Reck

MOTOmed®

MOTOmed®
Studies

Effectiveness of the apparatus-assisted MOTOmed movement therapy – scientifically evaluated and empirically proven

For RECK Medical Devices, the benefits that MOTOmed offers to users, have top priority. This is reflected for instance in the ongoing exchange with doctors and therapists as well as research institutes.

MOTOmed is recognized worldwide as the epitome of high-quality and safe device-based movement therapy.

To ensure customer satisfaction and trust in MOTOmed Movement Therapy, RECK Medical Devices pursues a consistent quality policy. Quality management according to EN ISO 13485 and scientific evidence of MOTOmed Movement Therapy build the foundation for RECK quality standards. The quality policy is primarily based on two pillars: a quality management according to EN ISO 13485:2016 and scientific evidence for the effectiveness of motor-assisted MOTOmed Movement Therapy based on studies.

Stroke

DOI: HTTPS://DOI.ORG/10.12669/PJMS.38.5.5259

1.18 Clinical Effects of MOTOmed Intelligent Exercise Training Combined with Intensive Walking Training on the Rehabilitation of Walking, Nerve and Lower Limb Functions among Patients with Hemiplegia after Stroke

Hu et al. 2022, China

THERAPY/INTERVENTION	PARTICIPANTS	AGE (MEAN)	DURATION	SELECTED RESULTS	SIGNIFICANCE (5 %)
MOTOmed viva2 + Intensive Walking Training	IG = 26	56,22 ± 10,37	8 weeks, 6 × weekly, 20 minutes	FAC-Scale 10-m maximum walking speed FMA scores NGF NT-3 BDNF	p < 0.000 p < 0.032 p < 0.000 p < 0.000 p < 0.000 p < 0.000
Intensive Walking Training	KG = 26	56,97 ± 10,24	8 weeks, 6 × weekly,		

Conclusion: The intelligent MOTOmed movement therapy, combined with intensive walking training, has been proven to significantly improve walking function, nerve activity, and lower limb function in patients with hemiparesis after a stroke.

DOI: HTTPS://DOI.ORG/10.19852/J.CNKI.JTCM.2023.02.006

1.17 Effectiveness on post-stroke hemiplegia in patients: electroacupuncture plus cycling vs electroacupuncture alone

Minh et al. 2023, Vietnam

THERAPY/INTERVENTION	PARTICIPANTS	AGE (MEAN)	DURATION	SELECTED RESULTS	SIGNIFICANCE (5 %)
MOTOmed viva2 + Electroacupuncture	IG = 60	–	6 weeks, 5 × weekly 30 minutes + Electro-acupuncture	Electromyography (Quadriceps, Tibialis Anterior, Deltoid and Biceps) Modified Rankin Scale (degree of disability or dependence) Barthel Scale (performance in activities of daily living) Orgogozo Scale (neurological outcome)	p < 0.05 p < 0.01 p < 0.01 p < 0.01
Electroacupuncture	CG = 60	–	6 weeks, 5 × weekly Electro-acupuncture		

Conclusion: Movement therapy with the MOTOmed viva2 significantly improves recovery in stroke patients who are also treated with electroacupuncture.

Stroke

DOI: HTTPS://DOI.ORG/10.2298/SARH231025032S

1.16 The impact of cycling exercise on motor and functional recovery of patients in acute and subacute stroke phase

Simić-Panić et al. 2024, Serbia

THERAPY/INTERVENTION	PARTICIPANTS	AGE (MEAN)	DURATION	SELECTED RESULTS	SIGNIFICANCE (5 %)
MOTOmed muvi + PT	IG = 63	65 ± 11,98	3 weeks, 6 × weekly, 30 minutes + PT	NIHSS-Scale MAS-Scale BMES leg-Scale FMA-LE-Scale BBS-Scale 6MWT	p < 0.030 p < 0.003 p < 0.049 p < 0.000 p < 0.000 p < 0.035
PT	CG = 64	67,34 ± 10,86	3 weeks, 6 × weekly + PT		

Conclusion: Movement therapy with the MOTOmed muvi, combined with traditional treatment methods, significantly improves motor skills and walking speed in patients with acute or subacute stroke.

DOI: HTTPS://DOI.ORG/10.1007/S11055-019-00882-1

1.15 Possibilities for Correcting Emotional and Behavioural Impairments in Stroke Patients during Rehabilitation Therapy

Kotov et al. 2020, Russia

THERAPY / INTERVENTION	PARTICIPANTS	AGE / Ø-YEARS	DURATION	SELECTED RESULTS	SIGNIFICANCE (5 %)
Combined MOTOmed movement therapy with cognitive self-training	IG = 50	65.0 ± 1.5	7 minutes to begin with, increasing up to 30-40 minutes 3 times a day for 2 weeks	Functional status (Modified Rankin Scale): psychometric parameters (Beck Depression and Anxiety Inventories)	p ≤ 0.05 p = 0.0001
Standard therapy	CG = 50	64.8 ± 1.5	not specified	-	-

Conclusion: The rehabilitation program consisting of MOTOmed movement therapy and cognitive self-training is an easily accessible therapy option for emotional and behavioral disorders.

DOI: HTTPS://DOI.ORG/10.1177/0269215518790782

1.14 Effects of MOTOmed movement therapy on the mobility and activities of daily living of stroke patients with hemiplegia: a systematic review and meta-analysis

Shen et al. 2018, China

THERAPY / INTERVENTION	PARTICIPANTS	AGE / Ø-YEARS	DURATION	SELECTED RESULTS	SIGNIFICANCE (5 %)
Meta-analysis on the effectiveness of MOTOmed movement therapy combined with PT vs. only PT	19 studies with a total of 1099 PTP were included for evaluation		4–12 weeks, 5–14 x / week, 20–40 min.	Overall significance of the meta-analysis related to the following test procedures compared to the control group: Fugl-Meyer-Assessment Score (16 studies, 473 PTP) Barthel Index (8 studies, 258 PTP) Berg Balance Scale (6 studies, 174 PTP) Modified Ashworth Scale (5 studies, 135 PTP) Functional Ambulation Category Scale (4 studies, 149 PTP) 10 m walk test (3 studies, 100 PTP) Modified Barthel Index (2 studies, 34 PTP)	p < 0.0001

Conclusion: Based on 19 studies, the meta-analysis concluded that MOTOmed movement therapy combined with conventional rehabilitation eads to improved mobility and activities of daily living.

Stroke

DOI: HTTPS://DOI.ORG/10.1016/J.KJMS.2013.07.006

1.13 Effect of biofeedback cycling training on functional recovery and walking ability of lower extremity in patients with stroke

Yang et al. 2014, Taiwan

THERAPY / INTERVENTION	PARTICIPANTS	AGE / Ø-YEARS	DURATION	SELECTED RESULTS	SIGNIFICANCE (5 %)
MOTOmed viva2 movement therapy + PT + OT	A = 15 B = 15	A = 53.6 ± 10.3 B = 54.5 ± 8.0	All participants received out-patient PT + ET (1 h each) A received additional MOTOmed movement therapy for 4 weeks (5 x per week for 30 min.) (T2) and follow-up after another 4 weeks (T3), B received the same intervention in reverse order.	Comparison of test results during intervention phase and non-intervention phase Fugl-Meyer-Assessment (LE-FMA) 6-minute-walk test 10-meter-walk test Modified Ashworth Scale (MAS)	 p < 0.001 p < 0.001 p < 0.001 p < 0.001

Conclusion: The study result shows that an additional 4-week biofeedback training with the MOTOmed movement therapy reduces the functional impairment of the lower extremities as well as improves the endurance and speed when walking in people with chronic stroke.

DOI: HTTPS://DOI.ORG/10.1161/STROKEAHA.110.599068

1.12 Cycling Induced by Electrical Stimulation Improves Motor Recovery in Postacute Hemiparetic Patients: A Randomized Controlled Trial

Ambrosini et al. 2011, Italy

THERAPY / INTERVENTION	PARTICIPANTS	AGE / Ø-YEARS	DURATION	SELECTED RESULTS	SIGNIFICANCE (5 %)
MOTOmed viva2 + FES	IG = 15	59.0 ± 14.0	4 weeks, 5 ×/ week, 25 min.	Extent of paralysis (Motricity Index) Trunk control (Trunk Control Test) Functional strength in the lower extremities (Upright Motor Control Test) Pedal symmetry	p < 0.001 p = 0.001 p = 0.005 p = 0.038
MOTOmed viva2	CG = 15	56.0 ± 10.0	4 weeks, 5 ×/ week, 25 min.	No significant changes	–

Conclusion: A four-week MOTOmed movement therapy in combination with functional electrical stimulation improves the motor functions of the lower extremity and accelerates the recovery of walking ability in stroke patients.

Stroke

DOI: HTTPS://DOI.ORG/10.1055/S-0031-1273338

1.11 Cyclic Movement Training versus Conventional Physiotherapy for Rehabilitation of Hemiparetic Gait after Stroke: A Pilot Study

Podubecka et al. 2011, Germany

THERAPY / INTERVENTION	PARTICIPANTS	AGE / Ø-YEARS	DURATION	SELECTED RESULTS	SIGNIFICANCE (5 %)
MOTOmed viva2 + PT	IG = 10	61.8 ± 13.2	4 weeks, 5 ×/ week 30 min.	Balance (BBS) by 35 %	$p < 0.05$
Gait training + PT	CG = 10	55.1 ± 14.1	4 weeks, 5 ×/ week 30 min.	Balance (BBS) by 27 %	$p < 0.05$

Conclusion: A four-week MOTOmed movement therapy improves the efficiency, balance, cardiac capacity and quality of life in stroke patients.

DOI: HTTPS://DOI.ORG/10.1007/S11055-011-9451-4

1.10 Current Approaches to Restoring Walking in Patients during the Acute Phase of Cerebral Stroke

Skvortsova et al. 2011, Russia

THERAPY / INTERVENTION	PARTICIPANTS	AGE / Ø-YEARS	DURATION	SELECTED RESULTS	SIGNIFICANCE (5 %)
MOTOmed viva2 + GT + PT	IG = 53	59.0 ± 10.4 (total partici- pants)	MOTOmed + GT 2 weeks, 1x / day 20 min. + PT: 2 weeks, 1x / day 30 min.	Walking ability (FGS) Balance (BBS) Walking speed Daily activities (BS) Proprioception	$p < 0.001$ $p < 0.001$ $p < 0.05$ $p < 0.001$ $p < 0.05$
PT	CG = 25	59 ± 10.4 (total partici- pants)	2 weeks, 1x / day 30 min.	No significant changes	–

Conclusion: After a two-week MOTOmed movement therapy in combination with conventional therapy, the general walking ability of stroke patients could be significantly improved.

DOI: HTTPS://DOI.ORG/10.1177/1545968310372138

1.9 Effect of Repetitive Arm Cycling Following Botulinum Toxin Injection for Poststroke Spasticity: Evidence From fMRI

Diserens et al. 2010, Switzerland

THERAPY / INTERVENTION	PARTICIPANTS	AGE / Ø-YEARS	DURATION	SELECTED RESULTS	SIGNIFICANCE (5 %)
MOTOmed viva2 + Botulinumtoxin IG 1 With Residual muscle strength	IG 1 = 4	49.0 ± 10.0	12 weeks 3x / week, 30 min.	Flexibility (ROM) Reduction: number of spasms	$p < 0.05$
IG 2 Without motor activity	IG 2 = 4	49.0 ± 10.0	12 weeks 3x / week, 30 min.	No significant changes	–

Conclusion: Passive MOTOmed movement therapy in combination with botolinum toxin injection showed improved arm motor function and a reduced tendency to spasticity for stroke patients, provided that residual muscle strength was present.

Stroke

DOI: –

1.8 Use of an Assistive Movement Training Apparatus in the Rehabilitation of Stroke Patients

Dobke et al. 2010, Germany

THERAPY / INTERVENTION	PARTICIPANTS	AGE / Ø-YEARS	DURATION	SELECTED RESULTS	SIGNIFICANCE (5 %)
MOTOmed viva2 training at home	IG = 16	63.1 ± 8.1	16 weeks 2x / day 10 min.	2MWT 6MWT Walking speed Quality of life Ø performance at 6.3 W	p = 0.015 p = 0.003 p = 0.024 p = 0.0018 p = 0.009
Conventional therapy	CG = 15	65.8 ± 10.7	16 weeks 2x / day 10 min.	No significant changes	–

Conclusion: A four-months MOTOmed training at home showed significant improvements of mobility, walking ability and quality of life.

DOI: HTTPS://DOI.ORG/10.11588/HEIDOK.00009950

1.7 Functional electrical stimulation on leg ergometer in rehabilitation after stroke: The use of functional electrical stimulation during training on the cyclic leg movement exerciser (FES-LCE) in inpatient rehabilitation after cerebral ischemic stroke

Eigler 2009, Germany

THERAPY / INTERVENTION	PARTICIPANTS	AGE / Ø-YEARS	DURATION	SELECTED RESULTS	SIGNIFICANCE (5 %)
MOTOmed viva2 + FES	IG = 18	66.5 ± 10.8	4 weeks 5x / week, 15 min.	Maximum power (Fmax) Ø performance Self-help skills Walking distance	p = 0.005 p = 0.022 p = 0.012 p = 0.000
MOTOmed viva2	CG = 13	65.13 ± 12.3	4 weeks 5x / week, 15 min.	No significant changes	–

Conclusion: After four weeks of MOTOmed movement therapy with functional electrical stimulation, improvements in performing activities of daily living were observed.

Stroke

DOI: –

1.6 The Influence of MOTOmed Leg Training on Hemiplegic Stroke Patients

Wan et al. 2009, China

THERAPY / INTERVENTION	PARTICIPANTS	AGE / Ø-YEARS	DURATION	SELECTED RESULTS	SIGNIFICANCE (5 %)
MOTOmed viva2 + PT	IG = 33	51.8 ± 10.7	8 weeks, 7x / week 20 min. + 7x / week 45 min.	Motoric skills of the legs (Fugl-Meyer Assessment) Walking ability (FAC) ADL (Barthel Index)	$p < 0.005$ $p < 0.005$ $p < 0.005$
PT	CG = 32	50.6 ± 12.7	8 weeks 7x/ week 45 min.	No significant changes	–

Conclusion: The MOTOmed movement therapy, combined with conventional physiotherapy, can further improve the motoric skills of the legs in stroke patients.

DOI: HTTPS://DOI.ORG/10.1177/0269215507081580

1.5 A pilot randomized controlled trial to evaluate the benefit of the cardiac rehabilitation paradigm for the non-acute ischaemic stroke population

Lennon et al. 2008, Ireland

THERAPY / INTERVENTION	PARTICIPANTS	AGE / Ø-YEARS	DURATION	SELECTED RESULTS	SIGNIFICANCE (5 %)
MOTOmed viva2 + PT + OT	IG = 23	59.0 ± 10.3	10 weeks 2x / week 30 min.	Maximum oxygen up take (VO_2) Cardiovascular risk factors (CRS) Depression (HADS)	$p < 0.001$ $p < 0.05$ $p < 0.001$
PT + OT	CG = 23	60.5 ± 10.0	10 weeks 2x / week 30 min.	No significant changes	–

Conclusion: Ten weeks training with the MOTOmed movement therapy shows significant improvements of cardiovascular parameters.

DOI: HTTPS://DOI.ORG/10.1016/J.JNS.2006.10.021

1.4 The Effect of Repetitive Arm Cycling on Post Stroke Spasticity and Motor Control: Repetitive Arm Cycling and Spasticity

Diserens et al. 2007, Switzerland

THERAPY / INTERVENTION	PARTICIPANTS	AGE / Ø-YEARS	DURATION	SELECTED RESULTS	SIGNIFICANCE (5 %)
MOTOmed viva2 + PT	IG = 9	66.3 ± 16.0	3 Wochen, 5 ×/ week à 30 Min.	Muscle strength of the upper extremities and mobility	$p < 0.01$ $p < 0.05$

Conclusion: After three weeks of MOTOmed movement therapy, muscle strength in the upper extremities and mobility could be improved in stroke patients.

Stroke

DOI: –

1.3 Rehabilitation of stroke and cerebellar patients

Bashir 2006, Switzerland

THERAPY / INTERVENTION	PARTICIPANTS	AGE / Ø-YEARS	DURATION	AUSELECTED RESULTS	SIGNIFICANCE (5 %)
Arm training with MOTOmed viva2 Quantification of spasticity, muscle force and range of active movements by EMG	IG = 9	66.3	3 weeks/ 5x week á 35 min. 15 min forwards 15 min. backwards with a 5 min. break in between	Ashworth Scale (Spasticity): • Maximal active extension of the biceps: • Minimal torque on the lesioned side during arm cycling: Muscle force: • Rivermead Motor Assessment: • Motoricity Index (MI): • Cycling Force:	 p < 0.001 p < 0.001 p < 0.001 p < 0.001 p < 0.001

Conclusion: Significantly less spasticity occurred as a result of MOTOmed arm training, and muscle strength and mobility also improved significantly. MOTOmed arm training can therefore be a useful tool for rehabilitation.

DOI: –

1.2 Cyclic Movement Training of the Lower Limb in Stroke Rehabilitation

Kamps et al. 2005, Germany

THERAPY / INTERVENTION	PARTICIPANTS	AGE / Ø-YEARS	DURATION	SELECTED RESULTS	SIGNIFICANCE (5 %)
MOTOmed viva2 + PT	IG = 16	63.1 ± 8.1	16 weeks 2x / day 10 min.	2MWT 6MWT Walking speed Timed Up & Go-Test	p = 0.015 p = 0.003 p = 0.024 p = 0.016
Conventional therapy	CG = 15	65.8 ± 10.7	16 weeks 2x / day 10 min.	No significant changes	–

Conclusion: A four-month MOTOmed movement therapy in the home environment shows significant improvements in mobility, walking ability and quality of life.

DOI: –

1.1 Examination of the Effects of Assisted Training on the Endurance Capacity on Stroke Patients

Demmer et al. 2005, Germany

THERAPY / INTERVENTION	PARTICIPANTS	AGE / Ø-YEARS	DURATION	SELECTED RESULTS	SIGNIFICANCE (5 %)
MOTOmed viva2 + therapy groups	IG = 7	62.0 ± 11.3	12 weeks 5x / week 15 min.	2-minute walk test Walking speed	p < 0.007 p < 0.007

Conclusion: The MOTOmed movement therapy can support the endurance ability.

Geriatrics

DOI: HTTPS://DOI.ORG/10.1038/S41598-021-92716-9

2.2 Low-volume cycling training improves body composition and functionality in older people with multimorbidity: a randomized controlled trial

Carballeira et al. 2021, Spain

THERAPY / INTERVENTION	PARTICIPANTS	AGE / Ø-YEARS	DURATION	SELECTED RESULTS	SIGNIFICANCE (5 %)
MOTOmed movement therapy at low to moderate activity	IG = 12	80.4 ± 7.8	6 weeks 3x/week 20 min.	Body mass correlations: • Muscle mass to waist circumference • Body weight to waist circumference • Muscle mass to body weight • Muscle mass to fat mass Total Score Performance-Orientated Mobility • Assessment (POMA) Total Score Short Physical Performance • Battery Test (SPPB)	 p < 0.05 p < 0.05 p < 0.05 p < 0.05 p < 0.05 p < 0.05
Usual activity	CG = 12	82.1 ± 7.6		Muscle mass to body weight	p < 0.05

Conclusion: A 20-minute MOTOmed movement therapy on 3 days per week at lower to medium intensity can improve body composition, walking performance and balance power in elderly adults with multimorbidity within only 6 weeks.

DOI: –

2.1 Use of an Assistive Movement Training Apparatus in the Rehabilitation of Geriatric Patients

Diehl et al. 2008, Germany

THERAPY / INTERVENTION	PARTICIPANTS	AGE / Ø-YEARS	DURATION	SELECTED RESULTS	SIGNIFICANCE (5 %)
MOTOmed viva2 + PT	IG = 21	80.7 ± 4.8	3 weeks 5x / week 15 min.	2-minute walk test 6-minute walk test Short distance speed test Timed up & go-test Ø performance	p = 0.006 p = 0.000 p = 0.012 p = 0.000 p = 0.016
Group therapy + PT	CG = 21	79.1 ± 7.5	3 weeks 5x / week 15 min.	No significant changes	–

Conclusion: MOTOmed viva2 can contribute to the rehabilitation of people in geriatrics to maintain and increase mobility and to improve endurance.

Multiple Sclerosis

DOI: HTTPS://DOI.ORG/10.1016/J.MSARD.2024.105552

3.3 Functional electrical stimulation combined with voluntary cycling accentuates VO_2 response in people with severe multiple sclerosis: A pilot study

Máté et al. 2024, Australia

THERAPY/INTERVENTION	PARTICIPANTS	AGE (MEAN)	DURATION	SELECTED RESULTS	SIGNIFICANCE (5 %)
MOTOmed viva1 + Functional Electrical Stimulation (FES)	IG = 10	52,4 ± 9,9	3 sessions with intervals of 2-6 days 1. FES Cycling – 30 minutes 2. Voluntary Cycling – 30 minutes 3. FES voluntary Cycling – 30 minutes	VO_2 (ml/min) METs (last 10 minutes) Pain Sensitivity	p < 0.03 p < 0.02 p < 0.01

Conclusion: The movement therapy with FES support resulted in significantly better oxygen uptake (VO_2) compared to independent movement therapy. The participants chose their own training intensity, which was classified as moderate to intense. After the training, they did not feel more exhausted than with other therapy forms.

DOI: HTTPS://DOI.ORG./10.1016/J.NRL.2017.07.008

3.2 Effect of visual biofeedback cycling training on gait in patients with multiple sclerosis

Hochsprung et al. 2017, Spain

THERAPY / INTERVENTION	PARTICIPANTS	AGE / Ø-YEARS	DURATION	SELECTED RESULTS	SIGNIFICANCE (5 %)
MOTOmed viva2 movement therapy	IG = 30	not specified	3 month, 1 ×/ week 30 min.	Walking ability After 1 month After 3 months Step length After 1 month After 3 months	 p = 0.014 p = 0.002 p = 0.001 p = 0.004
Exercise programme at home	CG = 31	not specified	3 month, 1 ×/ week 30 min.	No significant changes	–

Conclusion: Visual biofeedback during cycling training improved specific gait parameters in the short term and appears to be a therapeutic option for gait training in patients with Multiple Sclerosis.

DOI: HTTPS://DOI.ORG/10.1038/SJ.SC.3100376

3.1 The effects of therapy on spasticity utilizing a motorized exercise-cycle

Rösche et al. 1997, Germany

THERAPY / INTERVENTION	PARTICIPANTS	AGE / Ø-YEARS	DURATION	SELECTED RESULTS	SIGNIFICANCE (5 %)
MOTOmed pico	IG = 35	49.0 ± 10.3	1x 30 min.	Muscle tonus	p < 0.05

Conclusion: The antispastic effect of MOTOmed movement therapy can be documented by a decrease in the F-wave amplitude parameters.

Parkinson's Disease

DOI: HTTPS://DOI.ORG/10.3390/IJERPH19137847

4.11 Effects of cycling dual-task on cognitive and physical function in Parkinson's disease: a randomized double-blind pilot study

Pereira-Pedro et al. 2022, Spain

THERAPY/INTERVENTION	PARTICIPANTS	AGE (MEAN)	DURATION	SELECTED RESULTS	SIGNIFICANCE (5 %)
MOTOmed viva2 Parkinson + Cognitive Task	IG = 8	70,50 ± 9,24	7 weeks, 2 × weekly, 20 minutes	Active Distance Passive Distance Active Speed Total Work MDS-UPDRS III	p< 0.043 p< 0.032 p< 0.049 p< 0.047 p< 0.045
MOTOmed viva2 Parkinson	CG = 7	65,43 ± 5,22	7 weeks, 2 × weekly, 20 minutes		

Conclusion: The combination of MOTOmed movement therapy and a cognitive task provides a safe and effective way for Parkinson's patients to improve their ability to handle two tasks simultaneously – an important skill for daily life.

DOI: HTTPS://DOI.ORG/10.47197/RETOS.V47.93936

4.10 Effects of MOTOmed® movement therapy on the motor function and main symptoms of patients with Parkinson's disease: a systematic review

Pereira-Pedro et al. 2023, Spain

THERAPY /INTERVENTION	PARTICIPANTS	AGE / Ø-YEARS	DURATION	SELECTED RESULTS	SIGNIFICANCE (5 %)
Meta analyisis related to the MOTOmed Parkinson Movment Therapy	7 studies with a total of 206 participants have been taken into account.			Walking speed Stride length Posture Biodex Balance System MDS-UPDRS Motor III Score Upper limp MDS-UPDRS Score Total MDS-UPDRS Upper body function Bradykinesia Higher cadence Tremor Score Walking time Paces Pronation und Supination Parkinson's Disease Questionnaire (PQD8)	p < 0.000 p < 0.000 p < 0.000 p < 0.007 p < 0.05 p < 0.05 p < 0.04 p < 0.007 p < 0.044 p < 0.001 p < 0.05 p < 0.05 p < 0.05 p < 0.05 p < 0.05

Conclusion: The MOTOmed Parkinson movement therapy, alone or combined with standard rehabilitation, improves the motoric functions an main symptoms in patients affected by Parkinson's diesease.

Parkinson's Disease

DOI: HTTPS://DOI.ORG/10.3389/FNEUR.2015.00194

4.9 Dynamic high-cadence cycling improves motor symptoms in Parkinson's disease

Ridgel et al. 2015, USA

THERAPY /INTERVENTION	PARTICIPANTS	AGE / Ø-YEARS	DURATION	SELECTED RESULTS	SIGNIFICANCE (5 %)
MOTOmed viva2 Parkinson motor-assisted (75-85 rpm)	IG = 24	67.2 ± 1.6	1 week, 2x / week 40 min.	Motor function (total UPDRS) UPDRS lower extremity UPDRS upper extremity	p < 0.013 p < 0.001 p < 0.018
MOTOmed viva2 Parkinson without motor support assistance (self-selected cadence)	CG = 23	67.3 ± 0.9	1 week, 2x / week 40 min.	No significant changes	–

Conclusion: At 75-85 rpm, the motor function of Parkinson's patients improves after just three MOTOmed sessions. Motor-assisted training reduces the risk of injury, prevents fatigue and increases patient compliance.

DOI: HTTPS://DOI.ORG/10.1016/J.GAITPOST.2015.08.001

4.8 Active assistive forced exercise provides long-term improvement to gait velocity and stride length in patients bilaterally affected by Parkinson's disease

Stuckenschneider et al. 2015, Germany

THERAPY /INTERVENTION	PARTICIPANTS	AGE / Ø-YEARS	DURATION	SELECTED RESULTS	SIGNIFICANCE (5 %)
MOTOmed viva2 Parkinson (active + passive)	IG = 10	71.0 ± 4.6	12 weeks, 3 ×/ week 40 min.	Tremor Double stand phase Gait speed Stride length Swing and stand phase	p < 0.005 p < 0.001 p < 0.001 p < 0.001 p < 0.001
Drug therapy	CG = 12	71.4 ± 4.9	not specified	No significant changes	–

Conclusion: A twelve-week MOTOmed training program lead to a significant improvement of gait speed and a reduction of tremor in Parkinson's patients.

Parkinson's Disease

DOI: HTTPS://DOI.ORG/10.3233/NRE-130961

4.7 Biomechanical muscle stimulation and active-assisted cycling improves active range of motion in individuals with Parkinson's disease

Corbett et al. 2013, USA

THERAPY /INTERVENTION	PARTICIPANTS	AGE / Ø-YEARS	DURATION	SELECTED RESULTS	SIGNIFICANCE (5 %)
Crossover study without Parkinson's medication	N = 16	64.4 ± 5.3	4 sessions spaced one week apart		
			BMS: 2 min.		
Comparison biomechanical muscle stimulation (BMS)			at 20 hertz	ROM:	
				• Shoulder flexion and extension	$p < 0.05$ / $p < 0.05$
				• Shoulder abduction	$p < 0.05$
				• Hip flexion and extension	$p = 0.005$ / $p < 0.05$
				• Hip velocity over-ground walking	$p < 0.05$
			AAC: 30 min.		
Active-assisted cycling with MOTOmed viva2 Parkinson movement therapy (AAC)			at 80 rpm	ROM:	
				• Shoulder flexion and extension	$p < 0.05$ / $p < 0.05$
				• Shoulder abduction	$p < 0.05$
				• Hip flexion and extension	$p = 0.006$ / $p = 0.05$

Conclusion: The movement therapy with the MOTOmed viva2 Parkinson has a positive effect on shoulder and hip mobility. This indicates that motor control processes can be changed through high-frequency training.

DOI: HTTPS://DOI.ORG/10.1016/J.APMR.2012.05.015

4.6 Active-Assisted Cycling Improves Tremor and Bradykinesia in Parkinson's Disease

Ridgel et al. 2012, USA

THERAPY /INTERVENTION	PARTICIPANTS	AGE / Ø-YEARS	DURATION	SELECTED RESULTS	SIGNIFICANCE (5 %)
MOTOmed viva2 Parkinson 80–85 rpm	IG = 10	64.5 ± 2.1	1x 40 min.	Bradykinesia	$p < 0.001$

Conclusion: After a single active, motor-assisted movement unit, both bradykinesia and tremor symptoms improve (off medication) similar to taking medication.

DOI: -

4.5 Effects of Interval Active-Assisted Cycling on Balance in Individuals with Parkinson's Disease

Fickes 2012, USA

THERAPY/INTERVENTION	PARTICIPANTS	AGE / Ø-YEARS	DURATION	SELECTED RESULTS	SIGNIFICANCE (5 %)
MOTOmed viva2 Parkinson interval training (active/motor-assisted)	IG = 10	70.9 ± 5.4	4 weeks, 3x / week 40 min.	Motor function (UPDRS)	$p < 0.001$
No intervention	CG = 10	65.3 ± 8.6	not specified	No significant changes	-

Conclusion: A four week interval training (active and motor-assisted) with MOTOmed viva2 Parkinson improves the motor functon of Parkinson's patients.

Parkinson's Disease

DOI: HTTPS://DOI.ORG/10.1123/JAPA.19.2.87

4.4 Changes in Executive Function After Acute Bouts of Passive Cycling in Parkinson's Disease

Ridgel et al. 2011, USA

THERAPY/INTERVENTION	PARTICIPANTS	AGE / Ø-YEARS	DURATION	SELECTED RESULTS	SIGNIFICANCE (5 %)
MOTOmed viva2 Parkinson passive (60-80 rpm)	IG = 19	63.2 ± 8.5	3 weeks, 1x / week 40 min.	Cognition (TMT-B)	$p < 0.005$

Conclusion: A passive, motor-assisted movement training improves the cognitive abilities of Parkinson's patients significantly.

DOI: –

4.3 Exercise Training – Effects of MOTOmed® Exercise on Typical Motor Dysfunction in Parkinson's Disease

Laupheimer et al. 2011, Germany

THERAPY/INTERVENTION	PARTICIPANTS	AGE / Ø-YEARS	DURATION	SELECTED RESULTS	SIGNIFICANCE (5 %)
MOTOmed viva2 Parkinson + conventional therapy	IG = 21	67.5 ± 7.8	10 weeks, 5x / week 40 min.	Gait speed Stride length Diadochokinesia	$p = 0.000$ $p = 0.000$ $p = 0.03$
Conventional therapy	CG = 23	69.4 ± 5.8	10 weeks individual, conventional therapy	No significant changes	–

Conclusion: The gross motor skills (walking) and hand/fine motor skills (Diadochokinesia) of Parkinson's patients can be significantly improved with the help of ten weeks of MOTOmed movement therapy.

DOI: –

4.2 Effects of Active-Assisted Cycling on Upper Extremity Motor and Executive Function in Parkinson's Disease

Ridgel et al. 2010, USA

THERAPY/INTERVENTION	PARTICIPANTS	AGE / Ø-YEARS	DURATION	SELECTED RESULTS	SIGNIFICANCE (5 %)
MOTOmed viva2 Parkinson at 85 rpm	IG = 10	64.5 ± 2.1	3 weeks, 1x entrance test, 2x MOTOmed training for 30 min. with 1 week break inbetween	Bradykinesis	$p < 0.05$
MOTOmed viva2 Parkinson at 60 rpm	CG = 10	64.7 ± 1.9	3 weeks, 1x entrance test, 2x MOTOmed training for 30 min. with 1 week break inbetween 1 week break	No significant changes	–

Conclusion: Subjects showed an improvement in bradykinesia during a goal-directed movement task after MOTOmed movement therapy at 85 rpm, but no change after MOTOmed movement therapy at 60 rpm speed.

Parkinson's Disease

DOI: HTTPS://DOI.ORG/10.1177/1545968308328726

4.1 Forced, Not Voluntary, Exercise Improves Motor Function in Parkinson's Disease Patients

Ridgel et al. 2009, USA

THERAPY/INTERVENTION	PARTICIPANTS	AGE / Ø-YEARS	DURATION	SELECTED RESULTS	SIGNIFICANCE (5 %)
Tandem Bike „Foreced Exercise" approx. 80 rpm	IG = 5	58 ± 2.1	8 weeks, 3×/week 60 min.	Motor function (UPDRS) Ambidextrous dexterity	p < 0.002 p < 0.015
Bicycle ergometer self-selected cadance (59,8 ± 13,6 rpm)	CG = 5	64 ± 7.1	8 weeks, 3×/week 60 min.	No significant changes	–

Conclusion: A forced movement similar to cycling leads to improvements in Parkinson's symptoms and thus to improved motor function, as well as improved ambidextrous dexterity.

Hypertension

DOI: HTTPS://DOI.ORG/10.1097/HJH.0B013E3282FFAC13

5.1 The cardiovascular effects of upper-limb aerobic exercise in hypertensive patients

Westhoff et al. 2008, Germany

THERAPY/INTERVENTION	PARTICIPANTS	AGE / Ø-YEARS	DURATION	SELECTED RESULTS	SIGNIFICANCE (5 %)
MOTOmed viva2 + PT	IG = 12	66.1 ± 4.0	12 weeks, 3x / week 30 min.	Systolic blood pressure Diastolic blood pressure Artery Compliance Performance	p < 0.03 p < 0.02 p < 0.004 p < 0.005
No intervention	CG = 12	68.4 ± 9.7		No significant changes	–

Conclusion: A 12-week training program leads to a significant increase of the elasticity of small arteries.

Cerebral Palsy

DOI: HTTPS://DOI.ORG/10.1177/15459683177186631

6.5 Task-Specific and Functional Effects of Speed-Focused Elliptical or Motor-Assisted Cycle Training in Children With Bilateral Cerebral Palsy: Randomized Clinical Trial

Damiano et al. 2017, USA

THERAPY/INTERVENTION	PARTICIPANTS	AGE (MEAN)	DURATION	SELECTED RESULTS	SIGNIFICANCE (5 %)
MOTOmed gracile12	IG = 13	9,2 (2,9)	12 weeks, 5 × weekly, 20 minutes	Cadence (free cycling) Cadence (fast cycling) Cadence during elliptical training (free) Cadence during elliptical training (fast) SCALE	p < 0.03 p < 0.009 p < 0.001 p < 0.001 p < 0.001
Elliptical	CG = 14	11,4 (4,0)	12 weeks, 5 × weekly, 20 minutes		

Conclusion: Intensive leg training with the motor-assisted MOTOmed gracile and an elliptical machine led to noticeable improvements. After the training, children with cerebral palsy were able to train at higher speeds than before.

DOI: HTTPS://DOI.ORG/10.1080/09638288.2024.2353234

6.4 Home-based motorised cycling in Non-ambulant adults with cerebral palsy: a feasibility study

Holmes et al. 2024, Australia

THERAPY/INTERVENTION	PARTICIPANTS	AGE (MEAN)	DURATION	SELECTED RESULTS	SIGNIFICANCE (5 %)
MOTOmed loop edition	IG = 10	23 years Median: 18 to 32 years	4 weeks, 4 × weekly, min. 10 minutes	Participants satisfication was high Perceived benefits in pain, sleep, fatigue, stiffness, leg function, mood, behavior and social interactions	-

Conclusion: The study provides initial evidence of the feasibility of using the MOTOmed loop edition as a movement therapy device for adult patients with cerebral palsy and walking difficulties. Parameters such as acceptance, practicability, and safety were used for evaluation.

Cerebral Palsy

DOI: HTTPS://DOI.ORG/10.1136/ARCHDISCHILD-2019-EPA.833

6.3 Rehabilitation of children with spastic and dyskinetic forms of cerebral palsy through transcranial exposure and biologically feedback

Belogorova et al. 2019, Russia

THERAPY/INTERVENTION	PARTICIPANTS	AGE / Ø-YEARS	DURATION	SELECTED RESULTS	SIGNIFICANCE (5 %)
Combined transcranial magnetic stimulation with MOTOmed graile12 movement therapy (IG) compared to Sinus Magnetic Therapy (CG)	N = 30	children aged 2 - 14 years	Duration: 10 days 10 minutes per therapy session	Muscle tonus (Modified Ashworth Scale): Significant reuduction by one tonus point for 92 % in the IG and 75% in the CG	not specified

Conclusion: A trans-cranial magnetic stimulation in combination with MOTOmed gracile12 movement therapy can significantly reduce muscle tonus after a few days already.

DOI: –

6.2 Effectiveness of motor-assisted MOTOmed movement therapy in the rehabilitation of children diagnosed with infantile cerebral palsy

Nurmatova et al. 2012, Uzbekistan

THERAPY/INTERVENTION	PARTICIPANTS	AGE / Ø-YEARS	DURATION	SELECTED RESULTS	SIGNIFICANCE (5 %)
MOTOmed gracile12 + PT	IG = 120	6.7	2–3 weeks, 7×/week 10–25 min.	Range of motion of the ankle joint Muscle strength Muscle tonus	$p < 0.05$ $p < 0.05$ $p < 0.001$

Conclusion: MOTOmed movement therapy training for children with cerebral palsy improves the general condition and increases the independence in daily life.

DOI: –

6.1 Effects of MOTOmed Gracile Leg Training on the Lower Limbs Function in Children with Spastic Cerebral Palsy

Shen et al. 2009, China

THERAPY/INTERVENTION	PARTICIPANTS	AGE / Ø-YEARS	DURATION	SELECTED RESULTS	SIGNIFICANCE (5 %)
MOTOmed gracile12 + PT	IG = 24	3.0	6 month, 5×/week 20 min.	Muscle tonus Muscle strength	$p < 0.05$ $p < 0.05$
PT	CG = 24	3.3	6 month, 5×/week	No significant changes	–

Conclusion: Movement therapy with the MOTOmed gracile12 can promote the recovery of children with spastic cerebral palsy.

Hemodialysis

DOI: HTTPS://DOI.ORG/10.1056/EVIDOA2300057

7.6 Exercise during Hemodialysis in Patiens with Chronic Kidney Failure

Anding-Rost et al. 2023, Germany

THERAPY/INTERVENTION	PARTICIPANTS	AGE / Ø-YEARS	DURATION	SELECTED RESULTS	SIGNIFICANCE (5 %)
MOTOmed letto2 Study of 12 months duration, multicentrical, cluster-randomized, controlled study with combined strength and endurance exercises	N = 917 IG = 446	65.9 ± 14.4	IG: 3x/week MOTOmed letto 2 training therapy (30 min.) combined with resistance training (30 min.) during the first 2 hours of hemodialysis with a duration of 60 min. total	IG compared to CG: 60-second-sit-to-stand test (STS60): (after 12 months) The number of hospital stays per patient significantly decreased during the period of study: The duration of hospital stays could be significantly reduced during the period of study.	 p < 0.0001 p = 0.024 p = 0.036
Routine therapy	CG = 471		not specified		

Conclusion: Twelve months of intra-dialytical exercise in patients with kidney failure significantly improved physical functions (STS60) compared to ordinary treatments. In addition to that, hospitalization and stay duration could be significantly reduced per person.

DOI: HTTPS://DOI.ORG/10.3390/LIFE12081276

7.5 Effects of a Combined Intradialytic Exercise Training Program and Music on Cardiac Autonomic Nervous System Activity in Hemodialysis Patients

Mitsiou et al. 2022, Greece

THERAPY/INTERVENTION	PARTICIPANTS	AGE / Ø-YEARS	DURATION	SELECTED RESULTS	SIGNIFICANCE (5 %)
Rehabilitation program for hemodialysis patients involving the MOTOmed letto2 movement therapy	N = 40	50.0 ±12.7	3x/week 30-60 min. during the first 2 hours of hemodialysis for 6 months	A+B: Comparison start and end of the study HRV paramaters • Low Frequency (LF, sympathetic and parasympathetic nervous system	 p < 0.05
A: Movement with music	n = 10	48.0 ±15.4		• High Frequency	
B: Movement only	n = 10	50.6 ±10.8		(HF, parasympathetic nervous system)	p < 0.05
C: Music only	n = 10	50.5 ±11.5			
D: Control group	n = 10	50.2 ±14.0		6-minute walk test	p < 0.05

Conclusion: A six month combined exercise program with music increases the parasympathetic activity as well as the functional capacity. Therefore, aerobic training combined with music during hemodialysis could be recommended as clinical standard procedure for patients with chronic kidney failure.

Hemodialysis

DOI: HTTPS://DOI.ORG/10.3233/IES-160623

7.4 Three-Month Endurance Training Improves Functional Fitness and Knee Muscle Performance of Patients with End Stage Renal Disease (ESRD)

Dziubek et al. 2016, Poland

THERAPY/INTERVENTION	PARTICIPANTS	AGE / Ø-YEARS	DURATION	SELECTED RESULTS	SIGNIFICANCE (5 %)
MOTOmed letto2 (endurance training)	IG = 27	63.9 ± 12.4	3 months, 3×/week 20–40 min.	6-minute walk test Medium walk speed Metabolic Equivalent of Task (MET) Timed Up & Go-Test	p < 0.0001 p < 0.0001 p < 0.0001 p < 0.0001

Conclusion: Three months of endurance training with MOTOmed movement therapy at the bedside is effective in patients with end-stage renal failure (ESRD) and improves functional fitness.

DOI: HTTPS://DOI.ORG/10.1159/000368548

7.3 The Level of Anxiety and Depression in Dialysis Patients Undertaking Regular Physical Exercise Training – A Preliminary Study

Dziubek et al. 2016, Poland

THERAPY/INTERVENTION	PARTICIPANTS	AGE / Ø-YEARS	DURATION	AUSGEWÄHLTE ERGEBNISSE SELECTED RESULTS	SIGNIFICANCE (5 %)
MOTOmed letto2	IG = 20	66.3 ± 13.1	6 month, 3×/week	Anxiety symptoms Depression symptoms (BDI)	p < 0.027 p < 0.012
Strength training	CG = 8	56.4 ± 13.6	6 month, 3×/week	Depression symptoms (BDI)	p < 0.012

Conclusion: Six months of physical endurance training in patients with end-stage renal failure has a positive effect on mood and reduces anxiety.

DOI: HTTPS://DOI.ORG/10.1136/BMJOPEN-2015-008709

7.2 A Structured Exercise Programme During Haemodialysis for Patients with Chronic Kidney Disease: Clinical Benefit and Long-Term Adherance

Anding et al. 2015, Germany

THERAPY/INTERVENTION	PARTICIPANTS	AGE / Ø-YEARS	DURATION	SELECTED RESULTS	SIGNIFICANCE (5 %)
MOTOmed letto2 + (endurance training) + strength training	IG = 46	63.2 ± 16.3	5 years, 2×/week 60 min.	Timed Up & Go-Test Sit-to-stand test 6-miunute walk test Physical function	p < 0.0001 p < 0.001 p < 0.0002 p < 0.048

Conclusion: Combined endurance and strength training during dialysis is practicable and well accepted by patients over a long period (high compliance). It leads to an improvement of physical performance and quality of life. Improvements are best in very weak, multi-morbid patients.

Hemodialysis

DOI: HTTPS://DOI.ORG/10.1016/J.PHYSIO.2005.08.004

7.1 Uptake of and Adherence to Exercise During Hospital Haemodialysis

Torkington et al. 2006, United Kingdom

THERAPY/INTERVENTION	PARTICIPANTS	AGE / Ø-YEARS	DURATION	SELECTED RESULTS	SIGNIFICANCE (5 %)
Haemodialysis + MOTOmed letto2	IG = 22	58 ± 18	8 weeks, 3×/week 20–60 min.	Walking distance BMI Quality of life	$p < 0.001$ $p < 0.01$ $p < 0.02$
Haemodialysis	CG = 24	67 ± 10		No significant changes	–

Conclusion: Use of MOTOmed movement therapy devices for exercising while lying down during dialysis has a positive effect on the general condition. It leads to an improvement in physical capacity as well as quality of life.

Intensive Care Unit

DOI: HTTPS://DOI.ORG/10.4187/RESPCARE.07487

8.10 Acute Effects of Sitting Out of Bed and Exercise on Lung Aeration and Oxygenation in Critically Ill Subjects

Hickmann et al. 2021, Belgium

THERAPY/INTERVENTION	PARTICIPANTS	AGE / Ø-YEARS	DURATION	SELECTED RESULTS	SIGNIFICANCE (5 %)
MOTOmed viva2 or walking in place	N = 40		Start of intervention one week after admission to intensive care unit	Compared to CG, early mobilised intervention groups showed significant improvements in lung ventilation	
IG	IG = 17 mechanically ventilated of which 5 CG	68 ±13 CG: 62 ±18	study protocol: T1: Baseline Patients stayed in bed at 30° inclination T2: chair	IG mechanically ventilated: significant improvement of the anterior lung area	$p < 0.05$
	IG = 23 spontaneously ventilated of which 5 CG	53 ± 15 CG: 55 ± 15	Patients were transferred to a chair with 70° backrest inclination. Sitting time: 25 min. T3: 15 min. MOTOmed movement therapy or 6 min. walking in place T4: 20 min resting phase after training therapy in chair At the beginning and 20 min. post training blood gases were collected	IG spontaneously ventilated: significant improvement of the posterior lung area, especially in patients with low oxygen partial pressure at the baseline phase	$p < 0.05$
CG			CG: received only transfer to chair (T2-T4)		

Conclusion: In critically ill patients, a sitting position as well as the MOTOmed movement therapy lead to better ventilation of the lungs.

Intensive Care Unit

DOI: HTTPS://DOI.ORG/10.1016/J.AUCC.2020.02.007

8.9 Acceptability, safety, and feasibility of in-bed cycling with critically ill patients

Nickels et al. 2020, Australia

THERAPY/INTERVENTION	PARTICIPANTS	AGE / Ø-YEARS	DURATION	SELECTED RESULTS	SIGNIFICANCE (5 %)
MOTOmed letto2 + PT	N = 36	58 ±18	within 7 days in intensive care 6x MOTOmed letto2 movement therapy of 30 min.	In-bed cycling sessions were feasible in 90% of participants with a 0.7% rate of side effects. Acceptability questionnaire responses found that in-bed cycling was regarded as an acceptable intervention by patients, family members and clinicians. The implementation of in-bed cycling was safe and feasible to cmplete with critically ill patients in the early stages of their critical illness.	–
No CG					

Conclusion: The study shows a high acceptance of the MOTOmed movement therapy in patients, clinicians and family members.

DOI: HTTPS://DOI.ORG/10.21037/APM.2020.02.12

8.8 Use of in-bed cycling combined with passive joint activity in acute respiratory failure patients receiving mechanical ventilation

Yu L. et al. 2020, China

THERAPY/INTERVENTION	PARTICIPANTS	AGE / Ø-YEARS	DURATION	SELECTED RESULTS	SIGNIFICANCE (5 %)
MOTOmed letto2 movement therapy combined with passive joint mobilisation of the upper extremities.	N = 107 IG = 53	60 ± 8.0	During ICU stay	IG compared to CG: • ICU stay shorter • Mechanical ventilation shorter • Improved self care ability, Barthel-Index Muscle function increased: • Raising the arm • Flexing the forearm • Wrist straightening • Leg flexion • Knee straightening • Dorsal flexion of the foot	 p = 0.001 p < 0.001 p < 0001 p < 0,001 p = 0.009 p = 0.001 p < 0.001 p < 0.001 p < 0.001
Routine therapy	CG = 54	58 ± 7.4			

Conclusion: The in-bed MOTOmed movement therapy combined with passive joint mobilsation of the upper extremities is able to significantly reduce the duration of ventilation and the lenght of stay in the ICU. The ICU aquired weakness is significantly lower. As a consequence patients' self-care ability improves.

Intensive Care Unit

DOI: HTTPS://DOI.ORG/10.1016/J.APMR.2018.07.430

8.7 Feasibility of Exercise Testing in Patients Who Are Critically Ill: A Prospective, Observational Multicenter Study

Sommers et al. 2019, Netherlands

THERAPY/INTERVENTION	PARTICIPANTS	AGE / Ø-YEARS	DURATION	SELECTED RESULTS	SIGNIFICANCE (5 %)
Carrying out exercise tests using MOTOmed letto2	N = 37	61.3 ± 14.2			
A: Active MOTOmed training with an increase of one level after every minute at 20 rpm	n = 28	62.5 ± 12.5	Stress test in active training	Response of respiratory gases: • Breathing rate increased • VO_2 increased • VCO_2 increased Cardiovascular response (pre-post): • Heart rate increased • Systolic blood pressure increased Blood analysis: • Lactate increased	 p = 0.001 p < 0.001 p < 0.001 p < 0.001 p = 0.003 p = 0.005
B: Passive MOTOmed training at 20 rpm	n = 9	68.0 ± 13.5	Stress test in passive training	No significant increases measured	–

Conclusion: Exercise tests using MOTOmed letto2 can be carried out safely in critically ill patients.

DOI: HTTPS://DOI.ORG/10.7196/SAJCC.2018.V34I2.360

8.6 Muscle strength and endurance to predict successful extubation in mechanically ventilated patients: A pilot study evaluating the utility of upper-limb muscle strength and ergometry

De Beer et al. 2018, South Africa

THERAPY/INTERVENTION	PARTICIPANTS	AGE / Ø-YEARS	DURATION	SELECTED RESULTS	SIGNIFICANCE (5 %)
MOTOmed letto2	N = 37 of which 23 successfully extubated	45	Muscle strength tests and MOTOmed letto2 as an endurance test device (test duration 5 min.)	Oxfort scale (pre-post): Greater muscle strength of the deltoid and cervical flexor muscles was related to successful extubation. Muscle tested with MOTOmed letto2 also showed correlation to successful extubation. Successful extubated persons were also able to pedal actively for longer.	 p = 0.022 / p = 0.019 p = 0.014 p = 0.014
No CG					

Conclusion: Integrating muscle strength and endurance testing into ventilator weaning programmes can lead to greater success in extubation.

Intensive Care Unit

DOI: HTTPS://DOI.ORG/10.1097/CCM.0000000000003263

8.5 Impact of Very Early Physical Therapy During Septic Shock on Skeletal Muscle: A Randomized Controlled Trial

Hickmann et al. 2018, Belgium

THERAPY/INTERVENTION	PARTICIPANTS	AGE / Ø-YEARS	DURATION	SELECTED RESULTS	SIGNIFICANCE (5 %)
MOTOmed viva2, MOTOmed letto2 and physical therapy	IG = 9	59 ± 19	1 week, 2×/week 30 min.	Muscle cross-section	$p < 0.01$
Physical therapy	CG = 10	57 ± 20	1 week, 1×/week	No significant changes	–

Conclusion: Early mobilization with MOTOmed during the first week is well tolerated by the patient after septic shock and maintains or even improves the patient's muscle fiber cross section.

DOI: HTTPS://DOI.ORG/10.1590/S1806-37562016000000170

8.4 Effects that passive cycling exercise have on muscle strength, duration of mechanical ventilation, and length of hospital stay in critically ill patients: a randomized clinical trial

Dos Santos Machado et al. 2017, Brasil

THERAPY/INTERVENTION	PARTICIPANTS	AGE / Ø-YEARS	DURATION	SELECTED RESULTS	SIGNIFICANCE (5 %)
MOTOmed letto2 in combination with PT	In total 38 mechanically ventilated IG = 22	44.6 ± 19.2	PT + MOTOmed movement therapy 5x / week 20 min. until the last day in ICU + 2x / day PT 7x / week 30 min.	MRC scale (muscle strength classification) for legs and arms measured on the first day the person was cooperative (Richmond Agitation and Sedation Scale score = -1) and on the last day in the ICU. Compared to KG, IG had significantly more strength increase according to MRC scale	$p = 0.005$
Routine therapy	CG = 16	45.1 ± 18.9			

Conclusion: The results indicate that continuous passive movement using MOTOmed in-bed movement therapy helps to regain peripheral muscle strength.

Intensive Care Unit

DOI: HTTPS://DOI.ORG/10.1016/S0140-6736(16)31637-3

8.3 Early, goal-directed mobilisation in the surgical intensive care unit: a randomised controlled trial

Schaller et al. 2016, Germany

THERAPY/INTERVENTION	PARTICIPANTS	AGE / Ø-YEARS	DURATION	SELECTED RESULTS	SIGNIFICANCE (5 %)
Movement therapy (passive mobilisation)	IG = 104	66 (48–73)	1x / day	Functional mobilization Shorter stay in ICU Functional condition at discharge	$p < 0.0001$ $p = 0.0054$ $p = 0.0002$
Conventional therapy	CG = 96	64 (45–76)	–	No significant changes	–

Conclusion: Early, goal-directed mobilization improves the functional mobility of patients, leads to an improved discharge state of patients and significantly shortens the length of stay in Intensive Care Units.

DOI: HTTPS://DOI.ORG/10.1016/J.JCRC.2015.07.025

8.2 Feasibility and safety of in-bed cycling for physical rehabilitation in the intensive care unit

Kho et al. 2015, USA

THERAPY/INTERVENTION	PARTICIPANTS	AGE / Ø-YEARS	DURATION	SELECTED RESULTS	SIGNIFICANCE (5 %)
MOTOmed letto2 movement therapy as part of routine PT (IG)	IG = 181	56.7 ± 16.6	18 months IG: received 541 x MOTOmed letto2 movement therapy with duration from 18-30 min. Patients: Mechanical ventilation (N=138) Vasopressor infusions (N=30) Continuous renal replacement therapy (N=20)	A total of 411x active and passive training was carried out. Among 12 physiological abnormalities or potential safety occurence prospectively monitored in 541 sessions, only one event occurred (0.2% event rate, 95% upper confidence interval = 1.0%) This incident was the dislocation of a radial arterial line, due to unstable positioning and malfunction before cycling, which was already scheduled for replacement	
PT	No Cycling = 506	56.6 ± 16.0			

Conclusion: Use of MOTOmed in-bed training devices as part of routine PT interventions in ICU patients is feasible and appears safe.

Intensive Care Unit

DOI: HTTPS://DOI.ORG/10.1097/CCM.0B013E3181A38937

8.1 Early exercise in critically ill patients enhances short-term functional recovery

Burtin et al. 2009, Belgium

THERAPY/INTERVENTION	PARTICIPANTS	AGE / Ø-YEARS	DURATION	SELECTED RESULTS	SIGNIFICANCE (5 %)
MOTOmed letto2 + PT	IG = 31	56.0 ± 16.0	min. 1 week, 5 ×/ week 20 min.	6-minute-walk test Quality of life (SF-36)	p < 0.05 p < 0.01
PT + mobilisation	CG = 10	57.0 ± 17.0	min. 1 week, 5 ×/ week 20 min.	No significant changes	–

Conclusion: Early mobilisation with MOTOmed in-bed movement therapy in critically ill intensive care patients improves functional status and increases muscle strength at hospital discharge.

COPD Chronic Obstructive Pulmonary Disease

DOI: HTTPS://DOI.ORG/10.1080/15412555.2018.1560402

9.3 Functional Electrical Stimulation Changes Muscle Oxygenation in Patients with Chronic Obstructive Pulmonary Disease During Moderate-Intensity Exercise: A Secondary Analysis

Prieur et al. 2019, France

THERAPY/INTERVENTION	PARTICIPANTA	AGE (MEAN)	DURATION	SELECTED RESULTS	SIGNIFICANCE (5 %)
MOTOmed letto2 + Functional Electrical Stimulation (FES)	IG = 8	60,2 ± 6,7	2 sessions with 30-minute intervals FES Cycling: 30 minutes (50-60 rpm)	Muscle Oxygenation (Desoxy-Hb+Mb) (%) Muscle Oxygen Saturation (StO2) (%) Muscle Kinetics (Desoxy - Hb+Mb)ss (%) Muscle Kinetics (Desoxy - Hb+Mb)ampl (%)	p < 0.0001 p < 0.0001 p < 0.01 p < 0.001
MOTOmed letto2 + Placebo Functional Electrical Stimulation (FES)			Placebo-FES: 30 minutes (50-60 rpm)		

Conclusion: During the placebo-FES intervention, muscle oxygen uptake was greater than with FES movement therapy, suggesting a higher level of muscle activity. However, the FES therapy led to a higher overall oxygen uptake (VO2), indicating more intense muscle activation.

COPD Chronic Obstructive Pulmonary Disease

DOI: HTTPS://DOI.ORG/10.6133/APJCN.202312_32(4).0001

9.2 Effects of whey protein complex combined with lowintensity exercise in elderly inpatients with COPD at a stable stage

Zong et al. 2023, China

THERAPY/INTERVENTION	PARTICIPANTS	AGE (MEAN)	DURATION	SELECTED RESULTS	SIGNIFICANCE (5 %)
MOTOmed viva2 + Whey Protein Complex	IG = 27	80,5 (1,4)	12 weeks, 4 × weekly, 20 minutes + Whey Protein	Psychological Health Status Lung Function and Symptom Scores Weight (kg)	p < 0.022 p < 0.003 p < 0.03
MOTOmed viva2	IG = 29	81,1 (2,2)	12 weeks, 4 × weekly 20 minutes		
No details provided	CG = 28	85,5 (0,9)	–		

Conclusion: : Both intervention models led to an increase in muscle strength. Additionally, it was shown that the intake of protein had positive effects on mental health, lung function, and weight loss. These rehabilitation programs are particularly promising for older patients with COPD.

DOI: HTTPS://DOI.ORG/10.1055/S-2002-20087

9.1 Spiroergometry in Patients with Severe Chronic Obstructive Pulmonary Disease Confined to Bed

Galetke et al. 2002, Germany

THERAPY/INTERVENTION	PARTICIPANTS	AGE / Ø-YEARS	DURATION	SELECTED RESULTS	SIGNIFICANCE (5 %)
MOTOmed letto2	IG = 9 (COPD)	69.2 ± 9.5	spiroergometry 1. resting measurement 2. measurement 5 min passive at 30 rpm 3. measurement 5 min active at > 30 rpm 4. measurement 2 min active at max. rpm	Increase of the following parameters: Oxygen uptake (VO2) passive Oxygen uptake (VO2) active Maximum oxygen uptake (VO2 max)	 p < 0.02 p < 0.005 p < 0.001
MOTOmed letto2	CG = 6 (healthy)	28 ± 8.7	1. resting measurement 2. measurement 5 min passive at 30 rpm	No significant changes	–

Conclusion: Use of MOTOmed in-bed movement therapy as a part of routine PT interventions increases oxygen uptake, respiratory rate and respiratory minute volume in bedridden COPD patients.

Dementia / Alzheimer's Disease

DOI: HTTPS://DOI.ORG/10.1371/JOURNAL.PONE.0121478

10.1 Effects of Physical Activity Training in Patients with Alzheimer's Dementia: Results of a Pilot RCT Study

Holthoff et al. 2015, Germany

THERAPY/INTERVENTION	PARTICIPANTS	AGE / Ø-YEARS	DURATION	SELECTED RESULTS	SIGNIFICANCE (5 %)
MOTOmed viva2 movement therapy	IG = 15	72.4 ± 4.3	12 weeks (T1), 3x / week 30 min.	Activities of daily living (ADCS ADL total score): IG remained stable, CG worsened significantly (at T2) Behavioural symptoms of dementia (NPI total score): IG remained stable, CG had notable behavioural changes regarding depression and anxiety (at T2) Language ability / word fluency (CERAD / FAS test): IG was able to improve word fluency considerably (at T2)	$p < 0.05$ $p < 0.05$ $p < 0.05$
Monthly clinic visit + consultaions by PT	CG = 15	70.67 ± 5.4	Usual care + follow up after 6 months (T2)	Reaction / eye-hand coordination (FETZ test): IG could improve responsiveness (at T2)	$p < 0.05$

Conclusion: Physical activity in the home setting may be an effective and intrinsically attractive way to promote physical training in Alzheimer's Dementia and reduce caregiver burden. The results show that the transfer of ADL as well as cognitive and physical skills in patients with Alzheimer's Dementia has a positive impact.

Cancer

DOI: HTTPS://DOI.ORG/10.2340/16501977-2167

11.1 Influence of arm crank ergometry on development of lymphedema in breast cancer patients after axillary dissection: A randomized controlled trial

Schmidt et al. 2017, Germany

THERAPY/INTERVENTION	PARTICIPANTS	AGE / Ø-YEARS	DURATION	SELECTED RESULTS	SIGNIFICANCE (5 %)
MOTOmed viva2 movement therapy	IG = 21	61.7 ± 10.0	12 weeks, 2x / week 60 min.	increase: muscle mass increase: muscle strength reduction: body fat improvement quality of life: • general fatigue symptoms • physical fatigue • physical functions	$p < 0.049$ $p < 0.002$ $p < 0.009$ $p < 0.032$ $p < 0.002$ $p < 0.039$
Conventional therapy	CG = 28	53.0 ± 10.7	12 weeks, 2x / week	No significant changes	–

Conclusion: A MOTOmed arm training in breast cancer patients with lymph node dissection leads to improvements in strength, quality of life and reduces discomfort.

Paraplegia

DOI: HTTPS://DOI.ORG/10.1055/S-0033-1355939

12.2 FES-Cycling in Persons with Spinal Cord Injury - Impact on Subjective Perception and Activities of Daily Living

Kuhn et al. 2013, Germany

THERAPY/INTERVENTION	PARTICIPANTS	AGE / Ø-YEARSS	DURATION	SELECTED RESULTS	SIGNIFICANCE (5 %)
MOTOmed viva2 in combination with FES + PT + OT	In total 30 of which 13 with tetraplegia and 17 with paraplegia	44 ± 15.5	Study period 14 months in total, including 4 weeks of intervention with 2x / week FES cycling 20 min. On days without FES-cycling PT or OT	Short Form Health Survey (SF-36) to measure health-related quality of life (pre-post): • Physical functioning • Physical pain • General health • Vitality • Social functioning • Emotional role functioning • Psychological well-being • Physical sum scale • Mental sum scale Spinal Cord Independence Measure (SCIM) to assess functional ability as well as impairment Scale (AIS) to assess the neurological status (pre-post): • Self care • Breathing and sphincter control • Mobility in the room and bathroom • Indoor and outdoor mobility • Total	 p < 0.001 p < 0.001 p < 0.01 p < 0.001 p < 0.05 p < 0.05 p < 0.001 p < 0.01 p < 0.05 p < 0.01 p < 0.01 p < 0.001 p < 0.001 p < 0.01
No CG					

Conclusion: FES cycling can be a useful early therapy to acute inpatient patients with complete and incomplete paraplegia.

DOI: HTTPS://DOI.ORG/10.1007/S004210050042

12.1 Cardiovascular responses at the onset of passive Leg cycle exercise in paraplegics with spinal cord injury

Muraki et al. 2000, Japan

THERAPY/INTERVENTION	PARTICIPANTS	AGE / Ø-YEARS	DURATION	SELECTED RESULTS	SIGNIFICANCE (5 %)
Passive cycling movements wit self-made bike	In total 11, Paraplegics (PSCI): 6 Non handi- capped (ABS): 5	PSCI: 49.2 ± 4.5 ABS: 47.8 ± 13.5	passive cycle movements 30 min. subsequent resting phase passive cycling with 40 rpm for 6 Min.	Cardiovascular response in the form of cardiac output and cardiac stroke volume increased in PSCI compared to resting value.	p < 0.05

Conclusion: Rhythmic stretching and flexion of paralysed muscles with passive movement promotes venous return of these muscles and thus provides an improved cardiovascular response.

List of Abbreviations

A

AAC = Active-assisted cycling
ADL = Activities of Daily Living
ABS = Able-Bodied Subjects

B

BBS = Berg Balance Scale
BDI = Bech-Depressions-Inventar
BI = Barthel Index
BMI = Body Mass Index
BMS = Biomechanical muscle stimulation

C

CG = Control group
COPD = Chronic Obstructive Pulmonary Disease
CRS = Cardiac Risk Score

E

ESRD = End Stage Renal Disease

F

FAC = Functional Ambulation Categories
FES = Functional Electrical Stimulation
FGS = Functional Gait Scale

G

GT = Gait Training

H

h = Hour
HADS = Hospital Anxiety and Depression Scale
HF = High Frequency
HRV = Heart Rate Variability

I

IG = Intervention group

L

LE-FMA = Fugl-Meyer-Assessment
LF = Low Frequency

M

m = Meter
MAS = Modified Ashworth Scale
min. = Minute

N

N = quantity / sample size
NPI = Neuropsychiatric Inventory

O

OT = Occupational Therapy

P

POMA = Total Score Performance-Orientated Mobility Assessment
PQD8 = Parkinson's Disease Questionnaire
PSCI = Paraplegics with Spinal Cord Injury
PT = Physiotherapy
PTP = Participants

R

ROM = Range of Motion
rpm = Revolutions per minute

S

SCIM = Spinal Cord Independence Measure
SPPB = Short Physical Performance Battery Test

T

TMT = Trail Making Test
TMT-B = Part of the TMT that allows statements about flexibility

U

UPDRS = Unified Parkinson Disease Rating Scale

V

VO_2 = Oxygen intake
VCO_2 = Carbon dioxide emission

W

W = Watt

Explanation of Statistical Significance

The goal of scientific work is to develop generally valid statements. Statistics is an important tool for this purpose: Descriptive statistics guides to a clear and vivid information processing whereas the inferential statistics enables a verification of hypotheses. An important requirement is the (null) hypothesis, formulated before the start of examination. Statistical test methods are used to calculate the probability that the null hypothesis H0 has to be assumed to be true (failed to reject) or has to be rejected.

The significance level α indicates the probability determined by the researcher. Conventional values for the significance level of tests are $\alpha = 0.05$ or $\alpha = 0.01$. The significance level α is also described as the probability of error since it indicates with which probability the correct null hypothesis is rejected on the basis of the test results. If a researcher chooses $\alpha = 0.05$ and reports a significant result – HO was rejected – it remains open whether the null hypothesis would also have been rejected for $\alpha = 0.01$.

Therefore, empirical results are often verified on a different level of significance. This is done with the help of the so-called p-value, which is also known as „observed level of significance", because the p-value corresponds to the smallest value of α, for which the test result just achieves significance.

Conclusion

If the study results are lower (<) than $p < 0.05$, the probability that the positive results are e.g. caused by MOTOmed Movement Therapy is 95 % (= significant). If the result is $p < 0.001$, the results are highly significant, which means that they can be reduced exclusively to the intervention group (= therapy). The statistical significance of a result is a measure for the degree of „truth" of this result.

The p-value is an indicator for the reliability of a result. More precisely, the p-value measures the probability of an error in a result. A p-value of 0.05 for example indicates, that the probability of an apparent or false relation in a sample is max. 5%. In many fields of research, the p-value 0.05 is accepted as limit value of the error level.

Definition of the level of significance

$p > 0.05$ = not significant
$p \leq 0.05$ = significant
$p \leq 0.01$ = very significant
$p \leq 0.001$ = highly significant

Source: Bortz J., Schuster C. (2010). Statistik für Human- und Sozialwissenschaftler, 7. Auflage, Springer Verlag, Heidelberg.
DOI: https://doi.org/10.1007/978-3-642-12770-0

1 Stroke

1.15 Kotov S.V., Isakova E.V., Sheregeshev V.I. (2020). Possibilities for Correcting Emotional and Behavioral Impairments in Stroke Patients during Rehabilitation Therapy. Neuroscience and Behavioral Physiology, 50, 156-161. DOI: https://doi.org/10.1007/s11055-019-00882-1

1.14 Shen C., Liu F., Yao L., Li Z., Qiu L., Fang S. (2018). Effects of MOTOmed movement therapy on the mobility and activities of daily living of stroke patients with hemiplegia: a systematic review and meta-analysis. Clinical rehabilitation, 32(12), 1569-1580. DOI: https://doi.org/10.1177/0269215518790782

1.13 Yang H.-C., Lee C.-L., Lin R., Hsu M.-J., Chen C.-H., Lin J.-H., Lo S.K. (2014). Effect of biofeedback cycling training on functional recovery and walking ability of lower extremity in patients with stroke. The Kaohsiung Journal of Medical Sciences, 30(1), 35-42. DOI: https://doi.org/10.1016/j.kjms.2013.07.006

1.12 Ambrosini E., Ferrante S., Pedrocchi A., Ferrigno G., Molteni F. (2011). Cycling Induced by Electrical Stimulation Improves Motor Recovery in Postacute Hemiparetic Patients: A Randomized Controlled Trial. Stroke, 42(4), 1068-1073. DOI: https://doi.org/10.1161/STROKEAHA.110.599068

1.11 Podubecka J., Scheer S., Theilig S., Wiederer R., Oberhoffer R., Nowak D.A. (2011). Zyklisches apparatives Bewegungstraining versus konventionelles Gangtraining in der Rehabilitation des hemiparetischen Ganges nach Schlaganfall: Eine Pilotstudie. Fortschritte der Neurologie Psychiatrie, 79(7), 411-418. DOI: https://doi.org/10.1055/s-0031-1273338

1.10 Skvortsova V.I., Ivanova G.E., Rumyantseva N.A., Staritsyn A.N., Kovrazhkina E.A., Suvorov A.Yu. (2011). Current Approaches to Restoring Walking in Patients during the Acute Phase of Cerebral Stroke. Neuroscience and Behavioral Physiology, 41(5), 536-541. DOI: https://doi.org/10.1007/s11055-011-9451-4

1.9 Diserens K., Ruegg D., Kleiser R., Hyde S., Perret N., Vuadens P., Fornari E., Vingerhoets F., Seitz R.J. (2010). Effect of Repetitive Arm Cycling Following Botulinum Toxin Injection for Poststroke Spasticity: Evidence From fMRI. Neurorehabilitation and Neural Repair, 24(8), 753-762. DOI: https://doi.org/10.1177/1545968310372138

1.8 Dobke B., Schüle K., Diehl W., Kaiser T. (2010). Apparativ-assistive Bewegungstherapie in der Schlaganfallrehabilitation. Neurologie & Rehabilitation, 16(4), 173-185.

1.7 Eigler F. (2009). Funktionelle Elektrostimulation am Beinergometer in der Rehabilitation nach Schlaganfall: Der Einsatz funktioneller Elektrostimulation während des Trainings am zyklischen Beinbewegungstrainer (FES-LCE) in der stationären Rehabilitation nach zerebralem ischämischem Infarkt. Dissertation, Universität Heidelberg, Institut für Sport und Sportwissenschaft. DOI: https://doi.org/10.11588/heidok.00009950

1.6 Wan X., Gao C., Ye Z., Huang Z., Pan C. (2009). Einfluss des MOTOmed Beintrainings auf halbseitig gelähmte Schlaganfallpatienten. Chinese Journal of Physical Medicine and Rehabilitation, 31(7), 503-504.

1.5 Lennon O., Carey A., Gaffney N., Stephenson J., Blake C. (2008). A pilot randomized controlled trial to evaluate the benefit of the cardiac rehabilitation paradigm for the non-acute ischaemic stroke population. Clinical Rehabilitation, 22(2), 125-133. DOI: https://doi.org/10.1177/0269215507081580

1.4 Diserens K., Perret N., Chatelain S., Bashir S., Ruegg D., Vuadens P., Vingerhoets F. (2007). The effect of repetitive arm cycling on post stroke spasticity and motor control: Repetitive arm cycling and spasticity. Journal of the Neurological Sciences, 253 (1-2), 18-24. DOI: https://doi.org/10.1016/j.jns.2006.10.021

1.3 Bashir S. (2006). Rehabilitation of stroke and cerebellar patients. Thesis, Institute of Physiology, University of Fribourg.

1.2 Kamps A., Schüle K. (2005). Zyklisches Bewegungstraining der unteren Extremitäten in der Schlaganfallrehabilitation. Neurologie & Rehabilitation, 11(5), 259-269.

1.1 Demmer P.C. (2005). Überprüfung der Ausdauerfähigkeit von Schlaganfallbetroffenen durch ein apparativ-assistives Training. Diplomarbeit, Deutsche Sporthochschule Köln.

2 Geriatrics

2.2 Carballeira E., Censi K.C., Maseda A., López-López, R., Millán-Calenti J.C. (2021). Low-volume cycling training improves body composition and functionality in older people with multimorbidity: a randomized controlled trial. Scientific Reports, 11(1), 13364. DOI: https://doi.org/10.1038/s41598-021-92716-9

2.1 Diehl W., Schüle K., Kaiser T. (2008). Apparativ-assistives Bewegungstraining der unteren Extremitäten in der geriatrischen Rehabilitation. NeuroGeriatrie, 5(1), 3-12.

3 Multiple Sclerosis

3.2 Hochsprung A., Granja Dominguez A., Magni E., Escudero Uribe S., Moreno Garcia A. (2017). Effect of visual biofeedback cycling training on gait in patients with multiple sclerosis. Neurologia, 35(2), 89-95. DOI: https://doi.org./10.1016/j.nrl.2017.07.008

3.1 Rösche J., Paulus C., Maisch U., Kaspar A., Mauch E., Kornhuber H.H. (1997). The effects of therapy on spasticity utilizing a motorized exercise-cycle. Spinal Cord, 35, 176-178. DOI: https://doi.org/10.1038/sj.sc.3100376

4 Parkinson's Disease

4.10 Pereira-Pedro K.K., Machado de Oliveira I., Cancela Carral J.M., Mollinedo Cardalda I. (2023). Effects of MOTOmed® movement therapy on the motor function and main symptoms of patients with Parkinson's disease: a systematic review. Retos: nuevas tendencias en educación física, deporte y recreación, 47, 249-257. DOI: https://doi.org/10.47197/retos.v47.93936

4.9 Ridgel A., Phillips R. S., Walter B. L., Discenzo F. M., Loparo K. A. (2015). Dynamic high-cadence cycling improves motor symptoms in Parkinson's disease. Frontiers in Neurology, 6, 194. DOI: https://doi.org/10.3389/fneur.2015.00194

4.8 Stuckenschneider T., Helmich I., Raabe-Oetker A., Froböse I., Feodoroff B. (2015). Active assistive forced exercise provides long-term improvement to gait velocity and stride length in patients bilaterally affected by Parkinson's disease. Gait & Posture, 42(4), 485-490. DOI: https://doi.org/10.1016/j.gaitpost.2015.08.001

4.7 Corbett D.B., Peer K.S., Ridgel A.L.(2013). Biomechanical muscle stimulation and active-assisted cycling improves active range of motion in individuals with Parkinson's disease. NeuroRehabilitation, 33(2), 313-322. DOI: https://doi.org/10.3233/NRE-130961

4.6 Ridgel A.L., Peacock C.A., Fickes E.J., Kim C.-H. (2012). Active-Assisted Cycling Improves Tremor and Bradykinesia in Parkinson's Disease. Archives of Physical Medicine and Rehabilitation, 93 (11), 2049-2054. DOI: https://doi.org/10.1016/j.apmr.2012.05.015

4.5 Fickes E.J. (2012). Effects of interval active-assisted cycling on balance in individuals with Parkinson's disease. Dissertation, Kent State University.

4.4 Ridgel A.L., Kim C.-H., Fickes E.J., Muller M.D., Alberts J.L. (2011). Changes in Executive Function After Acute Bouts of Passive Cycling in Parkinson's Disease. Journal of Aging and Physical Activity, 19(2), 87-98. DOI: https://doi.org/10.1123/japa.19.2.87

4.3 Laupheimer M., Härtel S., Schmidt S., Bös K. (2011). Forced Exercise – Auswirkungen eines MOTOmed-Trainings auf parkinson typische motorische Dysfunktionen. Neurologie & Rehabilitation, 17(5/6), 239-246.

4.2 Ridgel A.L., Peacock C.A., Fickes E.J., Kim C.-H.(2010). Effects of active-assisted cycling on upper extremity motor and executive function in Parkinson's disease. Presentation at the Society of Neuroscience Meeting 2010.

4.1 Ridgel A.L., Vitek J.L., Alberts J.L. (2009). Forced, Not Voluntary, Exercise Improves Motor Function in Parkinson's Disease Patients. Neurorehabilitation and Neural Repair, 23(6), 600-608. DOI: https://doi.org/10.1177/1545968308328726

5 Hypertension

5.1 Westhoff T.H., Schmidt S., Gross V., Joppke M., Zidek W., van der Giet M., Dimeo F. (2008). The cardiovascular effects of upper-limb aerobic exercise in hypertensive patients. Journal of Hypertension, 26(7), 1336-1342. DOI: https://doi.org/10.1097/HJH.0b013e3282ffac13

6 Cerebral Palsy

6.3 Belogorova T., Vlasenko A., Mikhnovich V., Dutova N., Taskaeva T., Bugun O., Rychkova L. (2019). Rehabilitation of children with spastic and dyskinetic forms of cerebral palsy through transcranial exposure and biologically feedback. Archives of Disease in Childhood, 104(Suppl 3), A352. DOI: https://doi.org/10.1136/archdischild-2019-epa.833

6.2 Nurmatova S., Khamraev F., Mirzaev A., Diehl, W. (2012). Effectiveness of motor-assisted MOTOmed movement therapy in the rehabilitation of children diagnosed with infantile cerebral parese. Nevrologiya, 1(53), 34-37.

6.1 Shen M., Li Z.P., Cui Y., Kang L.H., Xie Z.Z., Yao X.H., Gu Q.Y. (2009). Effects of Motomed gracile leg training on the lower limbs function in children with spastic cerebral palsy. Chinese Journal of Rehabilitation Theory and Practice, 9, 828-829.

7 Dialysis

7.6 Anding-Rost K., von Gersdorff G., von Korn P., Ihorst G., Josef A., Kaufmann M., Huber M., Bär T., Zeißler S., Höfling S., Breuer C., Gärtner N., Haykowsky M.J., Degenhardt S., Wanner C., Halle M. (2023). Exercise during Hemodialysis in Patients with Chronic Kidney Failure. NEJM Evidence, EVIDoa2300057. DOI: https://doi.org/10.1056/EVIDoa2300057

7.5 Mitsiou M., Dimitros E., Roumeliotis S., Liakopoulos V., Kouidi E., Deligiannis A. (2022). Effects of a Combined Intradialytic Exercise Training Program and Music on Cardiac Autonomic Nervous System Activity in Hemodialysis Patients. Life, 12(8), 1276. DOI: https://doi.org/10.3390/life12081276

7.4 Dziubek W., Bulińska K., Rogowski Ł., Kusztal M., Zembroń-Łacny A., Gołębeiowski T., Markowska D., Klinger M., Woźniewski M. (2016). Three-month endurance training improves functional fitness and knee muscle performance of patients with end stage renal disease (ESRD). Isokinetics and Exercise Science, 24(3), 237-246. DOI: https://doi.org/10.3233/IES-160623

7.3 Dziubek W., Kowalska J., Kusztal M., Rogowski Ł., Gołębiowski T., Nikifur M., Szczepańska-Gieracha J., Zembroń-Łacny A., Klinger M., Woźniewski M. (2016). The Level of Anxiety and Depression in Dialysis Patients Undertaking Regular Physical Exercise Training – a Preliminary Study. Kidney Blood Pressure Research, 41(1), 86–98.DOI: https://doi.org/10.1159/000368548

7.2 Anding K., Bär T., Trojniak-Hennig J., Kuchinke S., Krause R., Rost J.M., Halle M. (2015). A structured exercise program during haemodialysis for patients with chronic kidney disease: clinical benefit and long-term adherence. BMJ Open, 5(8). DOI: https://doi.org/10.1136/bmjopen-2015-008709

7.1 Torkington M., MacRae M., Isles C. (2006). Uptake of and adherence to exercise during hospital haemodialysis. Physiotherapy, 92(2), 83-87. DOI: https://doi.org/10.1016/j.physio.2005.08.004

8 Intensive Care Unit

8.10 Hickmann C.E., Montecinos-Munoz N.R., Castanares-Zapatero D., Arriagada-Garrido R.S., Jeria-Blanco U., Gizzatullin T., Roeseler J., Dugernier J., Wittebole X., Laterre P.-F. (2021). Acute effects of sitting out of bed and exercise on lung aeration and oxygenation in critically ill subjects. Respiratory care, 66(2), 253-262. DOI: https://doi.org/10.4187/respcare.07487

8.9 Nickels M.R., Aitken L.M., Barnett A.G., Walsham J., McPhail S.M.Publish (2020). Acceptability, safety, and feasibility of in-bed cycling with critically ill patients. Australian Critical Care, 33(3), 236-243. DOI: https://doi.org/10.1016/j.aucc.2020.02.007

8.8 Yu L., Jiang J.-X., Zhang Y., Chen Y.-Z., Shi Y. (2020). Use of in-bed cycling combined with passive joint activity in acute respiratory failure patients receiving mechanical ventilation. Annals of Palliative Medicine, 9(2), 175-81. DOI: https://doi.org/10.21037/apm.2020.02.12

8.7 Sommers J., Klooster E., Zoethout S.B., van den Oever H.L.A., Nollet F., Tepaske R., Horn J., Engelbert R.H.H., van der Schaaf M. (2019). Feasibility of Exercise Testing in Patients Who Are Critically Ill: A Prospective, Observational Multicenter Study. Archives of physical medicine and rehabilitation, 100(2), 239-246. DOI: https://doi.org/10.1016/j.apmr.2018.07.430

8.6 De Beer C., Van Rooijen A., Pretorius J., Becker P., Rheeder P., Paruk F. (2018). Muscle strength and endurance to predict successful extubation in mechanically ventilated patients: A pilot study evaluating the utility of upper-limb muscle strength and ergometry. Southern African Journal of Critical Care, 34(2), 44-51. DOI: https://doi.org/10.7196/SAJCC.2018.v34i2.360

8.5 Hickmann C., Castanares-Zapatero D., Deldicque L., Van den Bergh P., Caty G., Robert A., Roesler J., Francaux M., Laterre P.-F. (2018). Impact of Very Early Physical Therapy During Septic Shock on Skeletal Muscle: A Randomized Controlled Trial. Critical Care Medicine. DOI: https://doi.org/10.1097/CCM.0000000000003263

8.4 Dos Santos Machado A., Pires-Neto R.C., Ximenes Carvalho M.T., Soares J.C., Cardoso D.M., Martins de Albuquerque I. (2017). Effects that passive cycling exercise have on muscle strength, duration of mechanical ventilation, and length of hospital stay in critically ill patients: a randomized clinical trial. Jornal brasileiro de pneumologia, 43(02), 134-139. DOI: https://doi.org/10.1590/S1806-37562016000000170

8.3 Schaller S., Anstey M., Blobner M., Edrich T., Grabitz S., Gradwohl-Matis I., Heim M., Houle T., Kurth T., Latronico N., Lee J., Meyer M., Peponis T., Talmor D., Velmahos G., Waak K., Walz J., Zafonte R., Eikermann M. (2016). Early, goal-directed mobilization in the surgical intensive care unit: a randomised controlled trial. The Lancet, 388 (10052), 1377-88. DOI: https://doi.org/10.1016/S0140-6736(16)31637-3

8.2 Kho M.E., Martin R.A., Toonstra A.L., Zanni J.M, Mantheiy E.C., Nelliot A., Needham D.M. (2015). Feasibility and safety of in-bed cycling for physical rehabilitation in the intensive care unit. Journal of critical care, 30(6), 1419.e1-1419.e5. DOI: https://doi.org/10.1016/j.jcrc.2015.07.025

8.1 Burtin C., Clerckx B., Robbeets C., Ferdinande P., Langer D., Troosters T., Hermans G., Decramer M., Gosselink R. (2009). Early exercise in critically ill patients enhances short-term functional recovery. Critical Care Medicine, 37(9), 2499-2505. DOI: https://doi.org/10.1097/CCM.0b013e3181a38937

9 COPD Chronic Obstructive Pulmonary Disease

9.1 Galetke W., Randerath W., Pfeiffer M., Feldmeyer F., Rühle K.-H. (2002). Spiroergometrie bei bettlägerigen Patienten mit schwergradiger COB. Pneumologie, 56(2), 98-102. DOI: https://doi.org/10.1055/s-2002-20087

10 Dementia / Alzheimer's Disease

10.1 Holthoff V.A., Marschner K., Scharf M., Steding J., Meyer S., Koch R., Donix M. (2015). Effects of Physical Activity Training in Patients with Alzheimer's Dementia: Results of a Pilot RCT Study. PloS one, 10(4), e0121478. DOI: https://doi.org/10.1371/journal.pone.0121478

11 Cancer

11.1 Schmidt T., Berner J., Jonat W., Weisser B., Röcken C., van Mackelenbergh M., Mundhenke C. (2017). Influence of arm crank ergometry on development of lymphedema in breast cancer patients after axillary dissection: a randomized controlled trail. Journal of Rehabilitation Medicine, 49(1), 78-83. DOI: https://doi.org/10.2340/16501977-2167

12 Paraplegia

12.2 Kuhn D., Leichtfried V., Schobersberger W., Röhl K. (2013). FES-Cycling bei Menschen mit Querschnittlähmung–Auswirkung auf subjektives Empfinden und Aktivitäten des täglichen Lebens. physioscience, 9(04), 142-150. DOI: https://doi.org/10.1055/s-0033-1355939

12.1 Muraki S., Ehara Y., Yamasaki M. (2000). Cardiovascular responses at the onset of passive leg cycle exercise in paraplegics with spinal cord injury. European journal of applied physiology, 81, 271-274. DOI: https://doi.org/10.1007/s004210050042

RECK Medical Devices has been the world market leader with its MOTOmed medical devices for over 50 years and is regarded as the innovative spirit of motor-assisted movement therapy devices in supine and sitting position.

Movement therapy with MOTOmed offers daily movement ranging from prevention and inpatient treatment to rehabilitation and training at home. The three therapy modes enable a movement training that is adapted to the personal training level:

passive → training using the device's motor strength
assistive → training with residual muscle strength
aktiv → training with own muscle strength

People, clinics, and institutions all over the world trust RECK Medical Devices and the MOTOmed devices as they provide the highest level of safety and optimum therapy measures for patients. With MOTOmed, effective and efficient therapy results can be achieved for various indications and in many areas of application.

Numerous MOTOmed movement therapy devices are recognized by the health insurances in Germany according to the list of medical aids and can be prescribed for use at home, depending on the indication.

If you have any questions about movement therapy with the MOTOmed, we are happy to help. Please give us a call, send us an e-mail or use the contact form on the MOTOmed website.

RECK-Technik GmbH & Co. KG
Reckstrasse 1–5
D-88422 Betzenweiler

+49 7374 18-85
info@motomed.com
www.motomed.com

RECK

100.024.081 en 20250219