One third of all dental injuries each year are sport related. The National Youth Sports Foundation for the Prevention of Athletic Injuries Inc. estimates that athletes participating in contact sports have a 10% chance per season of sustaining an orofacial injury and a 45% risk of sustaining an orofacial injury sometime in their athletic career (Woodmansey, 1999). Experts believe that an intraoral device such as an athletic mouth guard can substantially reduce the risk of a chipped or fractured tooth, especially to the posterior teeth of either jaw. Mouth guards also reduce the risk of injury to the maxillary incisors, which make up 80% of dental-impact injuries, and provide protection against mandible fracture (Chapman, 1989; Woodmansey, 1997).

Athletic mouth guards reduce the incidence of not only orofacial injuries but also concussions. Concussions are the result of direct- or indirect-impact forces being transmitted to the skull and brain through the mandibular condyles (Chapman, 1985). A properly fitted athletic mouth guard places the mandibular condyles in an anterior position within the temporomandibular joint, decreasing the amount of superior and posterior displacement of the mandibular condyles in the fossa (Miller & Truhe, 1991; Sane, 1988; Westerman et al., 1995; Woodmansey, 1997). This helps protect the athlete from concussions and serious injuries to the neck and central nervous system (Greasley & Karet, 1997; Miller & Truhe). The mouth guard also acts as a shock absorber, decreasing force production by attenuating and spreading impact forces over a larger area at the temporomandibular joint.

Since the use of athletic mouth guards in high school football was mandated in 1962,
Orofacial injuries have decreased 50% to an injury rate of 1.4% of all football injuries (Sane, 1988; Woodmansey, 1997). Flanders and Bhat (1995) reported that orofacial injuries accounted for 0.07% of injuries in football players wearing mouth guards. In a study of Illinois high school athletes, they found that when football players wore athletic mouth guards the rate of orofacial injuries was 1.4 per 10,000 practices and games. In basketball, in which athletic mouth guards are not regularly used, the rate of orofacial injuries was 18.3 per 10,000 practices and games (Kumamoto, Winters, Novickas, & Messa, 1997).

Athletes who participate in sports that do not require the use of athletic mouth guards have a higher risk of sustaining orofacial injuries. Maestrello-DeMoya and Primosch (1989) reported that 99.4% (313) of the 315 orofacial injuries sustained during a high school basketball season occurred to players who were not wearing mouth guards. A study of female collegiate basketball players found that the rate of orofacial injuries for players wearing mouth guards was 2.8%, compared with 30.3% for players not wearing them (Morrow, Bonci, Seals, & Barnwell, 1991). A study of orofacial injuries of Minnesota high school athletes revealed that the overall percentage of athletes sustaining at least one orofacial injury during the season was 27.6% for soccer players, 72.3% for wrestlers, and 55.4% for basketball players (Kvittem, Hardie, Rottger, & Conry, 1999).

**Types of Athletic Mouth Guards**

Currently, there are three types of athletic mouth guards to choose from: stock, mouth formed, and custom fitted (vacuum and pressure laminated). All three are considered maxillary mouth guards, in that they are placed over the upper teeth, preventing the mandibular teeth from striking the maxillary teeth during an impact.

**Stock Mouth Guards**

Stock mouth guards are the least expensive type. They can be bought over the counter at most pharmacies and sports stores and range in size from small to large. They are classified as ready-to-wear preformed rubber trays, which the athletes must keep in place by clamping their teeth together (Woodmansey, 1997). Athletes using stock mouth guards often experience difficulty with retention, breathing, and speech (Westerman et al., 1995; Woodmansey, 1997). In an effort to make stock mouth guards more comfortable, many athletes modify and trim them, thereby reducing the already limited protection they afford.

**Mouth-Formed Mouth Guards**

Mouth-formed, or boil-and-bite, mouth guards account for 90–95% of the mouth guards worn during athletic participation (Padilla, Dorney, & Balikov, 1996). They are made of a thermoplastic material that softens when immersed in boiling water, allowing the material to be molded to an athlete’s dental impression. Although a better option than stock mouth guards, boil-and-bite mouth guards also have limitations. The arch length of the mouth guard is not long enough to cover the posterior teeth in most high school and college athletes (Sports Dentistry, 1997). Similar to the stock brand, boil-and-bite mouth guards can be big, bulky, and ill fitting and can increase an athlete's gag reflex. To decrease their gag reflex, many athletes alter the posterior portion of the mouth guard, which reduces its effectiveness and increases their risk of sustaining an orofacial injury or concussion (Sports Dentistry).

**Custom-Fitted Mouth Guards**

Pressure-laminated and vacuum custom-made mouth guards are fabricated using a dental impression of the athlete’s maxillary arch and offer the greatest amount of retention within the arch. They allow athletes to breathe and speak with little interference. A pressure-laminated custom-made mouth guard is made using multiple layers of ethylene vinyl acetate (EVA), usually in a dentist’s office or a laboratory. The laminating process allows the dentist to achieve a defined EVA thickness under high heat and pressure to ensure chemical fusion of the thermoplastic (Sports Dentistry, 1997).

Vacuum custom-fitted mouth guards are also made from a dental impression of the maxillary arch and can be fabricated in the athletic training or therapy setting. They are an excellent alternative to the expense of pressure-laminated mouth guards, which must be fabricated by a dentist or professional laboratory, and provide more protection than boil-and-bite and stock mouth guards do. Multiple vacuum