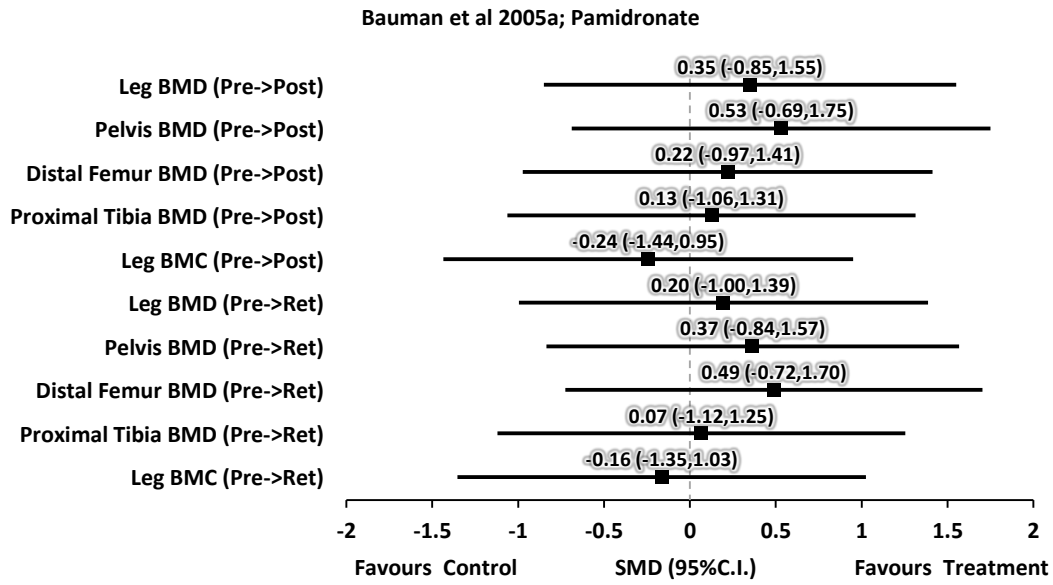
Author Year; Country Score Research Design Total Sample Size	Methods	Outcome
[Bauman et al. 2005a]; USA PEDro=10 RCT Level 1 N=14	**Population:** 14 participants (8 men, 3 women); age: 35 ± 12 years (range: 21–61); motor complete para (n=6) or tetraplegia (n=5); TPI: 44 ± 18 days (range: 22–65). AIS A. **Treatment:** Pamidronate for 12 months. Participants randomized to **1.** 60mg intravenous (n=6) or **2.** Placebo (n=5) **Outcome measures**: BMD by DXA, bone turnover markers at baseline, 1, 2, 3, 6, 9, 12-months post-SCI.	1. There was no significant between-group difference in BMD decline at 1 year. 2. The treatment group had significantly lower 24-hr urinary calcium at 1 month vs. placebo group (P<0.05) and there were no significant changes in markers of bone formation over the 12-month study.
	Effect Sizes: Forest plot of standardized mean differences (SMD ± 95%CI) as calculated from pre- to post-intervention data and pre-intervention to retention/follow-up data  12 & 24 months post-baseline data used as post-treatment & retention data, respectively	
[Minaire et al.]	**Population:** 17 men and 4 women;	1. No reported adverse

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1981 France PEDro=10 RCT Level 1 N=21	age: 29 years (range: 15-54); traumatic complete paraplegia; T1 - T12; TPI: 7.6 days (range: 5-29). **Treatment**: Clodronate for 3.5 months. Participants randomized to **1.** 400mg per day (n=7); **2.**1,600 per day (n=7); or ***3.*** Placebo (n=7). **Outcome measures:** BMD by DPA, histomorphometry	effects on bone mineralization with intervention. 2. Increase in serum and urine markers in the Placebo group (indicative of increased bone turnover). 3. Effective for acute prevention of declining bone mass and maintenance of BMC of the femur and tibia in the treatment groups.
	Effect Sizes: Forest plot of standardized mean differences (SMD ± 95%CI) as calculated from pre- to post-intervention data and pre-intervention to retention/follow-up data	

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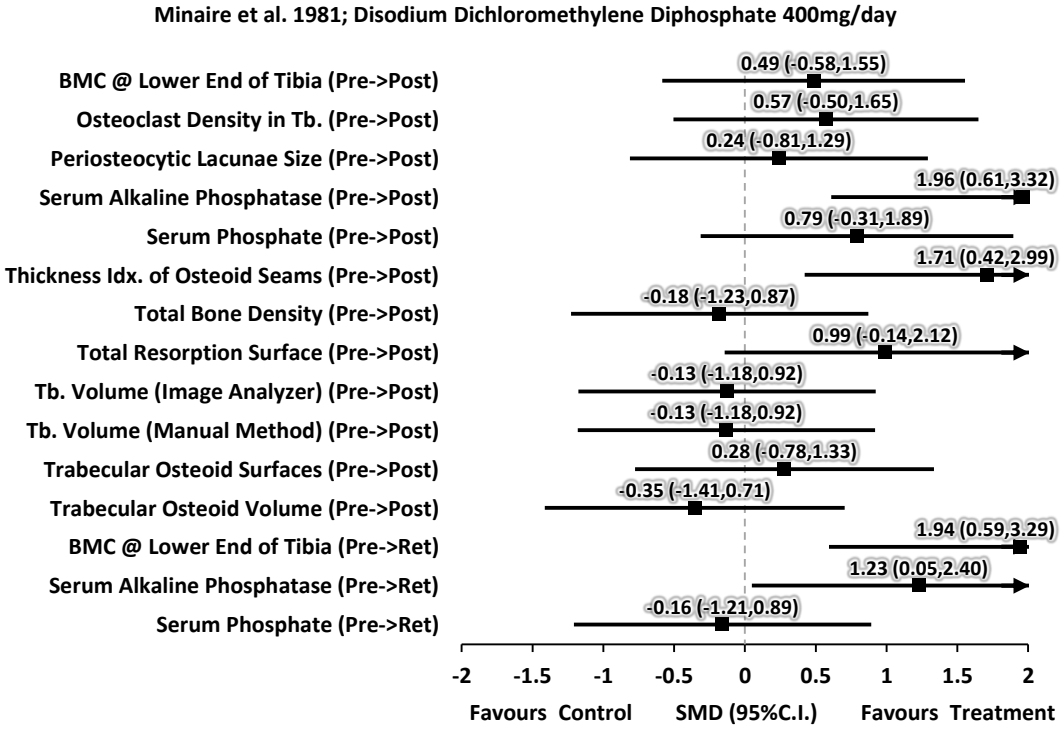

Tb. = trabecular bone

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	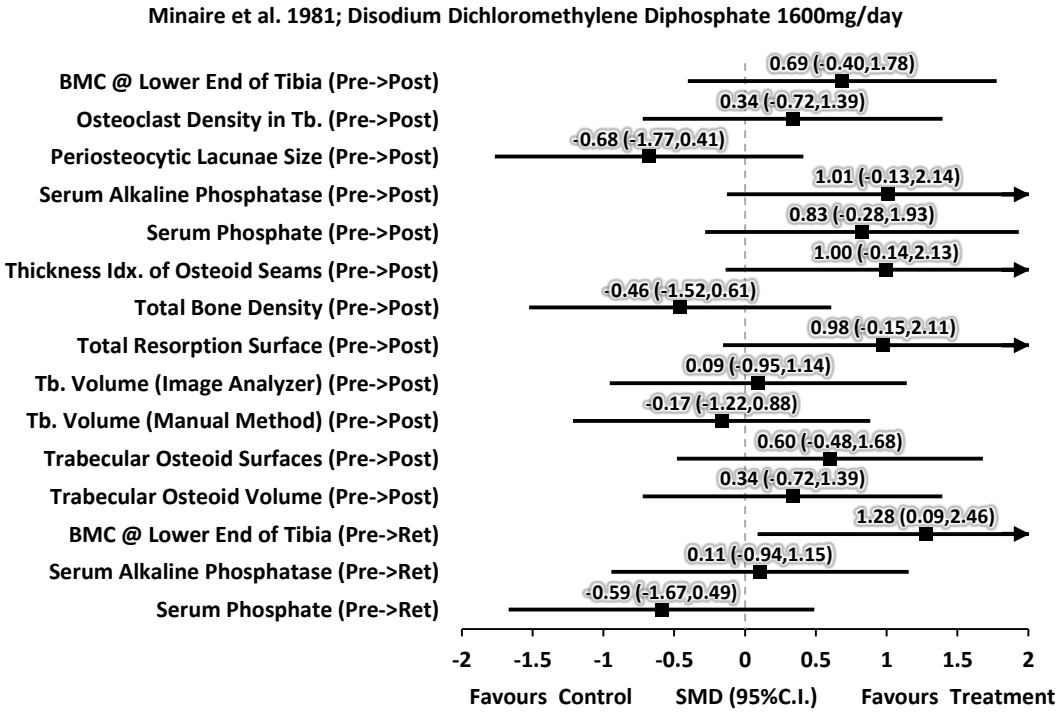 Tb. = trabecular bone	
Chappard et al. 1995; France PEDro=9 RCT Level 1 N=20	**Population:** 20 participants (14 men, 6 women), age: 28.0 + 6.4 years; traumatic injuries between C5-T12. **Treatment:** Tiludronate for 3 months. Participants randomized to **1**. 400 mg/day (n=7); **2**. 200 mg/day (n=7); or **3**. Placebo (n=6). **Outcome measures:** histomorphometry.	1. There was an increase in total bone volume in the treatment group 1(400mg/day) vs. treatment group 2 (200mg/day) and placebo groups. 2. Increased bone resorption indicators in the placebo group vs. the treatment groups.
	Effect Sizes: Forest plot of standardized mean differences (SMD ± 95%CI) as calculated from pre- and post-intervention data	

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	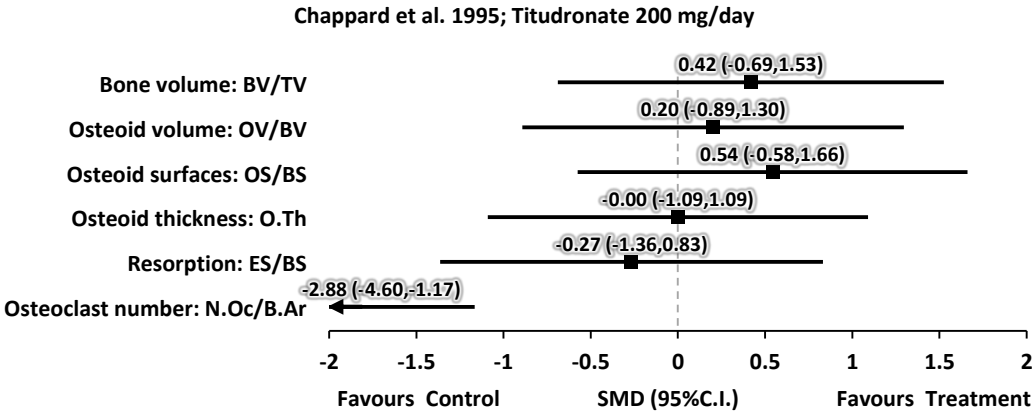 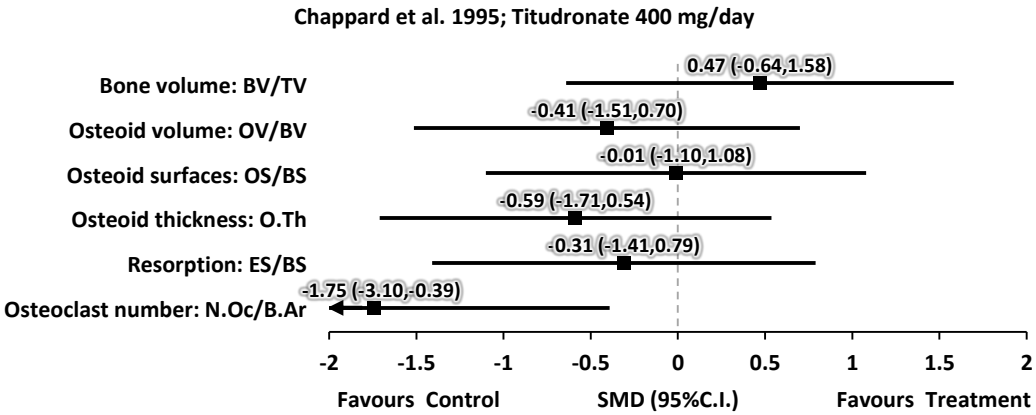	
Schnitzer et al. 2016; USA PEDro=8 RCT Level 1 N=16	**Population:** 16 participants (15 men, 1 women) with acute SCI; AIS-A/B, or AIS-C; and non-weight-bearing; age: 38.6 ± 16.2 years; 8 cervical, 8 thoracic; TPI: Placebo = 95.3 ± 50.0 days, Zoledronic acid: 35.1 ± 15.4 days. **Treatment:** Infusion of zoledronic acid (5 mg) or placebo (dilutant	1. Significant between-group difference at 6 months post-treatment in change of (mean±SD, zoledronic acid vs. placebo): Lumbar spine BMD: +2.4±1.8% vs. -2.5±2.2% Left total hip BMD: -3.7±1.0% vs. -12.3±6.9%

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	only) **Outcome measures**: BMD by DXA, bone turnover markers at baseline, 3, 6, 12-months post-treatment.	Right total hip BMD: -2.2±3.4% vs. -8.6±3.5% Left femoral neck BMD: -1.1±3.5% vs. -11.1±7.4% Right femoral neck BMD: -5.1±6.5% vs. -20.0±6.4% 2. Zoledronic acid group observed decreased BMD for left & right total hip and femoral neck but observed increased BMD for lumbar spine over 18-24 months post-treatment 3. Elevated levels of serum CTX and P1NP at baseline, and are reduced at 3 months in both zoledronic acid and placebo groups 4. Delayed zoledronic acid infusion in those with >10% BMD loss after 6 months of placebo resulted in stabilization in total hip, left femoral neck, and lumbar spine; however, BMD of left distal femur continued to decline 5. No adverse effects other than temperature elevations (n=3)
	Effect Sizes: Forest plot of standardized mean differences (SMD ± 95%CI) as calculated from pre- and post-intervention data	

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	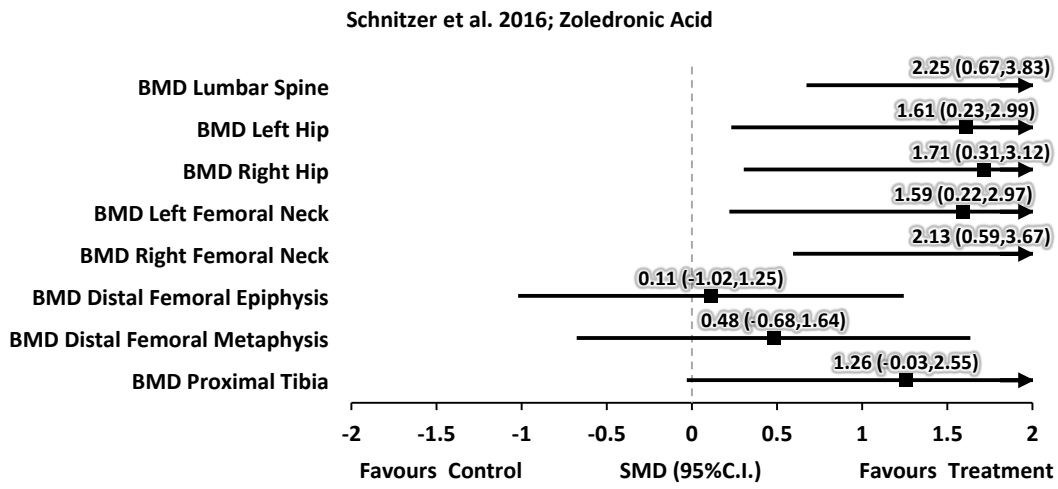	
Pearson et al. 1997 Canada PEDro=8 RCT Level 1 N=13	**Population:** 12 men and 1 woman; age: 22-57 years; injuries between C5-T12; AIS: A or D. **Treatment**: Etidronate for 30 weeks. Participants randomized to **1**.800mg daily (n=6; 5 men 1 woman; mean age: 35.6 years) or **2**. Conventional rehab and calcium 1000mg/day (n=7; 7 men; mean age: 33.6 years). **Outcome measures:** DXA and adverse event rate.	1. BMD loss at the distal femur was 26% and 22% at the proximal tibia. The rate of decline in BMD was greatest amongst the AIS A individuals. BMD of lower extremity for the Etidronate-treated AIS D individuals was preserved. 2. Oral Etidronate was safe and well-tolerated by participants.
Gilchrist et al. 2007 New Zealand PEDro=7 RCT Level 1 N=31	**Population:** 31 participants (22 men, 9 women) age: 17-55 years; 10 AIS A, 1 AIS B, and 3 AIS C. **Treatment:** Alendronate (oral) for 12 months within 10 days of acute injury. Participants randomized to 1. 70 mg once weekly (n=15; 10 men and 5 women); or 2. Placebo (n=16;	1. BMD at the femoral neck was maintained in the treatment group, and there was less BMD loss at other hip sites compared with the placebo group. 2. BMD at the hip in the Placebo group declined

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	12 men and 4 women). **Outcome Measures:** BMD and body composition by DXA, ultrasound, bone turnover markers.	steadily over the 18 months follow-up. 3. At 12 months, there was a 5.3% difference in total body BMD and a 17.6% difference in the percent change in total hip BMD between the two groups. 4. Alendronate compared with placebo-induced reductions in urinary calcium excretion and serum CTX at 3 months only.
	Effect Sizes: Forest plot of standardized mean differences (SMD ± 95%CI) as calculated from pre- to post-intervention data and pre-intervention to retention/follow-up data	

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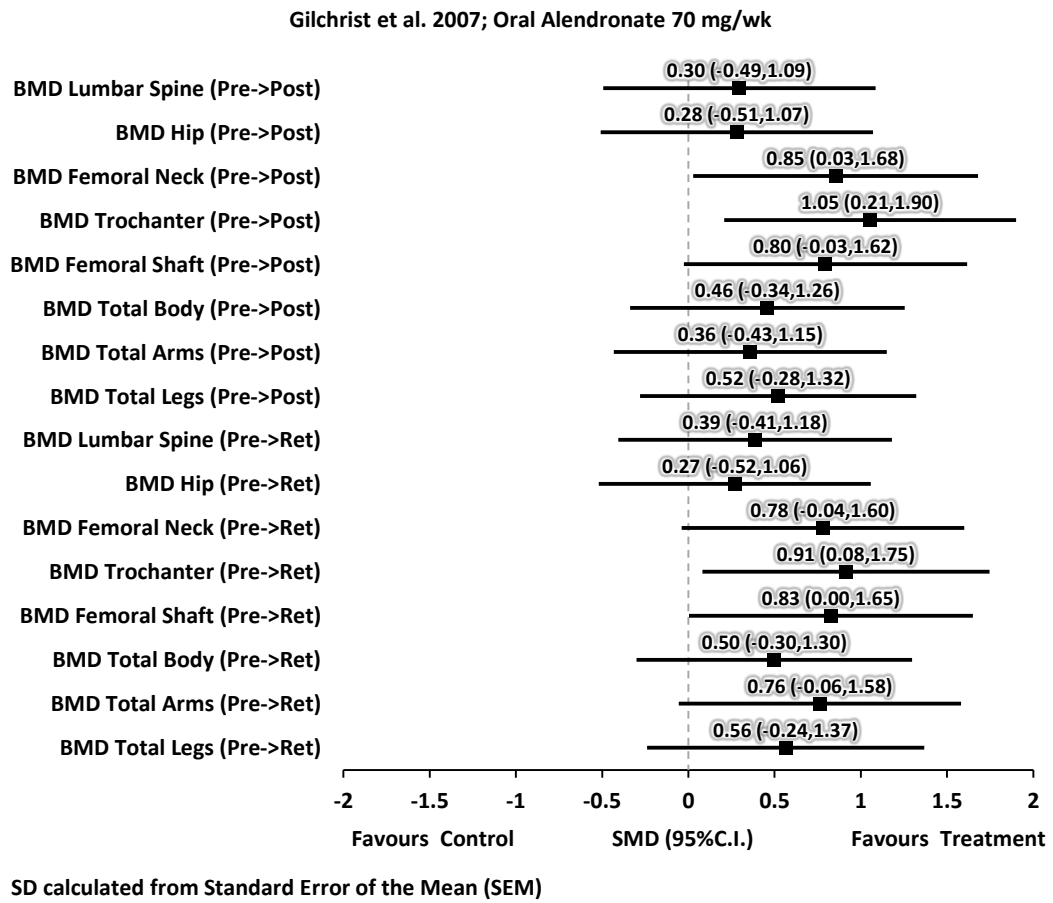
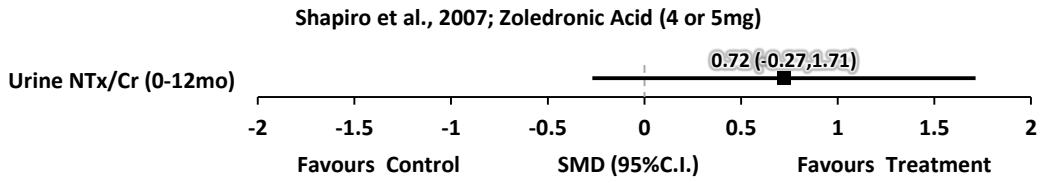
		
[Shapiro et al. 2007](#) USA PEDro=7 RCT Level 1 N=18	**Population:** 14 men and 4 women with traumatic SCI; age: 18-60 years (Placebo: 28.4 ± 9.4; Treatment: 30.1 ± 14.2); tetraplegia (n=5) or paraplegia (n=13); AIS A (n=14) or AIS B (n=4). **Treatment:** Zoledronic acid. Participants randomized to 1. Single-dose intravenous solution either 4mg (n=4) or 5mg (n=4)	1. Treatment group: Six months after zoledronic acid, BMD, bone cross-sectional area, and sectional modulus increased at the hip and buckling ratio decreased consistently with improved bone outcomes. At 12 months, narrow-

Author Year; Country Score Research Design Total Sample Size	Methods	Outcome
	(Total n=8), or 2. Placebo group received 50ml of normal saline over 15 minutes (n=10) Participants with low serum 25-hydroxyvitamin D received oral supplementation. **Outcome Measures:** bone turnover markers, BMD by DXA	neck femur values declined, and intertrochanteric and femoral shaft BMD was maintained. 2. Placebo group: decrease in bone outcomes and an increase in buckling ratio at the hip at 6 and 12 months.
	Effect Sizes: Forest plot of standardized mean differences (SMD ± 95%CI) as calculated from pre- and post-intervention data 	
Minaire et al. 1987 France PEDro=7 RCT Level 1 N=21	**Population:** 21 men and women; age: 15-54 years, complete paraplegia. **Treatment:** Clodronate for 100 days. Participants randomized to **1**.400mg per day (n=7); **2.** 1,600 per day (n=7); or **3.** Placebo (n=7). **Outcome measures:** DXA, histomorphometry, bone turnover markers.	1. There was a greater increase in bone removal markers in Placebo group (48%), compared with treatment groups (17-27%). 2. BMD was maintained in treatment groups with a ↓ in placebo group. 3. Lower bone turnover markers in treatment groups.
Bubbear et al. 2011 UK PEDro=6	**Population**: 14 acute SCI participants (Control: 5 men, 2 women; mean age 27 ± 14.4;	1. Significant difference between control and treatment groups over 12 months at lumbar spine

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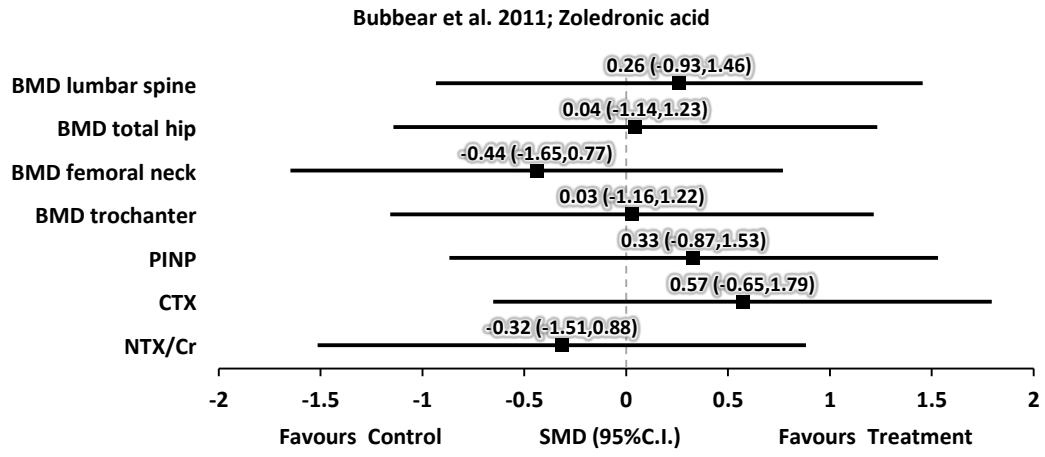
RCT Level 1 N = 14	Treatment: 4 men, 3 women; mean age 31.6 ± 7.1) **Treatment**: 4 mg intravenous zoledronic acid (active treatment group) or standard nursing/medical care (control group) **Outcome Measures**: BMD using DXA at baseline, 3, 6, 12 months for lumbar spine (L1-4) and hip (total, femoral neck, trochanter); Bone turnover markers (serum CTX and P1NP) and urinary N-terminal telopeptide/creatine ratio).	(+0.8±4.9% vs. +3.5±3.9%, p = 0.033), total hip (-15.8±8.9% vs. -3.4±3.0%, p=0.005), trochanter (-17.9±9.4% vs. -4.5±5.7%, p=0.028) 2. No significant difference between groups with femoral neck BMD or with creatine markers. 3. Bone turnover markers normalized within 6 weeks to 3 months in treatment group vs to up to 12 months in control group 4. 5 of 7 participants in zoledronic group had flu-like symptoms over 24 hours
	Effect Sizes: Forest plot of standardized mean differences (SMD ± 95%CI) as calculated from pre- and post-intervention data 	

Author Year; Country Score Research Design Total Sample Size	Methods	Outcome
Nance et al. 1999 Canada Prospective Controlled trial (nonrandomized) Level 2 N=24	**Population:** 22 men and 2 women, ages 25-57, injuries between C5-T12, AIS A-D. **Treatment:** Pamidronate for 6 months. Participants randomized to 30 mg intravenous every 4 weeks x 6 doses (total 180 mg/participant) [n=14; 30.8 ± 8.3 years (range 20 - 45)] or conventional rehab [n=10; 35.1 ± 10 years (range 25 - 57)]. **Outcome measures:** BMD by DXA, urine biochemical bone markers.	1. There was a lower % decline in BMD in treatment vs. control group. The mean overall BMD decline was 8.1% in the placebo group but only 2.7% in the treatment group (p=0.02). The average loss of BMD was 3.1% in the AIS D group and 7.7% in the AIS A group.

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