PICO: In school-aged children with cerebellar ataxia is balance training more beneficial than gait training to improve functional independence.

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| Title/Author/Year | Purpose | Participants | Intervention | Outcome/ Results | Conclusions | Comments |
| Video game-based exercises for balance rehabilitation: a single-subject design  BetkerAL, Szturm T, Moussavi ZK, Nett C (2006) | Does foot centered gravity of pressure video games or standing balance exercises improve dynamic balance. Do video games increase motivation to participate in exercises | 3 single subjects (1 excised cerebellar tumor, 1 TBI, 1 CVA) | Eight 45-minute exercise sessions (over 3 weeks) Sessions included video game of “tic-tac-toe” “memory match” and  “under pressure” | Decreased COP excursion and sway path. Decreased fall rate. Reported increased interest to participate in exercise. | Graded, dynamic balance exercises can be coupled into video games. | Focused mainly on Case 1 because of his diagnosis of cerebellar tumor excision. |
| Locomotor Training Using Body-Weight Support on a Treadmill in Conjunction With Ongoing Physical Therapy in a Child With Severe Cerebellar Ataxia  Cernak, K. Stevens, V. Price, R. Shumway-Cook, A. (2008) | To determine the effect of locomotor training using BWST in conjunction with overground walking on mobility. | 13 year old with severe cerebellar ataxia. | 15 minutes of BWST training, 15-20 minutes of overground walking with a BWS harness 5 days/week. | Patient increased independent walking 0-128 steps 4 weeks post intervention, Improved WeeFIM scores (pre: 3 and 2 to post 4 weeks: 4 for transfers). Improved Gillette Functional Walking from 2-6 at 6 months. | Locomotor training in conjunction with overground training is effective for improving function. | Majority of the improvements were seen 6 months post intervention. May indicate more time is needed to see improvements from intervention. |
| Younger is Not Always Better: Development of Locomotor Adapatation from Childhood to Adulthood  Vasudevan, E. Torres-Oviedo, G. Morton, S. et al (2010) | Investigate how the cerebellum adapts in ages 3- adulthood by using split-belt training and compare those results to individuals with cerebellar damage. | 50 healthy children (ages 3-17), 10 adults (ages 18-40) and 9 individuals with cerebellar damage (ages 46 +/- 9 years) | 4 minutes on tied belt to determine baseline. Then 1:2 speed ratio was determined for split belt. 14 minutes of split belt walking with 30 seconds of rest every 2 minutes. This was followed by 10-16 minutes of tied belt  training. | All children and adults had significant affects for phasing of steps ( -.06 +/- .02). Center of oscillation was significant for ages 3-15 (4.12+/-1.95). Step symmetry was significant for children younger than 6 years old (.24+/-.08) | Developmental spatial and temporal adaptation follows different time courses (part of cerebellum maturity). Temporal adaptation matures by age 3. Spatial adaptation isn’t fully mature until age 12. | More specific research on children with cerebellar ataxia is needed |
| Treadmill training for ataxic patients: a single-subject experimental design  Vaz, D. Schettino, R. Rolla de Castro, T. Teixeira, V. (2006) | Determine longitudinal changes in gait quality, balance and mobility performance from treadmill training for individuals with cerebellar ataxia. | 25 year-old female and 53 year-old man. Both have cerebellar ataxia from a head trauma. | Three 20-minute treadmill training sessions/week, with progression as needed. Patients also underwent a clinical assessment lasting 3 weeks prior to exercise. | Subject 1 increased 133% step length, 75% on TUG scores, and 69% on balance. Subject 2 increased 62% step length, 27% on TUG, and 31% for balance. Both patients demonstrated increases in walking speed | Practice of functional tasks during testing associated with treadmill training may yield positive results associated with balance and gait. |  |

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| Cerebellar ataxia: pathophysiology and rehabilitation  Marsden, J. (2011) | Informational article | NA | NA | NA | | NA | | Supports evidence for balance exercises as well as gait training as effective methods to improve function in patients with cerebellar ataxia. | |
| Video game-based coordinative training improves ataxia in children with degenerative ataxia  Iig, W.  Schatton, C.  Schicks, J.  Gies, M.  Schols, L.  Synofzik, M.  (2012) | Provide evidence that patients with progressive cerebellar ataxia can improve whole-body coordination and dynamic balance by an 8-week phase of intensive, but motivational and playful coordination training. | 10 patients (mean age 15.4 +/- 3.5 years) with progressive degenerative ataxia.  Rating on SARA >3, but gait score <4; no visual loss or hearing disturbances | 8 week video gamed based raining, consisting of 2 week lab training (4 1-hour sessions). 6 weeks of at home training.  Included mainly goal-directed limb movements, dynamic balance and whole-body coordination | | Clinically: Decrease of ataxic symptoms in SARA posture subscore (x2 =18.4, p=.0003), DGI scores increased (x2=8.2, p=.04)  Statistically: Decrease in step variability (x2=9.84, p=0.019) and decrease in lateral sway( x2=10.92, p=.012) | | Reduction of ataxic symptoms after 2 week training, with more pronounced results after 8-week period. | | Training benefits seems to be correlated with INTENSITY |