The following module contains a number of green, underlined terms which are hyperlinked to the dermatology glossary, an illustrated interactive guide to clinical dermatology and dermatopathology.

We encourage the learner to read all the hyperlinked information.
Goals and Objectives

The purpose of this module is to help medical students develop a clinical approach to the evaluation and initial management of patients presenting with stasis dermatitis and leg ulcers.

After completing this module, the learner will be able to:
- Recognize the clinical presentation of stasis dermatitis
- List treatment options and preventative measures for stasis dermatitis
- Distinguish stasis dermatitis from cellulitis
- List the most frequent causes of leg ulcers and describe their presentations
- Describe proper wound care and treatment for leg ulcers
- Discuss when to refer leg ulcers to a specialist
Case One

Mrs. Lillian Paulsen
HPI: Mrs. Paulsen is a 74 year-old woman who presents to the dermatology clinic with leg discoloration for the past three months. The “rash” does not hurt, but occasionally itches. She has not tried any treatment.

PMH: diabetes (last hemoglobin A1c was 6.7), hypertension, obesity. No history of atopic dermatitis.

Medications: ACE-inhibitor, thiazide diuretic, sulfonylurea

Allergies: none

Family history: noncontributory

Social history: lives with her husband in a nearby town

Health-related behaviors: no tobacco, drug use, or alcohol

ROS: as above, no leg pain when walking or at rest
Case One: Exam

Erythematous brown hyperpigmented plaque with fine fissuring and scale located above the medial malleolus on the left lower leg.

Right leg with varicosities.

Notice the asymmetry?

Palpation of the left leg reveals firm skin suggestive of fibrosis.
Case One, Question

What is the most likely diagnosis?

a. cellulitis
b. erysipelas
c. stasis dermatitis
d. tinea corporis
e. atopic dermatitis
Case One, Question 1

Answer: c

- What is the most likely diagnosis?
  a. cellulitis (cellulitis is more acute with more erythema, well-demarcated without pruritus or scale)
  b. erysipelas (a form of cellulitis caused by acute beta-hemolytic group A streptococcal infection of the skin)
  c. stasis dermatitis
  d. tinea corporis (would expect a sharply marginated, erythematous annular lesion with central clearing)
  e. atopic dermatitis (adults with AD have a history of childhood AD and a different distribution of skin involvement)
Diagnosis: Stasis Dermatitis

- **Stasis dermatitis** typically presents with erythema, scale, pruritus, erosions, exudate, and crust
  - Usually located on the lower third of the legs, superior to the medial malleolus
  - Can occur bilaterally or unilaterally (more common in the left leg)
  - **Lichenification** may develop
  - Edema is often present, as well as varicose veins and hemosiderin deposits (pinpoint yellow-brown macules)
Venous Insufficiency

- Stasis dermatitis is a cutaneous marker of venous insufficiency
- Normally, venous blood returns from the superficial venous system via perforating veins into the deep venous system
- Venous stasis occurs when the valves in the deep or perforating veins become incompetent, causing reflux into the superficial system (venous hypertension)
Venous Insufficiency

- Risk factors for venous insufficiency:
  - heredity
  - age (older)
  - female sex
  - pregnancy
  - obesity
  - prolonged standing
  - greater height

- Chronic venous disease is extremely common and is associated with a reduced quality of life secondary to pain, decreased physical function, and mobility
Venous Insufficiency

- **Early signs of venous insufficiency:**
  - Tenderness
  - Edema
  - Hyperpigmentation
  - Telangiectasias
  - Varicose veins

- **Late signs:**
  - Lipodermatosclerosis (subcutaneous fat is replaced by fibrosis, eventually impedes venous and lymphatic flow leading to edema above the fibrosis)
  - Venous ulcers
  - Scars that appears porcelain white and atrophic
What happened here?
Lipodermatosclerosis

- Stasis dermatitis can lead to fat necrosis with the end stage being permanent sclerosis (lipodermatosclerosis) with “inverted champagne bottle” legs as seen here
- Patients with lipodermatosclerosis may also have acute inflammatory episodes that present with pain and erythema (these episodes can be mistaken for cellulitis)
What happened here?
Elephantiasis Verrucosa Nostra

- Inflammation of the draining lymphatics (as occurs with cellulitis) results in damage to those vessels resulting in lymphatic insufficiency
- The overlying skin becomes pebbly, hyperkeratotic, and rough
- Ulceration in this setting (with lymphatic and venous insufficiency) is significantly harder to treat and heal
Which of the following are complications of venous insufficiency?

a. Recurrent ulceration
b. Cellulitis
c. Contact dermatitis
d. Venous thrombosis
e. All of the above
Case One, Question 2

Answer: e

- Which of the following are complications of venous insufficiency?
  a. Recurrent ulceration
  b. Cellulitis
  c. Contact dermatitis
  d. Venous thrombosis
  e. All of the above
Complications of Venous Insufficiency

- Recurrent ulcers
- Cellulitis (open wound provides a portal of entry for bacteria)
- Contact dermatitis (from topical agents applied to stasis dermatitis or ulceration)
- Venous thrombosis
Stasis Dermatitis: Treatment

- Important to treat both the dermatitis and the underlying venous insufficiency
  - Application of super-high and high potency steroids to area of dermatitis
  - Elevation (to reduce edema)
  - Compression therapy with leg wraps
  - Change wraps weekly, or more often if the lesion is very weepy
Compression Therapy Works

PRIOR TO TREATMENT

FOLLOWING TREATMENT
Case Two

Mr. Patrick Baily
Case Two: History

- HPI: Mr. Baily is a 50 year-old gentleman who presents to his primary care provider with pain in his left leg. He developed a “weeping spot” a few weeks ago, which he tried treating with an over the counter antibiotic ointment.
- PMH: history of a DVT 5 years ago after a transatlantic flight, no longer on anticoagulation, hypertension, type 2 diabetes
- Medications: thiazide diuretic, ACE-inhibitor, sulfonylurea (Glyburide), biguanide (Metformin)
- Allergies: none
- Family history: father with type 2 diabetes and hypertension
- Social history: lives with wife in an apartment, works in construction
- Health-related behaviors: smokes 1 cigarette/day
- ROS: as above
Case Two, Question 1

- How would you describe Mr. Baily’s skin exam?
Case Two, Question 1

- Irregularly shaped ulcer located on the medial aspect of the left ankle, erythematous border, exudative
- Without undermining (unable to probe under the edges)
- Pedal pulses are present, 1+
Case Two, Question 2

- Given the history and exam, what type of ulcer is on Mr. Baily’s left leg?
  a. Arterial
  b. Venous
  c. Diabetic
  d. Pressure
Case Two, Question 2

Answer: b

- Given the history and exam, what type of ulcer is on Mr. Baily’s left leg?
  a. Arterial
  b. Venous
  c. Diabetic
  d. Pressure
Venous Insufficiency Ulcers

- Active or healed venous leg ulcers occur in ~ 1% of the general population
- Typically tender, shallow, irregular ulcers with a fibrinous base that are always located below the knee
  - Usually located on the medial ankle or along the line of the long or short saphenous veins
  - Accompanied with leg edema, hemosiderin pigmentation, +/- dermatitis of the leg
- Patients may experience symptoms of aching or pain. Discomfort may be relieved by elevation.
Causes of chronic leg ulcers include:
- Venous insufficiency 45-60%
- Arterial insufficiency 10-20%
- Combination of venous and arterial 10-15%
- Diabetic 15-25%
- Malignancy, vasculitis, collagen-vascular diseases, and dermal manifestations of systemic disease may present as ulcers on the lower extremity

Smoking and obesity increase the risk for ulcer development and persistence (independent of the underlying cause)
Case Two, Question 3

Which of the following is the most appropriate next step in evaluating Mr. Baily?

a. Measure the blood pressure in the left arm and left ankle
b. Recommend he quit smoking
c. Obtain a skin biopsy
d. Treat the ulcer with topical antibiotics
Answer: a

Which of the following is the most appropriate next step in evaluating Mr. Baily?

a. Measure the blood pressure in the left arm and left ankle (Mr. Baily’s DP pulse was weak suggesting possible co-existent peripheral arterial disease)

b. Recommend he quit smoking (smoking cessation has been shown to help wound healing and should be encouraged)

c. Obtain a skin biopsy (not necessary unless the diagnosis is unclear or the ulcer does not respond to treatment)

d. Treat the ulcer with topical antibiotics (no, in fact topical antibiotic ointments may lead to a contact dermatitis)
Evaluation: Ankle/Brachial Index

- Measure the ankle/brachial index (ABI) to exclude arterial occlusive disease
  - Compression therapy (used to treat venous insufficiency) is contraindicated in patients with significant arterial disease
- The ABI is the ratio of systolic blood pressure in the ankle to the systolic blood pressure in the brachial artery
  - Normal: ≥ 0.8
  - < 0.8 = indication of peripheral arterial disease
- ABI is reliable except in diabetes (it may be falsely high)
- An ABI should be performed in all patients with weak peripheral pulses, risk factors for arterial occlusive disease (i.e. smoking, diabetes, hyperlipidemia), and when ulcers are in locations not consistent with venous ulcers
Venous Ulcers: Evaluation

- In addition to assessment of the ulcer, the physical exam of patients with leg ulcers should include the evaluation of peripheral pulses, capillary refill time, peripheral neuropathy, and deep tendon reflexes.

- Diagnosis of venous leg ulcers can be made clinically, however, non-invasive vascular studies such as venous duplex ultrasound and venous rheography can help document the presence and etiology of venous insufficiency.
  - Findings may warrant surgical intervention with endoscopic venous laser ablation, which may prevent further complication.
  - Surgical intervention tends to be more helpful when the venous disease is limited.
Venous Ulcers: Treatment

- Address the underlying cause (venous insufficiency) as well as local wound care:
  - Leg elevation
  - Keep the wound moist with a primary dressing
  - Compression therapy (except with an ABI < 0.8)
    - Apply external compression (applied over a primary dressing) with a high compression system such as a multilayer bandage or paste-containing bandage (e.g. Unna’s boot, Duke boot)
  - Treat dermatitis with topical steroids
  - Treat infection with debridement of necrotic or infected tissues and use systemic antibiotics for infection
  - Measure the ulcer at each visit to document improvement
Wound Care: The Primary Dressing

- Keep the wound moist. A moist wound environment promotes healing compared to air exposure.
- Choice of dressings is less important than the program of ulcer treatment outlined on the previous slide.
- Semipermeable dressings that allow oxygen and moisture to pass through (but not water) have made the treatment of leg ulcers easier and more effective.
Venous Ulcers: Treatment

- Patient education is crucial in successful treatment:
  - Topical antibiotics should rarely or never be applied to leg ulcers due to the high risk of developing allergic contact dermatitis.
  - Only cleanse the wound with saline. Avoid products like betadine and hydrogen peroxide.
  - Frequent manipulation of leg ulcers impedes healing. Dressings can be changed as infrequently as once weekly.
  - Venous hypertension is a chronic condition. Once healed, patients benefit from elastic stockings with 20-30mmHg compression.

- Patients with venous ulcers that do not demonstrate response to treatment (reduction in size) after 6 weeks should be referred to dermatology.
Case Three

Mr. Robert Lund
Case Three: History

- HPI: Mr. Lund is a 60 year-old gentleman who presents to his primary care provider with a painful “sore” on his right lateral leg. He reports a history of a “cramping pain” in his calves when walking, but this current pain is more localized to the skin.
- PMH: hyperlipidemia, hypertension, angina
- Medications: statin, thiazide diuretic, sublingual nitroglycerin when needed, aspirin
- Allergies: NKDA
- Family history: father with an MI at age 65, mother with diabetes
- Social history: lives with his wife, works in sales, 2 grown children
- Health-related behavior: smokes ½ pack of cigarettes/day, one glass of wine nightly, no drug use
- ROS: no shortness of breath or recent chest pain
Case Three, Question 1

- How would you describe Mr. Lund’s skin exam?
Case Three, Question 1

- “Punched out” appearing ulcer with sharply demarcated borders
- Minimal exudation and surrounding erythema
- Dorsalis pedis pulse is absent
- ABI is 0.6
Arterial Ulcers

- Arterial ulcers are secondary to peripheral arterial disease
- Occur on the lower leg, usually over sites of pressure and trauma: pretibial, supramalleolar, and at distant points, such as toes and heels
- Appear as “punched out,” with well-demarcated edges and a pale base
- Exudation is minimal
- Associated findings of ischemia: loss of hair on feet and lower legs, shiny atrophic skin
Arterial Ulcers

- Pulses (dorsalis pedis and posterior tibial) may be diminished or absent
- Stasis pigmentation and lipodermatosclerosis are absent
- Associated with intermittent claudication and pain
  - As disease progresses, pain and claudication may occur at rest
  - Unlike venous ulcers, leg pain often does not diminish when the leg is elevated
Case Three, Question 2

Which of the following recommendations should take priority?

a. Encourage him to stop smoking
b. Make sure his blood pressure and hyperlipidemia are under good control
c. Encourage him to ambulate
d. Refer to a vascular surgeon
Case Three, Question 2

Answer: d

Which of the following recommendations should take priority?

a. Encourage him to stop smoking
b. Make sure his blood pressure and hyperlipidemia are under good control
c. Encourage him to ambulate
d. Refer to a vascular surgeon (although all the answer choices are correct, the main goal of therapy is the re-establishment of adequate arterial supply)
Arterial Ulcers: Treatment

- Refer to a vascular surgeon for restoration of arterial blood flow with percutaneous or surgical arterial reconstruction.
- Patients should stop smoking, optimize control of diabetes, hypertension, and hyperlipidemia.
- Weight loss and exercise are also helpful.
- All types of ulcers require proper wound care as outlined above in venous ulcer treatment.
Case Four

Mr. Ryan Stricklin
Case Four: History

- **HPI**: Mr. Stricklin is a 46 year-old gentleman who presents to his primary care provider with lesions of the bottom of his foot. He noticed these lesions a few months ago when he was changing his socks at the gym. He reports keeping them clean with hydrogen peroxide.
- **PMH**: diabetes type 1 x 25 years, hernia repair 20 years ago
- **Medications**: insulin (glargine and regular)
- **Allergies**: none
- **Family history**: noncontributory
- **Social history**: lives alone, works as a realtor
- **Health-related behaviors**: no tobacco, alcohol, or drug use
- **ROS**: no fevers, sweats or chills
Case Four, Question 1

- How would you describe Mr. Stricklin’s skin exam?
Case Four, Question 1

Callus has been debrided, revealing ulcers on the plantar foot.

Able to undermine the ulcers with a metal probe, unable to track the ulcer to the bone.
Diabetic (Neuropathic) Foot Ulcers

- Peripheral neuropathy, pressure, and trauma play prominent roles in the development of diabetic ulcers.
- Usually located on the plantar surface under the metatarsal heads or on the toes.
- Repetitive mechanical forces lead to callus, which is the most important preulcerative lesion in the neuropathic foot.
Diabetic (Neuropathic) Foot Ulcers

- Lifetime risk of a person with diabetes developing a foot ulcer may be as high as 25%

- Risk factors for foot ulcers include:
  - Cigarette smoking
  - Past foot ulcer history
  - Peripheral vascular dz
  - Previous amputation
  - Poor glycemic control
  - Peripheral neuropathy
  - Diabetic nephropathy
  - Visual impairment
Diabetic patients with foot ulcers are often best managed in a multidisciplinary setting (podiatrists, endocrinologists, dietician)

- Remove the callous surrounding the ulcer (together with slough and non-viable tissue)
- Probe the ulcer to reveal sinus extending to bone or undermining of the edges where the probe can be passed from the ulcer underneath surrounding intact skin
  - Order an imaging study if concerned about bone involvement
  - Patients with suspected osteomyelitis should be admitted to the hospital for evaluation and treatment
Evaluation and Treatment

- Topical dressings to maintain a moist environment
- Platelet-derived growth factor gel may be locally applied, which has been shown to improve wound healing in diabetic foot ulcers
- Protect the ulcer from excessive pressure
  - Redistribute plantar pressures with casting or special shoes (a podiatrist with expertise in the management of the diabetic foot is extremely helpful in these cases)
  - Restrict weight bearing of the involved extremity
Case Four, Question 1

Which of the following statements about Mr. Stricklin is likely to be true?

a. He has diabetic neuropathy
b. He should continue to use hydrogen peroxide to keep his lesions clean
c. He should wear open-toed shoes
d. None of the above
Case Four, Question 1

Answer: a

Which of the following statements about Mr. Stricklin is likely to be true?

a. He has diabetic neuropathy (diabetic neuropathy can cause a loss of protective pain sensation as well as motor dysfunction)

b. He should continue to use hydrogen peroxide to keep his lesions clean (not true. Hydrogen peroxide interferes with wound healing)

c. He should wear open-toed shoes (diabetic patients should avoid open-toed and pointed shoes)

d. None of the above
Diabetic Foot Ulcers: Prevention

- Education about ulcer prevention should be provided for all diabetic patients
  - Optimizing glycemic control helps prevent the neuropathy associated with foot ulceration
  - Foot examinations should be performed at least yearly in all patients with diabetes. This includes monofilament testing for neuropathy and clinical assessment for peripheral vascular disease.
  - Patients should examine their own feet on a regular basis
  - Encourage smoking cessation (risk factor for vascular disease and neuropathy)
  - Optimize treatment of hypertension, hyperlipidemia, and obesity
  - If present, treat tinea pedis (to prevent the associated skin barrier disruption)
Case Five

Mrs. Melinda Dellinger
Case Five: History

- **HPI:** Mrs. Dellinger is a 50 year-old woman who presents to her primary medical provider with a 4-day history of new, very painful lesions on her hand and thigh. She initially thought these lesions were bug bites, but they now appear to be expanding and look more like ulcers.
- **PMH:** inflammatory bowel disease (well-controlled)
- **Medications:** sulfasalazine daily, multivitamin, fish oil
- **Allergies:** no known drug allergies
- **Family history:** brother with ulcerative colitis
- **Social history:** lives with husband and 20 year-old daughter, works full-time as a high school teacher
- **Health-related behaviors:** reports no alcohol, tobacco, or drug use
- **ROS:** no fevers, joint pains, abdominal pain or diarrhea
Case Five, Question 1

How would you describe the following skin findings?
Case Five, Question 1

Ulcer with undermined violaceous border, exudative
Case Five, Question 2

- Given the history and exam findings, Mrs. Dellinger’s primary care provider is concerned about pyoderma gangrenosum (PG) and made an urgent referral to the dermatology clinic.

- Which of the following is true about PG?
  a. PG is a slow process
  b. PG is painless
  c. A biopsy of PG is diagnostic
  d. Debridement of the ulcer will help the healing process
  e. PG is often mistaken as a spider bite
Answer: e

- Which of the following is true about PG?
  a. PG is a slow process (not true. PG rapidly progresses)
  b. PG is painless (not true. PG is often very painful)
  c. A biopsy of PG is diagnostic (not true. There are no specific histological features on skin biopsy)
  d. Debridement of the ulcer ill help the healing process (no! In fact, PG is triggered and made worse by trauma – a process called pathergy)
  e. **PG is often mistaken as a spider bite** (true! In fact, we recommend you consider PG or MRSA when the diagnosis of a brown recluse spider bite is at the top of your differential)
Diagnosis: Pyoderma Gangrenosum

- PG is an inflammatory ulcerative process mediated by influx of neutrophils into the dermis
- Begins as a small pustule which breaks down and rapidly expands forming an ulcer
- Undermined violaceous border
- Satellite ulcerations may merge with the central larger ulcer
- Rapid progression (days to weeks)
- Can occur anywhere on body (most frequently occurs on the lower extremities)
- Can be very painful
Pyoderma Gangrenosum

- Triggered by trauma (pathergy) (insect bites, surgical debridement, attempts to graft)
  - PG is often misdiagnosed as a brown recluse spider bite
- The majority of patients do not have an underlying condition. However, in every patient with PG, an underlying condition should be sought because it may be asymptomatic.
  - Inflammatory bowel disease (1.5%-5% of patients get PG); rheumatoid arthritis; hematologic dyscrasias, malignancy
- 1/3 of PG patients have arthritis: seronegative, asymmetric, monoarticular, large joint
Another Example of PG

Note the undermined violaceous border
PS should be considered a dermatologic emergency and an urgent referral to a dermatologist should be considered.

The diagnosis of PG is one of exclusion; there are no specific histological or clinical features.

Although non-diagnostic, a skin biopsy is often performed to exclude other conditions.

Treatment of the underlying disease may not help PG (often doesn’t).

Topical therapy: Superpotent steroids, topical tacrolimus.

Systemic therapy: Systemic steroids, cyclosporine, tacrolimus, cellcept, thalidomide, TNF-inhibitors.
<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Arterial Ulcer</th>
<th>Venous Ulcer</th>
<th>Diabetic Ulcer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location</td>
<td>Ankle, toes, and heels</td>
<td>Medial region of the lower leg</td>
<td>On soles, over bony prominences</td>
</tr>
<tr>
<td>Appearance</td>
<td>Irregular margin, punched out edges, little exudate</td>
<td>Irregular margin, sloping edges, pink base, usually exudative</td>
<td>Overlying callus, undermined, red, often deep and infected</td>
</tr>
<tr>
<td>Skin temperature</td>
<td>Cold and dry</td>
<td>Warm</td>
<td>Warm and dry</td>
</tr>
<tr>
<td>Pain</td>
<td>Present, may be severe</td>
<td>Mild-moderate, unless infected or with significant edema</td>
<td>May be absent</td>
</tr>
<tr>
<td>Arterial pulses</td>
<td>Diminished or absent</td>
<td>Present</td>
<td>Present or absent</td>
</tr>
<tr>
<td>Sensation</td>
<td>Variable</td>
<td>Present</td>
<td>Loss of sensation, reflexes, and vibration sense</td>
</tr>
<tr>
<td>Skin changes</td>
<td>Shiny and taut, edema not common</td>
<td>Erythema, edema, hyperpigmentation, lipodermatosclerosis</td>
<td>Shiny, taut, or doughy</td>
</tr>
<tr>
<td>Treatment</td>
<td>Refer to vascular surgeon, wound care</td>
<td>Compression is mainstay, wound care</td>
<td>Remove callus, off-load pressure</td>
</tr>
</tbody>
</table>
Take Home Points

- Stasis dermatitis is a cutaneous marker for venous insufficiency
- The most common types of leg ulcers include venous, arterial, combined (venous and arterial), and diabetic
- Diagnosis of leg ulcers may be made clinically, but evaluation with non-invasive vascular imaging and the ABI will often guide treatment
- Treatment of venous leg ulcers includes leg elevation, compression, and wound care
- Patients with arterial ulcers should be referred to a vascular surgeon for restoration of arterial blood flow
Take Home Points

- A callus is the most important preulcerative lesion in the diabetic foot
- Osteomyelitis should be considered in patients presenting with diabetic foot ulcers
- Education about ulcer prevention should be provided to all diabetic patients
- The diagnosis of PG should be considered in the rapidly expanding painful ulceration of the lower leg
- PG is a dermatologic emergency and patients should be referred to a dermatologist
End of the Module

End of the Module

- Miller O. Fred. Leg Ulcer Treatment. Presentation at Geisinger Medical Center.