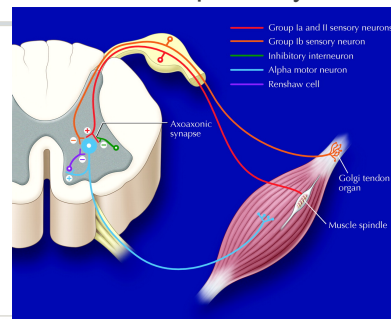


Spasticity

Jen Tooher and Liz Waddell



What is Spasticity?¹⁻³



Signs and Symptoms¹⁻³

- Increase in deep tendon reflexes
- Clonus
- Difficulty initiating movements
- Impaired voluntary control of muscles
- Difficulty relaxing muscles once a movement has ceased
- Sensation of muscle tightness or pain
- Flexion or extension synergy patterns
- Decreased range of motion



Spasticity¹⁻³

- Negative effects
 - Fatigue
 - Weakness
 - Contractures
 - Tissue changes in the muscle, tendons, joints
 - Pain
 - Pressure sores
- Benefits
 - Increase limb stability by compensating for weakness



Interventions

- Stretching
- Relaxation
- Positioning
- Gait training
- Biofeedback modalities
- Strengthening
- Aquatic therapy
- Endurance training
- Splinting
- Patient & caregiver education



Stretching^{4,5}

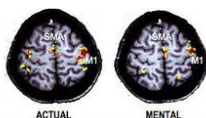
- Prolonged stretch 2-min, 10-min, 30-min
 - Stretch at a constant angle
 - Improved MAS and perceived spasticity with all durations*
- 30-min stretch of hip adductors (single bout)
 - Individually adjusted stretch with increasing angle
 - AROM increased 3-16°, PROM increased 1-9°
- 30-min stretch of hip adductors at home
 - Stretch 2-5 times a day over 2 weeks to 10 months
 - AROM increased 5-22°, PROM increased 6-12°



* = statistically significant

Motor Imagery & Stretching⁷

- Motor imagery with passive stretching
 - Daily or weekly stretching over 8 weeks (8-56 sessions)
 - 1 point decrease in MAS score in 4 of 6 subjects
- Motor imagery
 - Name the body part to be stretched
 - Picture, see and feel your limb
 - Move the limb in your mind
 - Apply stretch 10-30 sec at end range



Patient Education



<http://www.nationalmssociety.org/multimedia-library/brochures/staying-well/index.aspx>

Botox + Stretching & ROM⁸

- Botox injections in UE or LE
- PT group also received:
 - 40 min PT sessions for 15 consecutive days post-injection
 - Passive or active exercise
 - Stretching with short pauses at end range
- Significant decrease in spasticity greater in PT group*



MAS	Baseline	2 weeks	4 weeks	12 weeks
PT	3.63	2.73	2.64*	2.68*
Control	3.61	3.22	3.33	3.33

Leg Cycle Ergometer^{9,10}



- 20 min of cycle ergometry
 - Soleus H-reflex and MAS reduced
 - at 10, 30, and 60-min post cycling*
- 30 min of cycle ergometry, 3x/week for 4 weeks
 - Improved MSSS-88
 - at post intervention and post 1 and 4 weeks*
 - walking and pain and discomfort subscales*
 - No significant effect for soleus H-reflex or MAS

FES Bike¹¹

- 6 sessions of FES cycling over 2 weeks
 - FES to hamstrings and quadriceps
 - Warm-up and 12-18 min of FES-assisted cycling
 - 2-min intervals of max stimulation tolerated
- Reduction in spasticity pre to post training*
- Reduction in spasticity from first to last training
 - MAS mean before first session: 1.19
 - MAS mean after last session: 0.56



Therapeutic Standing¹²

- 30 min standing at home
 - 7 days a week for 3 weeks
 - Oswestry standing frame
 - Increased hip and ankle ROM*
 - Decreased spasticity and spasm frequency
 - Subjects: n=6, EDSS 7.0



Aquatic Exercise¹³



- Ai-Chi aquatic exercise
 - 60 min group class
 - 2x/week for 20 weeks
 - Spasm VAS
 - Decrease from baseline to week 20: 5/10 to 2/10
 - Improvement maintained at 4 weeks post-intervention
 - Increased to 4/10 at 10 weeks post-intervention
- Ai-Chi
 - 16 movements
 - Deep breathing and slow movements of the limbs and torso

Complementary & Alternative Therapies¹⁴

- Patients reported reduced spasticity or spasms
 - Reflexology
 - Massage
 - Yoga
 - Relaxation and meditation



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