

# **Blister** *Management*

2nd Annual Medicine & Science in Ultra-Endurance Sports Conference

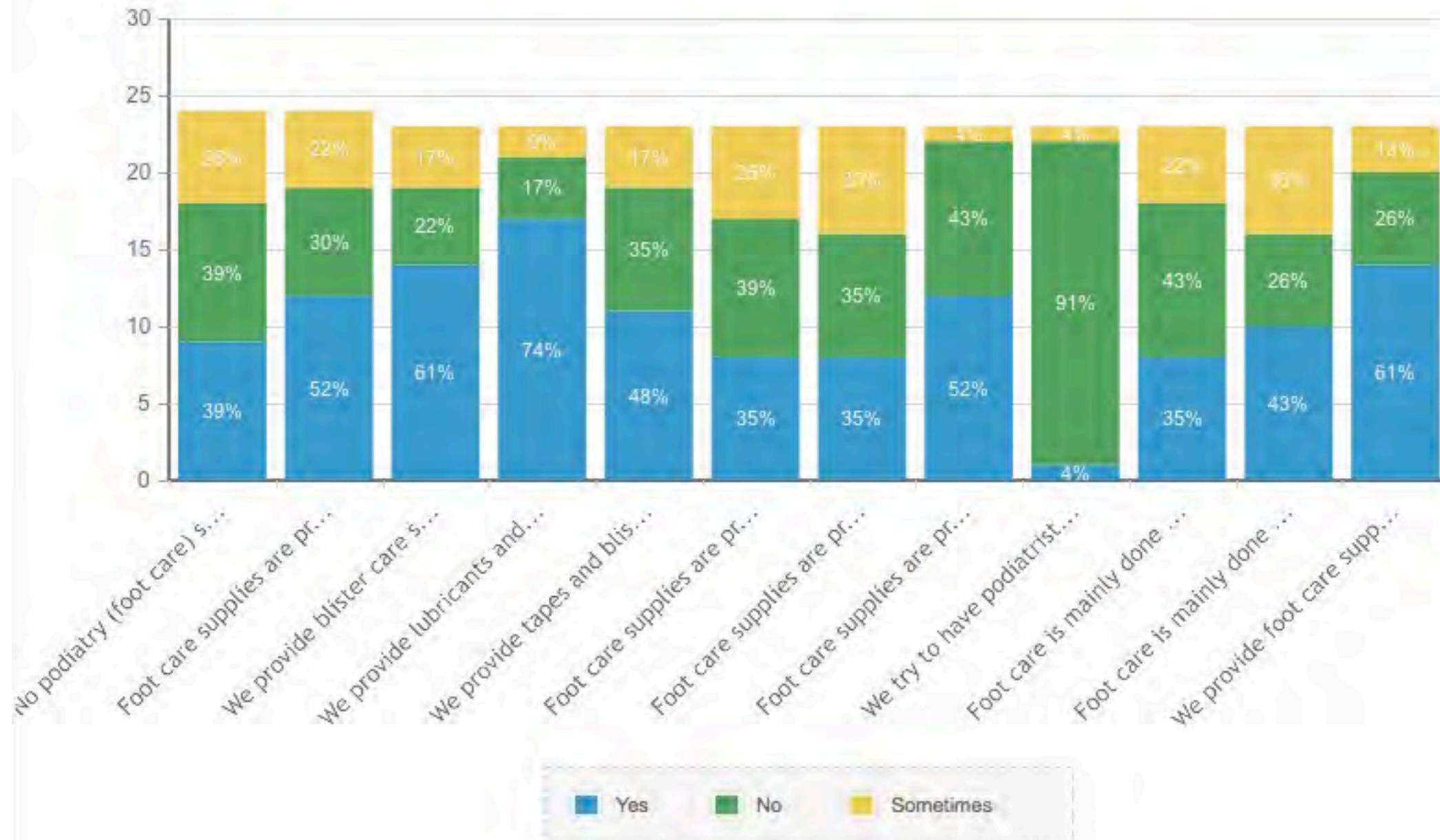


A SIMPLE BLISTER CAN  
ALTER ONE'S GAIT

# Medical & Podiatry Care at 100-Mile and Ultra Races

Tell us about any podiatry (foot care) services provided?

Answered: 23 Skipped: 11



I don't expect much. I know better. I've visited too many aid stations that had next to nothing in the way of quality foot care supplies. To me, part of being an ultra-runner is being self-sufficient. ~ Rachel DuBois

The people that are a concern are the ones that AREN'T on this list, who think they know it all or don't know what they don't know. ~ Terry Miller

A little suffering should drive home the lesson to learn how to care for your own feet. If someone fixes it for you, how will you ever learn? ~ Laz

If we keep raising our expectations of what is required of an RD, the fewer people will be willing to take on the task. ~ Richard Schick

What do you expect at aid stations: basic first aid kits at the aid stations; duct tape, Vaseline, alcohol swabs, band aids, antibiotic ointment, and scissors.

**Asked on the ULTRA Listserv forum**

*Blisters are so common we tend to not take them seriously, even when they're exceptionally painful and limiting. What happens next is blister treatment becomes the focus – not prevention. This is not acceptable.* ~ Rebecca Rushton, BSc (Podiatry)

# MY GOAL

To get runners back on  
the trail or road and  
able to finish the race.



My aim is to educate runners as I work on their feet so they are able to manage their own feet.

# Aid Station Tips

- Ask if they have clean socks and a change of shoes
- Roll their socks off their feet
- Remove their insoles and shake out the shoes
- Ask them “What’s going on?”
- Educate them as you work
- Use a shoe horn when putting their shoes back on

# Washing Feet



- Beware the communal water bucket
- Whatever you clean with water needs to be completely dried before tape or dressings can be applied

# MANAGING MOISTURE



# Maceration and Blisters

Many times people with macerated feet feel like they have blisters. Typically, there is nothing to lance and no fluid inside. Clean and dry the feet, and check for splits or tears in the skin.

If you find blisters with fluid, treat them as you normally would.



# Maceration

- Dry the skin as much as possible.
- Powder the feet
- Advise resting for a spell to allow the skin time to dry out
- Putting clean socks on can warm the skin and aid in healing
- Only time and drying the skin will help



## Moisture Controlling Agents:

- Desitin  
Maximum  
Strength  
Ointment
- Zinc Oxide
- Chafe X
- RunGoo
- SportsSlick

# MODIFYING FOOTWEAR









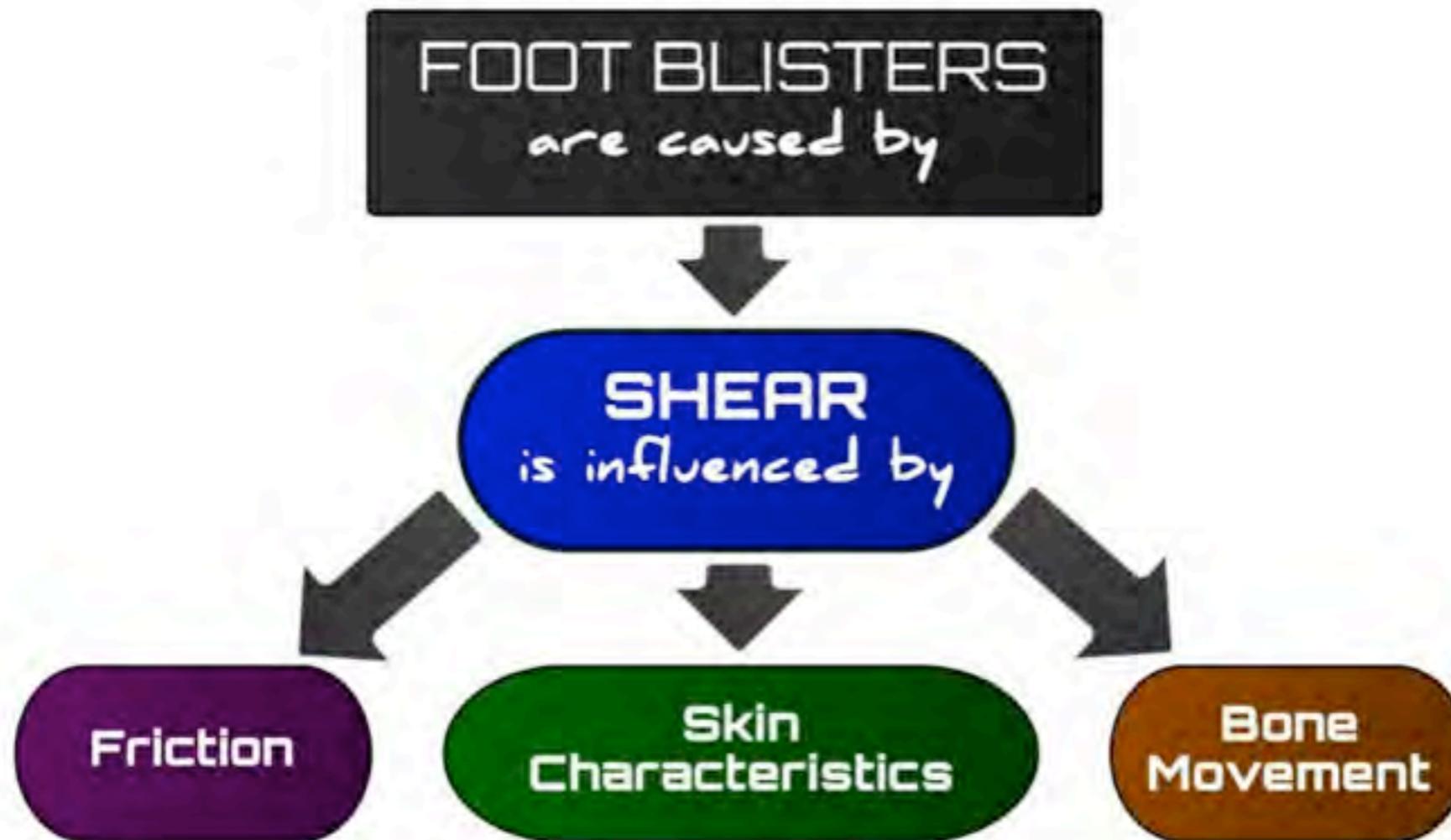


**Caution**



# BLISTER FORMATION

Heat  
Friction  
Moisture  
**Shear \***



Shear is the sliding of layers across one another – internal layers that are structurally connected. Those connections can break and when fluid fills that cavity, you have a blister!

# SHEAR

Shear might look like rubbing but it's not. Notice how your finger tip has not moved relative to the skin of the back of your hand? The skin on the back of your hand has moved relative to the underlying bone. Shear is the sliding of tissue layers over one another and it happens internally, below the skin's surface (whereas rubbing happens on the outer skin surface). It's that last little bit of shear that is damaging, when there is maximum skin stretch. When shear is excessive and repetitive, blisters form.

# FRICTION

Friction is what keeps the tip of your finger stuck to the back of your hand! Shear needs high friction to be able to approach blister-causing levels. The Images below show you what shear looks like at the back of the heel, a common site for blisters. The foot remains stationary in the shoe as the heel bone moves up and down. This causes the soft tissues (skin, fatty tissue, fascia, muscle, ligaments etc) between the skin surface and bone to shear (stretch).

credit Rebecca Rushton



The four requirements for blister-causing shear are listed below. Factors contributing to these conditions are quite obvious risk factors for blister development:

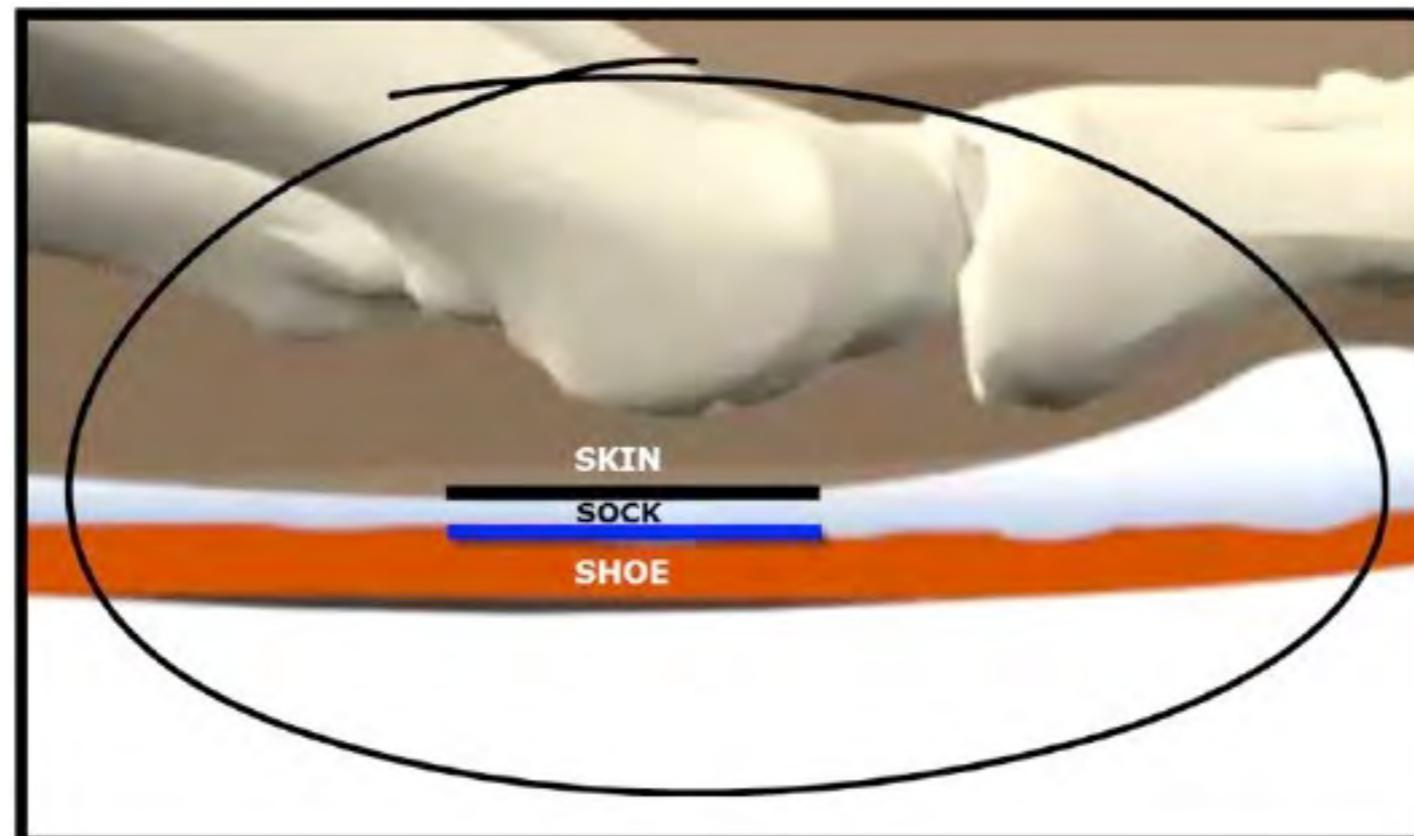
- Thick and immobile skin
- A high coefficient of friction (friction and pressure)
- Moving bone
- Repetition

credit Rebecca Rushton

RISK FACTOR	INCREASED BLISTER INCIDENCE	REDUCED BLISTER INCIDENCE
SKIN CHARACTERISTICS	Thick and stiff	Thin and mobile
SKIN MOISTURE	'Moist'	Very dry or very wet
<p><b>Skin characteristics and skin moisture:</b> Every experimental blister study has shown that blisters form most easily on thick and stiff skin of the feet, especially the soles (Akers and Sulzberger, 1972; Sulzberger et al, 1966). And research shows skin friction increases in the presence of moisture, compared to very dry or very wet skin (Naylor, 1955 A&amp;B; Sulzberger et al, 1966; Akers and Sulzberger, 1972; Highly, 1977; Nacht et al, 1981; Sivimani et al, 2003a).</p>		

The **black skin-sock interface**: By making it more slippery here, movement of the sock against the skin is encouraged. This rubbing is not necessarily going to be a problem to the skin - unless friction increases to a level that is abrasive.

The **blue sock-shoe interface**. By making it more slippery here, movement is encouraged between the shoe and sock. The rubbing can't cause abrasive skin damage because nothing is rubbing against the skin - the sock is protecting it because the two are stuck together and remain in stationary contact (thanks to friction) while movement occurs on the other side of the sock.



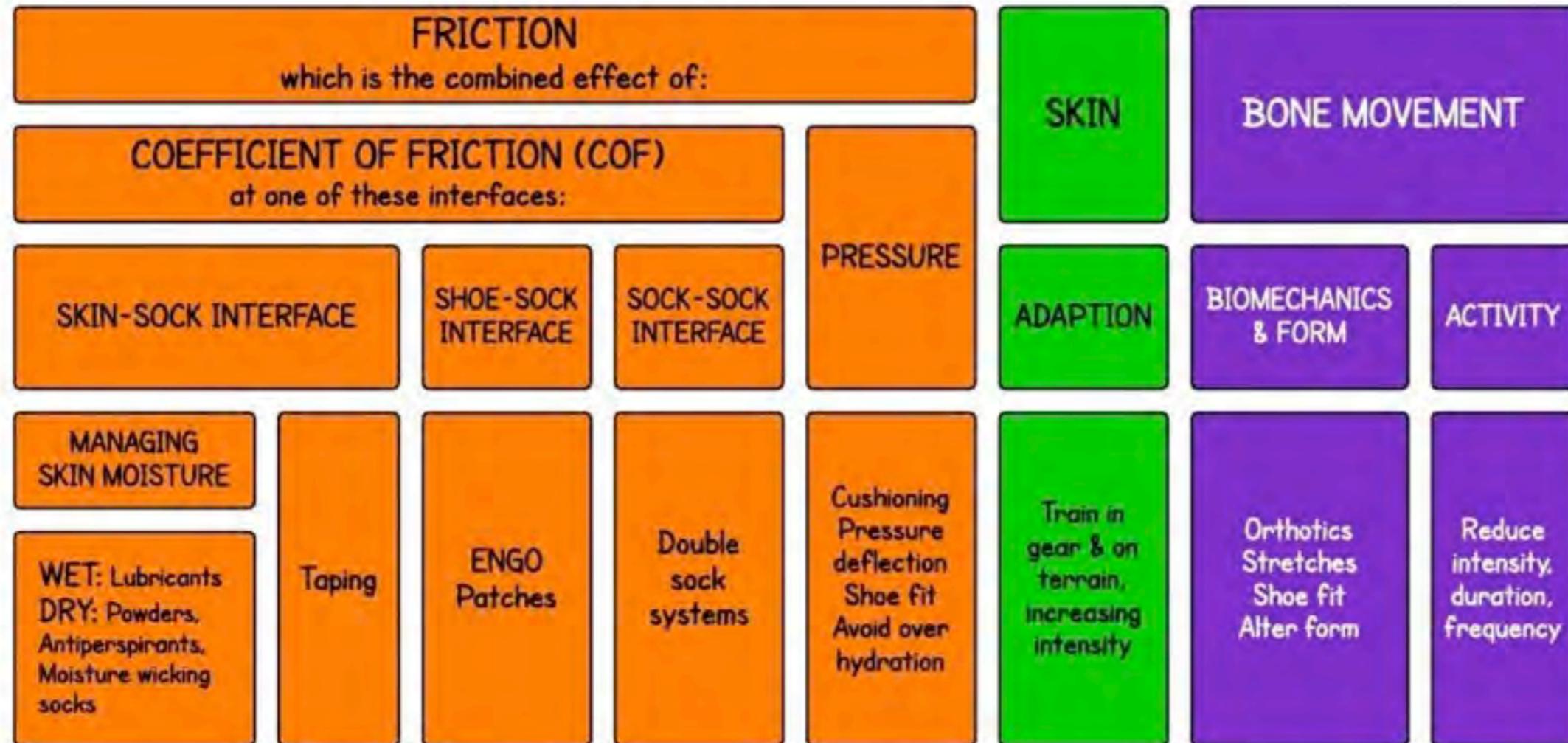
credit Rebecca Rushton

# BLISTERS

are an injury of

## SHEAR

Blister-causing shear is influenced by 3 factors:



[www.blistersprevention.com.au](http://www.blistersprevention.com.au)

credit Rebecca Rushton

**OTHER:** The Shear Modulus of thick cushioning materials allows some absorption of shear (eg: Spenco, Poron, Gels)

# Reducing Blister Formation

Lubricants

Powders

Taping

Sock combinations

ENGO Blister Prevention Patches

Gaiters

Quality Skin Care

Correct Toenail Care



For athletes and sports medicine professionals

Rebecca Rushton  
Australia Podiatrist  
[BlisterPrevention.com.au](http://BlisterPrevention.com.au)

# ENGO BLISTER PREVENTION PATCHES

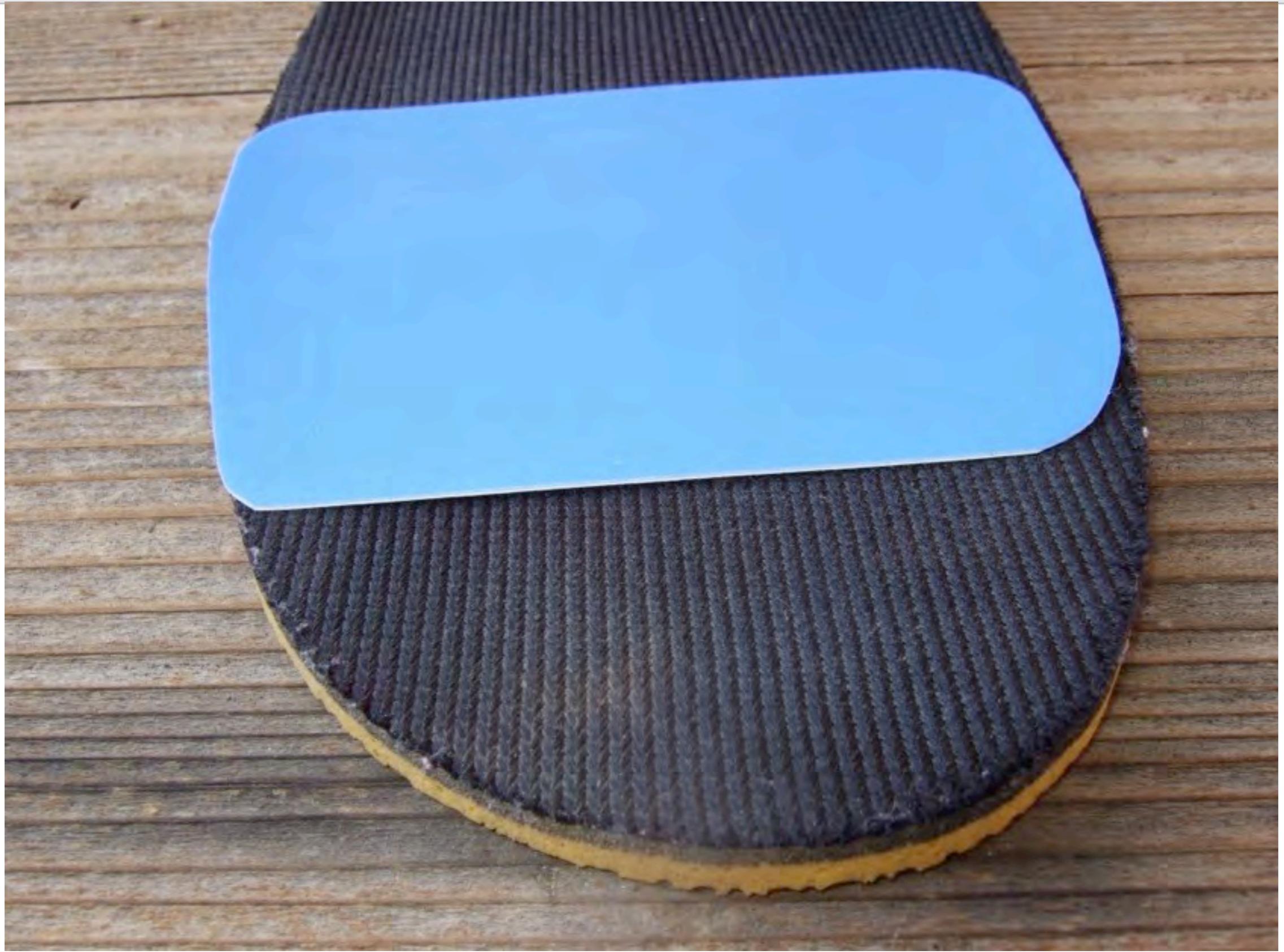


## ENGO Blister Prevention Patches

[www.GoEngo.com](http://www.GoEngo.com)



Polytetrafluoroethylene (PTFE) is an ultra-low friction material. Teflon® is an example of a PTFE material. ENGO Blister Prevention Patches is another. ENGO Patches are adhesive patches that stick to your shoe or insole where high friction causes blisters.



# TRIAGE





# BLISTER DRESSINGS

## Beware of Tape Residue





- Spenco 2nd Skin
- Island donut
- Compeed
- Antibiotic ointment
- Zinc Oxide

I don't inject Benzoin!



# MY PATCHING PROCESS

- Clean the skin of lube and grit
- Clean with an alcohol wipe
- Visualize the fluid
- Lance and drain
- Reclean the skin
- Dress blister's roof w zinc oxide or antibiotic ointment
- Apply Benzoin to area to be taped
- Apply tape & rub 20sec
- Apply line of Benzoin at tape/skin interface
- I do not remove the blister's roof

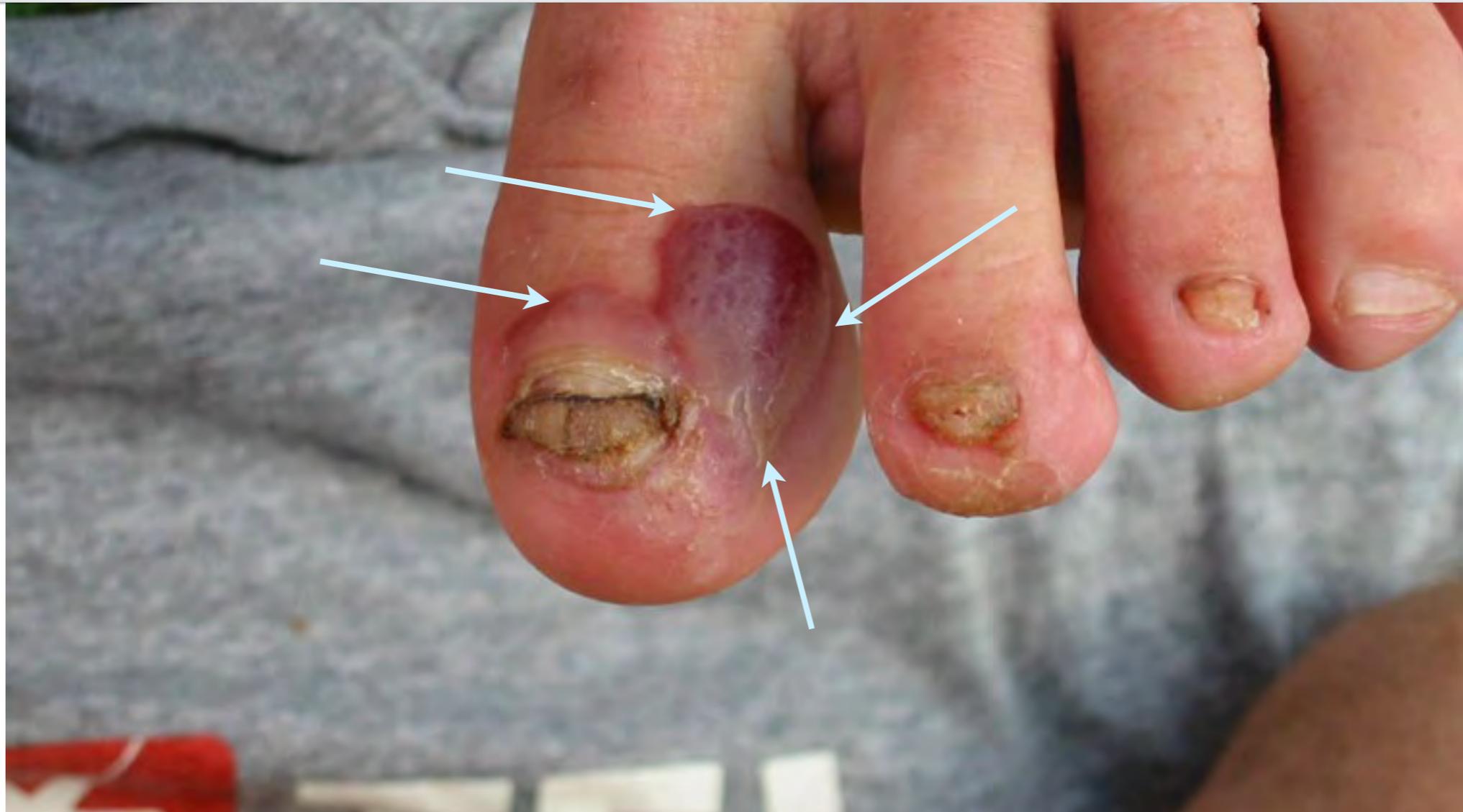
# LANCING BLISTERS

# TIPS FOR LANCING BLISTERS

- Lance in places where gravity and foot pressure through the foot's forward motion will help drain fluid
- Use an alcohol wipe over the blister – it helps in seeing where the fluid is under the skin
- Always make more than one opening, typically two or three
- Lance any size blister that is in a pressure point area where it causes pain or discomfort
- At finish lines or after events, lance only if in a pressure area, otherwise advise to soak in Epsom Salts and allow to heal naturally. The fluid typically reabsorbs over a few days.

# TOOLS FOR LANCING

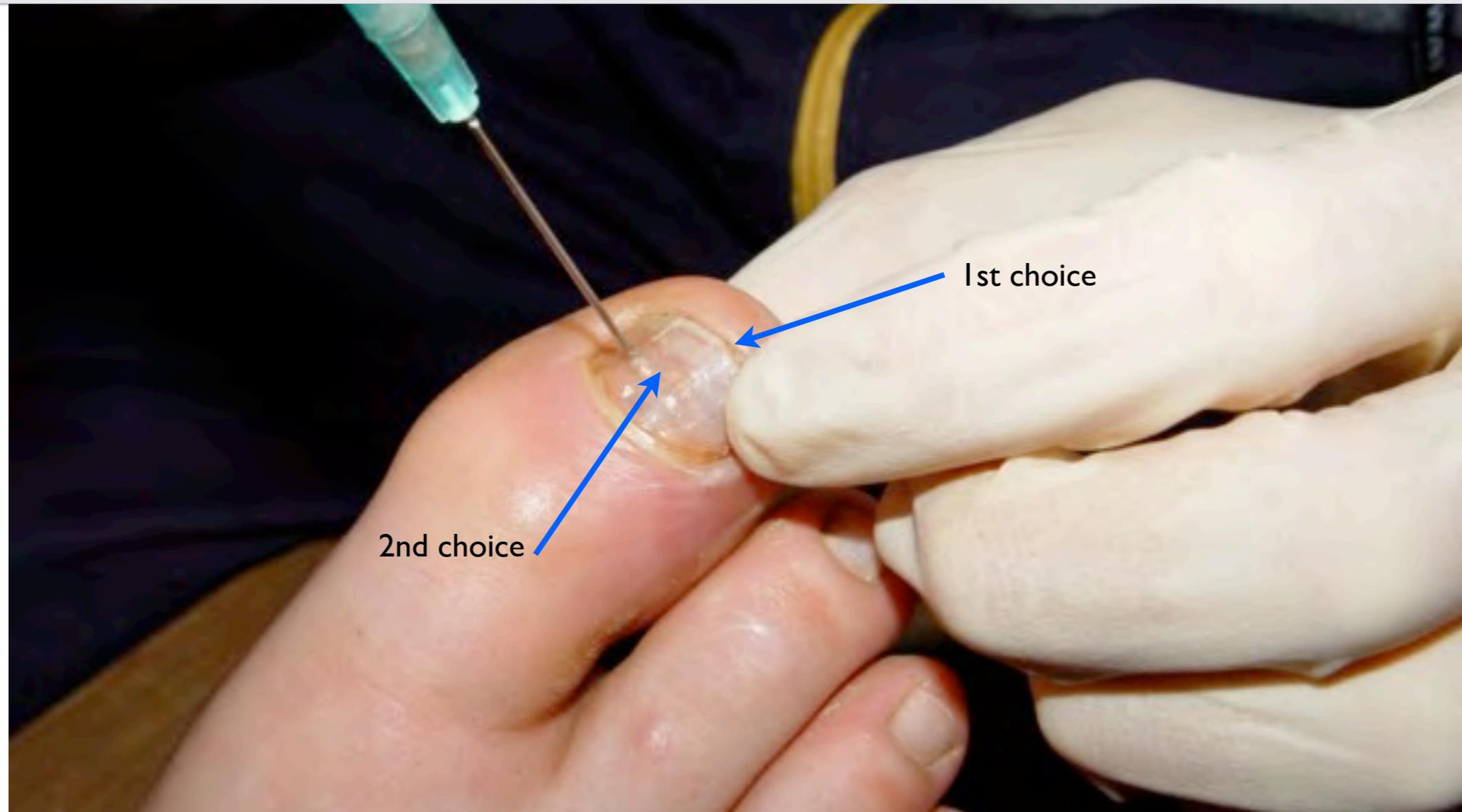
- Needles or pins can be used but they make a "puncture" hole that can seal back up on itself
- If using a needle or pin, press it side to side to stretch the hole open a bit more than normal
- A # 11 scalpel is perfect because it has a pointed tip
- All needles, pins or scalpels must be handled with care to avoid "needle stick injuries" to you or someone else
- A pointed scissors or nail clippers can be used if nothing else is available
- Disinfect your lancing tools with an alcohol wipe, hydrogen peroxide, a flame or antibacterial hand gel



This example is an older blister to the left front and then a newer blood blister formed above and behind it. Lance in the places shown so gravity and foot strike pressure will help them drain.



This is a typical heel blister. The bottom is somewhat flat, indicating it probably started at the edge where the insole meets the shoe's upper. Make three cuts at the bottom front and back, and at the inside upper edge. Gravity will drain from the bottom and as the foot moves through its motion, fluid will be pushed upward and out.



Blisters under toenails can be drained by drilling the nail or with a scalpel at the forward edge of the nail (if accessible). Holes in the nail can seal up, so if you have a choice, go for the edge of the nail.



BLOOD!

# BLOOD BLISTER CARE

- If in a pressure area where it will probably rupture anyway, it's better to lance it in a controlled environment.
- If in a pressure point where continuing would pop it, lance and dress
- Dress w antibiotic ointment and cover
- If end of race for the runner, don't lance. Advise Epsom Salts soak w warm / hot water daily x 3.





# HOW NOT TO TAPE







# TAPING BLISTERS



# TAPING TIPS

- Apply Compound Benzoin Tincture to the skin before taping to maximize adhesion.
- Use paper backing to rub the tape for 15-20 seconds after applying it to the skin – it warms and activates the adhesive to make it more tacky.
- When using kinesiology tapes, lay the tape on the skin and if you have to stretch the tape around a heel or toe, only apply a slight stretch to the middle, not the ends. The more stretch you apply, the more likely the tape is to come loose, especially in wet conditions.
- It takes as long as it takes – a precision tape job can take more than 30 minutes. Practice makes perfect and an adequate application technique takes time.



Apply a strip of Benzoin  
over the edge of the  
tape/skin interface

CAN YOU PATCH  
THESE?













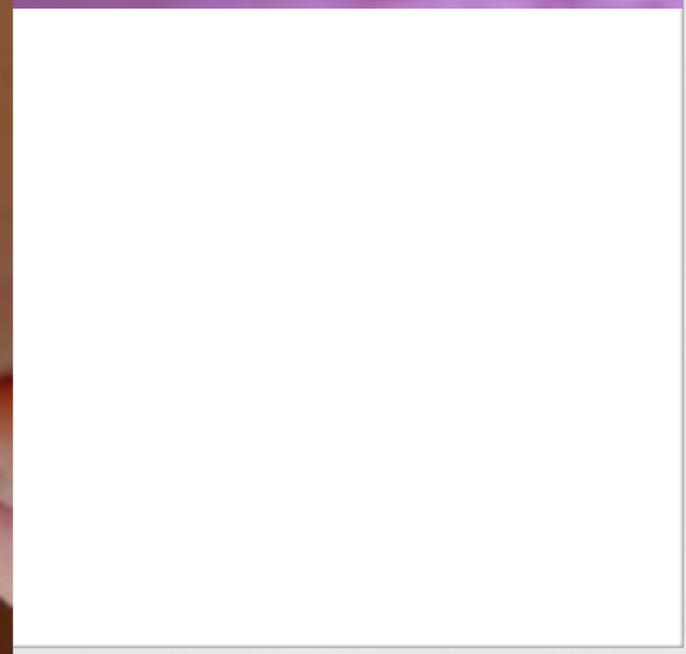




Value Line  
by Sammi



Pinch folds  
and trim,  
Then rub w  
paper  
backing





Cut and shape the  
tape to fit the  
blister and the  
shape of the foot.









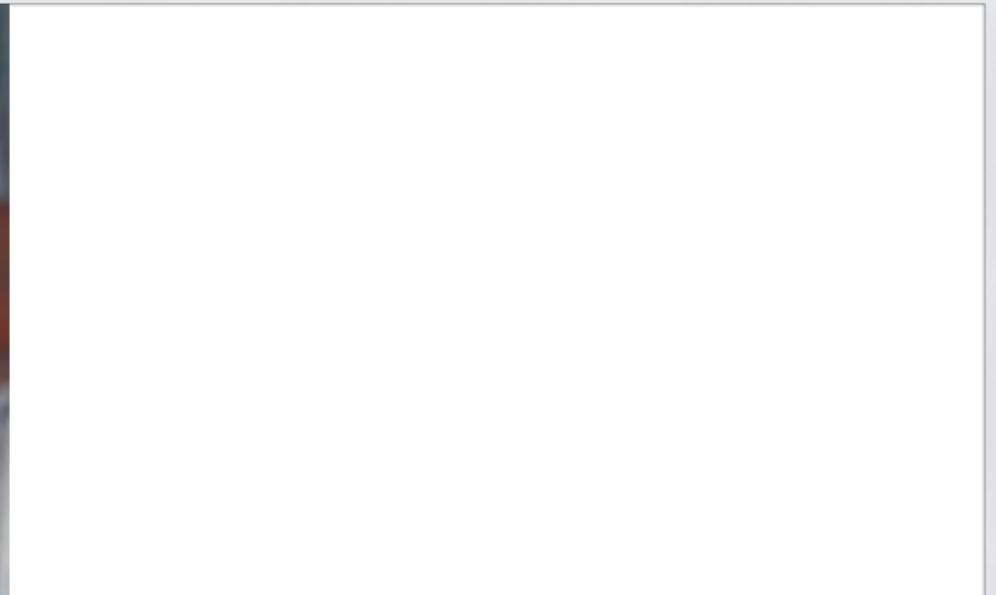


















# WARNING!

- Inform the runner of signs of infection:
  - Pus
  - Increasing pain
  - Swelling
  - Redness
  - Warmth
  - Red streaks extending upward from the blister
  - Ask if Tetanus is up-to-date



# MULTI-DAY RACE?

# POST RACE FOOT CARE

# General Post Race Blister Care

- As much as possible, let them clean and dress at home / hotel
- Shower / clean first when possible
- No more tape - use Coban or similar non-adherent dressing
- Soak feet in warm water and Epsom Salts to dry the blisters and macerated skin
- As much as possible, wear sandals or flip flops to allow the skin and blisters to air out. This helps dry the skin and blisters, and promotes healing.
- As blisters dry and skin becomes loose, it can be cut away with scissors

# Specific Post Race Blister Care

- Intact blisters: If in a non-weightbearing area and if no pressure from shoes, you can leave undressed. Otherwise, apply a non-adherent dressing to serve as protection and to guard from infection if it tears.
- Torn or lanced blisters: Redress as required with antiseptic and non-adherent dressing until resolved.
- Deroofed blisters: Redress as required with antiseptic and non-adherent or hydrocolloid dressing until healed.
- Blood blisters: As per above but monitor very closely for signs of infection – if present or unsure, seek medical advice.
- All four above blisters will benefit from warm water and Epson Salts soaks 3-4 X a day.





# FOOT CARE KITS





# Kit

- Scissors
- Tweezers
- 2x2s or 4x4s
- Scalpels #11 / needles
- Lubricants
- Powder
- Tapes
- ENGO Patches
- Blister pads
- Adhesive felt
- Tape adherent
- Hand sanitizer
- Gloves
- Alcohol wipes
- Hydrogen Peroxide
- Antibiotic ointment
- Moisture control creams
- Files (toenail and callus)
- Nail drill
- Shoe horn
- Towels
- Sharps Container

# More on Your Kit

- Tapes: StrengthTape, Rocktape H2O, Leukotape, HypaFix, Micropore
- Scissors: bandage & iris, and trauma shears
- Lubricants: your choice. Chafe X, Trail Toes, SportsSlick, RunGoo - no Vaseline
- Powders: most anything that's cheap, not talc
- Compound Tincture of Benzoin
- Wound dressings: Spenco 2nd Skin, DuoDerm, Tegaderm, etc.
- Small stool for you (save your back)
- Lounge type chair for the runners
- Lights for night
- Headlamp
- Pop-up / tarps for sun protection
- Extra chairs

# HELPING YOURSELF

- For 100-mile races and multi-day races, consider requiring a mandatory gear kit, which includes specific elements for foot care
- For trail races, consider “highly recommending” the use of gaiters
- Make sure your websites and race material specifies what is and is not supplied regarding both medical care and foot care

# OTHER GOOD STUFF

Socks

Callus

Toenails

Clenching Toes

Bunions

Morton's Toe

Hammer Toes

Plantar Fasciitis Pain

# SOCKS



- Roll socks off the foot
- Clean socks if full of dirt/sand/grit
- Replace with clean socks if the runner has them
- Roll the socks back on the foot
- Instruct the runner on how to take socks off and put socks back on

# CALLUS



Use a callus file to reduce any rough callus that can catch on socks.

Use discretion for how much pressure the runner can tolerate.

# TOENAILS

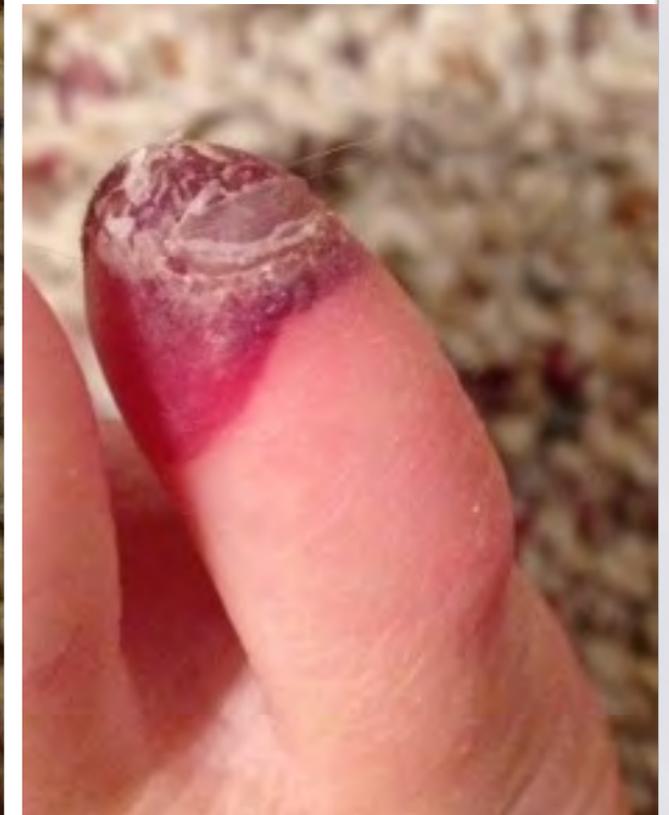


Rough edges will catch on socks and hit the front/top of the shoe's toebox. Nails should be trimmed straight across and then filed smooth and short.



- File toenails IF the runner can tolerate it
- Thick nails can be filed if able
- Do NOT remove toenails at an aid station
- If a toenail is partially torn off, try to lay it down and tape over it to hold it in place

# CLENCHING TOES



Run a strip of tape from under the toe, over the tip and anchor it to the top of the foot. If necessary, draw it to one side or the other to align the toe.

# BUNIONS



A strip of tape run along the outside of the foot over the bunion will offer some protection. You can also slit the shoe at the widest point.

# MORTON'S TOE



Tape the toe. You can modify the shoe by cutting a slit in the front of the shoe's toebox (over the toe) or removing a section of the shoe.

# HAMMER TOES



You can run a strip of tape from under the toe, up and over the tip of the toe, anchoring it on top of the foot. Apply the tape under a bit of stretch or tension to straighten the toe.

# OVERLAPPING TOES



Run a strip of tape from inside the toe, over the tip and along the outside of the foot. For inside toes, run the tape up and over the tip toward the right or left to create pull away from the neighboring toe.

# PLANTAR FASCIITIS PAIN



Run a wide strip of tape along the bottom of the foot front to back. Then apply two strips, from the inside of the mid-foot, under the foot, and up the other side. Overlap the two strips.

John Vonhof

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