9.3: Bone Mineral Density is an Indicator of Bone Health

Skills to Develop

• Identify the tests used to measure bone mass.

Bone mineral density (BMD) is a measurement of the amount of calcified tissue in grams per centimeter squared of bone tissue. BMD can be thought of as the total amount of bone mass in a defined area. When BMD is high, bone strength will be great. Similar to measuring blood pressure to predict the risk of stroke, a BMD measurement can help predict the risk of bone fracture. The most common tool used to measure BMD is called dual energy X-ray absorptiometry (DEXA). During this procedure, a person lies on their back and a DEXA scanner passes two X-ray beams through their body (Figure 9.3.1). The amount of X-ray energy that passes through the bone is measured for both beams. The total amount of the X-ray energy that passes through a person varies depending on their bone thickness. Using this information and a defined area of bone, the amount of calcified tissue in grams per unit area (cm$^2$) is calculated.
Most often the DEXA scan focuses on measuring BMD in the hip and the spine. These measurements are then used as indicators of overall bone strength and health. DEXA is the cheapest and most accurate way to measure BMD. It also uses the lowest dose of radiation. Other methods of measuring BMD include quantitative computed tomography (QCT) and radiographic absorptiometry. People at risk for developing bone disease are advised to have a DEXA scan. We will discuss the many risk factors linked to an increased incidence of osteoporosis and the steps a person can take to prevent the disease from developing.
Video 9.3.1: DEXA—Dual Energy X-Ray Absorptiometry (click to see video).

Key Takeaways

Bone-mineral density is a measurement of calcified bone tissue and positively correlates with overall bone health. DEXA is a clinical tool used to assess BMD.

Discussion Starter

1. Evaluate the animation below that discusses the technology of the DEXA procedure. Form a hypothesis on why doctors recommend this procedure for women over age fifty. Discuss your findings.