

Evolution of the VibroSense Meter®

– Scientific publications



Publications addressing use of the VibroSense Meter® are printed in **bold**.
The most recent publication is first in the lists.



Diabetic peripheral neuropathy (DPN)

1. Linnea Ekman^{1*}, Lars B. Dahlin^{1,2,3}, Gert S. Andersson⁴, Eero Lindholm⁵

[Diagnostic contribution of multi-frequency vibrometry to detection of peripheral neuropathy in type 1 diabetes mellitus compared with nerve conduction studies](#)

PLoS, ONE Jan 10 2024, 19(1): e0296661

1 Department of Translational Medicine, Hand Surgery, Lund University, Malmö, Sweden,

2 Department of Hand Surgery, Skåne University Hospital, Malmö, Sweden, 3 Department of Biomedical and Clinical Sciences, Linköping University, Linköping, Sweden, 4 Department of Clinical Sciences, Clinical Neurophysiology, Lund University, Malmö, Sweden, 5 Department of Clinical Sciences, Endocrinology, Lund University, Malmö, Sweden

2. Lars B. Dahlin^{1,2}, Targ Elgzyri³, Magnus Löndahl⁴, Linnea Ekman¹, Eero Lindholm³

[Improved metabolic control using glucose monitoring systems leads to improvement in vibration perception thresholds in type 1 diabetes patients.](#)

30 October 2019, Acta Diabetologica

1 Department of Translational Medicine - Hand Surgery, Lund University, Malmö, Sweden, 2 Department of Hand Surgery, Skåne University Hospital, 3 Department of Clinical Sciences, Endocrinology, Lund University, Malmö, Sweden, 4 Department of Clinical Sciences, Endocrinology, Lund University, Lund, Sweden

3. Eero Lindholm¹, Linnea Ekman¹, Jan Apelqvist¹, Magnus Löndahl², Lars B. Dahlin¹

[Comparison between multifrequency vibrometry, neurothesiometer and nerve conduction studies in subjects with type 1 diabetes.](#)

Poster at EASD in Barcelona

1 Lund University, Malmö, Sweden, 2 Lund University, Lund, Sweden.

4. Eero Lindholm¹, Magnus Löndahl², Katarina Fagher², Jan Apelqvist¹, Lars B. Dahlin^{3,4}

[Strong association between vibration perception thresholds at low frequencies \(4 and 8 Hz\), neuropathic symptoms and diabetic foot ulcers](#)

February 28, 2019, PLOS ONE

5. Erik Ising, Lars B. Dahlin, Helena Elding Larsson

[Impaired vibrotactile sense in children and adolescents with type 1 diabetes - Signs of peripheral neuropathy.](#)

April 19, 2018, PLOS ONE

6. E. Dahlin, E. Ekholm, A. Gottsater, T. Speidel, L.B. Dahlin

[Impaired vibrotactile sense at low frequencies in fingers in autoantibody positive and negative diabetes](#)

27 February 2013, Diabetes Research and Clinical Practice

7. J. Nelander¹, T. Speidel, A. Björkman, L. B. Dahlin^{1,*}

[Vibration thresholds are increased at low frequencies in the sole of the foot in diabetes - a novel multi-frequency approach](#)

4 NOV 2012, Diabetic Medicine

Vibration-induced neuropathy (HAVS)

1. Albin Stjernbrandt 1,* , Ingrid Liljelind 1, Eva Tekavec 2 and Hans Pettersson 1

[The diagnostic test performance of clinical point-of-care testing in relation to quantitative sensory testing for neurosensory injury among workers exposed to hand-arm vibration](#)

Journal of Occupational Health, 2025, 67(1), uiaf034

1Department of Epidemiology and Global Health, Umeå University, Umeå, Sweden

2Division of Occupational and Environmental Medicine, Department of Laboratory Medicine, Lund University, Lund, Sweden

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2. Thomas Clemm 1 Karl Færden 2 Bente Wolf city 1 Lars-Kristian Lunde 3 Karl Christian Nordby 1

[Dose-response relationship between hand-arm vibration exposure and vibrotactile thresholds among road workers](#)

Occup Environ Med: first published as 10.1136/oemed-2019-105926 on 9 January 2020.

1 Department of Occupational Medicine and epidemiology, the state arbeidsmiljøinstitutt , Oslo, Norway

2 Department of environmental and occupational medicine, Oslo University hospital, Oslo Norway

3 Department of Work Psychology and Physiology, the state arbeidsmiljøinstitutt , Oslo, Norway

3. Lars Gerhardsson & Mats Hagberg

[Vibration induced injuries in hands in long-term vibration exposed workers](#)

Journal of Occupational Medicine and Toxicology, 2019 July 15

Occupational and Environmental Medicine, University of Gothenburg

4. Lars Gerhardsson, Lennart Gillström and Mats Hagberg

[Test-retest reliability of neurophysiological tests of hand-arm vibration syndrome in vibration exposed workers and unexposed referents.](#)

22 October 2014, Journal of Occupational Medicine and Toxicology 2014 9:38

5. Necking LE, Lundborg G, Lundström R, Thornell LE, Fridén J.

Hand muscle pathology after long-term vibration exposure.

J Hand Surg 29B: 5: 431-437, 2004.

6. Carlsson I, Cederlund R, Holmberg J, Lundborg G.

Behavioural treatment of post-traumatic and vibration-induced digital cold sensitivity.

Scand J Plast Reconstr Surg Hand Surg, 37:371-378, 2003.

7. Necking LE, Fridén J and Lundborg G.

Reduced muscle strength in abduction of the index finger: An important clinical sign in hand-arm vibration syndrome.

Scand J Plast Reconstr Surg Hand Surg, 2003; 37: 365-370.

8. Cederlund R, Iwarsson S, Lundborg G.

Hand function tests and questions on hand symptoms as related to the Stockholm workshop scales for diagnosis of hand-arm vibration syndrome.

J Hand Surg 28B: 2: 165-171, 2003.

9. Necking LE, Lundborg G, Fridén J.

[Hand muscle weakness in long-term vibration exposure.](#)

J Hand Surg (Br). 27:6:520-525, 2002.

10. Lundborg G, Rosén B, Knutsson L, Holtås S, Ståhlberg F, Larsson EM

Hand-arm-vibration syndrome (HAVS): is there a central nervous component? An fMRI study.

J Hand Surg [Br] 27;6:514-9, 2002.

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11 Dahlin LB, Lundborg G.

[Vibration-induced hand problems: Role of the peripheral nerves in the pathophysiology](#)

Scand J Plast Reconstr Hand Surg 35: 225-232, 2001

12. Cederlund R, Nordenskjöld U, Lundborg G.

[Hand-arm vibration-exposure influences performance of daily activities.](#)

Disability and Rehabilitation 23:570-577, 2001

13. Strömberg T, Dahlin L, Rosén I, Lundborg G.

[Neurophysiological findings in vibration-exposed male workers.](#)

Hand Surg 24B:203-209, 1999

14. Cederlund R, Isacsson Å, Lundborg G.

[Hand function in workers with hand-arm vibration syndrome.](#)

J Hand Therapy 12: 16-24, 1999

15. Lundborg G, Dahlin L, Strömberg T.

Vibration-induced neuropathy of the hand.

In: Proceedings (eds. Lundström and Lindmark), 8th International Conference on hand-arm vibration, June 9-12, 1998, Umeå, Sweden, pp 155-163.

16. Strömberg T, Lundborg G, Dahlin L.

[Vibrotactile sense in the hand-arm-vibration syndrome.](#)

Scand J Work Environ Health. Scand J Work Environ Health 24: 495-502, 1998.

17. Nerve changes at wrist level in workers exposed to vibration.

Occupational and Environmental Medicine 54: 307-311, 1997.

Strömberg T, Dahlin LB, Brun A, Lundborg G. Structural

18. Impaired regeneration in rat sciatic nerves exposed to short-term vibration.

J Hand Surg 21B: 746-749, 1996. Strömberg T, Lundborg G, Holmqvist B, Dahlin LB.

19. Strömberg T, Dahlin LB, Lundborg G.

[Hand problems in 100 vibration-exposed symptomatic male workers.](#)

J Hand Surg 21B: 315-319, 1996

20. Skeletal muscle changes after short term vibration.

J Scand Plast Reconstr Hand Surg 30: 99-103, 1996, Necking LE, Fridén J, Lundström R, Lundborg G, Thornell LE.

21. Tissue displacement is a causative factor in vibration-induced muscle injury.

J Hand Surg. 21B, 6: 753-757, 1996. Necking LE, Lundström R, Dahlin L, Lundborg G, Thornell LE, Fridén J.

22. Lundborg G, Dahlin L, Cederlund R, Strömberg T

Vibrerande verktyg kan ge känselstörningar - viktigt att känna till.

Läkartidningen. 93: 2423-2427, 1996.

23. Östman F, Lundborg G, Lilja B.

[Is vibration-induced white fingers a reversible syndrome if vibration is stopped?](#)

J Hand Surg 21B: 750-752, 1996.

24. Nerve regeneration in nerve grafts conditioned by vibration exposure.

Rest. Neurol. Neurosci. 7: 165-169, 1995. Bergman S, Widerberg A, Danielsen N, Lundborg G, Dahlin L.

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25. **Vibration-induced hand problems.** In: **Current Trends in Hand Surgery** (Vastamäki M, ed.)
Lundborg G, Dahlin LB. Excerpta Medica International Congress Series 1083, IFSSH, Helsinki, Elsevier Science B.V, pp. 563-571, 1995. (Book chapter).
26. Åkesson I, Lundborg G, Horstmann V, Skerfving S.
[Neuropathy in female dental personnel exposed to high frequency vibrations.](#)
Occupational and Environmental Medicine, 52: 116-123, 1995.
27. Dahlin LB, Lundborg G
Mechanisms underlying neuromuscular dysfunction following vibration exposure.
Arbete och Hälsa 1995; 5:17-25. Stockholm National Institute of Occupational Health.
28. Lundborg G.
[Pain, nerve dysfunction and fatigue in a vibration exposed population.](#)
Quality of Life Research, 3: 25-27, 1994
29. Neurophysiological investigation of hands, damaged by occupational vibrations:
comparison with idiopathic carpal tunnel syndrome.
Scand J Plast Reconstr Hand Surg. 27: 209-216, 1993. Rosén I, Strömberg T, Lundborg G
30. Vibration induced muscle injury. An experimental model and preliminary findings.
J Hand Surg 17B: 270-274, 1992. Necking LE, Dahlin LB, Friden J, Lundborg G, Lundström R and Thornell LE.
31. Lundborg G, Dahlin LB, Lundström R, Necking LE and Strömberg T
[Vibrotactile function of the hand in compression and vibration-induced neuropathy. Sensibility index - a new measure.](#)
Scand J Plast Reconstr Hand Surg 26: 275-279, 1992.
32. Vibration exposure and conditioning lesion effect in nerves. An experimental study in rats.
J Hand Surg 17A:5: 858-861, 1992. Dahlin LB, Necking LE, Lundström R and Lundborg G.
33. Lundström R, Strömberg T, Lundborg G,
[Vibrotactile perception threshold measurement for diagnosis of sensory neuropathy.](#)
[Description of a reference population.](#)
Int Arch Occupational Environmental Health 64: 201-207, 1992
34. Lundström R, Strömberg T, Lundborg G.
Taktilometri för diagnostik av sensoriska neuropatier.
Arbete och Hälsa 24: 1990.
35. Vibration exposure and peripheral nerve fiber damage.
J Hand Surg 15A; 2: 346-351, 1990. Lundborg G, Dahlin LB, Hansson HA, Kanje M, Necking LE.
36. Finger receptor dysfunction in dental technicians exposed to high frequency vibration.
Scand J Work Environ Health 15:339-344, 1989. Hjortsberg V, Rosén I, Örbaek P, Lundborg G and Balogh I
37. Transient increase in insulin-like growth factor I immunoreactivity in rat peripheral nerves
exposed to vibrations.
Acta Physiol Scand. 132: 35-41, 1988. Hansson HA, Dahlin LB, Löwenadler B, Lundborg G, Paleus S and Skottner A

38. Tidig diagnostik av vibrationsskador möjligt med nyutvecklad screeningmetod.

Lundborg G, Necking L-E, Sollerman C and Strömberg T. Läkartidningen 84, No. 9, 606-608, 1987.

39. Intraneural edema following exposure to vibration.

Lundborg G, Dahlin LB, Danielsen N, Hansson HA and Pykkö I:
Scand J Work Environ Health 13: 326-329, 1987.

40. A new principle for assessment of vibrotactile sense in vibration-induced neuropathy.

Lundborg G, Sollerman C, Strömberg T, Pykkö I and Rosén B: Scand J Work Environ Health 13: 375-379, 1987.

41. Sensory-neural stages of vibration-induced white fingers.

Scand J Work Environ Health 13: 279-283, 1987. Brammer AJ, Taylor W, Lundborg G:

Chemotherapy-induced neuropathy (CIPN)

1. Sebastian W. Nielsen¹ · Simone Dyring Hasselsteen¹ · Helena Sylow Heilmann Dominiak¹ ·

Dejan Labudovic¹ · Lars Reiter¹ · Susanne Oksbjerg Dalton^{1,2,3} · Jørn Herrstedt^{1,3}

Oral cannabidiol for prevention of acute and transient chemotherapy-induced peripheral neuropathy

Support Care Cancer. 2022 Nov;30(11):9441-9451.doi: 10.1007/s00520-022-07312-y. Epub 2022 Aug 6.

2. Sebastian W. Nielsen^{1,*}, Sanne Lindberg¹, Christina Halgaard Bruvik Ruhlmann^{2,3}, Lise Eckhoff³ and Jørn Herrstedt^{1,4}

Addressing Chemotherapy-Induced Peripheral Neuropathy Using Multi-Frequency Vibrometry and Patient-Reported Outcome

J Clin Med. 2022 Mar 27;11(7):1862

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3. Simone Diedrichsen Marstrand, MD a Kristian Buch-Larsen a, Michael Andersson b, Lars Thorbjørn Jensen^{c,d}, Peter Schwarz^{a,d}

Vibration Perception Threshold and Heart Rate Variability as methods to assess chemotherapy-induced neuropathy in women with breast cancer – a pilot study

Science Direct Cancer Treatment and Research Communications 28 (2021) 100426

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Multifrequency Vibrometry

1. Linnéa Ekman¹, Eero Lindholm², Elisabeth Brogren³, Lars B Dahlin^{1,3}

[Normative values of the vibration perception thresholds at finger pulps and metatarsal heads in healthy adults](#)

PLoS One. 2021 Apr 6

1 Department of Translational Medicine, Hand Surgery, Lund University, Malmö, Sweden, 2 Department of Clinical Sciences, Endocrinology, Lund University, Malmö, Sweden, 3 Department of Hand Surgery, Skåne University Hospital, Malmö, Sweden

2. Lars B. Dahlin, Nuray Güner, Helena Elding Larsson, Toni Speidel

[Vibrotactile Perception in Finger Pulps and in the Sole of the Foot in Healthy Subjects among Children or Adolescents.](#)

April 2, 2015, PLOS ONE

Carpal tunnel syndrome

1. Magnus Flondell^{1,4}, Birgitta Rosén^{1,4}, Gert Andersson^{2,5}, Tommy Schyman³, Lars B. Dahlin^{1,4} and Anders Björkman^{1,4}
[Vibration thresholds in carpal tunnel syndrome assessed by multiple frequency vibrometry: a case-control study.](#)

Journal of Occupational Medicine and Toxicology. December 8, 2017

1 Department of Hand Surgery, Skåne University Hospital, Jan Waldenströms gata 5, 20502 Malmö, SE, Sweden.

2 Departments of Neurophysiology, Skåne University Hospital, Malmö, Sweden.

3 Department of Clinical Studies Sweden– Forum South, Skåne University Hospital, Malmö, Sweden.

4 Department of Translational Medicine – Hand Surgery, Lund University, Malmö, Sweden.

5 Department of Clinical Sciences, Lund University, Lund, Sweden.

2. Thomsen, R. Cederlund*, T. Speidel† and L. B. Dahlin

[Vibrotactile sense in patients with diabetes and carpal tunnel syndrome](#)

2011 Diabetic Medicine 28, DOI: 10.1111/j.1464-5491.2011.03308.x

3. L. B. Dahlin, S. Thrainsdottir, R. Cederlund, N. O. B. Thomsen, K. F. Eriksson†, I. Rosén‡, T. Speidel and G. Sundqvist

[Vibrotactile sense in median and ulnar nerve innervated fingers of men with Type 2 diabetes, normal or impaired glucose tolerance](#)

2008 Diabetic Medicine 25, DOI: 10.1111/j.1464-5491.2008.02433.x

Additional

1. Dan Ziegler, Gidon J Bönhof, Alexander Strom, Klaus Straßburger, Yanislava Karusheva, Julia Szendroedi, Michael Roden

[Progression and regression of nerve fibre pathology and dysfunction early in diabetes over 5 years](#)

Brain, Volume 144, Issue 10, October 2021, Pages 3251–3263

2. Carlsson D, Burström L, Lilliesköld VH, Nilsson T, Nordh E, Wahlström J.

[Neurosensory sequelae assessed by thermal and vibrotactile perception thresholds after local cold injury.](#)

17 February 2014, Int J Circumpolar Health

3. Lundborg G, Rosén B.

[The two-point discrimination test – time for a re-appraisal?.](#)

J Hand Surg 29B: 5: 418-422, 2004.

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4. Rosén B, Lundborg G

A new Model Instrument for Outcome After Nerve Repair.
Hand Clin 19; 463-470, 2003.

5. Rosén B, Dahlin LD, Lundborg G.

Assessment of functional outcome after nerve repair in a longitudinal cohort.
Scand J Plast Reconstr Hand Surg 34: 71-78, 2000

6. Rosén B, Lundborg G.

[A new tactile gnosis instrument in sensibility testing.](#)

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7. Digital vibrogram - a new diagnostic tool for sensory testing in compression neuropathy.

Lundborg G, Sollerman C and Lie-Stenström A-K: J Hand Surg 11-A: 693-699, 1986.

8. Domnade fingrar och klinisk diagnostik. - Handkirurgiska synpunkter.

Lundborg G and Sollerman C: Läkartidningen Vol. 81, No. 37, pp 3220-3223, 1984.74.