

Bone Mineral Density Loss after SCI: Overview

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Fact Sheet

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How much bone loss occurs after SCI?

Bone declines rapidly after a SCI with the most bone lost in the first 6 months. After 2 years, the rate of decline decreases, but bone loss is still occurring. Of particular concern, about 40% of bone is lost in the first 2 years.¹ For comparison, women in early menopause lose about 1.4 - 2% of bone per year² with averages of 3 - 5% seen per year for post-menopausal women as a whole.³ Less is known about the rates of loss with chronic SCI, especially when looking at bones that are common fracture sites. People post-SCI who regain the ability to walk lose less bone than people who use wheelchairs.⁴

After a SCI, the balance between bone resorption and bone formation is impacted with increased osteoclastic activity (resorption) and decreased osteoblastic activity (formation) seen. The imbalance is often called uncoupling of these two processes. Immobility and lack of weight bearing are only partially the causes. Neural and vascular effects as well as endocrine effects such as changes in testosterone or growth hormones also impact bone.⁵

The types of bone are impacted differently following a SCI. Bone loss is characterized by loss of trabecular or spongy bone and by cortical bone thinning. Recent studies have shown that the loss of trabecular bone is even greater than loss of cortical bone after SCI. Thus, the inner structure of bone weakens substantially and may be more related to fracture risk.

What are the risks to people with SCI?

People following SCI have an increased fracture risk with incidence of about 1% the first year after SCI, increasing to 4.6% per year when 20-29 years post-SCI.³ Most fractures post-SCI occur in the distal femur and proximal tibia.³ These fractures may occur after a traumatic event such as a fall or during basic daily activities such as twisting the leg when transferring or donning shoes. As people with paraplegia are more independent and active, they tend to have more fractures than people with tetraplegia. Fractures can lead to loss of independence, surgery, hospitalization, and psychosocial concerns. Significant skin issues can occur with casting, so a SCI specialist should be consulted about any immobilization needs. Temporary wheelchair and home adaptations are often needed.

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Risk Factors for Fractures after SCI ³	
Non-Modifiable	Increased time since injury
	More complete injury
	Female
	Pediatric SCI
	Previous fragility fractures [†]
	Paraplegia
Modifiable	Low Body Mass Index (BMI)
	>5 alcoholic beverages/day

[†] Fragility Fracture: any fracture that occurs after a fall from standing height or less

Signs of Fracture after SCI ⁶
Pain <i>*pain does not always occur due to sensory loss</i>
Limb deformity
Swelling
Hematoma
Increased difficulty with functional mobility
Increase in muscle spasms
Sweating
Autonomic Dysreflexia ⁷

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