



## INDUSTRY BULLETIN

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### PATHOLOGY-SPECIFIC FOOTWEAR RECOMMENDATIONS

When managing athletes with specific injuries, we are frequently asked to recommend footwear based on a given pathology. As a foot care specialist, one of the most important relationships you can build is with your local shoe retailer. Technical running shoe retailers are a valuable resource and without considering the design of footwear, positive outcomes may prove to be a challenge. In the current Industry Bulletin, we will present what we have learned in terms of pathology or injury specific footwear recommendations. This can hopefully be used as a resource to help assist you as you make recommendations to your patients.



Before we get into specifics, we should review that running shoes range from minimalist type designs to maximalist (Figure 1). The majority of what will be presented here will fall into the traditional running shoe design and maximal categories. Within the traditional running shoe realm, running shoes are categorized depending on the level of cushion and level of support or stability (Figure 2). The shoes with the greatest amount of cushion are termed neutral cushion and as support or stability increases there are neutral supportive, stability and motion control shoe categories, respectively. Each running shoe company typically has offerings in each of these categories.



Figure 2



Running shoes can be worn as a therapeutic modality and range from cushion to motion control shoes. Each shoe has specific characteristics that can help to complement orthotic therapy. The shoe may only be a temporary intervention but can certainly help to enhance healing and improve efficiency for return to sport. In all cases, it is important that the patient let comfort be the guide regardless of brand and we always encourage individuals to have a trial of wear to ensure that the shoe fit is comfortable.

For this review, we will focus on: 1) the cavus foot; 2) lateral ankle instability; 3) feet presenting with medial instability; and 4) mid-/forefoot pathologies.

The cavus foot may be the most challenging when it comes to footwear interventions (Burns et al., 2006). In our experience, because these feet tend to be more rigid, they often require increased cushion and a greater offset (i.e., drop or heel height differential) (Figure 3). In the running community, Williams et al. (2001) reported that individuals with high-arched feet typically suffer more: 1) foot injuries; 2) bony injury (stress fractures/reactions); and 3) lateral ankle sprains.



Figure 3

With cavus feet, our experience has been that they are most comfortable and best suited for the — 1) ASICS Nimbus; 2) Brooks Ghost or 3) Mizuno Wave rider. Each of the shoes fall into the neutral cushion category and have an offset of 10-12 mm. The offset, heel-to-toe drop or heel height differential is the difference between the thickness of shoe material under the rearfoot relative to the forefoot, i.e. heel stack height – toe stack height = drop/offset. (Figure 4)

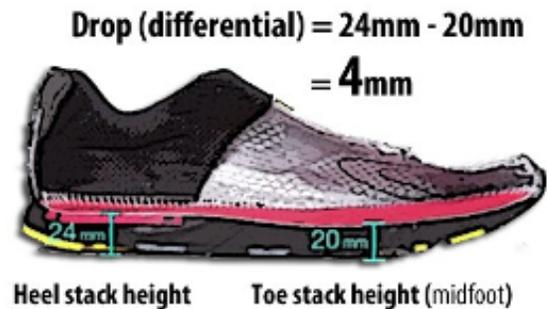


Figure 4

Another challenging clinical presentation are patients who suffer from lateral ankle instability (Figure 5). These individuals typically require increased lateral support. Biomechanically, when individuals have recurrent ankle sprains and particularly those that are not completely rehabilitated, the affected foot will tend to be more inverted and adducted (i.e. internally rotated) and the ankle will exhibit decreased dorsiflexion through mid stance and terminal stance. First and foremost, it is beneficial to recommend resolving any limitations in gastrocnemius and peroneal stiffness. We have found that stretching and massage therapy can be beneficial in helping to achieve this. There are running shoes that will help either temporarily or longer term to support these individuals. From our experience, excellent shoes for the recreational athlete include Brooks Dyad, ASICS Fortitude and New Balance 840. For the competitive runner, Brooks Glycerin, ASICS Cumulus and Saucony Ride can be the best recommendations. (Figure 5)



Conversely, we are often dealing with individuals who have medial instability or increased pronation. In the running community, Williams et al. (2001) reported that individuals with low-arched feet typically suffer more: 1) knee injuries; 2) soft tissue injury (tibialis posterior and patellar tendonopathy); and 3) medially distributed injuries.

These individuals tend to do better in stability or motion control shoes. We believe that there is still a role for motion control shoes and for some individuals, it enables them to participate in sport. For pathologies associated with adult acquired flat foot/posterior tibialis dysfunction or increased pronation, individuals would benefit from either stability or motion control shoes. Motion control shoe designs include Brooks Ariel or Beast, New Balance 940, Brooks Addiction and/or Mizuno Horizon. These examples all include a straight last, wide sole plate and medial post. For some, this might be too aggressive and for these individuals they may benefit more from a neutral supportive shoe. Recommendations include Brooks Dyad, New Balance 840 and Saucony Echelon. Compared to the motion control shoes, these shoes differ only in that they have a neutral midsole.

Approximately, 10 years ago, we discussed how MBT shoes (Masai Barefoot Technology) could be a useful tool in the management of lower extremity injuries. Today, there also seems to be pathology-specific running shoe applications for mid and forefoot pathologies such as plantar fasciitis, hallux limitus/rigidus, capsulitis, metatarsal stress reactions/fractures and 1st MTPJ injuries. In our experience, the HOKA running shoe with its stiff rocker has been effective in the management of these pathologies (Figure 6). In addition to the HOKA shoes, New Balance Fresh Foam More (v1 and v2) and Saucony Endorphin Shift are two other choices. We have had athletes who wear these temporarily and have others who wear them as they return to run and/or as a potential preventative measure.

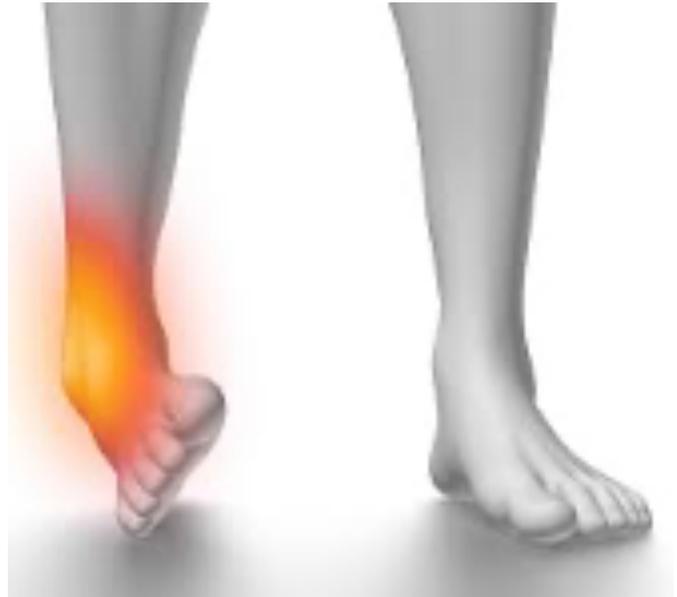


Figure 5

For years we have been trying to better understand the influence of increasing longitudinal bending stiffness (midsole bending stiffness) and rocker sole design. From a clinical perspective, these shoes likely decrease the requirement of the midfoot dorsiflexion and dorsiflexion of the MTPJs. Experientially, we have lots of evidence that these footwear modifications can be effective in improving clinical outcomes. However, quantitatively there is limited biomechanical data that explains the dynamical influence. Recently, there has been a plethora of research conducted as the result of one running shoe innovation – the Nike Vaporfly. Stiff rockered, running shoes have recently been studied regarding how they improve performance (Nigg et al, 2020). From these studies we can also deem valuable insight as to how increased longitudinal stiffness and rocker sole design can help our clients/patients return to sport from injury or even perhaps prevent injury.



Figure 6

From the biomechanical research, there is evidence that increased midfoot stiffness and a rocker profile leads to decreased dorsiflexion of the 1st MTPJ and ankle during both walking and running (Hoogkamer et al., 2019; Sobhani et al., 2015). This, in part, likely helps to explain the footwear's effectiveness in managing Achilles tendinopathy, plantar fasciitis and injuries to the MTPJs. Intuitively, there may also be a decreased requirement for the midfoot to dorsiflex and this could be beneficial in the prevention and management of metatarsal stress reactions/fractures.

Hopefully, this Industry Bulletin will help to provide some guidance for recommending footwear for specific injuries/pathologies. This footwear may help to enhance orthotic therapy or may be a standalone intervention.

We would like to acknowledge Phil Moore (Lady Sport, Fit First Footwear) for his contribution to this edition of Paris Orthotics Industry Bulletin.

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## Thank you for reading this edition of the Industry Bulletin.

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