"From heels to toes, products to pathology, resources to rehabilitation, this book has it all. An essential guide." — *Runner's World*

FIXING YOUR FEET

7TH Edition

John Vonhof
with **Tonya Olson, MSPT, DPT**

Injury Prevention and Treatment for People Who Push the Limits of Their Feet

Runners, Walkers, Hikers, Climbers, Athletes, Dancers, Soldiers, and More!

WILDERNESS PRESS

Praise for *Fixing Your Feet*

I have seen John work with endurance athletes before, during, and after some of the world's toughest footraces, and I can say with great confidence that no one knows feet better than John. Based on years of research and experience, he has compiled *the ultimate guide* on foot care for athletes. *Fixing Your Feet* contains practical treatments of foot problems and reveals tried-and-true secrets about how to prevent them.

—Lisa Bliss, MD, former medical director of the World's Toughest Foot Race, the Badwater Ultramarathon

John has more practical experience fixing feet than anyone I know. He is the expert, has the experience, and is the go-to guy for feet. *Fixing Your Feet* is comprehensive and complete; it is a must-read for foot care.

—Marshall Ulrich, author of *Running on Empty,* adventure racer, and Seven Summits mountaineer

I consider *Fixing Your Feet* a must-have for every sports podiatrist! It's an invaluable resource.

—Rob Conenello, DPM, former Global Clinical Advisor for the Special Olympics; past president of the American Academy of Podiatric Sports Medicine

Fixing Your Feet is the go-to foot care reference for the endurance athlete, period. Don't prepare for your next event without it.

—Tim Jantz, podiatrist and ultrarunner

If there's one thing that can turn an ultrarun or adventure race into a nightmare experience, it is sore and injured feet. Prerace care and conditioning, maintenance during a race, and the knowledge of how to deal with issues as they arise are crucial. John is the undisputed foot guru. *Fixing Your Feet* guides you through caring for and maintaining your feet.

—Lisa de Speville, adventure racer, ultrarunner, and editor of ar.co.za, South Africa's adventure-racing website

John has the amazing ability to give the runners superb foot care and educate while doing it. The vast and incomparable knowledge of foot care for athletes in *Fixing Your Feet* is, without a doubt, the best in the entire world!

—Denise Jones, aka the Badwater Blister Queen

Fixing Your Feet is the encyclopedia of foot care! Whether you're looking for daily foot health tips or ways to survive in ultra-endurance sports, this is your one-stop source of foot info. John has done his homework and presents it in an organized and easy read.

—Terri Schneider, ultrarunner, adventure racer, and triathlete; terrischneider.net

Fixing Your Feet is the most comprehensive book that I have ever seen on foot care. As a person who has been running for more than 31 years and has run more than 100,000 miles, I know just how important it is to maintain proper care of your feet. I encourage every runner to use this book as a valuable resource.

—David Horton, ultrarunner; extremeultrarunning.com

John has an unbridled passion and a comprehensive perspective and approach of what it takes to prevent and treat athletes in a multitude of environments. He has learned tried-and-true techniques. The recommendations of products that come from treating athletes will allow you to take his techniques and tweak them for yourself so that you can succeed and persevere beyond your wildest dreams.

—Zak Weis, DPM, with a master's of science in exercise physiology and chemistry

When a foot problem arises, this book's clear, concise explanations and fixes are wonderful. The book is comprehensive; every relevant topic is addressed. If you run ultras, you should have *Fixing Your Feet.*

—Karl King, president of Succeed! Sportsdrink LLC and inventor of S!Caps

I received personal foot care treatment at the DecaMan from John, the world's leading foot care expert for multiday running events. He's a legend in the ultrarunning community, and his book, *Fixing Your Feet,* is like a bible. He tirelessly worked the Deca for 10 days, and we were lucky to have his expertise on "hand." He's taken care of battered feet blistered by the sun at Badwater and macerated by wetness at the Amazon Jungle Marathon. His experience was invaluable to the event.

—Chris Solarz, finisher at DecamanUSA, 10 ultra-triathlon distances a day for 10 days

After my first adventure hiking the Grand Canyon rim to rim to rim, my feet were in horrible condition. After that debacle, I searched for how to care for blisters. Then I found *Fixing Your Feet.* What a difference that has made. I learned how to properly prepare my feet for the longer miles. —David Norton, hiker

I evaluate Navy special program candidates who will enter training where suffering in silence is the norm. There are essential lessons for any runner or active person to learn, but my candidates in particular benefit from the wisdom found in *Fixing Your Feet.* It is an irreplaceable resource in my toolbox to create coping skills for the raw impact their feet will endure when running wet, tired, and cold in mixed terrain. Bottom line, the path of least resistance to train smart and effectively, and to keep moving relentlessly forward, is to be armed with the first-class *Fixing Your Feet.* —Mark Negele, NDCS, US Navy (Ret.), Warrior Challenge Mentor

I have a copy of *Fixing Your Feet* and find it extremely informative, understandable, and helpful. It is my running foot care bible. I was convinced of its value after following John's blog for a year. I have quoted and recommended it to several running friends, including my friends on the Vermont Team in Training.

—Newton Baker, runner

It's confession time: as a veteran of more than 80 marathons, as well as ultramarathons up to 100 miles, and as a podiatrist for 18 years, I thought I knew it all. John's comprehensive approach of asking the so-called medical experts as well as the real experts out in the trenches for their tried-and-true advice will bring you more value for your endurance event than a podiatry degree ever will.

—Bill Johncock, DPM, fellow at the American Academy of Sports Medicine,
certified by the American Board of Podiatric Surgery

I have always had issues with blisters, particularly on long mountain runs. Since reading *Fixing Your Feet* and implementing John's techniques, I have not had any blister issues. This includes long runs in the mountains and pacing at Badwater for four years, including one double crossing and one starting at Las Vegas. This book is the solution to your foot problems.

—Scott Morgan, ultrarunner, endurance athlete, climber, and coach for SealFit; sealfit.com

John Vonhof literally wrote the book on foot care for ultrasports. His indispensable wisdom has made countless race finishes possible over the years, most especially at the Badwater Ultramarathon, the world's toughest foot race. —Chris Kostman, chief adventure officer and race director, AdventureCORPS Inc.

Fixing Your Feet has the collective wisdom of dozens of outdoor athletes who tell us what works for them. The book is well organized and full of great information. The personal anecdotes of athletes, many of whom I know either personally or by reputation, greatly enhance the readability of this reference book. The result is a smorgasbord of ideas and instructions for preventing and fixing any foot problem.

—Flyin' Brian Robinson, first person to complete the 7,400-mile Calendar Year Triple Crown hikes (2001)

One hundred miles, 28 hours of downpours, mud, and thigh-deep rushing rivers. ZERO BLISTERS. My feet look perfect! People were crossing the finish line with their feet in tatters and crazy cases of trench foot. Everyone's been asking what my secret is, and I've been referring them to *Fixing Your Feet*!

—Tanya Twerdowsky, ultrarunner

7TH Edition

FIXING YOUR FEET

Injury Prevention and Treatment for People Who Push the Limits of Their Feet

Runners, Walkers, Hikers, Climbers, Athletes, Dancers, Soldiers, and More!

Fixing Your Feet: Injury Prevention and Treatment for People Who Push the Limits of Their Feet

1st Edition 1997
2nd Edition 2000
3rd Edition 2004
4th Edition 2006
5th Edition 2011
6th Edition 2016
7th Edition 2021

Project editor: Kate Johnson
Front cover photo: © 2019 Ron Jones, Badwater 135
Back cover photos: (left to right) mutlu/Shutterstock, Meg Wallace Photography/Shutterstock, lzf/Shutterstock, makieni/Shutterstock
Cover design: Scott McGrew
Interior photos and illustrations: John Vonhof, except where noted
Indexer: Rich Carlson

Manufactured in the United States of America
Distributed by Publishers Group West

Library of Congress Cataloging-in-Publication Data

Names: Vonhof, John, author.
Title: Fixing your feet : injury prevention and treatment for people who push the limits of their feet / John Vonhof.
Description: 7th edition. | Birmingham, AL : Wilderness Press, 2021.
Identifiers: LCCN 2021022092 (pbk.) | LCCN 2021022093 (ebook) | ISBN 9781643590639 (pbk.) | ISBN 9781643590646 (ebook)
Subjects: LCSH: Foot—Care and hygiene. | Running injuries—Prevention. | Hiking injuries—Prevention.
Classification: LCC RD563 .V63 2021 (pbk.) | LCC RD563 (ebook) | DDC 617.5/85—dc23
LC record available at lccn.loc.gov/2021022092
LC ebook record available at lccn.loc.gov/2021022093

Published by: WILDERNESS PRESS
An imprint of AdventureKEEN
2204 First Ave. S., Ste. 102
Birmingham, AL 35233
800-678-7006; fax 877-374-9016

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WILDERNESS PRESS . . . *on the trail since 1967*

DEDICATION

This seventh edition of *Fixing Your Feet* is dedicated to those who provide foot care for their friends—and even people they don't know—in an effort to help them reach their goal or finish line. It may be in an ultramarathon, a multiday race, a backpack or thru-hike, or an adventure race; on the lines while fighting woodland fires; in military maneuvers; at a soccer or tennis game; or on any other excursion that involves feet. These are the people who want to help others, who in many cases are paying it forward. They may be people with medical experience or those who have learned from someone else or from the pages of *Fixing Your Feet.* It takes a special kind of person to work on someone else's dirty feet. Thanks for the hours spent honing your skills; for the long hours spent in aid stations, often in less-than-desirable conditions; and for, in many cases, sharing what you have learned with others. You are appreciated. Thank you.

ACKNOWLEDGMENTS

Thank you to the thousands of athletes who, over the life of this book, have shared their experiences, asked for foot care help, and given me encouragement to keep writing about fixing your feet.

Again, I give special thanks to my wife, Kathie, for her continued patience through yet another rewrite and research process. Thank you to my son, Scott, who, after one of my 12-hour track runs in 1996, gave me the idea for this book, and to my daughter, Wendy, who has supported me through all the rewrites.

Special thanks go to Tonya Olson for coming on board as a contributor to this edition with her unique perspective as the best physical therapist extraordinaire I have known. She has helped me fine-tune my foot care skills.

Thank you, Lisa Butler, whose poem "Foot Fetish" has graced these pages for many editions.

Thanks to Molly Merkle and the staff of AdventureKEEN and Wilderness Press for believing in the ongoing potential of *Fixing Your Feet.* They make it look great, correct my errors, and continue to take it to a high level of professionalism. Thank you to the whole team for the great cover and interior.

MY MOTIVATION

Run with perseverance the race marked out for you. *—Hebrews 12:1*

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FOREWORD BY TONYA OLSON

I met John at the Michigan Bluff aid station at the Western States 100-Mile Endurance Run in 2010. At the time, I was familiar with his book, and as a runner and physical therapist, I was passionate about foot care. It was truly an honor to have an opportunity to learn alongside a master. Little did I know that it was the beginning of a lasting friendship, mentorship, and collaboration.

Necessity truly is the mother of invention. Through his years as an endurance athlete, John has lived the experience of blisters affecting his and fellow competitors' races. He saw hopes dashed and months and miles of training rendered useless as a result of blisters, something that should be preventable. He got curious; he noticed the little things; he hypothesized, experimented, and analyzed the results. Along the way he found solutions and took it upon himself to write a book so that others could benefit from what he had learned. *Fixing Your Feet* was written so that others could achieve their goals, endure the trials and tribulations of endurance events, climb mountains, cross deserts, run and hike across the country and through the woods, and ultimately cross the finish line. In doing so, he authored a resource, spawned a specialty, nudged research, created new markets for products, and increased the chance of success for endurance athletes across the country and internationally.

John's experience as an athlete brings his perspective and implementation of foot care to another level. Wherever he is volunteering, in the mountains, desert, or jungle, athletes can count on him to do everything he can to get them to the finish line. Adventurous and dedicated to his craft, John has not thought twice about enduring the hardships of working at multiday races in remote places and extreme conditions in the Amazon, Chile, Costa Rica, Canada, or even a cold ice arena for six days helping runners to just keep running. Foot care at events is about more than blister prevention; it entails an understanding of the athlete experience, technology, products, and the multitude of factors contributing to foot care issues. As a runner and endurance athlete, John, who is loath to talk about himself and has a heart for service, understands the mind of the athletes who come in for foot care. John's three finishes and 23 years of volunteering at the Western States 100-Mile Endurance Run, as well as at many other multiday races, allow him to provide sage advice to runners when they most need the encouragement and perspective of someone who has truly been in their shoes.

Take all of this into consideration as you read through this book. Heed the advice, learn the lessons, develop your skills, and share them generously with

others. Volunteer at events and pay it forward to help the miles bring smiles and carry on the mission of John Vonhof, the "foot guy."

—Tonya Olson, MSPT, DPT,
board certified in orthopedic physical therapy, certified manual therapist

FOREWORD BY DENISE JONES

In 1988 I ran my first 50-mile race. It was daunting since my longest-distance race prior to that had only been a 50K. It was surprising that at about mile 32 I felt a hot spot on the ball of my foot. Since I'd been running about 10 years by then, and mostly distances up to a marathon, I hadn't realized that blisters might pop up at longer distances.

Fortunately, I was able to hobble to the finish and happily accept my finisher's silver buckle. It was after that first 50-mile race, however, that I decided getting the dreaded blisters was not going to prevent me from running longer distances. Perhaps a 100-miler was in my future? There were very few long-distance ultramarathons in those early years. Not long afterward my husband, Ben, entered the Badwater Ultramarathon. I was delegated to be his crew chief, a responsibility that entailed foot care. I scoured the limited information and found very little help on my quest. After a few years of experimenting and trial and error, I discovered a few blister-prevention techniques that seemed to work for some folks but not others.

In 1997 I ordered *Fixing Your Feet* by John Vonhof. Finally—a thorough and comprehensive book written especially about feet, covering every aspect of feet and ailments for athletes. Wow, was it impressive! Now in its seventh edition, the book has grown even more impressive.

In 2002 I had the honor and pleasure of meeting John at a postrace party for the Badwater Ultramarathon, and we became fast friends. We both had ideas that collectively contributed to a better way to keep runners and athletes more comfortable during races. I had the pleasure and good fortune of working with him at Western States 100 in 2003. Since I had already been taping for prevention and patching feet in races, it seemed only natural that we made a great team. At that race I was able to take away expert techniques to use in my pursuit of helping Badwater runners. Thus, I was dubbed the Badwater Blister Queen. At that time I set up a plethora of foot care items in a large tool chest

that I called the Badwater Badfeet Blister Buster Footbox. John and I often run foot care ideas and questions back and forth in trying to find the best options.

Any athlete would benefit from better foot care. John's book has all the answers and more. I am proud to have played a part in the development of *Fixing Your Feet* over the past 20-plus years.

—Denise Jones, aka the Badwater Blister Queen

Denise began running in the late 1970s. She has completed 10 marathons, 30 ultras, and 2 multiday stage races. In addition, she has finished the Badwater Ultramarathon three times and has summited Mount Whitney more than 20 times. Through all of her experience with desert ultrarunning and climbing Mount Whitney, she became knowledgeable in desert foot care and blister prevention. She is the coauthor with Theresa Daus-Weber of *Death Valley Ultras: The Complete Crewing Guide* (1996). She lives in Lone Pine, California, with her husband, Ben Jones, aka Badwater Ben.

Introduction

"One thing is for sure: when one's feet hurt . . . it definitely gets one's attention."

—Denise Jones, the Badwater Blister Queen

I have a hard time believing that this is the seventh edition of *Fixing Your Feet*—and that it took so many hundreds of hours to update and revise. There are several things I want to say up front.

First, I want to introduce you to Tonya Olson. In 2010 I met Tonya at the Michigan Bluff aid station of the Western States 100-Mile Endurance Run. In the years since, we have laughed and learned, and had a grand time working on runners' feet together. She's a quick learner and better at a lot of things than I am. She's a physical therapist (PT) with a bunch of fancy letters (degrees) behind her name. I finally approached her about joining me for this edition. She has reviewed all of the book's content and contributed new material from her experience as a PT. You'll find her bio at the back of the book.

As you look through this edition, you'll find 47 "Tonya's Tips" spread through the chapters. Please take the time to read these tips. I believe they've added immense value to this edition, and I think you'll agree. Welcome, Tonya.

Second, helping people has been my motivation for more than 25 years of learning as much as possible about foot care. I love to see athletes able to finish their races without foot problems. That hasn't changed. Over the past 25 years, I have stressed many points over and over. Things haven't changed. Here are three items from my list.

- First and foremost, you are responsible for your feet.
- Anyone can learn how to do high-quality foot care.
- Blisters are still the number one foot care problem athletes face.

That leads to the next thing. I have this crazy notion that we need to *pay it forward.* Take a moment and turn to page 4 and read "Getting the Most Out of *Fixing Your Feet.*" You'll learn about Tom Grow and how he helped his wife and others by learning how to patch feet. He took what he learned and paid it forward by helping others. That's why I've dedicated this seventh edition to those who have stepped up to help others with their foot problems.

There are more runners needing foot care at races than there are people volunteering their time and personal materials to help them. We need more people to learn foot care to help themselves and, in turn, help others.

The race directors of two ultra multiday races in Europe found their medical staff were inundated by runners wanting foot care, so they imposed a triage system of care. Runners were expected to carry a foot care kit and know how to use it. The race directors referenced the old military adage of the six Ps: Proper Preparation Prevents Piss-Poor Performance. Whose job is it to care for your feet? It's your job. Not your crew. Not anyone else. It's you. You need to know what your feet need and how to patch them with the right materials. Then you can train your crew and others. As you share what you've learned through the pages of *Fixing Your Feet,* you are paying it forward.

I won't be around forever. Neither will Tonya. As much as we'd love to help at more races, and while we'll consider those requests, sometimes it just isn't feasible. That's where you come in. I encourage you to learn and share. Tell others about *Fixing Your Feet.* Spread the word.

Finally, I want to emphasize that *Fixing Your Feet* is not a book to be read from front to back. Look over the table of contents to find and read the chapters that address any areas you currently struggle with. Then go back and spend time in each of the four parts: Foot Basics, Footwear Basics, Prevention, and Treatments. Study them to gain a complete education on good foot care techniques and skills. We live in a popular do-it-yourself culture, and this should extend to learning how to manage your own feet. Subscribe to my free blog at fixingyourfeet.com/blog to get up-to-date information on foot care products and services, as well as techniques.

The publishing world often stresses that to have a successful book, you need to help people with solutions to their problems. *Fixing Your Feet* has made it to a seventh edition because it continues to offer solutions.

Fixing Your Feet is for you—solutions for your feet. I would love to hear from you. Send me an email at john@fixingyourfeet.com and let me know your story about your feet.

FOOT FETISH

My feet are runner's feet;
a little rough around the edges,
with black nails on the toes where I have nails at all.
Lovingly decorated with bright colors.

My toes are warriors, of a sort.
They carry the entire continent of my body on adventures
and rise to challenges that could crush them.
Some days they are worn and calloused,
but they are strong and fierce adversaries
for the rocks they overtake.

My arches are the springboard of my soul.
They give me lift with every step I take
and cushion all my landings.
They are always ready
when I want to jump for joy.

My heels respond when the shepherd
of my spirit nips at them to run.
They strike again and again,
to thwart frustration,
to redeem the day.

My feet are runner's feet;
a little rough around the edges,
but they are strong
and they are willing
and oh, I love them.

—Lisa Butler, ultrarunner

Getting the Most out of *Fixing Your Feet*

In the 25 years since *Fixing Your Feet* first came out, I have answered many hundreds of questions about foot care. I have patched thousands of feet at ultramarathons, multiday stage races, adventure races, marathons, and walking events. If there is one thing I have learned that has not changed over time, it is this: the majority of athletes wait until they have problems to learn how to care for their feet. When problems develop, everything becomes reactive—working to solve an existing problem. Preventing foot problems is best when it's proactive—working to solve problems before they develop. Being proactive takes time up front. Being reactive takes time and resources often when they are not available or when using them may jeopardize the outcome of the event. I prefer proactive.

So here you are, holding this book in your hands. Maybe it's the first time you've seen it, or maybe you had one of the earlier editions. The question is, how can you get the most value out of it?

I would start by skimming the contents, the forewords, and the introduction. That will give you a feel for the depth of information inside. Then read the chapters that catch your attention—maybe because you are dealing with those particular issues. I suggest using Post-it notes to mark important content.

If you are new to learning about foot care, set aside some time to read through "Part One: Foot Basics" and "Part Two: Footwear Basics." They are the starting point for everything else in the book. Especially read all of "Part Two: Footwear Basics" if you are shopping for shoes.

After that, if you are currently experiencing foot problems, read the appropriate sections in "Part Four: Treatments," then go back and read "Part Three: Prevention." Otherwise, read the "Prevention" and "Treatments" sections in that order to get a well-rounded understanding of foot care. You'll get more out

of the book that way. If you want to learn how to do foot care for others or as part of a medical team, focus on the "Prevention" and "Treatments" sections.

Anytime you see products that sound interesting, check them out on the listed websites. Not all of the products are right for you, but I guarantee that many are.

While the majority of readers read *Fixing Your Feet* for their personal benefit, others read it and use what they learn to help others. There are two examples of how to use what's in the pages of *Fixing Your Feet*. The first is from Tom Grow about his experiences while providing support for his wife and other runners during ultras. The second is from Nathan, whose story was also shared in the fifth and sixth editions.

TOM'S STORY

I just had to take a moment to thank you for *Fixing Your Feet*. In the last three years my wife has transitioned into an ultrarunner. In 2016 she attempted and completed her first 100-mile ultra, the Farmdale 100 in central Illinois. Leading up to that event, she competed in multiple 30-milers, 50Ks, and 50-milers. I became her support crew for each event and for her 100. We purchased your book early that year, and I devoured it as a textbook. I applied your assessments, treatments, etc., to my wife's feet. She completed her 100 and came through with great feet, minus one toenail.

Fast-forward to April 2017, the Potawatomi Trail Runs in Pekin, Illinois. My wife paced two of her friends attempting their first 100-milers. We also crewed two of her friends: one attempting his first 150-miler and the other his first 200-miler. All in all, we were crewing/supporting four runners.

The 200-milers started on April 6. The 150-milers started on Friday, April 7. The 100-milers started on Saturday, April 8. Needless to say, I was dealing with a lot of feet over the long weekend. I applied so much of the knowledge you shared in your book to keep each of their feet as healthy as possible throughout the entire event. All four were finishers! The 200-miler took third overall, and the 150-miler took second.

Additionally, individuals crewing other runners were seeing us tending to our runners' feet and coming to us to help their runners. We kept a lot of runners on the course and were able to be a part of many amazing stories!

—Tom Grow

What Tom did is a perfect example of paying it forward. But step back a moment and pause. Read between the lines: "and coming to us to help their runners." What that means is that many of the support teams did not know how to work on their runners' feet. It is my hope that some of these support people, and their runners, will take the time to learn how to manage their feet. Then I'll be even happier.

I received an email from Nathan back in 2010. His story is a perfect example of how to personally get the most out of *Fixing Your Feet*. This seventh edition is the third to include his story. Thanks, Nathan. I could not have said it better.

NATHAN'S STORY

Nathan Wilson lives in the Kimberley region of northwest Australia. The week before emailing me, he had finished the seven-day, 250K stage race known as Racing the Planet: Australia. Previously Nathan had finished some marathons and ultra-marathons, the longest one being 100K. Of the 185 starting competitors in Racing the Planet: Australia, only 118 completed the race, and most competitors had problems with blisters from the first day.

Three months before the race, Nathan bought *Fixing Your Feet*. He read it and learned a great deal about what he needed to do in preparation for this grueling event. Importantly, he learned how to deal with the problems he had experienced in earlier races. He learned how to pretape his feet and brought the right tapes in his kit. He taped his feet three times during the race. He carried seven pairs of Injinji toe socks and Teko merino wool–blend socks to wear over the toe socks. He used a lubricant at the start of each day. He used Sorbothane insoles for added shock absorption. For river crossings, he took off his shoes and socks and, once on the other side, cleaned his feet and reapplied lubricant. Each evening he cleaned his shoes and insoles. When he got into camp each day, he dried his feet and coated them with iodine and, in one instance, benzoin, to dry them further. He watched his electrolytes to avoid swelling of his feet and hands. For him, the race was an enjoyable experience.

Nathan was proactive from the beginning. Contrast that to others, who did not have adequate protection for the wet conditions, did not know how to use the contents of their "mandatory" foot care kit, had the wrong materials, did not pretape, used the wrong tape, had not conditioned their feet and bodies for the weight of their packs, and were reactive to problems.

Nathan wrote, "I realized that the part of the book that focused on working on your feet prior to a large event really had an impact on me. After reading people's stories of soaking their feet, removing calluses, and filing their toenails, I was motivated to do the same on a near-daily basis. It also motivated me to work on my ankle strength and my calves to help my feet. I suppose if I had not done this prep work, all of the taping, lubricants, toe socks, and so on would have helped some, but it might not have made such a difference. A lot of people have asked about the race and the blisters 'I must have had.' I just laugh and tell them that I didn't get a single one."

Nathan thanked me for getting him through Racing the Planet: Australia, a very tough event. I commend Nathan for doing things right. I hold Nathan up as an example of how to use the material in this book. I could not have found a better illustration of being proactive. I challenge you to do likewise.

The Best of 25 Years of Foot Care

In 1997 the first edition of *Fixing Your Feet* was published. In the 25 years since then, I have learned a lot that is worth repeating. This chapter comes from my experiences, learned in the field and shared on my blog. You may find some of this repeated elsewhere in the book, and there is a reason for that. This is important stuff. It includes answers to questions and comments I also hear over and over. Allow me to share a bit of what I have learned. I also encourage you to check out and subscribe to my *Fixing Your Feet* blog by going to fixing yourfeet.com.

MANAGING YOUR FOOT CARE NEEDS

I have worked many multiday races and have seen athletes finish a day's stage and come to medical for every little thing. The medical staff at any race should not have to manage all your foot care. You can manage the small pea-size blister on your toe. If you have hot spots, you can tape over them and check your shoes for seams. There is typically not enough medical staff to care for 100% of each runner's needs. In addition, the supply of medical equipment is limited and can easily be overtaxed by runners wanting everything done for them.

While the majority of runners don't typically carry foot care supplies in a 100-mile run, their crews need to have the supplies. A small ziplock bag will easily carry what you need and fits nicely in a hydration pack.

I am also convinced that runners need to know how to patch their feet. Running a 100-mile race with no knowledge of how to care for one's feet if and when problems develop is asking for trouble and putting an undue burden on the medical teams. You cannot assume that all medical personnel know how to patch feet—and have the best supplies for doing so.

But, in what has become a catch-22, many runners genuinely expect medical personnel to be able to manage emergencies as well as manage their feet. They think *first aid* and *medical personnel* mean foot care. In reality, many races make no provision for foot care and take an "Oh well—that's life" attitude. In fairness to medical personnel, I know anyone doing medical at an aid station will try to help any runner needing it. However, they may not have the supplies and/or the training.

ANYONE CAN BLISTER

Every once in a while, an athlete tells me they never get blisters. I advise them to never say never. Conditions change and some day that same person will get a blister. Years ago, a pro golfer lost a tournament because of a blister, a pro tennis player lost a tournament because of a blister, and an actress and a model both developed sepsis because of foot blisters.

Sometimes circumstances outside of your control lead to blisters: rain, stream crossings, heat, and humidity. Other times it's circumstances that you have some control over: socks and not changing your socks, shoes and shoe fit, skin conditions, conditioning, not using powders or lubricants, and more.

Your job is to learn how to prevent and treat blisters, so when they happen, you know how to manage them.

12 FOOT CARE TIPS FOR SUCCESS AT 100s

I decided to make a list of my top 12 foot care tips for success at 100s—whether at Western States or any other 100-mile run.

1. **Make sure your shoes fit.** That means a bit of room in the toe box and good grip in the heel. It also means that the shoes are in good shape.
2. **Make sure you wear good socks.** That means no cotton—only moisture-wicking or water-hating socks. If you are prone to toe blisters, consider Injinji toe socks.
3. **Trim your toenails short and then file them smooth,** so when you run your finger over the tip of the toe, you don't feel any rough edges or points. This goes for thick toenails too—file them down.
4. **Reduce your calluses** with a callus file and moisture creams. Trust me—you don't want blisters under calluses.
5. **Wear gaiters** over the top of your socks and shoes. This keeps dust and grit from getting inside shoes and socks. Understand, though, that the mesh in today's trail shoes does allow dirt and grit inside the toe box, even with gaiters.
6. **Use a high-quality lubricant** like ChafeX, RunGoo, SportShield, Sportslick, or Trail Toes. Do not use petroleum jelly.

7. **Know how to treat a hot spot and blister** between aid stations—and carry a small kit in your hydration pack. Early care is better than waiting until a blister has formed or until the blister has popped and its roof has torn off.
8. **Your feet are your responsibility.** Just as you have trained by running and conditioning, you should know what your feet need to stay healthy and blister-free during the race. Just as you have learned what foods you can tolerate during a race and during the heat, you need to be prepared for foot care problems.
9. **Make sure your crew has a well-stocked foot care kit** (or multiple kits) and they know, in advance, how to care for your feet. Trailside, at an aid station, is not the time to learn or to train them what you like done.
10. **Keep your feet dry when you can.** When you pour water over your head and body to cool off, lean forward to keep water from running down your legs and into your shoes. Getting wet feet or waterlogged socks can lead to maceration very fast.
11. **Consider applying Desitin Maximum Strength Original Paste or RunGoo** liberally on your feet and toes to control moisture from excessive sweat, stream crossings, snowmelt, and water poured over your head that runs down into your shoes. Reapply at aid stations. Maceration can quickly lead to skin folds, tender feet, skin tears, and blisters.
12. **Don't assume that every aid station has people trained in foot care** or the supplies necessary to treat your feet. If you have a crew, have them work on your feet. Many times the medical personnel are backed up or are dealing with more serious medical emergencies. And, truth be told, blisters are not a medical emergency. Heat stroke, heat exhaustion, dehydration, and the like are more serious than blisters.

Five Tidbits of Wisdom

1. **Taking care of your feet is your job.** Do not count on someone else to take care of your feet.
2. **Fit is key.** Shoes that are too short or that are wrong for the event will make your feet hurt and lead to problems.
3. **Your feet must be conditioned** to endure the rigors and stresses of your chosen sport or sports. Train in race conditions in the shoes and socks you will wear on race day. Work up to distances that you will tackle in your event.
4. **A little toenail care goes a long way** in preventing blisters and black toenails. Properly trimmed and filed nails will not catch on socks and will be less likely to lead to toe blisters.
5. **Calluses can and usually do lead to problems** with blisters or with the thickened and hardened skin folding up on itself when it becomes macerated from being wet. They will become painful.

THE GOLDEN RULE FOR YOUR FEET

The signature line on Mike's email caught my eye: "Treat your feet as you would have yourself be treated." As a runner, he had emailed me about one of my blog posts, and his mention of "running's golden rule" caught my attention.

Mike said, "I think it means the same as the Golden Rule: Take care of your feet and they will take care of you; treat your feet with respect and kindness, and they'll support you in tough times; be a best friend to your feet, and they'll be your best friend when you need one most."

I like that. Too often we relegate our feet to the end of the line. Sure, we buy good footwear and socks, but that's it—we forget about the feet themselves. We forget quality toenail care and then wonder why we get black toenails. We forget about callus control and then wonder why we have to deal with blisters underneath them. We fail to deal with corns, athlete's foot, and other problems common to feet. We get blisters but don't take time to figure out why we get them or learn measures to prevent and treat them.

We forget running's golden rule: "Treat your feet as you would have yourself be treated." Actually, it is pretty easy. A few minutes a day is all it takes.

BASIC FOOT CARE: IT'S YOUR JOB

In January 2006 I had the opportunity to serve on the medical team at the Coastal Challenge, a seven-day, 150-mile stage race in Costa Rica. Some 51 athletes from around the world were there to experience the trails, roads, beaches, and rain forests of a beautiful country. The people were warm and very friendly. The food was great. The scenery was fantastic; the wildlife, colorful and exotic; and the weather, hot and humid. We had great fun.

I made some observations over the course of seven days. What I want to share here is pretty basic—but what many forget.

You are responsible for your feet. Not me. Not the medical crew, if there is one. It's your job. Let me explain.

You should have a foot care kit appropriate for the length (both in miles and days) and type of event. Having a foot care kit means that you also know how to pretape to prevent hot spots and blisters, repair any blisters you get, apply any patches you have, care for your toenails, and manage calluses or any other unique features of your feet.

The medical staff doing foot care at the Costa Rica race had lines every evening. Three of us were patching feet. We had a lot of materials but quickly went through much of it. It is difficult to patch feet in the evening and then

be expected to patch feet at the aid stations the next day, and then again that evening. We would have run out of materials in a few days. Fortunately, some of the runners had their own materials and patched their own feet. I commend them. They really helped us.

You also need to come into an event with feet that are properly prepared. That means reducing your calluses so they aren't as thick. The little calluses on the bottom of your toes can quickly become bothersome. Those on your heels can ruin your whole event. Work on your toenails so they won't create toe blisters and black toenails. See the "Toe Problems" chapter (page 352) for more on toenails. Put miles on your feet to condition them for the rigors of the event you will be doing. Running 20 miles a week will not prepare you effectively for doing a 150-mile, seven-day event. Also, prepare your feet by having quality shoes and socks—not ones that are worn down.

So what's the bottom line? It's your job to be prepared. It is not the job of the medical staff to patch you up every night and every morning, and at every aid station during the event—especially when your feet are not prepared coming into the event. Many times we can work small miracles, but please work with us. Then watch us as we work, and take the time to learn so the next time you can help us out.

Lisa Bliss, MD, the former Badwater Ultramarathon medical director, supports my comments. "If runners think we are there for blister care, then they will not take the time or effort to learn about it themselves and train appropriately in advance of the race," she says. "I don't mind helping; I just don't want runners to be helpless about prevention and treatment."

SELF-EDUCATION

Podiatrist Rob Conenello, who managed feet at the seven-day Sahara Race in Egypt, said, "I would go daily to the athletes' tents to help them prevent injury. The key is to educate the participants on how to tape themselves and care for small problems."

Self-education takes many forms. It's getting your feet in the best shape and condition possible for the events you do. It's getting inside your footwear. Literally. Check the insoles. It may be a basic, nonsupporting piece of heavy cardboard. Consider replacing them with supportive insoles. Check for bad seams and stitching in the shoe. Know your foot type, and research reviews to find the best shoes. Know what makes for a well-fitting shoe.

Find what works best for your feet. Learn how your skin reacts to powders and lubricants to reduce friction. Learn how to tape your feet and patch a

blister—in different ways with different products. Learn how to trim your toenails. Learn how to strengthen your feet and ankles. Learn what words such as *proprioception* and *onychocryptosis* mean and how they affect your feet.

ARE YOUR FEET PREPARED?

When I talk to runners preparing for a race, some seem to be well prepared. They know about blisters and what kind of socks to wear. They either have experience with foot issues or want to learn more. Others seem unconcerned or unprepared.

The main question I ask is, "Are your feet prepared?" The tips below can easily apply to anyone running or walking a marathon or doing a similar event. Are they magic? No. But many people, even athletes, seem to forget the commonsense tips that can make their event a better experience.

Preparing Your Feet for a Race

BEFORE THE RACE

- Toenails that are too long catch on socks. Trim them short.
- File toenails smooth so no rough edges are felt.
- Use a callus file to smooth calluses.
- Clean out lint and junk from inside shoes.
- Check your shoelaces and replace if frayed.

MORNING OF THE RACE

- Pretape your feet if you have problem spots.
- Apply a layer of your favorite lubricant or powder.
- Smooth your socks around your feet.
- Avoid tying laces too tightly.

DURING THE RACE

- If you feel a hot spot, apply a pad, a bit of tape, a dab of lubricant, or even an energy gel wrapper between your sock and shoe.
- Loosen shoelaces if you have pain on the top of your foot.

AFTER THE RACE

- If you have blisters, soak your feet in Epsom salts and warm water three times a day.
- Drain blisters only if they are in a pressure area.
- If feet are swollen, elevate and ice.

WITH FOOTWEAR, TRY THEN ADJUST

A triathlete recently said after running a marathon, "My left instep is still quite bruised. It took a pounding from the stretchy triathlon shoelaces that I used and—whoops!—never adjusted quite properly. Lesson learned: too loose is better than too snug."

In other words, she put the laces in her shoes and ran in them without adjusting them to fit her feet. This is an easily made and common mistake. When you make changes to your footwear, learn to try . . . and then adjust as necessary. You can apply this same lesson to other parts of your footwear.

A few don'ts when it comes to footwear:

- Don't wear new shoes for a walk, race, or hike without trying them first—it's easy to miss a bad fit, a rough inside seam, or a wrong-fitting arch. Walk around the house in them for a few hours.
- Don't wear new socks in an event without first trying them inside your shoes. The new socks may be thicker or thinner than your previous socks, making the fit different.
- Don't replace insoles without checking whether they are thinner or thicker than the old ones, which can change the space for your feet inside your shoes.

DON'T GIVE UP ON FOOTWEAR

Maggie was having tremendous problems getting a good fit with her footwear. She wrote, "This is by far the most frustrating thing I have experienced in my quest to find my personal 'very best way.' Occasionally I have come up with a combination that has had very acceptable results, only to have the same strategy fail miserably on the next outing."

Many more people have the same problem. Some have had only a few minor problems, while others have had lots. I like to hear from those who never have foot problems; they may be doing everything right, be genetically blessed with good feet, and likely have put lots of miles on their feet in order to have the right conditioning. Others, such as Maggie, have tried every idea under the sun—without success; these are the ones I love to talk to. They are dedicated to finding what works and don't give up.

Maggie and others are on a quest to find the best fit, as well as the best shoe and sock combination possible. They love being outdoors, running, hiking, or walking. It is a part of who they are. But they want to do it with happy feet.

You may be frustrated, as Maggie was. My advice? Don't give up. There is a solution. There are shoes out there that will fit. In your search you'll learn about fit, socks, insoles, orthotics, lacing techniques, heel counters, forefoot

width, pronation, supination, shoe lasts, narrow feet, wide feet, Morton's toe, bunions, and much more. Read shoe reviews in magazines. Do online searches on different shoes with the word *reviews* in the search box. Quiz your shoe store salesperson. Ask questions. Try different pairs by different manufacturers. Don't leave the store with a shoe that doesn't feel right. Don't settle for second best. Your feet deserve the very best.

PREVENTING BLISTERS

If there is one thing I have come to know, it's this: the very best way to prevent blisters today may not work tomorrow.

I wrote the above in response to a hiker who said he knew the secret to preventing blisters. He wrote, "The very best way to prevent blisters is to wear sock liners under your socks. Nothing works better to prevent blisters."

I wrote back to him, "There is not *one* 'very best way' for everyone to prevent blisters. I've patched thousands of feet and have seen it all and heard it all. I feel there is a very best way for each of us. It may mean using powder, lubricant, liner socks, double-layer socks, toe socks, pretaping, toughening your skin, keeping your skin as soft as a baby's bottom, and a host of other ideas. It may also be a combination of ways. Just understand that the very best way today may fail tomorrow. It's important to know your options."

Many others have learned this the hard way. They love their calluses, only to get deep blisters underneath. They wear the wrong socks. They fail to get the best fit possible. They don't trim toenails and then blister on the tips of their toes. They find that yesterday's solution is now today's blister. It can happen to anyone—and it usually does.

Many people share their "very best way" through social media. Someone asks a question about a foot or shoe problem, and sometimes more than 100 suggestions are made. I appreciate the solutions that people find. I've found them too. I've heard the comments, "Wow! My blisters are gone. I found the best socks." That's great. I'm happy. But be careful. Take a bit of time and know your options. Socks are good, but learn how to tape. Learn about insoles, fit, lacing options, and more. You know your own feet better than anyone else, so you have to experiment to find what works best for you.

LET YOUR FEET BREATHE

Are your feet comfortable? I mean, do they get to relax like the rest of you? If you are like most people, you get home from work and change into something comfortable. You know, loose-fitting clothes that are soft.

So what do you put on your feet? Socks and comfortable shoes? Flip-flops or sandals? Or maybe you even choose to go barefoot. What's the right choice?

In the same way that your body needs something comfortable, your feet do too. After a day cooped up in socks and shoes, or nylons and heels, give your feet a break. Let them out for some air. They need to breathe too. Wiggle your toes. Rub your feet. According to the American Podiatric Medical Association, our feet have approximately 250,000 sweat glands and produce as much as a pint of moisture per day. Your feet need their space, and they need to be let out for air at least once a day. Be nice to your feet and let them breathe.

MILES ON YOUR FEET

One runner I admire and consider a close friend is Catra Corbet. She has proven herself as the "owner" of the Ohlone Wilderness Trail. Many years she will run an Ohlone 100 or 200 just because she loves the trail so much. In talking to Catra after she completed one of those 200-mile runs, she mentioned that she had no blisters. I remember years ago taking a picture of her taping her toes. She used to tape every toe. I have a photo of her with a heel blister too. Now though, Catra runs blister-free. What's the difference?

I believe Catra's success with blister-free feet came through the miles of running she puts on her feet. She doesn't run short runs, she doesn't run a couple of times a week—she runs a lot. Many of you know Catra, or have heard of her, and know how much she runs. She has found the right shoes for her feet—Hokas. She also wears Drymax socks—a favorite of mine. Someday it may change, but for now, that's what works.

But it's not just Catra. I have worked medical and provided foot care at hundreds of ultramarathons, adventure races, walks, and multiday races and have seen the same thing.

At the Western States 100 Michigan Bluff 55.7-mile aid station, for example, the top 20–30 runners come through without needing any type of foot care. There may be one or two who get some type of foot care from their crew down the road, but if so, it is generally pretty minor. Most often, if anything, they just change socks or shoes.

As the race progresses and more runners come through, we begin to see runners needing help with foot care. The farther back the runners are, the more foot care they need. Not every runner, but many of them. And many of them have multiple issues. Not just one blister, but quite a few. The more problems they have, the more complex the repair, and the longer it takes to complete the fix. This becomes a huge issue if they are trying to stay ahead of the cutoffs at each aid station. I remember a runner several years ago whose

feet we patched up. At the next aid station, she needed more care and wanted to get out of the aid station quickly to avoid the cutoff. That meant not doing a quality patch job—and she came back to the aid station after going a bit down the road. She knew her race was over.

So the point here is that you need to put lots of miles on your feet in order to train them for long conditions. You can run 10 miles a day, day after day, and then try to do a 50-miler, and odds are that you'll have problems. You have 10- to 15-mile feet—not 50-mile feet.

This applies to walking, running, adventure racing, hiking, and any activity where you use your feet. It all boils down to how many miles you are putting on your feet.

We can't all be the top runners. Many runners don't have unlimited time to train. So what can the rest do? Make sure you get some long runs, especially closer to your race. Make sure you have the best possible fit in your shoes. Make sure you wear quality socks. Reduce your calluses. Learn proper toenail care. Change your socks and shoes as necessary for the conditions of your run or race.

WHAT CHANGED?

Let's begin with a story from an unnamed runner: "I've never had problems with blisters in the past, except for one little problem four years ago. So this last weekend I start the AT100, and by mile 16 I have hot spots on the sides of both heels. Got out the duct tape and did my thing, but by mile 32 both heels have blisters going, and I have hot spots on the balls of both feet as well. I retape, moleskin, and so on, but to no avail. By mile 48 the blister on the heel of my right foot has broken; the hot spots on the balls of my feet have turned into half-dollar-size blisters. Retape and go. At mile 57, I retape again; the side of the heel of my right foot is bleeding. As I came back into an aid station, the blister on the ball of my right foot had popped, and I rather painfully squish with every step. By this point I've had it, and at mile 67, I drop. I did nothing different than I've ever done—same shoes, same socks, and same lubricant. Everything was identical to my other 30 races where I've had no problems whatsoever. So what happened here?"

Blisters can be puzzling because they seem to develop on different parts of the foot at different times and for different reasons. If this happens to you, a question is in order: "What changed?"

The answer is sometimes simple. Other times, it's more complex. People tell me they never blistered before today, or they blistered in a new area, or

had problems with their toes, or something else. Or they tell me they worked hard to rid their feet of calluses and now something has happened and their feet are trashed. Some tell of bad blisters deep underneath calluses. Or of bad toe blisters.

Never mind the problem. The question is always the same: "What changed?" Another angle on the question is, "What felt different?" Even if you used the same shoes, socks, and lubricant as before, other factors could be different. Perhaps there was a change in hydration, temperature, and humidity. Maybe your training changed and you didn't put in the necessary miles before the event. Trail factors include slope, dust and grit, rocks, mud, and water. Perhaps water went down your legs while you were sponging off, or you didn't wear gaiters, or the mesh upper of the shoes allowed dust and grit inside that caused the hot spot. The insoles could be old and should be replaced if any of their fabric is folding down, or if a rough edge is exposed. The shoe's heel counter could be too rigid, or the heel counter fabric frayed, or the juncture of the insole and heel counter bothersome—all factors that could cause blisters. It could even be how tight you tied your shoes to secure your heel in place and the amount of heel movement. Socks often bunch up and cause problems. Maybe you changed to a new sock or never changed socks. How quickly after a hot spot developed and how well you taped the hot spots and blisters could also be a factor. Many times we blister more easily in certain places when walking as opposed to running, and that could also have been a factor. The lubricant you put on your feet could have worn off and was not replaced, or the lubricant softened the skin and led to blisters. Maybe your toenails were not trimmed and caught on your socks, causing toe blisters. The toe box could have also been too short or too low. Your feet could have been wet too long and the skin macerated into blisters. You could have slightly turned an ankle and thus changed your gait, causing pressure and blisters in never-before problem areas. And the list goes on.

Chances are that *something* changed. You need to figure out what it was. It could be something simple or complex or even a combination of changes.

Many athletes find that they have been fine and blister-free for years, and then an event comes along and their feet are trashed. Sometimes it is just one of those days. No two events are the same; few of us can do events time after time and not experience problems with legs, stomach, mind, or feet. So if your feet had been good and healthy and they blistered or had other problems, ask yourself, "What changed?"

TRIMMING TOENAILS

How hard can it be to trim your toenails? For a lot of folks, it's a huge deal and something they never do. In all the years I have been patching feet, I have observed that untrimmed toenails are the number one cause of problems leading to toe blisters and black toenails. Socks will catch on nails that are too long or that have rough edges. This puts pressure on the nail bed, leading to blisters under the toenails, blisters at the tips of the toes, or painful toenails as they are pushed back into the cuticle. Nails that are too long are also prone to pressure from a toe box that is too short or too low.

So what are some tips to keeping your toenails under control? Toenails should be trimmed straight across the nail—never rounded at the corners. Leave an extra bit of nail on the outside corner of the big toe to avoid an ingrown toenail. After trimming toenails, use a nail file to smooth the top of the nail down toward the front of the toe and remove any rough edges. If you draw your finger from the skin in front of the toe up across the nail and can feel a rough edge, the nail can be filed smoother or trimmed a bit shorter. This is especially important before a long run, hike, or race.

You can use an emery board from your drugstore, a cheap "use it a few times and toss it" file. Better yet, invest a few bucks in a nice metal file that will last a long time and serve you well. To trim your nails, there are regular nail clippers, nippers, and scissors made exclusively for thicker toenails. If your local drugstore or pharmacy doesn't stock them, search online for a great selection.

A little bit of care in toenail trimming goes a long way in preventing toe blisters and black toenails, as well as in making your socks last longer.

THE LITTLE-TOE TRIANGLE

Most of us have two. Little toes, that is. The number of problems with these little appendages has impressed me. It's all about that little triangle of skin where most problems occur.

If you look at your little toes, your toes may be well rounded and soft. Or they may have the triangle look where the skin on the bottom of the triangle is hard and callused. The skin on the bottom of the toe forms the point of the triangle. The problem is that on many of our little toes, the skin on this bottom point is hard and callused. The hard skin is prone to blisters forming underneath as pressure from the toe box creates shear. Often this hardened skin is partially under the next toe, another pressure area. The outside of the foot, the little toe area, is often more wet and damp than the rest of the foot, leading to

macerated skin. Once softened, this skin can easily blister underneath. Worse yet, the skin can separate, leading to major skin problems.

One runner whose feet I patched at Primal Quest had struggled for the whole event with macerated skin on his feet. When he came into a transition area, the skin had stripped off the bottom point of this triangle—on both feet. I know it was painful and uncomfortable. Once patched, he continued on as best he could.

The little toe is so small that it is hard to patch well. The use of Hypafix, Micropore, or a kinesiology tape is a good choice. Even better, in my opinion, is reducing the hard callused skin. Injinji toe socks can also be helpful. Good shoes are vital too. Shoes with a good toe box that allows the toes room to wiggle are best.

During a race or hike, be watchful of your little toes. This small but potentially troublesome triangle of skin deserves special care.

INFORMED ATHLETES

I am always happy to see informed runners and racers. They know, for the most part, what their feet need. The athletes with the fewest foot problems share the following characteristics:

- They pretape their feet to protect against hot spots and blisters.
- They use moisture-wicking socks.
- They change socks and shoes when necessary and before problems set in.
- They know about their foot problems—knowing when they have Morton's foot, bunions, calluses, bad toenails, or anything else out of the ordinary—and how to take care of them.
- They have tried to rid their feet of calluses, knowing that a blister under a callus is the worst kind to get.
- They use a good, state-of-the-art lubricant to avoid friction.
- They know the importance of shoes that fit well.
- They file down their toenails.

STILL LEARNING

What disturbs me is that there are still large numbers of athletes who seem to give little thought to their feet. The athletes with the most foot problems share the following characteristics:

- They shove feet into shoes without straightening their socks.
- They wear the wrong socks and do not look inside their socks for seams that cause toe blisters.
- They have sacrificed fit and buy a shoe because a friend recommended it and not because it was the best shoe for their feet.
- They try to fix blisters with adhesive bandages.
- They fail to change their socks often enough when their feet are wet.
- They fail to trim their toenails and wonder why they get black toenails and toe blisters.
- They fail to put in the miles that their feet need to be toughened for the rigors of racing.
- They speed through checkpoints, feeding their faces but not tending to their feet.

As Billy Trolan, MD, said in the foreword for the first edition of *Fixing Your Feet,* "The one factor that continues to amaze me is that individuals and teams will spend vast amounts of money, time, and thought on training, equipment, and travel, but little or no preparation on their feet. Too often the result has been that within a few hours to a few days, all that work has been ruined. Ruined because the primary mode of transportation has broken down with blisters." That was written in 1997 and is still true today.

WHAT WERE YOU THINKING?

Tonya Olson and I were working side by side as runners came over for our help at the Michigan Bluff aid station at Western States. She is a quick learner and asked a lot of questions—which was good. Twice, she seemed perplexed, as was I.

The first time was with a runner who had stubbed her toe, which lifted the big toenail off the nail bed. There was blood under the nail. We noticed more than blood. There was also a large buildup of residue from toenail fungus. I drained the blood blister but could do little to reduce the angle of the nail. It stuck up quite a bit. Putting pressure on the nail to try to get it to lie flatter didn't work. It hurt her too much. There was too much nail fungus buildup under the nail. That is common with nail fungus. I ended up running a strip of Kinesio Tex tape from the top of the toe over the tip and underneath. Then I wrapped a length of tape around the toe to help hold the nail down. I talked to the runner about her toenail fungus while I worked. She was aware of the fungus but hadn't done anything about it.

The second case was a runner who came in with macerated feet. We cleaned his feet and looked them up and down for anything to patch. Tonya pointed out a bunch of opened skin between his toes. Not a couple of tiny tears, but a lot of open skin around several toes. The skin was soft and wet and had torn open. It looked pretty painful. It was athlete's foot. As I worked on his feet, we talked to the runner. He worked in a running store. The advice I gave him was to get out of shoes during the day and let his feet air. And to start taking a proactive approach to medications to rid his feet of athlete's foot.

Both cases were interesting in that they knew they had a preexisting problem with their feet. And both had chosen to do nothing, to ignore the condition. Maybe it would go away on its own.

The problem was that these two runners had entered this 100-mile run; paid a large amount of money for gear, travel, crew, and pacers; and spent a lot of time training—without thinking about their preexisting foot conditions: toenail fungus in the first case and athlete's foot in the second.

Each condition was not enough to end a run on a normal day. However, this was a 100-mile run. The trail was wet and full of rocks, roots, sand, and dirt, and this was a race where things "happened."

A stubbed toe led to a raised big toenail that now pressed even more on a toe box. It must have hurt—especially on the downhills. The athlete's foot led to easily opened and torn skin between the runner's toes. The wet conditions had made it worse. That open and raw skin must have hurt too.

As I worked on their feet, I talked to both and told them they needed to take care of their conditions. I really wanted to say, "What were you thinking?" Truth be told, I wanted to yell it at them: **"What were you thinking?"**

Both runners had made choices that jeopardized their finishing. When you invest all that money and energy into a race, why not make sure the two feet that are responsible for getting you there are in the best shape possible?

PART ONE

Foot Basics

1 Seeking Medical Treatment

The information and advice given in this book is provided to athletes to use in their efforts to resolve foot problems. Not all foot problems or injuries will be resolved successfully by following the tips or using the products mentioned. There are times when it is important to seek professional medical help.

Never ignore an injury. Pushing through an injury or returning to your sport too soon after being injured can lead to additional injuries. You do not want to turn a temporary injury into a permanent disability. Too often athletes rely on self-diagnosis rather than consulting with a medical specialist. If during or after running or hiking, you have persistent foot problems or recurring pain that you cannot resolve, seek medical treatment from a medical specialist who can provide his or her expertise for your problem.

Primary Medical Specialists for Feet

Refer to Appendix C, "Medical and Footwear Specialists," for information on finding the specialists listed in this chapter.

An orthopedist is a medical specialist that focuses on injuries and diseases of the body's musculoskeletal system. This includes the upper and lower extremities and the spine. Look for an orthopedist who specializes in the foot and ankle. The American Academy of Orthopaedic Surgeons and the American Orthopaedic Foot and Ankle Society can provide referrals.

Sports medicine doctors specialize in sports-related injuries. They are typically doctors of internal medicine with additional training in sports medicine. When treating athletes with lower-extremity injuries that do not improve with their initial treatment, they may refer the athlete to a physical therapist, podiatrist, or orthopedist. Most are members of the American College of Sports Medicine (which does not provide referral services).

A podiatrist is a doctor of podiatric medicine (DPM) who works on the feet up to and including the ankles. Podiatrists specialize in human movement and in medical and surgical problems, including foot diseases, deformities, and injuries, such as nail, skin, bone, tendon, and diabetic disorders. They treat such disorders

with surgery, custom-made orthotics (shoe inserts), injections, casting and braces, prescription medication, and medicated creams and ointments. The American Podiatric Medical Association and the American Academy of Podiatric Sports Medicine can provide referrals.

A doctor of osteopathic medicine (DO) takes the same licensing exams as an MD, but additional schooling includes training in the musculoskeletal system.

If you have chronic foot problems, or you are uncertain about what your feet are trying to tell you through their pain, consider consulting a physical therapist, podiatrist, or orthopedic surgeon. Listen to your whole body and especially your feet. Be attentive to when the pain begins and what makes you hurt more or less. Then be prepared to tell the specialist about the problem, its history, what you have done to correct it, and whether what you did worked or made the problem worse.

There is a wide range of skill overlap between physical therapists, orthopedists, and podiatrists. All can diagnose most of the same foot problems; the level of skill in treatment can vary significantly. When searching for a medical specialist for your feet, talk to doctors about their training, experience, and whether they have a specialty field. Some orthopedists and podiatrists specialize in sports medicine, and these would be my first choice. Weigh this information when making a decision about whom to turn to for help. Additionally, a variety of other specialists can provide assistance in strengthening, alignment, rehabilitation, and footwear design and fit.

Foot Specialists

A certified pedorthist (C.Ped.) works with the design, manufacture, fit, and modification of shoes, boots, and other footwear. Pedorthists are board certified to provide prescription footwear and related devices. They will evaluate, fit, and modify all types of footwear. A C.Ped. can help find a shoe built on a last (the form over which a shoe is constructed) that best matches a person's feet, and then construct a custom orthotic that meets that person's particular biomechanical needs and interfaces with the shoe in a way that improves its fit and performance. The American Orthotics and Prosthetics Association and the Pedorthic Footwear Association can provide information and referrals.

A physical therapist (PT) is a movement expert who is skilled in the diagnosis, management, and prevention of musculoskeletal disorders. PTs are licensed to help with restoring function after illness and injury. Most work closely with medical specialists. Physical therapists use a variety of rehabilitation methods to restore function and relieve pain, such as massage, cold and heat therapy, ultrasound and

electrical stimulation, and stretching and strengthening exercises. There are also masters of physical therapy (MPTs) and doctors of physical therapy (DPTs). The American Physical Therapy Association can provide referrals. Generally, you do not need a referral from a physician to see a physical therapist, but it's good to consult your insurance provider to be sure.

An athletic trainer (AT) is licensed to work specifically on sports-related injuries. Athletic trainers work under the direction of physicians, as prescribed by state licensure statutes. Services provided by ATs include prevention, emergency care, clinical diagnosis, therapeutic intervention, and rehabilitation of injuries and medical conditions. The National Athletic Trainers' Association can provide referrals.

Massage therapists work with athletes in reducing pain and tightness in muscles, tendons, and ligaments—the body's soft tissues. The American Massage Therapy Association can provide referrals. Look for either a licensed massage therapist (LMT) or one board-certified in therapeutic massage and bodywork (BCTMB).

A chiropractor is a doctor of chiropractic (DC). This licensed health care profession emphasizes the body's ability to heal itself. Treatment typically involves manual therapy, often including spinal manipulation. Other forms of treatment, such as exercise and nutritional counseling, may be used as well. DCs specialize in the alignment of the body's musculoskeletal system and often treat pelvic, back, and neck pain. Some may specialize in sports injuries. There are also certified chiropractic sports physicians (CCSPs). The American Chiropractors Association and the International Chiropractic Association can provide referrals.

When the time comes to seek medical attention, ask others in your sport for referrals, ask at your local running or outdoors store, or search online. If you have a choice, choose a sports medicine specialist over a general doctor. For contact information for the professional organizations previously mentioned, check "Medical and Footwear Specialists" on page 419.

You Can Have Healthy and Happy Feet

This chapter was suggested by a reader who commented, "Many people don't have a clue about their own feet, about how things work and why, or about regular and preventive maintenance." As athletes, feet should be one of our most important concerns. They get us where we are going and back again. We toss on a hydration pack or backpack and trot off without a thought as to what that means to our feet. We shove them into shoes and boots without taking time to look at them. We add miles too fast, stress them with uneven terrain, let them become too dry or too wet, and then wonder why they hurt.

THINK "FEET"

Many foot problems happen because we forget to think about our feet. The only way to have feet that are healthy and happy is to be proactive in foot care, to stay on top of minor problems before they become major problems. That means buying high-quality shoes and socks, taking care of your skin and toenails through self-care, conditioning your feet with the miles you need for the sports you will participate in, not stressing them beyond what they can do, and resting them when they need rest.

A WEEKLY RITUAL

Once a week before putting on socks, take a few seconds to run your hands over your feet to check for anything out of the ordinary. If you find something, refer to the index to find the corresponding section in the book. Ask yourself some questions:

- Do I see any redness?
- Are there cracks or cuts in the skin?

- Do my nails need trimming?
- Do my nails look discolored or thick?
- Do the nail beds have redness or tender areas?
- Do I see any scaly skin?
- Does anything itch?
- Do I have old blisters that need attention?
- Is there pain anywhere?
- Do I have callus buildup that needs attention?
- Do I see any corns or plantar warts?
- Does anything feel odd?
- Does anything hurt?

TALK TO YOUR DOCTOR

Ask your doctor to do a foot check whenever you have a physical. He or she can help catch problems before they become medical emergencies. Ask what you should watch for. Typically watch for sores that don't heal, ingrown toenails, swelling, cold feet, numbness, a burning or tingling feeling, or unresolved or abnormal pain—even melanomas. Problems with our feet can develop into long-term health issues that can rob us of our mobility and independence. The American Orthopaedic Foot and Ankle Society says that many of the more than 4.8 million visits to doctors made each year for foot and ankle problems could have been prevented with better footwear and foot care.

SUMMER FOOT CARE BASICS

Summers are fun. We get outdoors and explore. We walk, hike, run, and participate in sports. Many of these activities, however, put added stress on our feet. This section discusses what we should do to prepare our feet for summer.

Many of us go barefoot in the summer. If you spend time outside, watch for cuts and abrasions to your skin. Use an antibiotic ointment if necessary. Going barefoot will cause the skin on the bottom of your feet to harden and become calloused. The problem occurs when a blister develops under a callus. If you prefer to keep some calluses, try to keep them under control and not too thick. Use a pumice stone or callus file to keep them manageable. Also watch for cracks in the heels. These cracks are called fissures and can be several layers of

skin deep. Once cracked, the skin has to heal from the inside out. The use of a skin moisturizer in the morning and evening can do wonders to keep your feet in shape. When applying a moisturizer or callus-remover cream in the evening, occasionally wrap your feet in a plastic bag or plastic wrap to hold the cream on the foot. Check out chapter 28, "Skin Disorders," for more information.

TONYA'S TIP *Spa Socks*

Spa socks are a good option as well. These socks are lined with moisturizing gel on the inside and work wonders for dry feet when you wear them at night. They aren't made for walking around in, though. Your feet will slide around in them, so be careful. You can search for them online.

—Tonya Olson, physical therapist

When you wear flip-flops and sandals, be aware that the rules for going barefoot apply here as well. You can also develop a very thick and hard "corner" of skin at the edges of the heel. Be attentive to the condition of the skin on the bottom of your feet, and care for it as described previously.

Keeping skin soft can help the toes. Many of us develop a hardened layer of skin at the bottom of our toes, especially the baby toes. This can easily develop into calluses and then blister. A file and skin moisturizer can help.

Toenails need to be kept trimmed and filed smooth. Trim them straight across to avoid an ingrown nail. File the nail smooth, so when you draw your finger across the tip of the nail, you can't feel rough edges. Nails that are too long or have rough edges can catch on socks and push the nail back into the nail bed. They also hit the front and top of the inside of the toe box, putting pressure on the nail, which can cause black nails. If the nail comes loose, be sure to keep it covered with tape or an adhesive bandage so it won't come off when pulling socks on or off.

This is a good time to drag all your shoes out of the closet and give them a once-over. Check for worn-out uppers, worn-down soles that could change your gait and cause problems, and compressed midsoles that offer no cushioning or support; put these shoes aside and save them for gardening and chores. For shoes that are in good shape, check for worn-out, paper-thin insoles, and replace them to give the shoes more life.

Strong ankles make walking, hiking, and running easier. Use a wobble board or ankle exercises to strengthen these important joints. A good exercise is to stand on one foot, or even on a soft pillow, with arms outstretched; when

you master this, close your eyes. Ankle exercises help to promote better balance, ankle strength, and the ability to respond in midstride to changes in the terrain. Refer to chapter 22, "Strains, Sprains, Fractures, and Dislocations" (page 305), for ankle-strengthening exercises.

WINTER FOOT CARE BASICS

Because you're not barefoot or in sandals as much in the winter, you may forget to check your feet as often as you do in the summer. But you still need to work on your skin and toenails and keep calluses in check. In addition, watch for dry skin. The cold, snow, and ice make it important to wear good socks and keep your feet warm. The thick socks can make your feet sweat more, so watch for athlete's foot; the use of antifungal foot powder can help prevent problems. Winter is a good time to go through your sock drawer and toss old and worn socks. Do the same with shoes, replacing old insoles and laces and, if necessary, tossing the shoes too.

AGING FEET

Being aware of how your feet change as you age can help you prepare and make good choices. At a meeting of the American Academy of Orthopaedic Surgeons in Orlando, experts with the Foot and Ankle Society described the variety of foot problems that emerge with age and how to tell which ones can probably not be blamed on normal aging.

Cherise M. Dyal, MD, the former chief of the Foot and Ankle Division of Orthopaedic Surgery at the Montefiore Medical Center in New York, explained that several things occur naturally with aging: "The size increases as your feet get longer and wider; you lose some of the padding on the bottom of your foot, so you thin out your fat pad and tend to lose some of the spring in your step; your foot tends to become a little stiffer, so you lose some of the range of motion in your foot and ankle; you tend to have some problems with balance; and there is a very mild settling of the arch that's seen as a flattening of the foot. Those are the natural changes."

It has been well documented that foot problems increase with age. A good resource as we get older is the book *Great Feet for Life: Footcare and Footwear for Healthy Aging* by Paul Langer, DPM. Although the book is out of print, you may find a copy by searching online. According to Langer, the most common foot complaints by older adults are toenail and skin problems, calluses or corns, swelling, bunions, and arthritis.

Here are some tips to deal with aging feet.

- Make sure to have your feet sized each time you buy shoes.
- Choose shoes with additional cushioning and support.
- Switch to insoles with more cushioning in the heel and support in the arch. Sorbothane and Spenco insoles with gel are good choices.
- Pay close attention to your toenails. They often thicken as you age, so be sure to keep them trimmed and filed properly.
- Do not minimize or ignore foot pain.

10 Easy Steps to Happy Feet

Here are my top 10 foot care tips to keep your feet healthy and happy. Each of these tips is explained in depth in this book.

1. Make sure your footwear fits.
2. Buy high-quality footwear.
3. Wear moisture-wicking socks.
4. Practice self-care of your feet.
5. Manage your toenails.
6. Strengthen your feet and ankles.
7. Rest your feet.
8. Condition your feet for your sport.
9. Learn how to prevent blisters.
10. Carry a small foot care kit.

Sports and Your Feet

Running, hiking, and adventure racing place extreme demands on our feet. Soccer, football, and court sports stress the feet and ankles with their quick changes in direction and sudden stops. Skiing and snowshoeing encase our feet in unforgiving hard boots that also stress our ankles. The surfaces we play and compete on vary from dirt, rock, grass, asphalt, and concrete to wooden courts, tracks, snow, and ice. Every sport offers a wide range of difficulty. We challenge ourselves with ultramarathons on trails or roads. We test our limits in adventure races under extreme conditions. We tackle the multisport fun of duathlons and triathlons. Our sport may last a few hours or multiple days. Whatever our sport, our feet take a beating.

A run may be a relatively short road 10K or a grueling ultrarunning event of 100 miles with thousands of feet of mountainous ascents and descents. It may be in a short- or medium-length duathlon or triathlon, or a longer Ironman or Ultraman triathlon. There are also further extremes: 24-, 48-, and 72-hour runs; six-day runs; and 1,000-mile races. The terrain may be paved roads, tracks, fire roads, trails, cross-country, or any combination. You may run without any gear; with a single water bottle; or with a fanny pack or lightweight backpack loaded with extra socks, food, and water bottles.

A hike may be a day trip with a day pack, an overnighter with a midweight 40-pound backpack, or a 10-day High Sierra trip with a pack that tips the scales at 65 pounds. You may be a traditional backpacker with a full-size pack that holds all the comforts of home, a fast-packer with a 30-pound pack, or an ultralight backpacker with a 16-pound pack. Typical backpackers may cover 6–10 miles in a day, ultralight backpackers can easily cover 30 miles, while fast-packers may cover 40 or more miles. The hike duration may be a night in your local hills, a week in the desert, three weeks in the Sierra, or several months on the Appalachian Trail or Pacific Crest Trail.

Many athletes are choosing multiday running and walking events. The event that started the rage is Racing the Planet's seven-day stage races, where

participants carry all their own gear, including food, as they navigate 150 miles in places such as China, the Sahara, and Chile. Racing the Planet's events, the six-day TransRockies Run, and other similar events are geared for people looking for adventure and challenges in a doable event. Of course, this multiday format also brings with it lots of foot problems.

Adventure racing has included events with names such as Primal Quest, Eco Challenge, the Raid Gauloises, and the Beast of the East. However, the list of current races has declined. These are typically competitive team races with four participants who must all finish together. Combining sports disciplines such as trail or cross-country running, mountain biking, rappelling, climbing, kayaking, canoeing, horseback riding, swimming, and glacier climbing, these races pose challenges along an unknown course with constantly changing terrain. Many are multiday events over distances of up to 450 miles. In these team events, the whole team is only as fast as the feet of its slowest member. Robert Nagle, one of the world's best adventure racers, recalls his experiences in the 1996 Extreme Games: "Our team had a strong and growing lead when my feet caused us to grind to a crawl. We continued, barely, losing more than 12 hours in the process, but still managed to take third place." He remembers that ESPN continued to show tapes of his feet 16 months after the event! After that experience, he worked hard to perfect a foot care regimen that would prevent such a disaster from happening again.

Most sports require considerable use of the feet, and participation in these sports requires an athlete to keep his or her feet happy and healthy. Many of these athletes have learned the finer points of keeping their feet in shape. They rely on the many sources of conventional wisdom about foot care. But while much of this wisdom is good, the best advice often comes from athletes who, through trial and error, have found unique solutions for the prevention and treatment of their foot problems. Ronald Moak, an Appalachian Trail thru-hiker (1977) and Pacific Crest Trail thru-hiker (2000), sums it up best: "I would like to think that after 30 years of backpacking, I'd have solved the little dilemma of my feet. But, alas, I'm not that naive." Ronald has the right idea—it's good to listen to all forms of advice and then try different things. Don't be afraid to go against conventional wisdom. Just because it didn't work for others doesn't mean it won't work for you.

SPORT SIMILARITIES

What do the aforementioned sports have in common? Foot-stressing sports have many similarities. They pound the feet, stress the joints, and strain the

muscles, often to unnatural extremes. They may take place over a day, yet often are done over several days or even a week or more. When athletes participate in these sports, their feet become highly susceptible to hot spots, blisters, and problems with toenails, stubbed toes, bruises, sprains, strains, heel spurs, plantar fasciitis, and Achilles tendinitis. Often unbeknownst to athletes, issues with their feet can change their gait and lead to muscle and skeletal imbalances and the myriad problems that brings. All of these sports can be more enjoyable by solving these common foot problems.

Runners put considerable weight on their feet with each step. Though hikers move more slowly than runners, they often find their feet stressed by the weight of a fully loaded hydration pack or backpack. Adventure racers may stress the feet faster in shorter events or longer over multiday events in which they compete in multiple sports and carry the special equipment they require. The longer multiday adventure races often tax the feet more than we can imagine with the regular exposure to water, constantly changing adverse conditions, and lack of time to do proper foot care.

In *Long-Distance Hiking: Lessons from the Appalachian Trail* (Ragged Mountain Press, 1998), Roland Mueser describes what he found when he surveyed hikers:

> *Problems with feet were endemic. Half of the hikers experienced blisters at the start; many of these were attributed to thrusting tender feet into stiff, heavy boots. During his first few days in Georgia, one hiker was forced into a hospital for an entire week with so many serious blisters that his trip was terminated. And even later when hikers' feet became toughened, the combination of rain, heavy boots, and wet socks meant trouble for one out of five on the trail. One foot-troubled backpacker reported having seven blisters at one time. And more than one hiker, squirming out of boots, was horrified to see socks soaked with blood.*[1]

Studies have shown that "carrying heavy external loads (i.e., a heavy backpack) during locomotion appears to increase the likelihood of foot blisters."[2] In addition, the type of physical activity performed is a factor in the probability of blister development. As we intensify our activity and as the duration of the activity increases, frictional shear forces are increased. Heavy loads, high-intensity activities, and long-duration activities are what we do as runners, hikers, and adventure racers. In our events, most of us experience at least two of these three stresses. Ultrarunner Suzie Lister typically has few problems with

her feet while running ultras. However, when she participated in the 1995 Eco Challenge, the added weight of a pack on her back and the multiday stresses of adventure racing caused many problems with her feet: blisters on top of blisters and swollen feet.

The similar stressors among sports make the preventive maintenance and treatments for blisters and other foot problems necessary for all sports. This book approaches the different disciplines—running, triathlons, hiking and backpacking, and adventure racing—as one and the same when dealing with one's feet. Proper foot care is the most important variable for a successful outing.

DIFFERENCES IN TERRAIN

The terrain is an important part of your running, hiking, and playing environment. While a flat, smooth, and resilient surface may seem ideal, it is not. Most runners spend the majority of their running miles on roads and trails, while most hikers spend their time on trails. The ideal surface is one that keeps changing the stress on the body. This will help prevent injury and make you stronger. Changing surfaces develop muscles and reflexes. Don't always choose the same surface; mix it up.

Variations from our normal running or hiking surface can produce problems as we compensate for uphills, downhills, concave surfaces, or irregularities of the surface. Be aware of compensations in your foot strike, stride, or gait due to changes in the surface.

Dirt and Trails

Dirt and trails provide a soft running and hiking surface. Trails or fire roads can open new vistas to the adventuresome athlete. Some trails are well groomed, while others are barely maintained. Soft dirt trails provide excellent shock absorption and can be a good surface to use if recovering from an injury.

Whether running or hiking, pay close attention to rocks, roots, wet leaves, mud, and other potential trail hazards, any of which can cause a turned ankle or a fall. On rainy days, slippery mud and grasses can present problems with footing. Watch for uneven terrain, roots, and holes on grassy sections of trail. Leaves covering roads and trails can hide surface depressions, rocks, and other debris that can trip you up. Trail dust, dirt, pebbles, and rocks can be kicked up into the sock or between the sock and the shoe. These irritants can cause hot spots, blisters, or cuts. Gaiters worn over the tops of shoes or boots can help prevent this problem (see "Gaiters," page 189).

Hiking on trails while wearing a backpack presents the added problem of maintaining one's balance with a top-heavy load while negotiating rocks, roots, and uneven trail. Attention to your footing can help prevent a turned ankle. Striding uphill stretches the Achilles tendons and the calf muscles and makes the pelvis tilt forward. Going downhill increases the shock impact to the heels when landing and tilts the body backward. Constantly going up- and downhill may also cause problems with toes, toenails, heel pain, plantar fasciitis, and more.

Grass

Grass is a forgiving surface and a great choice if you are prone to road-impact injuries. Be careful of uneven grassy areas, holes from burrowing animals, the slipperiness of wet grass, and the occasional rock or piece of glass.

Roads

Road running is the mainstay of most runners. The asphalt surface of most roads provides a softer surface than concrete sidewalks. However, roads have slanted surfaces curving down toward the sides. The convex surface puts more stress on the downward side of your shoes and your body. The foot of the higher leg rotates inward, while the foot of the lower leg rotates outward. Avoid prolonged running on slanted surfaces, or at least spend equal time on both road shoulders. Keep your eyes open for potholes and manhole covers. Of course, the biggest hazard to road runners is vehicles. Where possible, run opposite the flow of traffic and safely to one side of the road, and choose roads with wide shoulders.

Concrete and Sidewalks

Concrete is approximately 10 times harder than asphalt. While the surface is usually smooth, your bones, muscles, and connective tissue get hammered. This surface can cause foot, leg, or back pain through the jarring of the joints. Shin splints, stress fractures, and compartment syndrome are common injuries from running on concrete. Care must be taken to watch your footing on sidewalks to avoid the tapered edges of driveways and drop-offs at curbs. The use of good, cushioned shoes and gel insoles can make concrete bearable—but try at all costs to avoid running on concrete.

Courts

Court play is usually on either asphalt or wood. Tennis courts may be indoors or outdoors. Basketball, racquetball, and other indoor sports are usually on

wood. While asphalt and wood court surfaces are hard and unforgiving, the main foot stress for athletes playing on them is caused by sudden, quick movements and sudden starts and stops. Cushioned or motion-control shoes, depending on your feet, will protect your ankles. A good shoe fit, coupled with moisture-wicking socks and insoles, will prevent hot spots and blisters.

Sand

Walking or running on sand is hard work. Though sand is soft, its surface is not typically flat. Your heels may sink in more than the forefoot, and the uneven sand may cause a turned ankle. If you have access to a beach, try to stay near the water on the wet and packed sand.

Snow and Ice

Walking or running in the snow or on ice can be challenging. There may be snow on top of a layer of ice. Your shoes cannot make good traction unless they have been modified with small screws or special traction gear. Falling is a hazard, and muscle pulls can be common as you slip or slide.

Tracks

Most of us at some time run on tracks. True, they can be boring. Running in circles—actually in ovals—lap after lap after lap after lap may not be your idea of a good run, but there may be a time for it in your running schedule. A track allows us to calculate with accuracy how fast we are running. I have used a track for occasional speed workouts. Prior to my first 24-hour track run, I spent 3 hours running at a local high school track to get a feel for the repetitiveness of track running.

The continuous running in one direction stresses the outer leg, so if possible, change direction every now and then. Dirt tracks should always be checked for ruts and uneven surfaces that could cause you to trip. Running in the outer lanes is less stressful when rounding the curves.

CONDITIONING

Conditioning means more than getting your body in condition. It also means getting your feet into the best shape possible for your sport. Your feet will respond to training in the same way your legs respond. Increasing your running or hiking time by increments will allow your feet time to adapt to the added stress of the additional mileage. Increasing your mileage too quickly can lead to problems. If you are working up to a marathon, an ultra, or a multiday

hike, do back-to-back training days to work your feet into their best possible condition. Toned and strengthened feet can reduce the occurrence of injuries, as well as sore and tired feet.

personal experience

In 1991, I walked through immigration in the old Stapleton International Airport in Denver, wide-eyed and fresh from Australia and sporting some nice, neat, size 9 wing tips comfortably encasing my soft corporate toes. Years later I am outgrowing my somewhat less-than-nimble size 11 trail shoes, with nary a hope of ever squeezing back into my old wing tips. This rather dramatic change in foot size is due entirely to conditioning. In 1984, when I started adventure racing in Australia, I had a size 8 shoe, but the intervening 22 years spent running and hiking around for prolonged periods with a pack on my back has resulted in a physiologic adaptation.

This is really just conditioning. The same effect can be seen in farmer's hands, which grow to quite unusual sizes over decades of manipulating heavy machinery and tools. It is not uncommon to walk into a bar in the Midwest and see the little old farmer, neatly shrunk inside his once tight-fitting Wrangler jeans, with absolutely enormous gnarled hands, nursing a beer.

So, to get these nice, big, abuse-proof peds, spend some time on them. Lots of time. So much time that they hurt really bad. I don't usually say this, but in the case of feet, no pain, no gain. Don't go out and get bloody blisters, but do go out for those really long hikes, with a pack stuffed with baguettes, Camembert, bottles of red wine, and the kitchen sink, and really abuse your lower leg structures. Work the crossword every day and you will get good at it; wield a hammer all day and you will get calluses on your hands; hike with a heavy pack for hours and you'll get bigger, tougher feet!

—Ian Adamson, adventure racer

Brick Robbins was an adequately trained runner when he started his thru-hike of the Pacific Crest Trail, but he quickly found that running had not conditioned his feet. The extra weight of a backpack caused additional stress to his feet. After 100 miles, his feet were sore and bruised. By the time he reached Idyllwild—another 70 miles down the trail—he had killer blisters that took another 270 miles to heal. Although his feet were in good shape from running, they needed additional conditioning for the weight of a pack. There are no shortcuts to conditioning your feet. They will become conditioned to longer distances by gradually increasing your mileage.

When Karen Borski thru-hiked the Appalachian Trail in 1998, she had very few foot problems. A year before the thru-hike, however, her feet were so out

of shape that after an 8-mile day hike, they would be riddled with huge blisters on the sides of the heels. Wearing a pack, she found that after only a few miles, blisters would begin to develop on the soles of her feet, usually the balls of the feet where the main pressure is felt. Karen recalls that she was so frightened and worried about these blisters that she was afraid she would not be able to thru-hike. To fix the problem, she first bought new boots that were slightly too large so that during the course of a hike, as her feet naturally swelled, they wouldn't become too tight and rub. Then she started hiking with a pack every weekend. After hobbling around for most of the following week nursing these awful blisters, she would go out and do it again. When calluses finally began to develop, she took up running on the weeknights, both to get her body in shape and to help toughen her feet.

So, what is the best way to condition your feet? Your feet must be conditioned to endure the rigors and stressors of your chosen sport or sports. Train in race conditions in the shoes and socks you will wear on race day. Do short hikes with a pack on your back before taking off to tackle a multiday hike. Use a wobble board to strengthen your ankles. Toughen your feet with barefoot walking. Work up to distances that you will tackle in your event. Work out the kinks; find the best shoes and socks for what you will be doing. Learn how to trim your toenails and reduce calluses. Discover the proper insoles that provide support to relieve your plantar fasciitis or heel pain. Strengthen your toes and ankles. In short, do your homework before you head out to tackle the big one. Your feet will thank you.

If you are training for a long hike or an adventure race, at least 60% of your training should be done while wearing your pack with about the same amount of weight as you plan to carry during your hike or race. This works your upper and lower body and trains the muscles, tendons, and ligaments of your ankles and feet to handle the extra weight. You must also train on somewhat the same terrain you'll face during the event—rocks, sand, up- and downhills, even with wet feet. Knowing in advance how your feet respond to these conditions will help you anticipate problems. Finally, you must train for the same distances as the race itself. One or two long runs a week is much better than five or six short runs. To the undertrained, the multiple days of pounding on your feet can take a cumulative toll and make every step painful.

BIOMECHANICS

Many athletes who have participated in extreme sports have learned firsthand how one minor problem can be magnified over time and eventually have

major consequences. Typically this happens when a blister affects the gait, a backpack's weight throws off balance and stance, or stressed or weakened muscles cause an imbalance in the body's mechanics. Every athlete has different strengths and weaknesses, different degrees of flexibility, and different muscle skills and body types. These factors affect the way we walk, run, and move. Add on a fanny pack or backpack, or put a flashlight in one hand and a water bottle in the other, and your biomechanics change. Each time your foot lands, it absorbs about two-and-a-half times your body weight. For every mile you travel, your feet hit the ground around 800 times each.

TONYA'S TIP *The Importance of Balance*

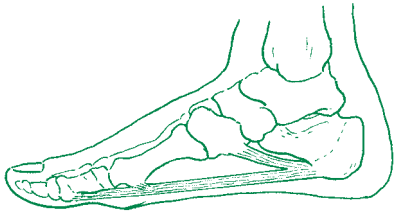
Critical to moving well over distance is the body's ability to distribute forces across bones, joints, ligaments, tendons, and muscles in an equal and balanced manner. The foot is connected to the pelvis through the knee, and the pelvis is connected to the shoulder through the lower back. Slight imbalances in one area over time can cause tissues to be overloaded and become painful and injured, slowing you down or causing you to have to stop altogether. Muscles work together to create and maintain balance as you move; an imbalance in strength in one muscle group can magnify into uneven forces through tendons, muscles, and joints. If your pelvis drops more on one side when your foot hits the ground, it causes your knee to rotate and move inward, and over time the resultant uneven forces through the hip, knee, and ankle can cause tissue breakdown and injury.

—Tonya Olson, physical therapist

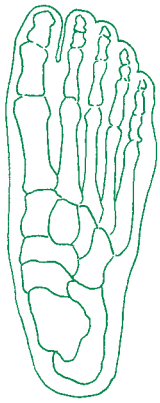
Maryna, a holistic practitioner who was part of the medical team at the Canadian Eco Challenge, emphasizes how your whole leg and, indeed, your whole body needs to function in a unified, integrated way. She saw a lot of blisters caused by legs being out of alignment in various places, from hips to knees to ankles. Misalignment causes radical changes in all phases of your footfall, from strike to break over to push off. Problems can work from the legs down or from the feet up. An understanding of biomechanics will help us visualize the cause and effect.

Understanding Biomechanics

Biomechanics is the study of the mechanics of a living body, especially the forces exerted by muscles and gravity on the skeletal structure. The foot, which includes everything below the ankle, is a complicated but amazing engineering marvel. With an intricate biomechanical composition of 26 bones each, the



Side view of the bones of the foot



Top view of the bones of the foot

foot accounts for almost one-quarter the total number of bones in the body. Thirty-three joints make each foot flexible. About 20 muscles manage control of the foot's movements and support the bones. Tendons stretch like rubber bands between the bones and muscles, so that when a muscle contracts, the tendon pulls the bone. Each foot contains 109 ligaments that connect bone to bone and cartilage to bone and hold the whole structure together. Nerve endings make the feet sensitive. With each step you walk or run, your feet are subjected to a force of two to three times your body weight, which makes the feet prone to injury.

The big toe, commonly called the great toe, helps to maintain balance, while the little toes function like a springboard. The three inner metatarsal bones provide rigid support, while the two outer metatarsal bones—one on each side of the foot—move to adapt to uneven surfaces.

Your feet are each supported by three arches and small muscles called foot intrinsics. The transverse arch runs from side to side just back from the ball of the foot. This is the major weight-bearing arch of the foot. The medial longitudinal arch runs the length of the instep, flattening while standing or running, giving spring to the gait, and shortening when you sit or lie down. The lateral longitudinal arch runs on the outside of the foot. Both longitudinal arches function in absorbing shock loads and balancing the body. These three arches of the foot are referred to singularly as the foot's arch.

Our feet have four ranges of motion. Upward motion is called dorsiflexion, and downward is plantar flexion. Inward motion is known as inversion, while outward motion is eversion.

Once you have a basic understanding of the foot's construction, it becomes increasingly important to be aware of how we affect our body's biomechanics. At some point in training for an event, we need to try to mimic the event itself.

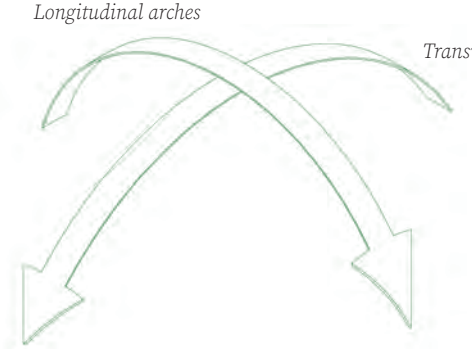
Wear the same shoes and socks that you plan on wearing during the event. Wear the same clothes. Carry the same weight in a fanny pack or backpack. Even get out in the same weather. Although we may not realize it, these factors can change our stride, work different muscles, and put pressure on different body parts—including the feet.

Physical therapists are biomechanics and movement experts who are skilled in the diagnosis, management, and prevention of musculoskeletal disorders. If you suspect you have an issue related to biomechanics, find a physical therapist who specializes in the foot and ankle and is familiar with your sport or activity. They are trained to perform a comprehensive evaluation and treatment for musculoskeletal injuries.

Avoiding Biomechanical Problems

The body lines up over the foot. When the foot goes out of alignment, the ankle, knee, pelvis, and back may all follow. Analyzing the way we stand, walk, and run helps a physical therapist, podiatrist, or orthopedist determine whether we have a mechanical misalignment and how it can be corrected. He or she will also want to see your running shoes to analyze the wear patterns on the soles.

An example of biomechanics is the functioning of the foot's arch and its connection to the position of the pelvis. Malalignments in the leg are best viewed from both a bottom-up and a top-down approach. Foot position can affect the pelvis, and pelvis position can affect foot position. A low arch, or flat foot, typically occurs when the foot is excessively pronated, turning it inward. A high arch supinates the foot, rolling it outward. Both of these structural variations can contribute to knee, hip, and back pain. When one arch flattens more than the other arch, that inner ankle moves closer to the ground. That hip then rotates downward and forward, causing a shortening of that leg during



The three arches are referred to singularly as the foot's arch. The transverse arch runs from side to side, while the medial and lateral longitudinal arches run the length of the foot. Structural variations with the arches can contribute to foot, knee, back, and hip pain.

walking and running. The pelvis and back both tilt lower on the shortened-leg side, and the back bends sideways. The opposite leg, which is now longer, is moved outward toward the side, putting added stress on its ankle, knee, and hip. The shoulder on that side then drops toward the dropped hip. Conversely, weakness in the muscles that hold the pelvis level can cause a hip to drop on one side and cause uneven stress through the foot. All of these are compensations as the body adapts. Muscles, tendons, ligaments, and joints are stretched to their limit. The body is out of alignment.

The stressors on our bodies can result in inflammation, often the cause of foot pain. Running on unbalanced and uneven feet may result in fatigue. Fatigue gives way to spasms that may cause a shift in the shape of our feet. Corns, calluses, bunions, spurs, and neuromas may develop when joints are out of alignment.

Do not fall into the trap of drawing erroneous conclusions about your injuries or the type of shoes or equipment that you need for your running style. A physical therapist, podiatrist, or orthopedist should check pain associated with running. Heel pain that we try to resolve with a heel pad may not be caused by a heel problem but by arch problems or weakness in the pelvic stabilizer muscles. This in turn may throw off the biomechanics of the body's alignment. If you begin a run and right away experience knee pain, you most likely have a problem with the knee. If the pain comes after running for a while, it is most likely not a knee problem but a biomechanical problem. Likewise, you may think that because you are a heavy runner, you need a shoe with lots of cushioning. Based on that decision, you buy a cushioned shoe, the most cushioning insoles, and thickly cushioned socks. But in reality, what you may need is a stability-control shoe. This is where the help and expertise of medical specialists comes in. They are trained to determine biomechanical problems.

In 1991 Craig Smith and his brother set out to hike 300 miles of the Continental Divide Trail. With training and planning done, they started with heavy packs that tipped the scale at almost 58 pounds each. Two days and 22 miles later, Craig had developed severe pain in both knees. Forced to abort the trip, they cached as much gear as possible before starting back. With Craig's knees wrapped with torn T-shirt strips, it took them four days to backtrack the 22 miles. It took several weeks of conditioning therapy before he could finally walk without a limp. Craig learned to pack lighter, do exercises that focus on strengthening his knees, and use a walking stick on downhills. He could have easily been a victim of biomechanical problems that centered in his knees.

CONDITIONING PRODUCTS

THE DYNADISC is made of the same material as a gym ball and is inflatable with just a standard ball needle and pump. The DynaDisc has both smooth and knobbed sides. It's perfect for balance-training, lower-back, pelvic-stabilization, and weight-shift exercises. The company also offers balance and wobble boards. exertools.com

OPTP (ORTHOPEDIC PHYSICAL THERAPY PRODUCTS) has a wide range of devices for balance/proprioception, massage, stretching, strength training, and more. optp.com

POLES can be used to hike farther and more comfortably, absorb shock, keep your knees healthy, and help maintain balance. Walkers, hikers, backpackers, and adventure racers have discovered the benefits of poles. Made of either aluminum or carbon fiber, many models offer antishock support and carbon tips. Poles are made by **BLACK DIAMOND, KOMPERDELL, LEKI, MSR, REI,** and many more companies. Typically called hiking or trekking poles, they can be found in sporting goods and camping stores. Some people use two, but others are comfortable using one. Check your local outdoors store for lightweight models.

WOBBLE and **ROCKER BOARDS** can be used to improve balance and strength, retrain injured muscles, improve muscle memory, and build core strength. You can get one wobble board for both feet or two smaller wobble boards, one for each foot. **SIMPLY FIT BOARD** (available online), **FITTERFIRST** (fitter1.com), and **INDO BOARD** (indoboard.com) are three companies that offer wobble boards.

Remember that most athletes have foot problems or become injured by doing too much, too soon, and too fast. To avoid biomechanical problems, use proper footwear, pace yourself, do strength training, and train in the gear you will use in your event.

TONYA'S TIP *Work on Ankle Strengthening*

A good time to work on ankle strengthening, balance, and proprioception is when you're brushing your teeth. Raise high up on your toes and lower slowly on both feet first, then one foot at a time as you get stronger.

—Tonya Olson, physical therapist

Form and Health

As long as you have good form, whether walking, running, hiking, paddling, or biking—any activity where you are using your feet for movement—you stand a better-than-average chance of not injuring yourself due to a biomechanical

Use hiking poles for support and to help the knees.

problem. But if a pack rides wrong on your back, making you lean to the side; weak abs make you lean forward; tired arms cause your shoulders to drop; or spent quads cramp up, your body is tossed out of alignment. This will ultimately work its way down to your feet. As they compensate for your biomechanical problems, your gait and stride change, and your feet develop their own problems.

So what is gait? For our purposes, gait can be best described as one's particular style of walking or running, which determines the distribution of stress to various parts of the legs and feet. While there is no single proper gait that suits everyone, if you experience pain or discomfort (particularly back, hip, or knee pain) while walking or running, a gait analysis from a podiatrist or physical therapist may be in order.

Your best bet is to maintain good form by thinking smart and training wisely, whatever the discipline. Make sure your shoes are not worn down—replace them before they lose their support and cushion. Wear good insoles to balance the foot and provide good heel and arch support and alignment. Strengthen the ankles and knees with specific exercises. Do upper-body exercises to strengthen your abs, back, and shoulders for carrying your pack. Work

your arms so they can help maintain balance and proper form. Learn how to tape a sprained ankle or turned knee. Condition yourself in incremental stages without huge jumps in mileage or extremes. Train with the gear you will use in an actual race—building up to appropriate weights rather than carrying everything all at once. Use hiking poles for support and to help the knees. Learn your body's weak links, and find exercises to strengthen those muscles and joints.

Every one of us, at one time or another, can fall victim to biomechanical problems as we race to extremes. Train smart and race smart, and you can stay healthy, starting with your feet.

TONYA'S TIP *Gait Biomechanics*

A person's gait depends on the complex interactions of the nervous, musculoskeletal, and cardiorespiratory systems. Gait analysis is the process of observing how a person moves, viewing the body as an integration of the different parts working together to create movement that is unique to each person. When a gait analysis is performed, factors such as stride length, height, cadence, and symmetry are observed, as well as how, when, and where the foot hits the ground. The balance of the pelvis; arm swing; and rotation of the thighs, shoulders, and head can all contribute to tissue overload, injury, and inefficiencies in movement.

—Tonya Olson, physical therapist

PART TWO

Footwear Basics

4

The Magic of Fit

The average person may take as many as 8,000 to 10,000 steps a day, which adds up to about 115,000 miles over a lifetime. That's enough to go around the circumference of the earth four times. Ill-fitting shoes bring on problems.

Fit is key. Again, repeat after me: "*Fit is key.*" Without properly fitting shoes or boots, your feet will encounter many problems that can initiate many others. If your footwear is too loose, your feet will slide around, creating shear. If your footwear is too tight in certain areas, your feet will experience excessive pressure. Wearing too-loose or too-tight footwear will change the biomechanics of your foot strike, which in turn will affect your gait and throw off your whole stride and balance. This will stress your tendons and ligaments. When your feet and toes are pinched in too-tight shoes with socks that make the fit even tighter, the blood circulation is reduced. To top it all off, you will endure aches and/or pain and will be more tired from dealing with all of the above. Sounds like fun, right? Unfortunately, many athletes have resigned themselves to this type of process. They go out strong for as long as their feet last—which in many cases is not as long as they had hoped and often is well before the finish line or the end of their journey. Does it have to happen this way? You decide. It's your choice.

Benno Nigg, PhD, the lead author of a study on footwear in the *British Journal of Sports Medicine,* found that runners who select shoes they feel are the most comfortable are more efficient and get hurt less. Another study, by Running USA, found that fit/comfort was the top determining factor in shoe purchases. Cushioning was second.

Fit starts with properly fitting shoes with a quality insole. No matter how good your socks are or how well you apply tape or how good any other component is, if the shoes fit incorrectly, you will have problems.

In *Advanced Backpacking,* Karen Berger makes a good comment on the fit of boots—and the same advice applies to any sport shoe. "Like most marriages, the mesh between boot and foot is not always a good match. If you look at the feet of several people, you'll undoubtedly see a range of bumps and bunions,

arches and anklebones—all of which are encased in the same hard leather cage. It takes a bit of time, accommodation, and softening for boots and feet to settle into a comfortable routine."[3] Because our feet are so different, many factors go into achieving a good fit.

Richard Schick, a physician assistant and ultrarunner, believes the key to getting the proper-size shoe is the insert: "If the foot does not fit the insert, then the shoe will have to stretch to accommodate the difference, or there may be excessive room in the shoe, which can lead to blisters and other foot problems." He thinks there is too much confusion about straight lasts, curved lasts, semicurved lasts, and so on:

> *You don't need to know any of this if you use the insert to fit your shoes. The same holds true for the proper width of shoe. Simply remove the insert from the shoe and place your heel in the depression made for the heel [in the insert]. There should be an inch to an inch and a half from the tip of your longest toe to the tip of the insert. None of your toes or any part of the foot should lap over the sides of the insert. If they do, is it because the insert is too narrow or is it because of a curved foot and straight insert or vice versa? The foot should not be more than about a quarter inch from the edges of the insert either. This includes the area around the heel, or the shoe may be too loose. Check to see if the arch of the insert fits in the arch of your foot. Finally, if all the above criteria are met, then try on the shoe. The only remaining pitfalls are tight toe boxes and seams or uppers that rub.*

Even after buying shoes that fit well, be alert to changes inside your shoes as you walk, run, and hike. Jason Pawelsky, formerly with Tamarack, the maker of the popular ENGO patches, reminds us, "We all know that changing conditions (terrain, temperature, distance, and so on) can make even the best-fitting pair of shoes feel and perform differently, so there is no perfect fit 100% of the time. The challenge is to get runners, hikers, and team sports players to not only recognize that, but to react proactively."

LEARNING FROM SHOE REVIEWS

We can learn a lot from shoe reviews. Whether the reviews are in magazines or on websites, online forums, or blogs, it can be helpful to hear what others have to say about shoes you are considering. RunRepeat.com is a website

that features running-shoe comparisons. In late 2015 it ran the numbers from 134,867 customer reviews of 391 running shoes from 24 brands. Shoes were ranked from one to five stars based on satisfaction. Interestingly, its conclusion was that expensive shoes are not any better than more moderately priced shoes. This means inexpensive running shoes are often better rated than expensive ones. It pointed out that perceived shoe quality is subjective and that the study was not scientifically based. One possible finding from the comparison is that runners who buy more expensive shoes likely have higher expectations and are more critical in their reviews. RunRepeat.com's numbers have increased since 2015. Its current total is 7 million reviews plus deals from 213 retailers.

Be Careful Out There

The newspaper and mail often bring us ads from discount sports and department stores. They typically advertise shoes with names that are unknown to the well-read athlete. Who has heard of these shoe models? Many major shoe companies make shoes aimed at these stores. They may be good shoes, but I wouldn't buy them for serious walking or running.

While most athletes are careful and know enough to buy running shoes at a running store, many more people are not. Pity the beginning walker or runner who buys shoes without the help of a qualified salesperson. They'll get no help with fit—with important things such as foot type, toe box space, arch support, and heel counter grip, to say nothing of shoe type, such as motion control, cushioning, and so on. They'll get no help finding the right shoes for whatever they plan to run and no information about the shoe's life expectancy.

They take their shoes home, lace them up, and start running. A small percentage of them will still be going a year later. But many more will have quit because their feet hurt or because after wearing the shoes down—and not knowing when to get new ones—they got injured and quit.

If you know someone who is starting to run or even walk seriously, take a moment and share a bit of your experience on buying good footwear. Many shoe companies make midrange or even cheap shoes, and I don't want these substandard shoes to have a negative influence on people wanting to get out and exercise. We all have to be careful out there.

Many shoe and boot companies suggest specific models that are best for certain types of activities and sports and for certain types of feet. They do this because many shoes are made for a specific type of foot—and many people have feet that will work better with one type of shoe than another. Look for the buyer's guides in the magazines of your sport. Runners can find shoe reviews

in *Runner's World, Trail Runner,* and *UltraRunning*. Backpackers and hikers can check out *Backpacker*'s reviews and *Outside*'s Buyer's Guide for helpful information.[4] For details on these and other shoe and gear review sources, see Appendix B, page 418. Other sport-specific magazines may offer similar reviews. Many websites post reviews, and some offer reader comments or reviews. Many online shoe retailers also offer phone support or online guides.

The September 2015 *Runner's World* Shoe Finder asked up front if readers knew the type of shoe that worked best for them. If so, they were guided to a four-section grid based on more shoe, less shoe, and more cushioning, less cushioning. Each box of the grid contained shoes recommended for that more/less choice. Other readers were asked questions about body mass index, running mileage, and injury experience, after which they too were directed to one of the four boxes to find their recommended shoes. Each shoe reviewed was also rated for heel cushioning, forefoot cushioning, and flexibility, and the shoe's weight and heel and forefoot heights were given. Unfortunately, these guides of suggested shoes usually include only 12–18 shoe models. Every year magazines come up with new ways of guiding athletes to the best shoes for them. It's a good starting point, but I would use the guides as a reference point to shop at my local running store and get their personal insights.

THE PERFECT SHOE

Can there be more than one shoe that is right for your feet? Are there perfect shoes? On Christopher Willett's 2003 Pacific Crest Trail thru-hike (2,600-plus miles), he went through four pairs of shoes. Wearing a size 15, he didn't have the option of buying from an outfitter along the trail, so he would call or go online from various towns along the way and have new shoes and socks sent uptrail. He started in the Brooks Adrenaline GTS and liked it in the hot 563-mile Southern California section. He wished the next shoe, the Asics Eagle Trail, had a more protective sole but liked the tread. While the New Balance 806 was structurally good, he felt it had a poor tread design; it is the only shoe he would not wear again. He finished the last 670 miles in the Asics Gel Trabuco V and liked its durability and tread. Would one of the shoes have worked for his whole thru-hike? If it had been the NB 806, the answer would be no. Probably any of the other three would have worked the whole way, but Willett might have had problems sticking with one shoe given the varying weather and terrain of the trail. Even the most perfect shoe can have small issues: breathability, tread design, cushioning, sole protection, and so on. Each of these issues can make them perfect for one set of conditions and wrong for another.

KNOW YOUR FEET

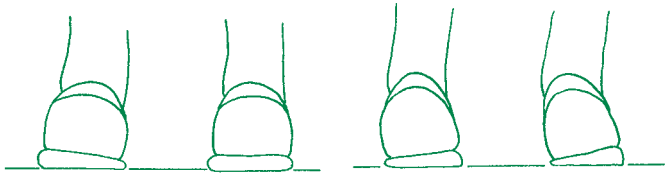
With knowledge of biomechanics and your specific foot type, you can make a better choice. When shopping for shoes or boots, try on several different pairs from several different companies. This will help you identify those that initially feel good versus those that just don't feel quite right. Knowing how different shoes and boots fit your feet will help in the final selection.

A biomechanically efficient athlete lands on the back outside of the heel and rolls inward (pronation) to absorb shock. The foot flattens as the motion moves forward, rolls through the ball of the foot, and rotates outward (supination) to the push off. Many runners nowadays land on their forefeet rather than heels.

There are two main schools of advice for preparing to purchase shoes. One school suggests asking a friend to watch or even to video your feet as you walk or run to determine how they land and your general form. Many shoe stores offer this service or will at least watch you run; with their experience in fitting shoes, this can be extremely helpful. This information and the wear patterns on your old shoes can help you decide whether you should look for shoes that compensate for underpronation, overpronation, or severe overpronation, or whether you can get by with shoes for neutral pronators. Use this information to select shoes from one of four categories: neutral-cushioned shoes for underpronators, stability or motion-control shoes for overpronators, motion-control shoes for severe overpronators, and neutral shoes for neutral pronators.[5]

Another school of advice suggests that you first consider your running and biomechanical needs, including your most common running surface, and then select one of five categories that best matches your needs: motion control, stability, cushioned, lightweight training, or trails. Next, determine whether your foot type is flat-, normal-, or high-arched (discussed below). Use this information to select shoes from within that category.[6]

Take your old shoes with you when you shop for new shoes. The wear patterns on the soles can help you or the salesperson determine how you run and the best shoes for your running style. Normal wear is on the outer heel and across the ball of the foot. Pronators show wear both on the outer heel and on



the inner forward side of the shoe. Supinators typically show wear on the heel to the forefoot along the outer edge of the shoe.

The key to a good fit in running shoes is to know your foot type. To determine this, walk on a hard surface with wet, bare feet to see your imprint.

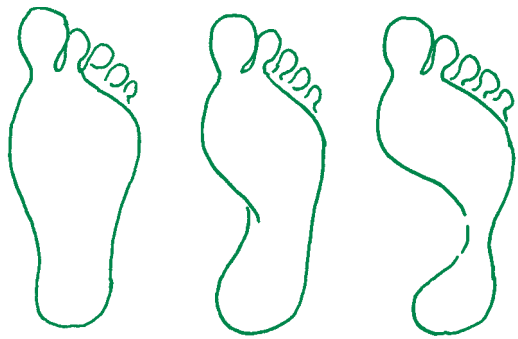
The Three Arch Types

Flat-arched feet leave an imprint that is almost completely without an inward curve at the arch. Standing and looking down their leg, these athletes will typically see their feet turned outward. They will typically do best in a shoe with a semicurved or straight last that offers good stability and/or motion control. They are often overpronators. An arch support is usually helpful.

Normal-arched feet leave an imprint that shows the forefoot and heel connected, but with an inward curve at the arch. Standing and looking down their leg, these athletes will see their ankles and feet follow the vertical line down their lower leg. These athletes will typically do best in a semicurved-last shoe because they are generally efficient in their gait. They may benefit from a cushioned or stability shoe with moderate control features. They are neutral pronators.

High-arched feet leave an imprint that shows the forefoot and heel connected by a very narrow curve at the arch. If your feet are turned inward, you will typically do best in a curved-last shoe with good cushioning. Athletes with high arches are typically underpronators and should avoid motion-control shoes.

A common problem when buying shoes and boots is that people will tell the salesperson, "I wear a size 9½." Well, that may or may not be true. Over time, our feet change, typically getting larger as we age. The fat pads on the bottom of our feet become thinner as we get older. We may get bunions, or our calluses may thicken and affect fit. You may have been a 9½, but now you may be a 10 or 10½.



Flat arch *Normal arch* *High arch*

TONYA'S TIP *Perfecting Shoe Fit*

Shoe fit is affected by distance, terrain, shoe construction, and type of foot.

The types of arches are caused by the way the bone, tendons, and ligaments of the foot and lower leg work together. A flat foot is mobile and flexible; it absorbs forces through the soft tissues and moves easily into pronation, where soft tissues are stretched closer to end range. A high-arched foot is less mobile and more rigid; it stays more in supination, where soft tissues are less stressed but the bones are absorbing forces.

These are factors to consider when choosing shoes. Once you know your foot type and the tissues that are more stressed while running, it is important to consider the different terrains and distances and the specific needs of different types of feet. A mobile foot running on uneven terrain for long distances will experience more stress through the soft tissues, placing them at risk for overuse injuries such as sprains and strains, and will benefit from the protection of some motion control to keep the tissues in their midrange. The same foot running shorter or mid distances on stable terrain may not need the added protection of motion control, and the muscles might even benefit from the strengthening effects of running.

Conversely, a high-arched less-mobile foot absorbs forces through the bones and will benefit from higher cushioning, especially on harder terrain such as roads. The same holds true for more rigid feet as with mobile feet; their particular weaknesses are magnified over time and distance and should be considered when choosing shoes.

A runner's weight is also something to take into consideration. A heavier runner with a mobile foot will do well with more motion control to protect the soft tissue, as compared to a lighter runner with the same type of foot and stride mechanics. The same goes for a more rigid foot—heavier runners need more cushioning to protect the bones of their feet.

Choosing the right shoe is a multifactor process and needs to take into consideration all factors that affect fit: foot type, biomechanics, weight, terrain, and distance. It sounds like a lot to consider at first, but if you start with comfort and purpose, you should do well.

—Tonya Olson, physical therapist

It's very important to get your feet sized each time you purchase a new pair of shoes. The Brannock Device is the tool that stores use to measure your feet to determine shoe size. Be sure to measure each foot. Measure sitting and standing—although standing is the most important measurement. Many of us have one foot a bit larger than the other foot, and you should always buy shoes to fit the larger foot. The device also measures the width of your foot. Correct fitting properly positions the ball of the foot joint at the widest part of the shoe, so the toes have the room they need.

This easy measurement is important to get the best fit possible. Remember, though, after measuring your feet and trying on a pair of shoes, the shoes still may not feel right. Shoes can vary in construction, and one company's shoes could run smaller or larger than those of another company. Once on your feet, the shoes need to feel comfortable. If they don't, move up or down a half size and see if that helps. If that still does not help, look at other shoes.

Shop around until you find running shoes that feel right on your feet. A correct fit will help in blister prevention. Valerie Doyle remembers her fight to beat blisters. When she learned how to buy shoes that fit properly, she found they solved her blister problem. The same applies to fitting boots. Studies have found that tight footwear can increase the forces exerted by the shoe or boot on the foot, increasing blister probability, while loose-fitting footwear increases the movement of the foot inside the shoe or boot, causing increased shear forces on the foot, which in turn increases blister probability.[7]

Walk in the shoes or boots for a while to be sure they are comfortable. Some shoes and boots will be higher at the ankle and may put pressure on your anklebones. Others will not bend at the forefoot and toe point that you need, making an uncomfortable heel-to-toe transition or pinching the toes. There may also be a seam inside the shoe or boot that rubs your foot and creates pressure and a potential blister. Pay close attention to the overall fit.

Fitting shoes means more than simply handing you a size 9 shoe and pushing down on the toe and saying, "Yup, it has enough room." When trying on shoes, the toe box (the front part of the shoe that covers the toes) is one of the most important parts of your shoe, and a good salesperson will make sure to emphasize this factor. Those little (or large) toes at the end of your feet need room, both height and width. The right toe box can save your toes. The wrong toe box can cost you your toenails.

In shoes with the right toe box, your toes will feel comfortable and have room to wiggle and breathe. Shoes with the wrong toe box will squeeze your toes, giving them no room to wiggle and breathe. This squeezing may happen from the sides and/or the top. The side squeeze will push your toes together and maybe even underneath each other. A squeeze from the top will put pressure on your toenails. As you go downhill, this pressure often results in subungual hematomas, or black toenails. If your nails are not trimmed properly and are too long, the toes jamming into the front of the shoe will put additional pressure on the nails, causing nail bed problems and possibly causing you to lose nails.

One rule of thumb is that when standing in your shoes, you need a thumb's width of space between the end of your longest toe and the front inside of the

shoe. Generally this works. You may want more space when you're going to be involved in a multiday race, hike, or event. In that case, consider buying shoes a size or two larger than normal. You'll note I said, "space between the end of your longest toe." For the majority of us, that means the big toe. But for about 15% of the population, it means the toe next to the big toe. This is a condition called Morton's foot or Morton's toe. This condition, usually hereditary, requires shoes to be fit to that toe.

If you have narrow or wide feet, consider shopping for shoes or boots that offer variable lacing capabilities. These shoes and boots will have lace eyelets that are not lined up in an up-and-down row but spaced horizontally farther apart. See "Lacing Options" (page 194) for information on how to lace for different types of feet.

The American Academy of Orthopaedic Surgeons gives suggestions for buying shoes. Foremost, it reminds us that shoes should always conform to the shape of your feet; your feet should never be forced to conform to the shape of a pair of shoes. Its suggestions apply equally well to buying boots.

Fit can be achieved with simply a little common sense and a bit of luck. Out of all the shoes and boots to choose from, there is more than one brand and style that will fit your feet well.

BUYING FOOTWEAR

Buying shoes has evolved to a level of complexity never before seen. Buyers have to study the latest issue of their favorite running, ultrarunning, adventure racing, triathlete, or outdoors magazine or website, or try to read through the materials posted on manufacturers' websites to comprehend the language they're speaking. Does Impact Quotient Technology really matter to you or me? Does IQS really guide my foot "from heel to toe in a much more natural, comfortable stride"? I know what a truss is, so is a Trusstic System something similar?

We're not buying a car, just a pair of shoes. But the complexity of the selection process has been turned up several notches. If you want to find the best shoes, you now have to read the fine print—and understand what the fine print means. Many of the aforementioned acronyms and terms are puzzling unless you read further. Some of the shoe companies' websites are very helpful, offering images and understandable explanations of what these things mean. But some are downright useless.

The bottom line: We need to find a shoe that fits well, lasts more than a few miles, and doesn't rub us the wrong way. And after we buy the shoes and find that we love them, we hope they don't discontinue them in six months when the new

COMMONSENSE TIPS FOR TRYING ON SHOES

- Try on and fully lace both shoes.
- The shoes should feel comfortable. You should feel no discomfort in any part of the shoe's fit.
- The shoes should feel natural and move with your foot and not force your feet to conform to the shoes.
- Feel around the inside of the shoe for rough spots where the parts of the uppers are stitched together.
- Your toes should have plenty of room to move and wiggle, and the toe box should not be too short in height or length. Aim for at least 0.5–1 inch of space between your longest toe and the front interior of the shoe.
- The tops of feet shouldn't be pinched when the shoes are laced properly.
- Your little toe should not be pinched by the shape of the front of the shoe. Likewise, your big toe joint should fit at the widest point of the shoe.
- Be sure the shoe's counter (the part that wraps around your ankle and heel) does not rub your foot wrong. Your heels should be snug in the heel counter of the shoe and should have little up-and-down movement. There should be a firm grip of the shoe to your heel, but not too firm.
- The arch of each foot should be supported, but the shoe arch should not be too high, or too far backward or forward, for your foot type.
- The shoe's shape (last) should be comfortable and not overly curved or straight for your foot type.
- The shoes should fit well with the same type of socks you will be wearing in your training and/or race event.
- The shoes should flex well for the type of terrain you will encounter and at the right point of your foot. This will help provide support to your ankles and prevent uncomfortable heel-to-toe transition or pinching of the toes.
- The shoes should provide adequate protection for the bottom of your feet from rocks and uneven terrain.
- The fit should come from the shoes themselves, not from tying the laces.
- The laces should stay tied the way you like them without coming undone.
- The shoes should have outsoles for the type of event or race you will be doing. They should help keep your feet in place inside the shoes.
- If the insoles that come in the shoe are weak and flimsy, replace them when you are buying the shoes. Get a pair that provides support and cushioning.
- If you will be using orthotics or special insoles, make sure that they fit in the shoes without pushing your feet too high in the shoes' uppers or too far forward.

models are released. There is something to be said for brand loyalty. I have it and I suspect many of you also do—especially when you've found a pair that fits well.

TONYA'S TIP *Choosing Shoes*

Choosing shoes is an incredibly personal experience, and you should trust your own assessment of the fit and comfort as the most important variable to consider. Be wary of making footwear decisions based on someone else's preferences. Start at a local specialty store with trained staff, try on multiple brands/models of shoes, and spend some time in them to assess fit—jump up and down and run around the block. You may spend a little more at first to find the brand/model that works best for you, but the investment is small compared to having shoe-related issues during an event or ending up with shoes that don't work for you. It is also rewarding to build relationships with the staff at the store. I love being able to walk into my local running store and say, "I need another pair of road shoes," and then sit down as they bring me a number of shoes to try. Easy-peasy!

—Tonya Olson, physical therapist

In today's marketplace, we are in a shoe buyer's heaven. Everywhere we turn, there's a shoe store, and in almost every magazine and on every website, there are ads galore for new shoes and boots. But are all things equal? Here is where I chime in with a big resounding NO.

First, we are faced with the typical mall store, usually a chain shoe store that employs people without any degree of knowledge of how to fit shoes. Many times, they also sell shoes that one would never find elsewhere. Some shoe companies sell shoes to these stores that are not found in running stores and running magazines. They are different and not as well made, yet are perfect for the typical mall shopper.

Specialty outdoors stores, such as running, backpacking, and camping stores, carry shoes that are well made and well known. This is important because we can find reviews of these shoes online and in sport-specific magazines. This allows us to shop with a high degree of knowledge that the shoes we buy are made for our sport and will perform well. These stores also have salespeople who can fit shoes and help you choose between several pairs.

There are running shoes (and this means road shoes and trail shoes), walking shoes, cross-trainers, and other sport-specific shoes. I can walk in running shoes but would not run in walking shoes. I can run and walk in most cross-trainers, but you would be wise not to use walking and running shoes for a serious game of basketball or other court sport. I can run on trails in most road shoes, although I may sacrifice traction and support. While I can also run on roads in trail shoes, they are often clunky, heavier, and not as flexible.

My preference is to use shoes for what they are intended. Road and trail shoes are intended for their individual purposes. Your choice in footwear is important. When shopping for shoes, look for those made for your sport. When participating in sports, use shoes designed for that specific sport.

Personally, I would never buy shoes from any source without trying them on and walking in them, running a short bit, or using them on an incline board. I prefer to frequent my local running stores, walking stores, and hiking or outdoors stores. I often check out websites where shoes are also sold. If I recognize a particular shoe and know it fits my foot, I might buy from one of these sites, but with rare exceptions, I buy from my local stores. I value the service, the help with fit, and their look at my gait as I try out the new shoe. They will measure my feet, look at my old shoes (so yes, take your old shoes along), ask what I will be using the shoes for, ask about my foot type, ask about any injury history, and maybe ask which shoes I have worn in the past. When they bring out the shoes, they will often point out the shoe's features. They'll have me try on the shoes, and they will check for correct spacing in the toe box (both length and height). They will ask me to walk in the shoes and maybe even to go outside and run to get a feel for the shoes. My bottom line: I want a shoe that works on my foot, a shoe that fits as well as possible, and a shoe that's right for whatever sport I throw at it—and that requires the help of a good salesperson.

Buy your shoes wherever you want, but remember, fit is one of the most important elements of using your shoes and boots without problems. Your local shoe store is dedicated to providing you with high-quality choices in shoes and service you can't get online. There is more than one pair of shoes for your feet. There may be a half dozen models that will fit well. The experts at your local store will help you select several brands and models to come up with a good final choice.

Tips for Buying Footwear

Whether you're buying shoes for running, hiking, court sports, or soccer, it is important to get a good fit. When you purchase footwear, consider the whole picture, not just the shoe or boot you hold in your hand. Your footwear must work with your choice of socks, insoles, and orthotics (if your wear them), and with the activity you will be doing. Hiking boots that feel OK when you walk around the store may feel different when you get home and try them when carrying a 30- to 40-pound pack on your back.

Here are some suggestions for buying shoes and boots.

- Use shoe-buying guides as just that—do not eliminate a shoe from your consideration until you have tried it on.

- Try shoes in a range of prices—don't save a buck at the expense of your feet. The differences between several pairs of shoes can be amazing.
- Judge a shoe by how it fits on your foot, not by the marked size.
- When going to try on or buy shoes, take a pair of your socks along rather than relying on the store's basket of socks that have been on who knows how many feet.
- Do not buy a pair assuming that they will fit better later, unless they are leather boots. In most cases, today's shoes and boots require no breaking-in period.
- Have your feet sized each time you buy new footwear. Measure both sitting and standing to determine your elongation factor.
- Fit new shoes to your larger foot and your longest toe.
- Try on shoes at the end of the day, preferably after running or walking; your feet normally swell and become larger after you've been standing and sitting all day.

Footwear purchasers frequently forget to allow enough toe space when buying shoes and boots. When your foot is in the shoe, the arch naturally flattens. Since your heel is held in place by the shoe's counter, your foot can only move forward. If the shoe does not have this bit of extra space in the toe box, the toes become cramped. Toenail problems, blisters, and calluses may develop.

Our Aging Feet

As we age, our feet change. Make no mistake—that fat pad on the bottom of your foot is getting thinner as you get older. Our feet spread out, getting longer and wider, so we may move up a size or more in footwear. Additionally, we usually become a bit stiffer in the joints. Your arch may also flatten more than normal. Just because we are aging doesn't mean that our feet have to hurt or that we have to stop walking, running, or whatever our activity is. As long as we remember how our feet change as we age and buy footwear that fits, we can stay physically active. So the natural question is, "What should we do?" Here are three steps to keep your aging feet happy.

- Have your feet measured each time you buy shoes.
- Buy shoes that fit the shape of your foot and have a wide and long enough toe box.
- Invest in a good pair of insoles that provide cushioning and support.

TIPS FOR HARD-TO-FIT FEET

Kevin wrote that he wears a size 7 and has found that the mid- and outsoles are the same thickness in all shoes regardless of size—they are not proportionally thinner in smaller sizes:

> *While shopping, if you pick up a large shoe of a particular model and try bending it, then pick up the smaller size of the same model and try bending*

that one, you quickly notice how much more rigidity a small foot has to work against. Try repeating that 10 times, and you see your arms get tired, not to mention bending it 25,000 times or more over a long day hike! It's not the shoe getting stressed; it's your feet and ankles trying to overcome the rigidity that a smaller, shorter foot has to work harder to overcome. When I am buying new shoes, I pick up each model and bend their size 7 and compare stiffness. I find quite a difference between models, so it helps me in the selection.

If, after trying on shoes from several manufacturers, you still have difficulty finding high-quality shoes that fit your particular foot, consider searching for a certified pedorthist (C.Ped.). Kirk Apt, C.Ped., describes the work of a pedorthist:

Even those with no medical conditions, but with common discomfort and general foot fatigue, can find relief by utilizing the expertise of a C.Ped. Specifically, pedorthics is the design, fit, manufacture, and modification of footwear and orthotics to help alleviate problems due to congenital deformity, injury, disease, or overuse. A C.Ped. functions as part of an allied health care team, where a person can go to a medical doctor (family doctor, orthopedist, podiatrist, and so on) and get a diagnosis and a prescription for a conservative, nonsurgical remedy. The patient may then be referred to a C.Ped., who can fill the prescription for therapeutic shoes and/or custom orthotics. Shoes are built around 3-D foot-shaped models called lasts, which are identical mirror images of feet of a given size. Unfortunately, real feet are seldom mirror images of each other. A C.Ped. can help find a shoe built on a last that best matches a person's feet, and then construct a custom orthotic that meets their particular biomechanical needs and interfaces with the shoe in a way that improves its fit and performance. In this way, athletes, active people, and those who work long hours on their feet can be accommodated with footwear designed specifically for their unique feet. In my practice, I work with patients who have a doctor's prescription and with others who want their footwear to fit and perform better. I often work with a physical therapist. Together, we do a pedorthic assessment where we determine the condition of the feet and analyze the gait of a person. Using this information, I can recommend a specific shoe or design and construct a custom orthotic.

Look online or ask your doctor for references. Also see Appendix C, "Medical and Footwear Specialists," on page 419.

Footwear

Many people consider footwear as simple, basic equipment that takes little thought. Yet the war against foot problems can be lost over ill-fitting shoes, boots, or socks that cause blisters, or insoles that are not right for your activity. Choose your footwear based on which sport you will be doing, the terrain expected, and your level of experience. Find the right shoes or boots and the right socks based on what feels right and fits correctly—not on price. Tom McGinnis, who thru-hiked the Appalachian Trail in 1979, makes a good observation: "Good boots and bad socks can be miserable. Cheap boots and good socks can be a dreamland." This chapter focuses on types of running shoes, sport shoes, hiking boots, custom shoes, and sandals. Going barefoot, minimalist footwear, and the new super shoes are discussed in the next chapter. Socks play such a large role in preventing problems that they are discussed at length in their own chapter.

Each person's feet are unique. Yours may look similar to mine, yet they are as different as our fingerprints. Although our feet may fit into the same size and shape of shoe or boot, they mold into the footwear differently. Corns, bunions, susceptibility to blisters, toe length, the type of arch, and the shape of the feet are just a few of the factors that affect the fit of footwear. Even how we react to and recover from the stresses of running and hiking is important in choosing shoes and boots. Only you can determine what type of footwear you need to wear.

THE ANATOMY OF FOOTWEAR

By understanding the parts of a shoe or boot, you can make informed choices about which running shoe, cross-trainer, or boot is best for your sport—and for your feet. The parts of a shoe are fairly common, regardless of what kind of footwear you're looking for.

Parts of a Shoe

- The shoe's **counter** is the part that wraps around the heel of the foot.
- The **eyelets** are the holes through which the shoelaces run.
- The **collar** is the part at the top that wraps around your ankle.
- The **heel tab** is the notch that surrounds the Achilles tendon.
- The **heel** is the back bottom of the shoe.
- The **upper** is the top of the shoe that surrounds the foot.
- The **insole** or **sock liner** is the inner insert on which your foot rests. These are typically interchangeable.
- The **outsole** is the shoe's bottom layer.
- The **midsole** sits between the shoe's insole and outsole.
- The **shank** is the part of the sole between the heel and the ball of the foot.
- **The toe box** is the tip of the shoe that shapes and protects the toes.

THE RIGHT FOOTWEAR FOR THE ACTIVITY

Certainly runners wear running shoes, but there are many types of running shoes. Hikers and adventure racers have many choices in hiking boots, but many make the choice to wear trail running shoes instead of boots. Many of the top adventure racers wear trail running shoes for their whole event, even on snow and ice and while wearing crampons. Just remember the ifs: If you are used to hiking in trail running shoes, if your ankles are strong, and if the shoes provide the necessary support while wearing a pack, then trail running shoes may be right for you. Likewise, if you are prone to sprained ankles, you may need a shoe or boot with a higher upper.

Regarding trail shoes, Cathy Corning makes a good point:

> *Trail shoes are constructed a bit differently than road shoes. Pronation is an important consideration for road shoes but not for trails. Think about it: On the road, it's the exact same movement over and over and over, and pronation is a big deal. On the trail, every footfall is completely different with all sorts of soft, hard, and twisted surfaces, and your foot lands differently every time. Pronation is really not a consideration. Trail shoes are far more focused on stability, with your foot sitting lower in the shoe and closer to the ground to help stabilize your foot on uneven surfaces. Even the base of the trail shoe is slightly wider than a road shoe for more stability.*

Another important point about trail shoes is how most are made with a mesh upper to reduce weight and allow heat dispersion. While nice, the mesh creates a different problem. It allows dirt, sand, dust, and trail grit into the shoes, onto your socks, and then onto your feet. In a long run or race, this can be problematic as it turns into an irritant and leads to hot spots and blisters. It also makes it harder to patch one's feet because the layer has mixed with whatever lubricant has been used, creating a hard-to-remove coating. Gaiters can help control this but are not always effective because of how they cover the mesh.

An important consideration in choosing footwear is shoe construction and ventilation. Footwear constructed with Gore-Tex fabric is good at keeping moisture out but tends to hold in sweat. In extreme cold, shoes that drain may be a better choice. Footwear made with mesh is lightweight, but, as mentioned above, the mesh allows grit and dust to get inside the shoe. Your shoes may be lighter and cooler, but the grit can increase friction.

Some years ago I spent a trail-running weekend with friends in the Northern California High Sierra. In between the fast hiking and running, while watching my step, I kept an eye on what others had on their feet. Most had good footwear—either trail running shoes or larger, heavier boots. There were some, however, who wore the wrong footwear. They wore running shoes made for roads, or court shoes. These shoes provided no traction on the slippery rocks and no protection from the sharp rocks, and they did not give their feet and ankles the needed support. One friend wore road shoes and ended the first day with three blisters and very sore feet. I saw several hikers with court shoes and a pack—a very poor combination. Trouble occurs when you end the day with blisters, damaged or black toenails, a turned ankle, or simply very sore feet. You may associate the discomfort and pain with the activity. Instead, the right footwear would have made the hike much more enjoyable. Whether walking, hiking, running, trail running, playing court sports, adventure racing, climbing, or biking, the right footwear can make all the difference.

When shopping for shoes or boots, try on several different pairs from several different companies. This will help you identify those that initially feel good versus those that just don't feel quite right. Knowing how a variety of shoes and boots fit your feet will help in the final selection. When going to buy new shoes, you may have a preferred shoe, sometimes based on magazine ads or on the recommendations of others, but buy only those that fit best.

Never wear a new pair in a race. Always wear them before the race to make sure they fit well and there are no problems. John Schumacher, in the *Sacramento Bee* newspaper, wrote about Stacy Dragila, a 2000 gold medalist in the pole vault. She had gone to Greece for the US Olympic training camp in 2004

with high expectations but came home devastated. And yes, it was the shoes. Dragila had provided input for a new shoe design for Nike. When Nike rolled it out before the US Olympic Trials in Sacramento, Dragila decided to make the switch. Her old jumping shoes were a little loose in the heel. The new pair, reinforced to last longer, felt nice and snug at first. As she wore them in the trials, she felt a little Achilles flare-up. "I just attributed it to stress, being at the trials, not sleeping as well as I probably should," said Dragila. "I never thought it was the shoe." By the training camp, both Achilles tendons were bothering her. She couldn't do her normal workouts, and during qualifying, she discovered she couldn't make a full approach on the runway. She tried heights she had easily done before but couldn't make them. "I just knew I was doomed," she says. Doomed, she admits, by her own hand. Or shoe. "When you're a fine-tuned athlete or sports car, you don't change the wheels," she said. "I wish somebody had told me. I don't blame anybody but myself. I shouldn't have tried to break in something new in a crucial time of training. In hindsight, looking back, stay with what you've got."

Socks vary in thickness, and changing socks can change the way your feet fit inside your shoes. When trying on shoes, wear the same socks when trying on shoes that you wear during races. When buying new socks, be sure they will not alter the fit of your shoes. If your new socks make your shoes fit tighter, you may be able to fix this with new, slightly thinner insoles.

Inspect Your Shoes

Whatever sports shoes you wear, remember to inspect them regularly for problems. Frank Sutman was on the second day of a six-day, 80-mile backpack trip when one boot's outsole split from the midsole to the ball of the foot. He suffered through four days of flapping sole; picking up pebbles, rocks, and sticks; and even being tripped up. The moral of his story: check your boots and shoes before major activities and periodically to keep small problems from becoming major inconveniences. Split outsoles, ripped or torn fabric that lets dirt and rocks into the shoe, cracked heel counters that create folds in the inner heel material, and broken laces retied into a bothersome knot over the top of the foot are all preventable.

BRAND LOYALTY

When athletes talk about footwear, you often hear, "Be loyal and don't jump from brand to brand or style to style." How true is that statement? Let's look at a few perspectives on the subject.

From the manufacturer's perspective, it makes perfect sense. If buyers are loyal and stay with the manufacturer's shoes, life is perfect. They have an ongoing market that remains faithful, so their shoes will always sell.

From the shoe store's perspective, it can be a catch-22. They'll keep ordering the same shoes from the same manufacturers and will also take chances on new shoes. But if buyers remain loyal to the old shoes, they'll have a harder time convincing athletes to switch brands.

So, that leaves our perspective: that of the customer. Why would athletes remain loyal to one brand? Let's identify some reasons, keeping in mind that the inverse is also telling—when one of the statements is no longer true, the athlete is often open to a change in shoes.

- The shoes work well for my sport.
- The shoes fit.
- They've never caused problems.
- I hate taking a chance on a new shoe.

Certainly, shoe companies would like us to be loyal. One obvious problem is that companies often seem to disregard the people who buy and wear their shoes. They will change or discontinue shoe styles with no warning. If you've found shoes that work, every spring and fall is tense as you wait to see if your favorite shoes are still being made, or how they have been changed. I know athletes who buy several pairs of shoes once they find a pair that works for their feet. They don't want to take a chance on the shoe companies not honoring their loyalty. I don't blame them.

TONYA'S TIP *Factors in Buying Shoes*

As John mentioned earlier, shoe choice should be based on a multitude of factors: activity, terrain, weather, foot type, experience, and most important, fit and overall comfort. These are all things to consider when choosing shoes. Variety in the model, components, and construction of the shoe can be helpful to your feet by introducing different stressors and different movements that strengthen the muscles in your feet and lower legs. Subtle differences can reduce the risk of injury from the repetitive stress of the same exact shoe all the time. Having a relationship with a local store is beneficial, as the salesperson will get to know you and recommend shoes based on your preferences and the purpose of the shoes. Local stores often have return policies that allow you to try the shoes for a few runs, and if they don't work out, you can exchange them for a different pair.

—Tonya Olson, physical therapist

RUNNING SHOES

There are many sources of information about which shoes may be the best for you. The five main sources are the shoe companies, local running stores, magazines and catalogs, running friends, and websites. Recognize the difference in the quality of help available at some chain shoe stores in shopping malls versus stores that specialize in running shoes and equipment. A specialized footwear store usually has personnel who are athletes themselves and can watch you run, look at your old shoes, and recommend specific brands of shoes and styles based on what they see and your answers to their questions.

One might ask why there are so many running shoe brands. Twenty-five years ago, eight major shoe companies dominated the market. Today, there are more than 40 shoe manufacturers. Running's popularity and accessibility have surged, and more people nowadays are embracing fitness. Obstacle races and novelty fun runs draw new people into running. To tap this growing audience, new companies enter the running shoe market, outdoor apparel companies make inroads in the market, and foreign companies also want a piece of the pie. It has led to better shoes and innovative designs and styles. Where it will lead is anyone's guess. Ten years from now, we'll see how many are still here. You have more choices than ever before, which means you need to educate yourself about footwear.

For years, running shoes were all pretty much the same—upper, midsole, and outsole with variations in design and technology. Most shoes were about the same height. Then the minimalist movement caught on and footwear changed. All of a sudden, shoes were lighter, with less support and cushioning, and shorter in height thanks to the next-to-nothing components between the foot and the ground.

Then along came the Hoka One One. Super light, very cushioned, with a Meta-Rocker design and low-drop geometry, the shoes became popular with runners of all distances. Runners swear by them. Suddenly the oversize running shoe took off, and now other companies are making similar shoes. Brian Metzler, in a Competitor.com article titled "Hot Running Shoe Trends for 2015" says maximalism is still thriving. In addition to Hoka One One, Altra, Saucony, and Skechers, he said big-name shoe companies are introducing maximally cushioned shoes. He quoted a retailer who told him that there are a lot of runners out there who just want a soft, comfortable ride.

I found it interesting that a survey of all finishers in the 2015 Western States 100-Mile Endurance Run found that 34.5% wore Hokas, 19.6% wore Brooks, and 16.5% wore Altras. The remaining 29.4% of shoes were a mix of

brands. That means 70.6% of the finishers wore one of three brands. It was pointed out that Hoka was first for the second year in a row, while Altra took second place after not being in the list in 2014.

To understand running shoes, you need to be aware of their construction. The first component is the *last,* the form over which a shoe is constructed.

Running Shoe Last Patterns

Board lasts have the shoe's upper material glued to the shoe's board, which runs the length of the shoe. This generally produces a fairly rigid and stable shoe.

Combination lasts have the shoe's upper material stitched to either the forefoot (slip-lasted) or the rear foot (board-lasted). This design offers additional stability at either the foot plant or the toe's push off.

Semicurved lasts are molded straight toward the rear foot while having some curve toward the forefoot. This mold provides stability and flexibility.

Semistraight lasts are built to curve slightly from the toe to the heel. This provides some flexibility and a high degree of stability.

Slip-last shoes are made with the upper material stitched directly to the midsole without a board. This offers maximum flexibility.

Straight lasts are built along the shoe's straight arch to provide maximum stability.

Basic Categories of Shoe Construction

Neutral shoes are made for the runner who has good biomechanics and would be categorized as a neutral pronator. These shoes generally have a good blend of flexibility and stability.

Flexibility shoes are made for runners who are underpronators, who have foot motion toward the outside, and need a shoe that offers more shock-absorbing pronation than their body can deliver.

Stability shoes offer high stability and cushioning. Midweight or normal-arched runners without motion problems who are looking for good cushioning typically use these shoes. These runners usually overpronate slightly beyond neutral and need a shoe with extra medial support. Most are built on a semicurved last.

Motion-control shoes provide the most control, rigidity, and stability. Heavy runners, severe overpronators, flat-footed runners, and orthotic users often choose these shoes. They are typically quite durable, but they are often heavier. Most are built on a straight last and offer the greatest level of medial support.

Trail running shoes usually offer increased toe protection, outsole traction, stability, and durability. Runners who run mainly on trails usually use these shoes.

Cushioned shoes are those with the best cushioning. These are typically used by high-arched runners and those who do not need extra medial support. Most are built on a curved or semicurved last. Maximum cushioned shoes, like the Hokas, take cushioning to a whole new level.

Lightweight shoes are typically made for fast training or racing. These come with varying degrees of stability and cushioning and can be worn by runners with few or no foot problems. Most are built on a curved or semicurved last.

Buying Running Shoes

Running shoes are changing rapidly. Many major shoe companies roll out new designs twice a year. Shoes now offer midsole air, gel, and tube chambers; springs; recoil plates; Gore-Tex and other membrane fabrics; breathable liners and mesh outer fabrics; more cushioning; and better support and stability. More models have been released for trails as this market has grown many times over.

Before you buy a pair of shoes, run your hands over the inside to check for seams that could cause irritation and lead to blisters. Look at the stitching and the seam that bonds the upper to the bottom of the shoe. Then pull out the insole and make sure everything is smooth. Try on the shoes wearing the socks you normally use. The best time to buy new shoes is later in the day after you've been on your feet a lot. This gives your feet a chance to spread out and even swell a bit as opposed to how they are in the morning.

Once you buy a new pair of shoes, wear them around the house to be sure they fit well and are comfortable. If you sense problems, return the shoes for another style or type. Even the same shoe model that you have worn in the past can have minor design changes in a new release. Wear them for a while until you are sure they fit well.

Shoe designs are always changing. Often our favorite shoes disappear from the shelves and we find ourselves forced to make new choices. Do your homework, study the shoe reviews and the ads, talk to your running friends, and try on various styles. Good stores will let you run in them. Ultrarunner Orin Dahl once found that his favorite shoes were no longer offered. Instead of the old shoes, Nike offered a new type of air shoe. He bought the shoes and began running in them. The new shoes were not as flexible in the forefoot, causing his heel to pull up and out of the shoe. To his dismay, he developed blisters at the back of his heels. He recalls how he turned the shoes over to the Salvation Army and began a search for a different pair. He has no doubt that the shoes were good shoes, but they were just not right for his feet and running style. As you look for shoes, remember that not every pair of shoes is right for your feet.

personal experience

I did 10 100-mile runs in 1999: Rocky Raccoon, Umstead, Massanutten, Old Dominion, Western States, Vermont, Leadville, Wasatch, Angeles Crest, and Arkansas.

I really didn't have too much of a problem with my feet that year. The Rocky Raccoon (the first race) is where I had the most trouble. It was 80˚F and very humid, and I wore last year's shoes, which were size 11 (my normal size). Because the shoes were a bit worn and [my feet had] some swelling due to the humidity, I had several blisters between my toes. After the run, I drained them with a pin and then pretty much forgot about them.

I then bought some Asics 2040s and Montrail Vitesse shoes in size 12. I always wear double-layer, blister-free socks. The rest of the year, I had very few blister problems. The only consistent blister problem was with the Montrails. If I didn't put duct tape on the balls of my feet, they would develop blisters. The shoes also rubbed on the outside of my left big toe. I did not need any tape with the 2040s. Even at the hot and humid Vermont 100, I had little problem with blisters, [and what problems I did have were] mostly as a result of wearing the Montrails. On rare occasions, I would get a small blister on the inside of the big toe on my right foot.

I never put anything on my feet. I do, however, use Succeed electrolyte caps. This has helped me with stomach distress (I only drink water or, late in the race, Pepsi). I am sure that [the caps] also help with the blistering. I think experience has a lot to do with blisters. The more races I run, the tougher my feet become.

—Jeff Washburn, ultrarunner

SPORTS SHOES

By sports shoes I mean any shoes specific to your particular sport, other than running. These may be soccer, football, baseball, or climbing shoes, or even cross-trainers. Even military boots can fall into this category—the requirements for getting a good fit are the same.

When shopping for these shoes, apply the same basic principles that you would for other athletic shoes. Try several different brands and styles. Try them on wearing the same socks you will wear during the activity. Lace the shoes up and be sure that they hold your heel, that your toes have wiggle room, and that they feel comfortable.

Many sport-specific shoes, such as those for soccer, have a simple thin insole with virtually no arch or heel support. These can lead to arch problems, metatarsal pain, blisters, and more. The first thing I do when I find a shoe that fits well is to replace the standard flimsy insoles with a good supporting

insole—but do this when buying the shoes to make sure they are big enough to accommodate the insoles.

Climbing shoes are meant to fit close to the skin. These are often worn without socks, so be sure there are no irritating seams that can cause blisters. If you will wear thin socks with the shoes, take them along when shopping for shoes. One problem area in climbing shoes is the tight toe box. If you have Morton's toe, hammertoes, bunions, corns, or other toe problems, be aware of how the tight fit will affect that condition. Understanding any preexisting foot problem will help you make an informed choice of shoes. Each of these conditions is discussed later in this book.

Military boots may not offer much in the way of selection, but you need to be aware of many of the fit issues discussed in the next section about hiking boots. Irritating seams, poor heel fit, thin insoles, toe boxes that are too narrow and too short, arches that are too high, and boots that are not correct for the shape of your feet can lead to long-term problems. If given a choice in boots, try on several to get the best fit possible. Again, as with most other shoes, replace the insoles. Then choose a good moisture-wicking sock.

HIKING BOOTS

Terry, a dedicated hiker, told me, "After a bazillion miles of backpacking and running, I should know everything about my feet. Yet when thinking about another thru-hike next year, I spend more time thinking about my feet than my backpack." We can learn from his insight.

My first pair of hiking boots was all leather, with thick Vibram soles. They laced all the way to my calf and seemed to weigh as much as my loaded backpack. Times have changed, and so have hiking boots. They now fit better and are easier on your feet. Running-shoe technology has had a positive influence on hiking boots. Insoles, molding, padding, and midsole and outsole advances have made many as comfortable as lighter-weight boots. An ad by boot maker Sorel claimed, "Any boot can repel water. Ours will actually suck the sweat off your pinky toes." As technology advances, many boot makers such as Sorel offer moisture-control systems to wick perspiration away from your feet. Gore-Tex fabrics are commonly built into boots for moisture transfer. Lacing systems are also changing for the better.

Kent Ryhorchuk has the right attitude about hiking footwear:

> *When it comes to budget, I would not be stingy on anything related to your feet. Your feet will hurt badly enough without having to deal with blisters and chafing. The year I hiked, bad feet stopped or hobbled many*

people—even some experienced Appalachian Trail hikers—mostly due to blisters. The shoe-and-socks system I use for footwear is Montrail Vitesse shoes, flat Spenco green insoles, Birkenstock blue footbeds over the Spenco insoles (to control my metatarsal problems), SmartWool low-cut hiker socks, and Fox River X-Static liner socks. It took several years of hiking, trail running, and adventure racing to figure this out, but I went from getting blisters all the time to hardly ever getting blisters at all. The point is that I spent a lot of time on it, not that this system is necessarily right for anybody else. Everyone's feet are different.

personal experience

On my feet, I wore a liner sock, SmartWool socks, and Wellco jungle boots with an enhanced cushioned midsole and Vibram-type sole. I coated my feet with Body Glide. This combination had worked very well for me in training, with no blisters, so I anticipated no problems. During the competition, however, I developed hot spots fairly early on the bottom of my feet. By mile 5, I was pretty sure that some of the hot spots had turned into full-on blisters; my suspicion quickly proved right. At about the 5.75-mile mark, I picked up a trot as the course came off a dike. As I did so, I felt an excruciating pain on the bottom of both heels. I realized two things: my feet were going to hurt a lot, and quitting just wasn't an option. . . . Somehow I did manage to qualify for the new unit.

As an experienced triathlete, I made some right choices. However, with the combination of a heavier 45-pound pack, gravel roads, liner socks that were too tight, and unseasonably warm and humid weather, my feet were doomed from the start.

I don't know that anybody teaches foot care to subjects in basic training. A lot of information is passed along through informal instruction in the ranger and infantry communities, but it may not be up-to-date and may not reflect lessons learned from people such as endurance athletes and adventure racers. The sad thing, however, is that if you showed up to a noninfantry (or non–special ops) unit on the morning that they'd decided to do a road march, you'd see some frightening equipment choices and personal preparation. There's very little foot care knowledge in many combat support units. It makes me shudder just to think about it.

—an Army Ranger, describing a 12-mile forced march that was part of the selection process for an elite special operations unit

Many hikers have been converted to using the newer lightweight boots. These are usually as flexible as running shoes and carry many of the running-shoe benefits of fit and comfort. Because of their flexibility and construction, many of these boots require very little or no break-in time. I completed an 8.5-day, 221-mile ultralight backpack of the John Muir Trail in regular running shoes. Unless you are used to hiking or running trails in running shoes while wearing a backpack, I do not recommend them for backpacking. Since I did the John Muir Trail in 1987, boots have changed. Today, I would consider a trail running shoe or lightweight boot for the same hike. Newer lightweight boots tend to dry faster and drain better. The typical leather boot can absorb up to a pound of water. That means you lift an additional 2,212 pounds to walk 1 mile.

Check out some of the features of new hiking boots at your local store. Many boots offer a combination of features: lighter-weight, breathable uppers, high-traction and long-lasting outsoles, improved lacing systems, flexible footbeds, stable and cushioning midsoles, wider toe boxes, and Gore-Tex fabric incorporated into the uppers. Some boot companies have developed what they call their "hiking boot last," which is designed to be snug around the heel and arch, with a roomy toe box. Using different insoles and different thicknesses of socks and/or number of pairs worn can adjust the fit even more.

Boots fall into three basic categories: lightweight hiking (for trail hiking and light loads), midweight hiking (for on-/off-trail hiking and light backpacking), and heavyweight hiking (for on-/off-trail, heavy loads, and multiday trips).

Before you go shopping for boots, determine the type of hiking you will be doing and how much support and protection you will need for the weight you will carry. Then look at the various features of different boots in each of the three categories. Finally, shop accordingly, but do not rule out a certain type of boot until you try them on your feet. A boot that pinches or rubs in the store will not feel better when you are out on the trail.

Rob Langsdorf suggests taking time to really test a new boot before leaving the store:

> *I usually wear mine around the store for an hour or more before deciding to take it. It takes time but consumes less time than having to return it or having to spend lots of time treating blisters. Then break in new boots by wearing them around the house and to work, church, and so on before going out on the trail. Begin with easy hikes before starting off on a long trip. Only when they feel good on a short hike are they ready for a longer one.*

I had a friend who bought a pair of boots but didn't break them in because she felt that wearing them around town wasn't the feminine thing to do. She ended up with major blisters after 6–7 miles. By the end of our 15-mile weekend backpack, she was ready to throw the new boots away and swear off backpacking—all because she didn't want to look funny wearing her boots in town.

Switchback, a hiker, writes:

Before you go on a hike, walk a few miles in your hiking footwear without socks. You will be amazed what your feet will tell you about potential hot spots, tight areas, and potential blisters. Listen to your feet when you do this experiment. Remember, each foot is different and will have different things to tell you. Socks not only protect our feet but can also mask problem areas. Then when you are out on your hike walking with your socks and shoes, you will know where potential problems might occur. This is very valuable to you. Why find out about a foot problem after it has developed? Be proactive and not reactive.

Some boots will soften and become more flexible with forceful flexion of the soles and uppers, hand-working a waterproofing solution into the leather, or mechanical flexion of the uppers at a shoe shop. If your boots are too stiff, try one of these three methods.

Rod Dalitz shares a good tip for getting a good fit with hiking boots:

It's important to shape the heel to fit your foot. Find a heavy-gauge plastic bag and put the boot inside, with the heel immersed in a large pot of boiling water, for a few minutes. (It doesn't do the leather any good to be directly in boiling water!) Make sure the bag doesn't leak. When the boot is hot, the plastic cup in the heel can be molded by gentle hand pressure to a suitable shape.

Ed Acheson made several painful discoveries when he hiked the Pacific Crest Trail. Before he began his trip, he switched to a new pair based on a salesperson's recommendation. The boots were too much boot for him and a half size too small—the salesperson told him they were sized larger than most. Ed remembers for the first 20 days having "more blisters than the number of days I had been out." To compensate for the blisters, he changed his gait, which in turn gave him knee problems. Before he could get new boots, he was forced to cross the Mojave in tennis shoes. He suffered for years from problems he attributes to the wrong boots.

And even after you have broken in your boots, be sure they still fit after not wearing them for a while. Wear them for at least one getting-reacquainted walk before going on a major hike. Your feet may have changed and may need to readjust to the boots before a long hike.

Buying Hiking Boots

Before buying new boots, understand how they are changing. Boot designs are offering waterproof, breathable Gore-Tex liners; thinner leather for better hot-weather hiking; better lug soles for increased traction; lugs that extend up the rounded sides; better insoles; softer uppers for shorter break-in times; snug ankle collars to keep debris out; and more. Boots are being made better, but never buy a pair for their features alone. Buy them because they fit.

Before buying boots, check *Backpacker* and *Outside* magazines for their coverage on hiking boots (see Appendix B, "Shoe and Gear Reviews"); these articles evaluate most brands based on fixed standards while identifying their features and costs. Then check out your local backpacking supply store for the brands and styles they carry. Spend as much time as necessary to get a good fit. Tell the salesperson what type of hiking you will be doing, for how long, and how much weight you plan on carrying. Try on several pairs of boots by different companies. Use your own socks. Walk in the boots. Squat in them. Some stores have a slant board to mimic going uphill or downhill. Look for a pair that fits right from the start and grips your heels. Take out the insoles and look at the boot's construction. Find the pair that fits and feels better than the others. Purchase a high-quality boot made for hiking rather than lighter-weight boots sold for general-purpose street wear. These fashion-statement boots will not hold up under the stresses of heavy trail use. Utilize the experience of the personnel of your local camping and backpacking stores to help you make a wise decision, but realize the final decision is yours based on how they feel on your feet.

Remember that the boots you select will each be picked up and put down many times each day. A pound on the foot equals about 6.4 pounds on your back. Hiking 12 miles each day would equate to about 25,000 steps,[8] day after day. Feel the weight of your boot and think about each step. Heavier boots are not always the best. True, they may provide more ankle stabilization, but you could get more benefit from a lightweight boot and proper ankle- and foot-strength conditioning before the hike. Ray Jardine, who has hiked the Pacific Crest Trail three times and the Appalachian and Continental Divide Trails once each, estimates that for each 3.5 ounces less a pair of boots weighs, hikers could add about a mile to a day's hiking progress.[9] A review of one store's boot

selection showed weights for a pair of boots ranging from 1 pound 9 ounces all the way to 3 pounds 9 ounces. Selecting boots that weigh 10.5 ounces less than another pair could mean the equivalent of an additional 3 miles hiked per day. An educated choice based on boot features, your personal needs, and the terrain ahead is necessary.

If you are planning a several-week or several-month thru-hike on a multistate trail, you will need to buy boots that are larger than normal to accommodate your feet as they become stronger and enlarge to their normal hiking size. Try on boots that are anywhere from one to two sizes larger than normal, which will allow your feet to fit into them properly. If you need to purchase new boots midway through a long trek, be aware of the potential problems of breaking in new boots.

Mara Factor has experienced her feet changing:

> *Be wary of buying multiple pairs before you start. Most people's feet change significantly as they hike. The shoes you wear day to day will adjust somewhat and continue to fit your feet. New shoes, the same size as the ones you've been wearing for a while, often do not fit. Longer and/or wider sizes are often required after spending a few hundred miles on the trail. I used to be a woman's size 12 before I started long-distance hiking. Now I'm a men's 13 (I can't find women's 14s or 15s). I may be an extreme example, but most people do have some change along the way. It may be worthwhile to plan a side trip or two off the trail to go to an experienced outfitter who can measure your feet and make sure the next pair will fit properly.*

When you do have problems with your feet—and you usually will at some point—you need to look at the boots and evaluate whether you need to replace them with another boot type and/or style. On long hikes, your feet do enlarge and change. Boots wear out. Over a couple of years, your feet may also change. Be open to new styles and features in newer-type boots and find the pair that best fits you.

If you are always having problems with your boots and a different set of boots does not help, consider trying a pair of trail running shoes. Be aware, however, of the differences. Running shoes do not provide the same degree of ankle support and overall foot protection, although some companies offer higher-top trail shoes. While some may prefer the increased ankle mobility of a low running shoe, this choice requires proper strength in the feet, ankles, and legs. My choice to wear running shoes when fast-packing the 221 miles of the

John Muir Trail was based on a trial overnight hike with a full backpack and years of running trails. I knew my feet and ankles could handle the stresses of the trail in running shoes, and I did not need heavier boots.

One week into hiking the John Muir Trail, Andrew Ferguson developed a hellacious deep blister on the back of his right foot, 1.5 inches in diameter. By nursing the blister with Spenco 2nd Skin and tape, he hiked for three days in running shoes before reaching civilization and purchasing a new pair of boots. The red heel bothered him for two weeks and took six months to return to normal. Andrew is now a believer in running shoes for hiking. Many people prefer trail running shoes instead of boots for hiking.

CHOOSING LIGHTWEIGHT FOOTWEAR

Our feet need varying degrees of support. Whether you are wearing a fanny pack, carrying a lightweight pack with 10 pounds, or carrying a 35-pound pack, having the correct footwear is important. If your ankles are weak, you'll benefit from a higher shoe. A good insole will provide support and cushioning, reducing the jarring of your feet. Good outsole tread will provide traction on rocks and on wet trails. Good spacing in the toe box will save your toenails. You can find all these features in a lightweight shoe. But don't make the mistake of choosing lightweight shoes without also considering the weight of your gear and pack; a heavy pack and lightweight shoes can hurt your feet and lead to an uncomfortable outing. Reducing the weight of your pack and gear will allow you the option of lightweight shoes.

For help in reducing your pack weight and saving your feet, the gurus of lightweight are Ryan Jordan and his team at Backpackinglight.com. The book Ryan edited, *Lightweight Backpacking and Camping: A Field Guide to Wilderness Hiking Equipment, Technique, and Style* (Beartooth Mountain Press, 2005), is a must if you are serious about going lightweight. Ryan emphasizes:

> *Chapter 1 begins appropriately with the category of equipment that is arguably more important than any piece of gear or apparel a lightweight backpacker will use: footwear. Lee Van Horn's treatise on footwear includes a comprehensive discussion of lightweight backpacking shoes. Simply put, shoes have such a profound impact on the lightweight backpacking experience because (1) the type of footwear you are able to wear depends in large part on the weight of the pack, and (2) the type of footwear you choose governs the transfer of energy and shock to the rest of your lower torso and*

spinal joints. Since this book's manuscript was finalized, I've been diving into research about ultralight footwear and experimenting with shoes lighter than anything the market has previously seen. I've been strengthening my feet, hiking in shoes with less support that are more akin to slippers than hiking shoes, and have been making some dramatic discoveries. In particular, I've learned that with proper conditioning, the natural features of the feet (as long as the arch is supported and the heel pad retains its shape for shock absorption) are ideally suited for transferring energy to the rest of your body, and I'm finding that I can walk longer distances in less supportive footwear—with a light pack—than I've ever been able to do before.

Another book to consider is *Backpacking the Light Way* by Richard A. Light (Menasha Ridge Press, 2015).

Of course, lightening your footwear means you should lighten your load. Get a lighter fanny pack, hydration pack, or backpack. If carrying a pack, lighten its load. Go from a tent to a new ultralight tent or a tarp. Change to one of the lightweight stoves and take advantage of lighter walking or hiking poles. Eliminate gear that you never seem to use but just had to pack. Your feet will feel all these weight savings. A weight loss of a few pounds will feel like heaven. You'll travel farther and your feet will be more comfortable.

A Shoe for Airing Your Feet

If you are looking for a shoe to wear after a race or around camp, an alternative to sandals is lightweight closed-cell foam structure shoes. Sometimes called clogs, these shoes have a soft, pliable feel and provide cushioning to your heels for all-day wear, all while massaging the bottoms of your feet with their textured footbed to promote circulation. They're warm in winter and cool in summer, with a vented design and antibacterial material to reduce foot odors. They are an especially good way to air your feet after a long day on the trail.

One pair weighs less than 10 ounces! And because they are made from one piece of closed-cell foam, they won't come apart or break down. Choose from an open-back shoe or one with a heel strap. The colors are as wild or sedate as you want. All this for around $30. And they provide better cushioning and support than flip-flops.

I'd toss these on my pack for use as camp shoes without a second thought. They're easy relief after a day of hiking and wonderful to have waiting outside your tent to slip on when you venture outdoors. They're also great to wear in

the communal shower on the road. They're dry in a minute, so you can throw them right into your gym bag.

The most common lines of clogs are Crocs (crocs.com) and Oofos (oofos.com). Vibram FiveFingers are a great lightweight alternative, with a glovelike appearance, stretchy upper, and Vibram sole (us.vibram.com). There are new lightweight sandals that are also great for this use. Check out the "Sandals" section 80.

CUSTOM SHOES

What happens when you can't find a shoe you like? Your options are limited. Shoe companies are not in the business of making custom shoes. If you have a narrow heel and a wide forefoot, have overall narrow or large feet, or typically struggle to find shoes that fit well, you have probably experienced shoe hell. Most shoes, because they don't fit your feet, lead to blisters, arch problems, tendinitis, squished toes, and more. Rather than finding a shoe that fits your feet, you force your feet into shoes made for the masses.

An excellent option is to check out the Hersey Custom Shoe Company. It offers shoe models for runners, walkers, race walkers, and hikers. These include trainers and lightweight trainers, high-mileage shoes, racing flats, walking and racewalking shoes, hiking shoes, trail runners, and a high-top for those who need ankle support. Its approach is very simple: "Tell us what you're looking for, and we'll let you know if we can help."

The Hersey staff will work with you to get the shoe you want based on your unique foot needs. You will first answer a set of questions about how often you hike, run, and race; what your usual race distance is; and what shoes you have used in the past that have worked and that have not worked. Then you'll answer questions about your feet (pronate, supinate, abnormal wear, orthotics, shoe breakdown patterns, and so on). You will also send a tracing of your feet based on Hersey's specific instructions. Then choose your model and design options, and the shoes will be made to fit your feet and your feet alone.

Do they cost more? Certainly. Are they worth it? If you have hard-to-fit feet, I'd bet they are. If you want a shoe that is solidly made and not an off-the-shelf, made-in-who-knows-where shoe, I'd also bet they will appeal to you. The company also does resoling of running and trail shoes and boots. The Hersey Custom Shoe Company can be found at herseycustomshoe.com.

Its custom shoes were named by *Runner's World* as the best in both men's and women's in 1985. This shocked the Hersey staff—but shocked the giant

shoe companies even more. *Runner's World* and other publications were pressured to do away with independent judging of shoes. It's a good company that has stood the test of time.

SANDALS

Sandals are a nice alternative to shoes and boots. They are becoming more popular as designs improve to provide better traction, foot control, and comfort. Changing from running shoes or hiking boots into an open pair of sandals can be refreshing. When your feet are tired, hot, or sore, sandals can feel like a small piece of heaven on Earth.

Spencer Nelson recommends sandals for some uses:

> *I have put in some quality training and raced in them to get a feel for their use. I always wear them with socks (usually SmartWool) and have worn them for flat 5-mile runs to 20 miles on trails to day two of the Tahoe Triple Marathon, which had 13 miles of downhill. They are good for my feet, and I will probably get another pair for the following positive reasons. They are very comfortable and better cushioned than they appear. I don't even notice that they are sandals after 4 or 5 minutes; in other words the straps and open-air feel don't affect me. They are quick to dry on trail runs with water crossings. They keep my feet cool. They feel as good after around 200 miles as they did when I got them. Scree gets in and is easily kicked out . . . honestly! I have not had any problems with stubbing my toes or things of that nature.*

Those who prefer the freedom of sandals over constricting shoes will find a wide selection to choose from. Companies make sandals for cool, comfortable use, providing the cushioning, stability, toe protection, and support of a running shoe in a lightweight, airy sandal. Try several types to find one with a supportive and cushioning footbed and the right strapping system for your feet.

The minimalist movement has hit the sandals market too. Companies like Xero Shoes, Bedrock Sandals, and Luna Sandals make lightweight, minimalist sandals with simple strap systems. Many runners use these for trail running.

Wearing sandals while running or hiking takes practice. Small pebbles, gravel, leaves, or other debris can easily work their way underfoot. A shake of the foot or a light kick against a rock will usually knock these loose. Be especially careful of sticks that could inflict a puncture wound to your exposed feet. Try them for a while to make sure the straps don't rub your feet wrong.

If you wear sandals without socks, the skin of your feet will eventually form calluses. Check the calluses regularly for cracks that can split through to uncalloused skin and bleed or become infected. If you choose to go without socks, a dab of sunscreen on the toes and tops of the feet will protect them from bothersome sunburn. Consider wearing socks to protect your heel's protective fat pad and to avoid cracks and fissures in the skin. Some athletes have glued Spenco Hiker insoles onto the sandals, while others use Velcro to secure insoles or foot pads onto the sandal's footbed.

Switchback, a long-distance hiker, recommends several things if you hike with sandals: "Use a good insole glued into the sandal footbed, use hiking socks and a foot cream on your feet to keep them from chapping and drying out, and if your heels hurt, use a heel cup under or over the insole to provide a little extra cushion for the heels."

Tired of running shoes that fit him poorly, caused blisters and toenail problems, and seemed to collect dirt, Rob Grant bought a pair of sandals. He used his Tevas in a Sri Chinmoy 24-Hour Run. At 100K both little toes were swollen. The next day he ground down the ridge on the footbeds that fits under the toes. This corrected the problem. After putting 405 miles on the sandals, he reports no noticeable wear on the soles or the straps. Rob found that rubbing petroleum jelly on the inside of the straps helped to soften them. He feels that ankle support in sandals is comparable to that of running shoes.

Skip the Flip-Flops

Flip-flops are almost a classic piece of footwear. In reality, they offer little, if any, support for the foot and ankle. Their spongy sole causes the foot to roll inward even more than usual. This is pronation and can cause problems, which can lead to pain in the heel, arch, forefoot, and toes. Many people wear them so much that they become flattened on the side where their heel lands. Wearing them around camp in a multiday event—likewise wearing them around the pool—is fine, just not all day.

TOSSING SHOES AND BOOTS

There comes a time when shoes and boots need to be thrown out. You may feel a difference in the cushioning of the shoe—they may feel flat or lack the spring they once had. You may experience foot, ankle, or knee pain. The footwear may simply be trashed. Some athletes, especially runners, log the miles they run in each pair of shoes, and then move the worn ones to garden duty. There

SANDAL PRODUCTS

BEDROCK SANDALS are high-quality, minimalist sandals. bedrocksandals.com

CHACOS makes a variety of sandals and slides. It also offers resoling and repair services of its sandals. chacos.com

ECCO makes a line of sandals that include several "off-road" designs. us.ecco.com

KEEN makes sandals with the protection of a shoe and the comfort of a sandal. The sandals have a toe guard, traction outsole, a wide footbed, and a quick-release drawstring closure. keenfootwear.com

LUNA SANDALS come in a variety of designs and are another minimalist-style sandal, made by Barefoot Ted. lunasandals.com

OOFOS sandals and flip-flops are lightweight and made for recovery. Very soft and comfortable; absorb more shock than other foams; support the arch while reducing stress on sore feet, knees, and lower back. Several styles are offered. oofos.com

TEVA sandals are for walking, running, and water sports. Many of its designs would work well on trails and roads. teva.com

XERO SHOES, by Steven Sashen, are designed after the huaraches running sandals worn by the Tarahumara Indians, famed for their long-distance running. The Umara Z-Trail and Amuri Z-Trek minimalist packable sandals have zero drop for natural movement. The company also offers ready-made huaraches and kits to make your own. xeroshoes.com

is no hard-and-fast rule, but many suggest 500–600 miles as the maximum you should expect to get from a pair. How long your shoes will last depends on your technique, running surface, mileage, and weight, and on the shoe itself. The newer technologies in some shoes can extend their life beyond that of other shoes. Here are a few tips and reminders to keep in mind when evaluating your shoes:

- Write the purchase date in the tongue of the shoe or on your calendar.
- Exposure to heat and water will shorten the life of shoes.
- Never put your shoes in the dryer; instead, air-dry them.
- Heavier runners should replace shoes more often.
- Buy a second pair, or even three pairs, and rotate shoes in your workouts. This can give you a better feel for worn shoes.

Kevin shared this tip:

I wear New Balance 833s. They wear out fast, before the uppers are even dirty. I couldn't take the idea of tossing them out and ended up with nearly a dozen used pairs. When my knees start to ache, it tells me the shoes are going. I tried Resole America (resole.com) and have been satisfied with the result. The resoled shoes don't last as long as the originals, but for me it's better than tossing them out. Plus because I have five pairs now, I can rotate to make them last longer.

The Hersey Custom Shoe Company (herseycustomshoe.com) also does resoling. See page 79 for more on this company.

If your old shoes still have some life in them, consider donating them to a company that sends shoes to others in need. Soles4Souls (soles4souls.org) is one such organization. Visit their website to find a drop-off location in your area or to mail in your shoes for free.

Barefoot, Minimalist, Maximalist, and Super Shoes

The minimalist footwear movement started when *Time* magazine named Vibram FiveFingers one of the best inventions of 2007. A few people got on the bandwagon. Then in 2009 Christopher McDougall wrote the book *Born to Run,* and the movement took off. McDougall set off to find out why his feet hurt and shared with readers the secrets of the Tarahumara Indians—and a better way to run. Barefoot running and running in minimalist footwear suddenly became much more acceptable, and now the testimonials abound.

Mitch Kern shares his experience with barefoot running:

> *I've been running for years, but my career has always been punctuated by injuries along the way. Like so many others, I read McDougall's* Born to Run *and just had to buy a pair of Vibram FiveFingers. From there I transitioned into barefoot running and have been injury-free ever since. I feel like I've learned just how to run for the first time. In the past, I was a heel striker/long strider, but now I take a very different approach—faster cadence and on the balls of the feet. I am convinced it is the way to go. People think I'm nuts, but man, oh man, what a difference."*

Talk to a few people who are wearing Vibram FiveFingers or who run barefoot and you will discover a culture. This unique line of footwear has five individual toes—for your toes—and with a Vibram outsole, it is akin to going barefoot. People who were previously unable to run now can. Those who had become accustomed to discomfort and pain from bunions, heel pain, and more have discovered relief. It is worth paying attention to.

Daniel Lieberman, a prominent researcher in the barefoot and minimalist movement, has written extensively on the subject. On his website he says, "We

do not know how early humans ran, but our research indicates that humans were able to run comfortably and safely when barefoot or in minimal footwear by landing with a flat foot (midfoot strike) or by landing on the ball of the foot before bringing down the heel (forefoot strike)."[10]

Unfortunately, what runners didn't realize was how the typical modern-day runner differs from the Tarahumara runners. The Tarahumara were generally small with low body mass, they ran on continuously varying terrain, they had run since a young age, and running was constantly a main part of their lives.[11] This is quite different from today's modern runner.

Running barefoot or in minimalist shoes is different from running in the usual running shoe. Most important, you land differently. Danny Abshire, the cofounder of Newton Running, says you acquire a connection with the ground as you run. You are more agile and run with finesse. Others in the barefoot and minimalist movement echo the same thought.

Generally speaking, the information and tips in this chapter apply to someone either going barefoot or wearing FiveFingers or other minimalist footwear. Many of those wearing minimalist footwear will also forgo socks.

Vibram FiveFingers V-Trek for trails
COURTESY OF VIBRAM

And lest you think that going barefoot is only for walking and running, some states have barefoot hiking clubs or Meetup groups. Barefoot Chris (his trail name), a member of Barefoot Hikers, recalls the reaction of hikers the group encountered while on a weeklong barefoot backpacking trip on the Appalachian Trail: "They told stories of many other barefoot hikers, including at least two that had done the entire trail without shoes."

SHOES VS. MINIMALIST OR NO FOOTWEAR

For years, everyone wore shoes, or if we were hikers, we wore boots. We could choose between neutral, flexible, stable, motion-control, cushioned, lightweight, and trail shoes. We might stick to one design or try several. Many athletes went through pair after pair trying to find the perfect shoe for their feet, often in an effort to accommodate injuries. We had choices—as long as it was a shoe the shoe companies offered.

Yes, there were always a few runners who ran barefoot. Many times they received odd looks. Others looked for ultralightweight shoes, which were few and far between. If you wanted to run, shoes were what you needed.

Kevin O'Neall shared his experience with wearing FiveFingers:

> *I was close to giving up running after 50-plus marathons and two dozen ultras because of chronic heel pain. My feet had developed golf ball–size lumps where the Achilles tendons insert on the heel bone. After a year and a half wearing FiveFingers exclusively, the lumps are 90% gone. There is still heel pain, but it tends to fade while I'm running. At this point I prefer them to running shoes, even though they do make me a slower runner."*

Of course, there are many arguments for and against barefoot running. Some claim that it's better for you. Others argue that it is dangerous and will lead to more injuries. And still others say that running shoes prevent injuries—or lead to injuries—depending on their point of view. Athletes will point to the few studies available to support their views, whatever they are.

The conspiracy theorists talked about the "big lie" from the shoe companies that wanted you to buy their shoes. One ultrarunner, a proponent of the minimalist movement, wrote in an online forum, "They want you to buy heavy, stiff, supportive, motion-control shoes so that all the little muscles, tendons, and bones in your feet get weak, conforming to the brand you run in, so that they can upgrade you to the next model, which will invariably be heavier, stiffer, more supportive, more cushioned, more motion control, more expensive, and wear out faster." Personally, I don't believe that statement. I think there is room for regular shoes and minimalist shoes—and barefoot running. You have to make the choice, and in my view, it should be an educated and informed choice.

Christian Griffith, an ultrarunner, made a valuable comment in an online forum about the barefoot and FiveFingers bandwagon that so many athletes are touting. He wrote, "It's a tool to help strengthen, lengthen, and improve flexibility in the leg muscles with the added benefit of forcing me to run what I view as 'correctly'—meaning upright, with a stable midline, midfoot strike, and gently." Others in the forum agreed, emphasizing it as a way to learn and maintain good running form and to keep that form when moving back to shoes. While some athletes will stick to barefoot or minimalist footwear, many rotate among a combination of trail shoes, road shoes, barefoot, and minimalist footwear.

Running in bare feet requires a midfoot strike.
COURTESY OF BAREFOOT TED

The Value of "Going Bare"

In the simplest of terms, going barefoot or wearing minimalist footwear makes your feet do more of the work they were intended to do. The bones, muscles, tendons, and ligaments all work together. You have a lighter gait. Instead of landing on your heels, you land more on the midsole and forefoot. With that comes a better connection between your feet and the ground. Good running form is important. One needs strong feet, strong ankles, strong lower legs, and a good sense of agility.

A 2004 study at the Sapporo International Half-Marathon in Japan captured foot-strike positions of 283 runners: 75% of the runners landed on their heels, 24% landed midfoot near the arch, and only 4% landed on their forefoot. The 4% were not the fastest.

When we wear shoes, most of us are heel strikers. Barefoot runners, as well as those in minimalist footwear, tend to strike the ground near or on the ball of the foot. I watched a 72-year-old woman—who, because of heel injuries as a child, had been unable to run—show me how she could now run. She was excited and had just finished her first 5K race. FiveFingers had allowed her to run again.

Our body adapts: muscles, tendons, and bones adjust to changes in footwear, our stride, and the way our foot strikes the ground. Many runners who have struggled with chronic injuries and have switched to running barefoot or to minimalist footwear have seen their injuries reduced or eliminated. But this adaptation takes time. Start by walking indoors, then walk outdoors. Then transition to run indoors, then run outdoors. Once running outdoors, transition from running on soft surfaces to harder ones. Doing this will allow your body's natural shock mechanisms to build up, which will allow you to run better with these shoes or barefoot in the future.

The Science on Barefoot Running

Articles in journals have talked about running shoes and barefoot running for some time. Here are a few examples.

- Barefoot running promotes front- and midfoot strike, which allows the runner to take more "advantage of elastic energy stored in both the Achilles tendon

and the longitudinal arch of the foot." This develops more calf and foot muscle strength and avoids "uncomfortable and potentially injurious impact."[12]

- A shoe with any heel height, trainers included, alters the entire body posture.[13]
- "The soles and tips of the toes contain over 200,000 nerve endings," connecting us to the world and helping us balance. The stimulation is a connection from foot to body and foot to brain. This sensory perception is often "denied us because of our thick-layered and inflexible shoes."[14]
- "When running barefoot . . . the runner compensates for the lack of cushioning" by adjusting the foot-landing angle to a more natural mid- to front-foot strike, giving it a softer landing.[15]
- "Humans have engaged in endurance running for millions of years, but the modern running shoe was not invented until the 1970s. For most of human evolutionary history, runners were either barefoot or wore minimal footwear such as sandals or moccasins with smaller heels and little cushioning relative to modern running shoes."[16]
- "The soft materials in modern running shoes allow a contact style [heel strike] that you would not use [if you were] barefoot. The foot no longer gets the proprioceptive cues" that it should, and "a midsole [foot strike] can impair the foot's ability to react to the ground. This can mute or alter feedback the body gets while running."[17]
- "We found adding 100 grams to the shoe increased the aerobic demand of running by 1%. Now 100 grams is about 3.5274 ounces, so each ounce changes the cost of running about 0.2835%." For each additional ounce, the runner loses "about .83 seconds for a mile."[18]

The barefoot movement took the running community by storm. Athletes wanted to mimic the experience McDougall wrote about in *Born to Run.* Thousands have tried barefoot running, FiveFingers, and whatever new minimalist footwear they have heard others talking about. They want the function and the feeling of venturing out with as little as possible on their feet. They are after the natural movement of going barefoot.

Unfortunately, this barefoot function requires a change in form that many do not consider. You cannot run barefoot, or in the new minimalist shoes, and land on your heels. You will become injured. This new style requires a mid-foot or forefoot strike. Newton Running calls it natural running, saying it will help you discover your optimal running form. The company has a YouTube channel with videos on natural running, and the book *Natural Running: The Simple Path to Stronger, Healthier Running* (VeloPress, 2010), by cofounder Danny Abshire, is a must-read for anyone wanting to learn more about running better and more efficiently with fewer injuries. The Natural Running Center

(naturalrunningcenter.com) is a good online resource for information about learning how to run more naturally.

Think about how we move on our feet. When we walk, we naturally land on our heels first. When we sprint, we land on our toes. Ideally, we need a point in between.

When we run in normal shoes, we land on our heels and roll through to our forefoot and toes. Our heels strike first, in front of our center of gravity. This impact leads to a moment of deceleration, as the heel shock moves upward through the knees and spine. Then we push off with the muscular force of our toes.

When we run barefoot or in minimalist shoes, we naturally land on our midfoot or forefoot. We lean slightly forward, with our center of gravity over where our forefoot strikes. Our stride is shorter with a quicker cadence. We land lightly and quickly lift our foot for the next foot strike. The body should be relaxed rather than tight or tense. This engages our vision, brain, and all the muscles, tendons, bones, and supporting structures of our feet and legs.

It takes time to unlearn old habits and learn the proper technique. Many become injured because they do too much too soon.

FiveFingers are worn by many trail runners. COURTESY OF VIBRAM

Barefoot Running Precautions

Whether you're going barefoot or wearing minimalist footwear, you need to start slowly. Your muscles need to get used to the new stresses on them. Tendons and ligaments need to be strengthened. Bones need to adapt to the new demands placed on them. Flexibility needs to be developed. None of this happens overnight. You need to ease your way into it. Doing too much too soon could cause damage to all those internal parts. Muscle tears, tendinitis, strained tendons, and stress fractures could result. Long-distance barefoot runner Tellman Knudson suggests starting with 5 minutes a day running barefoot, then putting your shoes on. After a week, add in another 5 minutes. Continue this for a few weeks, and let your feet be your guide. If you experience swelling, internal pain, or a burning sensation, reduce the amount of time spent barefoot.

You are also changing from a heel striker to a forefoot striker. Landing on the balls of your feet adds new stress on your Achilles tendon and calf muscles. Many of those starting out complain of Achilles and calf pain. Starting slowly will give these muscles time to strengthen. Landing on your forefoot or midfoot doesn't mean that your heels don't come down; it just means they don't touch first. You'll land more in the middle of the foot first, and then your foot continues down until the heels touch. The forefoot and midfoot landings provide a natural springing action. You can also investigate Pose Method (posemethod.com) and ChiRunning (chirunning.com), which advocate landing more on the forefoot. These techniques teach athletes how to position their body during exercises such as running and teach better form and conditioning for reduced injuries.

When venturing barefoot onto trails or even pavement, you should take a few precautions. Start slowly with short barefoot excursions to give your feet time to adjust. Your feet are used to the support and cushioning of shoes, and going without will make a sudden change. Be attentive to the conditions of the path underfoot. Your feet can be cut or punctured by debris on the road or trail. If you want to run barefoot, start by walking.

Walking and running barefoot can be an excellent way to condition your feet in order to prevent blisters when you do wear boots or shoes. Your skin will be tougher, and you may develop calluses. But be forewarned: This is no guarantee that you will not get blisters. Remember that when it is raining, the moisture will soften the skin on your feet. That's a good time to switch to one of the minimalist shoes.

Aside from the possibility of cutting your feet on glass or metal, if you have any cuts or open skin on your feet, you run the risk of picking up an infection.

Another concern is skin that calluses over. These calluses can split into fissures or cracks in the skin. This opens the inner layers of skin to a greater risk of infection. If you step on something sharp and get a puncture wound, seek medical care. Puncture wounds typically close up, and this seals any debris, germs, or contaminants inside the wound. If you choose to go barefoot, it's smart to take care of your feet. There is no point in getting an infection through carelessness.

After reading about all the possible injuries from going barefoot, you may be worried. Going barefoot may be the goal of many athletes, but in reality, wearing minimalist shoes will provide protection and enhance the barefoot experience. Knudson likes FiveFingers, especially for those who

Xero Shoes Z-Trail sandals offer protection and flexibility. COURTESY OF XERO SHOES

- Don't want to deal with the pain of running barefoot.
- Want to minimize the risk of stepping on something that could hurt their feet.
- Run on hot surfaces where their feet would roast without protection.
- Are in the process of transitioning from running in shoes to running barefoot.

Remember that switching to barefoot running or minimalist footwear does not mean that you can't ever run in shoes again. Many athletes employ a combination of going barefoot or wearing minimalist footwear or shoes. Running in minimalist footwear helps runners focus on good form, and for many, it will reduce injuries. If you want or need something more substantial than FiveFingers, consider using one of the minimalist shoes from companies like Altra, Inov-8, Nike, Newton, New Balance, Merrell, Skora, Vibram, Vivobarefoot, or Xero Shoes. These replicate the free and natural flexible motions of your feet better than the usual running shoe.

Avoiding Injuries

Running on any surface in bare feet exposes them to glass, rocks, nails, screws, twigs, wire, and roots—all typical debris in places we like to run. One misplaced step onto a rusty wire or a piece of glass can lead to an infected foot and, if not attended to properly, an even worse outcome. Learn to regularly check your feet for abrasions and cuts. Running on grass or trails offers a softer and more

Barefoot Ted's Luna Sandals PHOTO BY BAREFOOT TED

comfortable surface than asphalt or concrete. Wearing at least some degree of foot covering will protect the soles of your feet.

A strip of tape can be put on the ball of the forefoot for protection when running barefoot. Likewise, when wearing FiveFingers, tape can even be added to the forefoot to reduce friction. Because the FiveFingers have individual toes, you could wear Injinji toe socks with them if you plan ahead and buy the footwear with room for the socks. That can provide an extra bit of cushioning, toe protection, and padding from any rough inside seams.

Scott Sanders uses FiveFingers and told me, "They are amazing shoes. My ITB [iliotibial band syndrome] and sore knee problems went away almost immediately. I wear them around town all the time, but I really can't run in them." Here are two problems Scott has had with FiveFingers:

- They offer no protection from roots, rocks, stones, pavement, and concrete. "An ultrarunner friend of mine broke her toe wearing them, and I banged my foot on a root while training and have been forced to use them on the treadmill and elliptical pretty much exclusively," he says. "We have few soft trails to run on in Northern Georgia."
- There is very little cushioning on the bottom of the sole. "I tried inserting Dr. Scholl's Gel and regular shoe inserts to give me just a little more cushioning, but it didn't work," Scott says.

Many athletes, like Scott, are finding that FiveFingers are fine for walking, but they have a hard time running the distances they used to run in normal shoes. Minimalist shoes from the companies listed previously are a good choice for athletes who want a shoe designed for running on their midfoot and forefoot—a more natural running form.

Ice can help minimize swelling, especially as you are starting out. The "Cold and Heat Therapy" chapter (page 400) has information on how to get the most benefits from icing.

When going out to run barefoot, add a few things to a fanny pack. Knudson, known for his efforts to run across America barefoot, suggests including tweezers, moleskin for padding, Gorilla Super Glue to seal wounds and to help moleskin or tape stick, duct tape, bandages in case of cuts, and alcohol wipes to disinfect.

Michael Sandler, the author of books on barefoot running, reminds runners to start out slowly. "Start out barefoot and run only a few hundred yards. Work on proper form. Let your skin condition be your guide. If your skin becomes tender, chances are you're overly fatiguing muscles, tendons, ligaments, and even bones. Don't run barefoot two days in a row until your feet are strong (at least three months)."

Barefoot Running Tips

- Go barefoot whenever possible to help your feet get used to it.
- Start slowly—give your feet time to strengthen themselves.
- When your skin gets sore, stop and wear something else.
- Strengthen your feet and ankles.
- Let pain be your guide; stop if your arches, the tops of your feet, or anything else hurts.
- Watch for abrasions and cuts on your feet, and care for them.
- Be careful of hot and cold surfaces.
- Rest days are beneficial.
- Be attentive to roots and rocks, which can cause injury.
- Stand upright to stay on your toes and be light on your feet.
- Get over the social implications of going barefoot.

It is imperative that those wanting to try either barefoot running or minimalist footwear understand the importance of starting slowly and letting pain

be your guide. Making the change to running barefoot and/or in minimalist footwear can easily lead to months of sore calf muscles, sore Achilles tendons, and various foot and ankle pains that could naturally limit your training. Even stress fractures can occur. Increasingly, many athletes ignore these warning signs and become injured. In mid-2010, articles started appearing about the epidemic of barefoot running injuries. Podiatrists and physical therapists reported a surge in injuries that seemed to be related to barefoot and minimalist footwear running. Heel and calf muscle injuries, Achilles tendinosis, and plantar fasciitis can happen when one does too much too soon. The transition from normal running shoes to running either barefoot or in minimalist footwear can take months. Most of us have been heel strikers for years. Changing to a midfoot strike takes retraining our brain, which knows we are used to landing on our heels.

Be careful. Reduce your mileage. Start slowly. If you are older, be prepared for the transition to take even longer. Walk barefoot as much as possible. Let your bones, muscles, tendons, and ligaments get used to being unfettered and free from shoes.

MINIMALIST SHOES

The choices in footwear when it comes to minimalist-type shoes have multiplied in the past few years. Vibram FiveFingers were once the most commonly used. Some athletes try sandals, whether homemade huaraches or store-bought sandals. Companies like Altra, Inov-8, Nike, New Balance, Newton, Merrell, Skora, Vibram, Vivobarefoot, and Xero Shoes offer excellent minimalist shoes. Remember, though, that not all of these shoes are sold in running stores.

Most minimalist shoes are built on a level platform. The term *zero drop* is used to describe these shoes. The drop is the height difference between the toe and the heel of a shoe. So *zero-drop shoes* means that the sole is a straight, level plane. Today, many zero- or near-zero-drop shoes have some degree of cushioning between the foot and the outsole. This can add a bit of support and cushioning to the shoe. Minimalist shoes typically do not have thick, cushioned heels and midsoles and generally do not have any arch support.

Remember that just because a shoe is marketed as minimalist doesn't mean that it is designed to accommodate a midfoot or forefoot strike. Some are simply made with a thinner outsole and less support and structure.

Consider your footwear needs based on the surfaces on which you run, how far you run, your running style, and your history of running injuries. Try the footwear on to make sure it feels right, and run a bit—even if it's around the

store. Ask the store for pointers and whether you can take the footwear outside for a try. Remember that some of the minimalist shoes will not provide protection against rocks if trail running.

Vibram FiveFingers

FiveFingers footwear was the brainchild of industrial designer Robert Fliri. He proposed the idea to Marco Bramani, grandson of Vibram founder Vitale Bramani, who invented the first rubber soles used on mountaineering boots in 1936.

Vibram's FiveFingers V-Run for running
COURTESY OF VIBRAM

Vibram FiveFingers are, simply put, little more than five-toed gloves for your feet. The outsole is 3, 3.5, or 4 millimeters thick, depending on the style. There is no arch support and no cushioning. Your feet and toes can spread out and bend and flex in a natural way, as they were intended to.

FiveFingers come in many styles. The best designs for running are those where the top of the shoes comes up near the ankle. This keeps debris from getting inside and better secures the footwear to the foot. The KSO EVO is one of the standard designs. The V-Run is made for the roads. A more rugged version, the V-Trek, is designed for trails and trekking.

Getting Fit for FiveFingers

Gillian Robinson, of the former running store ZombieRunner, has fit many pairs of FiveFingers. She recommends them for people with bunions and those with toes that curl downward or upward, toes that overlap, or hammertoes. She suggests making sure your toenails are trimmed and filed smooth to avoid poking through the mesh upper. Here are her tips on getting the best fit:

- When possible, get fitted at a store that fits and sells FiveFingers.
- Wear them snugly against the foot, heel back in the shoe, but the toes should not be tight against the ends of the toe pockets.
- Size them to your longest toe.
- Get the right size: too big and they flop around and cause blisters; too small and your toes can't flatten *and* flex.

FiveFingers come in European sizing only (that is, 34–48, depending on whether they're for men or women), and men and women can wear each other's FiveFingers, but those made for women are generally narrower.

Newton shoes are made with actuator lugs in the forefoot for energy return.
COURTESY OF NEWTON RUNNING

Inov-8

Inov-8 footwear is worn by many trail runners because of its design, which allows the foot the freedom to move and function as nature intended, without interference from the structure of the shoe. The lightweight Inov-8 shoes protect the foot from the harsh external environment experienced by the off-road runner but maintain the feeling and function of barefoot running.

Newton

Newton running shoes are made to enhance the natural running gait of landing on your midfoot or forefoot. Energy is absorbed and returned back to the runner through its patented Action/Reaction Technology. Runners I have talked to indicate the shoes help them land in a more natural position. For those wanting a minimalist shoe with protection and support that also provides a forefoot running technique, Newton shoes are a good choice.

Vivobarefoot

Shoes by Vivobarefoot were developed specifically to replicate being barefoot. The Evo looks like a normal running shoe. They are lightweight and made with breathable mesh and lightweight microfiber, and the outsole is 3 millimeters thick. Individuals who cannot wear FiveFingers because of fitting issues may do well in these shoes. The Stealth III is made for running; the Primus Trail FG, for trails and hiking; and the Primus Trail Winter FG, for wet trails. They allow a barefoot running or even hiking experience with some degree of protection.

Other Minimalist Shoes

Because of the growing popularity of minimalist footwear, more companies, such as Altra, Inov-8, Nike, New Balance, Newton, Merrell, Skora, and Xero Shoes, have designed footwear for this market. The websites and blogs listed at the end of this chapter are a good way to stay in touch with changes in the

market. Doing an online search for "minimalist shoes" will give you an idea of other shoes.

When shopping, be sure to read reviews from magazines and websites dedicated to the barefoot and minimalist movement (two examples are birth dayshoes.com and barefootrunningshoes.org). Make sure the footwear is made for running, not just casual wear. Because of the growing interest in minimalist footwear, many companies are trying to enter the minimalist shoe marketplace, and those shopping for such shoes need to be informed.

The minimalist movement has hit the sandals market too. Companies like Bedrock Sandals, Luna Sandals, and Xero Shoes make lightweight, minimalist sandals with simple strap systems. Many runners use these for trail running. Refer to "Sandal Products" on page 82 for more about these sandals.

As you might guess, wearing footwear without socks can lead to funky-smelling shoes. Wiping your feet with a premoistened antibacterial wipe is a good start. ActiFresh Foot Spray, Kiwi Fresh Force, and ZORBX Odor Remover work well.

Barefoot Ted's tips on the next page can also be applied to those wearing minimalist footwear. It is about technique and form as well as whether we wear shoes or not.

Another popular barefoot runner, Barefoot Ken Bob Saxton, gave the following quote in an article on barefoot running in *Runner's World* (February 2010): "Barefoot running is actually something that's been tried and tested over millions of years of evolution. Feet have become the engineering marvel that they are because they work. We're just trying to help average runners become more mindful of how they're running and to enjoy it more."

Barefoot Ted in typical running form
COURTESY OF BAREFOOT TED

Running barefoot and wearing minimalist footwear can help you get to that point. But remember, start slowly and let pain be your guide.

Barefoot Ted's Tips for Getting Started

I asked Barefoot Ted to share from his experience. He has been running barefoot longer than most. Here is his response:

"So, you wanna start running barefoot? First, before you begin, you want to evaluate what it is that is leading you to even accept the logic behind the concept of barefoot running. We all know that barefoot running has gotten a lot of attention lately. Much of it is valid and deserves your attention.

"Yet, one must still ask: Is this a viable option for me? Before you answer that question, let me explain why I think barefoot or minimal-footwear running may not be good for you. It is not good if you are thinking it is some sort of cure-all that only requires taking off your shoes and starting to run injury-free without radical changes in the way you may have been thinking of running up to now. If your running strategy has been about very specific time or distance goals, and you have been willing to push through pain to injury, then I would caution you: your bare feet will not allow you to continue this way.

"Barefoot running is not about blocking or pushing through pain, or at least it shouldn't be. Rather it is about tuning in to your own body's highly sophisticated set of integrated awareness systems, systems that communicate through feelings and senses that are being collected in real time as you move. From my perspective, learning how to run well means learning how to tap into the feeling of running well, which more often than not requires baring the foot to get the full feel of what happens when you move.

"However, even if you decide that barefoot is the route for you, take one step backward and realize that you are most likely in the process of rehabilitating your feet and legs from years of being differently abled, shod, and cast. Atrophy, loss of range of motion, weakness, neglect—the foot has not been treated well lately. All the padding and support and protection has not led to stronger feet, sadly.

"So, the first key is to start slowly and incrementally, and avoid overexuberance; avoid being driven by your ego. The hallmark of my barefoot running philosophy is regaining connectedness, mindfulness, and presence in your running and in your body."

Barefoot Ted's Barefoot Running Goals

So, what are the secrets I share with clients who take my Introduction to Barefoot Running Clinic? First, my aim is to get people to learn how to *feel* what good running feels like. One of the primary feelings becomes an awareness of the texture and hardness of terrain and of impact. This awareness is the beginning.

To master this awareness, I have clients learn to move on hard surfaces *first*. Not focusing on distance or speed, I have my clients first walk and then trot on hard, fairly smooth surfaces. I work with them to focus on and begin to master three goals: quiet, quick, and in balance (see below for details).

Ultimately my aim in coaching is to help people perfect what I call a persistent hunt trot . . . a gait not purely about speed, but about smooth, flowing, efficient, sustainable movement, movement that leaves you ready to play another day. Listen to your body. Learn what it is telling you. Then adjust and advance accordingly.

THE THREE GOALS

1. QUIET Master gentle, quiet, forefoot-centric landings, silent and smooth. Learn to move with no hard edges and no pounding by learning how to have the impact of your landing flow through your forefoot and smoothly spread through the legs. Notice how silent your movement becomes. Imagine the movement of a big cat. Watch dogs trot. Let them be models for a flowing movement that wastes no energy.

2. QUICK Quicken your cadence. Running in bare feet encourages this naturally. Some shoe runners are plodders. You can hear them coming. Lots of wasted energy on poorly timed impact. Quicker cadence ends up making sense when you realize that your ability to absorb and recoil energy through elasticity in your body dissipates quickly and is lost if not used. Learning how to get back in touch with the sweet spot of optimal recoil efficiency is easier when you can feel your feet, a feeling that encourages a landing phase with your foot more in line with your center of gravity. Overstriding is discouraged and nearly impossible when barefoot.

3. IN BALANCE The feeling of balance is a stable, upright posture; head balanced and upright; core engaged; belly button pulled into the spine; and waist not bent. I think that good running can be judged aesthetically. It should look good, not painful. When you see someone moving or running well, it looks smooth and fluid and graceful and efficient. The opposite looks painful, when someone is hunched and stiff, robotic and plodding. Indeed, efficient running is tall and stable, the upper body acting as the fulcrum from which the legs and arms can move freely with a lack of bouncing or swaying of the head.

MAXIMALIST SHOES

In 2010 Hoka One One changed the running world by rolling out its maximally cushioned shoes. They were designed to offer increased comfort, protection, and natural running features. Even though this was in the midst of the minimalist shoe craze, after several years of fine-tuning, Hoka quickly caught the eyes of runners.

BAREFOOT AND MINIMALIST FOOTWEAR WEBSITES

Note: For running sandals, check the "Sandals" section, page 80.

BAREFOOT RUNNING UNIVERSITY, founded by barefoot ultramarathon runner Jason Robillard, author of *The Barefoot Running Book,* offers information about running barefoot, a blog, footwear reviews, links, and more. The Barefoot Running University is on Facebook.

BAREFOOTERS.ORG, the website of the Society for Barefoot Living, offers resources, facts, and links about living barefoot.

BAREFOOTRUNNING.COM by Barefoot Ken Bob is the original barefoot running site. Started in 1997, it offers tips and answers to frequently asked questions about barefoot running.

BAREFOOTRUNNING.FAS.HARVARD.EDU Daniel Lieberman, a Harvard researcher, maintains this website titled "Biomechanics of Foot Strikes and Applications to Running Barefoot or in Minimal Footwear."

BAREFOOTRUNNINGSHOES.ORG offers reviews of barefoot running shoes.

BIRTHDAYSHOES.COM is a website and blog dedicated to barefoot running shoes with tips and facts to help your minimalist experience.

INOV-8.COM, the official site of Inov-8 Footwear, has information on its products designed around the natural functions of the foot.

NATURALRUNNINGCENTER.COM The Natural Running Center is an online resource for barefoot running. It has a blog, a RunRX section, and more.

NEWTONRUNNING.COM is the website of the Newton line of running shoes. It contains good information on the science of natural running and articles on improving your running form.

RUNBARE.COM is the website of Michael Sandler and Jessica Lee, authors of *Barefoot Running, Barefoot Walking,* and the *Barefoot Running* movie.

VIVOBAREFOOT.COM, Vivobarefoot's official site, covers its extensive line of minimalist and natural shoes.

US.VIBRAM.COM is the website for Vibram, maker of FiveFingers shoes.

Maximalist shoes are usually characterized by their big, cushiony, and wide midsoles. We all know what a "normal" running shoe midsole look like. A maximalist shoe typically has a midsole that looks too big for the shoe. Some might call the thick midsoles abnormal. Over the years, these shoes have been improved so they are more stable, and some even have 0- to 8-millimeter drops. Thicker midsoles and lower heel drops create a rocker effect that helps runners. All these add up to the ability to lessen runners' fatigue, which results in better form to avoid injury.

BOOKS ON BAREFOOT RUNNING

BAREFOOT RUNNING: HOW TO BECOME HEALTHY, FIT, AND BLISSFUL BY GETTING IN TOUCH WITH THE EARTH by Michael Sandler and Jessica Lee (Boulder: RunBare, 2011)

BAREFOOT RUNNING: STEP BY STEP by Ken Saxton and Roy Wallack (Beverley, MA: Fair Winds, 2011)

THE BAREFOOT RUNNING BOOK: A PRACTICAL GUIDE TO THE ART AND SCIENCE OF BAREFOOT AND MINIMALIST SHOE RUNNING by Jason Robillard (Allendale, MI: Barefoot Running, 2012)

BORN TO RUN: A HIDDEN TRIBE, SUPERATHLETES, AND THE GREATEST RACE THE WORLD HAS NEVER SEEN by Christopher McDougall (New York: Alfred A. Knopf, 2009)

One question that is often asked is whether maximalist shoes are better than minimalist shoes. To answer that question, it's interesting to see what podiatrists say. Some have said that runners wearing minimalist shoes have helped their business when many of these runners get injured, either by doing too many miles too soon or simply because the shoes are not right for their feet. Some cite how the maximalist shoes offer better stability, improved shock absorbency, and reduced forces on the foot's joints—statements that in effect say the opposite is true for minimalist shoes. For older runners, a maximalist shoe can mean added support and protection with shock absorption, providing them with a safer run for many more years.

Shoe companies are developing better midsole materials, like Nike's ZoomX, New Balance's Fresh Foam, and Saucony's PEBA midsole foam. Some of the shoes that would be considered maximalist include Hoka's One One Bondi 7, New Balance's Fresh Foam Roav, On Running's Cloudstratus, and Saucony's Endorphin Speed and Shift.

SUPER SHOES

The term *super shoes* is fairly new. It was brought to my attention by Australian-based Bartold Clinical in a late 2020 webinar, "The Impact of Super Shoes on Performance . . . and Injury." Bartold is "an online sports medicine education platform with a focus on the lower limb and athletic footwear."[19] The Bartold team consists of Simon Bartold and Paul Griffin. Bartold is a sports podiatrist with more than 30 years of clinical experience, a performance footwear consultant, a researcher, an educator, a mentor, and an innovator. Griffin is a sports

Glossary

Achilles tendon the large tendon that runs from the calf to the back of the heel and helps you push off with your toes to propel your body forward

adventure racing multisport races over difficult terrain, often done in teams over several days

arch the curved part of the bottom of the foot

athlete's foot a fungal infection that causes itchy, red, soggy, flaking, and cracking skin between the toes or fluid-filled bumps on the sides or sole of the foot

biomechanics the study of the mechanics of a living body, especially of the forces exerted by muscles and gravity on the skeletal structure

blister a fluid-filled sac between layers of skin that occurs as a result of friction

bone spur a small, bony growth usually indicating a bone irritation

bruise an injury in which blood vessels beneath the skin are broken and blood escapes to produce a discolored area

bunion a bony protrusion at the base of the big toe

bunionette a bunion on the little toe

bursitis the formation of an inflamed, fluid-filled sac, usually where muscles or tendons glide over bone

calcaneus the large heel bone

callus a thickening of skin caused by recurring friction, usually on the sole of the foot, heel, or inner big toe

capsulitis inflammation of a ligament

claw toes toes that are contracted down at the middle joint but up at the joint at the ball of the foot

contusion a bruising injury that does not involve a break in the skin

corn a thickening of the skin, generally on or between the toes, usually caused by friction

dermis the sensitive connective-tissue layer of the skin located below the epidermis, containing nerve endings, sweat and sebaceous glands, and blood and lymph vessels

dislocation a complete displacement of bone from its normal position at the joint surface

dorsal relating to the top side of the foot

edema the swelling of body tissues due to excess fluid

epidermis the outer, protective, nonvascular layer of the skin covering the dermis

eversion movement of the foot as it rolls inward at the ankle

fat pad (under the ball of the foot and the heel) provides cushioning to reduce friction and pressure on the foot's structure

fibula the outer and smaller of the two bones of the lower leg

fissure a crack in the skin, usually found on the toughened, callused skin of the heels

flat foot a foot that has either a low arch or no arch

flexion the bend; the flexion of your foot and shoe should be at the same place for an effective gait

forefoot the ball of the foot and the toes

friction the force that resists one surface sliding against another

frostbite the result of the freezing of skin tissue

Haglund's deformity a bump in the form of an enlargement of the back of the heel bone (calcaneus) at the area of the insertion of the Achilles tendon

hallux the great or big toe

hallux valgus the turning in of the big-toe joint that often causes bunions

hammertoes toes that are contracted at the toe's middle joint, making the toe bend upward at its center and forcing the tip of the toe downward

heel the largest bone of the foot, which absorbs three times your body weight with every heel strike

heel pad the soft-tissue pad on the bottom of the heel

heel-pain syndrome pain at the heel usually caused by overuse or repetitive stress to the heel

heel spur a small edge of bone that juts out of the calcaneus

hematoma a swelling containing blood beneath the skin caused by an injury to a blood vessel

hot spot a hot and reddened area of skin that has been irritated by shear

hyperhidrosis excessive moisture

infection a condition in which a part of the body is invaded by a microorganism such as bacteria or a virus

ingrown toenail when one or both sides of the nail have grown into the flesh of the toe

inversion movement of the foot as it rolls outward at the ankle

last the form over which a shoe or boot is constructed

lateral relating to the outside of the foot, leg, or body

lateral longitudinal arch the curved part of the bottom of the foot that runs the length of the outside foot, providing shock absorption and stability

ligament the strong, fibrous connective tissue at a joint that connects one bone to another bone; each foot has more than 100 ligaments

LOVE load, optimism, vascularization, and exercise; PEACE & LOVE are the best cold treatment for injuries

maceration a breaking down or softening of skin tissue by extended exposure to moisture

mallet toes toes that are contracted at the end joint only

medial the inside of the foot, leg, or body

medial longitudinal arch the curved part of the bottom of the foot that runs the length of the inside foot, providing shock absorption and stability

metatarsals the five long bones at the ball of the foot that sit just behind the toes

metatarsalgia pain somewhere underneath the metatarsal heads of the foot

midfoot the middle or center part of the foot, containing the arch and five metatarsal bones

Morton's neuroma pain on the bottom of the foot, usually under the pad of the third or fourth toe

Morton's toe a foot condition in which the second toe is longer than the big toe

neuroma the swelling of a nerve due to an inflammation of the nerve or the tissue surrounding the nerve

NSAIDs nonsteroidal anti-inflammatory drugs; used to control pain and swelling after an injury

orthopedist an orthopedic surgeon specializing in the treatment and surgery of bones and joint injuries, diseases, and problems

orthotic an insert made from a mold of the bottom of the foot that is then inserted into a shoe or boot to correct a foot abnormality

PEACE protection, elevation, avoid anti-inflammatories, compression, and education (move early); PEACE & LOVE are the best cold treatment for injuries

pedorthist a specialist trained to work on the fit or modification of shoes and orthotics to alleviate foot problems caused by disease, overuse, or injury

peripheral neuropathy a painful nerve condition that can manifest itself as a burning sensation in the feet

plantar the bottom surface of the foot

plantar fascia the thick band of fibers along the arch of the foot that connects the heel to the toes

plantar fasciitis an inflammation of the plantar fascia

plantar warts small, hard, flesh-colored, white, or pink granulated lumps typically found on the feet and caused by a virus

podiatrist a doctor of podiatric medicine who specializes in the treatment and surgery of the foot and ankle

pronation the rolling of the foot toward the inside of the body when weight-bearing

Raynaud's syndrome discomfort caused by a decreased blood supply to the fingers and toes

sesamoiditis inflammation of the two little bones beneath the ball of the foot and under the joint that moves the big toe

shear a strain in the structure of a substance produced by pressure when its layers are laterally shifted in relation to each other

sole the bottom of the foot

sprain a joint injury in which ligament damage is sustained

sterilization the process by which bacteria is removed

strain muscular injury produced by overuse or abuse of a muscle

stress fracture typically a small crack in the outer shell of the affected bone caused by sudden or repetitive stress, usually from overuse without proper conditioning

subluxation an incomplete or partial dislocation

subungual hematoma a hematoma under the nail plate

supination the rolling of the foot toward the outside of the body when weight-bearing

tendinitis inflammation of a tendon or its surrounding sheath

tendon the elastic, tough, fibrous tissue that connects muscles to bone

toes provide stability, spread to relieve pressure, and help propel you forward

toe box the front part of a shoe or boot that covers the toes

toenail fungus marked by nails that are thick and deformed, with a brown, white, or yellowish discoloration

transient paresthesia temporary nerve compression that can be caused by a gradual buildup of fluids in your feet during extended on-your-feet activity

transverse arch the curved part of the bottom of the foot that runs from side to side as the major weight-bearing arch

trench foot a serious nonfreezing cold injury that develops when the skin of the feet is exposed to a combination of moisture and cold for extended periods

turf toe a condition of pain at the base of the big toe at the ball of the foot, usually caused from jamming the toe

ultrarunning running distances greater than a marathon

virus a tiny organism that causes disease

wart a thickened, painful area of skin caused by a virus

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About the Authors

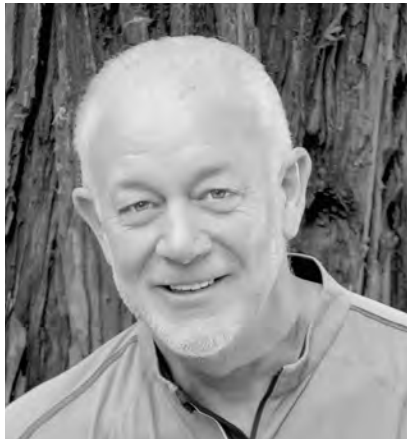

PHOTO BY ANGELA HUNT

JOHN VONHOF brings a varied background and extensive experience to *Fixing Your Feet.* This seventh edition is the synthesis of 39 years of his experience as a runner, hiker, cyclist, and medical professional, and a never-ending quest to learn more about foot care to help athletes in extreme events.

His popular website, fixingyourfeet.com, is dedicated to providing articles, resources, links, and a blog about foot care, and it serves to inform and educate athletes about all that's new in foot care and to provide foot care advice.

Other medical professionals recognize John's expertise too. In 2009 he was the lead author of a chapter on foot injuries in the textbook *Expedition and Wilderness Medicine* (Cambridge University Press).

Over the years John has provided volunteer medical aid at numerous sporting events around the world, patching feet, training medical staff and interested athletes, and providing advice to thousands of athletes. He has worked many multiday races, including Six Days in the Dome, DecamanUSA, Amazon Jungle Marathon, Primal Quest Adventure Races, Costa Rica Coastal Challenge, Racing the Planet Chile, BC Canada's Raid the North Extreme, Gold Rush Adventure Races, TransRockies, Death Valley's Badwater 135 Ultramarathon, the Western States Endurance Run, Tahoe Rim Trail Endurance Runs, the 2-day AVON Walk, the 3-day Susan G. Komen Walk, and more. He continues to be sought out for his expertise and experience in providing answers to foot care questions, especially for multiday events.

A runner since 1982, John discovered trail running and ultras in 1984. He has completed more than 20 ultras: 50Ks, 50-milers, 100-milers, 24-hour runs, and a 72-hour run. He ran the difficult Western States 100-mile Endurance Run three times and the Santa Rosa 24-Hour and 12-Hour Track Runs 12 times. In 1987, with fellow runner Will Uher, John fast-packed the 211-mile John Muir Trail in the Sierra Nevada in 8.5 days, carrying a 30-pound pack.

He has been a paramedic, an orthopedic technician, and an ER technician, retiring in 2013. For fun, he writes and rides his road bike. Contact John at john@fixingyourfeet.com.

TONYA OLSON, MSPT, DPT, began to develop her lifelong interest in foot care when she was growing up riding and training horses, learning first-hand the truth behind the adage "no hoof, no horse." She brings a comprehensive understanding of foot care from her experience as a runner on roads and trails and from short to ultra distances. Her training as a physical therapist provides her with an understanding of wound care, physics, biomechanics, and the complexity of factors that contribute to foot care issues and injuries.

PHOTO BY MARIA SCHON

Over the years, she has worked with countless runners to help them get back to or succeed in the sport they love. Ten years of living in the Pacific Northwest running trails and working with ultrarunners fueled her passion for working with endurance athletes of all kinds.

Working with John Vonhof at the Western States 100 Endurance Run since 2010 has fostered a mentorship, friendship, and further development of foot care expertise.

Tonya currently lives in St. Petersburg, Florida, where she runs Centaur Rehab, LLC, her own cash physical therapy practice. She is also adjunct faculty in the two-year hybrid DPT program at South College in Knoxville, Tennessee, and is pursuing a doctorate in education at the University of St. Augustine for Health Sciences.

Tonya is board certified in orthopedic physical therapy and is a certified manual therapist. Contact her through her website, centaurrehab.com, or follow her on Twitter and Instagram @tonyakolsondpt.

Praise for *Fixing Your Feet*

I reference *Fixing Your Feet* often when consulting with customers about their foot troubles. There simply is no replacement for the amount of relevant content introduced in the book. The product recommendations are unbiased and based on experience with real athletes. *Fixing Your Feet* is a must-read for serious runners, hikers, and team sports athletes.

—Jason Pawelsky, formerly with Tamarack Habilitation Technologies

Through our experience as ultrarunners, we've noticed that our foot care needs continue to change due to different environments, changes in training and racing, and even changes in our feet. We keep coming back to *Fixing Your Feet* for the most useful and comprehensive foot advice, and we always find the answers we're looking for. This new edition keeps us up to date with the latest products and trends. We couldn't ask for anything more!

—Gillian Robinson and Don Lundell, ultrarunners and founders of zombierunner.com

I found *Fixing Your Feet* after a 48-hour race when my feet became so bad that I was reduced to a painful shuffle for the last 24 hours, then weeks of healing. I am now able to race 24 hours on a track without a scratch, and, as we say, "If you do not have a plan for your feet, you do not have a race plan." Thanks heaps for the help and advice you give so freely.

— Billy Pearce, husband, father of three boys, nurse, and ultrarunner

I can't praise *Fixing Your Feet* enough. It's written for us, the walkers and hikers and runners who need advice on what to do before and after we stress our feet.

—Wendy Bumgardner, walking and marathon coach, Very Well Fit

As a walker, runner, hiker, and podiatrist, I have found *Fixing Your Feet* full of essential information for athletes at all levels. An absolute must for runners, adventure racers, and ultrarunners!

—Christine Dobrowolski, podiatrist and author of *Those Aching Feet*

When it comes to patching the damaged feet of endurance athletes, John Vonhof is the ninja master. His expert services allowed me to finish the 2004 Primal Quest, and he's saved races for many teams at Gold Rush Adventure Racing events over the years.

—Mark Richardson, course director, Gold Rush Adventure Racing

I have helped people on the trail with their feet. Their feet are a mess! I was stunned. I have many people taping their feet now. I even wrote in the guest book at John Muir Trail Ranch about your book . . . I even told my chiropractor about kinesiology tape, and he has a big roll in his office.

—Steve Quinne, long-distance hiker

I can't thank you enough for your book. It's saved me tons of pain and foot problems. I try to follow your advice on foot care, and so far, I've had only one small blister in three 50s and one 100-kilometer race. The course was very sandy, and I didn't change socks quickly enough. At my last 50-mile race, I changed socks (Injinjis) at the 25-mile aid station, washed all the dirt off my legs and feet, dried them out, and continued to the end with no incidents.

—Scott Sanders, runner

> After more than 25 years of treating feet and reading about treating feet, I've found nothing, absolutely nothing, as helpful as *Fixing Your Feet*.
>
> —Buck Tilton, MS, cofounder of the Wilderness Medicine Institute of NOLS and author of many books on outdoor health and safety




Take Care of Your Feet

Whether you're hiking, backpacking, running, or walking, your feet take a beating with every step. Don't wait until foot pain inhibits your speed, strength, and style. Learn the basics and the finer points of foot care before pain becomes a problem. Foot expert and ultrarunner John Vonhof and physical therapist Tonya Olson share how the interplay of anatomy, biomechanics, and footwear can lead to happy (or hurting!) feet. *Fixing Your Feet* covers all you need to know to care for your feet, right now and miles down the road.

Inside You'll Find

- Tried-and-true methods of foot care from numerous experts
- Tips and anecdotes about recovery and training
- Information about hundreds of foot care products for nearly every foot ailment
- High-interest topics such as barefoot running and minimalist footwear, blister prevention, and foot care for athletes
- Discussions of individual foot care and team care

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