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# ERIGO THERAPY IS BACKED BY 10 YEARS OF CLINICAL RESEARCH!



# SUMMARY

- 1** Erigo training was called a breakthrough in avoiding a vicious cycle during early care.
- 2** The Erigo is the best-investigated robotic tilt table on the market.
- 3** Research shows that Erigo training is safe and effective for various patient groups.
- 4** Erigo training is the safest of three tested mobilization methods in the intensive care unit (ICU).
- 5** With Erigo training, the risk of syncope during verticalization is reduced.
- 6** With Erigo training, time spent in a vertical position is increased.
- 7** Brain activity during Erigo training is comparable to brain activity during regular human gait.
- 8** The Hocoma Knowledge Platform: Find all available literature in one place!

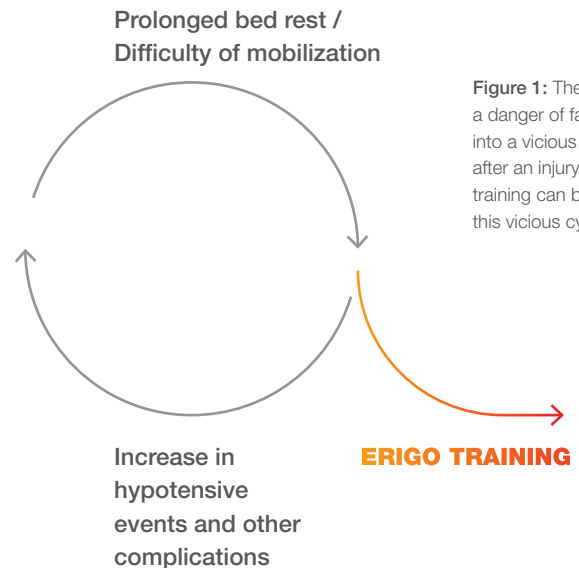


# 1 ERIGO TRAINING WAS CALLED A BREAKTHROUGH IN AVOIDING A VICIOUS CYCLE DURING EARLY CARE.

Bed rest and inactivity result in rapid decline of several body functions, for example the reduction of aerobic fitness [1], reduction of bone mass [2], drastic increase in the risk of thrombosis or embolisms [3] and muscular atrophy [4]. At the same time, orthostatic tolerance is reduced both as a result of bed rest [5] and nervous system injury [6]. This can lead to a vicious cycle where verticalization is either avoided altogether out of fear of hypotensive events (such as pre-syncope or syncope) or negative effects on cerebral blood flow or where verticalization is attempted, but needs to be interrupted due to a potentially life threatening hypotensive event. This, in turn, increases the probability of hypotensive events and other mentioned complications.



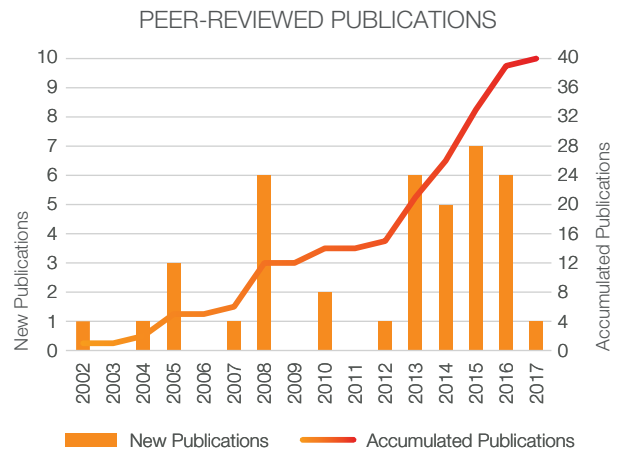
Erigo therapy was called a breakthrough by established researchers because it stabilizes the hemodynamic system during verticalization and thus avoids or breaks this vicious cycle [7].



**Figure 1:** There is a danger of falling into a vicious cycle after an injury. Erigo training can break this vicious cycle.

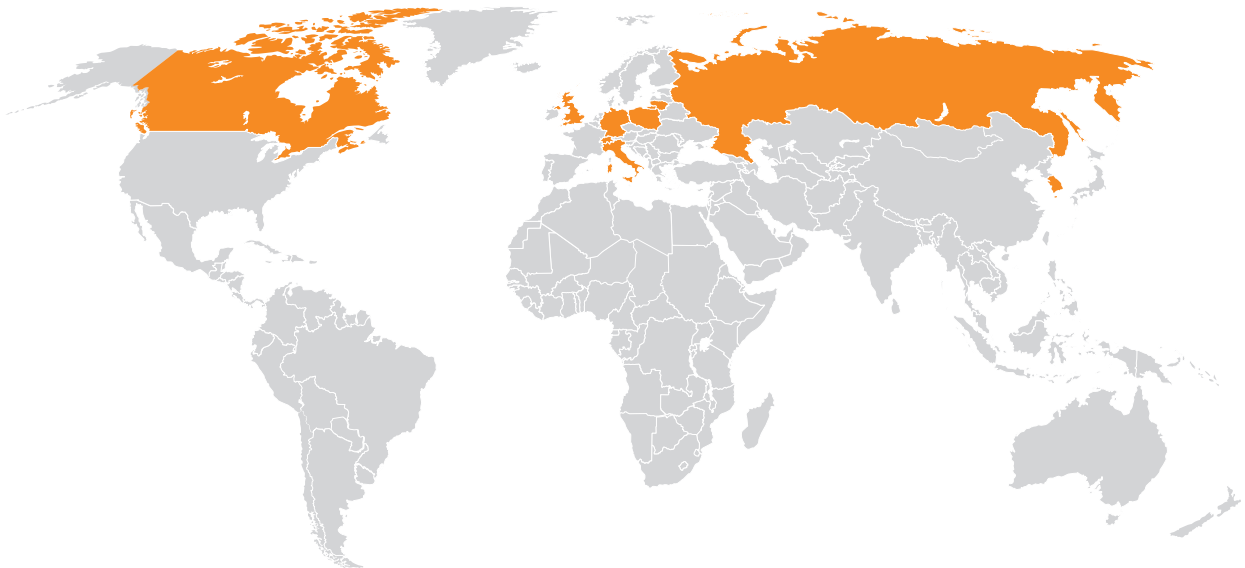
## 2 THE ERIGO IS THE BEST-INVESTIGATED ROBOTIC TILT TABLE ON THE MARKET.

Today, 40 Erigo research articles from independent research groups all over the world have been published in peer-reviewed journals (as of August 2017). These studies include 8 randomized controlled trials (RCTs) including 212 participants, 10 cross-sectional studies including 134 patients, observational studies and technical papers.



**Figure 2:** Especially in recent years, research interest in the Erigo has grown and 40 scientific publications are available today. This includes peer-reviewed journal and conference publications.

**Figure 3:** The Erigo research community spans over large parts of the world. Published papers also include 4 international collaborations.



### 3 **RESEARCH SHOWS THAT ERIGO TRAINING IS SAFE AND EFFECTIVE FOR VARIOUS PATIENT GROUPS.**

- A** Individuals with spinal cord injury [8-16]
- B** Individuals post stroke [17-24]
- C** Individuals with traumatic brain injury [9, 12, 25-31]
- D** Individuals with disorders of consciousness [17, 18, 26, 30-32]
- E** Individuals being treated in an intensive care unit [13, 24, 25, 32, 33]





## 4 **ERIGO TRAINING IS THE SAFEST OF THREE TESTED MOBILIZATION METHODS IN THE INTENSIVE CARE UNIT (ICU).**

Several studies compared the safety of different mobilization methods for patients being treated in the ICU [7, 25, 32, 33]. They compared verticalization with the Erigo to verticalization with a regular tilt table, mobilization in bed (with or without technology assistance) or mobilization with the assistance of therapists, and found that Erigo verticalization led to fewer hypertensive events and significantly fewer training interruptions [7, 25, 32].

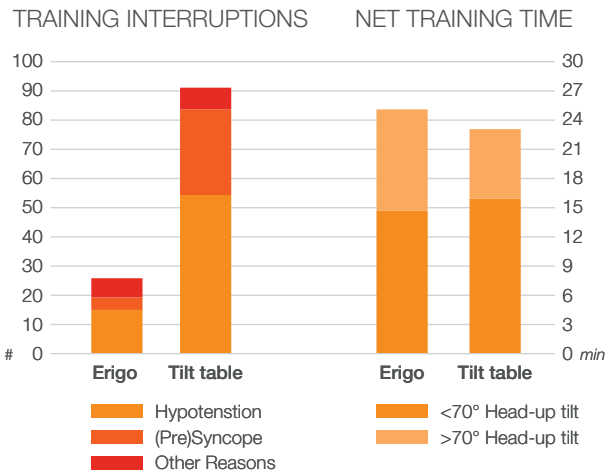
In addition, Erigo verticalization was the only method tested that did not lead to a potentially dangerous increase in stress hormones after verticalization [33]. Several studies are currently planned or ongoing to further investigate the effects of Erigo therapy in the intensive care unit ([www.clinicaltrials.gov](http://www.clinicaltrials.gov)).

## 5 **WITH ERIGO TRAINING, THE RISK OF SYNCOPE DURING VERTICALIZATION IS REDUCED.**

The Erigo was developed to allow safe and effective verticalization of patients who otherwise are at a high risk of potentially life threatening syncope episodes. This goal has clearly been reached as there is strong agreement in all the studies regarding the superiority of the Erigo in reducing pre-syncope and syncope during verticalization [9-11, 14, 24-27, 30, 32, 34, 35].

6 **WITH ERIGO TRAINING, TIME SPENT IN A VERTICAL POSITION IS INCREASED.**

Thanks to increased orthostatic tolerance, therapy interruptions can be decreased and total therapy time increased with the Erigo [26, 32, 34, 35]. In particular, the duration of head-up tilt of more than 70 degrees was increased by 50% and the number of training interruptions due to syncope, pre-syncope or orthostatic intolerance was diminished by two thirds [32].



**Figure 4:** Comparison of training interruptions and net head-up tilt time with the Erigo compared to regular tilt table verticalization [32].



7 **BRAIN ACTIVITY DURING ERIGO TRAINING IS COMPARABLE TO BRAIN ACTIVITY DURING REGULAR HUMAN GAIT.**

It has been shown that brain activity during Erigo stepping is very similar, with regards to localization and temporal sequence, to the activity during regular human walking in able-bodied individuals [36]. The gait-like stepping movement in the Erigo is therefore extremely useful, not only to stabilize the cardiovascular system, but also with regards to very early, but still safe gait rehabilitation [36].

8

# THE HOCOMA KNOWLEDGE PLATFORM: FIND ALL AVAILABLE LITERATURE IN ONE PLACE!

A full overview of all papers published on the Erigo can be found on the Hocoma Knowledge Platform (<http://knowledge.hocoma.com/research/erigo.html>).

<div><div> <b>Hocoma</b> <small>a DIH brand</small></div><div><div>BODY OF KNOWLEDGE</div><div>CLINICAL PRACTICE</div><div>RESEARCH</div><div>TRAINING MATERIAL</div><div>EXPERT SECTION</div></div><div></div></div>			
Author	Title	Publication Type	Year
Riberholt C.G., Lindschou J., Gluud C., Mehlsen J., Moller K.	Early mobilisation by head-up tilt with stepping versus standard care after severe traumatic brain injury – Protocol for a randomised clinical feasibility trial Trials.19; (1):612	Journal Article	2018
Zivi I., Valsecchi R., Maestri R., Maffia S., Zarucchi A., Molatore K., Vellati E., Saltuari L., Frazzitta G.	Early Rehabilitation Reduces Time to Decannulation in Patients With Severe Acquired Brain Injury: A Retrospective Study Front Neurol.9; 559	Journal Article	2018
Kumar S., Yadav R., Aafreen, Yadav S.	Effect of robotic tilt table on rehabilitation outcome in right side versus left side hemiplegia International Journal of Yogic, Human Movement and Sports Sciences.3; (2):237-241	Journal Article	2018
Daunoraviciene K., Adomaviciene A., Svirskis D., Griskevicius J., Juocevicius A.	Necessity of early-stage verticalization in patients with brain and spinal cord injuries: Preliminary study Technol Health Care.26; (S2):613-623	Journal Article	2018



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## CURRENT HOCOMA RESEARCH FOCUS:

Hocoma would like to thank all their research partners and the many researchers who independently showed interest and studied our devices for their hard work and dedication. Together, we're pushing the field forward and improving therapy for our patients! Hocoma, along with our partners, is currently focused on the following research topics:

- What are the economic advantages of our devices? We join forces with clinical partners with experience in research who are interested in collaborating with health economists on this topic.
- How can I increase the efficiency of delivering therapy with Hocoma devices? We join forces with clinical partners with experience in research who are interested in collaborating with health economists on this topic.
- What is the real advantage of Augmented Performance Feedback? We join forces with clinical partners with experience in research who are willing to investigate the effects of using Augmented Performance Feedback in a longitudinal study.

If you have clinical expertise and a good idea on how to highlight the clinical potential of our devices in a research project, please send a short proposal to [clinical.research@hocoma.com](mailto:clinical.research@hocoma.com). We are always looking for new collaborations!

If you have engineering expertise and want to contribute to the technical innovation of our devices, please contact us at [info@hocoma.com](mailto:info@hocoma.com) with the keyword "Technical innovation" in the subject line.

# INTENSITY = REPETITION × EFFORT

This is what drives us at Hocoma: a strong motivation to help people with technologies and ideas that look at functional movement therapy from a **completely new perspective**. Because these technologies enable people to exercise **intensively**. Because they maximize **motivation**. Because they encourage patients to make possible what they've been told was impossible.

We improve the lives of millions by providing functional and efficient solutions that set new standards in the field of human movement therapy.

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