Constraint-Induced Movement Therapy – upper extremity

Author, Year PEDro Score, Country	Sample size	Intervention	Outcome and significance: (+) significant (-) not significant
Abo et al. (2014). PEDro score: 6/10	66 patients with chronic stroke	CIMT (n=22) Vs. Low-frequency rTMS with intensive OT (NEURO) (n=44) **Treatment details:** CIMT: 6 hours shaping techniques and repetitive task practice/day and mitt on the less-impaired upper limb during intervention. NEURO: 20 mins low-frequency rTMS/day and OT 2 hours/day, 6 days/week for 15 days. Each rTMS session consisted of 1200 pulses of 1Hz rTMS to the nonlesional heishpere over the primary motor area.	At 15 days (post-treatment): (+) Fugl-Meyer Assessment (+) Wolf Motor Function Test – Functional Ability* (-) Wolf Motor Function Test – Performance Time * Note: between-group differences in favour of NEURO compared to CIMT.
Abu Tariah et al., 2010 PEDro score: 6/10	18 patients with subacute or chronic stroke	mCIMT (n=10) vs. Neurodevelopmental therapy (NDT, n=8) **Treatment details:** mCIMT: restraint of the less-affected hand for 2 hours/day and intensive training for 2 hours/day, 7 days a week for 2 months. NDT: conventional NDT for 2 hours/day, 5 days/week and home program 2 days/week for 2 months.	At 2 months (post-treatment): -) Wolf Motor Function Test - Performance Time (WMFT-PT) (+) Wolf Motor Function Test - Functional Ability (WMFT-FA) (-) Motor Activity Log - Amount Of Use (MAL-AOU) (-) Motor Activity Log -Quality Of Movement (MAL-QOM (-) Fugl-Meyer Assessment (FMA) – joint motion (-) FMA – pain (-) FMA – sensation (-) FMA – motor function At 6 months (follow-up): (-) WMFT-PT

Constraint-Induced Movement Therapy – upper extremity

Author, Year PEDro Score, Country	Sample size	Intervention	Outcome and significance: (+) significant (-) not significant
			(+) WMFT-FA* (-) MAL-AOU (-) MAL-QOM (-) FMA – joint motion (-) FMA – pain (-) FMA – sensation (-) FMA – motor function * results approached significance
Alberts et al., 2004 PEDro score: 4	10 right-handed patients with subacute or chronic stroke	Immediate CIMT (n=5) Vs. Delayed CIMT (no CIMT, n=5) **Treatment details:** CIMT: training for up to 6 hours/day, 5 days/week for 2 weeks and mitt worn on less affected hand for 90% of waking hours. The no-CIMT group received same treatment approximately 1 year after initial evaluation, therefore had not received any intervention at time of assessment.	At 2 weeks (post-treatment): (-) Wolf Motor Function Test (WMFT)* (-) Fugl-Meyer Assessment (FMA) – arm and hand scale (+) Maximum precision grip force (-) Grasp force regulation (-) Grasp torque regulation * results approached significance for WMFT median time
Atteya, 2004 PEDro score: 1	6 patients with subacute stroke	mCIMT (n=2) Vs. Conventional rehabilitation (CR, n=2) Vs. No therapy (n=2) **Treatment details:** mCIMT: sling on less affected hand for 5 hours/weekday and 30 min PT and OT 3x/week for 10 weeks.	At 10 weeks (post-treatment): (+) Fugl-Meyer Assessment (FMA) (+) Wolf Motor Function Test (WMFT) (+) Action Research Arm Test (ARAT) (+) Motor Activity Log – Amount of Use (MAL-AOU) (+) Motor Activity Log – Quality of Movement (MAL-QOM)

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Author, Year PEDro Score, Country	Sample size	Intervention	Outcome and significance: (+) significant (-) not significant
		CR: 30 mins PT and 30 mins OT for 10 weeks.	Note: results indicate improvement in the mCIMT group from pre- to post-test. No between-group differences or tests of statistical significance were reported.
Azab et al., 2009 PEDro score: 6		mCIMT + standard rehabilitation vs. Standard rehabilitation alone **Treatment details:** mCIMT: Unaffected hand restrained in mitt for 6-7 hours/day for 4 weeks Standard rehabilitation: 40 minutes PT + 40 minutes OT 3 times/week for 4 weeks without use of mitt	At post-treatment: (+) Barthel Index At 6 months follow-up (+) Barthel Index Note: While the authors stated that the intervention group demonstrated significant improvements as compared to the control group, no p-values were given.
Barzel et al., 2009 PEDro score: n/a (quasi-experimental study)	14 patients with chronic stroke	mCIMT home program (n=7) vs. CIMT (n=7) **Treatment details:** mCIMT: self-directed home program for 2 hours/day, 5 days/week and splint worn 60% of waking hours 7 days/week, for 4 weeks CIMT: physiotherapy 6 hours/day, 5 days/week and splint worn 90% of waking hours 7 days/week, for 2 weeks	At post-treatment and 6 months (follow-up): (-) Wolf Motor Function Test – Performance Time (WMFT-PT) (-) Wolf Motor Function Test – Functional Ability (WMFT-FA) (-) Motor Activity Log – Amount of Use (MAL-AOU) (-) Motor Activity Log – Quality of Movement (MAL-QOM)
Barzel et al. (2015). PEDro Score: 7/10	156 patients with chronic stroke	Home-based mCIMT (n=85) Vs. Conventional rehabilitation (n=71) **Treatment details:** mCIMT: 5 home visits over 4 weeks (50-60 minutes/visit);	At 4 weeks (post-treatment): +) MAL-AOU (+) MAL-QOM (-) WMFT-PT (-) WMFT-FA

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Author, Year PEDro Score, Country	Sample size	Intervention	Outcome and significance: (+) significant (-) not significant
		Exercises with the affected arm for 2 hours/weekday; glove on the affected hand for 2-4 hours/day for 4 weeks Conventional rehabilitation: 10 25-30-minute sessions or 5 50-60-minute sessions over 4 weeks	(-) SIS-Hand Function (-) Nine Hole Peg Test (-) Barthel Index (-) Instrumental Activities of Daily Living At 6 months post-treatment (follow-up): (+) MAL-AOU (+) MAL-QOM (-) WMFT-PT (-) WMFT-FA (-) SIS-Hand Function (-) Nine Hole Peg Test (-) Barthel Index (-) Instrumental Activities of Daily Living
Batool et al. (2015) PEDro Score: 6/10	42 patients with acute to subacute stroke (2 weeks to 3 months post-stroke)	mCIMT (n=21) Vs. Motor relearning program (n=21) **Treatment details:** 2 hours/session, 6 times/week for 3 weeks. The mCIMT group wore a mitt on the less affected hand.	At 3 weeks (post-treatment): (+) Motor Assessment Scale (MAS) – total (+) MAS – upper arm function (+) MAS – hand movements (+) MAS – advanced hand movements (+) Functional Independence Measure (FIM) – total (+) FIM – eating (+) FIM – grooming (+) FIM – bathing (-) FIM – dressing upper body (+) FIM – dressing lower body
Boake et al., 2007 PEDro score: 6	23 patients with acute stroke	mCIMT + therapy vs. control (therapy alone)	Immediately post-treatment (+) Fugl-Meyer Assessment (FMA) - Upper

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Author, Year PEDro Score, Country	Sample size	Intervention	Outcome and significance: (+) significant (-) not significant
		Treatment details: mCIMT: mitten restraint worn 90% of waking hours + therapy of the affected UE 3 hours/day, 6 days/week, for 14-15 days Control: therapy of the affected UE 3 hours/day, 6 days/week, for 14-15 days	Extremity motor scale (-) Grooved Pegboard Test (GPT) (-) Motor Activity Log (quality of movement) (MAL – QOM) (-) Motor Activity Log (amount of use) (MAL-AOU) (-) Transcranial magnetic stimulation (TMS) 3 - 4 months follow-up (-) FMA - Upper Extremity motor scale (-) GPT (+) MAL - QOU (-) MAL -AOU (-) TMS Note: Only the 16 participants with complete data were included in this analysis.
Brogårdh & Sjülund, 2006 PEDro score: 5	16 patients with chronic stroke	CIMT + extended mitt use (n=9) Vs. CIMT alone (n=7) **Treatment details:** All participants received group CIMT for 6 hours/day for 2 weeks + mitt on the unaffected hand for a target of 90% of waking hours. The experimental group continued to wear a mitt every other day for an additional 3 months.	At 2 weeks (post-CIMT): (+) modified Motor Assessment Scale* (+) Sollerman Hand Function Test* (+) Motor Activity Log – Amount of Use (MAL-AOU)* (+) Motor Activity Log – Quality of Movement (MAL-QOM)* (-) Two-Point Discrimination Test Results reflect significant within-group differences of all participants following CIMT At 3 months (post extended mitt use): (-) modified Motor Assessment Scale

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Author, Year PEDro Score, Country	Sample size	Intervention	Outcome and significance: (+) significant (-) not significant
			(-) Sollerman Hand Function Test (-) MAL-AOU (-) MAL-QOM (-) Two-Point Discrimination Test
Brogårdh et al., 2009a PEDro score: 5	14 patients with chronic stroke	4-year follow-up from 2006 study Note: This was a pre-post study; no control group was used	Pre-treatment to 4 years: (-) Sollerman Hand Function Test (+) Motor Activity Log – Amount of Use (MAL-AOU) (+) Motor Activity Log – Quality of Movement (MAL-QOM) Post-treatment (2 weeks, 3 months) to 4 years: (-) Sollerman Hand Function Test (-) MAL-AOU* (-) MAL-QOM* * Significant decrease in scores from post-treatment time points to 4-year follow-up.
Brogårdh et al., 2009b PEDro score: 6	24 subjects, an average of 7 weeks post stroke with mild to moderate impaired hand function	mCIMT with mitt use Vs. mCIMT with no mitt use **Treatment details:** Mitt use on the less affected hand for 90% of waking hours for 12 days. Both groups received mCIMT arm and hand training for 3 hours/day for 2 weeks	At 2 weeks (post-treatment): (-) modified Motor Assessment Scale (-) Sollerman Hand Function Test (-) 2-point discrimination test (-) Motor Activity Log (MAL) At 3 months (follow-up): (-) modified Motor Assessment Scale (-) Sollerman Hand Function Test (-) 2-point discrimination test (-) MAL

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Author, Year PEDro Score, Country	Sample size	Intervention	Outcome and significance: (+) significant (-) not significant
Brogårdh, C. & Lexell, J., 2010 PEDro score: 5	20 patients with subacute stroke	mCIMT with mitt use (n=11) vs. mCIMT with no mitt use (n=9) **Treatment details:** Mitt use on the less affected hand for 80-90% of waking hours for 12 days. Both groups received mCIMT arm and hand training 3 hours/day for 2 weeks.	At 12 months (follow-up): -) Sollerman Hand Function Test (-) Modified Motor Assessment Scale (-) Motor Activity Log – Amount of Use (MAL-AOU) (-) Motor Activity Log – Quality of Movement (MAL-QOM)
Brunner, Skouem & Strand (2012). PEDro Score: 7/10	30 patients with subacute stroke	mCIMT (n=14) Vs. Bimanual task-related training (n=16) **Treatment details:** Both groups received therapist-directed training for 4 hours/week, and performed self-training for 2-3 hours/day for 4 weeks; the mCIMT group wore a restraint for 4 hours/day	At 4 weeks (post-treatment): (-) Action Research Arm Test (ARAT) (-) Nine Hole Peg Test (NHPT) (-) Motor Activity Log – Amout of Use (MAL-AOU) (-) Motor Activity Log – Quality of Movement (MAL-QOM) At 3-month follow-up: (-) ARAT (-) NHPT (-) MAL-AOU (-) MAL-QOM
Caimmi et al., 2008 PEDro score: N/A (pre-post study without multiple baselines)	8 chronic stroke and 8 healthy controls	mCIMT vs. no treatment (controls) **Treatment details:** mCIMT: splint worn approx. 80% of waking hours + 1 hour OT + 1 hour PT Control: no treatment	At post-treatment: Pre-post test results of the patient group: (+) Kinematics testing (+) Wolf Motor Function Test (+) Motor Activity Log (-) Motricity Index Note: When compared to the non-dominant arm of matched health controls at post

Constraint-Induced Movement Therapy – upper extremity

Author, Year PEDro Score, Country	Sample size	Intervention	Outcome and significance: (+) significant (-) not significant
			treatment, the arm movement of CIMT group (as measured by kinematics) was found to be significantly less smooth at post-treatment.
Dahl et al., 2008 PEDro score: 8	30 patients with subacute and chronic stroke (1-92 months post stroke)	CIMT + traditional rehabilitation vs. traditional rehabilitation alone Treatment details : CIMT : restraining mitt worn 90% of waking hours + 6 hours of therapy daily for 10 weekdays Traditional therapy: 6 hours of therapy daily for 10 week days	At post-treatment: (+) Wolf Motor Function Test (time-performance) (+) Wolf Motor Function Test (functional ability) (-) Motor Activity Log (amount of use) (-) Motor Activity Log (quality of movement) (-) Functional Independence Measure (-) Stroke Impact Scale At 6-month follow-up: (-) Wolf Motor Function Test (time-performance) (-) Wolf Motor Function Test (functional ability) (-) Motor Activity Log (amount of use) (-) Motor Activity Log (quality of movement) (-) Functional Independence Measure (-) Stoke Impact Scale
Dettmers et al., 2005 PEDro score: N/A (pre-post study with multiple baselines)	11 chronic stroke all with active extension of at least 20° at the wrist and at least 10° at the fingers	mCIMT **Treatment details:** Motor training of the affected arm (3 hours/day for 20 days) Restraint worn 9.3 hours daily for 20 days	At post-treatment and 6-month follow-up: (+) Motor Activity Log (+) Wolf Motor Function Test (+) Frenchay Arm Test (+) Grip Strength (+) Ashworth Scale (greater improvements for the shoulder in comparison to the elbow and wrist)

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Author, Year PEDro Score, Country	Sample size	Intervention	Outcome and significance: (+) significant (-) not significant
			(+) Stroke Impact Scale – physical function (+) Stroke Impact Scale – social participation and communication* (-) Stroke Impact Scale – memory and thinking, emotional status * from pre-treatment to follow-up only
Dromerick et al., 2000 PEDro score: 7	20 acute stroke; All patients had the presence of a protective response, as indicated by a score of >= 3 on the upper-arm item of the Motor Assessment Scale	mCIMT + traditional UE therapy vs. traditional UE therapy alone **Treatment details:** mCIMT: restraint worn 6 hours/day for 2 weeks Traditional therapy: 2 hours/day, 5 days/week for 2 weeks	At post-treatment: (+) Total Action Research Arm Test (ARA) (+) ARA pinch subtest (-) ARA grasp subtest (-) ARA grip subtest (-) ARA gross movement subtest At discharge: (-) Barthel Index (+) Functional Independence Measure (FIM) upper body dress item (-) FIM lower body dress item (-) FIM grooming item (-) FIM bathing item (-) FIM eating item
Dromerick et al., 2009 (VECTORS) PEDro score: 7	52 acute stroke (mean 9.7 days after stroke)	Standard CIMT vs. High-intensity CIMT vs. Control (traditional upper extremity therapy (dose-matched to standard CIMT)) **Treatment details:** All groups underwent 2 weeks of treatment. The standard CIMT group received 2 hours/day of shaping therapy and	At day 14 of treatment and at 90 days after stroke: Standard CIMT vs. Control (-) NIH Stroke Scale (-) Total ARAT score (Action Research Arm Test) and ARAT subtests (grip, pinch, grasp) (-) Functional Independence Measure (FIM)-

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Author, Year PEDro Score, Country	Sample size	Intervention	Outcome and significance: (+) significant (-) not significant
		wore a padded constraint mitten for 6 hours/day (mCIMT). The high-intensity CIMT group received 3 hours/day of shaping therapy and wore the mitten for 90% of waking hours (mCIMT). The control group received traditional occupational therapy which consisted of 1 hour of ADL training and 1 hour of upper extremity bilateral training exercises.	Upper Extremity (-) Stroke Impact Scale (SIS)-hand function subscale: (+) at day 14, (-) at 90 days after stroke (-) Wong-Baker Faces Scale (Pain ratings) (-) Geriatric Depression–15 Scale [Standard CIMT and. Control] VS. High intensity CIMT (+) *NIH Stroke Scale (+) *Total ARAT score (Action Research Arm Test) (+) *ARAT-grip (-) ARAT-pinch & grasp (-) FIM-Upper Extremity (+) *SIS-hand (only for control group at day 14, otherwise (+) at day 90 for both standard CIMT and control groups) (-) Wong-Baker Faces Scale (Pain ratings) (-) Geriatric Depression–15 Scale *In favour of control and standard CIMT groups. * No significant differences between the standard CIMT and control groups at day 14 and 90 days after stroke. However, High intensity CIMT group had significantly lower gains in total ARAT scores compared to the standard CIMT and control groups at day 14 and 90 days after stroke.

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Author, Year PEDro Score, Country	Sample size	Intervention	Outcome and significance: (+) significant (-) not significant
El-Helow et al. (2015). PEDro Score: 7/10	60 patients with acute stroke	mCIMT (n=30) vs. Conventional rehabilitation (n=30) mCIMT: restraint for up to 6 hours/day and shaping for 2 hours/day, 5 days/week for 2 weeks.	At 2 weeks (post-treatment): (+) FMA (+) ARAT
Gauthier et al., 2008 PEDro score: 4	36 patients with chronic stroke	mCIMT + transfer package (n=16) Vs. mCIMT (n=20) **Treatment details:** mCIMT: Restraint worn 90% of waking hours, and functional task training for 3 hours/day for 10 days. Transfer package: additional behavioural training 30 mins/day.	At 2 weeks (post-treatment): (+) Motor Activity Log – Quality of Movement (MAL-QOM) (-) Wolf Motor Function Test (WMFT)
Hammer & Lindmark, 2009a PEDro score: 6	30 patients with subacute stroke	Forced use (n=15) Vs. Conventional therapy (n=15) **Treatment details:** Sling worn on unaffected UE for up to 6 hours/day, 5 days/week for 2 weeks. Both groups received a conventional interdisciplinary rehabilitation program	At 2 weeks (post-treatment), 1 month (follow-up 1) and 3 months (follow-up 2): (-) Motor Activity Log – Amount of Use (MAL-AOU) (-) Motor Activity Log – Quality of Movement (MAL-QOM)
Hammer & Lindmark, 2009b PEDro score: 7	30 patients with subacute stroke	Forced use (n=15) vs. Conventional therapy (n=15) **Treatment details:** Sling worn on unaffected UE for up to 6 hours/day, 5 days/week for 2 weeks. Both groups received a	At 2 weeks (post-treatment), 1 month (follow-up 1) and 3 months (follow-up 2): (-) Fugl-Meyer Assessment – Upper Extremity scale (-) Modified Ashworth Scale

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Author, Year PEDro Score, Country	Sample size	Intervention	Outcome and significance: (+) significant (-) not significant
		conventional interdisciplinary rehabilitation program 5 days/week	(-) Action Research Arm Test (-) Motor Assessment Scale (-) 16 Hole Peg Test (-) Isometric grip strength
Hayner et al., 2010 PEDro score: N/A (quasi-experimental design study)	12 patients with chronic stroke Patients were stratified according to degree of UE function into two groups: 'less impaired' and 'more impaired'	mCIMT (n=6) vs. Bilateral UE training (n=6) **Treatment details:** mCIMT: Mitt worn on unaffected UE for 6 hours/day OT and home practice for 10 days. Bilateral training: same treatment intensity and duration with instruction to use both UEs during performance of tasks.	At 10 days (post-treatment) and at 6 months (follow-up): mCIMT vs. Bilateral UE training (-) Wolf Motor Function Test (WMFT) Less impaired UE function vs. More impaired UE function (+) WMFT* (+) Canadian Occupational Performance Measure (COPM) - Self performance rating** (+) COPM - Satisfaction with performance rating** Significant improvement in favour of less-impaired participants (all participants) ** Significant improvement in favour of less-impaired participants (all participants and sub-group of mCIMT participants)
Huseyinsinoglu, Ozdincler, & Krespi. (2012). PEDro Score: 7/10	24 patients with chronic stroke	CIMT (n=13) Vs. Bobath Concept training (n=11) **Treatment details:** CIMT: mitt on the less-affected hand for 90% of waking hours for 12 consecutive days, and therapy sessions for three hours/day for 10 consecutive weekdays.	At 2 weeks (post-treatment): (-) WMFT-FA (-) WMFT-PT (+) MAL-AOU (+) MAL-QOM (-) Motor Evaluation Scale for Arm in Stroke Patients (MESUPES)

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Author, Year PEDro Score, Country	Sample size	Intervention	Outcome and significance: (+) significant (-) not significant
		Bobath Concept: therapy sessions for 1 hour/day for 10 consecutive weekdays.	(-) FIM self-care (-) FIM total
Khan et al., 2011. PEDro Score: 8/10	44 patients with subacute to chronic stroke	Conventional neurological therapy (n=15) Vs. Modified CIMT (n=14) Vs. Therapeutic climbing (n=15). **Treatment details:** Conventional neurological therapy: physiotherapy 5 hours/week, occupational therapy 2.5 hours/week, and group therapy for 2-3 hours/week. Therapeutic climbing: physiotherapy 5 hours/week with climbing-specific exercises during 80% of sessions, occupational therapy 2.5 hours/week, and group therapy for 2-3 hours/week. Modified CIMT: group-based physiotherapy and occupational therapy 5 hours/week while wearing a mitt, and an additional 5 hours/week of self-training of repetitive task-oriented activities.	At discharge (average 32 days): (+) WMFT – Time* (-) WMFT - Performance (-) WMFT - Strength (-) MAL-AOU (-) MAL-QOM (+) Chedoke McMaster Impairment Inventory for shoulder pain* (-) Shoulder flexion active ROM (-) isometric strength - shoulder flexion/extension (-) Isometric strength – elbow flexion/extension in favour of mCIMT compared to therapeutic climbing At follow-up (6 months):(+) WMFT – Time** (-) WMFT - Performance (-) WMFT - Strength (-) MAL-AOU (-) MAL-QOM (+) Chedoke McMaster Impairment Inventory for shoulder pain*** (-) Shoulder flexion active ROM (-) isometric strength - shoulder flexion/extension (-) Isometric strength – elbow flexion/extension

Author, Year PEDro Score, Country	Sample size	Intervention	Outcome and significance: (+) significant (-) not significant
			** in favour of mCIMT compared to therapeutic climbing and conventional neurological therapy compared to therapeutic climbing *** in favour of mCIMT compared to therapeutic climbing and mCIMT compared to conventional neurological therapy
Kim et al., 2008 PEDro score: 3	21 chronic hemiparetic stroke *4 subjects in the CIMT group did not complete the study	CIMT using a modified opposition restriction orthosis (MORO) vs. control **Treatment details:** CIMT with MORO for at least 5 hours/day, 7 days/week for 8 weeks control treatment not specified NOTE: Although the article refers to the treatment as CIMT, the prescribed wearing time (5 hours per day) for the MORO was less than 90% of the subjects' waking hours and 6 hours of concentrated repetitive training was not performed. For the purposes of this website this study will be included in the indepth review of the use of mCIMT rather than CIMT.	At post-treatment (-) Motor Activity Log (-) Purdue Pegboard Test (-) Manual Function Test NOTE: While significant pre-post improvements were reported on all outcomes for the CIMT group and slight improvement on all outcomes for the control group, no between-group statistical comparisons were provided, therefore all outcomes were considered non-significant.
Kopp et al., 1999 PEDro score: N/A (pre-post study without multiple baselines)	4 patients with chronic stroke	CIMT **Treatment details:** Unaffected UE restrained for 90% of waking hours for 2 weeks Affected UE training 6 hours/day for 2 weeks	At post-treatment: (+) Actual Amount of Use Test (+) Motor Activity Log (+) Arm Motor Ability Test (+) Wolf Motor Function Test At 3-month follow-up: (+) Actual Amount of Use Test (+) Motor Activity Log

Author, Year PEDro Score, Country	Sample size	Intervention	Outcome and significance: (+) significant (-) not significant
			(+) Arm Motor Ability Test (+) Wolf Motor Function Test Note: Significance refers to pre-post improvements and not between-group differences, since there was no control group in this study.
Lang, Thompson & Wolf, S.L. (2013). PEDro Score: 3/10	222 patients with subacute to chronic stroke from the EXCITE trial	Immediate CIMT (CIMT-I, n=106) Vs. Delayed CIMT (CIMT-D, n=116). **Treatment details:** CIMT-I: 2 weeks of CIMT immediately after randomization, CIMT-D: care for 1 year, then 2 weeks of CIMT.	At post-treatment (2 weeks): (-) WMFT* At follow-up (12 months): (-) WMFT * There was a significant between-group difference in WMFT – Lift pencil (item 10), in favour of CIMT-I compared to CIMT-D.
Lin et al., 2007 PEDro score: 6	32 patients with chronic stroke	mCIMT vs. traditional rehabilitation Treatment details : mCIMT : restraint worn on unaffected hand 6 hours/day + intensive training of the affected UE 2 hours/day for 3 weeks Traditional rehabilitation: strength, balance, and fine motor dexterity training, functional task practice, and stretching/weight-bearing by the affected arm 2 hours/weekday for 3 weeks	At post-treatment: (+) Reaction time (+) Percentage of movement where peak velocity occurs (-) Normalized movement unit (-) Maximum grip aperture (-) Percentage of movement time where maximum grip aperture occurs (+) Motor Activity Log (+) Functional Independence Measure
Lin et al., 2008 PEDro score: 5	22 patients with chronic stroke (mean time post	mCIMT combined with intensive training of the affected limb vs. traditional intervention (control treatment)	At post-treatment: (+) Fugl-Meyer Assessment

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Author, Year PEDro Score, Country	Sample size	Intervention	Outcome and significance: (+) significant (-) not significant
	onset of stroke = 18.9 months)	**Treatment details:** Both therapies were provided 2 hours/day, 5 days/week for 3 weeks. Both groups received restraint of the less affected limb outside rehabilitation 3 hours/day. The mCIMT group focused on intensive training of the affected limb while the control group focused on traditional therapies	(+) Total Functional Independence Measure (FIM) (+) FIM self-care subscale (+) FIM locomotion subscale (-) Motor Activity Log (MAL) -Amount of use (-) MAL- Quality of movement (+) Nottingham Extended ADL Scale - Mobility domain
Lin et al., 2009a PEDro score: 5	32 patients within 6 to 40 months after onset of a first stroke (chronic)	mCIMT combined with intensive training of the affected limb vs. traditional intervention (control treatment) **Treatment details:** Both therapies were provided 2 hours/day, 5 days/week for 3 weeks. Both groups received restraint of the less affected limb outside rehabilitation 5 hours/day. The mCIMT group received intensive training while the control group received conventional therapy	At post-treatment: (+) Fugl-Meyer Assessment (+) Total Functional Independence Measure (FIM) (+) FIM self care subscale (+) FIM locomotion subscale (-) Motor Activity Log (MAL) -amount of use (-) MAL-quality of movement (+) Stroke Impact Scale - ADL, mobility & hand function subscales (+) Nottingham Extended ADL Scale - mobility domain
Lin et al., 2009b PEDro score: 8	60 patients with chronic stroke	Constraint-induced therapy (CIT) vs. bilateral arm training (BAT) vs. control **Treatment details:** CIT: Unaffected hand restrained in mitt 6 hours/day + intensive training of affected UE 2 hours/weekday for 3 weeks (mCIMT)	At post-treatment: CIT vs. control (in favour of CIT) (+) Overall Fugl-Meyer Assessment (+) Distal part Fugl-Meyer Assessment (-) Proximal part Fugl-Meyer Assessment (+) Functional Independence Measure (locomotion subtest)

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Author, Year PEDro Score, Country	Sample size	Intervention	Outcome and significance: (+) significant (-) not significant
		BAT: Training of both affected and unaffected UE in functional tasks in symmetric and alternating patterns for 2 hours/weekday for 3 weeks Control: Standard UE therapy 2 hours/weekday for 2 weeks	(+) Motor Activity Log – AOU (+) Motor Activity Log – QOM (+) Overall Stroke Impact Scale (+) Stroke Impact Scale – activities of daily living/ instrumental activities of daily living subtest (+) Stroke Impact Scale – hand function domain BAT vs. control (in favour of BAT) (+) Overall Fugl-Meyer Assessment (+) Distal part Fugl-Meyer Assessment (+) Proximal part Fugl-Meyer Assessment (-) Functional Independence Measure (-) Motor Activity Log – AOU (-) Motor Activity Log – QOM (-) Stroke Impact Scale CIT vs. BAT (in favour of CIT) (-) Overall Fugl-Meyer Assessment (-) Distal part Fugl-Meyer Assessment (+) Proximal part Fugl-Meyer Assessment * in favour of BAT (+) Functional Independence Measure (locomotion subtest) (+) Motor Activity Log – AOU (+) Motor Activity Log – QOM (+) Overall Stroke Impact Scale (+) Stroke Impact Scale – activities of daily living/ instrumental activities of daily living domain

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Author, Year PEDro Score, Country	Sample size	Intervention	Outcome and significance: (+) significant (-) not significant
			(+) Stroke Impact Scale – social participation domain
Lin et al., 2010 PEDro score: 4	13 patients with chronic stroke	mCIMT (n=5) Vs. Conventional rehabilitation (n=8) **Treatment details:** Upper limb training through repetitive functional tasks and behavioural shaping for 2 hours/day, 5 days a week for 3 weeks; restrictive mitt worn for up to 6 hours/day during treatment period.	At 3 weeks (post-treatment): (+) Fugl-Meyer Assessment – Upper Limb subscale (FMA-UL) (+) Motor Activity Log – Amount of Use (MAL-AOU) (+) Motor activity Log – Quality of Movement (MAL-QOM)
Liu et al., 2016 PEDro Score: 6/10	90 patients with acute stroke	Self-regulated mCIMT (n=31) Vs. mCIMT (n=32) Vs. Conventional rehabilitation (n=27)	At post-treatment (2 weeks): SR-mCIMT vs. mCIMT (-) ARAT – total score (-) ARAT – grasp (-) ARAT – grip (-) ARAT – pinch (-) ARAT – gross movement (+) FMA-UE – total score (-) FMA-UE – upper arm (-) FMA-UE – wrist (-) FMA-UE – hand (+) FMA-UE – coordination (+) MAL-AOU (-) MAL-QOM (+) Lawton IADL SR-mCIMT vs. control group (+) ARAT – total score

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Author, Year PEDro Score, Country	Sample size	Intervention	Outcome and significance: (+) significant (-) not significant
			(-) ARAT – grasp (-) ARAT – grip (+) ARAT – pinch () ARAT – gross movement(+) FMA-UE – total score (+) FMA-UE – upper arm (+) FMA-UE – wrist (+) FMA-UE – hand (+) FMA-UE – coordination (+) MAL-AOU (+) MAL-QOM (+) Lawton IADL mCIMT vs. control group (+) ARAT – total score (-) ARAT – grasp (+) ARAT – grip (+) ARAT – pinch (-) ARAT – gross movement (+) FMA-UE – total score (-) FMA-UE – upper arm (-) FMA-UE – wrist (-) FMA-UE – hand (-) FMA-UE – coordination (+) MAL-AOU (+) MAL-QOM (-) Lawton IADL At follow-up (1 month post-treatment): SR-mCIMT vs. mCIMT

Constraint-Induced Movement Therapy – upper extremity

Author, Year PEDro Score, Country	Sample size	Intervention	Outcome and significance: (+) significant (-) not significant
			-) ARAT – total score (-) ARAT – grasp (-) ARAT – grip (+) ARAT – pinch (-) ARAT – gross movement (-) FMA-UE – total score (-) FMA-UE – upper arm (-) FMA-UE – wrist (+) FMA-UE – hand (+) FMA-UE – coordination (-) MAL-AOU (-) MAL-QOM (-) Lawton IADL SR-mCIMT vs. control group (-) ARAT – total score (-) ARAT – grasp (+) ARAT – grip (-) ARAT – pinch (+) ARAT – gross movement (-) FMA-UE – total score (-) FMA-UE – upper arm (+) FMA-UE – wrist (-) FMA-UE – hand (+) FMA-UE –coordination (+) MAL-AOU (+) MAL-QOM (-) Lawton IADL mCIMT vs. control group

Constraint-Induced Movement Therapy – upper extremity

Author, Year PEDro Score, Country	Sample size	Intervention	Outcome and significance: (+) significant (-) not significant
			(-) ARAT – total score (-) ARAT – grasp (-) ARAT – grip (-) ARAT – pinch (-) ARAT – gross movement (-) FMA-UE – total score (-) FMA-UE – upper arm (-) FMA-UE – wrist (+) FMA-UE – hand (-) FMA-UE – coordination (-) MAL-AOU (-) MAL-QOM (-) Lawton IADL
Myint et al., 2008 PEDro score: 7	43 patients with subacute stroke	mCIMT + intensive UE training vs. Usual care **Treatment details:** mCIMT: Shoulder sling worn on less affected UE 90% of waking hours for 10 weekdays + 4 hours daily of supervised activities with shaping technique for 10 weekdays Control: 4 hours daily of conventional occupational therapy and physical therapy for 10 weekdays	At post-intervention: (+) Functional Test of the Hemiparetic Upper Extremity (+) Motor Activity Log – AOU (+) Motor Activity Log –QOM (-) Total Action Research Arm Test (+) Action Research Arm Test grasp component (+) Action Research Arm Test grip component (+) Action Research Arm Test pinch component (+) Action Research Arm Test gross movement component (+) Nine-hole Peg Test (-) Modified Barthel Index At 12-week follow-up:

Constraint-Induced Movement Therapy – upper extremity

Author, Year PEDro Score, Country	Sample size	Intervention	Outcome and significance: (+) significant (-) not significant
			(+) Functional Test of the Hemiparetic Upper Extremity (+) Motor Activity Log – AOU (+) Motor Activity Log – QOM (+) Total Action Research Arm Test (-) Action Research Arm Test grasp component (+) Action Research Arm Test grip component (-) Action Research Arm Test pinch component (-) Action Research Arm Test gross movement component (+) Nine-hole Peg Test (-) Modified Barthel Index
Page et al., 2001 PEDro score: 4	6 patients with subacute stroke	mCIMT (n=2) Or Conventional rehabilitation (n=2) Or No therapy (n=2) **Treatment details:** mCIMT: restraint of the less affected hand for 5 hours/day, 5 days/week for 10 weeks; CR: 30 minutes PT and OT 3x/week for 10 weeks.	At 10 weeks (post-treatment): (+) Fugl-Meyer Assessment (+) Action Research Arm Test (+) Wolf Motor Function Test (+) Motor Activity Log – Amount of Use (MAL-AOU) (+) Motor Activity Log – Quality of Movement (MAL-QOM) Note: Results indicate within-group differences in the mCIMT group from pre- to post-test. No statistical data or between-group differences were reported.
Page et al., 2002 PEDro score: 7	14 subacute stroke (All patients had active extension of at least 20° at	mCIT vs. Traditional rehabilitation (TR) vs. Control Treatment details : mCIT : 30 min of physical therapy + 30 min of	At post-intervention: (in favour of the mCIT group as compared to both the TR and control groups)

Constraint-Induced Movement Therapy – upper extremity

Author, Year PEDro Score, Country	Sample size	Intervention	Outcome and significance: (+) significant (-) not significant
	the wrist and at least 10° at the fingers)	occupational therapy 3 times/week for 10 weeks + 5 hours/day of wearing a restraint on the less-affected upper limb TR: 30 min of occupational therapy + 30 min physical therapy 3 times/week for 10 weeks Control: No intervention or therapy over the 10 weeks	(+) Fugl-Meyer Assessment (-) Action Research Arm Test (-) Motor Activity Log
Page et al., 2004 PEDro score: 7	17 chronic stroke (All patients had active extension of at least 20° at the wrist and at least 10° at the fingers)	mCIMT + UE functional activities training vs. Traditional UE therapy vs. no therapy (control) **Treatment details:** mCIMT :Unaffected UE restrained in a sling and hand in mitt for 5 hours/day for 10 weeks + 30 minutes of UE functional activities 3 days a week for 10 weeks Traditional UE therapy: 30 minutes traditional UE therapy 3 days a week for 10 weeks Control: No therapy	At post-treatment: mCIMT vs. Traditional UE therapy: (+) Fugl-Meyer Assessment (-) Action Research Arm Test (-) Motor Activity Log (improvements in mCIMT group but no significant differences between the three groups) mCIMT vs. control: (+) Fugl-Meyer Assessment (+) Action Research Arm Test (-) Motor Activity Log (improvements in mCIMT group but no significant differences between the three groups) Traditional UE therapy vs. control: (-) Fugl-Meyer Assessment (+) Action Research Arm Test (-) Motor Activity Log
Page et al., 2005 PEDro score: 5	10 patients with acute stroke (all patients had active extension of at least	mCIMT + UE functional activities therapy vs. Traditional rehabilitation (TR) **Treatment details:** mCIMT: 30 min individualized therapy sessions 3	At post-treatment: (-) Fugl-Meyer Assessment (-) Action Research Arm Test (-) Motor Activity Log

Constraint-Induced Movement Therapy – upper extremity

Author, Year PEDro Score, Country	Sample size	Intervention	Outcome and significance: (+) significant (-) not significant
	20° at the wrist and at least 10° at the fingers)	days/week for 10 weeks + unaffected hands and wrists restrained every weekday for 5 hours TR: 30 min standard therapy sessions 3 days/week for 10 weeks	Note: While the mCIMT group showed improvements on all measures and the TR group did not, no significant between-group differences were reported
Page et al., 2008 PEDro score: 5	35 patients with chronic stroke	Modified CIMT (mCIMT) + UE functional activities vs. Time-matched rehabilitation program (TR) vs. No therapy (control). **Treatment details:** mCIMT: Unaffected UE restrained in a sling with hand in a mitt for 5 hours daily, 5days/week + functional practice sessions 30 min/day 3 days/week for 10 weeks TR: 30 min/day 3 days/week of proprioceptive neuromuscular facilitation exercises, functional tasks, and stretching of the affected arm Control: no therapy	At post-treatment Comparison of mCIMT vs. TR & mCIMT vs. control (-) Fugl-Meyer Assessment (+) Action Research Arm Test (+) Motor Activity Log AOU and QOM
Ploughman & Corbett 2004 PEDro score: 5	30 patients with subacute stroke. Patients had some movement of the arm and hand (minimum of level 2 on the Chedoke McMaster Impairment Inventory)	Modified CIMT vs. traditional Upper Extremity therapy. The mCIMT group wore a thick mitt for 1 hour daily in the first week and 6 hours daily for the remaining of their stay (average wearing time was 2.7 hours/day). Upper Extremity therapy was provided on a daily basis for 1 hour.	At post-treatment: (+) Chedoke McMaster Impairment Inventory (CMII): postural control (-) mCMII Arm (improvements in mCIMT group but no significant differences between the two groups) (-) Action Research Arm (improvements in mCIMT group but no significant differences between the two groups) (+) Shoulder pain (Patients in mCIMT group had an increase in shoulder pain as compared to the traditional Upper Extremity therapy group.

Constraint-Induced Movement Therapy – upper extremity

Author, Year PEDro Score, Country	Sample size	Intervention	Outcome and significance: (+) significant (-) not significant
			Correlation analysis depicted that worsening of shoulder pain in mCIMT group did not related to degree of recovery of upper extremity function) (-) Grip strength (dynamometer) (-) Functional Independence Measure (FIM)
Richards et al., 2008 PEDro score: N/A	3 patients with chronic stroke and ataxia	mCIMT + therapy sessions of graded task practice **Treatment details:** Unaffected hand in mitten restraint during 90% of waking hours Patient 1 and 2: 10 therapy sessions, 5 days/week, 6 hours/day Patient 3: 10 therapy sessions, 3 days/week, 3 hours/day	At post-intervention: All 3 patients: (+) Fugl- Meyer Motor Assessment, (+) Wolf Motor Function Test, (+) Motor Activity Log - amount of use and quality of movement (+) Kinematics of reaching
Sawaki et al., 2008 PEDro score: 5	30 patients with subacute stroke	CIMT + intensive UE therapy vs. Usual and customary care (control) **Treatment details:** CIMT: padded mitt worn on the less affected upper limb for at least 90% of waking hours over 14 days + intensive UE therapy 6 hours/day, 5 days /week for 2 weeks Control: usual and customary care (no treatment, orthosis, or OT/PT)	At 4 months follow-up: (-) Wolf-Motor Function Test (time-based measures) (-) Wolf Motor Function Test (weight that could be lifted) (+) Wolf Motor Function Test (grip strength) (-) TMS – motor area map expansion (nearly significant; p = 0.053)
Smania et al., 2012. PEDro Score: 8/10	66 patients with subacute to chronic stroke	Modified constraint-induced movement therapy (mCIMT, n=34) Vs. Conventional rehabilitation (control, n=32).	At post-treatment (2 weeks): (+) WMFT -Functional Ability (-) WMFT - Time (+) MAL-AOU (+) MAL-QOM

Constraint-Induced Movement Therapy – upper extremity

Author, Year PEDro Score, Country	Sample size	Intervention	Outcome and significance: (+) significant (-) not significant
		Treatment details: mCIMT: 2 hours rehabilitation/weekday for 2 weeks and restraint of the unaffected arm for 12 or more hours/day Conventional rehabilitation: 1 hour/weekday for 2 weeks.	(-) Ashworth Scale At follow-up (3 months): (+) WMFT Functional Ability (-) WMFT - Time (+) MAL-AOU (+) MAL-QOM (+) Ashworth Scale
Sterr et al., 2002 PEDro score: 7	15 patients with chronic stroke (13 with stroke, 2 with traumatic brain injury) All patients had active extension of at least 20° at the wrist and at least 10° at the fingers prior to the study.	CIMT + 6 hours daily traditional UE therapy vs. CIMT + 3 hours daily traditional UE therapy **Treatment details:** CIMT: sling and resting hand splint or hand mitt worn 90% of waking hours for 2 weeks	At 4-week follow-up: (+) Motor Activity Log AOU + QOM (in favour of the 6 hour group) (-) Wolf Motor Function Test Note: Both groups showed significant improvements on both outcomes at post-treatment and 4 weeks follow-up, but significant between-group differences were only found at 4 weeks in the Motor Activity Log.
Suputtitada et al., 2004 PEDro score: 6	69 patients with chronic stroke	CIMT vs. bimanual UE training (control) **Treatment details:** CIMT: mitten restraint on the unaffected hand for 90% of waking hours + affected UE training Control: bimanual UE training with no restraint	At post-treatment: (+) Action Research Arm Test (-) Hand grip strength (+) Pinch strength
Taub et al., 1993 PEDro score: 6	21 patients with chronic stroke	CIMT and traditional Upper Extremity therapy vs. traditional Upper Extremity therapy Restraint with a sling for 90% of waking hours for 14 days. Upper Extremity therapy for 6 hours daily for 10 days.	At post-treatment: (+) Emory (Wolf) Motor Function Test (+) Arm Motor Ability Test

Constraint-Induced Movement Therapy – upper extremity

Author, Year PEDro Score, Country	Sample size	Intervention	Outcome and significance: (+) significant (-) not significant
			Motor Activity Log (+ at post-treatment and 2-year follow-up)
Taub et al., 2006 PEDro score: N/A (controlled clinical trial)	41 patients with chronic stroke	CIMT (n=21) Vs. Time-matched physical, cognitive and relaxation exercises (n=20) Treatment details: Intensive training (shaping) 6 hours/day on 10 consecutive weekdays and restraint of the less-affected limb for 90% of waking hours for 2 weeks.	At 2 weeks (post-treatment): (+) Motor Activity Log – Quality of Movement (MAL-QOM) (+) Upper extremity actual amount of use test (AAUT) (+) Wolf Motor Function Test – Performance Time (WMFT-PT) (-) WMFT – Functional Ability (WMFT-FA) Note: follow-up measures were also taken at 4 weeks, 3 months and 2 years however between-group differences were not reported at any follow-up time point.
Thrane et al., 2015. PEDro Score: 7/10	47 patients with acute stroke	Modified CIMT (n=24) Vs. Conventional rehabilitation (n=23). **Treatment details:** mCIMT: 3 hours/day (2 hours shaping + 0.5 hours task practice + 0.5 hours adherence-enhancing behaviour strategies) for 10 consecutive days and mitt on the nonaffected hand for 90% of waking hours.	At 2 weeks (post-treatment): (+) WMFT time (-) WMFT functional ability (-) WMFT arm strength (-) WMFT grip strength (-) FMA-UE (+) Nine Hole Peg Test (NHPT) (-) Arm use ratio (-) Stroke Impact Scale (SIS) hand function (-) SIS ADL/IADL (-) SIS participation/role function (-) SIS global perception of recovery At 6-month follow-up:

Constraint-Induced Movement Therapy – upper extremity

Author, Year PEDro Score, Country	Sample size	Intervention	Outcome and significance: (+) significant (-) not significant
			(-) WMFT time (-) WMFT functional ability (-) WMFT arm strength (-) WMFT grip strength (-) FMA-UE (-) Nine Hole Peg Test (NHPT) (-) Arm use ratio (-) Stroke Impact Scale (SIS) hand function (-) SIS ADL/IADL (-) SIS participation/role function (-) SIS global perception of recovery
Treger et al., 2012. PEDro Score: 8/10	28 patients with subacute stroke	Modified CIMT (n=9) Vs. Conventional rehabilitation (n=19) **Treatment details:** mCIMT: restraint of the unaffected hand during 1-hour rehabilitation sessions and use of a mitten for up to 4 hours/weekday for 2 weeks. Control group: conventional OT for 1 hour/weekday using a task-oriented approach.	At 4 weeks: (+) peg transfer (+) ball grasp, carry and release (+) eating with a spoon
Underwood et al., 2006 PEDro score: 6	41 individuals with subacute or chronic stroke recruited from a single centre of the EXCITE trial	Immediate CIMT (n=21) Vs. Delayed CIMT (n=20) **Treatment details:** CIMT for 6 hours/day for 10 days over 2 weeks. CIMT group received treatment 3-9 months after stroke;	At 2 weeks (post-treatment): (-) Wolf Motor Function Test (WMFT) (-) Fugl-Meyer Assessment (FMA) – joint pain subscale (-) Pain (non-standardized scale) (-) Fatigue (non-standardized scale) (-) Treatment intensity (minutes)

Constraint-Induced Movement Therapy – upper extremity

Author, Year PEDro Score, Country	Sample size	Intervention	Outcome and significance: (+) significant (-) not significant
		Delayed CIMT group received treatment 1 year after enrollment in the study	
Van der Lee et al.1999 PEDro score: 7	66 patients with chronic stroke	CIMT and intensive Upper Extremity training vs. intensive bi-manual Upper Extremity training based on NDT restraint of unaffected arm with a resting hand splint for 90% of waking hours and a sling during treatment. Upper Extremity training was provided for 2 weeks, 5 days per week, 6 hours daily.	At post-treatment: (+) Action Research Arm (ARA) Test (limb function) (+ post-treatment and 1-year follow-up) Motor Activity Log (MAL) (+) Amount of Use (-) Quality of Movement (-) Fugl-Meyer Assessment (-) Rehabilitation Activities Profile Patients with sensory deficits: those in CIMT group had significant improvements on ARA and Amount of Use subscale of MAL, as compared to those in bimanual training group.
Wang et al., 2011 PEDro score: 5	30 patients with acute and subacute stroke	mCIMT (n=10) vs. Intensive conventional rehabilitation (ICR, n=10) Vs. Conventional rehabilitation (CR, n=10) **Treatment details:** mCIMT: upper limb rehabilitation with shaping for 3 hours/day, 5 days a week for 4 weeks; resting hand splint worn for 90% of waking hours ICR: upper limb rehabilitation for 3 hours/day, 5 days a week for 4 weeks. CR: upper limb rehabilitation for 45 mins/day, 5 days a week for 4 weeks.	At 2 weeks post-treatment: (+) Wolf Motor Function Test – Functional Ability (WMFT–FA)* (-) WMFT – Performance Time (WMFT–PT) At 4 weeks post-treatment: (-) WMFT-FA (+) WMFT-PT* in favour of mCIMT compared to conventional rehabilitation. Note: there were no significant differences between mCIMT and ICR, or between ICR and CR.

Constraint-Induced Movement Therapy – upper extremity

Author, Year PEDro Score, Country	Sample size	Intervention	Outcome and significance: (+) significant (-) not significant
Wittenberg et al., 2003 PEDro score: 5	16 patients with chronic stroke	(All patients had active extension of at least 20° at the wrist and at least 10° at the fingers prior to the study) CIMT + task-oriented training vs. Task-oriented training alone (control) **Treatment details:** CIMT: daily task-oriented therapy 6 hours/day for 8 days and for 2 weekend days of 4 hours/day + hand splint/sling worn on less affected UE during waking hours throughout study period * Control: Task-oriented training 3 hours/day for 8 days and 2 weekend days of rest + passive therapy (stretching and heat) of the affected side for 1 hour	At post-treatment: (-) Wolf Motor Function Test (+) Motor Activity Log (-) Assessment of Motor and Process Skills (-) Transcranial Magnetic Stimulation (-) Positron Emission Tomography
Wolf et al., 2006 PEDro score: 7	222 patients with subacute or chronic stroke	CIMT plus intensive training vs. usual care **Treatment details:** The CIMT group wore constraint 90% of waking hours and received training of the affected limb 6 hours per day, 5 days per week, for 2 weeks Usual care: no treatment, orthosis, or physical/occupational therapy	At 2 weeks (post-treatment): (+) Wolf Motor Function Test – performance time (WMFT-PT) (+) WMFT – Functional Ability (WMFT-FA) (-) WMFT – Grip (-) WMFT – Weight (+) WMFT – number of tasks completed (+) Motor Activity Log – Amount of Use (MAL-AOU) (+) MAL – Quality of Movement (MAL-QOM) At 4 months (follow-up 1): (+) WMFT-PT (-) WMFT-FA (-) WMFT-Grip (-) WMFT-Weight

Constraint-Induced Movement Therapy – upper extremity

Author, Year PEDro Score, Country	Sample size	Intervention	Outcome and significance: (+) significant (-) not significant
			(+) Wolf Motor function Test – number of tasks completed (+) MAL-AOU (+) MAL-QOM (+) SIS – hand function (-) SIS – physical function At 8 months (follow-up 2): (+) WMFT-PT (-) WMFT-FA (-) WMFT-Grip (-) WMFT-Weight (+) Wolf Motor function Test – number of tasks completed (+) MAL-AOU At 12 months (follow-up 3): (+) WMFT-PT (-) WMFT-FA (+) WMFT-Grip (+) WMFT-Weight (+) Wolf Motor function Test – number of tasks completed (+) MAL-AOU (+) MAL-QOM (+) SIS – hand function (-) SIS – physical function

Constraint-Induced Movement Therapy – upper extremity

Author, Year PEDro Score, Country	Sample size	Intervention	Outcome and significance: (+) significant (-) not significant
Wolf et al., 2008 PEDro score: 8 (follow-up study)	106 patients with subacute or chronic stroke	This study is the follow-up of EXCITE trial after 24 months following the treatment in order to examine the "improvement"(comparison of the mean after 24 month post-training period with the baseline) and "retention" (comparison of the mean at 12 months with that at 24 months after CIMT training) of the CIMT results. At baseline: CIMT plus intensive training vs. usual care **Treatment details:** The CIMT group wore constraint 90% of waking hours and received training of the affected limb 6 hours per day, 5 days per week, for 2 weeks Usual care: no treatment, orthosis, or physical/occupational therapy	At 24 months after CIMT compared to baseline (improvement): (+) All Wolf motor function test (WMFT) domains (+) Motor activity log (MAL)-AOU (amount of use) and MAL-HW (how well limb was used) (+) Stroke impact scale (SIS)-strength, SIS-ADL & IADL, SIS-social participation, SIS-physical domain (-) SIS-memory & thinking At 24 months after CIMT compared to 12 months after CIMT (retention): (-) WMFT-T(time to complete the WMFT tasks) (+) WMFT-WTB (weight to box task for shoulder flexion strength) (+) WMFT-GS (grip strength) (-) MAL-AOU and MAL-HW (+) All SIS domains
Wolf et al., 2010 PEDro score: 6	222 patients with subacute and chronic stroke	Early CIMT (treatment received between 3-9 months post-stroke, n=106) vs. Delayed CIMT (treatment received between 15-24 months post-stroke, n=116) **Treatment details:** CIMT: Mitt constraint 90% of waking hours and received training of the affected limb 6 hours per day, 5 days per week, for 2 weeks	At 12 months: (+) Wolf Motor Function Test – Performance Time (WMFT-PT) (+) Wolf Motor Function Test – Functional Ability (WMFT-FA) (+) Motor Activity Log – Amount of Use (MAL-AOU) (+) MAL – Quality of Movement (MAL-QOM) (+) Stroke Impact Scale (SIS) – hand function

Author, Year PEDro Score, Country	Sample size	Intervention	Outcome and significance: (+) significant (-) not significant
			and ADL/IADL scales only At 24 months: (-) WMFT-PT (-) WMFT-FA (-) MAL-AOU (-) MAL-QOM (+) SIS – hand function, ADL/IADL and communication scales only Note: between-group differences are in favour of early CIMT compared to delayed CIMT
Wu et al., 2007a PEDro score: 6	47 patients with acute, subacute, or chronic and able to reach Brunnstrom stage III or above for the proximal part of the UE	mCIMT vs. neurodevelopmental therapy **Treatment details:** mCIMT: less affected UE in mitt for 6 hours/day + intensive functional training of the affected UE 2 hours/day 5 days/week for 3 weeks Control: neurodevelopmental therapy 2 hours/day, 6 days/week, for 3 weeks with emphasis on functional task practice such as stretching, weight-bearing, and fine motor dexterity	At post-treatment (+) Motor Activity Log - Amount of use (+) Motor Activity Log - Quality of movement (+) Fugl-Meyer Assessment Kinematic analysis (+) Reaction time (+) Movement time (+) Total UE displacement (-) Peak velocity
Wu et al., 2007b PEDro score: 6	26 patients with acute, subacute, or chronic, and able to reach Brunnstrom stage III or above for the proximal part of the UE	mCIMT + intensive UE training vs. neurodevelopmental therapy (control) **Treatment details:** mCIMT: Restraining mitt on the less affected UE 6 hours/day + 2 hours/day of intensive functional training of the more affected UE 5 days/week for 3 weeks Control: Neurodevelopmental therapy that emphasized functional task practice such as stretching, weight-	At post-treatment: (+) Fugl-Meyer Assessment (+) Functional Independence Measure (+) Motor Activity Log - Amount of use (+) Motor Activity Log - Quality of movement (+) Stroke Impact Scale – domains of strength, activities of daily living/instrumental activities of daily living, and stroke recovery

Constraint-Induced Movement Therapy – upper extremity

Author, Year PEDro Score, Country	Sample size	Intervention	Outcome and significance: (+) significant (-) not significant
		bearing, and fine motor dexterity training 5 days/week for 3 weeks	(-) Stroke Impact Scale – domains of hand function, memory and thinking, emotion, communication, participation, and mobility
Wu et al., 2007c PEDro score: 7	30 patients with chronic stroke	mCIMT + UE training vs. Neurodevelopmental therapy (control) **Treatment details:** mCIMT: Less affected UE restrained in mitt 6 hours/day + 2 hours/day intensive functional training of the more affected UE 5 days/week for 3 weeks Control: Neurodevelopmental therapy emphasizing stretching, weight-bearing, and fine motor dexterity training 5 days/week for 3 weeks	At post-treatment: (+) Functional Independence Measure (+) Motor Activity Log – Amount of Use (+) Motor Activity Log – Quality of Movement (+) Kinematic analysis – Bimanual tasks: spatial movement efficiency temporal movement efficiency, more preplanned movement control Unilateral tasks: more ballistic/preplanned reaching movement (-) Kinematic analysis: Unilateral tasks: temporal and spatial movement efficiency
Wu et al., 2010 PEDro score: 2	6 patients with chronic stroke	Modified constraint induced movement therapy (n=2) Or Bilateral arm therapy (n=4) **Treatment details:** 2 hours/day, 5 days/week for 3 weeks.	At 3 weeks (post-treatment): (+) ARAT* (+) FMA – UE subtest* (+) MAL – AOU* (+) MAL – QOM* results represent improvement in scores from pre- to post-treatment in the mCIMT group. Statistical data and between-group differences were not provided.
Wu et al., 2011 PEDro score: 6	66 patients with chronic stroke	mCIMT (n=22) Vs. Bilateral Arm Training (BAT, n=22) Vs. Conventional rehabilitation (n=22)	At 3 weeks (post-intervention): mCIMT compared to BAT or control: (-) Unilateral kinematics – normalized

Constraint-Induced Movement Therapy – upper extremity

Author, Year PEDro Score, Country	Sample size	Intervention	Outcome and significance: (+) significant (-) not significant
		Treatment details: All groups received occupational therapy 2 hours/day, 5 days/week for 3 weeks. CIMT: mitt constraint 6 hours/day while performing functional tasks BAT: bilateral movement in symmetric or alternating patterns while performing functional tasks Conventional rehabilitation: neurodevelopmental therapy and compensatory practice of functional tasks using unaffected and/or both arms.	movement time (NMT) (+) Unilateral kinematics – normalized movement unit (NMU)* (-) Unilateral kinematics – peak velocity (PV) (-) Unilateral kinematics – percentage of movement time when peak velocity occurred (PPV) (-) Bilateral kinematics – NMT (+) Bilateral kinematics – NMU* (-) Bilateral kinematics – PV (-) Bilateral kinematics – PPV (+) Wolf Motor Function Test – Performance Time (WMFT-PT)* (+) WMFT – Functional Ability (WMFT-FA)* (-) WMFT – Strength (+) Motor Activity Log – Amount of Use (MAL-AOU)** (+) MAL – Quality of Movement (MAL-QOM)** in favour of mCIMT compared to the control group only ** in favour of mCIMT compared to the control and bilateral arm therapy groups BAT compared to control: (-) Unilateral kinematics – NMT (+) Unilateral kinematics – NMU (+) Unilateral kinematics – PV (-) Unilateral kinematics

Constraint-Induced Movement Therapy – upper extremity

Author, Year PEDro Score, Country	Sample size	Intervention	Outcome and significance: (+) significant (-) not significant
Wu et al., 2012(a). PEDro Score: 7/10	45 patients with chronic stroke	mModified CIMT (mCIMT, n=15) Vs. Modified CIMT with trunk restraint (mCIMT+TR, n=15) Vs. Conventional rehabilitation (n=15). **Treatment details:** 2 hours/day, 5 days/week for 3 weeks and wore a mitt on the unaffected hand and wrist for 6 hours/day.	At 3 weeks (post-treatment): mCIMT vs. conventional rehabilitation (-) FMA-UE proximal score (-) FMA-UE distal score (-) FMA-UE total score (-) MAL-AOU (-) MAL-QOM (-) Grip (-) Shoulder joint range (-) Elbow joint range (-) Trunk movement mCIMT+TR vs. conventional rehabilitation (-) FMA-UE proximal score (+) FMA-UE distal score (+) FMA-UE total score (-) MAL-AOU (-) MAL-QOM (+) Grip (+) Shoulder joint range (-) Elbow joint range (+) trunk movement mCIMT+TR vs. mCIMT (-) FMA-UE proximal score (-) FMA-UE distal score (-) FMA-UE total score (-) MAL-AOU (-) MAL-QOM (-) Grip

Constraint-Induced Movement Therapy – upper extremity

Author, Year PEDro Score, Country	Sample size	Intervention	Outcome and significance: (+) significant (-) not significant
			(+) Shoulder joint range (-) Elbow joint range (+) Trunk movement
Wu et al., 2012(b). PEDro Score: 5/10	57 patients with chronic stroke	Modified constraint-induced movement therapy (mCIMT) Vs. Modified constraint-induced movement therapy with trunk restraint (mCIMT-TR) Vs. Conventional rehabilitation **Treatment details:** 2 hours/day, 5 days/week for 3 weeks. Both mCIMT groups wore a mitt on the non-affected hand and wrist for 5 hours/day for 3 weeks	At 3 weeks (post-treatment): mCIMT vs. conventional rehabilitation (-) ARAT grasp (-) ARAT grip (-) ARAT pinch (+) ARAT gross (+) ARAT total (+) MAL-AOU (+) MAL-QOM (-) FAI domestic chores (-) FAI leisure/work (-) FAI outdoor activities (+) FAI total (+) SIS strength (-) SIS ADLs (-) SIS mobility (+) SIS hand function (-) Trunk slope (-) Normalized shoulder flexion (-) Normalized elbow flexion mCIMT-TR vs. conventional rehabilitation (-) ARAT grasp (+) ARAT grip (+) ARAT pinch

Constraint-Induced Movement Therapy – upper extremity

Author, Year PEDro Score, Country	Sample size	Intervention	Outcome and significance: (+) significant (-) not significant
			(+) ARAT gross (+) ARAT total (-) MAL-AOU (+) MAL-QOM (-) FAI domestic chores (-) FAI leisure/work (+) FAI outdoor activities (+) FAI total (-) SIS strength (-) SIS ADLs (-) SIS mobility (+) SIS hand function (+) Trunk slope (-) Normalized shoulder flexion (-) Normalized elbow flexion mCIMT vs. mCIMT-TR (-) ARAT grasp (+) ARAT grip** (-) ARAT pinch (-) ARAT gross (-) ARAT total (-) MAL-AOU (-) MAL-QOM (-) FAI domestic chores (-) FAI leisure/work (-) FAI outdoor activities (-) FAI total (+) SIS strength*

Constraint-Induced Movement Therapy – upper extremity

Author, Year PEDro Score, Country	Sample size	Intervention	Outcome and significance: (+) significant (-) not significant
			(-) SIS ADLs (-) SIS mobility (-) SIS hand function (-) Trunk slope (+) Normalized shoulder flexion** (-) Normalized elbow flexion in favour of mCIMT compared to mCIMT-TR ** in favour of mCIMT-TR compared to mCIMT
Yoon et al. (2014). PEDro Score: 5/10	24 patients with subacute stroke	CIMT (n=9) Vs. CIMT+Mirror therapy (n=8) Vs. Occupational Therapy (OT) alone (n=9) **Treatment details:** CIMT: 6 hours/day + self-exercise program 30 mins/day + OT 40 mins/day, 5 days/week for 2 weeks CIMT+Mirror therapy: 6 hours/day + mirror therapy 30 mins/day + OT 40 mins/day, 5 days/week for 2 weeks Conventional rehabilitation: self-exercise program 30 mins/day + OT 40 mins/day, 5 days/week for 2 weeks.	At 2 weeks (post-treatment): CIMT vs. OT alone (+) Box and Block Test (BBT) (-) Nine Hole Peg Test (NHPT) (+) Grip strength (-) Brunnstrom stages of recovery (-) Wolf Motor Function Test (WMFT) (-) Fugl-Meyer Assessment (FMA) – total (-) FMA – Upper extremity (FMA-UE) (+) Korean modified Barthel Index CIMT+Mirror therapy vs. OT alone (+) BBT* (+) NHPT* (+) Grip strength* (-) Brunnstrom stages of recovery (+) WMFT (-) FMA – total (-) FMA-UE (+) Korean modified Barthel Index

Constraint-Induced Movement Therapy – upper extremity

Author, Year PEDro Score, Country	Sample size	Intervention	Outcome and significance: (+) significant (-) not significant
			In favour of CIMT+Mirror therapy compared to CIMT CIMT+Mirror therapy vs. CIMT (+) BBT (+) NHPT (+) Grip strength (-) Brunnstrom stages of recovery (-) WMFT (-) FMA – total (-) FMA-UE (-) Korean modified Barthel Index