Modified Constraint-Induced Therapies:
An Introduction

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Learning Objectives

1. Identify the components comprising constraint induced therapy (CIT) for the upper extremity

2. Identify possible methods for constraint induced therapy (CIT) of the lower extremity

3. Describe the criteria necessary for a stroke survivor to qualify for constraint induced therapy (CIT) for the upper extremity

4. Describe the criteria necessary for a stroke survivor to qualify for constraint induced therapy (CIT) for the lower extremity

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If you are a stroke patient…

…which UE would you use to reach (more versus less affected)?

…on which LE would you be more likely to weightbear (more versus less affected)?

Less affected:
Learned Nonuse (UE)/*Mis*use (LE)
Operant conditioning
- Success/punishment-operant conditioning
- -therapy/compensation

https://musculoskeletalkey.com/orthotic-decision-making-in-neurological-and-neuromuscular-disease/

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Constraint-induced movement therapy for the upper extremity

- Components to induce repeated practice with the affected UE include:
  - 6 hour training sessions on 10 consecutive weekdays
  - Forced use of UE during all waking hours
  - Behavioral contract)
  - Treatment diary

- Increases more affected UE use & function in subacute & chronic stroke pts.

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Constraint-induced movement therapy for the lower extremity

Encourages use/integration of both LE's

3 hours/day of clinical time for 10 consec. days
30 second trials
KR after each performance (e.g., how many; how high)

No restraint device (some have used knee immobilizer)

Complexity level of the shaping task should be set at just beyond what the participant can easily accomplish

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Other LE CIT Variants

https://www.rehab.research.va.gov/jour/00/37/1/aruin.htm
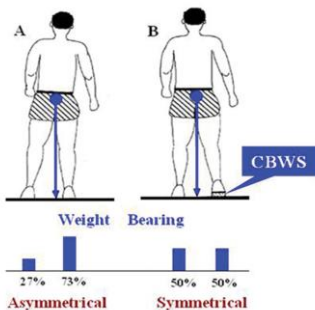
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Other LE CIT variants

Effects of constraint-induced movement
therapy for lower limbs on measurements
of functional mobility and postural balance
in subjects with stroke: a randomized
controlled trial.

GAIT & POSTURE

E Silva EMGS[1], Ribeiro TS[1], da Silva TCC[1], Costa MFP[1], Cavalcanti FADC[1], Lindquist ARR[1]

Author information »

Treadmill with "load" (equivalent to 5% of body weight)
to "restrain" the less affected ankle

10 consecutive days; 30 mins/session

Improved BERG and TUG (clinically significant)

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The UE: Lots and lots of studies support
"Lots and lots of practice"

Author/ PEDro Score	Intervention	Intensity/Duration	Main Outcome(s) Result
Taub et al. 1993 6 (RCT)	Unaffected upper extremity restrained in a sling + practice using impaired upper extremity (n=4) vs. procedures designed to focus attention use of impaired upper extremity (control) (n=5)	6 hrs/day x 5 days/wk x 2 wks	Emory Test (+ at end of treatment and 2 yr) Arm Motor Activity Rest test (+ at end of treatment and 2 yr) Motor Activity Log (+ increase in ability to use affected upper extremity)
van der Lee et al. 1999 7 (RCT)	Intensive forced use therapy + immobilization of the unaffected arm (n=33) vs. intensive bimanual training based on NDT (n=33)	6 hrs/day x 5 days/wk x 2 wks	Action Research Arm (+ at end of treatment) Motor Activity Log (+ during treatment)
Sterr et al. 2002 4 (RCT)	Longer CIMT + 'shaping procedure' (n=7) vs. shorter CIMT + 'shaping procedure' (n=8)	6 hrs/day for a target of 90% of waking time or 3hrs/day x 2 wks.	Motor Activity Log (+ after treatment and at weekly follow-up for 4 wks) Wolf Motor Function Test (+ after treatment and at weekly follow-up for 4 wks)
Ploughman & Corbett 2005 5 (RCT)	Forced-use therapy + conventional rehab (n=10) vs. conventional rehab only (n=13)	Intervention group patients wore a thick mitten on unaffected hand beginning with 1 hr/day progressing up to 6 hrs/day for length of inpatient stay.	Action Research Arm (+ at end of treatment) Chedoke-McMaster Impairment Inventory (postural component) (+ at end of treatment)
Wittenberg et al. 2003 USA 5 (RCT)	Intense CIMT (n=9) vs. less intense CIMT (n=7)	6 hrs/day (4hrs on weekends) or 3 hrs/day on weekdays only) x 10 days	Motor Activity Log (+) Wolf Motor Function Test (-) Assessment of Motor and Process Skills (-) (All at end of therapy)
Suputtitada et al. 2004 6 (RCT)	CIMT (n=33) vs. bimanual-upper-extremity training based on NDT approach (n=36) vs.	6 hrs/day x 5 days/wk x 14 days or daily weekday therapy for an unspecified time for 2 weeks	Action Research Arm (+) Pinch test (+)

Teasell; EBRSR

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The LE: Research Support

• Aruin AS, Hanke T, Chaudhuri G, Harvey R, Rao N. Compelled weightbearing in persons with hemiparesis following stroke: the effect of a lift insert and goal-directed balance exercise. *J Rehabil Res Dev*. 2000;37:65-72

• Bonnyaud C, Pradon D, Zory R, et al. Effects of a gait training session combined with a mass on the non-paretic lower limb on locomotion of hemiparetic patients: A randomized controlled clinical trial. *Gait Posture*. 2013;37:627-63

• Marklund I, Klässbo M. Effects of lower limb intensive mass practice in poststroke patients: single-subject experimental design with long-term follow-up. *Clin Rehabil*. 2006;20:568-576.

• Rodriguez GM, Aruin AS. The effect of shoe wedges and lifts on symmetry of stance and weight bearing in hemiparetic individuals. *Arch Phys Med Rehabil*. 2002;83:478-482.

• Ding Q, Stevenson IH, Wang N, et al. Motion games improve balance control in stroke survivors: a preliminary study based on the principle of constraint-induced movement therapy. *Displays*. 2013;34:125-131.

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CIT (UE + LE)

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*But are we **really** here yet?*

CONSTRAINT-INDUCED THERAPY FOR SALE

THE DOCTOR IS IN

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Time for a little restraint?
Concerns & experiences…

Stroke Survivors Celebrate Success of Restraint Therapy

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Modified constraint-induced therapy:
Translating "preclinical research" to care

- Therapy 3 times/week for ½ an hour
- Practice with the more affected arm for 5 hours/day 5 days/week
- Behavioral techniques (log, shaping)
- ✓Reimbursement (acute and OP)
- ✓More UE reps → more opportunity for operant conditioning
- ✓Distributed practice schedule

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How much movement is needed to start mCIT for the UE/LE?

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LE inclusion criteria

- Able to walk independently by 10 feet on flat surface *without the use of assistive devices (ref below)* OR

- Able to walk *at least 25 feet using an assistive device or not, at least three times a day (Taub laboratory)*;

e Silva EMG de S, et al. Top Stroke Rehabil. 2017;24:555-561

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Minimum Motor Criteria

1.   **Extension of the hemi wrist greater than 10°**

2.   **Some active ABDuction of the carpal metacarpal joint of the thumb**

3.   **10° of active extension in, at least, 2 additional digits.**

(Should be able to do the movement 3x in 1 min.)

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•*If this Pt. started in a fist…*

…and ended up like this

…would they qualify for mCIT?
Yes. Upstream changes too????

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Behavior contract

• Therapy
  • Set up therapy schedule, location, and what happens during tx
  • Patient expectations for attendance, advanced notice of missing sessions
  • Patient bring sling/mitt (UE)
  • Achieve safety while at home

• Home exercise/ "homework"
  • Schedule, example activities/exercises

• Establish:
  • activities to be done independently by the participant
  • activities to be done with the supervision and/or help of a caregiver
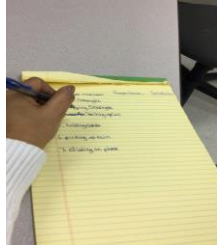 • activities **not** to be done for safety reasons.

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Picking the Tasks...

Tasks should be one or more of the following:

- Important to the patient (motivating)

- Challenging Fun, interesting, engaging

- Necessary (feeding)

- We use the COPM & MAL

- Pt is regularly assessed; progressed in task difficulty when he/she can perform deficient component 70-80% of time

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Items to ask the care partner (put in treatment notes)

- What types of things does he/she like to do?
- What are 6 specific activities that he she really enjoys?
- When doing an activity or hobby, does he/she like to do it alone or with others?
- Are there specific activities where he/she prefers to be alone? How about activities where he/she prefers not to have someone watch him/her?
- What time of day is he/she typically most active?
- In what environments does he/she spend most of his/her time? In what rooms of the house?

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- OK, you've given me some great answers so far. Now I want to ask about what helps him/her perform the activity better.
- During the activity,
  - what does the person like to hear when performing activities?
  - Like to see?
  - Like others to say? Like others to do?
  - Prefer to compete with others (norms) or him/herself (stopwatch, video)?
- When the activity has just finished:
  - what does the person like to hear when he/she is finished?
  - Like to see?
  - Like others to say? Like others to do?
  - What kind of feedback helps? Hurts? Frustrates? Upsets? Motivates? Excites?

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What about the "constraint?"

What does the client need as a reminder?

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Keep your hands off (as much as possible)

- We discourage facilitation
  - Most pts don't really need it due to their high level
  - You're trying to induce pt to attempt movements with affected UE
  - Learning is always initially ugly but gets better later as you correct and shape.
  - Boylestein – the social arrangement of CIT

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Thank-you

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