Injury rates and the amount of time lost from sports participation are consistently greater for the knee than for any other joint (Anderson & Hall, 1995; Arnheim & Prentice, 1997). Therefore it is not surprising that considerable time, effort, and funding have been directed at developing and refining the various braces intended to protect against knee injury.

With the increased use and development of knee braces during the past three decades, it is difficult to keep abreast of all knee brace technology.

This article discusses different types of braces and reviews their development and present use. The controversy of knee brace efficacy will be covered briefly, along with how the technology evolved. Some of the current thinking and recommendations regarding the use of knee braces are also discussed.

Looking Back

In the early 1970s a few braces were available that were typically used for knee injuries. Some of these “functional” braces are still manufactured today and are recommended following certain types of knee joint injuries.

In the late 1960s, Dr. Robert McDavid developed a splint-like, single-hinged knee brace that was positioned along the outside of the knee, the goal being to protect a previously injured knee (McLaren, 1984). The flat splint was made of a durable polycarbonate (Lexan) sewn inside a flex-ible sleeve that was secured above and below the knee with velcro straps or tape.

About the same time, Dr. James Nicholas and associates began developing the Lenox Hill derotation brace. They used a custom fitted design that relied on a 3-point fixation system with medial and lateral support bars—a monocentric hinge, a medial fulcrum disc, and a rigid pretibial bar (Drez, 1985). The basic design remained the same for years and was one of the most utilized functional braces.

Another popular brace that was developed in the late 1970s was the Anderson knee stabler (Anderson et al., 1979). This lateral brace was a double-hinged, single-sided brace with steel stays and foam rubber pads over contoured aluminum alloy flanges at each end. It was attached by taping and its purpose was to reduce the chance of reinjury by preventing significant valgus stress of the knee.

The McDavid and Anderson prototype braces rapidly became more popular as they began to be used and marketed for the purpose of preventing injury.

Key Points

- The concern about knee injuries in sports has led to the development of knee braces, mainly prophylactic, functional, and rehabilitative.
- Thanks to design improvements, braces are now lighter, stronger, and can provide a more custom fit.
- The AAOS has taken a position stand on prophylactic knee braces, listing seven features one should expect from them.
Classification of Knee Braces

Many manufacturers (e.g., MacGregor, Bike, Wilson, Cramer) began producing lateral preventive braces. Some anticipated that these would become a standard part of the equipment for football (McLaren, 1984).

Because of a concern that there was minimal objective data on the multitude of knee braces flooding the market at that time, the American Academy of Orthopaedic Surgeons (AAOS) sponsored a seminar on knee braces in 1984 to obtain data from manufacturers, physicians, and engineers as to their design and effectiveness. In view of the data presented at the seminar, the Sports Medicine Committee suggested that the following knee brace classifications be used:

- **Prophylactic knee braces**—those designed to prevent or reduce the severity of knee injuries (Photo 1).
- **Functional knee braces**—those designed to provide stability for unstable knees (Photo 2).
- **Rehabilitative knee braces**—those designed to allow protected range of motion for injured knees after surgery or other treatment (Photo 3) (Drez, 1985).

Prophylactic Knee Braces

Theoretically, these lateral braces absorb valgus forces to the knee and minimize the number and/or severity of medial knee injuries. Examples of prophylactic knee braces include the McDavid brace (Arco), Anderson knee stabler (Omni), Stromgren, the PKG (protective knee guard) by DonJoy, the Muellerhinge, and a lateral knee brace by Cramer.

The basic design for these braces has not changed much over the years. They include some type of lightweight (10 oz) lateral bar (steel, aluminum alloy, plastic, or polycarbonate material) with single, dual, or polycentric hinges with hyperextension stops. The braces are attached via tape, polypropylene or neoprene sleeves, or elastic straps.

The cost of these braces is typically $25 to $50. Many athletes continue to use the braces today in the hope of preventing knee injuries, even though there is not much scientific evidence to support this view.

As a multitude of preventive braces were being developed and marketed in the early 1980s, numerous investigations began to address and test for the recommended characteristics of the AAOS. At first, anecdotal evidence and testimonials on behalf of preventive knee braces seemed encouraging.

According to the AAOS, an ideal prophylactic knee brace should do the following:

1. Supplement the knee’s natural stiffness for contact and noncontact stresses;
2. Not interfere with the joint’s normal function;
3. Not increase risk factors to other lower extremity structures;
4. Be adaptable to various anatomic sizes and shapes;
5. Not pose any risk to other players;
6. Be durable and cost effective;
7. Have documented efficacy in preventing injuries (Drez, 1985).

After early use of lateral braces for preventing new injury to existing knee injuries (Anderson et al., 1979; McLaren, 1984), some began using the same braces on noninjured football players solely to prevent injury. Some studies reported a decrease in knee injuries (Hansen et al., 1985; Sitler, 1992). Others found either no difference or even an increase in knee injuries for braced athletes (Paulos et al., 1986; Scriber & Matheny, 1990; Teitz et al., 1987).

Results such as these pointed to four potentially adverse effects from lateral bracing: preloading; shift of the brace center axis; brace slippage; and brace bending to the point of joint contact (Paulos et al., 1986).

Salvaterra et al. (1993) reported that certain lateral prophylactic knee braces were not effective in stabilizing the knee joint from a static valgus force. Borsa et al. (1993) addressed the concern of the effect of bracing on physical activity and concluded that lateral knee braces...