Bone Mineral Density Loss after SCI: Diagnosis

Author: Therese E. Johnston, PT, PhD, MBA

FACT SHEET

How is bone loss diagnosed and measured?

It is reasonable to assume that bone loss has occurred over time in people with SCI of any level of AIS classification. The measurement and diagnosis of bone loss varies among centers and physicians. Some routinely screen people for bone loss and fracture related risk factors while others do not. Referral is warranted if there is concern about someone's bone density due to fractures or other risk factors.

DXA Scan: The gold standard assessment for bone density in the general population is dual energy x-ray absorptiometry or DXA. While DXA does provide information about spine and hip bone density, assessment around the knee is not common and requires specialized equipment/software that not all centers have. Therefore, DXA does not assess bone in the areas in which people with SCI sustain the greatest numbers of fractures. For someone with a SCI, DXA values around the hip still provide valuable information about bone health. In addition, most DXA machines do not allow the measurement of trabecular bone. Another challenge with DXA is it requires a transfer onto a table that usually does not align with the height of a wheelchair, and the rooms are often not large enough to accommodate a larger wheelchair or do not have an overhead lift.

DXA Scanner

QCT Scan: Quantitative computerized tomography (QCT) is a method that provides more detailed measurement of bone in the areas of interest in SCI. Many research studies use QCT but it is used less often clinically. There is a specialized QCT for extremities called peripheral QCT (pQCT) which allows the person to remain seated for testing. Disadvantages of QCT are that it delivers a much higher dose of radiation than DXA and is more expensive.

ACADEMY OF NEUROLOGIC PHYSICAL THERAPY
SPINAL CORD INJURY SIG

Academy of Neurologic Physical Therapy

American Physical Therapy Association

1111 North Fairfax Street
Alexandria, VA
22314-1488
800-999-2782,
ext. 3237

Fax: 703-706-8578

neuropt@apta.org
www.neuropt.org

Blood Tests: In addition to imaging, blood histological measures can provide insight into the balance of bone resorption and formation. These measures are expensive and not performed routinely. A few studies have examined these bone markers,[1] but more research is needed to better understand how they can be used to inform fracture risk post-SCI.

Due to these challenges and the lack of commonly available tools to measure sites of interest, many people with SCI do not receive formal bone density measurements. Regardless of whether a person has had formal bone density measurement, repeat fractures are a concern and patient education about safety during transfers and functional mobility is warranted. A physician or endocrinologist can recommend lab work that is similar to that performed in post-menopausal women (i.e., vitamin D, parathyroid hormone) as well as lab values affected by SCI that can impact bone health.

What does the DXA report mean?

The World Health Organization sets the standards for defining osteoporosis using DXA (http://www.4bonehealth.org/education/world-health-organization-criteria-diagnosis-osteoporosis/). Bone health is based on the T score, a standardized score that identifies the number of standard deviations away bone density is from values for young healthy women. Osteoporosis is defined as being 2.5 standard deviations below this healthy value and is based on measurements at the hip, spine, and forearm only. The DXA report will include the T score for each location tested and usually a Z score too. The Z score provides a similar standardized score, but compares bone density to values of age matched people. But the T score is what determines the presence of osteopenia (defined as 1-2.5 standard deviations below healthy value) or osteoporosis (defined as ≥2.5 standard deviations below healthy value).

References:

1. Sabour H, Norouzi JA, Latifi S, et al. Bone biomarkers in patients with chronic traumatic spinal cord injury. *Spine J.* 2013.