

Clinical Evidence for Carbonhand

Carbonhand is an assistive device that supports individuals during activities of daily living. To date, 367 participants have taken part in clinical trials evaluating Carbonhand.

Findings demonstrate that Carbonhand enhances grip strength, hand function, activity performance, and overall quality of life, with evidence of sustained therapeutic benefits over time.

Below are short summaries of key publications.

Improved physical function using a power enhancing glove in persons with IBM. The glove significantly improves hand function and perceived independence in individuals with IBM, with the greatest benefits observed in those with mild to moderate weakness. It supports performance across a range of daily activities, although outcomes may vary depending on the level of impairment. Regardt M, Alexanderson H, Hunn S, et al POS1282 IMPROVED ACTIVITY PERFORMANCE USING A POWER ENHANCING GLOVE IN PERSONS WITH INCLUSION BODY MYOSITIS (IBM) Annals of the Rheumatic Diseases 2024;83:613-614.	Published: 2024 Participants: 40 Indications: Inclusion Body Myositis (IBM). Aim: Carbonhand is used for the purpose to investigate feasibility with IBM.
Therapy effect on hand function after home use of a wearable assistive robotic glove supporting grip strength. After six weeks use of Carbonhand during daily activities at home, participants with chronic hand function limitations showed significant and lasting improvements in grip strength and overall hand function. The glove benefited a wide range of diagnoses and was shown to be safe and effective, even with unsupervised daily use. This large study demonstrated true therapeutic effects from a wearable robotic glove integrated into daily life. Kottink, A.I.R. et al. (2022). Six weeks Use of a Wearable Soft-robotic Glove During ADL: Preliminary Results of Ongoing Clinical Study. In: Torricelli, D., Akay, M., Pons, J.L. (eds) Converging Clinical and Engineering Research on Neurorehabilitation IV. ICNR 2020. Biosystems & Biorobotics, vol 28. Springer, Cham.	Published: 2024 Participants: 63 Indications: Acquired brain injury, osteoarthritis, rheumatoid arthritis, spinal cord injury, orthopedic conditions, and other neurological disorders. Aim: Carbonhand is used for the purpose to evaluate the therapeutic effect.
Usability and Satisfaction of a Next Generation Robotic Glove for Grip Support Among Patients with Hand Function Limitations. The next-generation Carbonhand was evaluated in a usability study involving individuals with persistent hand limitations related to trauma or arthritis. Participants reported positive usability and satisfaction ratings. The findings support the value of usability testing in optimizing assistive technology and promoting its successful adoption. Radder B, Prange-Lasonder G, Kottink A, Melendez-Calderon A, Buurke J, Rietman J. Feasibility of a wearable soft-robotic glove to support impaired hand function in stroke patients. J Rehabil Med 2018; 50: 598-606.	Published: 2025 Participants: 5 Indications: Trauma and arthritis. Aim: Carbonhand is used for the purpose to explore usability and satisfaction.
The impact of a robotic glove on activity performance and body function for brachial plexus birth injury patients–A longitudinal case series. Most BPBI patients who used the Carbonhand glove at home for three months reported improvements in activity performance, satisfaction, and strength. The glove enabled new activities, reduced pain in some cases, and was shown to be safe and usable as both an assistive and training tool. Longer daily was associated with greater improvements. Helena Millkvist, Anna Källströmer, Birgitta Bernspång, Mikael Wiberg, The impact of a soft robotic glove on activity performance and body function for brachial plexus birth injury patients–A longitudinal case series, Journal of Hand Therapy, Volume 38, Issue 2, 2025, Pages 297-305, ISSN 0894-1130	Published: 2024 Participants: 8 Indications: Brachial plexus birth injury. Aim: Carbonhand is used for the purpose of investigating improved activity performance and body function for patients with BPBI.

Home-based rehabilitation using a robotic hand glove device leads to improvement in hand function in people with chronic spinal cord injury: a pilot study. Twelve weeks of home use with the Carbonhand resulted in significant and lasting improvements in hand function, strength, and independence among individuals with chronic spinal cord injury. Gains were maintained after discontinuation, and most participants reported that the glove was useful and easy to use for daily activities. Osuagwu BAC, Timms S, Peachment R, Dowie S, Thrussell H, Cross S, Shirley R, Segura-Fragoso A, Taylor J. Home-based rehabilitation using a soft robotic hand glove device leads to improvement in hand function in people with chronic spinal cord injury: a pilot study. J Neuroeng Rehabil. 2020 Mar 5;17(1):40. doi: 10.1186/s12984-020-00660-y. PMID: 32138780; PMCID: PMC7057671.	Published: 2020 Participants: 15 Indications: Chronic spinal cord injury. Aim: Carbonhand is used for the purpose to investigate therapeutic effect of a self-administered home-based hand rehabilitation program for people with cervical SCI.
Factors affecting the usability of an assistive robotic glove after stroke or multiple sclerosis. The glove demonstrated favourable outcomes for individuals with moderate hand limitations, particularly during activities requiring a strong and sustained grip. Benefits were more variable for select fine hand-use activities, particularly typing and handling small objects. Overall, the findings support the glove's potential to improve functional hand use and independence across a variety of daily activities. Palmerantz S, Plantin J, Borg J. Factors affecting the usability of an assistive soft robotic glove after stroke or multiple sclerosis. Karolinska Institutet, Department of Clinical Sciences, Danderyd Hospital, Division of Rehabilitation Medicine, Stockholm, Sweden. Journal of Rehabilitation Medicine (2020).	Published: 2020 Participants: 20 Indications: Stroke and multiple sclerosis. Aim: Carbonhand is used to explore the usability and effects in individuals daily activities.
Home rehabilitation supported by a wearable robotic device for improving hand function in older adults: A pilot randomized controlled trial. A four-week study involving 91 older adults found the glove to be highly usable, with improvements in handgrip and pinch strength particularly evident in the therapeutic group. Functional task performance also improved, with comparable gains observed across all groups. Overall, the findings suggest that the glove may help support hand function and address age-related decline. Radder B, Prange-Lasonder GB, Kottink AIR, Holmberg J, Sletta K, Van Dijk M, et al. The effect of a wearable soft-robotic glove on motor function and functional performance of older adults. Assist Technology. 2020;32(1):9–15	Published: 2019 Participants: 91 Indications: Self-perceived decline of hand function Aim: Assistive robotic glove is used to explore the effect of prolonged use of during daily activities at home.
The effect of a wearable robotic glove on motor function and functional performance of older adults. Older adults with reduced hand function used the robotic glove for four weeks and demonstrated significant improvements in pinch strength. The glove was highly rated for usability, well tolerated, and associated with no major concerns. While changes in daily task performance varied, the findings support the glove as a safe, well-accepted option for improving hand strength, with longer or more targeted use potentially offering additional functional benefits. Radder B, Prange-Lasonder G, Kottink A, Holmberg J, Sletta K, Van Dijk M, Meyer T et al. (2018): The effect of a wearable soft-robotic glove on motor function and functional performance of older adults, Assistive Technology, DOI: 10.1080/10400435.2018.1453888	Published: 2018 Participants: 65 Indications: Older adults. Aim: Robotic glove used for the purpose to evaluate the direct, assistive effect of the grip.
Pilot Study on the Effects of Motor-Assisted Gloves (SEM™ Glove) on Functional Disorders of the hand. The Glove significantly improved pinch strength and daily activity performance in patients with upper limb disorders, particularly those with moderate to good arm strength. It was also shown to be safe and comfortable to use. Hashida R, Matsuse H, Totsugi M, Omoto M, Shinozaki N, Tanaka J, Nago T. (2016). Study on the Effects of Motor-Assisted Gloves (SEM™ Glove) on Functional Disorders of the hand. The Kurume Medical Journal (2018). DOI:10.2739/kurumemedj.MS652007	Published: 2018 Participants: 30 Indications: Upper limb functional disorder. Aim: To evaluate the effectiveness of the grip and pinch strength of patients with functional disorders of the fingers.



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