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# **BULL'S HANDBOOK OF SPORTS INJURIES**

Second Edition

*Wilma K. Bergfeld and Joshua M. Berlin***INTRODUCTION**

Athletes are prone to a variety of skin problems that can hinder performance. In some instances a dermatologic disorder can disqualify an athlete from participation. The various dermatoses that bring the athlete to the attention of a physician are categorized by the underlying cause: mechanical problems, physical factors, and infections.

**MECHANICAL PROBLEMS OF THE SKIN****Corns**

Corns are thickening of the stratum corneum in areas of increased pressure that are due to mechanical forces and protect underlying structures. Corns are frequently found in skiers, ice skaters, and snow boarders. A hydrocolloid dressing such as Duoderm will pad and protect the area during treatment. Prior to application of the hydrocolloid dressing, pare down the corn with a scalpel, pumice stone, or keratolytic emollient such as Lac-Hydrin. The dressing can be left on for several days and often will stay in place with training and showering. Cotton socks are worn over the dressing. Padding can be added to footwear for comfort and to prevent sliding of the feet.

**Blisters**

Blisters commonly occur in novice athletes or athletes with new footwear while running or competing for a long period of time. They primarily occur on weight-bearing or equipment contact surfaces of the feet and hands. Frictional forces cause dissolution of keratinocytes in the epidermis and the loss of adhesion of keratinocytes. The effect of friction is exacerbated by heat, humidity, and sweat-soaked clothing. Unless symptomatic or impeding with further activity, there is no treatment necessary for blisters. When treatment is required, the blister should be prepped with alcohol or povidone iodine, and then incised with a sterile #11 blade or needle. The blister fluid is evacuated by gentle pressure and the surrounding necrotic epidermis can be left in place. The re-epithelialization process is enhanced by the application of an antibiotic ointment such as bacitracin. An occlusive hydrocolloid dressing like Duoderm can then be applied to serve as a physical barrier to infection and further trauma. Blisters on the feet can be reduced by applying an antiperspirant with aluminum chlorohydrate on a regular basis to decrease sweating.

**Subcorneal Hemorrhage**

With vigorous exercise, capillaries in the superficial papillary dermis may rupture, leading to hemorrhagic bullae. At times, small hemorrhagic blisters may not be noticed, and as they resorb, they may leave pigmentation within the stratum corneum that is often mistaken for melanoma. The black discoloration due to blood in the stratum corneum is known as a calcaneal puncture or talon noir. Talon noir commonly occurs at the upper edge of the heel due to shearing forces from sudden stops and starts, and is commonly

seen in tennis players and gymnasts. No treatment is necessary as the lesions will spontaneously resolve with discontinuation of the activity. If the diagnosis is in question, a talon noir can be confirmed by paring the skin to the stratum corneum that houses the hemoglobin pigment. If paring does not remove the pigment, a biopsy should be considered to exclude the possibility of melanoma.

### Splinter Hemorrhage

Splinter or subungal hemorrhages, like subcorneal hemorrhages, occur in sports that involve rapid starts and stops such as squash, tennis, racquetball, and basketball, and is often confused with an underlying pigmented neoplasm. Subungal melanoma is often preceded by an erroneous history of prior trauma; therefore clinicians must be wary of this pitfall. A pigmented lesion in the nail bed should be evaluated closely (Fig. 15-1). A punch biopsy can be obtained through the nail plate. If hemorrhage is suspected, the area of hemorrhage underneath the nail will grow out in an orderly fashion at approximately 2 mm per month, and the outgrowth should be monitored. If the pigmented area does not grow out or if it spreads out laterally, a biopsy is indicated.

A variant of splinter hemorrhage is called golfer's nails. This disorder is due to gripping the club too tightly and loosening the grip will lead to spontaneous resolution. "Tennis toe" refers to subungal hemorrhage from repetitive slippage of the foot anteriorly against the shoe toe box. Advise athletes to trim their

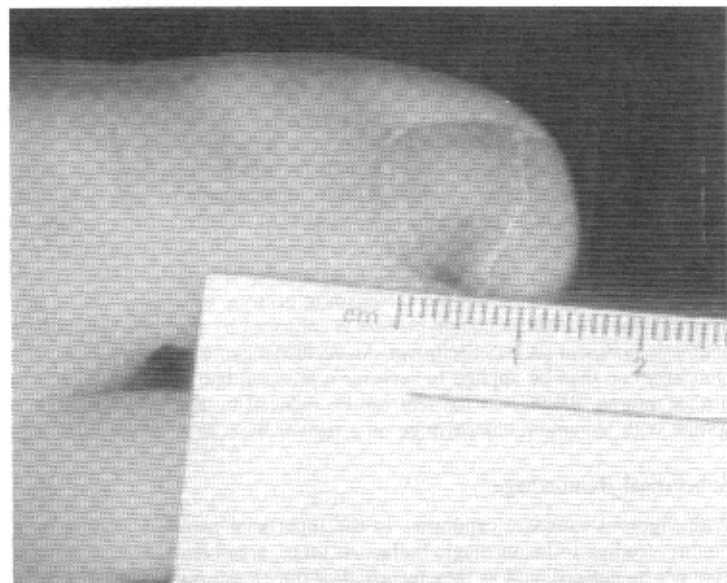


FIG 15-1 Black discoloration involving the great toenail due to blood in the stratum corneum. This discoloration is commonly seen in tennis players, gymnasts, and ballerinas. It is important to rule out subungal melanoma if the pigment does not resolve.



FIG 15-2 Multiple striae on the abdomen due to extensive stretching of the skin with fragmentation of elastic supporting fibers.

toenails as short as possible and to wear shoes with a toe box that has a thumb-width sized space between the great toe and the end of the shoe.

### **Striae Distensae**

Striae distensae or stretch lines are a result of extensive stretching of the skin with fragmentation of elastic supporting fibers (Fig. 15-2). Weight gain or increased muscle mass lead to rupture of elastic fibers into the reticular dermis. The most common sites for striae are the shoulders, back, and thighs. Weightlifters and wrestlers are particularly prone to striae. Treatment options are limited with laser therapy offering only modest results and topical retinoids and alpha-hydroxy acids producing limited improvement in studies done to date.

### **Abrasions**

Abrasions are superficial erosions or ulcerations that occur due to shearing forces directed to the skin, and they are prevalent throughout all sports participants. The underlying etiology is direct epidermal trauma, so the best intervention is wearing protective clothing, especially on artificial turf. Once abrasions occur, gentle cleansing and application of a topical antibiotic ointment will prevent secondary infection, and an occlusive dressing may speed healing. If the abrasion becomes secondarily infected, systemic antibiotics such as dicloxacillin or cephaloxin 500 mg three times a day for 10 days may be indicated. Debridement of crusts will help improve the final cosmetic appearance.

## **PHYSICAL FACTORS**

### **Sunburn**

Sunburn is a phototoxic reaction due to excessive skin exposure to ultraviolet light. Clinically, it presents as an intense erythema with or without blistering

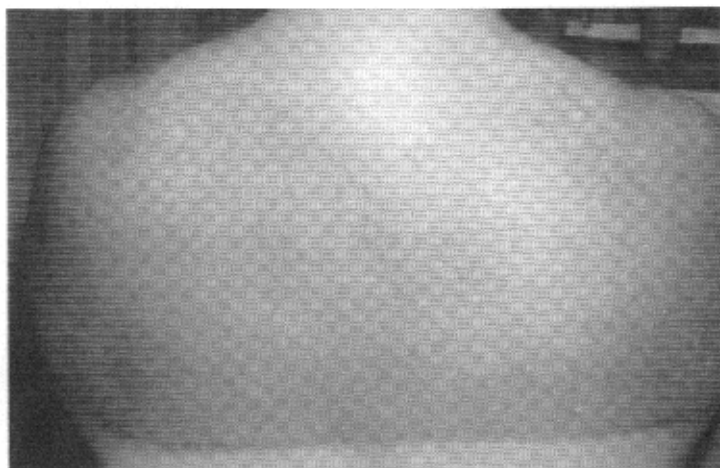


FIG 15-3 Sunburn is most likely occur between 10 AM and 2 PM because of the intensity of ultraviolet B rays at that time of day. It is important to advise athletes on the importance of using broad-spectrum sunscreens.

at the sites of sun exposure (Fig. 15-3). It is common in athletes with fair complexion and blond or red hair. Athletes who train between the hours of 10 AM and 2 PM, when ultraviolet light is at its greatest intensity, are at greatest risk for developing sunburn. Skiers, paddlers, and sailors are exposed secondary to reflection of the sun on snow and water, and often develop sunburn on normally shaded areas of the face and body. Athletes should use broad spectrum sunscreens applied 30 minutes prior to activity to allow the active ingredients to combine with the stratum corneum, and sunscreens should be reapplied every 2 hours. Many athletes do not receive optimal benefit from traditional sunscreens because they are removed by sweating. A sunscreen with a sun protective factor (SPF) of at least 30 should be used. The SPF is calculated by dividing the amount of time required to produce erythema in skin covered with a sunscreen by the time required to produce erythema in skin without sunscreen. For example, an SPF of 10 would allow a person who normally burns in 10 minutes to be exposed as long as 100 minutes before burning occurs. Acute sunburn can trigger many skin disorders including herpes simplex, solar urticaria, and lupus erythematosus. In addition, athletes taking medications like tetracycline and sulfa products can have phototoxic reactions following sun exposure. Sunburn interferes with the sweating mechanism, decreasing evaporative heat exchange and increasing the risk of heat stroke.

The treatment of sunburn is directed towards decreasing inflammation and temperature of the skin. Cool compresses are effective in reducing skin heat and local discomfort. A low-potency topical corticosteroid applied twice daily can hasten resolution of the local inflammatory response. Nonsteroidal anti-inflammatory agents such as aspirin or indomethacin interfere with the prostaglandin mediators that initiate cutaneous damage, and help relieve pain. Emollients are important to reduce dehydration of the epidermis that results from extensive ultraviolet exposure.

## INFECTIONS

### Herpes

Infections with herpes simplex virus types I and II can affect any part of the body, and recurrent infection commonly occurs around the lips and vermilion border. Although it will classically present as grouped vesicles on an erythematous base, early cases may exhibit no lesions and late lesions may show only erosions (Fig.15-4). Herpes virus is known to shed before skin manifestations are visible, and the moist lesions of herpes simplex are highly contagious through contact. Athletes with prodromal symptoms of burning or tingling and with active lesions should be closely monitored and kept from participating in contact sports. Treatment with a systemic antiviral agent for at least 5 days will suppress the infection and decrease the risk of athlete-to-athlete transmission, and allow athletes to return to contact sports. Once the lesions are crusted and dry, participation in sports is also considered safe. Treatment is directed to alleviate pain and promote early healing. Oral antiviral agents such as acyclovir (400 mg five times a day for 10 days), famciclovir (250 mg three times a day for 10 days), or valacyclovir (1000 mg twice a day for 10 days) are effective if started early in the course of the infection or during the prodrome, when patients will often note tingling prior to the onset of a skin eruption.

Genital herpes is characterized by the development of vesicles and pustules on an erythematous base. Lesions tend to be clustered and the patient may experience flu-like symptoms such as myalgia and headache. Treatment with oral antiviral agents given in daily doses is indicated. Unless the athlete feels ill, and assuming there will be no contact with the affected area, genital herpes does not require disqualification from sports.



**FIG 15-4** Crusted plaque involving the upper lip commonly characterizes herpes simplex infections. When the lesions are moist, the virus is highly contagious and athletes should be held back from competition.

### Herpes Gladiatorum

Herpes gladiatorum or scrum pox is the spread of herpes simplex via direct skin-to-skin contact. It is common among wrestlers and other athletes with direct skin-to-skin contact, and some studies found that up to one-third of wrestlers have experienced the disease. The lesions commonly affect the head and neck, upper extremities, and trunk, and are commonly masked by the hairline. If spread to the eye occurs, the athlete can be blinded for life. When the diagnosis is suspected, the wrestler should be quarantined from contact, the lesion cultured, and systemic antiviral medications started. A Tzanck smear or immunofluorescence study can also provide confirmation of herpes simplex infection, but require a trained reader for accurate results. Widespread blisters can develop in individuals with pre-existing dermatoses such as atopic dermatitis and Darier's disease. Therapy with an antiviral agent is warranted to stop the transmission within and between teams. In addition, transmission to other wrestlers can be reduced by showering immediately after practice, cleaning workout clothing daily, not sharing equipment, and cleaning the mats daily. Covering isolated lesions during practice sessions and competitions does not assure safety for uninfected wrestlers. Outbreaks and recurrences can be reduced by suppressive therapy with valacyclovir 500 mg a day for affected athletes.

### Molluscum Contagiosum

Molluscum contagiosum is caused by a poxvirus that commonly affects athletes. It presents as discrete, flesh-colored 2- to 5-mm papules with central umbilication (Fig. 15-5). The disease is easily spread by autoinoculation and from one individual to another. Widespread outbreaks have been reported in swimming, rugby, and wrestling teams. The lesions of molluscum contagiosum occur on exposed surfaces such as the face, trunk, and extremities.

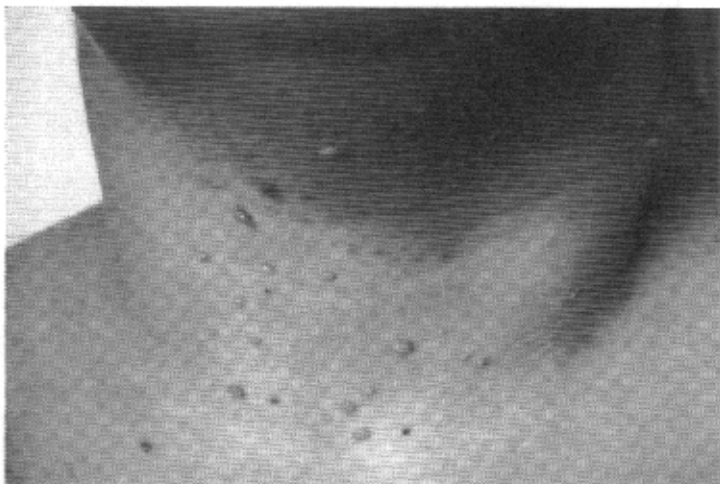


FIG 15-5 Multiple umbilicated papules are characteristic of molluscum contagiosum. Widespread outbreaks can occur among swimming, rugby, and wrestling teams.

Contact sports should be avoided until lesions have been resolved for 24 hours, and wrestlers should have the treated lesions covered with a bio-occlusive dressing. Treatment is aimed at destruction of the poxvirus lesion with liquid nitrogen cryotherapy, electrocautery, chemical lysis, or curettage. Athletes with dark complexions are at risk for hypopigmentation and liquid nitrogen cryotherapy should be used with caution. The use of a topical anesthetic such as lidocaine (ELA-Max) applied 30 minutes prior to the procedure may be helpful in young children. Less invasive treatment options include the application of tretinoin (Retin-A), topical salicylic acid preparations (eg, Duofilm), or an immunomodulator such as imiquimod (Aldara) cream.

### **Warts**

Warts are common benign growths caused by infection with the human papilloma virus. Common warts are typically skin-colored or tan in appearance with a rough surface. If the diagnosis is in question, paring the warts will reveal stippled blood vessels and loss of normal dermatoglyphics. Warts are often located on the hands and feet and may interfere with sports participation. Treatment of warts varies and no one treatment is uniformly effective. Destructive techniques include the use of chemical agents, liquid nitrogen for cryocautery, and electrodesiccation. During the competitive season, these destructive techniques may result in an erosion or ulcer that may interfere with an athlete's performance. Topical salicylic acid preparations can also be effective, with greater concentrations of salicylic acid producing results more quickly. We favor the use of 40% salicylic acid plasters (Mediplast) cut to the size of the wart and applied each night at bedtime. Covering a topical salicylic acid preparation with duct tape overnight can also speed the wart's destruction. A novel therapy involves the topical immunomodulator Aldara cream applied to the wart on a scheduled basis to stimulate the body's immune response and destroy the papilloma-virus.

### **Human Immunodeficiency Virus Infection**

HIV infection in high-profile athletes has helped raise the awareness of this disease. Athletes with recalcitrant herpes zoster, candidiasis, or extensive molluscum contagiosum may be exhibiting the cutaneous manifestations of AIDS. Current information suggests that there is no risk of acquiring HIV through sports activity or intact skin-to-skin contact, but athletes are not immune from the disease. It is important for sports physicians and athletic trainers to practice universal precautions with all treated individuals.

### **Folliculitis**

Folliculitis is infection of the upper portion of the hair follicle. Sweating during practice and competition are risk factors for developing folliculitis. On examination there are discrete pustules with hair follicles in the center (Fig. 15-6). Once the pustule ruptures, a superficial crust or erosion can be noted. Treatment involves daily use of a benzoyl peroxide wash followed by application of a topical antibiotic such as clindamycin (Cleocin) solution or erythromycin gel. For widespread or refractory folliculitis, oral erythromycin or minocycline are usually effective.

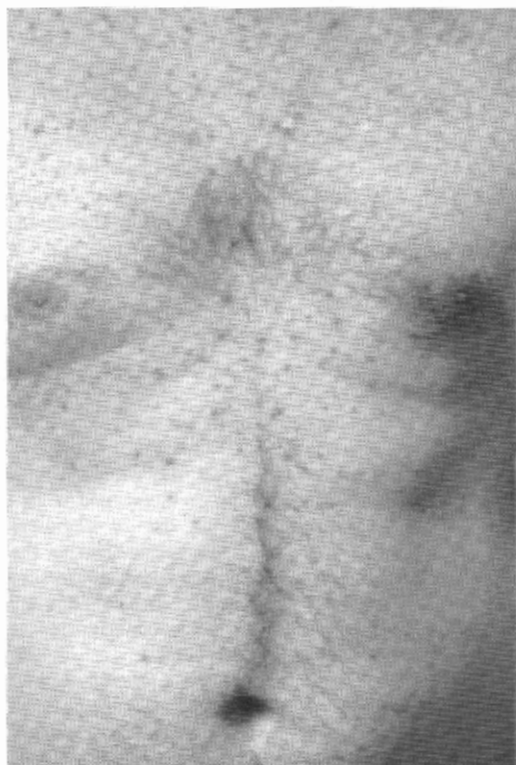
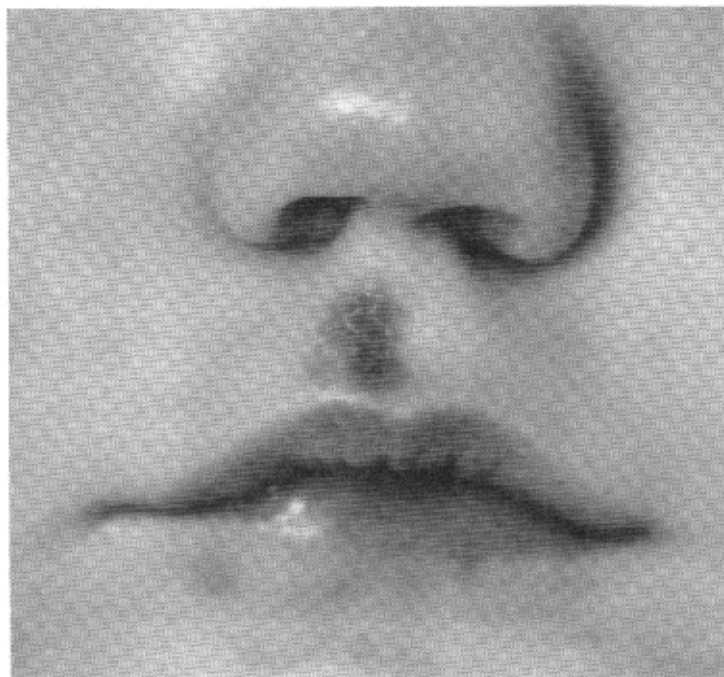


FIG 15-6 Folliculitis. Discrete pustules centered around a hair follicle on the chest.

### Impetigo

Impetigo is a highly contagious, superficial skin infection that commonly occurs in wrestlers, rugby, and football players. *Staphylococcus* and *Streptococcus* species are the most common culprits. It often occurs around the mouth as pustules that rupture, resulting in erosions which form honey-colored crusts on healing (Fig. 15-7). The disease is easily spread through minor skin trauma. Athletes should be withheld from contact sports until the lesions of impetigo have fully healed, which generally occurs in 7-10 days. Topical treatment should include the use of a benzoyl peroxide wash and application of an antibacterial ointment such as mupirocin. For more widespread eruptions, the use of oral antibiotics such as dicloxacillin (500 mg three times a day for 10 days) or erythromycin (250 mg three times a day for 2 weeks) is indicated. Treatment is enhanced by using moist, warm packing to debride the crusts. Wrestlers with impetigo and other bacterial skin infections should be on antibiotics for at least 72 hours with no draining, oozing, or moist lesions before returning to contact practice or competition.



**FIG 15-7** Impetigo is a highly contagious bacterial infection that begins as pustules that rupture, leaving a honey colored crust. Athletes should be withheld from contact sports until the lesions have fully healed.

### Erythrasma

Erythrasma is an infection caused by *Corynebacterium minutissimum* that presents as well demarcated red to reddish-brown plaques in the axillae and inguinal folds. The diagnosis can be confirmed by the presence of coral-red fluorescence while exposing the rash to a Wood's ultraviolet lamp. These patients do very well with a benzoyl peroxide wash and application of a topical erythromycin cream twice a day for 7 days. The alcohol-based erythromycin products should be avoided because of the irritation they create in the body folds.

### Tinea Infections

Fungal infections are common in athletes, and can be spread by direct contact. Skin fungal infections thrive in dark, damp places, but can occur anywhere on the body.

*Tinea cruris* is an infection of the inguinal folds that presents as scaly annular plaques with central clearing (Fig. 15-8). The scrotum is spared and this condition is commonly seen in the summer months. Topical antifungals such as econazole (Spectazole) or terbinafine (Lamisil) applied twice daily for 6 weeks usually resolve the infection.



**FIG 15-8** Tinea cruris, a fungal infection, presents as scaly, erythematous patches with discrete borders. It responds well to topical antifungals.

*Tinea capitis* is a fungal infection of the scalp that is characterized by scaling, erythema, patchy hair loss, and pustule formation. In severe cases, kerion formation occurs, consisting of a boggy, indurated mass with purulent discharge. Treatment with an antifungal shampoo such as ketoconazole (Nizoral) coupled with oral antifungals such as griseofulvin 500 mg a day for 4–6 weeks, terbinafine 250 mg a day for 6 weeks, or itraconazole (Sporanox) 200 mg twice a day for the first week of each month for 2–3 months is effective.

*Tinea pedis* or athlete's foot usually involves interdigital web spaces of the toes, but can present in several different ways. Some individuals have widespread scaly plaques involving the soles of their feet in a moccasin like distribution, while others present with inflammatory vesicles along the instep. Topical treatment with antifungals is usually effective. Nail infection or onychomycosis can commonly occur with tinea pedis.

Tinea infections are especially prevalent in wrestlers and have been termed *tinea corporis gladiatorum*. *Trichophyton tonsurans* is the most common fungus leading to this condition, and it is easily transmitted through direct skin contact. Wrestlers are prone to develop infections due close skin-to-skin contact during training and competition. The head, neck, and upper extremities are commonly affected. The wrestler should not be allowed to compete if active lesions are present on the neck or head, and lesions on other body parts must be covered with an occlusive dressing. A bio-occlusive dressing like Tegaderm covered with prewrap and secured with elastic tape makes an effective and adherent dressing. Oral antifungals are the most effective agents for treating and controlling the spread of tinea in wrestlers, and a wrestler should be treated for 24 hours for skin lesions and 14 days for scalp lesions before returning to contact practice and competition. Potential therapeutic regimens include Lamisil 250 mg a day for 2–4 weeks, griseofulvin 500 mg twice a day for 4 weeks, or itraconazole (Sporanox) 100 mg a day for 15 days. These agents can be combined with a topical antifungal.

## INFESTATIONS

### Scabies

Scabies infestation is common in young athletes and easily spread with close contact to other individuals. It is characterized by an intensely pruritic eruption that may involve the flexural surfaces of the wrists and extremities, the lower abdomen and genitalia, and the interdigital web spaces. Although burrows may be seen, often the only clinical finding will be excoriations. A skin scraping viewed under oil immersion microscopy can sometimes demonstrate the mite. Treatment involves the use of permethrin (Elimite) cream applied to the entire body at night and subsequently washed off the next morning. All clothing and bedding should be laundered and everyone living in the same household as the index case should be treated. The treatment should be repeated 1 week later.

### Lice

Lice infection (*Phthirus corporis* and *P. pubis*) may be spread through close contact between individuals. Lice can remain in clothing, equipment, or bedding, so infection is often acquired while traveling if the accommodations are not properly sanitized. For scalp involvement, shampoos such as Nix or Pronto provide improvement. A nit brush can then be used following shampoo treatment to remove eggs from the hair. This treatment can be repeated after 10 days if the infection persists. All individuals on a team warrant examination if one member is infected. Athletes may return to practice the day after treatment.

## Miscellaneous Dermatoses

### *Green Hair*

Swimmers with blond or light hair can develop a greenish tint to their hair. This occurs due to long-term exposure to copper ions found in the water. Treatment with penicillamine-containing shampoos or application of 2-3% hydrogen peroxide will clear the color.

### *Jogger's Nipples*

This condition refers to redness and irritation of the nipples from chronic friction between the nipples and clothing. If the runner does not seek medical attention, erosions will develop. These athletes should apply petroleum jelly and adhesive tape over the nipples before running. Some athletes may need to have cotton patches sewn into jerseys if the problem persists.

### *Cold Panniculitis*

Some athletes, especially young women, may develop panniculitis on the lateral thighs. This has been noted most often in equestrian sports. The cold may lead to solidification of the panniculus, which in turn leads to formation of painful erythematous nodules. Wearing protective clothing will help prevent recurrence.

### *Foot Contact Dermatitis or Sweat Sock Dermatitis*

Foot contact dermatitis is a red, scaly rash, sometimes associated with deep splitting of the skin, located on the dorsal and plantar surfaces of the feet,

sparing the interdigital web spaces. Foot dermatitis is often confused with tinea pedis and the sparing of the interdigital spaces is the key physical finding. It is due to sensitivity or allergic reaction to the glues and dyes used in shoe manufacturing that leach onto the skin with heavy sweating or wet footwear. The foot dermatitis is controlled with topical steroid creams and antiperspirants to decrease the inflammatory reaction and stop the chemical leaching onto the skin. Frequent sock changes and wearing sandals will decrease the intensity and duration of the rash.

## CONCLUSION

Proper diagnosis for common skin conditions that affect athletes will improve comfort, decrease risk of spread, and return athletes to peak performance. Skin ailments that do not resolve with the usual interventions should be evaluated by a dermatologist familiar with the demands sports puts on athletes to ensure the athlete will be able to return to practice and competition without undue delay.

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