

Diabetic autonomic neuropathy

Diabetic [autonomic neuropathy](#) (DAN) is a serious and common complication of diabetes. Despite its relationship to an increased risk of cardiovascular mortality and its association with multiple symptoms and impairments, the significance of DAN has not been fully appreciated. The reported prevalence of DAN varies widely depending on the cohort studied and the methods of assessment. In randomly selected cohorts of asymptomatic individuals with diabetes, approximately 20% had abnormal cardiovascular autonomic function. DAN frequently coexists with other peripheral neuropathies and other diabetic complications, but DAN may be isolated, frequently preceding the detection of other complications. Major clinical manifestations of DAN include resting tachycardia, exercise intolerance, orthostatic hypotension, constipation, gastroparesis, erectile dysfunction, sudomotor dysfunction, impaired neurovascular function, "brittle diabetes," and hypoglycemic autonomic failure. DAN may affect many organ systems throughout the body (e.g., gastrointestinal [GI], genitourinary, and cardiovascular). GI disturbances (e.g., esophageal enteropathy, gastroparesis, constipation, diarrhea, and fecal incontinence) are common, and any section of the GI tract may be affected. Gastroparesis should be suspected in individuals with erratic glucose control. Upper-GI symptoms should lead to consideration of all possible causes, including autonomic dysfunction. Whereas a radiographic gastric emptying study can definitively establish the diagnosis of gastroparesis, a reasonable approach is to exclude autonomic dysfunction and other known causes of these upper-GI symptoms. Constipation is the most common lower-GI symptom but can alternate with episodes of diarrhea. Diagnostic approaches should rule out autonomic dysfunction and the well-known causes such as neoplasia. Occasionally, anorectal manometry and other specialized tests typically performed by the gastroenterologist may be helpful. DAN is also associated with genitourinary tract disturbances including bladder and/or sexual dysfunction. Evaluation of bladder dysfunction should be performed for individuals with diabetes who have recurrent urinary tract infections, pyelonephritis, incontinence, or a palpable bladder. Specialized assessment of bladder dysfunction will typically be performed by a urologist. In men, DAN may cause loss of penile erection and/or retrograde ejaculation. A complete workup for erectile dysfunction in men should include history (medical and sexual); psychological evaluation; hormone levels; measurement of nocturnal penile tumescence; tests to assess penile, pelvic, and spinal nerve function; cardiovascular autonomic function tests; and measurement of penile and brachial blood pressure. Neurovascular dysfunction resulting from DAN contributes to a wide spectrum of clinical disorders including erectile dysfunction, loss of skin integrity, and abnormal vascular reflexes. Disruption of microvascular skin blood flow and sudomotor function may be among the earliest manifestations of DAN and lead to dry skin, loss of sweating, and the development of fissures and cracks that allow microorganisms to enter. These changes ultimately contribute to the development of ulcers, gangrene, and limb loss. Various aspects of neurovascular function can be evaluated with specialized tests, but generally these have not been well standardized and have limited clinical utility. Cardiovascular autonomic neuropathy (CAN) is the most studied and clinically important form of DAN. Meta-analyses of published data demonstrate that reduced cardiovascular autonomic function as measured by heart rate variability (HRV) is strongly (i.e., relative risk is doubled) associated with an increased risk of silent myocardial ischemia and mortality. The determination of the presence of CAN is usually based on a battery of autonomic function tests rather than just on one test. Proceedings from a consensus conference in 1992 recommended that three tests (R-R variation, Valsalva maneuver, and postural blood pressure testing) or longitudinal testing of the cardiovascular autonomic system. Other forms of autonomic neuropathy can be evaluated with specialized tests, but these are less standardized and less available than commonly used tests of cardiovascular autonomic function, which quantify loss of HRV. Interpretability of serial HRV testing requires accurate, precise, and reproducible procedures that use established physiological maneuvers. The battery of three recommended tests for assessing CAN is

readily performed in the average clinic, hospital, or diagnostic center with the use of available technology. Measurement of HRV at the time of diagnosis of type 2 diabetes and within 5 years after diagnosis of type 1 diabetes (unless an individual has symptoms suggestive of autonomic dysfunction earlier) serves to establish a baseline, with which 1-year interval tests can be compared. Regular HRV testing provides early detection and thereby promotes timely diagnostic and therapeutic interventions. HRV testing may also facilitate differential diagnosis and the attribution of symptoms (e.g., erectile dysfunction, dyspepsia, and dizziness) to autonomic dysfunction. Finally, knowledge of early autonomic dysfunction can encourage patient and physician to improve metabolic control and to use therapies such as ACE inhibitors and beta-blockers, proven to be effective for patients with CAN ¹⁾.

- 1: Du Y, Neng Q, Li Y, Kang Y, Guo L, Huang X, Chen M, Yang F, Hong J, Zhou S, Zhao J, Yu F, Su H, Kong X. Gastrointestinal Autonomic Neuropathy Exacerbates Gut Microbiota Dysbiosis in Adult Patients With Type 2 Diabetes Mellitus. *Front Cell Infect Microbiol.* 2022 Feb 8;11:804733. doi: 10.3389/fcimb.2021.804733. PMID: 35211420; PMCID: PMC8861497.
- 2: Liao J, Kang A, Xia C, Young T, Tanna GLD, Arnott C, Pollock C, Krishnan AV, Agarwal R, Bakris G, Charytan DM, de Zeeuw D, Heerspink HJL, Levin A, Neal B, Wheeler DC, Zhang H, Zinman B, Mahaffey KW, Perkovic V, Jardine MJ, Smyth B. The impact of canagliflozin on the risk of neuropathy events: a post-hoc exploratory analysis of the CREDENCE trial. *Diabetes Metab.* 2022 Feb 13:101331. doi: 10.1016/j.diabet.2022.101331. Epub ahead of print. PMID: 35172198.
- 3: Fan J, Pan Q, Gao Q, Li W, Xiao F, Guo L. TSH Combined with TSHR Aggravates Diabetic Peripheral Neuropathy by Promoting Oxidative Stress and Apoptosis in Schwann Cells. *Oxid Med Cell Longev.* 2021 Nov 11;2021:2482453. doi: 10.1155/2021/2482453. PMID: 34804362; PMCID: PMC8601831.
- 4: Brahimi F, Galan A, Siegel S, Szobota S, Sarunic MV, Foster AC, Saragovi HU. Therapeutic Neuroprotection by an Engineered Neurotrophin that Selectively Activates Tropomyosin Receptor Kinase (Trk) Family Neurotrophin Receptors but Not the p75 Neurotrophin Receptor. *Mol Pharmacol.* 2021 Nov;100(5):491-501. doi: 10.1124/molpharm.121.000301. Epub 2021 Aug 31. PMID: 34470776.
- 5: Uemura T, Watanabe H, Yanai T, Kawano H, Yoshida A, Okutsu I. A Minimally Invasive Full Endoscopic Approach to Tibial Nerve Neurolysis in Diabetic Foot Neuropathy: An Alternative to Open Procedures. *Plast Reconstr Surg.* 2021 Sep 1;148(3):592-596. doi: 10.1097/PRS.00000000000008299. PMID: 34432688.
- 6: Tian J, Song T, Wang H, Wang W, Ma X, Hu Y. Toll-Like Receptor 2 Antagonist Ameliorates Type 2 Diabetes Mellitus Associated Neuropathic Pain by Repolarizing Pro-inflammatory Macrophages. *Neurochem Res.* 2021 Sep;46(9):2276-2284. doi: 10.1007/s11064-021-03365-3. Epub 2021 Jun 3. PMID: 34081245.
- 7: Duarte RV, Nevitt S, Maden M, Meier K, Taylor RS, Eldabe S, de Vos CC. Spinal cord stimulation for the management of painful diabetic neuropathy: a systematic review and meta-analysis of individual patient and aggregate data. *Pain.* 2021 Nov 1;162(11):2635-2643. doi: 10.1097/j.pain.0000000000002262. PMID: 33872236.
- 8: Petersen EA, Stauss TG, Scowcroft JA, Brooks ES, White JL, Sills SM, Amirdelfan K, Guirguis MN, Xu J, Yu C, Nairizi A, Patterson DG, Tsoulfas KC, Creamer MJ, Galan V, Bundschu RH, Paul CA, Mehta ND, Choi H, Sayed D, Lad SP, DiBenedetto DJ, Sethi KA, Goree JH, Bennett MT, Harrison NJ, Israel AF, Chang P, Wu PW, Gekht G, Argoff CE, Nasr CE, Taylor RS, Subbaroyan J, Gliner BE, Caraway DL, Mekhail NA. Effect of High-frequency (10-kHz) Spinal Cord Stimulation in Patients With Painful Diabetic

- Neuropathy: A Randomized Clinical Trial. *JAMA Neurol.* 2021 Jun 1;78(6):687-698. doi: 10.1001/jamaneurol.2021.0538. PMID: 33818600; PMCID: PMC8022268.
- 9: Agarwal P, Sharma D, Nebhani D, Kukrele R, Kukrele P. Saphenous nerve to posterior tibial nerve transfer: A new approach to restore sensations of sole in diabetic sensory polyneuropathy. *J Plast Reconstr Aesthet Surg.* 2021 Sep;74(9):2110-2119. doi: 10.1016/j.bjps.2021.01.012. Epub 2021 Feb 5. PMID: 33612426.
- 10: Shin DA, Kim TU, Chang MC. Minocycline for Controlling Neuropathic Pain: A Systematic Narrative Review of Studies in Humans. *J Pain Res.* 2021 Jan 26;14:139-145. doi: 10.2147/JPR.S292824. PMID: 33536779; PMCID: PMC7849188.
- 11: Rao S, Rajan N. Dexmedetomidine as an Adjunct for Regional Anesthetic Nerve Blocks. *Curr Pain Headache Rep.* 2021 Feb 3;25(2):8. doi: 10.1007/s11916-020-00926-z. PMID: 33533982.
- 12: Cheshire WP, Freeman R, Gibbons CH, Cortelli P, Wenning GK, Hilz MJ, Spies JM, Lipp A, Sandroni P, Wada N, Mano A, Ah Kim H, Kimpinski K, Iodice V, Idiáquez J, Thaisetthawatkul P, Coon EA, Low PA, Singer W. Electrodiagnostic assessment of the autonomic nervous system: A consensus statement endorsed by the American Autonomic Society, American Academy of Neurology, and the International Federation of Clinical Neurophysiology. *Clin Neurophysiol.* 2021 Feb;132(2):666-682. doi: 10.1016/j.clinph.2020.11.024. Epub 2020 Dec 22. Erratum in: *Clin Neurophysiol.* 2021 May;132(5):1194. PMID: 33419664.
- 13: Zhao J, Yang S, Shu B, Chen L, Yang R, Xu Y, Xie J, Liu X, Qi S. Transient High Glucose Causes Persistent Vascular Dysfunction and Delayed Wound Healing by the DNMT1-Mediated Ang-1/NF- κ B Pathway. *J Invest Dermatol.* 2021 Jun;141(6):1573-1584. doi: 10.1016/j.jid.2020.10.023. Epub 2020 Nov 28. PMID: 33259831.
- 14: Shavit-Stein E, Gofrit SG, Gayster A, Teldan Y, Ron A, Abu Bandora E, Golderman V, Gera O, Harnof S, Chapman J, Dori A. Treatment of Diabetic Neuropathy with A Novel PAR1-Targeting Molecule. *Biomolecules.* 2020 Nov 13;10(11):1552. doi: 10.3390/biom10111552. PMID: 33203057; PMCID: PMC7698286.
- 15: Ikenouchi H, Yoshimoto T, Hamano E, Saito S, Fukuma K, Washida K, Hattori Y, Kataoka H, Ihara M. Postprandial cerebral infarction resolved by extracranial- intracranial bypass surgery. *eNeurologicalSci.* 2020 Oct 14;21:100283. doi: 10.1016/j.ensci.2020.100283. PMID: 33102822; PMCID: PMC7575838.
- 16: Nolte S, van Londen M, Elting JWJ, de Greef BTA, Kuks JBM, Faber CG, Nolte IM, Groen RJM, Bakker SJL, Groothof D, Lesman-Leegte I, Berger SP, Drost G. Vibration threshold in non-diabetic subjects. *PLoS One.* 2020 Oct 7;15(10):e0237733. doi: 10.1371/journal.pone.0237733. PMID: 33027294; PMCID: PMC7540842.
- 17: Puma A, Grecu N, Villa L, Butori C, Besson T, Cambieri C, Cavalli M, Azulay N, Sacconi S, Raffaelli C. Ultra-high-frequency ultrasound imaging of sural nerve: A comparative study with nerve biopsy in progressive neuropathies. *Muscle Nerve.* 2021 Jan;63(1):46-51. doi: 10.1002/mus.27073. Epub 2020 Oct 18. PMID: 32939798.
- 18: Markova L, Umek N, Horvat S, Hadžić A, Kuroda M, Pintarič TS, Mrak V, Cvetko E. Neurotoxicity of bupivacaine and liposome bupivacaine after sciatic nerve block in healthy and streptozotocin-induced diabetic mice. *BMC Vet Res.* 2020 Jul 17;16(1):247. doi: 10.1186/s12917-020-02459-4. PMID: 32680505; PMCID: PMC7367396.

- 19: Jiang G, Xiao G, Luo C, Tang Z, Teng Z, Peng X. Correlation Between SNPs at the 3'UTR of the FGF2 Gene and Their Interaction with Environmental Factors in Han Chinese Diabetic Peripheral Neuropathy Patients. *J Mol Neurosci*. 2021 Feb;71(2):203-214. doi: 10.1007/s12031-020-01641-5. Epub 2020 Jul 1. PMID: 32613556.
- 20: Raghu ALB, Parker T, Aziz TZ, Green AL, Hadjipavlou G, Rea R, FitzGerald JJ. Invasive Electrical Neuromodulation for the Treatment of Painful Diabetic Neuropathy: Systematic Review and Meta-Analysis. *Neuromodulation*. 2021 Jan;24(1):13-21. doi: 10.1111/ner.13216. Epub 2020 Jun 26. PMID: 32588933.
- 21: Zhao W, Liang J, Chen Z, Diao Y, Miao G. Combined analysis of circRNA and mRNA profiles and interactions in patients with Diabetic Foot and Diabetes Mellitus. *Int Wound J*. 2020 Oct;17(5):1183-1193. doi: 10.1111/iwj.13420. Epub 2020 Jun 23. PMID: 32573975; PMCID: PMC7949074.
- 22: Yamasaki DS, Nickerson DS, Anderson JC. Acute Improvement in Intraoperative EMG During Common Fibular Nerve Decompression in Patients with Symptomatic Diabetic Sensorimotor Peripheral Neuropathy: EMG and Clinical Attribute Interrelations. *J Neurol Surg A Cent Eur Neurosurg*. 2020 Nov;81(6):484-494. doi: 10.1055/s-0040-1701619. Epub 2020 May 26. PMID: 32455446.
- 23: De Gregorio C, Contador D, Díaz D, Cárcamo C, Santapau D, Lobos-Gonzalez L, Acosta C, Campero M, Carpio D, Gabriele C, Gaspari M, Aliaga-Tobar V, Maracaja- Coutinho V, Ezquer M, Ezquer F. Human adipose-derived mesenchymal stem cell- conditioned medium ameliorates polyneuropathy and foot ulceration in diabetic BKS db/db mice. *Stem Cell Res Ther*. 2020 May 1;11(1):168. doi: 10.1186/s13287-020-01680-0. PMID: 32357914; PMCID: PMC7195803.
- 24: Rinkel WD, Fakkkel TM, Castro Cabezas M, Birnie E, Coert JH. (Cost-)effectiveness of lower extremity nerve decompression surgery in subjects with diabetes: the DeCompression (DECO) trial- study protocol for a randomised controlled trial. *BMJ Open*. 2020 Apr 26;10(4):e035644. doi: 10.1136/bmjopen-2019-035644. PMID: 32341044; PMCID: PMC7204866.
- 25: Hijazi MM, Buchmann SJ, Sedghi A, Illigens BM, Reichmann H, Schackert G, Siepmann T. Assessment of cutaneous axon-reflex responses to evaluate functional integrity of autonomic small nerve fibers. *Neurol Sci*. 2020 Jul;41(7):1685-1696. doi: 10.1007/s10072-020-04293-w. Epub 2020 Mar 3. PMID: 32125538; PMCID: PMC7359149.
- 26: Lai YR, Huang CC, Chiu WC, Liu RT, Tsai NW, Wang HC, Lin WC, Cheng BC, Su YJ, Su CM, Hsiao SY, Wang PW, Chen JF, Ko JY, Lu CH. The role of blink reflex R1 latency as an electrophysiological marker in diabetic distal symmetrical polyneuropathy. *Clin Neurophysiol*. 2020 Jan;131(1):34-39. doi: 10.1016/j.clinph.2019.09.022. Epub 2019 Nov 5. PMID: 31751837.
- 27: Lai YR, Huang CC, Chiu WC, Liu RT, Tsai NW, Wang HC, Lin WC, Cheng BC, Su YJ, Su CM, Hsiao SY, Chang HW, Chen JF, Ko JY, Lu CH. Sural nerve sensory response in diabetic distal symmetrical polyneuropathy. *Muscle Nerve*. 2020 Jan;61(1):88-94. doi: 10.1002/mus.26739. Epub 2019 Nov 1. PMID: 31614013.
- 28: Glatte P, Buchmann SJ, Hijazi MM, Illigens BM, Siepmann T. Architecture of the Cutaneous Autonomic Nervous System. *Front Neurol*. 2019 Sep 10;10:970. doi: 10.3389/fneur.2019.00970. PMID: 31551921; PMCID: PMC6746903.
- 29: Ekman L, Thrainsdottir S, Englund E, Thomsen N, Rosén I, Hazer Rosberg DB, Petersson J, Eriksson KF, Dahlin LB. Evaluation of small nerve fiber dysfunction in type 2 diabetes. *Acta Neurol Scand*. 2020

Jan;141(1):38-46. doi: 10.1111/ane.13171. Epub 2019 Oct 9. PMID: 31549387.

30: Chukhlovina ML, Chukhlov AA. Osobennosti diagnostiki i lecheniia diabeticheskoi polineuropatii u patsientov starshikh vozrastnykh grupp [Specifics of diagnosis and treatment of diabetic polyneuropathy in elderly patients]. Zh Nevrol Psikhiatr Im S S Korsakova. 2019;119(6):42-46. Russian. doi: 10.17116/jnevro201911906142. PMID: 31407680.

31: Kong D, Guo Z, Yang W, Wang Q, Yu Y, Zhang L. Tanshinone II A Affects Diabetic Peripheral Neuropathic Pain via Spinal Dorsal Horn Neuronal Circuitry by Modulating Endoplasmic Reticulum Stress Pathways. Exp Clin Endocrinol Diabetes. 2020 Jan;128(1):59-65. doi: 10.1055/a-0919-4614. Epub 2019 Jul 11. PMID: 31295750.

32: Cao BL, Yao Y, Xu YX, Fang J, Song WJ, Hu B, Guo QY, Lu B, Li J, Gu P, Shao JQ. The Relationship Between β -cell Function Indices and Sudomotor Function in Chinese Patients with Type 2 Diabetes. Exp Clin Endocrinol Diabetes. 2021 Aug;129(8):553-559. doi: 10.1055/a-0950-9828. Epub 2019 Jul 3. PMID: 31269513.

33: Cabal Mirabal CA, Berlanga Acosta J, Fernández Montequín J, Oramas Díaz L, González Dalmau E, Herrera Martínez L, Sauri JE, Balamero Hernández J, Savigne Gutiérrez W, Valdés JL, Tabio Reyes AL, Pérez Pérez SC, Valdés Pérez C, Armstrong AA, Armstrong DG. Quantitative Studies of Diabetic Foot Ulcer Evolution Under Treatment by Digital Stereotactic Photography. J Diabetes Sci Technol. 2019 Sep;13(5):821-826. doi: 10.1177/1932296819853843. Epub 2019 Jun 13. PMID: 31195816; PMCID: PMC6955448.

34: Lai YR, Huang CC, Chiu WC, Liu RT, Tsai NW, Wang HC, Lin WC, Cheng BC, Su YJ, Su CM, Hsiao SY, Wang PW, Chen JF, Ko JY, Lu CH. Close relationship between cardiovagal function and sural sensory nerve action potential in type 2 diabetes. Clin Neurophysiol. 2019 Jul;130(7):1160-1165. doi: 10.1016/j.clinph.2019.03.036. Epub 2019 May 8. PMID: 31102989.

35: Filimonov RV, Filimonova IV, Shapoval SD, Kobeliatskyi YY. Comparative analysis of the methods of anesthetic maintenance in patients with diabetes with the syndrome of diabetic foot requiring operative intervention. Wiad Lek. 2019;72(4):558-561. PMID: 31055532.

36: Yu ZY, Geng J, Li ZQ, Sun YB, Wang SL, Masters J, Wang DX, Guo XY, Li M, Ma D. Dexmedetomidine enhances ropivacaine-induced sciatic nerve injury in diabetic rats. Br J Anaesth. 2019 Jan;122(1):141-149. doi: 10.1016/j.bja.2018.08.022. Epub 2018 Oct 4. PMID: 30579393.

37: Wang QQ, Zhai C, Wahafu A, Zhu YT, Liu YH, Sun LQ. Salvianolic acid B inhibits the development of diabetic peripheral neuropathy by suppressing autophagy and apoptosis. J Pharm Pharmacol. 2019 Mar;71(3):417-428. doi: 10.1111/jphp.13044. Epub 2018 Dec 7. PMID: 30537209.

38: Wang Q, Zhang L. Reply: Two-Point Discrimination Predicts Pain Relief after Lower Limb Nerve Decompression for Painful Diabetic Peripheral Neuropathy. Plast Reconstr Surg. 2019 Feb;143(2):447e-448e. doi: 10.1097/PRS.00000000000005245. PMID: 30516754.

39: Gromova OA, Torshin IY, Stakhovskaya LV, Pepelyaev EG, Semenov VA, Nazarenko AG. Opyt primeneniia meksidola v nevrologicheskoi praktike [Experience with mexidol in neurological practice]. Zh Nevrol Psikhiatr Im S S Korsakova. 2018;118(10):97-107. Russian. doi: 10.17116/jnevro201811810197. PMID: 30499505.

40: Ramdharry G. Peripheral nerve disease. Handb Clin Neurol. 2018;159:403-415. doi: 10.1016/B978-0-444-63916-5.00026-4. PMID: 30482330.

- 41: Eroğlu A, Sarı E, Topuz AK, Şimşek H, Pusat S. Recurrent carpal tunnel syndrome: Evaluation and treatment of the possible causes. *World J Clin Cases*. 2018 Sep 26;6(10):365-372. doi: 10.12998/wjcc.v6.i10.365. PMID: 30283799; PMCID: PMC6163139.
- 42: Sun X, Xu J, Ni Y, Qin W, Jin Y. CT-Guided Consecutive Neurolytic Celiac Plexus Block for the Management of Refractory Abdominal Neuralgia Caused by Diabetic Neuropathy. *J Vasc Interv Radiol*. 2018 Oct;29(10):1474-1476. doi: 10.1016/j.jvir.2018.05.003. PMID: 30266227.
- 43: McCormack EP, Alam M, Erickson NJ, Cherrick AA, Powell E, Sherman JH. Use of MRI in diabetic lumbosacral radiculoplexus neuropathy: case report and review of the literature. *Acta Neurochir (Wien)*. 2018 Nov;160(11):2225-2227. doi: 10.1007/s00701-018-3664-z. Epub 2018 Sep 10. PMID: 30203363.
- 44: Han K, Liu C, Shi X, Rao X. Effects of alprostadil combined with calcium dobesilate in patients with diabetic peripheral neuropathy. *Neuro Endocrinol Lett*. 2018 May;39(2):143-147. PMID: 30183208.
- 45: Baeriswyl M, Taffé P, Kirkham KR, Bathory I, Rancati V, Crevoisier X, Cherix S, Albrecht E. Comparison of peripheral nerve blockade characteristics between non-diabetic patients and patients suffering from diabetic neuropathy: a prospective cohort study. *Anaesthesia*. 2018 Sep;73(9):1110-1117. doi: 10.1111/anae.14347. Epub 2018 Jun 2. PMID: 29858510.
- 46: Li R, Li Y, Wu Y, Zhao Y, Chen H, Yuan Y, Xu K, Zhang H, Lu Y, Wang J, Li X, Jia X, Xiao J. Heparin-Poloxamer Thermosensitive Hydrogel Loaded with bFGF and NGF Enhances Peripheral Nerve Regeneration in Diabetic Rats. *Biomaterials*. 2018 Jun;168:24-37. doi: 10.1016/j.biomaterials.2018.03.044. Epub 2018 Mar 26. PMID: 29609091; PMCID: PMC5935004.
- 47: Liao C, Nickerson DS, Visocchi M, Yang M, Liu P, Zhong W, Zhou H, Zhang W. Mechanical Allodynia Predicts Better Outcome of Surgical Decompression for Painful Diabetic Peripheral Neuropathy. *J Reconstr Microsurg*. 2018 Jul;34(6):446-454. doi: 10.1055/s-0038-1636938. Epub 2018 Mar 22. PMID: 29566410.
- 48: Maguire SC, Fleming CA, O'Brien G, McGreal G. Lumbar sympathectomy can improve symptoms associated with ischaemia, vasculitis, diabetic neuropathy and hyperhidrosis affecting the lower extremities-a single-centre experience. *Ir J Med Sci*. 2018 Nov;187(4):1045-1049. doi: 10.1007/s11845-018-1775-4. Epub 2018 Mar 7. PMID: 29516399.
- 49: Wang Q, Guo ZL, Yu YB, Yang WQ, Zhang L. Two-Point Discrimination Predicts Pain Relief after Lower Limb Nerve Decompression for Painful Diabetic Peripheral Neuropathy. *Plast Reconstr Surg*. 2018 Mar;141(3):397e-403e. doi: 10.1097/PRS.0000000000004171. PMID: 29481409.
- 50: Liao C, Yang M, Liu P, Zhong W, Zhang W. Stable Rat Model of Mechanical Allodynia in Diabetic Peripheral Neuropathy: The Role of Nerve Compression. *J Reconstr Microsurg*. 2018 May;34(4):264-269. doi: 10.1055/s-0037-1621723. Epub 2018 Feb 2. PMID: 29396983.
- 51: Ri-Ge-le A, Guo ZL, Wang Q, Zhang BJ, Kong DW, Yang WQ, Yu YB, Zhang L. Tanshinone IIA Improves Painful Diabetic Neuropathy by Suppressing the Expression and Activity of Voltage-Gated Sodium Channel in Rat Dorsal Root Ganglia. *Exp Clin Endocrinol Diabetes*. 2018 Nov;126(10):632-639. doi: 10.1055/s-0044-100722. Epub 2018 Jan 31. PMID: 29388177.
- 52: Erasso D, Tender GC, Li Q, Yan J, Culicchia F, Abdi S, Cui J. The Effects of Agrin Isoforms on Diabetic Neuropathic Pain in a Rat Streptozotocin Model. *Anesth Analg*. 2018 Oct;127(4):1051-1057. doi: 10.1213/ANE.0000000000002773. PMID: 29369095.

- 53: Ten Hoope W, Hollmann MW, de Bruin K, Verberne HJ, Verkerk AO, Tan HL, Verhamme C, Horn J, Rigaud M, Picardi S, Lirk P. Pharmacodynamics and Pharmacokinetics of Lidocaine in a Rodent Model of Diabetic Neuropathy. *Anesthesiology*. 2018 Mar;128(3):609-619. doi: 10.1097/ALN.0000000000002035. PMID: 29251644.
- 54: Lai HY, Foo LL, Lim SM, Yong CF, Loh PS, Chaw SH, Hasan MS, Wang CY. The hemodynamic and pain impact of peripheral nerve block versus spinal anesthesia in diabetic patients undergoing diabetic foot surgery. *Clin Auton Res*. 2020 Feb;30(1):53-60. doi: 10.1007/s10286-017-0485-8. Epub 2017 Dec 1. PMID: 29196938.
- 55: Ji ZH, Liu ZJ, Liu ZT, Zhao W, Williams BA, Zhang HF, Li L, Xu SY. Diphenyleneiodonium Mitigates Bupivacaine-Induced Sciatic Nerve Damage in a Diabetic Neuropathy Rat Model by Attenuating Oxidative Stress. *Anesth Analg*. 2017 Aug;125(2):653-661. doi: 10.1213/ANE.0000000000002186. PMID: 28682956.
- 56: Li R, Ma J, Wu Y, Nangle M, Zou S, Li Y, Yin J, Zhao Y, Xu H, Zhang H, Li X, Ye QS, Wang J, Xiao J. Dual Delivery of NGF and bFGF Coacervate Ameliorates Diabetic Peripheral Neuropathy via Inhibiting Schwann Cells Apoptosis. *Int J Biol Sci*. 2017 May 16;13(5):640-651. doi: 10.7150/ijbs.18636. PMID: 28539836; PMCID: PMC5441180.
- 57: Carricarte Naranjo C, Sanchez-Rodriguez LM, Brown Martínez M, Estévez Báez M, Machado García A. Permutation entropy analysis of heart rate variability for the assessment of cardiovascular autonomic neuropathy in type 1 diabetes mellitus. *Comput Biol Med*. 2017 Jul 1;86:90-97. doi: 10.1016/j.combiomed.2017.05.003. Epub 2017 May 8. PMID: 28527351.
- 58: Tannemaat MR, Datema M, van Dijk JG, Midha R, Malessy MJA. In Reply: Decompressive Surgery for Diabetic Neuropathy: Waiting for Incontrovertible Proof. *Neurosurgery*. 2017 Sep 1;81(3):E35. doi: 10.1093/neuros/nyx193. PMID: 28472403.
- 59: Sun J, Feng X, Zhu Q, Lin W, Guo H, Ansong E, Liu L. Analgesic effect of perineural magnesium sulphate for sciatic nerve block for diabetic toe amputation: A randomized trial. *PLoS One*. 2017 May 2;12(5):e0176589. doi: 10.1371/journal.pone.0176589. PMID: 28464014; PMCID: PMC5413065.
- 60: Liao C. Letter: Decompressive Surgery for Diabetic Neuropathy: Waiting for Incontrovertible Proof. *Neurosurgery*. 2017 Sep 1;81(3):E33-E34. doi: 10.1093/neuros/nyx192. PMID: 28419341.
- 61: Zhong W, Yang M, Zhang W, Visocchi M, Chen X, Liao C. Improved neural microcirculation and regeneration after peripheral nerve decompression in DPN rats. *Neurol Res*. 2017 Apr;39(4):285-291. doi: 10.1080/01616412.2017.1297557. Epub 2017 Mar 14. PMID: 28290778.
- 62: van Beek M, van Kleef M, Linderöth B, van Kuijk SM, Honig WM, Joosten EA. Spinal cord stimulation in experimental chronic painful diabetic polyneuropathy: Delayed effect of High-frequency stimulation. *Eur J Pain*. 2017 May;21(5):795-803. doi: 10.1002/ejp.981. Epub 2016 Nov 28. PMID: 27891705; PMCID: PMC5412908.
- 63: Tannemaat MR, Datema M, van Dijk JG, Midha R, Malessy MJ. Decompressive Surgery for Diabetic Neuropathy: Waiting for Incontrovertible Proof. *Neurosurgery*. 2016 Dec;79(6):783-785. doi: 10.1227/NEU.0000000000001448. PMID: 27861415.
- 64: Zhao WN, Xu SQ, Liang JF, Peng L, Liu HL, Wang Z, Fang Q, Wang M, Yin WQ, Zhang WJ, Lou JN. Endothelial progenitor cells from human fetal aorta cure diabetic foot in a rat model. *Metabolism*. 2016 Dec;65(12):1755-1767. doi: 10.1016/j.metabol.2016.09.007. Epub 2016 Sep 28. PMID: 27832863.

- 65: Yang W, Guo Z, Yu Y, Xu J, Zhang L. Pain Relief and Health-Related Quality- of-Life Improvement After Microsurgical Decompression of Entrapped Peripheral Nerves in Patients With Painful Diabetic Peripheral Neuropathy. *J Foot Ankle Surg.* 2016 Nov-Dec;55(6):1185-1189. doi: 10.1053/j.jfas.2016.07.004. Epub 2016 Sep 3. PMID: 27600489.
- 66: Nagasaki K, Obara H, Tanaka K, Koyano K, Asamia A, Kitagawa Y. Peripheral nerve crushing to relieve chronic pain in diabetic and ischaemic foot ulcers. *J Wound Care.* 2016 Aug;25(8):470-4. doi: 10.12968/jowc.2016.25.8.470. PMID: 27523659.
- 67: Byun SH, Lee J, Kim JH. Ultrasound-guided bilateral combined inguinal femoral and subgluteal sciatic nerve blocks for simultaneous bilateral below- knee amputations due to bilateral diabetic foot gangrene unresponsive to peripheral arterial angioplasty and bypass surgery in a coagulopathic patient on antiplatelet therapy with a history of percutaneous coronary intervention for ischemic heart disease: A case report. *Medicine (Baltimore).* 2016 Jul;95(29):e4324. doi: 10.1097/MD.0000000000004324. PMID: 27442683; PMCID: PMC5265800.
- 68: Dones I, Zanin L, Marongiu I, Levi V, Chiapparini L, Rizzi M. Severe Pain and Edema due to a Widespread Lymphangioma: Disappearance of Symptoms and Reduction of Lesion with Spinal Cord Stimulation. *World Neurosurg.* 2016 Sep;93:487.e1-3. doi: 10.1016/j.wneu.2016.06.129. Epub 2016 Jul 8. PMID: 27402439.
- 69: DuBrava S, Mardekian J, Sadosky A, Bienen EJ, Parsons B, Hopps M, Markman J. Using Random Forest Models to Identify Correlates of a Diabetic Peripheral Neuropathy Diagnosis from Electronic Health Record Data. *Pain Med.* 2017 Jan 1;18(1):107-115. doi: 10.1093/pm/pnw096. PMID: 27252307.
- 70: Kramerov AA, Saghizadeh M, Ljubimov AV. Adenoviral Gene Therapy for Diabetic Keratopathy: Effects on Wound Healing and Stem Cell Marker Expression in Human Organ-cultured Corneas and Limbal Epithelial Cells. *J Vis Exp.* 2016 Apr 7;(110):e54058. doi: 10.3791/54058. PMID: 27077448; PMCID: PMC4841362.
- 71: Heschl S, Hallmann B, Zilke T, Gemes G, Schoerghuber M, Auer-Grumbach M, Quehenberger F, Lirk P, Hogan Q, Rigaud M. Diabetic neuropathy increases stimulation threshold during popliteal sciatic nerve block. *Br J Anaesth.* 2016 Apr;116(4):538-45. doi: 10.1093/bja/aew027. PMID: 26994231; PMCID: PMC4797685.
- 72: Duarte RV, Andronis L, Lenders MW, de Vos CC. Quality of life increases in patients with painful diabetic neuropathy following treatment with spinal cord stimulation. *Qual Life Res.* 2016 Jul;25(7):1771-7. doi: 10.1007/s11136-015-1211-4. Epub 2015 Dec 22. PMID: 26694963; PMCID: PMC4893357.
- 73: Tian R, Yang W, Xue Q, Gao L, Huo J, Ren D, Chen X. Rutin ameliorates diabetic neuropathy by lowering plasma glucose and decreasing oxidative stress via Nrf2 signaling pathway in rats. *Eur J Pharmacol.* 2016 Jan 15;771:84-92. doi: 10.1016/j.ejphar.2015.12.021. Epub 2015 Dec 10. PMID: 26688570.
- 74: Lee EJ, Yang HK, Kim TW, Hwang JM, Kim YH, Kim CY. Comparison of the Pattern of Retinal Ganglion Cell Damage Between Patients With Compressive and Glaucomatous Optic Neuropathies. *Invest Ophthalmol Vis Sci.* 2015 Nov;56(12):7012-20. doi: 10.1167/iovs.15-17909. PMID: 26523385.
- 75: Hu P, Mei QY, Ma L, Cui WG, Zhou WH, Zhou DS, Zhao Q, Xu DY, Zhao X, Lu Q, Hu ZY. Secoisolariciresinol diglycoside, a flaxseed lignan, exerts analgesic effects in a mouse model of type 1 diabetes: Engagement of antioxidant mechanism. *Eur J Pharmacol.* 2015 Nov 15;767:183-92. doi:

10.1016/j.ejphar.2015.10.024. Epub 2015 Oct 19. PMID: 26494631.

76: Callaghan BC, Price RS, Chen KS, Feldman EL. The Importance of Rare Subtypes in Diagnosis and Treatment of Peripheral Neuropathy: A Review. *JAMA Neurol.* 2015 Dec;72(12):1510-8. doi: 10.1001/jamaneurol.2015.2347. PMID: 26437251; PMCID: PMC5087804.

77: Campero M, Ezquer M, Ezquer F. Nerve excitability and structural changes in myelinated axons from diabetic mice. *Exp Clin Endocrinol Diabetes.* 2015 Sep;123(8):485-91. doi: 10.1055/s-0035-1559606. Epub 2015 Aug 18. PMID: 26285066.

78: Kiefe TM, Pintea B. The Usefulness of Spinal Cord Stimulation for Chronic Pain Due to Combined Vasospastic Prinzmetal Angina and Diabetic Neuropathic Pain of the Lower Limbs. *J Neurol Surg A Cent Eur Neurosurg.* 2016 Mar;77(2):176-8. doi: 10.1055/s-0034-1543960. Epub 2015 Aug 3. PMID: 26238940.

79: Barreiro TJ, Asiimwe DD, Gemmel D, Brine P. Catastrophic chest pain: blinded by cardiopulmonary disease. *BMJ Case Rep.* 2015 Jul 1;2015:bcr2015209928. doi: 10.1136/bcr-2015-209928. PMID: 26135489; PMCID: PMC4493218.

80: Shapoval SD, Savon IL, Sofilkanych MM. [Prolonged blockade of nervus ischiadicus in a system of complex treatment of patients, suffering complicated diabetic foot syndrome]. *Klin Khir.* 2015 Mar;(3):52-4. Ukrainian. PMID: 26072546.

81: Fukuda K, Kanazawa H, Aizawa Y, Ardell JL, Shivkumar K. Cardiac innervation and sudden cardiac death. *Circ Res.* 2015 Jun 5;116(12):2005-19. doi: 10.1161/CIRCRESAHA.116.304679. PMID: 26044253; PMCID: PMC4465108.

82: Lee YF, Lin CC, Cheng JS, Chen GS. Nerve conduction block in diabetic rats using high-intensity focused ultrasound for analgesic applications. *Br J Anaesth.* 2015 May;114(5):840-6. doi: 10.1093/bja/aeu443. Epub 2015 Jan 16. PMID: 25904608.

83: Ruhdorfer AS, Azaryan M, Kraus J, Grinzinger S, Hitzl W, Ebmer J, Dellon AL, Hölzl B. Selecting a prospective test for early detection of diabetic polyneuropathy. *Microsurgery.* 2015 Oct;35(7):512-7. doi: 10.1002/micr.22409. Epub 2015 Apr 3. PMID: 25847628.

84: Sadosky A, Mardekian J, Parsons B, Hopps M, Bienen EJ, Markman J. Healthcare utilization and costs in diabetes relative to the clinical spectrum of painful diabetic peripheral neuropathy. *J Diabetes Complications.* 2015 Mar;29(2):212-7. doi: 10.1016/j.jdiacomp.2014.10.013. Epub 2014 Nov 8. PMID: 25498300.

85: Liao C, Zhang W, Yang M, Ma Q, Li G, Zhong W. Surgical decompression of painful diabetic peripheral neuropathy: the role of pain distribution. *PLoS One.* 2014 Oct 7;9(10):e109827. doi: 10.1371/journal.pone.0109827. PMID: 25290338; PMCID: PMC4188608.

86: de Vos CC, Meier K, Zaalberg PB, Nijhuis HJ, Duyvendak W, Vesper J, Enggaard TP, Lenders MW. Spinal cord stimulation in patients with painful diabetic neuropathy: a multicentre randomized clinical trial. *Pain.* 2014 Nov;155(11):2426-31. doi: 10.1016/j.pain.2014.08.031. Epub 2014 Aug 29. PMID: 25180016.

87: Janovsky CC, Rolim LC, de Sá JR, Poyares D, Tufik S, Silva AB, Dib SA. Cardiovascular autonomic neuropathy contributes to sleep apnea in young and lean type 1 diabetes mellitus patients. *Front Endocrinol (Lausanne).* 2014 Aug 11;5:119. doi: 10.3389/fendo.2014.00119. PMID: 25157241; PMCID: PMC4127968.

- 88: Lirk P, Verhamme C, Boeckh R, Stevens MF, ten Hoope W, Gerner P, Blumenthal S, de Girolami U, van Schaik IN, Hollmann MW, Picardi S. Effects of early and late diabetic neuropathy on sciatic nerve block duration and neurotoxicity in Zucker diabetic fatty rats. *Br J Anaesth*. 2015 Feb;114(2):319-26. doi: 10.1093/bja/aeu270. Epub 2014 Aug 21. PMID: 25145353.
- 89: Denjalić A, Bečulić H, Jusić A, Bečulić L. Evaluation of the surgical treatment of diabetic foot. *Med Glas (Zenica)*. 2014 Aug;11(2):307-12. PMID: 25082245.
- 90: Zhong W, Zhang W, Yang M, Li G, Ma Q, Yang X. Impact of diabetes mellitus duration on effect of lower extremity nerve decompression in 1,526 diabetic peripheral neuropathy patients. *Acta Neurochir (Wien)*. 2014 Jul;156(7):1329-33. doi: 10.1007/s00701-014-2087-8. Epub 2014 Apr 24. PMID: 24760499.
- 91: van Maurik JFMM, van Hal M, van Eijk RPA, Kon M, Peters EJG. Value of surgical decompression of compressed nerves in the lower extremity in patients with painful diabetic neuropathy: a randomized controlled trial. *Plast Reconstr Surg*. 2014 Aug;134(2):325-332. doi: 10.1097/PRS.0000000000000369. PMID: 24732651.
- 92: de Vos CC, Bom MJ, Vanneste S, Lenders MW, de Ridder D. Burst spinal cord stimulation evaluated in patients with failed back surgery syndrome and painful diabetic neuropathy. *Neuromodulation*. 2014 Feb;17(2):152-9. doi: 10.1111/ner.12116. Epub 2013 Sep 24. PMID: 24655043.
- 93: Lin YC, Kao CH, Cheng YK, Chen JJ, Yao CH, Chen YS. Current-modulated Electrostimulation as a treatment for peripheral nerve regeneration in diabetic rats. *Restor Neurol Neurosci*. 2014;32(3):437-46. doi: 10.3233/RNN-130381. PMID: 24595226.
- 94: Singh B, Singh V, Krishnan A, Koshy K, Martinez JA, Cheng C, Almquist C, Zochodne DW. Regeneration of diabetic axons is enhanced by selective knockdown of the PTEN gene. *Brain*. 2014 Apr;137(Pt 4):1051-67. doi: 10.1093/brain/awu031. Epub 2014 Feb 27. PMID: 24578546; PMCID: PMC3959560.
- 95: Nickerson DS, Rader AJ. Nerve decompression after diabetic foot ulceration may protect against recurrence: a 3-year controlled, prospective analysis. *J Am Podiatr Med Assoc*. 2014 Jan-Feb;104(1):66-70. doi: 10.7547/0003-0538-104.1.66. PMID: 24504579.
- 96: Bekircan-Kurt CE, Uçeyler N, Sommer C. Cutaneous activation of rage in nonsystemic vasculitic and diabetic neuropathy. *Muscle Nerve*. 2014 Sep;50(3):377-83. doi: 10.1002/mus.24164. Epub 2014 May 17. PMID: 24395344.
- 97: Lunn MP, Hughes RA, Wiffen PJ. Duloxetine for treating painful neuropathy, chronic pain or fibromyalgia. *Cochrane Database Syst Rev*. 2014 Jan 3;(1):CD007115. doi: 10.1002/14651858.CD007115.pub3. PMID: 24385423.
- 98: Dworkin RH, O'Connor AB, Kent J, Mackey SC, Raja SN, Stacey BR, Levy RM, Backonja M, Baron R, Harke H, Loeser JD, Treede RD, Turk DC, Wells CD. Interventional management of neuropathic pain: NeuPSIG recommendations. *Pain*. 2013 Nov;154(11):2249-2261. doi: 10.1016/j.pain.2013.06.004. Epub 2013 Jun 6. PMID: 23748119; PMCID: PMC4484720.
- 99: Backonja MM, Attal N, Baron R, Bouhassira D, Drangholt M, Dyck PJ, Edwards RR, Freeman R, Gracely R, Haanpaa MH, Hansson P, Hatem SM, Krumova EK, Jensen TS, Maier C, Mick G, Rice AS, Rolke R, Treede RD, Serra J, Toelle T, Tugnoli V, Walk D, Walalce MS, Ware M, Yarnitsky D, Ziegler D. Value of quantitative sensory testing in neurological and pain disorders: NeuPSIG consensus. *Pain*.

2013 Sep;154(9):1807-1819. doi: 10.1016/j.pain.2013.05.047. Epub 2013 Jun 3. Erratum in: Pain. 2014 Jan;155(1):205. PMID: 23742795.

100: Zhang W, Zhong W, Yang M, Shi J, Guowei L, Ma Q. Evaluation of the clinical efficacy of multiple lower-extremity nerve decompression in diabetic peripheral neuropathy. *Br J Neurosurg*. 2013 Dec;27(6):795-9. doi: 10.3109/02688697.2013.798854. Epub 2013 May 29. PMID: 23713665.

101: Valdivia Valdivia JM, Weinand M, Maloney CT Jr, Blount AL, Dellon AL. Surgical treatment of superimposed, lower extremity, peripheral nerve entrapments with diabetic and idiopathic neuropathy. *Ann Plast Surg*. 2013 Jun;70(6):675-9. doi: 10.1097/SAP.0b013e3182764fb0. PMID: 23673565.

102: Keyl C, Held T, Albiez G, Schmack A, Wiesenack C. Increased electrical nerve stimulation threshold of the sciatic nerve in patients with diabetic foot gangrene: a prospective parallel cohort study. *Eur J Anaesthesiol*. 2013 Jul;30(7):435-40. doi: 10.1097/EJA.0b013e328360bd85. PMID: 23624746.

103: Sertoz N, Deniz MN, Ayanoglu HO. Relationship between glycosylated hemoglobin level and sciatic nerve block performance in diabetic patients. *Foot Ankle Int*. 2013 Jan;34(1):85-90. doi: 10.1177/1071100712460366. PMID: 23386766.

104: Cuvillon P, Reubrecht V, Zoric L, Lemoine L, Belin M, Ducombs O, Birenbaum A, Riou B, Langeron O. Comparison of subgluteal sciatic nerve block duration in type 2 diabetic and non-diabetic patients. *Br J Anaesth*. 2013 May;110(5):823-30. doi: 10.1093/bja/aes496. Epub 2013 Jan 24. PMID: 23348203.

105: Zhang W, Li S, Zheng X. Evaluation of the clinical efficacy of multiple lower extremity nerve decompression in diabetic peripheral neuropathy. *J Neurol Surg A Cent Eur Neurosurg*. 2013 Mar;74(2):96-100. doi: 10.1055/s-0032-1320029. Epub 2012 Dec 18. PMID: 23250876.

106: Juranek JK, Geddis MS, Song F, Zhang J, Garcia J, Rosario R, Yan SF, Brannagan TH, Schmidt AM. RAGE deficiency improves postinjury sciatic nerve regeneration in type 1 diabetic mice. *Diabetes*. 2013 Mar;62(3):931-43. doi: 10.2337/db12-0632. Epub 2012 Nov 19. PMID: 23172920; PMCID: PMC3581233.

107: Ibinson JW, Mangione MP, Williams BA. Local anesthetics in diabetic rats (and patients): shifting from a known slippery slope toward a potentially better multimodal perineural paradigm? *Reg Anesth Pain Med*. 2012 Nov-Dec;37(6):574-6. doi: 10.1097/AAP.0b013e31826e5218. PMID: 23086347.

108: Lirk P, Flatz M, Haller I, Hausott B, Blumenthal S, Stevens MF, Suzuki S, Klimaschewski L, Gerner P. In Zucker diabetic fatty rats, subclinical diabetic neuropathy increases in vivo lidocaine block duration but not in vitro neurotoxicity. *Reg Anesth Pain Med*. 2012 Nov-Dec;37(6):601-6. doi: 10.1097/AAP.0b013e3182664afb. PMID: 23011115; PMCID: PMC3480545.

109: Ibitoye RT, Rajbhandari SM. Neuropathic truncal pain—a case series. *QJM*. 2012 Oct;105(10):1027-31. doi: 10.1093/qjmed/hcs128. Epub 2012 Jul 20. PMID: 22820611.

110: Saxena AK, Mandhyan R. Multimodal approach for the management of Hunan hand syndrome: a case report. *Pain Pract*. 2013 Mar;13(3):227-30. doi: 10.1111/j.1533-2500.2012.00567.x. Epub 2012 Jun 11. PMID: 22681338.

111: Homs J, Ariza L, Pagès G, Verdú E, Casals L, Udina E, Chillón M, Bosch A, Navarro X. Comparative study of peripheral neuropathy and nerve regeneration in NOD and ICR diabetic mice. *J Peripher Nerv Syst*. 2011 Sep;16(3):213-27. doi: 10.1111/j.1529-8027.2011.00345.x. PMID: 22003936.

- 112: Malysz T, Ilha J, Severo do Nascimento P, Faccioni-Heuser MC, De Angelis K, D'agord Schaan B, Achaval M. Exercise training improves the soleus muscle morphology in experimental diabetic nerve regeneration. *Muscle Nerve*. 2011 Oct;44(4):571-82. doi: 10.1002/mus.22133. PMID: 21922469.
- 113: Sander SV. [Partial denervation in complex treatment of occlusive diseases of the lower extremity arteries]. *Klin Khir*. 2011 Mar;(3):45-8. Ukrainian. PMID: 21698817.
- 114: Ebenezer GJ, O'Donnell R, Hauer P, Cimino NP, McArthur JC, Polydefkis M. Impaired neurovascular repair in subjects with diabetes following experimental intracutaneous axotomy. *Brain*. 2011 Jun;134(Pt 6):1853-63. doi: 10.1093/brain/awr086. PMID: 21616974; PMCID: PMC3140859.
- 115: Pondaag W, Allen RH, Malessy MJ. Correlating birthweight with neurological severity of obstetric brachial plexus lesions. *BJOG*. 2011 Aug;118(9):1098-103. doi: 10.1111/j.1471-0528.2011.02942.x. Epub 2011 Apr 11. PMID: 21481148.
- 116: Vinik A. Discussion. The role of peripheral nerve surgery in diabetic limb salvage. *Plast Reconstr Surg*. 2011 Jan;127 Suppl 1:275S-278S. doi: 10.1097/PRS.0b013e3182012cfe. PMID: 21200302.
- 117: Dellon AL. Discussion. The role of peripheral nerve surgery in diabetic limb salvage. *Plast Reconstr Surg*. 2011 Jan;127 Suppl 1:270S-274S. doi: 10.1097/PRS.0b013e3182006831. PMID: 21200301.
- 118: Ducic I, Felder JM 3rd, Iorio ML. The role of peripheral nerve surgery in diabetic limb salvage. *Plast Reconstr Surg*. 2011 Jan;127 Suppl 1:259S-269S. doi: 10.1097/PRS.0b013e31820063d4. PMID: 21200300.
- 119: Urban MJ, Li C, Yu C, Lu Y, Krise JM, McIntosh MP, Rajewski RA, Blagg BS, Dobrowsky RT. Inhibiting heat-shock protein 90 reverses sensory hypoalgesia in diabetic mice. *ASN Neuro*. 2010 Aug 11;2(4):e00040. doi: 10.1042/AN20100015. PMID: 20711301; PMCID: PMC2919983.
- 120: Kocum A, Turkoz A, Bozdogan N, Caliskan E, Eker EH, Arslan G. Femoral and sciatic nerve block with 0.25% bupivacaine for surgical management of diabetic foot syndrome: an anesthetic technique for high-risk patients with diabetic nephropathy. *J Clin Anesth*. 2010 Aug;22(5):363-6. doi: 10.1016/j.jclinane.2009.04.009. PMID: 20650384.
- 121: Kroin JS, Buvanendran A, Williams DK, Wagenaar B, Moric M, Tuman KJ, Kerns JM. Local anesthetic sciatic nerve block and nerve fiber damage in diabetic rats. *Reg Anesth Pain Med*. 2010 Jul-Aug;35(4):343-50. doi: 10.1097/aap.0b013e3181e82df0. PMID: 20607875.
- 122: Williams BA. Toward a potential paradigm shift for the clinical care of diabetic patients requiring perineural analgesia: strategies for using the diabetic rodent model. *Reg Anesth Pain Med*. 2010 Jul-Aug;35(4):329-32. doi: 10.1097/AAP.0b013e3181e82e0b. PMID: 20588148; PMCID: PMC2943239.
- 123: Olney N, Rosen H. AVP-923, a combination of dextromethorphan hydrobromide and quinidine sulfate for the treatment of pseudobulbar affect and neuropathic pain. *IDrugs*. 2010 Apr;13(4):254-65. PMID: 20373255.
- 124: Chen YS, Chung SS, Chung SK. Aldose reductase deficiency improves Wallerian degeneration and nerve regeneration in diabetic thy1-YFP mice. *J Neuropathol Exp Neurol*. 2010 Mar;69(3):294-305. doi: 10.1097/NEN.0b013e3181d26487. PMID: 20142761.
- 125: Federici T, Boulis NM. Invited review: festschrift edition of neurosurgery peripheral nervous

system as a conduit for delivering therapies for diabetic neuropathy, amyotrophic lateral sclerosis, and nerve regeneration. *Neurosurgery*. 2009 Oct;65(4 Suppl):A87-92. doi: 10.1227/01.NEU.0000335653.52938.F2. PMID: 19927084.

126: Busik JV, Tikhonenko M, Bhatwadekar A, Opreanu M, Yakubova N, Caballero S, Player D, Nakagawa T, Afzal A, Kielczewski J, Sochacki A, Hasty S, Li Calzi S, Kim S, Duclas SK, Segal MS, Guberski DL, Esselman WJ, Boulton ME, Grant MB. Diabetic retinopathy is associated with bone marrow neuropathy and a depressed peripheral clock. *J Exp Med*. 2009 Dec 21;206(13):2897-906. doi: 10.1084/jem.20090889. Epub 2009 Nov 23. PMID: 19934019; PMCID: PMC2806461.

127: Lunn MP, Hughes RA, Wiffen PJ. Duloxetine for treating painful neuropathy or chronic pain. *Cochrane Database Syst Rev*. 2009 Oct 7;(4):CD007115. doi: 10.1002/14651858.CD007115.pub2. Update in: *Cochrane Database Syst Rev*. 2014;1:CD007115. PMID: 19821395.

128: Melenhorst WB, Overgoor ML, Gonera EG, Tellier MA, Houpt P. Nerve decompression surgery as treatment for peripheral diabetic neuropathy: literature overview and awareness among medical professionals. *Ann Plast Surg*. 2009 Aug;63(2):217-21. doi: 10.1097/SAP.0b013e31818ba768. PMID: 19593109.

129: Cain JD, DiNucci K. Revisional peripheral nerve surgery. *Clin Podiatr Med Surg*. 2009 Jan;26(1):11-22. doi: 10.1016/j.cpm.2008.10.002. PMID: 19121750.

130: Williams BA, Murinson BB. Diabetes mellitus and subclinical neuropathy: a call for new paths in peripheral nerve block research. *Anesthesiology*. 2008 Sep;109(3):361-2. doi: 10.1097/ALN.0b013e3181829f0d. PMID: 18719433; PMCID: PMC2606666.

131: Blount AL, Peled ZM, Dexter EL, Nagle RB, Maloney CT, Dellon AL. Sympathetic nerves in the tarsal tunnel: implications for blood flow in the diabetic foot. *Plast Reconstr Surg*. 2008 Jul;122(1):188-191. doi: 10.1097/PRS.0b013e31817742c3. PMID: 18594404.

132: Cho KT, Kim NH. Diabetic amyotrophy coexisting with lumbar disk herniation and stenosis: a case report. *Surg Neurol*. 2009 Apr;71(4):496-9; discussion 499. doi: 10.1016/j.surneu.2007.10.028. Epub 2008 Mar 4. PMID: 18295835.

133: Chalk C, Benstead TJ, Moore F. Aldose reductase inhibitors for the treatment of diabetic polyneuropathy. *Cochrane Database Syst Rev*. 2007 Oct 17;2007(4):CD004572. doi: 10.1002/14651858.CD004572.pub2. PMID: 17943821; PMCID: PMC8406996.

134: Baker N, Green A, Krishnan S, Rayman G. Microvascular and C-fiber function in diabetic charcot neuroarthropathy and diabetic peripheral neuropathy. *Diabetes Care*. 2007 Dec;30(12):3077-9. doi: 10.2337/dc07-1063. Epub 2007 Sep 5. PMID: 17804679.

135: Dellon AL. Diabetic neuropathy: medical and surgical approaches. *Clin Podiatr Med Surg*. 2007 Jul;24(3):425-48, viii. doi: 10.1016/j.cpm.2007.03.003. PMID: 17613384.

136: Ates O, Cayli SR, Yucel N, Altinoz E, Kocak A, Durak MA, Turkoz Y, Yologlu S. Central nervous system protection by resveratrol in streptozotocin-induced diabetic rats. *J Clin Neurosci*. 2007 Mar;14(3):256-60. doi: 10.1016/j.jocn.2005.12.010. PMID: 17258134.

137: Rimoldi OE, Drake-Holland AJ, Noble MI, Camici PG. Basal and hyperaemic myocardial blood flow in regionally denervated canine hearts: an in vivo study with positron emission tomography. *Eur J Nucl Med Mol Imaging*. 2007 Feb;34(2):197-205. doi: 10.1007/s00259-006-0233-0. Epub 2006 Sep 2. PMID: 16951953.

- 138: Garrity-Moses ME, Teng Q, Krudy C, Yang J, Federici T, Boulis NM. X-Linked inhibitor of apoptosis protein gene-based neuroprotection for the peripheral nervous system. *Neurosurgery*. 2006 Jul;59(1):172-82; discussion 172-82. doi: 10.1227/01.NEU.0000219237.69329.B7. PMID: 16823314.
- 139: Szerb J, Persaud D. Long current impulses may be required for nerve stimulation in patients with ischemic pain. *Can J Anaesth*. 2005 Nov;52(9):963-6. doi: 10.1007/BF03022059. PMID: 16251563.
- 140: Valdivia JM, Dellon AL, Weinand ME, Maloney CT Jr. Surgical treatment of peripheral neuropathy: outcomes from 100 consecutive decompressions. *J Am Podiatr Med Assoc*. 2005 Sep-Oct;95(5):451-4. doi: 10.7547/0950451. PMID: 16166462.
- 141: Orudzheva SA, Zviagin AA, Kurochkina AI. [Central hemodynamics during conduction anesthesia in patients with pyonecrotic forms of the diabetic foot]. *Anesteziol Reanimatol*. 2005 May-Jun;(3):15-7. Russian. PMID: 16076038.
- 142: Adam DJ, Raptis S, Fitridge RA. Trends in the presentation and surgical management of the acute diabetic foot. *Eur J Vasc Endovasc Surg*. 2006 Feb;31(2):151-6. doi: 10.1016/j.ejvs.2005.05.039. Epub 2005 Jul 14. PMID: 16023389.
- 143: Reisin RC, Zurrú C, Buso C, Marchesoni C, Pardal AM, Jadzinsky M. Multifocal motor neuropathy, type 1 diabetes and asymptomatic Hashimoto's thyroiditis: an unusual association. *Neuromuscul Disord*. 2005 May;15(5):358-60. doi: 10.1016/j.nmd.2005.01.008. PMID: 15833429.
- 144: Wilson J, Chawla J, Fisher M. Sensitivity and specificity of electrodiagnostic criteria for CIDP using ROC curves: comparison to patients with diabetic and MGUS associated neuropathies. *J Neurol Sci*. 2005 Apr 15;231(1-2):19-28. doi: 10.1016/j.jns.2004.12.004. PMID: 15792816.
- 145: Arrieta O, García-Navarrete R, Zúñiga S, Ordóñez G, Ortiz A, Palencia G, Morales-Espinosa D, Hernández-Pedro N, Sotelo J. Retinoic acid increases tissue and plasma contents of nerve growth factor and prevents neuropathy in diabetic mice. *Eur J Clin Invest*. 2005 Mar;35(3):201-7. doi: 10.1111/j.1365-2362.2005.01467.x. PMID: 15733075.
- 146: Shor NA, Chumak IuF, Reuka VP, Zhukov OA. Revaskularizatsii nizhnikh konechnostei pri ishemicheskoi forme diabeticheskoi stopy s gnoino- nekroticheskimi porazheniiami tkanei [Revascularization of the lower limbs for ischemic diabetic foot with pyonecrotic tissue lesions]. *Angiol Sosud Khir*. 2004;10(4):85-9. Russian. PMID: 15627142.
- 147: Burnand RC, Price SA, McElhaney M, Barker D, Tomlinson DR. Expression of axotomy-inducible and apoptosis-related genes in sensory nerves of rats with experimental diabetes. *Brain Res Mol Brain Res*. 2004 Dec 20;132(2):235-40. doi: 10.1016/j.molbrainres.2004.05.002. PMID: 15582161.
- 148: Freedman G, Entero H, Brem H. Practical treatment of pain in patients with chronic wounds: pathogenesis-guided management. *Am J Surg*. 2004 Jul;188(1A Suppl):31-5. doi: 10.1016/S0002-9610(03)00289-7. PMID: 15223500.
- 149: Mizisin AP, Vu Y, Shuff M, Calcutt NA. Ciliary neurotrophic factor improves nerve conduction and ameliorates regeneration deficits in diabetic rats. *Diabetes*. 2004 Jul;53(7):1807-12. doi: 10.2337/diabetes.53.7.1807. PMID: 15220205.
- 150: Chistyakov AV, Soustiel JF, Hafner H, Kaplan B, Feinsod M. The value of motor and somatosensory evoked potentials in evaluation of cervical myelopathy in the presence of peripheral neuropathy. *Spine (Phila Pa 1976)*. 2004 Jun 15;29(12):E239-47. doi:

10.1097/01.brs.0000127191.12310.fb. PMID: 15187647.

151: Li Y, Owyang C. Musings on the wanderer: what's new in our understanding of vago-vagal reflexes? V. Remodeling of vagus and enteric neural circuitry after vagal injury. *Am J Physiol Gastrointest Liver Physiol*. 2003 Sep;285(3):G461-9. doi: 10.1152/ajpgi.00119.2003. PMID: 12909562.

152: Pierson CR, Zhang W, Sima AA. Proinsulin C-peptide replacement in type 1 diabetic BB/Wor-rats prevents deficits in nerve fiber regeneration. *J Neuropathol Exp Neurol*. 2003 Jul;62(7):765-79. doi: 10.1093/jnen/62.7.765. PMID: 12901702.

153: Mundinger TO, Mei Q, Figlewicz DP, Lernmark A, Taborsky GJ Jr. Impaired glucagon response to sympathetic nerve stimulation in the BB diabetic rat: effect of early sympathetic islet neuropathy. *Am J Physiol Endocrinol Metab*. 2003 Nov;285(5):E1047-54. doi: 10.1152/ajpendo.00136.2003. Epub 2003 Jul 22. PMID: 12876072.

154: Kayali H, Kahraman S, Sirin S, Bedük A, Timurkaynak E. Bilateral Carpal tunnel syndrome with type 1 diabetes mellitus in childhood. *Pediatr Neurosurg*. 2003 May;38(5):262-4. doi: 10.1159/000069824. PMID: 12686771.

155: D'Agord Schaan B, Lacchini S, Bertoluci MC, Irigoyen MC, Machado UF, Schmid H. Impact of renal denervation on renal content of GLUT1, albuminuria and urinary TGF-beta1 in streptozotocin-induced diabetic rats. *Auton Neurosci*. 2003 Mar 28;104(2):88-94. doi: 10.1016/S1566-0702(02)00295-3. PMID: 12648610.

156: Ahmad M, Goucke CR. Management strategies for the treatment of neuropathic pain in the elderly. *Drugs Aging*. 2002;19(12):929-45. doi: 10.2165/00002512-200219120-00004. PMID: 12495368.

157: Kamitani T, Kuroiwa Y. [Electrophysiology in diabetic neurological complications]. *Nihon Rinsho*. 2002 Oct;60 Suppl 10:222-34. Japanese. PMID: 12430233.

158: Pierson CR, Zhang W, Murakawa Y, Sima AA. Early gene responses of trophic factors in nerve regeneration differ in experimental type 1 and type 2 diabetic polyneuropathies. *J Neuropathol Exp Neurol*. 2002 Oct;61(10):857-71. doi: 10.1093/jnen/61.10.857. PMID: 12387452.

159: Craner MJ, Klein JP, Black JA, Waxman SG. Preferential expression of IGF-I in small DRG neurons and down-regulation following injury. *Neuroreport*. 2002 Sep 16;13(13):1649-52. doi: 10.1097/00001756-200209160-00016. PMID: 12352620.

160: Mei Q, Mundinger TO, Lernmark A, Taborsky GJ Jr. Early, selective, and marked loss of sympathetic nerves from the islets of BioBreeder diabetic rats. *Diabetes*. 2002 Oct;51(10):2997-3002. doi: 10.2337/diabetes.51.10.2997. Erratum in: *Diabetes* 2002 Dec;51(12):3591. PMID: 12351439.

161: Schnell O, Hammer K, Muhr-Becker D, Ziegler A, Weiss M, Tatsch K, Standl E. Cardiac sympathetic dysinnervation in Type 2 diabetes mellitus with and without ECG-based cardiac autonomic neuropathy. *J Diabetes Complications*. 2002 May- Jun;16(3):220-7. doi: 10.1016/s1056-8727(01)00180-5. PMID: 12015192.

162: Xu G, Pierson CR, Murakawa Y, Sima AA. Altered tubulin and neurofilament expression and impaired axonal growth in diabetic nerve regeneration. *J Neuropathol Exp Neurol*. 2002 Feb;61(2):164-75. doi: 10.1093/jnen/61.2.164. PMID: 11855383.

163: Shor NA, Chumak luF. Primenenie poiasnichnoï simpatéktomii po povodu diabeticheskoi

angiopatii nihznikh konechnostei pri nalichii gnoino- nekroticheskikh izmenenii na stope [Application of lumbar sympathectomy for the lower extremities diabetic angiopathy in presence of purulent necrotic changes on the foot]. *Klin Khir.* 2001 Aug;(8):59-61. Russian. PMID: 11794119.

164: Xu G, Sima AA. Altered immediate early gene expression in injured diabetic nerve: implications in regeneration. *J Neuropathol Exp Neurol.* 2001 Oct;60(10):972-83. doi: 10.1093/jnen/60.10.972. PMID: 11589428.

165: Chinyanga HM, Kalangu KK, Bhagat K. Neuropathic pain—from mice to men. *Cent Afr J Med.* 2000 Dec;46(12):332-5. doi: 10.4314/cajm.v46i12.8581. PMID: 11486475.

166: Eckersley L, Ansselin AD, Tomlinson DR. Effects of experimental diabetes on axonal and Schwann cell changes in sciatic nerve isografts. *Brain Res Mol Brain Res.* 2001 Aug 15;92(1-2):128-37. doi: 10.1016/s0169-328x(01)00163-2. PMID: 11483249.

167: Wein TH, Albers JW. Diabetic neuropathies. *Phys Med Rehabil Clin N Am.* 2001 May;12(2):307-20, ix. PMID: 11345009.

168: Ustinova EE, Barrett CJ, Sun SY, Schultz HD. Oxidative stress impairs cardiac chemoreflexes in diabetic rats. *Am J Physiol Heart Circ Physiol.* 2000 Nov;279(5):H2176-87. doi: 10.1152/ajpheart.2000.279.5.H2176. PMID: 11045951.

169: Kennedy JM, Zochodne DW. The regenerative deficit of peripheral nerves in experimental diabetes: its extent, timing and possible mechanisms. *Brain.* 2000 Oct;123 (Pt 10):2118-29. doi: 10.1093/brain/123.10.2118. PMID: 11004128.

170: Horlocker TT, O'Driscoll SW, Dinapoli RP. Recurring brachial plexus neuropathy in a diabetic patient after shoulder surgery and continuous interscalene block. *Anesth Analg.* 2000 Sep;91(3):688-90. doi: 10.1097/0000539-200009000-00035. PMID: 10960400.

171: Nash TP. Treatment options in painful diabetic neuropathy. *Acta Neurol Scand Suppl.* 1999;173:36-42; discussion 48-52. doi: 10.1111/j.1600-0404.1999.tb07388.x. PMID: 10819090.

172: Kogawa S, Yasuda H, Terada M, Maeda K, Kikkawa R. Apoptosis and impaired Axon regeneration of sensory neurons after nerve crush in diabetic rats. *Neuroreport.* 2000 Mar 20;11(4):663-7. doi: 10.1097/00001756-200003200-00003. PMID: 10757497.

173: MacDonald BK, Cockerell OC, Sander JW, Shorvon SD. The incidence and lifetime prevalence of neurological disorders in a prospective community-based study in the UK. *Brain.* 2000 Apr;123 (Pt 4):665-76. doi: 10.1093/brain/123.4.665. PMID: 10733998.

174: Casals M, Murga V, Frascari A, Vidal F, Bausili JM. Abordaje lateral del nervio ciático en el hueco poplíteo [Lateral approach to the sciatic nerve in the popliteal space]. *Rev Esp Anesthesiol Reanim.* 1999 Aug-Sep;46(7):322-3. Spanish. PMID: 10563134.

175: Maeda K, Yasuda H, Taniguchi Y, Terada M, Kikkawa R. Endoneurial microvasculature of chronically transected sciatic nerves in diabetic rats. *J Peripher Nerv Syst.* 1999;4(1):13-8. PMID: 10197061.

176: Schmid H, Forman LA, Cao X, Sherman PS, Stevens MJ. Heterogeneous cardiac sympathetic denervation and decreased myocardial nerve growth factor in streptozotocin-induced diabetic rats: implications for cardiac sympathetic dysinnervation complicating diabetes. *Diabetes.* 1999

Mar;48(3):603-8. doi: 10.2337/diabetes.48.3.603. PMID: 10078563.

177: Stevens MJ, Raffel DM, Allman KC, Schwaiger M, Wieland DM. Regression and progression of cardiac sympathetic dysinnervation complicating diabetes: an assessment by C-11 hydroxyephedrine and positron emission tomography. *Metabolism*. 1999 Jan;48(1):92-101. doi: 10.1016/s0026-0495(99)90016-1. PMID: 9920151.

178: Cánovas L, López R, Domínguez M, Gómez A, Ramil M, Castro A. Parada cardiorrespiratoria y neuropatía autónoma diabética: experiencia en un caso [Cardiorespiratory failure and diabetic autonomic neuropathy: a case report]. *Rev Esp Anestesiología y Reanimación*. 1998 Nov;45(9):397-400. Spanish. PMID: 9847658.

179: Stevens MJ, Raffel DM, Allman KC, Dayanikli F, Ficaro E, Sandford T, Wieland DM, Pfeifer MA, Schwaiger M. Cardiac sympathetic dysinnervation in diabetes: implications for enhanced cardiovascular risk. *Circulation*. 1998 Sep 8;98(10):961-8. doi: 10.1161/01.cir.98.10.961. PMID: 9737515.

180: Jiráť S, Staněk F, Jonášová A, Krivánek J, Tesar D. Retrográdní intravenózní perfuze-metoda léčby trofických defektů dolních končetin. Zkušenosti u pacientů s primární trombocytemií [Retrograde intravenous perfusion - a therapeutic method in trophic defects of the lower extremities. Experience in patients with primary thrombocythemia]. *Vnitr Lek*. 1997 Oct;43(10):672-7. Czech. PMID: 9601882.

181: Ido Y, Chang K, Lejeune W, Tilton RG, Monafo WW, Williamson JR. Diabetes impairs sciatic nerve hyperemia induced by surgical trauma: implications for diabetic neuropathy. *Am J Physiol*. 1997 Jul;273(1 Pt 1):E174-84. doi: 10.1152/ajpendo.1997.273.1.E174. PMID: 9252494.

182: Sharma S, Hoskin-Mott A, Benstead T, Maxner C. Correlation of the pilo- pupil ratio average, a new test for autonomic denervation, to the severity of diabetic retinopathy. *Can J Ophthalmol*. 1997 Apr;32(3):170-4. PMID: 9131280.

183: Hounsom L, Tomlinson DR. Does neuropathy develop in animal models? *Clin Neurosci*. 1997;4(6):380-9. PMID: 9358984.

184: Dey J, Misra A, Desai NG, Mahapatra AK, Padma MV. Cognitive function in younger type II diabetes. *Diabetes Care*. 1997 Jan;20(1):32-5. doi: 10.2337/diacare.20.1.32. PMID: 9028690.

185: Waters JH, Watson TB, Ward MG. Conus medullaris injury following both tetracaine and lidocaine spinal anesthesia. *J Clin Anesth*. 1996 Dec;8(8):656-8. doi: 10.1016/s0952-8180(96)00146-8. PMID: 8982894.

186: Rosa-e-Silva L, Troncon LE, Oliveira RB, Foss MC, Braga FJ, Gallo Júnior L. Rapid distal small bowel transit associated with sympathetic denervation in type I diabetes mellitus. *Gut*. 1996 Nov;39(5):748-56. doi: 10.1136/gut.39.5.748. PMID: 9014777; PMCID: PMC1383402.

187: Carrión-Pareja JC, Sánchez-Tirado JA, Gállego-Franco J, Facorro-Gaspar E, Valentín-Sánchez Uría L. Bloqueo del hueco poplíteo. Posibles soluciones al inconveniente de la postura [Popliteal fossa block. Possible solutions to the postural inconvenience]. *Rev Esp Anestesiología y Reanimación*. 1996 Oct;43(8):297. Spanish. PMID: 9011902.

188: Stewart JD, McKelvey R, Durcan L, Carpenter S, Karpatis G. Chronic inflammatory demyelinating polyneuropathy (CIDP) in diabetics. *J Neurol Sci*. 1996 Oct;142(1-2):59-64. doi: 10.1016/0022-510x(96)00126-8. PMID: 8902721.

- 189: Turpeinen AK, Vanninen E, Kuikka JT, Uusitupa MI. Demonstration of regional sympathetic denervation of the heart in diabetes. Comparison between patients with NIDDM and IDDM. *Diabetes Care*. 1996 Oct;19(10):1083-90. doi: 10.2337/diacare.19.10.1083. PMID: 8886553.
- 190: Zhuang HX, Snyder CK, Pu SF, Ishii DN. Insulin-like growth factors reverse or arrest diabetic neuropathy: effects on hyperalgesia and impaired nerve regeneration in rats. *Exp Neurol*. 1996 Aug;140(2):198-205. doi: 10.1006/exnr.1996.0129. PMID: 8690062.
- 191: Soichot P, Roth G. High frequency discharge of a fraction (f) of motor unit action potential. *Electroencephalogr Clin Neurophysiol*. 1996 Jun;101(3):201-5. doi: 10.1016/0924-980x(96)95615-5. PMID: 8647031.
- 192: Koistinen MJ, Airaksinen KE, Huikuri HV, Linnaluoto MM, Heikkilä J, Torniainen P, Ahonen A. No difference in cardiac innervation of diabetic patients with painful and asymptomatic coronary artery disease. *Diabetes Care*. 1996 Mar;19(3):231-3. doi: 10.2337/diacare.19.3.231. PMID: 8742567.
- 193: Vandertop WP, de Vries WB, Notermans NC, Tulleken CA, Gispen WH. Neural influences on the iris of diabetic rats and effect of oculomotor nerve crush. *J Auton Nerv Syst*. 1995 Oct 5;55(1-2):112-4. doi: 10.1016/0165-1838(95)00034-u. PMID: 8690843.
- 194: Mashiah A, Soroker D, Pasik S, Mashiah T. Phenol lumbar sympathetic block in diabetic lower limb ischemia. *J Cardiovasc Risk*. 1995 Oct;2(5):467-9. doi: 10.1177/174182679500200512. PMID: 8749275.
- 195: Vandertop WP, de Vries WB, Notermans NC, Tulleken CA, Gispen WH. Beneficial effect of an ACTH4-9 analogue on experimentally induced diabetic autonomic neuropathy in the eye of the rat under general anaesthesia. *J Auton Nerv Syst*. 1995 Jan 20;51(1):49-57. doi: 10.1016/0165-1838(95)80006-v. PMID: 7722215.
- 196: Stewart JD, Nguyen DM, Abrahamowicz M. Quantitative sweat testing using acetylcholine for direct and axon reflex mediated stimulation with silicone mold recording; controls versus neuropathic diabetics. *Muscle Nerve*. 1994 Dec;17(12):1370-7. doi: 10.1002/mus.880171205. PMID: 7969237.
- 197: Ziegler D. Diabetic cardiovascular autonomic neuropathy: prognosis, diagnosis and treatment. *Diabetes Metab Rev*. 1994 Dec;10(4):339-83. doi: 10.1002/dmr.5610100403. PMID: 7796704.
- 198: Lindström P, Brismar T, Sima AA. Impaired recovery in diabetic rat nerve following anoxic conduction block. *Diabetes Res Clin Pract*. 1994 Oct;25(3):177-81. doi: 10.1016/0168-8227(94)90006-x. PMID: 7851272.
- 199: De Angelis C, Scarfò C, Falcinelli M, Perna E, Reda E, Ramacci MT, Angelucci L. Acetyl-L-carnitine prevents age-dependent structural alterations in rat peripheral nerves and promotes regeneration following sciatic nerve injury in young and senescent rats. *Exp Neurol*. 1994 Jul;128(1):103-14. doi: 10.1006/exnr.1994.1117. PMID: 8070513.
- 200: Krentz AJ, Singh BM, Wright AD, Nattrass M. Effects of autonomic neuropathy on glucose, fatty acid, and ketone body metabolism following insulin withdrawal in patients with insulin-dependent diabetes. *J Diabetes Complications*. 1994 Apr-Jun;8(2):105-10. doi: 10.1016/1056-8727(94)90059-0. PMID: 8061346.
- 201: Ordoñez G, Fernandez A, Perez R, Sotelo J. Low contents of nerve growth factor in serum and submaxillary gland of diabetic mice. A possible etiological element of diabetic neuropathy. *J Neurol*

Sci. 1994 Feb;121(2):163-6. doi: 10.1016/0022-510x(94)90346-8. PMID: 8158209.

202: Grohmann G, Pöhlmann G, Eidner G. Optimierung der Analgesie und Verfahrensweise der retrograden Venenperfusion bei Behandlung von Patienten mit peripheren arteriellen Durchblutungsstörungen [Optimizing analgesia and procedure of retrograde venous perfusion in treatment of patients with peripheral arterial occlusive diseases]. *Vasa*. 1994;23(1):74-5. German. PMID: 8154178.

203: Strian F, Haslbeck M, Standl E. Behandlung schmerzhafter Diabetesneuropathien [Treatment of painful diabetic neuropathies]. *Internist (Berl)*. 1994 Jan;35(1):32-40. German. PMID: 7908279.

204: Rende M, Provenzano C, Tonali P. Modulation of low-affinity nerve growth factor receptor in injured adult rat spinal cord motoneurons. *J Comp Neurol*. 1993 Dec 22;338(4):560-74. doi: 10.1002/cne.903380406. PMID: 8132861.

205: Ahlgren SC, Levine JD. Mechanical hyperalgesia in streptozotocin-diabetic rats is not sympathetically maintained. *Brain Res*. 1993 Jul 9;616(1-2):171-5. doi: 10.1016/0006-8993(93)90206-3. PMID: 8358610.

206: Dreyfuss P, Dumitru D, Prewitt-Buchanan L. Intercostal somatosensory-evoked potentials. A new technique. *Am J Phys Med Rehabil*. 1993 Jun;72(3):144-50. doi: 10.1097/00002060-199306000-00007. PMID: 8512676.

207: Camilleri M, Balm RK, Low PA. Autonomic dysfunction in patients with chronic intestinal pseudo-obstruction. *Clin Auton Res*. 1993 Apr;3(2):95-100. doi: 10.1007/BF01818993. PMID: 8324379.

208: Ishibashi S, Mori N, Shimada M, Oka T, Shimano H, Gotoda T, Komeda K, Kawazu S, Murase T, Yazaki Y, et al. Apolipoprotein E metabolism in sciatic nerves of diabetic rats. Implication for diabetic neuropathy. *Horm Metab Res*. 1993 Feb;25(2):82-7. doi: 10.1055/s-2007-1002048. PMID: 8458613.

209: Putzhammer A, Claus D, Brenner PM, Neundörfer B. Resistance to ischaemic nerve-fibre block in diabetes mellitus and in mitochondrial encephalomyopathies. *J Neurol*. 1993 Feb;240(2):87-92. doi: 10.1007/BF00858723. PMID: 8437026.

210: Mehta N, Veliath S, Thombre DP. The effect of bilateral gastric vagotomy and histamine stimulation on parietal cell activity in streptozotocin induced diabetic rat model. *Indian J Physiol Pharmacol*. 1993 Jan;37(1):30-4. PMID: 8449542.

211: Watkins PJ. Progression of diabetic autonomic neuropathy. *Diabet Med*. 1993;10 Suppl 2:77S-78S. doi: 10.1111/j.1464-5491.1993.tb00206.x. PMID: 8334849.

212: Matsuoka H. Protective role of renal nerves in the development of diabetic nephropathy. *Diabetes Res*. 1993;23(1):19-29. PMID: 7924145.

213: Beggs J, Johnson PC, Olafsen A, Watkins CJ. Innervation of the vasa nervorum: changes in human diabetics. *J Neuropathol Exp Neurol*. 1992 Nov;51(6):612-29. doi: 10.1097/00005072-199211000-00006. PMID: 1484291.

214: Britland ST, Young RJ, Sharma AK, Clarke BF. Acute and remitting painful diabetic polyneuropathy: a comparison of peripheral nerve fibre pathology. *Pain*. 1992 Mar;48(3):361-370. doi: 10.1016/0304-3959(92)90085-P. PMID: 1594258.

215: Stevens MJ, Edmonds ME, Foster AV, Douglas SL, Watkins PJ. Paradoxical blood flow responses in

the diabetic neuropathic foot: an assessment of the contribution of vascular denervation and microangiopathy. *Diabet Med.* 1992 Jan- Feb;9(1):49-54. doi: 10.1111/j.1464-5491.1992.tb01713.x. PMID: 1551310.

216: Ram Z, Sadeh M, Walden R, Adar R. Vascular insufficiency quantitatively aggravates diabetic neuropathy. *Arch Neurol.* 1991 Dec;48(12):1239-42. doi: 10.1001/archneur.1991.00530240043016. PMID: 1845025.

217: Zeuzem S, Olbrich HG, Seeger C, Kober G, Schöffling K, Caspary WF. Beat-to- beat variation of heart rate in diabetic patients with autonomic neuropathy and in completely cardiac denervated patients following orthotopic heart transplantation. *Int J Cardiol.* 1991 Oct;33(1):105-14. doi: 10.1016/0167-5273(91)90158-I. PMID: 1937967.

218: Stevens MJ, Watkins PJ. Diabetic autonomic neuropathy. *Acta Diabetol Lat.* 1991 Jan-Mar;28(1):105-12. doi: 10.1007/BF02732120. PMID: 1862685.

219: Britland ST, Young RJ, Sharma AK, Lee D, Ah-See AK, Clarke BF. Vagus nerve morphology in diabetic gastropathy. *Diabet Med.* 1990 Nov;7(9):780-7. doi: 10.1111/j.1464-5491.1990.tb01492.x. PMID: 2148129.

220: Lucas LF, Tsueda K. Cardiovascular depression after brachial plexus block in two diabetic patients with renal failure. *Anesthesiology.* 1990 Nov;73(5):1032-5. doi: 10.1097/00000542-199011000-00033. PMID: 2098017.

221: Faradji V, Sotelo J. Low serum levels of nerve growth factor in diabetic neuropathy. *Acta Neurol Scand.* 1990 May;81(5):402-6. doi: 10.1111/j.1600-0404.1990.tb00984.x. PMID: 2375241.

222: Vulpio C, Borzone A, Iannace C, Agnes S, Mascaro A, De Santis M, Mingrone G, Flore R, Pola P, Castagneto M, et al. Lumbar chemical sympathectomy in end stage of arterial disease: early and late results. *Angiology.* 1989 Nov;40(11):948-52. doi: 10.1177/000331978904001102. PMID: 2817518.

223: Suwa H, Hanakita J, Sakaida H, Nishi S, Ohta F, Mori N, Nagamine T, Taniyama K. [Carpal tunnel syndrome associated with long-term hemodialysis: case report]. *No Shinkei Geka.* 1989 Aug;17(8):747-50. Japanese. PMID: 2685635.

224: Alio J, Hernandez I, Millan A, Sanchez J. Pupil responsiveness in diabetes mellitus. *Ann Ophthalmol.* 1989 Apr;21(4):132-7. PMID: 2729817.

225: Tachibana S. [Distribution of motor nerve conduction velocities in the ulnar nerve—a control study, its clinical application and limitations]. *No To Shinkei.* 1987 Sep;39(9):807-15. Japanese. PMID: 3689603.

226: Hosokawa S, Shinoda H, Sakai T, Kato M, Kuroiwa Y. Electrophysiological study on limb myokymia in three women. *J Neurol Neurosurg Psychiatry.* 1987 Jul;50(7):877-81. doi: 10.1136/jnnp.50.7.877. PMID: 3625211; PMCID: PMC1032126.

227: Scott LM, Tomkin GH. Cholesterol metabolism: regulatory effects of the vagus in the normal and diabetic animal. *Diabetes Res.* 1985 Nov;2(6):313-7. PMID: 4075700.

228: Timperley WR, Boulton AJ, Davies-Jones GA, Jarratt JA, Ward JD. Small vessel disease in progressive diabetic neuropathy associated with good metabolic control. *J Clin Pathol.* 1985 Sep;38(9):1030-8. doi: 10.1136/jcp.38.9.1030. PMID: 4044873; PMCID: PMC499354.

- 229: Low PA, Ward K, Schmelzer JD, Brimijoin S. Ischemic conduction failure and energy metabolism in experimental diabetic neuropathy. *Am J Physiol.* 1985 Apr;248(4 Pt 1):E457-62. doi: 10.1152/ajpendo.1985.248.4.E457. PMID: 3985144.
- 230: Füessl HS, Schälzky H, Schewe S, Frey KW, Goebel FD. Zur Pathogenese und klinischen Bedeutung der Mönckebergschen Mediaverkalkung [Pathogenesis and clinical significance of Mönckeberg medial calcinosis]. *Klin Wochenschr.* 1985 Mar 1;63(5):211-6. German. doi: 10.1007/BF01731171. PMID: 3990163.
- 231: Knezevic W, Bajada S. Peripheral autonomic surface potential. A quantitative technique for recording sympathetic conduction in man. *J Neurol Sci.* 1985 Feb;67(2):239-51. doi: 10.1016/0022-510x(85)90120-0. PMID: 3981220.
- 232: Lazarov G. Nevrovegetopatija na sŭrtseto pri zakharnata bolest [Autonomic neuropathy of the heart in diabetes mellitus]. *Vutr Boles.* 1985;24(6):61-9. Bulgarian. PMID: 3913150.
- 233: Knezevic W, Bajada S. Peripheral autonomic surface potential: a quantitative technique for recording autonomic neural function in man. *Clin Exp Neurol.* 1985;21:201-10. PMID: 3843220.
- 234: Vogelberg KH, Kübler HG, Cicmir J, Rathmann W. Gallenblasenkontraktilität, Cholelithiasis und autonome Neuropathie bei Diabetes mellitus [Gallbladder contractility, cholelithiasis and autonomic neuropathy in diabetes mellitus]. *Dtsch Med Wochenschr.* 1984 Nov 9;109(45):1712-5. German. doi: 10.1055/s-2008-1069440. PMID: 6389069.
- 235: Ewing DJ, Neilson JM, Travis P. New method for assessing cardiac parasympathetic activity using 24 hour electrocardiograms. *Br Heart J.* 1984 Oct;52(4):396-402. doi: 10.1136/hrt.52.4.396. PMID: 6383446; PMCID: PMC481648.
- 236: Guy RJ, Dawson JL, Garrett JR, Laws JW, Thomas PK, Sharma AK, Watkins PJ. Diabetic gastroparesis from autonomic neuropathy: surgical considerations and changes in vagus nerve morphology. *J Neurol Neurosurg Psychiatry.* 1984 Jul;47(7):686-91. doi: 10.1136/jnnp.47.7.686. PMID: 6747645; PMCID: PMC1027895.
- 237: Llamas G, Arriaga J. Denervación autonómica cardiovascular avanzada de etiología diabética. Presentación de un caso [Advanced autonomic cardiovascular denervation of diabetic etiology. Presentation of a case]. *Arch Inst Cardiol Mex.* 1984 Mar-Apr;54(2):167-71. Spanish. PMID: 6742940.
- 238: de Queiroz AC, dos Anjos MR. Estudo histopatológico de gânglios nervosos simpáticos em diabéticos [Histopathologic study of the sympathetic ganglia in diabetics]. *Acta Med Port.* 1984 Jan;5(1):7-9. Portuguese. PMID: 6711361.
- 239: Gorio A, Aporti F, Di Gregorio F, Schiavinato A, Siliprandi R, Vitadello M. Ganglioside treatment of genetic and alloxan-induced diabetic neuropathy. *Adv Exp Med Biol.* 1984;174:549-64. doi: 10.1007/978-1-4684-1200-0_46. PMID: 6204518.
- 240: Schmidt RE, Modert CW, Yip HK, Johnson EM Jr. Retrograde axonal transport of intravenously administered 125I-nerve growth factor in rats with streptozotocin-induced diabetes. *Diabetes.* 1983 Jul;32(7):654-63. doi: 10.2337/diab.32.7.654. PMID: 6345245.
- 241: Kaada B. Vasodilation induced by transcutaneous nerve stimulation in peripheral ischemia (Raynaud's phenomenon and diabetic polyneuropathy). *Eur Heart J.* 1982 Aug;3(4):303-14. doi: 10.1093/oxfordjournals.eurheartj.a061312. PMID: 6982164.

- 242: Lalau JD, Dubreuil A, Quichaud J. Les neuropathies diabétiques. Deuxième partie. Physiopathologie - traitement [Diabetic neuropathies. 2. Physiopathology - treatment]. LARC Med. 1982 Jul-Aug;2(7):616-22. French. PMID: 6762477.
- 243: Funakoshi A, Glowniak J, Owyang C, Vinik AI. Evidence for cholinergic and vagal noncholinergic mechanisms modulating plasma motilin-like immunoreactivity. J Clin Endocrinol Metab. 1982 Jun;54(6):1129-34. doi: 10.1210/jcem-54-6-1129. PMID: 7042730.
- 244: Faerman I, Faccio E, Calb I, Razumny J, Franco N, Dominguez A, Podestá HA. Autonomic neuropathy in the skin: a histological study of the sympathetic nerve fibres in diabetic anhidrosis. Diabetologia. 1982 Feb;22(2):96-9. doi: 10.1007/BF00254836. PMID: 7060854.
- 245: Singler RC. An improved technique for alcohol neurolysis of the celiac plexus. Anesthesiology. 1982 Feb;56(2):137-41. doi: 10.1097/00000542-198202000-00008. PMID: 7055324.
- 246: Bellavere F, Ewing DJ. Autonomic control of the immediate heart rate response to lying down. Clin Sci (Lond). 1982 Jan;62(1):57-64. doi: 10.1042/cs0620057. PMID: 7056031.
- 247: Elsässer E. Organisch verursachte Ejakulations-störungen [Organic origin of ejaculation disorders]. MMW Munch Med Wochenschr. 1980 Nov 7;122(45):1586-8. German. PMID: 6109248.
- 248: Jacobs RL, Karmody AM, Wirth C, Vedder D. The team approach in salvage of the diabetic foot. Surg Annu. 1977;9:231-64. PMID: 882894.
- 249: Gendre P, Mamère L, Quancard X, Mamère L, Tingaud R. Etude en microscopie électronique des sympathiques lombaires réséqués pour artérite des membres inférieurs [Electron microscopic studies of lumbar sympathetic chains resected for arteritis of the lower limbs (author's transl)]. Acta Chir Belg. 1977 Jan;76(1):27-35. French. PMID: 848231.
- 250: Forgács S. Gastrointestinale Komplikationen des Diabetes mellitus [Gastrointestinal complications of diabetes mellitus]. Med Klin. 1975 Sep 5;70(36):1424-31. German. PMID: 1177796.
- 251: Heard G. Letter: Diabetic autonomic neuropathy. Br Med J. 1974 Aug 17;3(5928):470. doi: 10.1136/bmj.3.5928.470-b. PMID: 4414183; PMCID: PMC1611426.
- 252: Baron JH. Letter: Autonomic neuropathy and autovagotomy. Br Med J. 1974 Aug 10;3(5927):408-9. doi: 10.1136/bmj.3.5927.408-a. PMID: 4852705; PMCID: PMC1613143.
- 253: Swash M, Fox KP. The pathology of the human muscle spindle: effect of denervation. J Neurol Sci. 1974 May;22(1):1-24. doi: 10.1016/0022-510x(74)90050-1. PMID: 4364511.
- 254: Lloyd-Mostyn R, Watkins PJ, Oram S. Proceedings: Autonomic neuropathy and the heart in diabetes. Br Heart J. 1974 Apr;36(4):397. PMID: 4842628.
- 255: Christensen NJ. Plasma catecholamines in long-term diabetics with and without neuropathy and in hypophysectomized subjects. J Clin Invest. 1972 Apr;51(4):779-87. doi: 10.1172/JCI106872. PMID: 5014611; PMCID: PMC302191.
- 256: Christensen NJ. Diabetic angiopathy and neuropathy. A review with special reference to circulation in the extremities, the effect of hypophysectomy on capillary resistance and capillary permeability, functional abnormalities in early diabetes. Acta Med Scand Suppl. 1972;541:3-60. PMID: 4571960.

- 257: Lansing AM. Clinical evaluation of the ischemic leg. J Ky Med Assoc. 1971 Oct;69(10):771-6. PMID: 5118308.
- 258: Christensen NJ. Function of small blood vessels and plasma catecholamines in diabetes mellitus. Acta Diabetol Lat. 1971 Sep;8 Suppl 1:203-13. PMID: 5146905.
- 259: Christensen NJ. Plasma catecholamines in juvenile diabetics. Scand J Clin Lab Invest. 1971 May;27(3):227-31. doi: 10.3109/00365517109080212. PMID: 5581184.
- 260: Fontaine JL, Rezek C, Fontaine R. Bilan de 289 lésions vasculaires dites "diabétiques" observées et traitées à la clinique chirurgicale A de Strasbourg [Evaluation of 289 so-called "diabetic" vascular lesions observed and treated in surgical clinical A of Strasbourg]. J Chir (Paris). 1971 May-Jun;101(5):505-28. French. PMID: 5092220.
- 261: Teuscher A, Escher F, König H, Zahnd G. Long-term effects of transsphenoidal hypophysectomy on growth hormone, renal function and eyeground in patients with diabetic retinopathy. Diabetes. 1970 Jul;19(7):502-18. doi: 10.2337/diab.19.7.502. PMID: 5427554.
- 262: Dub O, Rennerová J. Diabetická generalizovaná mikroangiopatie retinopathia diabetica, těžká polyneuropatie, začínající gangréna nohy-úspěšně léčená implantací 32 P do adenohypofýzy [Diabetic generalized microangiopathy, diabetic retinopathy, severe polyneuropathy, beginning gangrene of the leg-successfully treated with implantation of 32P into the adenohypophysis]. Cas Lek Cesk. 1969 Jul;108(35):1053-5. Czech. PMID: 5802090.
- 263: Girgis SM, Etriby A, el-Hefnawy H, Kahil S. Aspermia: a survey of 49 cases. Fertil Steril. 1968 Jul-Aug;19(4):580-8. doi: 10.1016/s0015-0282(16)36731-0. PMID: 5672568.
- 264: Ionășescu V, Luca N, Vuia O, Popa V. Respiratory control and oxidative phosphorylation in the denervated muscle of patients with amyotrophic lateral sclerosis. Biochemical comparison with diabetes mellitus. Acta Neurol Scand. 1968;44(4):440-56. doi: 10.1111/j.1600-0404.1968.tb05585.x. PMID: 5687883.
- 265: Whitehouse FW. Two minutes with diabetes. Med Times. 1967 Mar;95(3):354-5. PMID: 6038963.
- 266: CLASSEN JN. NEUROTROPHIC ARTHROPATHY WITH ULCERATION. Ann Surg. 1964 Jun;159(6):891-4. doi: 10.1097/00000658-196406000-00006. PMID: 14170290; PMCID: PMC1408698.
- 267: MULLAN S, HARPER PV, HEKMATPANAH J, TORRES H, DOBBIN G. PERCUTANEOUS INTERRUPTION OF SPINAL-PAIN TRACTS BY MEANS OF A STRONTIUM90 NEEDLE. J Neurosurg. 1963 Nov;20:931-9. doi: 10.3171/jns.1963.20.11.0931. PMID: 14186094.
- 268: GREENE LF, KELALIS PP, WEEKS RE. RETROGRADE EJACULATION OF SEMEN DUE TO DIABETIC NEUROPATHY; REPORT OF 4 CASES. Fertil Steril. 1963 Nov-Dec;14:617-25. doi: 10.1016/s0015-0282(16)35045-2. PMID: 14076215.
- 269: RECORDIER AM, SERRATRICE G. LE PIED DIAB'ETIQUE NEUROG'ENE [THE NEUROGENIC DIABETIC FOOT]. Journ Annu Diabetol Hotel Dieu. 1963:85-9. French. PMID: 14118889.
- 270: HELD JP. [Neurology]. Vie Med. 1962;43(13):43-7. French. PMID: 13953545.
- 1)
- Vinik AI, Maser RE, Mitchell BD, Freeman R. Diabetic autonomic neuropathy. Diabetes Care. 2003 May;26(5):1553-79. doi: 10.2337/diacare.26.5.1553. PMID: 12716821.

From:

<https://neurosurgerywiki.com/wiki/> - **Neurosurgery Wiki**

Permanent link:

https://neurosurgerywiki.com/wiki/doku.php?id=diabetic_autonomic_neuropathy

Last update: **2024/06/07 02:52**

