Author Year; Country Score Research Design Total Sample Size	Methods	Outcome
Standing (n=5 studies)		
Dudley-Javoroski et al. 2012 USA Longitudinal Level 2 N=28	**Population:** 28 participants (24 men, 4 women) with SCI; AIS A & B; age: 16-64 years. 14 non-disabled control participants (11 men, 3 women; age: 22-50 years). **Treatment:** 3 doses of bone compressive loads: no standing, passive standing, quadriceps activation during stance. 7 participants performed unilateral quadriceps stimulation in supported stance (150% body weight compressive load = "High Dose") while the opposite leg received 40% body weight = "Low Dose". 5 participants stood passively without applying quadriceps NMES to either leg (40% body weight load). 16 participants performed no standing (0% body weight load - "untrained"). **Outcome Measures:** BMD assessment between 1-6 times over a 3-year training protocol.	1. BMD for the High dose group significantly exceeded BMD for both the Low Dose and Untrained groups. 2. BMD for participants performing passive stance did not differ from individuals who performed no standing. 3. High-resolution CT imaging of one High Dose participant revealed 86% higher BMD and 67% higher trabecular width in the High Dose limb.
Goktepe et al. 2008 Turkey Observational Level 5 N=92	**Population:** 71 participants (60 men, 11 women; 64 traumatic, 7 nontraumatic); age: 30.9 years (range: 18-46), TPI: 4.5 years and AIS A (n=64) – B (n=7).	1. There was no statistically significant difference between the 3 groups in the BMD of any of the regions measured 2. Group A tended to have higher *t*-scores,

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	Treatment: Participants were divided into 3 groups: Group A had standing ≥1hr daily, Group B stood <1hour/day, and Group C did not stand at all. **Outcome Measures:** BMD by DXA of bilateral hips (Ward's triangle and femoral neck) and spine (L2 to L4)	although the differences were not significant
Needham-Shropshire et al. 1997 USA Pre-post Level 4 N=16	**Population:** 13 men and 3 women; age: 28.4 ± 6.6 years; TPI: 4.0 + 3.5 years; complete injuries; T4-T11; no controls. **Treatment:** Standing and ambulation. 32 sessions then participants continued ambulation for 8 more weeks. **Outcome measures:** Hip BMD by DPA	1. There were no significant changes in BMD in the femoral neck, Ward's triangle, or the trochanter.
Kunkel et al. 1993 USA Pre-post Level 4 N=6	**Population:** 6 men; age: 49 years (range: 36-65); complete and incomplete; C5-T12; 4 traumatic and 2 nontraumatic (multiple sclerosis); no controls. **Treatment:** Passive standing frame. Increased gradually until able to "stand" 30 mins 3x/day. Progressed to 45 mins 2x/day then participants completed 45 mins of standing 2x/day for 5 months. **Outcome measures:** Lumbar spine and femoral neck BMD and fracture risk by DPA	1. There was no significant change in fracture risk as measured with BMD for femoral neck or lumbar spine with "standing".

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Kaplan et al. 1981 USA Pre-post Level 4 N=10	**Population:** 8 men and 2 women; age: 19-56 years; incomplete tetraplegia; no controls. **Treatment**: Tilt-table weight-bearing and strengthening exercises. Each tilt table session lasted at least 20mins 1x/day, and the tilt table angle attained was ≥45^0. Two groups: **1**) early (within 6 months of SCI) and **2**) late group (12-18 months post SCI). **Outcome Measures**: urinary calcium excretion	1. Significant improvement ($p<0.01$) in calcium excretion, urinary calcium, and calcium balance for the early group. 2. The late group had a significant improvement in urinary calcium and calcium balance.
Walking (n=4 studies)		
Carvalho et al. 2006 Brazil Prospective controlled trial Level 2 N=21	**Population:** 21 men; age: 31.95 ± 8.01 years; C4-C8; TPI: 66.42 ± 48.23 months (range: 25-180). Two groups: In the treatment group, all individuals had a complete lesion; in the control group individuals had an incomplete lesion (AIS B) **Treatment:** Treadmill gait training provided by NMES. Quadriceps and tibialis anterior stimulated for <5 months before beginning gait training (2x/week) to walk for 20 min and support <50% of body weight (pre-gait training) Groups were: 1. NMES for 6 months, 20 min/session,2x/week (n=11).; or	1. Increase in bone formation markers after gait training occurred in 81.8% (9/11) of the participants, with 66.7% (8/11) had a decrease in bone resorption markers. 2. In the control group, no changes were observed in three people; two people had an increase in bone formation markers; while three people had a decrease in bone resorption markers.

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	2. No training (n=10) **Outcome measures:** BMD by DXA, bone markers	
Giangregorio et al. 2006 Canada Pre-post Level 4 N=14	**Population:** 11 men and 2 women; age: 22-53 years; TPI: 7.4 years (range 1.2-24); with incomplete traumatic injuries; C4-T12; AIS B-C; matched control group. **Treatment:** Body-weight-supported treadmill training, 12 months. Completed protocol 3x/week for 144 sessions; intensity increased as tolerated **Outcome Measures:** BMD by DXA, bone markers	1. There were no significant changes in bone density or bone geometry at axial or peripheral sites except for a small but significant decrease in whole-body BMD. 2. No significant difference in bone markers.
Thoumie et al. 1995 France Pre-post Level 4 N=7	**Population:** For bone assessment, there were 6 men and 1 woman; age: 31 years (range: 26-33); TPI: 29 months (range: 15-60); T2-T10. **Treatment:** reciprocating gait orthosis - II hybrid orthosis. Completed the protocol within 3-14 months (2-hour sessions 2x/week). **Outcome measures:** BMD by DPA	1. At baseline, participants (compared with age-matched Z-score) had no significant change in L-spine BMD but a decrease in femoral neck BMD. 2. After the training program (16 months), no consistent changes at the femoral neck BMD among participants (4 participants decreased BMD, 1 participant increased BMD and no change in 2 participants).

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Ogilvie et al. 1993 England Pre-post Level 4 N=4	**Population:** Bone assessment with 2 men (25 and 28 years) and 2 women (16 and 42 years), with traumatic paraplegia. **Treatment:** Reciprocal gait orthosis. No protocol provided. Quantitative computed tomography repeated every 6 months from the 1st referral, orthotic fitting and training, to independent and regulator ambulation (mean=5 months). The reciprocating gait orthosis was used daily on average for 3 hours. **Outcome measures:** Lumbar spine and hip BMD by QCT	1. Three of 4 participants increased or maintained femoral neck BMD but no change in lumbar spine.

* All data expressed as mean±SD, unless expressed otherwise.