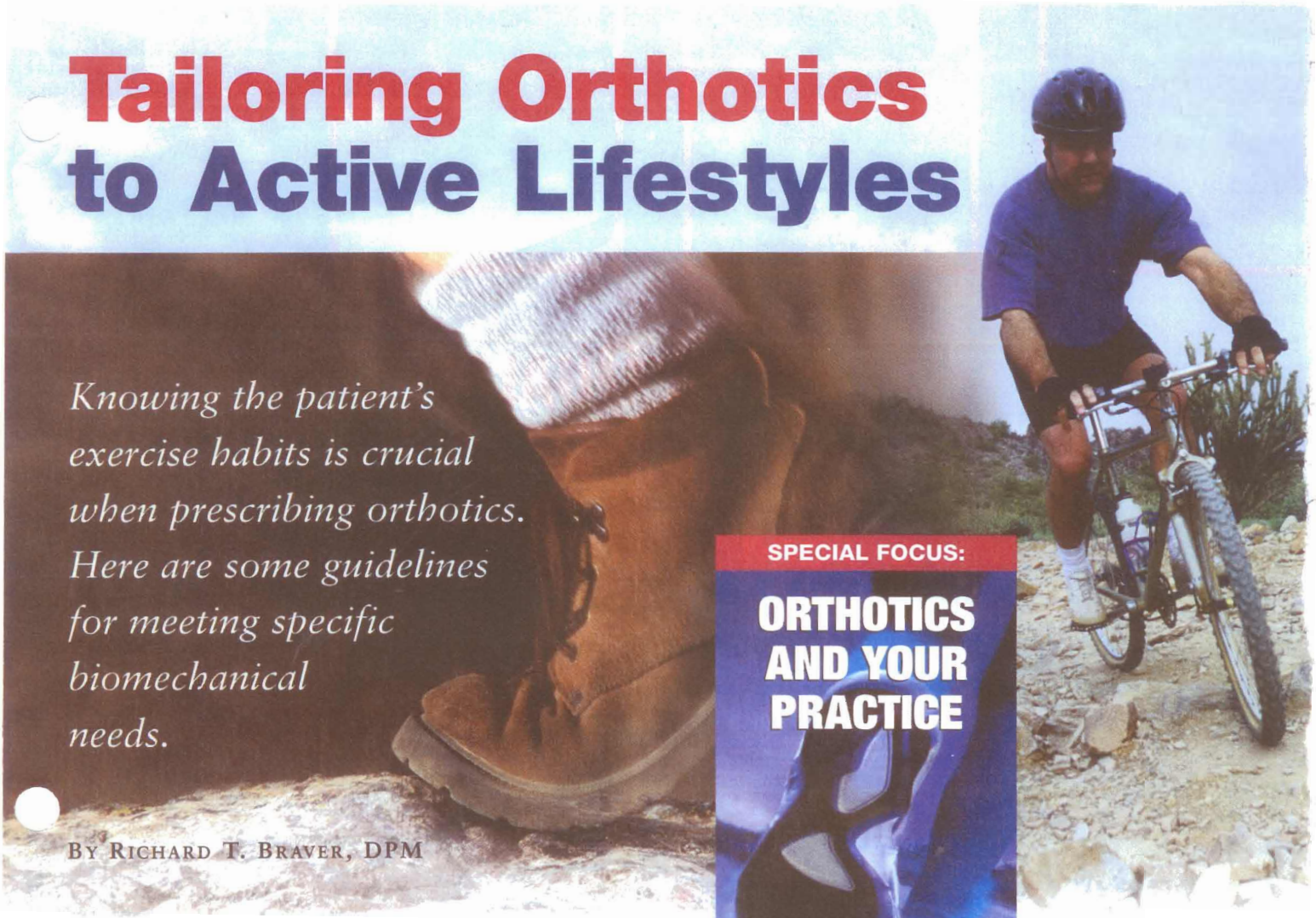
Tailoring Orthotics to Active Lifestyles



Knowing the patient's exercise habits is crucial when prescribing orthotics. Here are some guidelines for meeting specific biomechanical needs.

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SPECIAL FOCUS:

ORTHOTICS AND YOUR PRACTICE

Patients who are prescribed a single pair of orthotics sometimes do not see their foot or leg pain resolved. Often this is because the podiatrist did not take into account the patient's active lifestyle when prescribing the inserts. Instead, the patient was offered the same orthotics for use at play as well as at work.

In my view, podiatrists must pay closer attention to the patient's activity and level of participation when fabricating orthotics. Certain orthotics may be good for walking, but are totally unsuitable for another sport. Yet patients who participate in multiple sports often try to function during each activity with the same orthotic. It's up to the podiatrist to be aware of the patient's needs and to consider prescribing an additional orthotic in such cases.

Let's say that a patient you treated for heel pain reports no significant improvement after two weeks of wearing the orthotics you prescribed. At this point, it is imperative that you inquire about the activities in which he or she participates.

If the patient golfs twice a week, for example, he or she might be aggravating the heel problem, especially if the patient is wearing a "generic" orthotic that is not designed to adequately control the foot during golfing. In contrast, a more sports-specific orthotic can be fabricated to properly control the additional stresses placed on the foot during golf.

Just as professional and amateur athletes in team sports such as baseball, basketball, football, soccer and ice hockey have specific biomechanical needs, so do the "weekend athletes" that come

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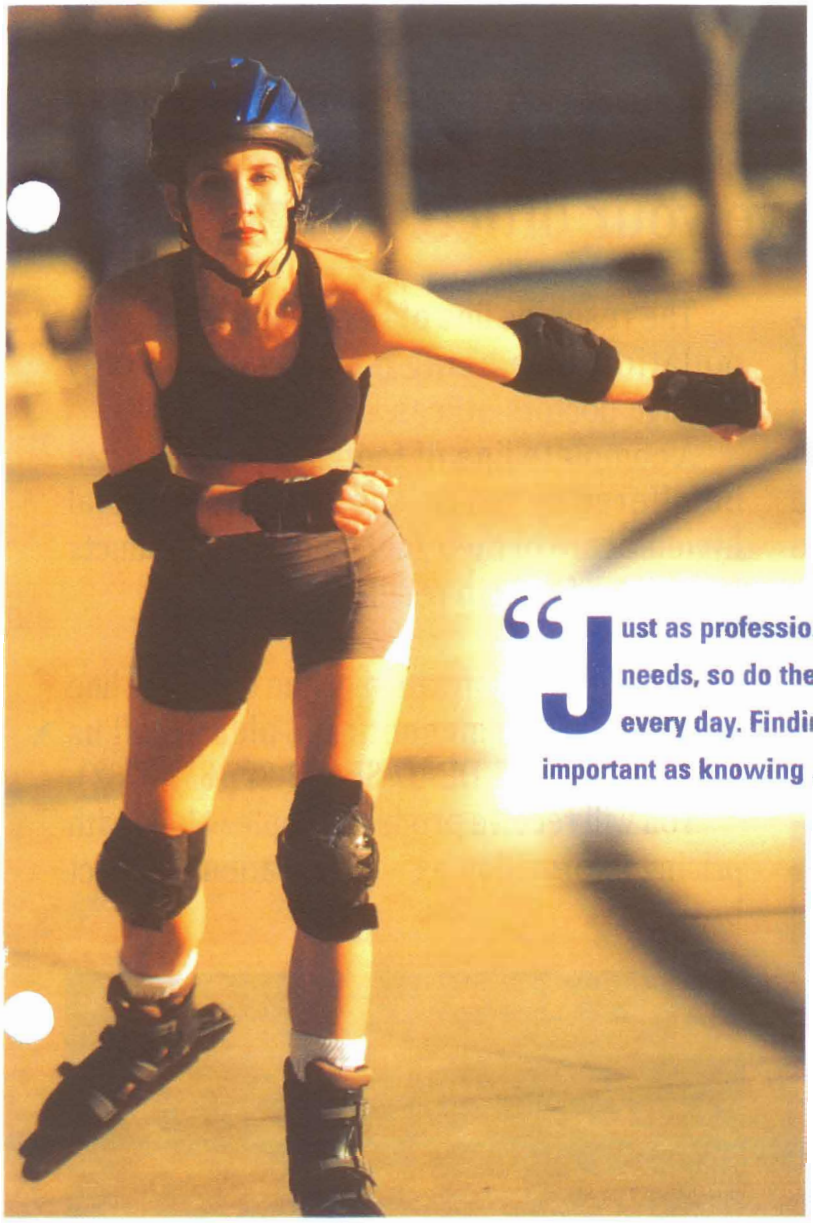

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into your practice every day. Finding out these patients' exercise habits is every bit as important as knowing their medical histories.

The following overview of common athletic activities and the biomechanical pitfalls related to each pastime can guide you in prescribing the most suitable orthotics for your patients. Keep in mind that this list is based on my clinical experience, and is subject to modification depending on the individual patient.

Exercise walking. The gait sequence for this activity involves heel contact, midstance and push-off. Patients who engage in exercise walking and have planus feet are prone to internal leg rotation and knock knees, which may predispose the patient to heel pain, shin splints and knee strain.

For this modification, I would recommend a deep heel cup (16 to 19 millimeters). Rearfoot posting is intrinsic with a crepe stabilizer, and forefoot posting is extrinsic with an extended runner's wedge made of Poron to provide both cushioning and support apropos to the forces of exercise walking.

The normal-width, full-length orthotic would feature a semiflexible shell and a full-length top cover with shock absorption. Arch fill can be added to the shell for increased shock absorption or support depending on the individual's body weight. Arch height would depend on the foot's structure.

It also must be noted that there are differences between indoor and outdoor walking. Indoor tracks generally feature more turns so the left foot toes out more than it does when the patient walks on an outdoor track; this increases the incidence of arch strain and shin splints. Outdoor exercise walking encompasses varied terrain and involves the use of more muscles than does indoor walking.

"Just as professional and amateur athletes have specific biomechanical needs, so do the "weekend" athletes that come into your practice every day. Finding out these patients' exercise habits is every bit as important as knowing their medical histories."

Running. Like walking, running involves heel contact, midstance and push-off. However, the faster the patient runs, the less heel contact and more forward the weight is over the foot. Any structural malalignment is greatly exaggerated, thereby predisposing the feet and legs to injuries which are classified as compression on one side of the ankle or knee joint, and stretching on the other side.

The flatfoot would be predisposed to medial band plantar fasciitis and posterior tibial tendinitis. In contrast, if someone has a high-arched foot, the strains occur laterally and include peroneal tendinitis and iliotibial band friction syndrome.

Also, the high-arched foot would be prone to compression-related injuries, leading to wear and tear of the medial ankle and knee. In addition to the foot and leg structure, the podiatrist must take into account the patient's running style, shoe-wear pattern and running surface.

The orthotic should incorporate a deep heel cup to prevent fat displacement, thereby providing a natural shock absorber. It also should provide increased stability against heel motion.

The shell should be semiflexible, utilizing a 3/16- or 1/8-inch polypropylene or similar plastic

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or comparable graphite composite. The choice of flexibility vs. stiffness is dependent on the patient's body weight and on whether the patient is a sprinter (more flexible) or a distance runner.

The orthotic should include the extended extrinsic runner's wedge, which aids function at toe-off. The arch may be reinforced with Poron for increased shock absorption or with neoprene crepe. The device should be a full-length top cover, which may be of an antiblister or shock-absorbing material.

Tennis. The frequent turning, pivoting, sprinting, bending and stroking involved with this sport often lead to plantar fasciitis, shin splints and patella-femoral syndrome.

The frequent turning, pivoting, sprinting, bending and stroking involved with tennis often lead to plantar fasciitis, shin splints and patella-femoral syndrome.

The required device would include a deep (16 to 20 millimeters) heel cup with a modified rearfoot intrinsic post, a crepe stabilizer and an extrinsic extended forefoot runner's wedge. The normal- to wide-width, full-length device would call for a semiflexible shell with arch fill as needed for shock absorption or support and a shock-absorbing, antifriction top cover. Arch height would vary with foot structure.

Aerobics/cheerleading. The gait sequence entails much stepping, bouncing/jumping, pivoting and kicking, and often leads to plantar fasciitis, shin pain and patella-femoral syndrome.

I feel that such activity calls for a 16- to 20-millimeter heel cup with modified intrinsic rearfoot posting and an extrinsic, extended runner's wedge for the forefoot. The normal-width, full-length device should include a semiflexible shell and a shock-absorbing, antifriction top cover.

Biking/pedaling. The downstroke/upstroke gait sequence associated with this activity can lead to patella-femoral syndrome, hamstring tendinitis and Achilles strain. The extent of stress on the foot depends on how much the patient is sitting or standing while cycling and whether sneakers or cleated shoes are being worn.

This patient should use an orthotic with a normal to shallow heel cup. The rearfoot should be modified intrinsically and posted vertically with a low heel grind. The forefoot should be posted with a minimally extended runner's wedge or intrinsic forefoot post.

The orthotic should be thin and narrow and should extend to the sulcus or metatarsal heads and be covered with a thin top cover. Graphite material provides for a firm, yet thin, lightweight shell.

In-line skating. Skaters frequently use their feet for push-off and gliding and in the process develop structurally influenced tendon strains and joint compression injuries. The skate's inner wheel and outer wheel edgewear also can predispose skaters to foot injuries. The inner edges become worn and pronation is enhanced, leading to medial foot and leg strains.

Skating enthusiasts need a device with a deep 16- to 18-millimeter heel cup, modified intrinsic or extrinsic rearfoot posting, and extrinsic extended forefoot posting with a runner's wedge. The normal-width, full-length device should include a cushioned top cover and a shell made of flexible to semiflexible material, depending on body weight.

Skiing. As the skier glides downhill, the feet are subjected to frequent turning and carving motions (e.g., via S-shaped turns). Additional strain is placed on the feet during any uphill ascents or frequent stops. Moguls and poor ski conditions contribute to increased demands on one's structure and alignments.

Cross-country skiers also subject their feet to possible injury due to constant gliding and kicking, including toenail injuries, arch strain, heel bruises and patella-femoral syndrome.

The skier thus needs a device with a deep heel cup, a low to moderate arch height, intrinsic or extrinsic rearfoot posting and extrinsic forefoot posting with a runner's wedge. A mildly narrow-width, full-length orthotic should have an accommodating, semiflexible shell (leather is acceptable), and a thin, shock-absorbing top cover.

Dual-density orthotics should be considered for the avid skier. The device's longitudinal middle is softer, with firmer outer medial and lateral portions. The orthotic can be fabricated by cutting out the middle part and inserting softer material in its place, allowing for a "cantilever" effect.

The dual-density device comes up higher on both sides to prevent excessive splay. This increases overall shock absorption and keeps the knees from getting jarred, especially while skiing over bumps and moguls. This fabrication also allows for some extra pronation (shock absorption) that is needed because ski boots, bindings and skis are hard.

Figure/ice skating. The push-offs, glides, spinning, cutting, bending and stopping involved

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Athletic Activities and Gait

Common Athletic Activities	Gait Sequence
E· rcise walking	Heel contact, midstance and push-off
Ru ning	Heel contact, midstance and push-off
Te nis	Frequent turning, pivoting, sprinting, bending and stroking
Aerobics/cheerleading	Stepping, bouncing/jumping, pivoting and kicking
Biking/pedaling	Downstroke/upstroke
In-line skating	Push-off and gliding
Skiing	Frequent turning, carving motions; for cross-country skiers, constant gliding and kicking
Figure/ice skating	Push-offs, gliding, spinning, cutting, bending and stopping
Volleyball	Jumping and pivoting
Basketball	Jumping, running, pivoting, cutting, squatting, acceleration and push-off
Golf	Much walking (heel contact, midstance, push-off); excessive supination of lead foot and hyperpronation of back foot

with ice skating can lead to a multitude of tendon and joint stresses. Anterior ankle tendinitis is another common ailment among figure skaters.

How the foot reacts to skating many times depends on whether the skater wears the patch (flexible), figure (semirigid) or freestyle (extremely rigid) skate boot. These boots often irritate bony prominences such as the navicular, malleoli or any posterior heel protrusion.

This activity calls for a device with no heel cup, an extrinsic rearfoot wedge and a minimally to moderately extended runner's wedge at the forefoot. The narrow-width, full-length device should feature a low arch, a semiflexible shell made of a firm material (e.g., graphite) and a thin top cover.

Volleyball. Frequent jumping and pivoting often lead to ankle sprains, shin splints and patella tendinitis.

The volleyball player needs an orthotic with a deep (16 to 20 millimeter) heel cup, moderate arch height, modified intrinsic rearfoot posting with a crepe stabilizer and extrinsic forefoot posting with a runner's wedge. The medium-width, full-length device should be fabricated with a thin top cover and a flexible 1/8-inch shell made of polypropylene or subortholin.

Basketball. Whether the patient is playing on a team or on the blacktop, a game of hoops can be rough on the feet. The constant jumping, running, pivoting, cutting, squatting, acceleration and push-off can lead to plantar fasciitis, ankle sprains, shin splints and "jumper's knee."

A device with a 16- to 20-millimeter heel cup and an extended extrinsic forefoot runner's wedge is appropriate. Rearfoot posting should involve a modified intrinsic or biaxial intrinsic post with a crepe stabilizer so that the foot does not slide laterally.

The full-length device should be wide for an increased support base. It should feature a shock-absorbing, antifriction top cover and a 3/16-inch shell of polypropylene or a comparable material. The podiatrist can add a Poron arch fill for shock absorption or crepe for support. Arch height will vary according to foot structure.

Golf. The gait sequence unique to golf includes much walking (heel contact, midstance and push-off). The golf swing also generates a high level of stress on the feet, excessively supinating the lead foot and hyperpronating the back foot. Plantar fasciitis and shin and knee strain are common golfer's ailments.

The avid golfer needs a device with a 16- to 18-millimeter heel cup, modified intrinsic rearfoot posting with a crepe stabilizer, and extrinsic forefoot posting with a Poron- or crepe-based extended runner's wedge. The normal-width, full-length device should include a full-length top cover and a semiflexible shell. Arch fill can be added to the shell for increased shock absorption or support. The arch height should vary with foot structure.

As people are leading increasingly active lifestyles, patients are presenting with more complex biomechanical needs that often cannot be addressed with a single orthotic. Podiatrists must be prepared to "keep up" with these patients—or else get left in the dust in today's health-care market. □