Snyder-Mackler L.

Neuromuscular electrical stimulation for quadriceps muscle strengthening after bilateral total knee arthroplasty: a case series.

J Orthop Sports Phys Ther. 2004 Jan;34(1):21-9.

Iib/4/D/P

Stratford PW, Levy DR, Gauldie S, Misferi D, Levy K.
The evaluation of phonophoresis and friction massage as treatments for extensor carpi radialis tendinitis: A randomized controlled trial.
Physiotherapy Canada. Vol. 41(2)(pp 93-99), 1989.
Ib/1/B/P

Svarcova J, Trnavsky K, Zvarova J.
The influence of ultrasound, galvanic currents and shortwave diathermy on pain intensity in patients with osteoarthritis.
Scandinavian Journal of Rheumatology. Vol. 17(SUPPL. 67)(pp 83-85), 1988.
Iib/4/D/P

Svarcova J, Zvarova J, Pichova A, Kouba A, Simacek K, Uhlemann C, Callies R.
Comparison of the analgesic effects of electroacupuncture and of galvanic current in patients with activated ostoarthrosis (a controlled clinical study).
Zeitschrift fur Physiotherapie. Vol. 42(6)(pp 375-378), 1990.
Iib/4/D/P

Tander B, Canturk F, Cengiz K, Durmus D, Akyol Y.
Are the physical therapeutic modalities really safe?.
Ftr - Turkiye Fiziksel Tip Ve Rehabilitasyon Dergisi. Vol. 51(4)(pp 131-133), 2005.
III/4/D/P

Taskaynatan MA, Ozgul A, Ozdemir A, Tan AK, Kalyon TA.
Steroid iontophoresis and electrotherapy in bicipital tendinitis.
Ftr - Turkiye Fiziksel Tip Ve Rehabilitasyon Dergisi. Vol. 51(1)(pp 9-13), 2005.
Iib/4/D/P

Thorsteinsson G, Stonnington HH, Stillwell GK, Elveback LR
Transcutaneous electrical stimulation: a double-blind trial of its efficacy for pain.
Arch Phys Med Rehabil. 1977 Jan;58(1):8-13.
Ib/1/B/P

Ulreich A, Leibrecht W, Promer M, Kullich W.
Infiltration versus iontophoresis in cases of epicondylitis - A comparative study.
Physikalische Medizin Rehabilitationsmedizin Kurortmedizin. Vol. 6(5)(pp 183-185), 1996.
Iib/4/D/N

Ulreich A, Kullich W, Klein G.
Evaluation of a multidisciplinary rehabilitation programme in chronic periarthritis of the shoulder.
Physikalische Medizin Rehabilitationsmedizin Kurortmedizin. Vol. 7(4)(pp 129-132), 1997.
Iib/4/D/P

Ulreich A, Kullich W
Results of a multidisciplinary rehabilitation concept in patients with chronic lumbar syndromes]
Wien Med Wochenschr. 1999;149(19-20):564-6.
Iib/4/D/P

Valencic V, Vodovnik L, Stefancic M, Jelnikar T
Improved motor response due to chronic electrical stimulation of denervated tibialis anterior muscle in humans.
Muscle Nerve. 1986 Sep;9(7):612-7.

I Ib/4/D/P

Van der Windt DA, van der Heijden GJ, van den Berg SG, ter Riet G, de Winter AF, Bouter LM

Ultrasound therapy for musculoskeletal disorders: a systematic review. Pain. 1999 Jun;81(3):257-71.

Ia/1/D/N

Van Der Windt DA, Van Der Heijden GJ, Van Den Berg SG, Ter Riet G, De Winter AF, Bouter LM

Ultrasound therapy for acute ankle sprains. Cochrane Database Syst Rev. 2002;(1):CD001250.

Ia/1/C/I

Vecchini L, Grossi E

Ionization with diclofenac sodium in rheumatic disorders: a double-blind placebo-controlled trial. J Int Med Res. 1984;12(6):346-50.

Ib/1/B/P

Volklein R, Callies R.

Changes in pain by different types of diadynamic current in gonarthrosis and lumbar syndrome. Zeitschrift fur Physiotherapie. Vol. 42(2)(pp 113-118), 1990.

I Ib/4/D/P

Ward RS, Hayes-Lundy C, Reddy R, Brockway C, Mills P, Saffle JR.

Evaluation of topical therapeutic ultrasound to improve response to physical therapy and lessen scar contracture after burn injury. Journal of Burn Care & Rehabilitation. Vol. 15(1)(pp 74-79), 1994.

Ib/1/D/N

Welch V, Brosseau L, Peterson J, Shea B, Tugwell P, Wells G.

Therapeutic ultrasound for osteoarthritis of the knee. Cochrane Database Syst Rev. 2001;(3):CD003132.

Ia/1/C/I

Werner S, Arvidsson H, Arvidsson I, Eriksson E.

Electrical stimulation of vastus medialis and stretching of lateral thigh muscles in patients with patello-femoral symptoms.

Knee Surg Sports Traumatol Arthrosc. 1993;1(2):85-92.

I Ib/4/D/P

Werners R, Pynsent PB, Bulstrode CJ

Randomized trial comparing interferential therapy with motorized lumbar traction and massage in the management of low back pain in a primary care setting.

Spine. 1999 Aug 1;24(15):1579-84.

I Ib/4/D/P

Wiesinger GF, Quittan M, Ebenbichler G, Kaider A, Fialka V.

Benefit and costs of passive modalities in back pain outpatients: A descriptive study. European Journal of Physical Medicine & Rehabilitation. Vol. 7(6)(pp 182-186), 1997.

I Ib/4/D/P

Wiesinger GF, Crevenna R, Nuhr MJ, Huelsmann M, Fialka-Moser V, Quittan M.

Neuromuscular electric stimulation in heart transplantation candidates with cardiac pacemakers Arch Phys Med Rehabil. 2001 Oct;82(10):1476-7.

Iib/4/D/P

Yang D-J. Xu F-Y. Ma L. Gan J-H.

Ultrasonic wave in combination with quadriceps exercise for the treatment of senile knee osteoarthritis.

Zhongguo Linchuang Kangfu. Vol. 9(26)(pp 252-254), 2005. Date of Publication: 14 JUL 2005.

Ib/1/B/P

Yu D. Chae J.

Neuromuscular stimulation for treating shoulder dysfunction in hemiplegia.

Critical Reviews in Physical & Rehabilitation Medicine. Vol. 14(1)(pp 1-23), 2002.

Ia/1/B/P

b) Literatur: Lehrbücher sowie EBM-Graduierungszitate

Ammer K. Passive physikalische Maßnahmen zur Rehabilitation beim chronischen unspezifischen Kreuzschmerz. ÖZPMR. 2002; 12: 54-58*

Aringer M et al. Bewegung und Leistung. MCW Block 21, Blockbuch, 2. Auflage, Facultas Wien

Braddom RL. Physical Medicine & Rehabilitation. 2nd ed. 2000. W.B. Saunders Company (Standardwerk)

Fialka-Moser V. Elektrotherapie. Herausgeber Liebenstund I, Pflaum Physiotherapie. Richard Pflaum Verlag GmbH&Co 2005

Evidenzbasierte Medizin (Evidenzgrade zur Bewertung von Studien, Graduierung von Therapieempfehlungen). aus Herold/Innere Medizin 2005*

Jantsch H, Schuhfried F. Niederfrequente Ströme zur Diagnostik und Therapie. Verlag Wilhelm Maudrich, 2. Auflage 1973

Müllner M. Erfolgreich wissenschaftlich arbeiten in der Klinik – evidence based medicine. 2. Auflage, Springer, New York Wien 2005

Preisinger E. Arbeitsbuch Physikalische Therapie. Verlag Wilhelm Maudrich Wien – München-Berlin, 1997

Stiwell GK. Therapeutic Electricity and ultraviolet radiation. third edition. 1967, ed.
Williams & Wilkins Baltimore and London

Trnavsky G. Grundzüge der Physikalischen Medizin. 2.Auflage Verlag Wilhelm Maudrich
Wien – München-Berlin, 1996

Werner G et al. Checkliste Physikalische und Rehabilitative Medizin. Thieme Verlag, 2.
Auflage, 2000