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Abbreviations

Go to:

H-reflex	Hoffmann's reflex
HVLA	High-velocity, low-amplitude
MVC	Maximum voluntary contraction
MN	Motoneuron
Mmax	Maximum direct motor response
SM	Spinal manipulation
sEMG	Surface electromyography
SOL	Soleus muscle

Author contributions

Go to:

TLC, IKN, KH, RWN, HH were involved in the design, data collection, analysis, and article writing. JD and KA were involved in the data collection and article reviewing. PM, KST and JHO the design and article reviewing. All authors read and approved the final manuscript. All Authors declare that they have no conflict of interest.

References

Go to:

- Aagaard P, Simonsen EB, Andersen JL, et al. Neural adaptation to resistance training: changes in evoked V-wave and H-reflex responses. J Appl Physiol. 2002;92:2309–2318. doi: 10.1152/japplphysiol.01185.2001. [PubMed] [CrossRef] [Google Scholar]
- Alkjaer T, Meyland J, Raffalt PC, et al. Neuromuscular adaptations to 4 weeks of intensive drop jump training in well-trained athletes. Physiol Rep. 2013;1:e00099. doi: 10.1002/phy2.99. [PMC free article] [PubMed] [CrossRef] [Google Scholar]
- Andrew D, Yielder P, Haavik H, Murphy B (2017) The effects of subclinical neck pain on sensorimotor integration following a complex motor pursuit task. Exp Brain Res 1–11. 10.1007/s00221-017-5103-4 [PubMed]
- Armstrong N, McManus AM. Physiology of elite young female athletes. Med Sport Sci. 2010;56:23–46. doi: 10.1159/000320626. [PubMed] [CrossRef] [Google Scholar]
- Baarbé JK, Holmes MWR, Murphy HE, et al. Influence of subclinical neck pain on the ability to perform a mental rotation task: a 4-week longitudinal study with a healthy control group comparison. J Manipulative Physiol Ther. 2016;39:23–30. doi: 10.1016/j.jmpt.2015.12.002. [PubMed] [CrossRef] [Google Scholar]
- Botelho MB, Andrade BB. Effect of cervical spine manipulative therapy on judo athletes' grip strength. J Manip Physiol Ther. 2012;35:38–44. doi: 10.1016/j.jmpt.2011.09.005. [PubMed] [CrossRef] [Google Scholar]
- Brinkworth RSA, Tuncer M, Tucker KJ, et al. Standardization of H-reflex analyses. J Neurosci Methods. 2007;162:1–7. doi: 10.1016/j.jneumeth.2006.11.020. [PubMed] [CrossRef] [Google Scholar]
- Brolinson PG, Smolka M, Rogers M, et al. Precompetition manipulative treatment and performance among Virginia Tech athletes during 2 consecutive football seasons: a preliminary, retrospective report. J Am Osteopath Assoc. 2012;112:607–615. [PubMed] [Google Scholar]
- Bronfort G, Haas M, Evans R, et al. Effectiveness of manual therapies: the UK evidence report. Chiropr Osteopat. 2010;18:3. doi: 10.1186/1746-1340-18-3. [PMC free article] [PubMed] [CrossRef] [Google Scholar]
- Bronfort G, Evans R, Anderson AV, et al. Spinal manipulation, medication, or home exercise with advice for acute and subacute neck pain:A randomized trial. Ann Intern Med. 2012;156:1–10. doi: 10.7326/0003-4819-156-1-201201030-00002. [PubMed] [CrossRef] [Google Scholar]
- Brooke JD, Cheng J, Misiaszek JE, Lafferty K. Amplitude modulation of the soleus H reflex in the human during active and passive stepping movements. J Neurophysiol. 1995;73:102–111. doi: 10.1152/jn.1995.73.1.102. [PubMed] [CrossRef] [Google Scholar]
- Brutsaert TD, Parra EJ. What makes a champion? Explaining variation in human athletic performance. Respir Physiol Neurobiol. 2006;151:109–123. doi: 10.1016/j.resp.2005.12.013. [PubMed] [CrossRef] [Google Scholar]
- Burke D, Gandevia SC, McKeon B. Monosynaptic and oligosynaptic contributions to human ankle jerk and H-reflex. J Neurophysiol. 1984;52:435–448. doi: 10.1152/jn.1984.52.3.435. [PubMed] [CrossRef] [Google Scholar]
- Chilibeck PD, Cornish SM, Schulte A, et al. The effect of spinal manipulation on imbalances in leg strength. J Can Chiropr Assoc. 2011;55:183–192. [PMC free article] [PubMed] [Google Scholar]
- Dalligadu J, Haavik H, Yielder PC, et al. Alterations in cortical and cerebellar motor processing in subclinical neck pain patients following spinal manipulation. J Manipulative Physiol Ther. 2013;36:527–537. doi: 10.1016/j.jmpt.2013.08.003. [PubMed] [CrossRef] [Google Scholar]
- Del Balso C, Cafarelli E. Neural changes associated with training adaptations in the activation of human skeletal muscle induced by short-term isometric resistance training. J Appl Physiol. 2007;103:402–411. doi: 10.1152/japplphysiol.00477.2006. [PubMed] [CrossRef] [Google Scholar]
- Farid B, Yielder P, Holmes M, Haavik H, Murphy B (2017) Subclinical neck pain leads to altered multi-sensory integration at baseline and four week follow-up relative to healthy controls. Paper presented at: ACC-RAC Platform and poster presentation abstracts, Washington DC, USA
- Gandevia SC. Spinal and Supraspinal Factors in Human Muscle Fatigue. Physiol Rev. 2001;81:1725–1789. doi: 10.1152/physrev.2001.81.4.1725. [PubMed] [CrossRef] [Google Scholar]
- Gandevia SC, McNeil CJ, Carroll TJ, Taylor JL. Twitch interpolation: superimposed twitches decline progressively during a tetanic contraction of human adductor pollicis. J Physiol. 2013;591:1373–1383. doi: 10.1113/jphysiol.2012.248989. [PMC free article] [PubMed] [CrossRef] [Google Scholar]
- Gondin J. Soleus- and gastrocnemii-evoked V-wave responses increase after neuromuscular electrical stimulation training. J Neurophysiol. 2006;95:3328–3335. doi: 10.1152/jn.01002.2005. [PubMed] [CrossRef] [Google Scholar]
- Grosprêtre S, Martin A. Conditioning effect of transcranial magnetic stimulation evoking motor-evoked potential on V-wave response. Physiol Rep. 2014 [PMC free article] [PubMed] [Google Scholar]
- Haavik H, Murphy B. Subclinical neck pain and the effects of cervical manipulation on elbow joint position sense. J Manipulative Physiol Ther. 2011;34:88–97. doi: 10.1016/j.jmpt.2010.12.009. [PubMed] [CrossRef] [Google Scholar]
- Haavik H, Murphy B. The role of spinal manipulation in addressing disordered sensorimotor integration and altered motor control. J Electromyogr Kinesiol. 2012;22:768–776. doi: 10.1016/j.jelekin.2012.02.012. [PubMed] [CrossRef] [Google Scholar]
- Haavik H, Niazi IK, Jochumsen M, et al. Impact of spinal manipulation on cortical drive to upper and lower limb muscles. Brain Sci. 2017;7:2. doi: 10.3390/brainsci7010002. [PMC free article] [PubMed] [CrossRef] [Google Scholar]
- Haavik Taylor H, Murphy B. Altered cortical integration of dual somatosensory input following the cessation of a 20 min period of repetitive muscle activity. Exp Brain Res. 2007;178:488–498. doi: 10.1007/s00221-006-0755-5. [PubMed] [CrossRef] [Google Scholar]
- Haavik-Taylor H, Murphy B. Cervical spine manipulation alters sensorimotor integration: a somatosensory evoked potential study. Clin Neurophysiol. 2007;118:391–402. doi: 10.1016/j.clinph.2006.09.014. [PubMed] [CrossRef] [Google Scholar]
- Hancock MJ, Maher CG, Latimer J, McAuley JH. Selecting an appropriate placebo for a trial of spinal manipulative therapy. Aust J Physiother. 2006;52:135–138. doi: 10.1016/S0004-9514(06)70049-6. [PubMed] [CrossRef] [Google Scholar]
- Harries SK, Lubans DR, Callister R. Resistance training to improve power and sports performance in adolescent athletes: a systematic review and meta-analysis. J Sci Med Sport. 2012;15:532–540. doi: 10.1016/j.jsams.2012.02.005. [PubMed] [CrossRef] [Google Scholar]
- Hazen W, Scheele D, Conway PJ. Electromyographic responses of back and limb muscles associated with spinal manipulative therapy. Spine (Phila Pa 1976) 1999;24:146–152. doi: 10.1097/00007632-199901150-00012. [PubMed] [CrossRef] [Google Scholar]
- Hillermann B, Gomes AN, Korporaal C, Jackson D. A pilot study comparing the effects of spinal manipulative therapy with those of extra-spinal manipulative therapy on quadriceps muscle strength. J Manip Physiol Ther. 2006;29:145–149. doi: 10.1016/j.jmpt.2005.12.003. [PubMed] [CrossRef] [Google Scholar]
- Hollermann A, Roeleveld K, Engstrom M, Sand T. Enhanced H-reflex with resistance training is related to increased rate of force development. Eur J Appl Physiol. 2007;101:301–312. doi: 10.1007/s00421-007-0503-y. [PubMed] [CrossRef] [Google Scholar]
- Hultborn H. Spinal reflexes, mechanisms and concepts: From Eccles to Lundberg and beyond. Prog Neurobiol. 2006;78:215–232. doi: 10.1016/j.pneurobio.2006.04.001. [PubMed] [CrossRef] [Google Scholar]
- Humphries KM, Ward J, Coats J, et al. Immediate effects of lower cervical spine manipulation on handgrip strength and free-throw accuracy of asymptomatic basketball players: a pilot study. J Chiropr Med. 2013;12:153–159. doi: 10.1016/j.jcm.2013.10.008. [PMC free article] [PubMed] [CrossRef] [Google Scholar]
- Kelly DD, Murphy BA, Backhouse DP. Use of a mental rotation reaction-time paradigm to measure the effects of upper cervical adjustments on cortical processing: a pilot study. J Manipulative Physiol Ther. 2000;23:246–251. doi: 10.1067/mmt.2000.106099. [PubMed] [CrossRef] [Google Scholar]
- Knikou M. The H-reflex as a probe: pathways and pitfalls. J Neurosci Methods. 2008;171:1–12. doi: 10.1016/j.jneumeth.2008.02.012. [PubMed] [CrossRef] [Google Scholar]
- Kockum B, Heijne AILM. Hop performance and leg muscle power in athletes: reliability of a test battery. Phys Ther Sport. 2015;16:222–227. doi: 10.1016/j.ptsp.2014.09.002. [PubMed] [CrossRef] [Google Scholar]
- Lelic D, Niazi IK, Holt K et al (2016) Manipulation of dysfunctional spinal joints affects sensorimotor integration in the prefrontal cortex: A brain source localization study. Neural Plast 2016:3704964. 10.1155/2016/3704964 [PMC free article] [PubMed]
- Lersa LB, Stinear CM, Lersa RA. The relationship between spinal dysfunction and reaction time measures. J Manipulative Physiol Ther. 2005;28:502–507. doi: 10.1016/j.jmpt.2005.07.007. [PubMed] [CrossRef] [Google Scholar]
- Marshall PWM, Lovell R, Jeppesen GK, et al. Hamstring muscle fatigue and central motor output during a simulated soccer match. PLoS One. 2014;9:1–11. [PMC free article] [PubMed] [Google Scholar]
- McManus AM, Armstrong N. Physiology of elite young male athletes. Med Sport Sci. 2011;56:1–22. [PubMed] [Google Scholar]
- Milner-Brown HS, Lee RG. Synchronization of human motor units: Possible roles of exercise and supraspinal reflexes. Electroencephalogr Clin Neurophysiol. 1975;38:245–254. doi: 10.1016/0013-4694(75)90245-X. [PubMed] [CrossRef] [Google Scholar]
- Niazi IK, Türker KS, Flavel S, et al. Changes in H-reflex and V-waves following spinal manipulation. Exp Brain Res. 2015;233:1165–1173. doi: 10.1007/s00221-014-4193-5. [PubMed] [CrossRef] [Google Scholar]
- Nook DD, Nook EC, Nook BC. Utilization of chiropractic care at the world games 2013. J Manipulative Physiol Ther. 2016;39:693–704. doi: 10.1016/j.jmpt.2016.09.005. [PubMed] [CrossRef] [Google Scholar]
- Nordlund Ekblom MM. Improvements in dynamic plantar flexor strength after resistance training are associated with increased voluntary activation and V-to-M ratio. J Appl Physiol. 2010;109:19–26. doi: 10.1152/japplphysiol.01307.2009. [PubMed] [CrossRef] [Google Scholar]
- Oliveira AS, Corvino RB, Gonçalves M, et al. Effects of a single habituation session on neuromuscular isokinetic profile at different movement velocities. Eur J Appl Physiol. 2010;110:1127–1133. doi: 10.1007/s00421-010-1599-z. [PubMed] [CrossRef] [Google Scholar]
- Pensini M, Martin A. Effect of voluntary contraction intensity on the H-reflex and V-wave responses. Neurosci Lett. 2004;367:369–374. doi: 10.1016/j.neulet.2004.06.037. [PubMed] [CrossRef] [Google Scholar]
- Pérot C, Goubel F, Mora I. Quantification of T- and H-responses before and after a period of endurance training. Eur J Appl Physiol Occup Physiol. 1991;63:368–375. doi: 10.1007/BF00364464. [PubMed] [CrossRef] [Google Scholar]
- Pickar JG, Wheeler JD. Response of muscle proprioceptors to spinal manipulative-like loads in the anesthetized cat. J Manipulative Physiol Ther. 2001;24:2–11. doi: 10.1067/mmt.2001.112017. [PubMed] [CrossRef] [Google Scholar]
- Pierrot-Deseilligny E, Mazevet D. The monosynaptic reflex: a tool to investigate motor control in humans. Interest and limits. Neurophysiol Clin. 2000;30:67–80. doi: 10.1016/S0987-7053(00)00062-9. [PubMed] [CrossRef] [Google Scholar]
- Rosner AL. Evidence-based medicine: revisiting the pyramid of priorities. J Bodyw Mov Ther. 2012;16:42–49. doi: 10.1016/j.jbmt.2011.05.003. [PubMed] [CrossRef] [Google Scholar]
- Sale DG, MacDougall JD, Upton AR, McComas AJ. Effect of strength training upon motoneuron excitability in man. Med Sci Sports Exerc. 1983;15:57–62. doi: 10.1249/00005768-198315010-00011. [PubMed] [CrossRef] [Google Scholar]
- Sale DG, Upton ARM, McComas AJ, MacDougall JD. Neuromuscular function in weight-trainers. Exp Neurol. 1983;82:521–531. doi: 10.1016/0014-4886(83)90077-8. [PubMed] [CrossRef] [Google Scholar]
- Schieppati M. The Hoffmann reflex: a means of assessing spinal reflex excitability and its descending control in man. Prog Neurobiol. 1987;28:345–376. doi: 10.1016/0301-0082(87)90007-4. [PubMed] [CrossRef] [Google Scholar]
- Suter E, McMorland G, Herzog W, Bray R. Decrease in quadriceps inhibition after sacroiliac joint manipulation in patients with anterior knee pain. J Manipulative Physiol Ther. 1999;22:149–153. doi: 10.1016/S0161-4754(99)70128-4. [PubMed] [CrossRef] [Google Scholar]
- Suter E, McMorland G, Herzog W. Short-term effects of spinal manipulation on H-reflex amplitude in healthy and symptomatic subjects. J Manipulative Physiol Ther. 2005;28:667–672. doi: 10.1016/j.jmpt.2005.09.017. [PubMed] [CrossRef] [Google Scholar]
- Taylor HH, Murphy B. Altered sensorimotor integration with cervical spine manipulation. J Manipulative Physiol Ther. 2008;31:115–126. doi: 10.1016/j.jmpt.2007.12.011. [PubMed] [CrossRef] [Google Scholar]
- Taylor HH, Murphy B. Altered central integration of dual somatosensory input after cervical spine manipulation. J Manipulative Physiol Ther. 2010;33:178–188. doi: 10.1016/j.jmpt.2010.01.005. [PubMed] [CrossRef] [Google Scholar]
- Taylor HH, Murphy B. The effects of spinal manipulation on central integration of dual somatosensory input observed after motor training: a crossover study. J Manipulative Physiol Ther. 2010;33:261–272. doi: 10.1016/j.jmpt.2010.03.004. [PubMed] [CrossRef] [Google Scholar]
- Tsertsvadze A, Clar C, Court R, et al. Cost-effectiveness of manual therapy for the management of musculoskeletal conditions: a systematic review and narrative synthesis of evidence from randomized controlled trials. J Manipulative Physiol Ther. 2014;37:343–362. doi: 10.1016/j.jmpt.2014.05.001. [PubMed] [CrossRef] [Google Scholar]
- Tucker KJ, Tuncer M, Türker KS. A review of the H-reflex and M-wave in the human triceps surae. Hum Mov Sci. 2005;24:667–688. doi: 10.1016/j.humov.2005.09.010. [PubMed] [CrossRef] [Google Scholar]
- Un CP, Lin KH, Shiang TY, et al. Comparative and reliability studies of neuromechanical leg muscle performances of volleyball athletes in different divisions. Eur J Appl Physiol. 2013;113:457–466. doi: 10.1007/s00421-012-2454-1. [PubMed] [CrossRef] [Google Scholar]
- Vila-Cha C, Falla D, Correia MV, Farina D. Changes in H reflex and V wave following short-term endurance and strength training. J Appl Physiol. 2012;112:54–63. doi: 10.1152/japplphysiol.00802.2011. [PubMed] [CrossRef] [Google Scholar]

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