Despite being labeled high risk by the National Athletic Trainers’ Association (Arnheim & Prentice, 1997), soccer is often perceived by the general public as a relatively safe sport. Although most injuries in soccer are isolated to the lower extremity, epidemiological studies reveal that 10–15% of injuries to the upper part of the body occur to the head and face (Nilsson & Roaas, 1978; Sullivan, Gross, Grana, & Garcia-Moral, 1980). From these injuries, concussion incidence rates per 100 players are 1.14 and 0.75 for girls’ and boys’ soccer, respectively (Powell & Barber-Foss, 1999). Although these figures are lower than those reported for either collegiate or high school football athletes (Guskiewicz, Weaver, Padua, & Garrett, 2000), concussions and other head injuries still pose a real problem for sports medicine personnel working with soccer athletes.

Soccer-related head injury usually results from one of two mechanisms. One is collision of the player’s head with another object while attempting to redirect the ball with the head. The collision object might be another player’s head or other body part, the ground, or a stationary object (goal post, bleachers, etc.). Forcible contact of this nature can result in concussion and accounts for up to 22% of all soccer injuries (Ruchinskas, Francis, & Barth, 1997). Another, more recently proposed mechanism of head injury is a series of subconcussive blows to the head resulting from years of head-to-ball contact in both games and practice (Jordan, Green, Galanty, Mandelbaum, & Jabour, 1996). Asken and Schwartz (1998) suggest that multiple headings from game and practice situations might be comparable to a boxer receiving multiple blows to the head from matches and sparring. In either situation, a single blow to the head from a punch or heading a soccer ball likely causes negligible damage, but the extent of neurocognitive impairment from multiple incidents remains unknown.

The medical community widely accepts the premise that receiving blows to the head in boxing leads to a degeneration of brain function over time. Sports medicine personnel have observed and reported the cumulative effects of this phenomenon in the “punch drunk” boxer (Ross, Cole, Thompson, & Kim, 1987). Individuals suffering from this pathology display the signs and symptoms of an inebriated individual immediately after an intense boxing match or practice in which they received several significant blows to the head. Over time, their cognitive functions improve, but never to the levels seen before competition. The etiology for this condition is a degeneration of brain tissue that can contribute to permanent cognitive signs and symptoms. Tysvaer and Storli (1981) reported on soccer players developing headaches, a symptom of head injury, after a brief heading session, and...
Smodlaka (1984) describes a similar personal experience. Boden, Kirkendall, and Garrett (1998) report no instance in which a common heading resulted in a concussion but argue that encephalopathic deficits in some soccer players are a result of multiple subconcussive blows to the head from heading.

Although most mild head injuries resolve within a matter of minutes to hours, the literature has shown that repeated concussions have a negative cumulative effect on cognition ("Brain Damage in Sport," 1976). Gronwall & Wrightson (1974, 1975) reported that patients receiving more than one concussion have a decreased rate of information processing and recovered more slowly. Based on these findings, there is concern for the safety of players in relation to the long-term effects of heading soccer balls. Although one incident of heading a soccer ball might have no clinical consequence, authors have suggested in the recent literature that the cumulative, long-term effects of heading might be analogous to multiple subconcussive blows that will, in time, manifest in decreased brain function (Matser, Kessels, Lezak, Jordan, & Troost, 1998, 1999; Tysvaer & Løchen, 1991).

Shock waves passed through the United States' youth soccer leagues in 1999 after publication of a European study (Matser et al., 1999) that called for a reform of heading rules. Entrepreneurs have supported this position by developing and marketing a headband designed to reduce the force of impact of a soccer ball on a player's head. Others have gone farther, saying that officials should require full helmets for all players. Some have speculated that implementing rules requiring a headband or helmet could have the greatest impact on reducing the number of head-to-head concussions in soccer, in addition to reducing the force of ball-heading impact that might cumulatively manifest in long-term effects. Some scientists question the safety of headgear, suggesting that it might increase the contact time between the head and the ball and potentially give the players a false sense of invulnerability. A change of this magnitude would alter the nature of the game and seems premature before further investigation into the effects of soccer heading can be conducted.

Although no governing body has called for banning heading from the game of soccer, measures have been taken to improve athlete safety. The greatest step in this direction came with the arrival of synthetic soccer balls. Traditionally, manufacturers constructed soccer balls from leather, which absorbs as much as one fifth of its weight in water during inclement weather (Smodlaka, 1984). The combined ball and water weight were then transferred through the skull and to the brain when players headed the ball. Smodlaka reports from a 1925 study by Hey of a soccer player who developed postconcussive symptoms during a match played on a wet field. The player collapsed after the game in the locker room and later died of a subdural hematoma (Smodlaka). With the advent of waterproof synthetic materials, manufacturers now make soccer balls that are impervious to the water that formerly affected ball weight.

Authors also suggest that governing bodies implement the use of padded goal posts to make the game of soccer safer (Fields, 1989). Although padding the goal posts would reduce the number of concussions in soccer, Boden et al. (1998) reported that the incidence of brain trauma from contact with a goal post accounts for only 5% of the total number of concussions in soccer and therefore questioned the cost efficiency of padded goal posts. A cheaper alternative might be formed mouthpieces, which some authors have speculated reduce the full force of a blow to the jaw from being transferred to the brain on impact, therefore decreasing brain trauma. However, an impact to the jaw of a soccer player that results in a concussion is an unlikely scenario. In any case, more prospective investigations are needed to determine the effect of new or modified equipment on the frequency and severity of injuries.