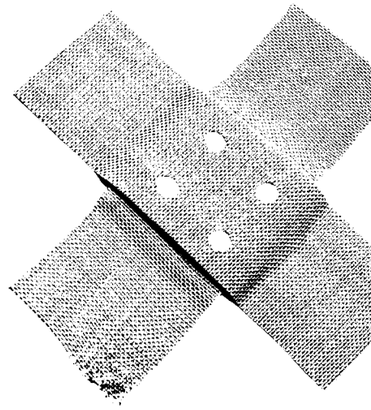
BLISTERS

Photo: Delly Carr

They're small and easy to underestimate, but blisters can stand between you and success on the course. Left untreated they can lead to infection and more serious problems. Podiatrist Anna Beetham shares her tips on causes, treatment and all-important prevention.

BANISH BLISTER PAIN



TEXT BY **ANNA BEETHAM, PODIATRIST** | PHOTOGRAPHY BY **ANDY CUMMING/DELLY CARR**

Blisters are one of the most common athletic injuries and can form easily during vigorous physical activity. They can be debilitating and often result in athletes having to persevere with extreme pain or cease activity to gain treatment.

Care must be taken to attend to blisters quickly as there is a risk of cellulitus (a bacterial infection of the skin and underlying tissue) or sepsis (a serious blood stream infection) if they are left untreated.

While they are frustrating, blisters are one of the simplest injuries to prevent. This article will take you through all you need to know, from how blisters form at a cellular level to treatment advice and tips on how to prevent them.

WHAT ARE THE CAUSES?

Blisters form when the skin is in contact with a surface, and when an attempt is made to move across the skin by an external force a frictional force will oppose this movement.

Repeated friction on the skin causes a slight exfoliation of the *stratum corneum* (top layer of epidermis) and a reddened area, called a 'hot spot', forms around the rubbing. With continued rubbing a stinging or burning sensation is experienced as a pale narrow area forms around the hot spot. This area then enlarges to encompass the reddened area, which becomes elevated over the underlying skin as it fills with fluid.

Next, friction forces mechanically separate epidermal cells at the level of the *stratum spinosum* (the deepest layer). Hydrostatic pressure causes the separated area to fill with a fluid that is similar in composition to plasma but has a lower protein level.

About six hours after the blister forms recovery begins, and cells in the blister base begin to take amino acids and nucleosides. At 24 hours there is high mitotic activity in the basal cells, and at 48 and 120 hours a new granular layer is present.

INFLUENCING FACTORS

The major factors that contribute to a blister formation are the magnitude of frictional forces (Ff) and the number of times an object cycles across the skin. The higher the Ff, the fewer cycles necessary to produce a blister. Moist skin is also a factor and there are indications that while very dry or very wet skin decreases Ff, moist skin increases the Ff.

The most common areas to get blisters are on the soles of feet and palms of hands, where skin is thickest. Contrary to popular belief, blisters are more likely to form in areas that have thick skin or callous because callous forms for the same reason blisters do (friction), due to the body trying to protect that area of skin.

Higher exercise intensity can increase Ff and longer exercise duration results in more shear cycles. Both increase sweat production and create a moist skin environment.

WARNING SIGNS

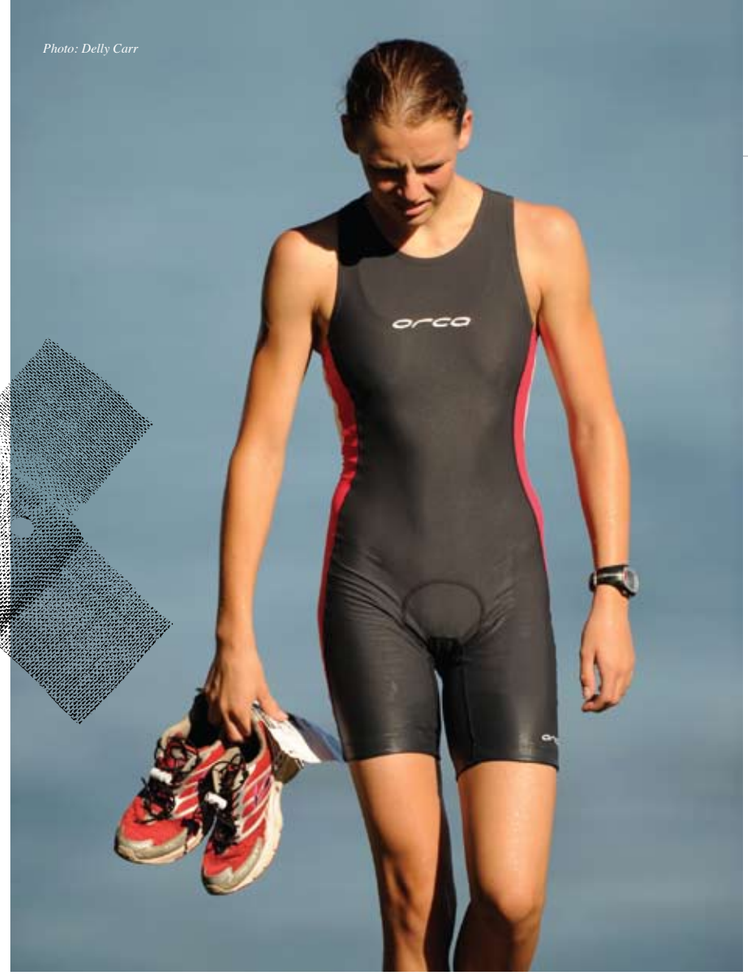
Redness and warmth on the skin is called a hot spot. After a hot spot forms, fluid fills the space between the top two layers of skin to provide protection from continued rubbing. When this happens you will see a blister that looks like a little bubble on the skin. If you notice any hot spots during activity, it's important to tend to them right away to prevent or stop further blistering.

ACT ON PREVENTION

Anti-perspirants with emollients and drying powders applied to the feet do not appear to decrease the chance of friction blisters. While dry powder on dry skin will reduce Ff, as you sweat and your skin becomes wet or moist, the Ff increases. It has also been documented that when alkaline sweat combines with foot powder it clumps and creates an abrasive surface.

> *"Taping an area of concern or while wearing in a new pair of shoes is a simple and extremely effective way of reducing hot spots and blister formation. The most important thing you need to know is that hyperallergenic tape is best."* — *Anna Beetham*

NO MERCY: Left, World Champion Chrissie Wellington, post Ironman Australia 2008, bears the painful truth of racing triathlon



THE HOT SHOE SHUFFLE: Post-race soreness and blisters are a common complaint amongst athletes

The use of petroleum-based lubricant products has long been challenged and I strongly advise against their use. It has been shown that they simply sit on the skin's surface, holding water in the skin and blocking evaporation. The skin therefore becomes a 'holding tank' for water. This causes surface tension to increase and available water to flow into any open spaces which form in the skin, which suggests that petroleum-based products may increase the chance of blistering.

LOOK AFTER YOUR SKIN

I cannot stress enough the importance of moisturising to prevent blisters and chafing. With regular use of a natural intensive moisturiser your skin becomes more nourished and elastic, therefore decreasing Ff and reducing the chance of blisters. Using a completely natural product is the only way to go.

Healed Sole Food has been developed with the active person in mind and gives your skin all the nutrients it requires to improve its condition and regenerative qualities to repair damaged skin. In addition to this, the anti-microbial qualities of Healed Sole Food help with fungal and bacterial infections common in the active population. You should ideally moisturise two times daily for two to three weeks to get them in good condition, then maintain your feet with once daily applications.

YOUR SOCKS

I recommend only using good quality technical socks. Look for socks with a synthetic blend and Coolmax, which allows moisture to be 'wicked' to the outer area of the sock rather than retaining moisture. Do not wear pure cotton socks for long or vigorous activity. Cotton is a hydrophilic (water-loving) material that increases friction while compacting the material, reducing comfort.

Thick socks have been found to reduce friction, especially those with specific anatomical padded areas. I prefer not to 'double sock' as there is a chance of bunching in the socks.

Wearing the right technical socks, on the other hand, ensures good 'feel' while reducing bulk in the shoe and cost.

YOUR FOOTWEAR

The correct fit is the most important feature of a shoe, followed by its function. It is important that the shoe is right for your foot type, which is best judged by feel. If a shoe feels comfortable it has more chance of functioning well.

Tips on the perfect fit:

- Not too tight (any rubbing will cause friction)
- Not too loose (increased movement will increase friction)
- No seams on areas of prominence (bony/tendon)
- Leave a thumbs width from end of longest toe to end of shoe and enough width in forefoot to wiggle your toes
- Try shoes on at the end of the day when your feet are the most swollen and with the socks you plan to run/walk in
- Lace up correctly (there are many specific lacing techniques to allow your foot to sit firmly in the shoe and reduce lifting at the heel; ask at your specialist footwear store how to 'lace lock', or for specific forefoot lacing if you have bunions or hammer toes)

TAPING UP

Taping an area of concern or while wearing in a new pair of shoes is a simple and extremely effective way of reducing hot spots and blister formation.

The most important thing you need to know is that hyperallergenic tape is best. I recommend both Fixomull or Hypafix brands in my practice. They are gentle on your skin, very thin so they don't take up any room, and stretch to allow movement. Avoid putting athletic tape directly onto your skin, however if you need heavy-duty prevention you can use Fixomull or Hypafix under these for ease of removal and to prevent tearing your skin on removal.

A single layer of this tape will reduce surface friction dramatically. Round the edges of the tape to prevent rolling and apply to areas prone to friction or as soon as you feel a hot spot.

Taping your little toes with two strips approximately 2cm wide – one placed from top of toe around the tip and under, then the second piece of tape from under the toe to join in the middle on the top of your toe – will wrap the toe and prevent friction from the other toe and your footwear. This is especially helpful if you have a little toe that curls under the fourth toe. Duoderm, a hydrocolloid dressing, is very effective at reducing friction over blister prone areas and can also be used to treat blisters once formed.

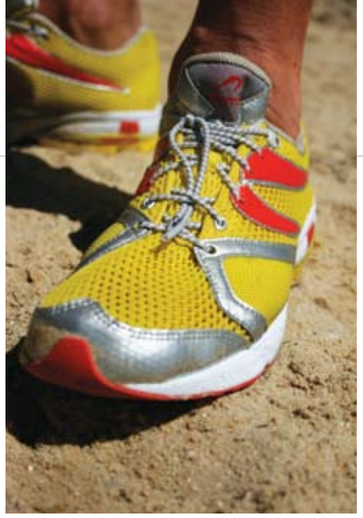
LUBRICATE... NATURALLY

This is a very simple piece of advice. Petroleum and silicone-based products have been shown to increase the Ff after long periods of activity. The only way to lubricate your skin to prevent friction is naturally, while nourishing it at the same time.

Healed Skin Protect Anti-Chafing Balm is the only completely natural product on the market and its small, portable and hygienic applicator makes it perfect for use on the run. See www.healedonline.com for more information.

STAY HYDRATED

Drink plenty of water to prevent dehydration. Among other things, staying well hydrated will help prevent blisters and chafing by allowing you to perspire easily, reducing the possibility of friction.



LACING FOR COMFORT: Find the lace lock that suits you the best for training and racing

LUBRICATE: Staying well hydrated will help reduce blisters and chafing by increasing perspiration

MECHANICAL FACTORS

For some people, the way they run or walk places a significant load on certain areas of their feet. For example, a person with tight calves may walk/run with an abducted (turned out) gait, and this will increase loading through the big toe through propulsion which can cause callous build-up and ultimately blister formation. Improving calf flexibility can reduce abduction and medial loading. If someone over-pronates (rolls inwards), irritation can occur at the back of your heels from the rubbing as the rear foot rolls inwards against the shoe or through the arch as it lowers and rubs against your inner soles.

See a podiatrist if you suffer repeated lower limb injuries or have had chronic trouble with blisters.

GOOD INNER SOLES

It has been shown that Spenco ® (orthoses material) can reduce friction. This can be added to existing orthoses or used as an innersole in running/walking shoes.

GETTING TREATMENT

Despite all efforts to prevent them, blisters may still occur and treatment will be necessary. The main goals are to prevent expansion of the lesion, reduce discomfort, promote healing and prevent infection.

After six years being involved with the Oxfam Trailwalker as Podiatry Co-ordinator, my clinical experience suggests that draining intact painful blisters and maintaining the roof/hood of the blister tends to reduce discomfort and the chance of secondary infection, and promote healing.

Clean the area and needle prior to doing this with alcohol wipes. Once clean, lance the blister at the lowest point so fluid can drain, flush the area with a saline solution, apply a simple wound gel such as Solosite, and cover with a non-stick dressing such as Melolin and hypoallergenic tape such as Fixomull to secure. The dressing can be changed daily to monitor healing, checking for infection, swelling or inflammation. If you are concerned about the area not healing, have an infection or a red line tracking from the area up your leg, seek medical advice immediately. Antibiotic use is not required unless there is an obvious infection, and antiseptic use can actually reduce healing rates in non-infected wounds.

To treat blisters that have de-roofed, or very large and/or painful blisters, I suggest using a hydrocolloid dressing. Duoderm is my dressing of choice. This is the most effective way to increase comfort and facilitate healing. These can be directly applied to the area (after flushing clean with saline and drying with sterile gauze) along with Fixomull to secure.

If you require additional padding, a donut pad surrounding the blistered area will reduce pressure and pain. This can be made with orthopaedic foam or moleskin.

If you have a simple blister but need to continue activity, a hydrocolloid type dressing will enable you to be more comfortable. You can keep these on for two to four days at a time.

SOCKS: Thick socks have been found to be a good way to reduce friction

IN SUMMARY

While blisters are a debilitating injury, they are small and easily prevented. But if left untreated they can result in further discomfort or more serious problems. The age old saying – "prevention is better than a cure" – is certainly true for blisters. Get to know your feet well, wear the correct socks and tape, lubricate and lace up well to avoid an injury that could prevent you crossing that finishing line!

Anna Beetham is a podiatrist with eight and a half years of experience in sports medicine and a passion for all things active and sports-related. She is the consultant podiatrist for the Melbourne Victory soccer team, Podiatry Co-ordinator for the Oxfam Trailwalker and was part of the medical team at t he 2006 Commonwealth Games. She has vast experience in treating any and every kind of blister, and has made it her mission to give athletes the best advice regarding their prevention and treatment. In addition to this Anna recently developed Healed, a range of completely natural skin products with foot care, blister and chafing prevention in mind. For more information or to contact Anna visit www.healedonline.com

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TOP TIPS PODIATRIST ANNA BEETHAM'S SOLUTIONS FOR BLISTER PREVENTION:

- Moisturise your feet every day (Healed Sole Food Foot Balm)
- Use pumice or foot files to keep callouses down
- See a podiatrist if you have continued trouble (shoes/identify abnormal biomechanics/taping techniques/remove callouses)
- Apply hypoallergenic tape to areas of repeated friction or if you have new shoes you need to wear in (remember to round the edges of the tape)
- Have your shoes fitted by a professional and ask about lacing techniques to secure your foot
- Buy and wear the best socks you can afford (Look for Coolmax®) and change them regularly
- Attend to hot spots immediately
- Use a natural anti-chafing balm (Healed Skin Protect) to assist in reducing friction and to soothe areas of irritation after activity
- Wear technical and breathable clothing with no internal seams
- NEVER wear a new pair of shoes on race day (same for new socks and clothing – always test drive them and wear shoes in)
- Avoid petroleum-based products
- Do not use duct tape or sports tape directly applied to the skin
- Do not use powders to absorb sweat
- Soak feet in tea prior to an event to improve the skin's strength (tannins)
- Stay well hydrated

Check out www.healedonline.com for more information