Continue

Use of electricity to involuntarily contract muscleThe examples and perspective in this article deal primarily with the United States and do not represent a worldwide view of the subject. You may improve this article, discuss the issue on the talk page, or create a new article, as appropriate. (April 2019) (Learn how and when to remove this message)Not to be confused with transcutaneous electrical nerve stimulation.Electrical muscle stimulation (EMS), also known as neuromuscular electrical stimulation (NMES) or electromyostimulation, is the elicitation of muscle contraction using electrical impulses. EMS has received attention for various reasons: it can be utilized as a strength training tool for healthy subjects and athletes; it could be used as a rehabilitation and preventive tool for people who are partially or totally immobilized; it could be utilized as a testing tool for evaluating the neural and/or muscular function in vivo. EMS has been proven to be more beneficial before exercise and activity due to early muscle activation.[clarification needed] Electrostimulation has been found to be ineffective during post exercise recovery and can even lead to an increase in delayed onset muscle soreness (DOMS).[1] The impulses are generated by the device and are delivered through electrodes on the skin near to the muscles being stimulated. The electrodes are generally pads that adhere to the skin. The impulses mimic the action potential that comes from the central nervous system, causing the muscles to contract. The use of EMS has been cited by sports scientists[2] as a complementary technique for sports training, and published research is available on the results obtained.[3] In the United States, EMS devices are regulated by the U.S. Food and Drug Administration (FDA).[4]A number of reviews have looked at the devices.[5][6]Athlete recovering with four-channel, electrical muscle stimulation machine attached through self-adhesive pads to her hamstringsElectrical muscle stimulation can be used as a training,[7][8][9] therapeutic,[10][11] or cosmetic tool.NMES works by delivering electrical impulses that cause involuntary muscle contractions, mimicking the effects of voluntary exercise. In addition to directly stimulating muscle fibers, recent research has shown that NMES activates corticomotor pathways, engaging both peripheral and central nervous system structures. This process helps activate fast-twitch muscle fibers and promotes neural adaptations similar to those seen with voluntary high-intensity exercise.[12]In medicine, EMS is used for rehabilitation purposes, for instance in physical therapy in the prevention of muscle atrophy due to inactivity or neuromuscular imbalance, which can occur for example after musculoskeletal injuries (damage to bones, joints, muscles, ligaments and tendons). This is distinct from transcutaneous electrical nerve stimulation (TENS), in which an electric current is used for pain therapy. "The main difference is the desired outcome. TENS unit is a medical device for pain relief. The desired outcome is to reduce pain by stimulating different nerve signals. EMS fitness is also an FDA-cleared medical device but meant for muscle development. EMS fitness is designed to stimulate all the major muscle groups to elicit strength and endurance adaptations."[13] In the case of TENS, the current is usually sub-threshold, meaning that a muscle contraction is not observed.[original research?] For people who have progressive diseases such as cancer or chronic obstructive pulmonary disease, EMS is used to improve muscle weakness for those unable or unwilling to undertake whole-body exercise.[14] EMS may lead to statistically significant improvement in quadriceps muscle strength, however, further research is needed as this evidence is graded as low certainty.[15] The same study also indicates that EMS may lead to increased muscle mass.[14] Low certainty evidence indicates that adding EMS to an existing exercise programme may help people who are unwell spend fewer days confined to their beds.[16] Additionally, neuromuscular electrical stimulation (NMES) has been shown to improve functional capacity, walking distance, and muscle strength in patients undergoing hemodialysis for end-stage renal disease, with no major adverse effects reported.[12]NMES has been found to be effective in treating certain upper and lower extremity issues post-stroke, weakness following ACL repair and total knee replacement, muscle weakness in knee osteoarthritis, and debilitation and weakness after critical illnesses. However, the benefit of NMES for patellofemoral pain syndrome (PFPS) remains uncertain.[17] During EMS training, a set of complementary muscle groups (e.g., biceps and triceps) are often targeted in alternating fashion, for specific training goals,[18] such as improving the ability to reach for an item.The FDA rejects certification of devices that claim weight reduction.[19] EMS devices cause a calorie burning that is marginal at best: calories are burnt in significant amount only when most of the body is involved in physical exercise: several muscles, the heart and the respiratory system are all engaged at once.[20] However, some authors imply that EMS can lead to exercise since people toning their muscles with electrical stimulation are more likely afterwardsto participate in sporting activities as the body becomes ready, fit, willing and able to take on physical activity.[18]"Strength training by NMES does promote neural and muscular adaptations that are complementary to the well-known effects of voluntary resistance training".[21] This statement is part of the editorial summary of a 2010 world congress of researchers on the subject. Additional studies on practical applications, which came after that congress, pointed out important factors that make the difference between effective and ineffective EMS.[22][23] This in retrospect explains why in the past some researchers and practitioners obtained results that others could not reproduce. Also, as published by reputable universities, EMS causes adaptation, i.e. training, of muscle fibers.[24] Because of the characteristics of skeletal muscle fibers, different types of fibers can be activated to differing degrees by different types of EMS, and the modifications induced depend on the pattern of EMS activity.[25] These patterns, referred to as protocols or programs, will cause a different response from contraction of different fiber types. Some programs will improve fatigue resistance, i.e. endurance, others will increase force production.[26] Some important considerations prior for the use of NMES are to make sure there are no present bone fractures, burns, skin lesions, lupus erythematosus, thromboembolic disease, deep vein thrombosis[27]Luigi Galvani (1761) provided the first scientific evidence that current can activate muscle. During the 19th and 20th centuries, researchers studied and documented the exact electrical properties that generate muscle movement.[28][29] It was discovered that the body functions induced by electrical stimulation caused long-term changes in the muscles.[30][31] In the 1960s, Soviet sport scientists applied EMS in the training of elite athletes, claiming 40% force gains.[32] In the 1970s, these studies were shared during conferences with the Western sport establishments. However, results were conflicting, perhaps because the mechanisms in which EMS acted were poorly understood.[33] Medical physiology research[34][25] pinpointed the mechanisms by which electrical stimulation causes adaptation of cells of muscles, blood vessels[35][36][37] and nerves.[26]The U.S. Food and Drug Administration (FDA) certifies and releases EMS devices into two broad categories: over-the counter devices (OTC), and prescription devices. OTC devices are marketable only for muscle toning; prescription devices can be purchased only with a medical prescription for therapy. Prescription devices should be used under the supervision of an authorized practitioner, for the following uses:Relaxation of muscle spasms;Prevention or retardation of disuse atrophy;Increasing local blood circulation;Muscle re-education;Immediate post-surgical stimulation of calf muscles to prevent venous thrombosis;Maintaining or increasing range of motion.The FDA mandates that manuals prominently display contraindication, warnings, precautions and adverse reactions, including: no use for wearer of pacemaker; no use on vital parts, such as carotid sinus nerves, across the chest, or across the brain; caution in the use during pregnancy, menstruation, and other particular conditions that may be affected by muscle contractions; potential adverse effects include skin irritations and burnsOnly FDA-certified devices can be lawfully sold in the US without medical prescription. These can be found at the corresponding FDA webpage for certified devices.[38] The FTC has cracked down on consumer EMS devices that made unsubstantiated claims;[39] many have been removed from the market, some have obtained FDA certification.Wikimedia Commons has media related to Electrical muscle stimulation.ElectroacupunctureFunctional electrical stimulationMicrocurrent electrical neuromuscular stimulatorTranscutaneous electrical nerve stimulation^ Dupuy, Olivier; Douzi, Wafa; Theurot, Dimitri; Bosquet, Laurent; Dugu, Benoit (2018). "An Evidence-Based Approach for Choosing Post-exercise Recovery Techniques to Reduce Markers of Muscle Damage, Soreness, Fatigue, and Inflammation: A Systematic Review With Meta-Analysis". Frontiers in Physiology. 9: 403. doi:10.3389/fphys.2018.00403. ISSN1664-042X. PMC5932411. PMID29755363.^ Zatsiorsky, Vladimir; Kraemer, William (2006). "Experimental Methods of Strength Training". Science and Practice of Strength Training. Human Kinetics. pp.132133. ISBN978-0-7360-5628-1.^ Examples of peer-reviewed research articles attesting increased muscular performance by utilizing EMS:[improper synthesis?]Babault, Nicolas; Cometti, Gilles; Bernardin, Michel; Pousson, Michel; Chatard, Jean-Claude (2007). "Effects of Electromyostimulation Training on Muscle Strength and Power of Elite Rugby Players". The Journal of Strength and Conditioning Research. 21 (2): 431437. doi:10.1519/R-19365.1. PMID17530954. S2CID948463.Malatesta, D; Cattaneo, F; Dugnani, S; Maffiuletti, NA (2003). "Effects of electromyostimulation training and volleyball practice on jumping ability". Journal of Strength and Conditioning Research. 17 (3): 573579. CiteSeerX10.1.1.599.9278. doi:10.1519/00124278-200308000-00025. PMID12930189.Willoughby, Darryn S.; Simpson, Steve (1998). "Supplemental EMS and Dynamic Weight Training: Effects on Knee Extensor Strength and Vertical Jump of Female College Track & Field Athletes". Journal of Strength and Conditioning Research. 12 (3).Willoughby, Darryn S.; Simpson, Steve (1996). "The Effects of Combined Electromyostimulation and Dynamic Muscular Contractions on the Strength of College Basketball Players". Journal of Strength and Conditioning Research. 10 (1).^ FDA Guidance Document for Powered Muscle Stimulator, standard indications for use, page 4; contraindications, p. 7; warnings and precautions, p. 8. Product code: NGX^ Gondin, Julien; Cozzone, Patrick J.; Bendahan, David (2011). "Is high-frequency neuromuscular electrical stimulation a suitable tool for muscle performance improvement in both healthy humans and athletes?". European Journal of Applied Physiology. 111 (10): 24732487. doi:10.1007/s00421-011-2101-2. PMID21909714. S2CID1110395.^ Babault, Nicolas; Cometti, Carole; Maffiuletti, Nicola A.; Deley, Galle (2011). "Does electrical stimulation enhance post-exercise performance recovery?". European Journal of Applied Physiology. 111 (10): 25012507. doi:10.1007/s00421-011-2117-7. PMID21847574. S2CID606457.^ Babault, Nicolas; Cometti, Gilles; Bernardin, Michel; Pousson, Michel; Chatard, Jean-Claude (2007). "Effects of Electromyostimulation Training on Muscle Strength and Power of Elite Rugby Players". The Journal of Strength and Conditioning Research. 21 (2): 431437. doi:10.1519/R-19365.1. PMID17530954. S2CID948463.^ Banerjee, P.; Caulfield, B; Crowe, L; Clark, A (2005). "Prolonged electrical muscle stimulation exercise improves strength and aerobic capacity in healthy sedentary adults". Journal of Applied Physiology. 99 (6): 23072311. doi:10.1152/japplphysiol.00891.2004. hdl:10379/8847. PMID16081619.^ Porcari, John P.; Miller, Jennifer; Cornwell, Kelly; Foster, Carl; Gibson, Mark; McLean, Karen; Kernozek, Tom (2005). "The effects of neuromuscular stimulation training on abdominal strength, endurance and selected anthropometric measure". Journal of Sports Science and Medicine. 4: 6675.^ Lake, DA (1992). "Neuromuscular electrical stimulation. An overview and its application in the treatment of sports injuries". Sports Medicine. 13 (5): 320336. doi:10.2165/00007256-199213050-00003. PMID1565927. S2CID9708216.^ Delitto, A; Rose, SJ; McKowen, JM; Lehman, RC; Thomas, JA; Shively, RA (1988). "Electrical stimulation versus voluntary exercise in strengthening thigh musculature after anterior cruciate ligament surgery". Physical Therapy. 68 (5): 660663. doi:10.1093/ptj/68.5.660. PMID3258994. S2CID33688979.^ a b Valenzuela, Pedro L.; Morales, Javier S.; Ruilope, Luis M.; de la Villa, Pedro; Santos-Lozano, Alejandro; Lucia, Alejandro (April 2020). "Intradialytic neuromuscular electrical stimulation improves functional capacity and muscle strength in people receiving haemodialysis: a systematic review". Journal of Physiotherapy. 66 (2): 8996. doi:10.1016/j.jphys.2020.03.006. hdl:11268/9143. ISSN1836-9561. PMID32291224.^ Sanchez, Conrad (5 August 2022). "Tens Unit Vs. EMS Fitness - Bodybuzz". Bodybuzz EMS Workout. Retrieved 31 July 2023.^ a b Jones, Sarah; Man, William D.-C.; Gao, Wei; Higginson, Irene J.; Wilcock, Andrew; Maddocks, Matthew (17 October 2016). "Neuromuscular electrical stimulation for muscle weakness in adults with advanced disease". The Cochrane Database of Systematic Reviews. 2016 (10): CD009419. doi:10.1002/14651858.CD009419.pub3. ISSN1469-493X. PMC6464134. PMID27748503.^ Jones, Sarah; Man, William D.-C.; Gao, Wei; Higginson, Irene J.; Wilcock, Andrew; Maddocks, Matthew (17 October 2016). "Neuromuscular electrical stimulation for muscle weakness in adults with advanced disease". The Cochrane Database of Systematic Reviews. 2016 (10): CD009419. doi:10.1002/14651858.CD009419.pub3. ISSN1469-493X. PMC6464134. PMID27748503.^ Hill, Kylie; Cavalheri, Vinicius; Mathur, Sunita; Roig, Marc; Janaudis-Ferreira, Tania; Robles, Priscila; Dolmage, Thomas E.; Goldstein, Roger (29 May 2018). "Neuromuscular electrostimulation for adults with chronic obstructive pulmonary disease". The Cochrane Database of Systematic Reviews. 2018 (5): CD010821. doi:10.1002/14651858.CD010821.pub2. ISSN1469-493X. PMC6494594. PMID29845600.^ Nussbaum, E. L.; Houghton, P.; Anthony, J.; Rennie, S.; Shay, B. L.; Hoens, A. M. (2017). "Neuromuscular Electrical Stimulation for Treatment of Muscle Impairment: Critical Review and Recommendations for Clinical Practice". Physiotherapy Canada. Physiotherapie Canada. 69 (5): 176. doi:10.3138/ptc.2015-88. PMC5683854. PMID29162949.^ a b Vrbova, Gerta; Olga Hudlicka; Kristin Schaefer Centofanti (2008). Application of Muscle-Nerve Stimulation in Health and Disease. Springer. p.70.^ FDA Import Alert 10/02/2009 Electrical Muscle Stimulators and Iontophoresis Devices Muscle stimulators are misbranded when any of the following claims are made: girth reduction, loss of inches, weight reduction, cellulite removal, bust development, body shaping and contouring, and spot reducing.^ Maffiuletti, NA (2006). "The use of electrostimulation exercise in competitive sport". International Journal of Sports Physiology and Performance. 1 (4): 406407. doi:10.1123/ijspp.1.4.406. PMID19124897. S2CID13357541.^ Maffiuletti, Nicola A.; Minetto, Marco A.; Farina, Dario; Bottinelli, Roberto (2011). "Electrical stimulation for neuromuscular testing and training: State-of-the-art and unresolved issues". European Journal of Applied Physiology. 111 (10): 23912397. doi:10.1007/s00421-011-2133-7. PMID21866361.^ Filipovic, Andre; Heinz Kleinder; Ulrike Drmann; Joachim Mester (September 2012). "Electromyostimulation--a systematic review of the effects of different electromyostimulation methods on selected strength parameters in trained and elite athletes". Journal of Strength and Conditioning Research. 26 (9): 26002614. doi:10.1519/JSC.0b013e31823f2cd1. ISSN1533-4287. PMID22067247. S2CID12233614.^ Filipovic, Andre; Heinz Kleinder; Ulrike Drmann; Joachim Mester (November 2011). "Electromyostimulation-a systematic review of the influence of training regimens and stimulation parameters on effectiveness in electromyostimulation training of selected strength parameters part 2". Journal of Strength and Conditioning Research. 25 (11): 32183238. doi:10.1519/JSC.0b013e318212e3ce. ISSN1533-4287. PMID21993042. S2CID9205854.^ Quoted from National Skeletal Muscle Research Center; UCSD, Muscle Physiology Home Page Electrical Stimulation Archived 18 July 2014 at the Wayback Machine^ a b Salmons, S; Vrbov, G (1969). "The influence of activity on some contractile characteristics of mammalian fast and slow muscles". The Journal of Physiology. 201 (3): 53549. doi:10.1113/jphysiol.1969.sp008771. PMC1351409. PMID5767881.^ a b Pette, Dirk; Vrbov, Gerta (1999). "What does chronic electrical stimulation teach us about muscle plasticity?". Muscle & Nerve. 22 (6): 666677. doi:10.1002/(SICI)1097-4598(199906)22:63.0.CO;2-Z. PMID10366220. S2CID13405287.^ Lago, Alessandra Fabiane; Basile-Filho, Anibal; Oliveira, Anamaria Siriani de; Souza, Hugo Celso Dutra de; Santos, Daniele Oliveira dos; Gastaldi, Ada Clarice (17 February 2022). "Effects of physical therapy with neuromuscular electrical stimulation in acute and late septic shock patients: A randomised crossover clinical trial". PLOS ONE. 17 (2): e0264068. Bibcode:2022PLoSO..1764068L. doi:10.1371/journal.pone.0264068. ISSN1932-6203. PMC8853464. PMID35176099.^ Ranvier, Louis-Antoine (1874). "De quelques faits relatifs l'histologie et la physiologie des muscles stris". Archives de Physiologie Normale et Pathologique (in French). 6: 115.^ Denny-Brown, D. (1929). "On the Nature of Postural Reflexes". Proceedings of the Royal Society B. 104 (730): 252301. Bibcode:1929RSPSB.104..252D. doi:10.1098/rspb.1929.0010. JSTOR81340.^ Buller, AJ; Eccles, JC; Eccles, RM (1960). "Interactions between motoneurones and muscles in respect of the characteristic speeds of their responses". The Journal of Physiology. 150 (2): 41739. doi:10.1113/jphysiol.1960.sp006395. PMC1363172. PMID13805874.^ Pette, Dirk; Smith, Margaret E.; Staudte, Hans W.; Vrbov, Gerta (1973). "Effects of long-term electrical stimulation on some contractile and metabolic characteristics of fast rabbit muscles". Pflgers Archiv: European Journal of Physiology. 338 (3): 257272. doi:10.1007/BF00587391. PMID4736724. S2CID27756322.^ Ward, AR; Shkuratova, N (2002). "Russian electrical stimulation: The early experiments". Physical Therapy. 82 (10): 101930. doi:10.1093/ptj/82.10.1019. PMID12350217.^ Siff, Mel (1990). "Applications of Electrostimulation in Physical Conditioning: A Review". Journal of Strength and Conditioning Research. 4 (1).^ Vrbov, Gerta; Gordon, Tessa; Jones, Rosemary (1995). Nerve-Muscle Interaction. London: Chapman & Hall. ISBN978-0-412-40490-0.[pageneeded]^ Blomqvist, C G; Saltin, Bengt (1983). "Cardiovascular Adaptations to Physical Training". Annual Review of Physiology. 45: 16989. doi:10.1146/annurev.ph.45.030183.001125. PMID6221687.^ Cabric, M.; Appell, H.-J.; Resic, A. (2008). "Stereological Analysis of Capillaries in Electrostimulated Human Muscles". International Journal of Sports Medicine. 08 (5): 327330. doi:10.1055/s-2008-1025678. PMID3679647.^ Harris, B. A. (2005). "The influence of endurance and resistance exercise on muscle capillarization in the elderly: A review". Acta Physiologica Scandinavica. 185 (2): 8997. doi:10.1111/j.1365-201X.2005.01461.x. PMID16168003.^ FDA-Certified Devices^ FTC Charges Three Top-selling Electronic Abdominal Exercise Belts with Making False ClaimsMaffiuletti, Nicola A (December 2006). "The use of electrostimulation exercise in competitive sport". International Journal of Sports Physiology and Performance. 1 (4): 406407. doi:10.1123/ijspp.1.4.406. ISSN1555-0265. PMID19124897. S2CID13357541.Maffiuletti, Nicola A; Marco A Minetto; Dario Farina; Roberto Bottinelli (October 2011). "Electrical stimulation for neuromuscular testing and training: state-of-the art and unresolved issues". European Journal of Applied Physiology. 111 (10): 23912397. doi:10.1007/s00421-011-2133-7. ISSN1439-6327. PMID21866361.Boschetti, Gianpaolo (2008). Globus SHT (ed.). "EMS Digest". Archived from the original on 12 November 2012. Retrieved 29 January 2013. Google document inspired by a workshop by authorGianpaolo Boschetti (2000). Che cos' l'elettrostimolazione. Libreria dello Sport. Archived from the original on 18 February 2009. Retrieved 10 January 2013. It is compiled to serve as a practical guide to understanding electrical muscle stimulation for sport training, and is supplemented by material taught by the author during workshops, and by appendices written by professional trainers.Retrieved from " youve ever visited a physical therapist to rehabilitate a soft tissue injury, its possible youve experienced a form of electrical muscle stimulation, or e-stimtherapy (also referred to as EMS, electromyostimulation or neuromuscular electrical stimulation, and NMES). Another form of e-stim therapy called TENS (transcutaneous electrical nerve stimulation) works on nerves rather than muscles. During e-stim treatment, a therapist secures electrode pads to your skin. He or she then turns a dial or presses a button on an electrical muscle stimulation device, a console thats either plugged into the wall or battery-operated. This machine generates electric impulses that stimulate your skeletal muscles to contract. An e-stim device has various settings, meaning the contractions may be barely noticeable or they may feel, and look, like involuntary muscle twitches. Ready to Take Control of Your Pain Management and Recovery Journey? Experience the power of the NexWave IFC, TENS & NMES device today!Click the button below to learn more about how this innovative, all-in-one solution can help you live pain-free and recover faster. The primary purpose of e-stim therapy is to simulate what happens in the body when you voluntarily contract and release a muscle many times in a row. This process strengthens and repairs tissue, particularly muscles which have become shortened, weakened, or atrophied due to injury or disease. For example:If youve torn an Achilles tendon, the muscles in your calf and foot may become atrophied from wearing a boot to immobilize the ankle, or from changing your gait to favor the injured ankle.If you have a shoulder injury (e.g., a rotator cuff tearor impingement), resting, immobilizing, or favoring the shoulder may cause the muscles in and around that shoulder to weaken.If you have neuromuscular dysfunction or a neuromuscular disorder (such as muscular dystrophy), muscles throughout the body may weaken progressively; e-stim can help to slow this progression and improve motor control. E-stim can also be used by athletes as a muscle conditioning or recovery tool. Some studies have indicated that e-stim can be targeted to create contractions in different types of muscle fibers, allowing athletes (with the guidance and help of professional sports therapists) to train injured or weakened muscles for particular functions and responses. For example, a long-distance runner might use e-stim therapy as a complementary technique to train muscle fibers to resist fatigue.How Exactly Does E-stim Work? EMS therapy mimics the action potential that comes from the central nervous system. Action potential is what we call it when a neuron (cell in the nervous system) transmits information (electrical impulses) along an axon (the thread-like conduit leading away from the neuron body, toward other cells). When these impulses pass a threshold, the action potential is fired and something happens. In this case, that something is a muscle contraction.EMS therapy creates steady electric impulses that stimulate muscle contractions--many of them over a sustained therapy session. This repetitive contracting and relaxing of the muscle has the effect of:Increasing circulation (blood flow) to the affected tissue area, which aids in repair.improving strength by flexing and working weakened muscles.slowing the process of muscle atrophy by strengthening weakened or unused muscles.adapting (training or educating) muscle fibers to certain patterns of response (e.g., contracts the fibers that are responsible for force, which results in building strength).Another form of e-stim therapy called TENS (transcutaneous electrical nerve stimulation) works on nerves rather than muscles. Its used primarily for managing or blocking pain signals to the brain, and has been in regular use by doctors and physical therapists since the 1960s.TENS therapy can issue electrical stimulation at different wavelengths for different purposes (relaxation, circulation, blocking pain) and can sometimes be performed at home, after the patient has been taught proper and safe use of the equipment. Uses and Benefits of E-stim TherapyWhen used for recovery, rehabilitation, muscle training, or pain relief, EMS and TENS devices are normally prescription-only and administered by professionals: for example, sports medicine physicians, physical therapists, or orthopedists. There are however, some devices available for over-the-counter purchase and home use.Some of the common uses of prescription EMS therapy include:Relieving back spasms. Electric muscle stimulation can relax back muscles, easing tightness and soreness in the lower back area. Sciatica symptoms, for example, can be caused by back muscles in spasm. Stopping the spasm may relieve the pressure on the sciatic nerve. EMS can also help with muscle tightness and soreness from other spinal issues, including postural problems and scoliosis.Working weakened or atrophied muscles. Broken bones, soft tissue injuries, spinal cord injuries, neuromuscular disorders, stroke, and certain forms of illness can inhibit movement and exercise, causing muscles to become weak from disuse. E-stim can be used to keep these muscles active and prevent atrophy.Retraining muscles after surgery or illness. Occasionally, following orthopedic surgery or illness (such as a stroke), a patient may have difficulty contracting muscles at will. In such cases, e-stim can be used for muscle re-education. The electrical impulses contract the muscle involuntarily. If the patient concentrates on voluntarily contracting this muscle during the therapy, the brain may re-learn how to do so without help.Aiding athletic recovery. E-stim active recovery program settings use specific low-level frequencies to increase blood flow, remove lactic acid, release endorphins, and promote muscle relaxation. Athletes working out at high intensity levels--who may be prone to intense cramping or spasms--may find this program beneficial. Endurance athletes, for example, may wish to work regular e-stim sessions into their routines so they can keep their muscles loose and continue training without injury.TENS therapy, on the other hand, is normally used to manage pain (acute or chronic), rather than working with muscle function. Many varieties of TENS devices can be purchased without a prescription for use at home. However, patients are advised to consult with a doctor first, to receive instruction and guidance regarding how to select and use the equipment. TENS sessions can be helpful in managing pain and discomfort from the following conditions: Back or neck problems (including sciatica) Foot and toe issues (OA, plantar fasciitis, metatarsalgia, bunions, hammer toes, sore arches, peripheral neuropathy) Both EMS and TENS have been in wide use for decades. When administered by professionals, they are safe and painless and have very few if any side effects. Administered correctly, these techniques can make a difference in pain levels and can aid muscle recovery, relaxation, and rehabilitation.To find out if you can benefit from this therapy, you should first have an assessment by a physician. People with open wounds or certain health conditions (such as a pacemaker) should not use use e-stim or TENS therapy without approval from a doctor.Please contact Coastal Orthopedics in Corpus Christi with any questions about the use of E-Stim or TENS at (361) 994-1166. Article written by: Rob Williams, MD Rob S Williams, MD Dr. Williams has been practicing orthopedic surgery in Corpus Christi since 1998. After graduating from Texas Tech hereceived his medical degree from the University of Texas at San Antonio. At the prestigious Campbell Clinic located at the University of Tennessee, Dr. Williams completed not only an Orthopedic Surgery Residency, but an additional year of Fellowship Training in Spine Surgery. Dr. Williams is dedicated to creating an excellent patient experience in the office or in the surgery suite. Have you ever wondered about the benefits of electric muscle stimulation to your body? Read on to find out.Electric muscle stimulation, also known as ESTIM or EMS, has a lot of benefits you are probably not aware of. It involves sending electrical impulses to the muscles using electrodes or EMS suits to reduce pain, strengthen muscles, increase endurance, shape your body, and more.EMS mimics physiological activities like jogging, walking, stretching, and massaging, which release neurochemicals in the brain.What are the benefits of Electro Muscle Stimulation?1. Strength Training:The results from a single 20-minute session of EMS muscle stimulation can be mind-blowing. It is more time efficient and cost-effective than traditional exercises. This is mostly beneficial to people who have sustained injuries in the past or have certain disabilities, like stroke, that limit their abilities to do some activities.2. Rehabilitation (muscle recovery):Rehabilitation is one of the significant benefits of electric muscle stimulation. It can assist people in repairing their muscles after a major injury or surgical operation It improves circulation, reduces swelling and soreness, and activates muscle contractions to speed up the healing process of your muscles.3. Increased Endurance:Using muscular electrostimulation through electrodes or unique wireless suits can improve muscular endurance. EMS energizes your muscles to last for a longer period. This is mostly beneficial for athletes or people involved in demanding activities.4. Pain Management:E-stim can help you reduce back pain, joint pain, spinal cord injury, arthritis, etc. It sends electrical pulses or signals to your injured or affected muscles and induces them to reduce pain. The beautiful part of electric muscle stimulation is that it is a painless procedure and process.5. Mood and Brain Health:Not only does ESTIM build your body, but it also improves your mood and your brains health. How? It alleviates stress by releasing neurochemicals and natural painkillers like endorphins. This helps to improve your mood, your brains health, and your self-esteem.6. Weight and Fat Loss:One of the major benefits of electric muscle stimulation is weight and fat loss. The electrical impulses and signals produced by EMS make your muscles contract. As your muscles contract, your muscle strength and tone get better and strongerwhen your muscles become stronger, they burn a lot of calorieisthis can help you achieve weight loss three times quicker. This helps you lose a lot of weight without any weight-loss supplements.7. Improves Blood Flow and Circulation:When your blood isnt flowing as it should, there is a greater chance of arterial clots, which can lead to a heart attack. Using EMS, you can induce your muscles, improve blood flow circulation throughout your body, and increase the blood flow to the selected muscles. And of course, youll have a healthier heart when you have improved blood flow.8. Cellulite Correction:Currently, EMS devices are the best technology available for targeted muscle stimulation and efficient cellulite correction. Recent study data also indicates that, when combined with exercise, it can effectively aid in muscle toning and, therefore, reduce the appearance of cellulite.9. Increased Metabolism:Your metabolism is increased during an EMS session because more muscle fibers are stimulated than during a traditional workout. The electrical stimulation increases metabolic flux and growth, which helps you live a healthy lifestyle.In conclusion, electric muscle stimulation is a great way to improve your life, improve your state of life, and get you in better shape. To enjoy the benefits of electric muscle stimulation, you should try out our wireless EMS suits today. E-stim may not be appropriate for everyone, but for many people this painless procedure is accelerating recovery and providing relief from painful or uncomfortable symptoms.Whether youre recovering from an injury or stroke or dealing with the pain of fibromyalgia or another condition, you may benefit from a physical therapy procedure called electrical stimulation, or e-stim. E-stim sends mild electrical pulses through the skin to help stimulate injured muscles or manipulate nerves to reduce pain.E-stim uses electrical pulses to mimic the action of signals coming from neurons (cells in your nervous system). These mild electrical currents target either muscles or nerves.E-stim therapy for muscle recovery sends signals to targeted muscles to make them contract. (Flexing your biceps is a form of muscle contraction.) By causing repeated muscle contractions, blood flow improves, helping repair injured muscles.Those muscles also improve their strength through repeated cycles of contraction and relaxation. E-stim can also train muscles to respond to the bodys natural signals to contract. This is an especially helpful benefit for stroke survivors who must essentially relearn basic motor functions.The type of e-stim that focuses on pain relief sends signals on a different wavelength so they reach the nerves, rather than the muscles. Electrical stimulation can block pain receptors from being sent from nerves to the brain.The two main types of e-stim are transcutaneous electrical nerve stimulation (TENS) and electrical muscle stimulation (EMS).TENS may be used for chronic (long-term) pain as well as for acute (short-term) pain. Electrodes are placed on the skin near the source of the pain. Signals are sent through nerve fibers to block or at least reduce the pain signals traveling to the brain.EMS uses a slightly stronger current than TENS to get muscles to contract. The units electrodes (also placed on the skin near the affected muscles) cause rhythmic contractions. This can improve muscle strength if the user attempts to contract the muscle simultaneously. In addition to EMS and TENS, your doctor or physical therapist may recommend other e-stim treatments.Other types of e-stimOne of the following similar e-stim treatments may help you, depending on your condition:Electrical stimulation for tissue repair (ESTR) helps reduce swelling, increase circulation, and speed up wound healing.Interferential current (IFC) stimulates nerves to reduce pain.Neuromuscular electrical stimulation (NMES) stimulates the nerves in muscles to restore function and strength, prevent muscle atrophy, and reduce muscle spasms.You may have seen TV and online advertisements for home e-stim systems. If youre interested in one of these products, talk with your doctor or a physical therapist. Be sure to get proper instruction on its use before trying it out.As part of a physical therapy program, you may be provided a battery-powered unit to use at home. Make sure the units settings are correct before using it on your own.E-stim uses small electrodes placed on the skin. The electrodes are small, sticky pads that should come off with little discomfort at the end of the session. Several electrodes are placed around the area receiving treatment. Wires from the e-stim device are attached to the pads.Steady streams of electrical pulses are delivered through the wires from the e-stim unit. The unit may be small enough to fit in your hand or larger, like a landline phone and answering machine. For muscular stimulation, the pulses will reach the muscles, signaling them to contract. Pulses aimed at the nervous system block the transmission of pain signals from reaching the spinal cord and brain. The pulses also stimulate the body to produce more natural pain-relieving chemicals called endorphins.What to expect during e-stimElectrodes are placed around the site receiving therapy.The electrical current will begin on a low setting and increased gradually.Youll get a tingly, pins and needles feeling at the site.Depending on the type of e-stim, you may feel a muscle twitch or contract repeatedly.Each e-stim therapy session may last 5 to 15 minutes, depending on the condition being treated.When e-stim is part of an overall physical therapy program, your insurance may cover it like other physical therapy treatments.Check with your insurance provider first, however. The nature of your condition will often determine coverage. For example, an insurance provider may cover e-stim for scoliosis in serious cases, but not if the curvature is less than 20 degrees.Home TENS or EMS systems can start at $20 for simple, starter units. Higher-end systems that are more durable and offer more features can cost several hundred dollars.E-stim may be appropriate for the following conditions:back paincancer-related paindysphagia (trouble swallowing)fibromyalgiajoint painarthritismuscle conditioning (mostly for athletes, such as long-distance runners)muscle injury from trauma or diseasenerve inflammationpoor muscle strengthurinary incontinencespinal cord injurystrokesurgery recoveryThe most common risk of e-stim is skin irritation where the electrodes are placed. However, theres a much more serious risk to heart health. For people with a pacemaker or other implantable heart device, e-stim may be dangerous and isnt recommended. E-stim is also not recommended for those who are pregnant. But in some supervised circumstances, e-stim has been used to help relieve labor pains.E-stim targeting the nerves for pain relief can be effective in treating a range of conditions causing nerve and musculoskeletal pain as well as pain that doesnt respond to traditional treatments, according to 2019 research.However, the researchers note e-stim isnt always a first-line treatment. Rather, its part of a broader set of options available to physical therapists.Depending on your condition, you could start to feel better after one e-stim session. You may need multiple sessions, depending on the severity of your condition and symptoms. In a small 2019 study, researchers found that 36 NMES sessions over a 16-week period improved muscle function in people with rheumatoid arthritis.E-stim is still considered an alternative therapy. There are some health experts who are skeptical of its long-term effectiveness. Theres also some disagreement about which conditions are best suited for e-stim treatment. Generally speaking, e-stim is most effective at working weakened or atrophied muscles and healing muscles after an injury or surgery. As a pain reliever, e-stim (especially TENS therapy) can be effective in treating many conditions, though typically as part of a broader pain-management program.While e-stim can be an effective tool in physical therapy and rehabilitation, its just one of many strategies employed by physical therapists, sports medicine physicians, and orthopedists. Other forms of therapy include:muscle-strengthening exercises using weights, resistance bands, machines, and a persons own body weightmassagerange-of-motion exercisesstretching and flexibility exercisesice and heat treatmentsE-stim treatments have become standard parts of physical therapy for many conditions. When used as part of injury or surgery recovery, e-stim should be used as a prescribed, supervised treatment, though home use may be appropriate in many cases. Just be sure to tell your healthcare provider if you have a heart condition or are pregnant. Sharing your medical history and a list of medications and supplements you take is always a smart and safe approach, too.If youre interested in e-stim as a tool for muscle conditioning or pain relief, talk with your doctor about your options and how to proceed safely. As a library, NLM provides access to scientific literature. Inclusion in an NLM database does not imply endorsement of, or agreement with, the contents by NLM or the National Institutes of Health. Learn more: PMC Disclaimer | PMC Copyright Notice Electrical muscle stimulation (EMS) activates muscles through electrical currents, resulting in involuntary muscle contractions. This study aimed to evaluate the immediate clinical effects of superimposing EMS on strength training compared with conventional exercise in healthy non-athletic adults.This study was a randomised, controlled, parallel-group trial conducted at a single centre. Forty-one healthy young volunteers were recruited and randomised into two groups: strengthening with superimposed EMS (S+E) and strengthening (S) groups. All participants underwent the 30 minutes of strength training program, three times a week for 8 weeks, consisting of core muscle exercises. Additionally, the S+E group received EMS during training, which stimulated the bilateral abdominal, gluteus, and hip adductor muscles. As the primary outcome measure, we evaluated the changes in muscle thickness, including the abdominal, gluteal, and hip adductor muscles, using ultrasound. Muscle thickness was measured in both resting and contracted states. For secondary outcomes, physical performance (Functional Movement System score, McGills core stability test, and hip muscle power) and body composition analysis were evaluated. All assessments were performed at the beginning and end of the intervention.39 participants (S+E group = 20, S group = 19) completed the study. The clinical characteristics and baseline functional status of each group did not differ significantly between the groups. After completion of the training, the S+E group showed more efficient contraction in most of the evaluated muscles. The resting muscle thickness did not differ significantly between the groups; however, the contracted muscle thickness in the S+E group was higher than that in the S group ($p < 0.05$). Physical performance and body composition were not significantly different between the two groups. No intervention-related complications were reported during the study.EMS seems to be a safe and reasonable modality for improving physical fitness in healthy individuals.Keywords: abdominal muscle, electrical stimulation, exercise, muscle contraction, strength trainingElectrical muscle stimulation (EMS) has long been used as a complementary training method, applied either locally[1,2] or to the whole body.[3,4] It activates muscles artificially through various electrical current forms, which are delivered through electrodes on the target muscles. As a result, electrical current induces involuntary muscle contraction which produces similar exercise benefits without much discomfort.[5] More specifically, it was designed to facilitate passive activation of a large number of motor units and induce synchronous recruitment of muscle fibers, with the aim of strengthening or maintaining muscle mass.[68] Owing to recent advances in EMS technology, relatively low-cost and portable EMS devices have been developed and applied in several settings (e.g., hospitals, clinics, homes, and leisure sports).Previous studies have demonstrated the effectiveness of EMS on muscle function and physical performance in various populations including healthy young individuals, the elderly, and patients with debilitating muscle-wasting conditions such as sarcop