



What is Keeogo+?

Keeogo+ is an ambulatory assistive device that is fitted to the lower body and powered at the knee. This computer-assisted orthosis follows the knee joint and provides complementary torque to assist the wearer throughout a variety of activities, namely:

- > **Assistance with knee flexion and extension during the various swing and stance phases of gait**
- > **Assistance with eccentric knee control and knee extension during various weight bearing situations**
- > **Assistance with knee flexion and extension in stairs**
- > **Allows for mono-and bilateral, symmetrical or asymmetrical assistance**

Keeogo+ does not attempt to move through a predetermined pattern of movements, instead it integrates seamlessly with movements initiated by the user themselves, and provides assistance based on the detected activity. The assistance is customized by the clinician to provide a personalized experience that meets the user's needs and clinical goals.

Powered Motion in Sync with Your Mobility

The term "Dermoskeleton" was coined to differentiate the low-profile and natural, user-initiated motion of B-Temia device from existing exoskeletons. Dermoskeleton technology has been approved for medical use in Europe since it obtained CE Marking in 2019.

The AI-based powered-driven system moves symbiotically with the wearer. Dermoskeleton technology detects intention based on the initial movements. Motors then support completion of the movement. The joint is braced, supported, and assisted throughout the user's motion. The Dermoskeleton provides personalized assistance for each user to ensure appropriately augmented, healthier movements.

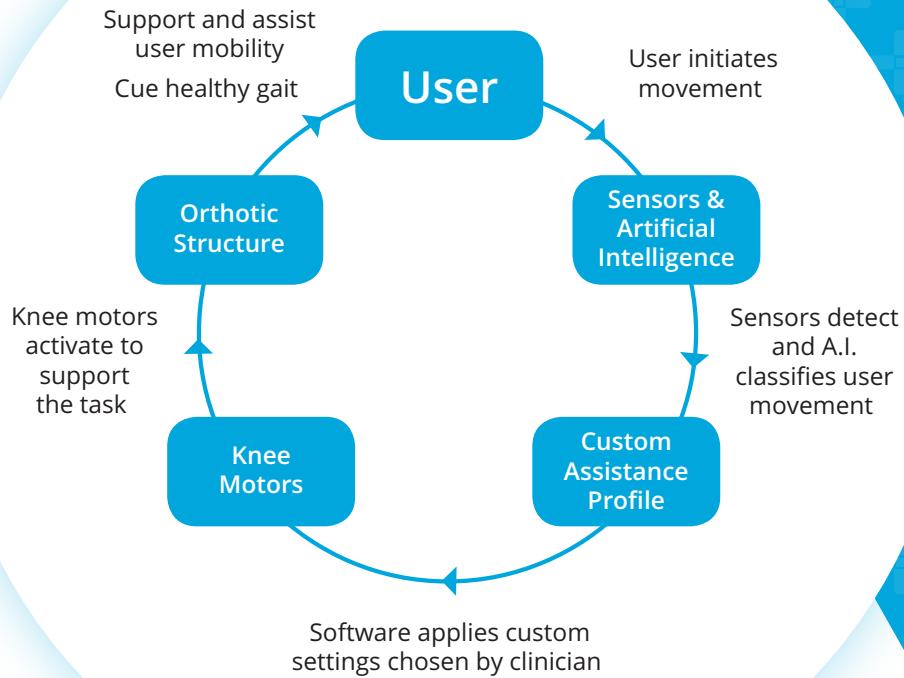
The Dermoskeleton surrounds the body to serve as an additional and supporting artificial musculoskeletal system. It intends to protect the wearer from knee stress to prevent acute or chronic injuries and enhances capacity for and quality of movements.

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A Smart Powered Orthosis



Keeogo+, a smart powered orthosis for rehabilitation

Keeogo+ is intended for medical applications such as rehabilitative training and personal assistance, offering the following advantages to clinicians and end-users:

- Provides strength and support to assist daily activities and facilitate exercises
- Stabilizes, mobilizes, and relieves pain at the knee
- Cues healthy gait patterns and provides performance feedback to reinforce gait training
- Has a short device familiarization time
- Is usable with a wide variety of patient types, disability levels, and mobility tasks
- Enhances training with custom assistance based on patient deficit(s)

Some Numbers from Independant Studies

Use with Stroke – In-clinic gait & mobility training:

The immediate benefits of Keeogo to persons with chronic stroke were examined by Jayaraman *et al.* in a 2020 pivotal study with chronic stroke patients (n = 40). While using Keeogo, users:

- **Improved walking biomechanics:**

Statistically significant and clinically meaningful improvements in gait biomechanics were achieved (2.6 pts improvement on Wisconsin Gait Scale over individual baseline, unassisted scores, $p < .0001$, MCID = 2.25pts).

- **Improved knee strength & endurance:**

Improved 30-second Chair Test performance by an average of 4 repetitions over their baseline, unassisted scores ($p < .001$, MCID = 3).

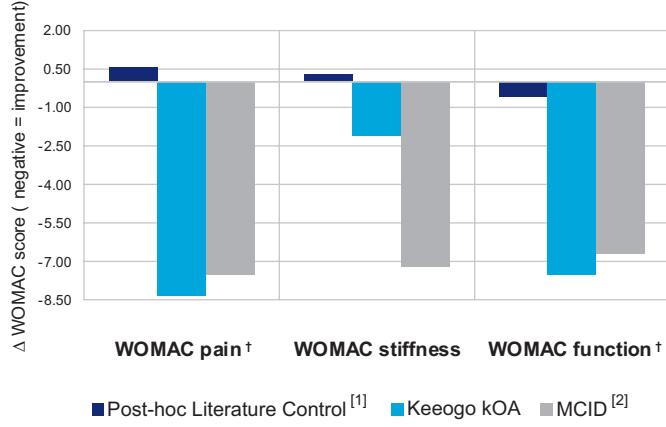
Further, clinicians reported that while wearing Keeogo, specific functional deficits were addressed by activity:

- 100% of users improved their weight bearing during walking.
- 95% of applicable users improved their stair climbing technique.
- 79% of applicable users improved their use of secondary devices while walking.

These benefits were achieved after 3 sessions of device use.

Effect of 2wks of home Keeogo use on WOMAC Scores in McGibbon 2021 study

(Individual change over baseline score, 6wk study duration, n = 24)



† Change over baseline $p < .005$

[1] Value of Literature Control taken from post-hoc meta-analysis of KOA waitlist control groups in other studies (n = 211)

[2] MCID from Angst *et al.* 2001

Use for Multiple Sclerosis – Home rehab:

Based on the pivotal Keeogo study (McGibbon *et al.* 2018) of people with Multiple Sclerosis (n = 29), patients achieved rehab benefits (no device, baseline vs. post-intervention) after 2 weeks of unsupervised self-selected home-use:

- 24m improvement on the 6-min Walk Test ($p < .05$, MCD = +48.7m).
- 2.8s improvement on Timed Stairs Test ($p < .05$, MCD = -2.42s)
- 2.2s improvement on Timed Up-and-Go test ($p < .05$, MCD = -2.71s).

Despite the short duration of the trial (2 weeks of home device use, average of 10 hours of total use per participant), 97% of users achieved rehab benefits in one or more of their unassisted timed functional testing scores. Volume of device use was positively correlated with individual benefits.

Use for Knee Osteoarthritis – Relief of impairments due to structural deficits of the knee:

A pivotal study examining the benefits of home Keeogo use (McGibbon *et al.* 2021) for persons with Knee Osteoarthritis (n = 24) measured improvement in self-reported disability scores (baseline vs. post-intervention, 6-week trial duration, 2-week treatment duration with Keeogo, no other applicable treatments):

- 8.3pts improvement on WOMAC pain sub-scale ($p = .004$, MCID = -7.5pts)
- 7.5pts improvement on WOMAC function sub-scale ($p = .003$, MCID = -6.7pts)
- 2.1pts improvement on WOMAC stiffness sub-scale ($p = .647$, MCID = -7.2pts)
- 7.1pt improvement in SF36 Energy/Vitality ($p = .005$)
- 5.0pt improvement in SF36 General health ($p = .043$)

Who is Keeogo+ for?

Keeogo+ is intended to provide support in ambulation for those living with weakness, pain, decreased muscle strength and endurance due to illness or injury.

This ambulatory support can be used in medical applications such as rehabilitative training and personal assistance for home use.

The Patient...

- Should have the ability to initiate all movements in walking, sit-stand, stand-sit, squatting, crouching, kneeling and stair climbing.
- Should be able to walk without human assistance (with or without an assistive device).
- Should have the necessary trunk control and core strength to remain balanced when operating the device.



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PATIENT POPULATIONS WHO MAY BENEFIT FROM KEEOGO+ INCLUDE, BUT ARE NOT LIMITED TO:

Conditions

- Multiple Sclerosis
- Parkinson's Disease
- Knee and Hip Osteoarthritis
- Patients with MSK injuries
- Incomplete SCI
- Muscular Dystrophy
- Brain Injury
- Stroke

Deficits

- Heavy gait impairments
- Advanced knee osteoarthritis
- Knee spasticity
- Strength or neuromotor deficit affecting quadriceps and/or hamstrings group
- Knee buckling issues
- Cognitive dual-task deficit related to knee
- People who could benefit from proprioceptive cues for lower-body activities
- Asymmetric postural or strength issues

Contraindications

- Complete paralysis of the lower limb
- Severe osteoporosis
- Severe cognitive impairment
- Pregnancy

Keeogo+™ is available for medical use and received regulatory clearance for commercialization in Canada, in the European Community and any other jurisdictions that accept CE Mark labeling for commercialization, and in the United-States the Keeogo is indicated for the Stoke population in rehabilitation environments.

