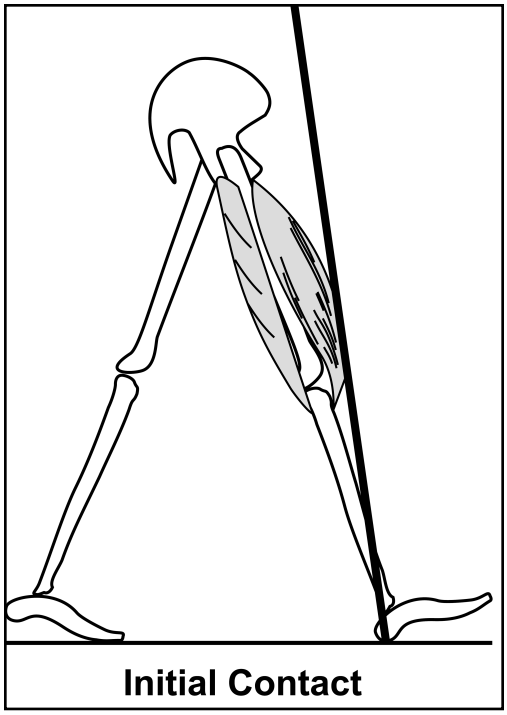

Figure 5-9. IC knee control: Anterior and posterior stabilization by the quadriceps and hamstrings. The anterior vector presents a flexor moment.

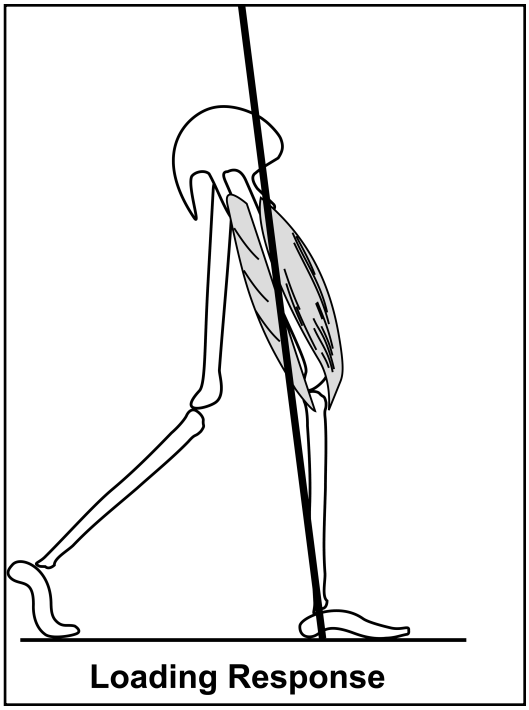

Figure 5-10. Loading response knee control: Quadriceps extension opposes the posterior vector. Hamstring activity is waning.

rapidly flex for foot clearance and then extend to ensure optimal limb advancement. The relationships among motion, muscle action, and force relate to these demands.

Initial Contact (0% to 2% GC)

Posture: Knee appears fully extended
Function: Stable weight bearing

At the instant of initial heel contact with the floor, the knee observationally appears extended (5º flexion) and 2 extensor mechanisms are present (Figure 5-9). First is the alignment of the body vector anterior to the knee axis. Second is active muscular control by the vastii and a tense IT band by upper gluteus maximus activity. Continued low-level action (approximately 10% to 20% MMT) by the hamstring provides a protective flexor moment to prevent knee hyperextension.

Loading Response (2% to 12% GC)

Motion: Knee flexion (20º)
Function: Shock absorption
Stability maintenance

The rapid rate of body weight transfer onto the limb disrupts the knee's stable extended posture and initiates knee flexion (Figure 5-10). The heel rocker rolls the tibia forward faster than the femur can advance. This drives the knee joint anterior to the body vector, and an extensor moment is required to stabilize the knee. The prompt response by the vastii muscles limits knee flexion to approximately 20º. The vastii function eccentrically to restrain (decelerate) but not totally prevent