



Fig. 1-8. Schematic representation of various loading modes.

away from the surface of the structure. Maximal tensile stress occurs on a plane perpendicular to the applied load (Fig. 1-9). Under tensile loading, the structure lengthens and narrows. The failure mechanism of bone tissue loaded in tension is mainly debonding at the cement lines and pulling out of the osteons (Fig. 1-10).

Clinically, fractures produced by tensile loading are usually seen in cancellous bone. Examples are fractures of the base of the fifth metatarsal adjacent to the attachment of the peroneus brevis tendon and fractures of the calcaneus adjacent to the attachment of the Achilles tendon. Figure 1-11 shows a tensile fracture through the calcaneus; strong contraction of the triceps surae muscle produced abnormally high tensile loads on this bone.