INTERNET-BASED HOME TRAINING FOR ADULTS WITH CEREBRAL PALSY – THE ULTrA PROJECT

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Movement Therapy

- Role of task-based motor training to improve upper limb function

- Based on concept of plasticity within the central nervous system ("use it or lose it")
  - increase in synaptic connections, neurotransmitters, growth factors
Typically involves intensive practice (up to 10 hrs/day for several weeks)

- e.g. constraint-induced therapy in stroke

Limitations:

- Time commitment
- Resources – clinical setting, rehabilitation specialist required
- Motivation/Adherence
Motor Training in Children with Hemiplegic CP

- 6 wk home training program (40 min 2x daily, 5x wk)
- Improved upper limb coordination, grasp force control
Purpose of the ULTrA Study

➢ To determine if an internet-based home training program will improve sensorimotor function in adults with hemiplegic cerebral palsy.
Study Participants

- N=12 (3 males, 9 females)
- age range: 21-58 yrs
- mild to moderate UL spasticity

- home setting
  - greater Ann Arbor area, Flint, Lansing, Ohio, Windsor, Canada

- 10/12 – no assistive devices
8 wks – 40 min/day, 5 days/wk
- monitored by interactive webcam – 2-3 times/wk
- arm and hand performance data uploaded from home to lab via the internet after each training session
- software-guided instructions for warm-up/training modules
- pre/post laboratory-based movement assessment
ULTrA Training Components

- Visually-guided upper limb reaching (unilateral, bilateral)
  - Workspace – low - high targets; central – lateral targets

- Manipulation tasks (grasp-transfer-release, stereognosis, card turning, object transfer)

- Tactile discrimination tasks (N. Byl, UCSF)
Training Board Tasks
Unilateral Movement Duration

![Graph showing Unilateral Movement Duration](image-url)
Bilateral Sequential Movements – Interlimb Movement Time
Improvement in Interlimb Coordination
Reach-Grasp-Release Duration

Transport

Release

Time (s)
Hand Manipulation - Stereognosis
Variable Change in Stereognosis
Tactile Discrimination
Task-specific upper limb training can lead to marked improvement in upper limb function in adults with CP.

Existing internet technology is an effective, low-cost means of delivering movement-based therapy which can be remotely monitored by rehabilitation professionals.

The ULTrA program provides quantitative data related to performance throughout the training period without the need to travel to a clinical/research setting.
Future Directions

- Expand program nationally and internationally
  - Determine carryover, optimal training duration
  - Quantify spontaneous motor function

- Expand training system to include instrumented haptic devices, modify for use in pediatric populations
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