

## Supplementary

- 8 MacLean PD. The Triune Brain in Evolution: Role in Paleocerebral Functions. New York: Plenum Press; 1990
- 9 Zabara J. Peripheral control of hypersynchronous discharge in epilepsy. *Electroencephalogr Clin Neurophysiol* 1985;61s:S162
- 10 Zabara J. Time course of seizure control to brief repetitive stimuli. *Epilepsia* 1985;26:518
- 11 Penry JK, Dean JC. Prevention of intractable partial seizures by intermittent vagal stimulation in humans: preliminary results. *Epilepsia* 1990;31(Suppl 2):S40-S43
- 12 Davis P, Gaitanis J. Neuromodulation for the treatment of epilepsy: a review of current approaches and future directions. *Clin Ther* 2020;42(7):1140-1154
- 13 Yu ZJ, Weller RA, Sandidge K, Weller EB. Vagus nerve stimulation: can it be used in adolescents or children with treatment-resistant depression? *Curr Psychiatry Rep* 2008;10(2):116-122
- 14 Groves DA, Brown VJ. Vagal nerve stimulation: a review of its applications and potential mechanisms that mediate its clinical effects. *Neurosci Biobehav Rev* 2005;29(3):493-500
- 15 Ben-Menachem E, Hamberger A, Hedner T, et al. Effects of vagus nerve stimulation on amino acids and other metabolites in the CSF of patients with partial seizures. *Epilepsy Res* 1995;20(3):221-227
- 16 Nishikawa Y, Koyama N, Yoshida Y, Yokota T. Activation of ascending antinociceptive system by vagal afferent input as revealed in the nucleus ventralis posteromedialis. *Brain Res* 1999;833(1):108-111
- 17 Randich A, Aicher SA. Medullary substrates mediating antinociception produced by electrical stimulation of the vagus. *Brain Res* 1988;445(1):68-76
- 18 Ring HA, White S, Costa DC, et al. A SPECT study of the effect of vagal nerve stimulation on thalamic activity in patients with epilepsy. *Seizure* 2000;9(6):380-384
- 19 Van Laere K, Vonck K, Boon P, Brans B, Vandekerckhove T, Dierckx R. Vagus nerve stimulation in refractory epilepsy: SPECT activation study. *J Nucl Med* 2000;41(7):1145-1154
- 20 Ren K, Randich A, Gebhart GF. Vagal afferent modulation of a nociceptive reflex in rats: involvement of spinal opioid and monoamine receptors. *Brain Res* 1988;446(2):285-294
- 21 Hosoi T, Okuma Y, Nomura Y. Electrical stimulation of afferent vagus nerve induces IL-1beta expression in the brain and activates HPA axis. *Am J Physiol Regul Integr Comp Physiol* 2000;279(1):R141-R147
- 22 Khasar SG, Green PG, Miao FJ, Levine JD. Vagal modulation of nociception is mediated by adrenomedullary epinephrine in the rat. *Eur J Neurosci* 2003;17(4):909-915
- 23 Ekbom K. Some observations on pain in cluster headache. *Headache* 1975;14(4):219-225
- 24 Horton BT. Histaminic cephalgia. *Lancet* 1952;2:92-98
- 25 May A, Leone M, Boecker H, et al. Hypothalamic deep brain stimulation in positron emission tomography. *J Neurosci* 2006;26(13):3589-3593
- 26 Leone M, Bussone G. Pathophysiology of trigeminal autonomic cephalgias. *Lancet Neurol* 2009;8(8):755-764
- 27 Lin T, Gargya A, Singh H, Sivanesan E, Gulati A. Mechanism of peripheral nerve stimulation in chronic pain. *Pain Med* 2020;21(1, Suppl 1):S6-S12
- 28 Benarroch EE. The central autonomic network: functional organization, dysfunction, and perspective. *Mayo Clin Proc* 1993;68(10):988-1001
- 29 Pavlov VA, Tracey KJ. Neural circuitry and immunity. *Immunol Res* 2015;63(1-3):38-57
- 30 Koopman FA, Chavan SS, Miljko S, et al. Vagus nerve stimulation inhibits cytokine production and attenuates disease severity in rheumatoid arthritis. *Proc Natl Acad Sci USA* 2016;113(29):8284-8289
- 31 Martelli D, McKinley MJ, McAllen RM. The cholinergic anti-inflammatory pathway: a critical review. *Auton Neurosci* 2014;182:65-69
- 32 Schwartz PJ, Pagani M, Lombardi F, Malliani A, Brown AM. A cardiocardiac sympathovagal reflex in the cat. *Circ Res* 1973;32(2):215-220
- 33 Brack KE, Winter J, Ng GA. Mechanisms underlying the autonomic modulation of ventricular fibrillation initiation—tentative prophylactic properties of vagus nerve stimulation on malignant arrhythmias in heart failure. *Heart Fail Rev* 2013;18(4):389-408
- 34 Zhang Y, Popovic ZB, Bibelevski S, et al. Chronic vagus nerve stimulation improves autonomic control and attenuates systemic inflammation and heart failure progression in a canine high-rate pacing model. *Circ Heart Fail* 2009;2(6):692-699
- 35 Van der Werf YD, Witter MP, Groenewegen HJ. The intralaminar and midline nuclei of the thalamus. Anatomical and functional evidence for participation in processes of arousal and awareness. *Brain Res Brain Res Rev* 2002;39(2-3):107-140
- 36 Schiff ND. Central thalamic contributions to arousal regulation and neurological disorders of consciousness. *Ann NY Acad Sci* 2008;1129:105-118
- 37 Zamotritsky AV, Kondratiev B, de Jong JW. Vagal neurostimulation in patients with coronary artery disease. *Auton Neurosci* 2001;88(1-2):109-116
- 38 Payrits T, Ernst A, Ladits E, Pokorny H, Virágos I, Längle F. [Vagal stimulation - a new possibility for conservative treatment of peripheral arterial occlusion disease]. *Zentralbl Chir* 2011;136(5):431-435
- 39 Hackl G, Preinner A, Jud P, et al. Auricular vagal nerve stimulation in peripheral arterial disease patients. *Vasa* 2017;46(6):462-470
- 40 Beekwilder JP, Beems T. Overview of the clinical applications of vagus nerve stimulation. *J Clin Neurophysiol* 2010;27(2):130-138
- 41 Ben-Menachem E. Vagus-nerve stimulation for the treatment of epilepsy. *Lancet Neurol* 2002;1(8):477-482
- 42 Ben-Menachem E. Vagus nerve stimulation, side effects, and long-term safety. *J Clin Neurophysiol* 2001;18(5):415-418
- 43 Jürgens TP, Leone M. Pearls and pitfalls: neurostimulation in headache. *Cephalalgia* 2013;33(8):512-525
- 44 Rush AJ, George MS, Sackeim HA, et al. Vagus nerve stimulation (VNS) for treatment-resistant depressions: a multicenter study. [see comment] *Biol Psychiatry* 2000;47(4):276-286
- 45 Sackeim HA, Rush AJ, George MS, et al. Vagus nerve stimulation (VNS) for treatment-resistant depression: efficacy, side effects, and predictors of outcome. *Neuropsychopharmacology* 2001;25(5):713-728
- 46 Rush AJ, Marangell LB, Sackeim HA, et al. Vagus nerve stimulation for treatment-resistant depression: a randomized, controlled acute phase trial. *Biol Psychiatry* 2005;58(5):347-354
- 47 Bottomley JM, LeReun C, Diamantopoulos A, Mitchell S, Gaynes BN. Vagus nerve stimulation (VNS) therapy in patients with treatment resistant depression: a systematic review and meta-analysis. *Compr Psychiatry* 2019;98:152156
- 48 Doddamani RS, Samala R, Agrawal M, Verma R, Kumar N, Chandra PS. Robotic guided bilateral anterior cingulate radiofrequency ablation for obsessive-compulsive disorder. *Neurol India* 2020;68(Supplement):S333-S336
- 49 Oshinsky ML, Murphy AL, Hekierski H Jr, Cooper M, Simon BJ. Noninvasive vagus nerve stimulation as treatment for trigeminal allodynia. *Pain* 2014;155(5):1037-1042
- 50 Lange G, Janal MN, Maniker A, et al. Safety and efficacy of vagus nerve stimulation in fibromyalgia: a phase I/II proof of concept trial. *Pain Med* 2011;12(9):1406-1413

- 51 Napadow V, Edwards RR, Cahalan CM, et al. Evoked pain analgesia in chronic pelvic pain patients using respiratory-gated auricular vagal afferent nerve stimulation. *Pain Med* 2012;13(6):777–789
- 52 Nesbitt AD, Marin JCA, Tompkins E, Rutledge MH, Goadsby PJ. Initial experience with a novel non-invasive vagus nerve stimulation device for the treatment of cluster headache. *Neurology (Minneap)* 2015;84:1–5
- 53 Gaul C, Diener HC, Silver N, et al. Non-invasive vagus nerve stimulation for PREvention and Acute treatment of chronic cluster headache (PREVA): a randomised controlled study. *Cephalgia* 2016;36(6):534–546
- 54 Goadsby PJ, Grosberg BM, Mauskop A, Cady R, Simmons KA. Effect of noninvasive vagus nerve stimulation on acute migraine: an open-label pilot study. *Cephalgia* 2014;34(12):986–993
- 55 Moscato D, Moscato FR, Liebler EJ. Efficacy of noninvasive vagus nerve stimulation (nVNS) in the treatment of acute migraine attacks. *Headache* 2014;44:1418
- 56 Huang J, Wang Y, Jiang D, Zhou J, Huang X. The sympathetic-vagal balance against endotoxemia. *J Neural Transm (Vienna)* 2010;117(6):729–735
- 57 Johnson RL, Murray ST, Camacho DK, Wilson CG. Vagal nerve stimulation attenuates IL-6 and TNF $\alpha$  expression in respiratory regions of the developing rat brainstem. *Respir Physiol Neurobiol* 2016;229:1–4
- 58 Bansal V, Ryu SY, Lopez N, et al. Vagal stimulation modulates inflammation through a ghrelin mediated mechanism in traumatic brain injury. *Inflammation* 2012;35(1):214–220
- 59 Levy G, Fishman JE, Xu DZ, et al. Vagal nerve stimulation modulates gut injury and lung permeability in trauma-hemorrhagic shock. *J Trauma Acute Care Surg* 2012;73(2):338–342, discussion 342
- 60 Gold MR, Van Veldhuisen DJ, Hauptman PJ, et al. Vagus nerve stimulation for the treatment of heart failure: The INOVATE-HF Trial. *J Am Coll Cardiol* 2016;68(2):149–158
- 61 Zannad F, De Ferrari GM, Tuinenburg AE, et al. Chronic vagal stimulation for the treatment of low ejection fraction heart failure: results of the NEural Cardiac TherApy foR Heart Failure (NECTAR-HF) randomized controlled trial. *Eur Heart J* 2015;36(7):425–433
- 62 Premchand RK, Sharma K, Mittal S, et al. Autonomic regulation therapy via left or right cervical vagus nerve stimulation in patients with chronic heart failure: results of the ANTHEM-HF trial. *J Card Fail* 2014;20(11):808–816
- 63 Limburg PJ, Ahlquist DA, Sandborn WJ, et al. Fecal calprotectin levels predict colorectal inflammation among patients with chronic diarrhea referred for colonoscopy. *Am J Gastroenterol* 2000;95(10):2831–2837
- 64 von Roon AC, Karamountzos L, Purkayastha S, et al. Diagnostic precision of fecal calprotectin for inflammatory bowel disease and colorectal malignancy. *Am J Gastroenterol* 2007;102(4):803–813
- 65 Sinniger V, Pellissier S, Fauville F, et al. A 12-month pilot study outcomes of vagus nerve stimulation in Crohn's disease. *Neurogastroenterol Motil* 2020;32(10):e13911
- 66 Hakon J, Moghiseh M, Poulsen I, Øland CML, Hansen CP, Sabers A. Transcutaneous vagus nerve stimulation in patients with severe traumatic brain injury: a feasibility trial. *Neuromodulation* 2020;23(6):859–864
- 67 Smith DC, Modglin AA, Roosevelt RW, et al. Electrical stimulation of the vagus nerve enhances cognitive and motor recovery following moderate fluid percussion injury in the rat. *J Neurotrauma* 2005;22(12):1485–1502
- 68 Smith DC, Tan AA, Duke A, et al. Recovery of function after vagus nerve stimulation initiated 24 hours after fluid percussion brain injury. *J Neurotrauma* 2006;23(10):1549–1560
- 69 Zamotrinsky A, Afanasyev S, Karpov RS, Cherniavsky A. Effects of electrostimulation of the vagus afferent endings in patients with coronary artery disease. *Coron Artery Dis* 1997;8(8-9):551–557