

# It's Alive!

## Skin Infections



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# The usual suspects: Common Culprits

## + Infection

### + Bacterial

- + Impetigo
- + Cellulitis
- + Erysipelas

### + Fungal

- + Tinea
- + Majocchi's
- + Tinea Versicolor
- + Erosio interdigitalis  
blastomycetica

## + Viral

- + Varicella VZV
- + Herpes Simplex HSV

## + Creatures

- + Scabies
- + Bed Bugs

# Bacteria



# Bacterial infection: Impetigo

- + Superficial skin infection
- + Caused by *Staphylococcus aureus* or *Streptococcus pyogenes*
- + Erythematous vesicles or pustules, shallow erosions with honey colored crust
- + Typical on the face, nose, mouth, extremities



# Bacterial infection: Impetigo

- + No systemic symptoms
- + Localized treat topically with mupirocin, widespread treat with oral antibiotics based on culture results
- + If you are treating with empiric antibiotics and MRSA is suspected or confirmed: doxycycline 100 mg BID or sulfamethoxazole-trimethoprim 1 or 2 DS tablets twice daily



Oral antimicrobial therapy for treatment of skin and soft tissue infections due to methicillin-resistant *Staphylococcus aureus* (MRSA) in adults

Treatment	Adult dose
Clindamycin	300 mg orally 4 times daily or 450 mg orally 3 to 4 times daily
Trimethoprim-sulfamethoxazole (cotrimoxazole)	1 or 2 DS tablets twice daily
Doxycycline	100 mg orally twice daily
Minocycline	200 mg orally once, then 100 mg orally twice daily
Linezolid	600 mg orally twice daily
Tedizolid	200 mg orally once daily
Delafloxacin	450 mg orally twice daily
Omadacycline	300 mg orally once daily

The doses recommended above are intended for patients with normal renal function; the doses of some of these agents must be adjusted in patients with renal insufficiency.

DS: double strength (ie, 160 mg trimethoprim with 800 mg sulfamethoxazole per tablet).

Data from:

1. Stevens DL, Bisno AL, Chambers HF, et al. Practice guidelines for the diagnosis and management of skin and soft tissue infections: 2014 update by the Infectious Diseases Society of America. *Clin Infect Dis* 2014; 59:e10.
2. Liu C, Bayer A, Cosgrove SE, et al. Clinical Practice Guidelines by the Infectious Diseases Society of America for the Treatment of Methicillin-Resistant *Staphylococcus Aureus* Infections in Adults and Children. *Clin Infect Dis* 2011; 52:e18 (note: for TMP-SMX dose in osteomyelitis, refer to p e38).

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# Bacterial infection: Cellulitis

- + characterized by ill defined, erythema, pain, warmth, and swelling.
- + Can present with lymphatic streaking and fevers and malaise
- + Most common culprits:
  - + Immunocompetent adults: *Staphylococcus aureus* and *Streptococcus pyogenes*.
  - + Kids: *Staphylococcus aureus*
  - + Immunocompromised: including those with diabetes and decubitus ulcers: mixture of gram-positive cocci and gram-negative aerobes and anaerobes.





# Bacterial infection: Cellulitis

- + Risk factors
  - + minor skin trauma
  - + intravenous drug use
  - + tinea pedis infection
  - + animal bites
  - + peripheral vascular disease
  - + immune suppression (chronic systemic steroid use, neutropenia, immunosuppressive medications, alcohol use disorder)
  - + lymphatic damage lymph node dissection
  - + radiation therapy
  - + vein harvest for coronary artery bypass surgery
  - + prior episodes of cellulitis





# Bacterial infection: Cellulitis

- + Empiric oral therapy (covers MSSA and MRSA) and MRSA definitive therapy: for 5-10 days but should be individualized
  - + Trimethoprim-sulfamethoxazole (TMP/SMX) 1-2 double-strength tabs orally 2 times daily, OR
  - + Doxycycline or minocycline 100 mg orally 2 times daily, OR
  - + Clindamycin 300-450 mg orally 4 times daily



# Bacterial infection: Erysipelas

- + most often caused by beta-hemolytic group A streptococci (*Streptococcus pyogenes*).
- + It involves the lymphatics of the superficial dermis.
- + Risk factors for development: extremes of age, debilitated patients, and patients with poor lymphatic drainage
- + Clinical presentation – well demarcated, abrupt onset of fever, chills, nausea, and malaise, lymphadenopathy
- + Can be anywhere on the body but think about it on the face, legs, penis



# Bacterial infection: Erysipelas

- + elevated WBC count , ASO titer can be positive
- + DDX: cellulitis, contact dermatitis, angioedema, necrotizing fasciitis
- + Immunocompetent patient, routine blood and tissue cultures are not recommended



# Bacterial infection: Erysipelas

- + Tx (Adults)
  - + PCN 250-500 mg 4 times daily for 10-14 days
  - + Dicloxacillin 250-500 mg four times daily for 10 days
  - + Erythromycin 250-500 mg four times daily for 10 days
  - + Penile (prednisone)
  - + Consider daily prophylaxis with penicillin in patients with multiple recurrent bouts of erysipelas who have poor lymphatic drainage.



# Bacterial infection: Erysipelas

- + Treatment (Children)
- + Mild (outpatient)
  - + PCN G 25-50 mg/kg/day divided 3-4 times daily
  - + Amoxicillin 25-50 mg/kg/day divided 3-4 times daily
- + Moderate/severe (inpatient) (IV)
  - + Ceftriaxone 50-75 mg/kg/day divided 1-2 times daily
  - + Cefazolin 100 mg/kg/day divided 3 times daily
  - + Clindamycin 30 mg/kg/day divided 3 times daily
- + PCN allergy
  - + Erythromycin 30-50 mg/kg/day divided 2-4 times daily (may not be adequate in areas with highly resistant beta hemolytic streptococci)
  - + Clindamycin 30 mg/kg/day divided 3 times daily.





Tinea corporis (body), Capitis (head), beard area (barbae)  
Tinea pedis (feet) Tinea Manus (hands)  
Cruris (inguinal folds)

- + Skin infection caused by dermatophyte most commonly *trichophyton rubrum*
- + CP: annular, erythematous scaly plaques with central clearing, typically itchy
- + Tinea incognito – infection treated with topical steroids that can present with pustules and result in infection that tracts down follicle



Tinea corporis (body), Capitis (head), beard area (barbae)  
Tinea pedis (feet) Tinea Manus (hands)  
Cruris (inguinal folds)

- + Topical antifungals for 1-6 weeks, based on clinical response. Options include one of the following:
  - + Terbinafine 1% cream or spray – Apply once to twice daily.
  - + Clotrimazole 1% cream – Apply twice daily.
  - + Econazole 1% cream – Apply once to twice daily.
- + Extensive disease or hair bearing areas
  - + Terbinafine 250 mg once a day for 2-4 weeks.





# Majocchi's granuloma (deep fungal infection)

- + Skin infection caused by dermatophyte most commonly *trichophyton rubrum* that involves the hair follicle
- + More common in immunosuppressed patients but can happen in young adults treated with topical steroids
- + Tx: Terbinafine 250 mg once a day for 2-4 weeks.



# Tinea versicolor also known as Pityrosporum versicolor

- + Benign superficial skin infection caused by a yeast *Malassezia*
- + Most common in young adults and teenagers
- + CP: hyper or hypo pigmented oval shaped thin plaques with a fine dusty scale, can also be erythematous in lighter skin types found on the upper trunk and arms, neck, and face
- + **Topically, for large skin areas:** Imidazole creams (clotrimazole, econazole) applied once or twice daily for 1-4 weeks.



# Erosio interdigitalis blastomycetica



- + interdigital candidiasis of the hands and feet
- + Clinical Presentation: macerated, round to oval shaped, and may extend onto the sides of the digits. Pustules may also be present
- + Risk factors: Working with hands in water (homemakers, dishwashers, bar tenders) Other predisposing factors include obesity, diabetes mellitus, and immunosuppression

# Erosio interdigitalis blastomycetica



- + Treatment:
- + Gentamicin cream or ointment  
AND econazole cream

# Viruses



# Viral infections – Varicella zoster virus (VZV)

## + Chicken Pox

- + Highly contagious, spread by respiratory droplet and skin vesicles
- + In healthy people, incubation 2-3 weeks, 1-3 days fever, malaise, crops of dew drops on rose petal (vesicles on erythematous bases) present for a week, can also affect mucous membranes, resolves without complication
- + In rare cases complications like bacterial superinfection, pneumonia, encephalitis
- + Tx: Symptomatic treatment for varicella, antiviral tx only in severe cases

# Viral infections – Varicella zoster virus (VZV)

- + Herpes Zoster (“Shingles”)
  - + Reactivation of latent VSV infection, individuals lifetime risk of development 1 in 3
  - + 1-3 day prodrome of burning pain or paresthesias in the affected dermatome, followed by eruption of vesicles in the dermatome
  - + Can spread to susceptible children, pregnant women, adults without exposure to the virus



# Herpes zoster complications/considerations



- + Herpes Zoster ophthalmicus
  - + Involvement of the ophthalmic branch of the trigeminal nerve
- + Herpes zoster oticus (Ramsey – Hunt syndrome)
  - + Involvement of the vestibulocochlear nerve
- + Disseminated zoster
  - + >20 vesicles outside of primary and adjacent dermatomes (typically in immunocompromised)
- + Post herpetic neuralgia
  - + Risk factors: older age, female, prodrome, greater rash, acute pain
- + Tx: immunocompetent: Valacyclovir 1000 mg by mouth every 8 hours for 7 days.
- + Tx if administered in the first 72 hours (and possibly up to 7 days) after symptom onset, can shorten the length and severity of the acute episode and may help to decrease the likelihood of developing post herpetic neuralgia

# Herpes Simplex Virus type 1 and 2

- + Herpes Simplex virus type 1
  - + 90% of adults have antibodies, classically affects orolabial mucosa but can be found anywhere on the body
  - + virus establishes lifelong latency in the dorsal root ganglia
  - + Clinical disease occurs with reactivation (spontaneously or with trauma, UV exposure, fever, or immunosuppression) of the latent virus
  - + Treatment: (episode) Valacyclovir 2000 mg PO q12h x1 day; Start: ASAP after sx onset, (suppression) 500 mg daily



# Herpes Simplex Virus type 1 and 2

- + Herpes Simplex virus type 2
  - + Classically genital herpes
  - + Symptoms of primary disease are usually more severe than recurrent disease
  - + CP: erosions or ulcers with scalloped borders, grouped vesicles on erythematous bases
  - + Treatment: (immunocompetent)
    - + 1<sup>st</sup> episode Valacyclovir 1000 mg PO q 12 hour x 7-10 days
    - + Recurrence Valacyclovir 500 mg PO q12 hr x 3 days
    - + Suppression Valacyclovir 1000 mg PO qd



# Creatures



# Scabies: *Sarcoptes scabiei*

- + Clinical presentation:
  - + Extreme itching in the body fold areas, gluteal cleft, axillae
  - + Burrows on the axillae, ventral wrists, Nodules on the scrotum
- + Diagnosis:
  - + KOH - Mites, ova, or scybala (brown feces)
  - + Identify a burrow







# Scabies: *Sarcoptes scabiei*

- + Treatment: Permethrin 5% cream is the treatment of choice. Apply to entire body from the neck down at night and rub well onto all skin surfaces. Leave on for 8-14 hours, and rinse off in the morning. A second application is recommended after 7 days, OR
- + Ivermectin 200 µg/kg orally, repeated in 2 weeks. This is the treatment of choice for immunocompromised patients and for crusted scabies, although a recent meta-analysis suggests that treatment failure of ivermectin for common scabies may be greater than permethrin overall, due to its short half-life and limited ovicidal activity. Infants and young children should not be treated with ivermectin.









Bed Bugs (*Cimex lectularis*)

## Bed Bugs(*Cimex lectularis*)

- + 4-5 mm ovoid, flat, wingless, red-brown, nocturnal, blood-sucking insects
- + hide during the day in the seams of mattresses, in the crevices of box springs, and in the cracks of floors and walls
- + require a blood meal to progress in their life cycle
- + feed weekly and prefer to bite in the predawn hours
- + While a blood meal is required to advance in the life cycle, bedbugs have been known to survive up to 12 months without a “meal”

# Bed Bug Bites



## Bed Bugs(*Cimex lectularis*)

- + Diagnosis: clinical + history
- + Eradicate the infestation, bites will resolve on their own in 1-2 weeks.
  - + Oral antihistamines for pruritus: diphenhydramine 25-50 mg by mouth every 8 hours or hydroxyzine 10-25 mg by mouth every 8 hours, as tolerated.
  - + Mid-potency topical corticosteroids (class 3-4) for skin lesions: Triamcinolone cream, ointment – Apply every 12 hours
- + <https://www1.nyc.gov/assets/doh/downloads/pdf/vector/bed-bug-guide.pdf>

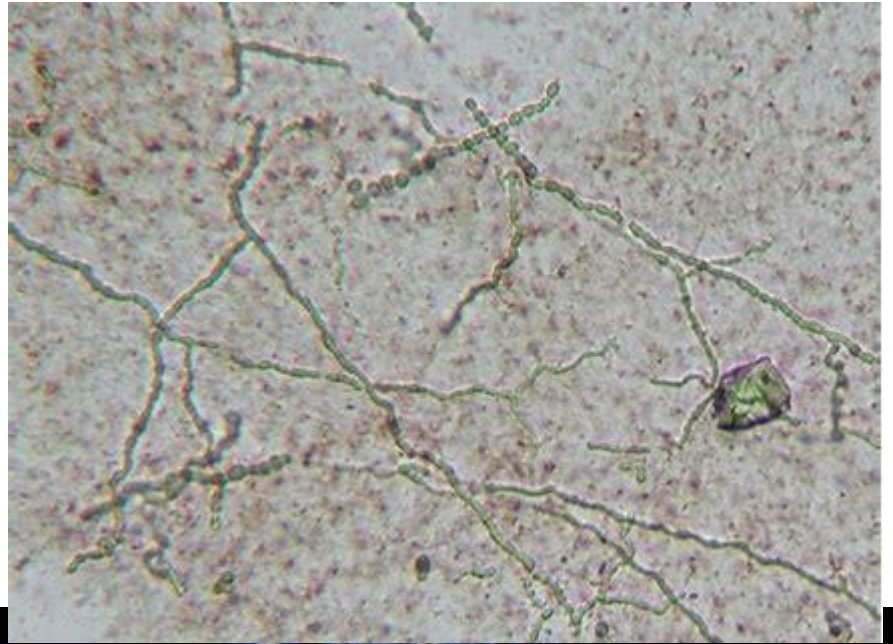
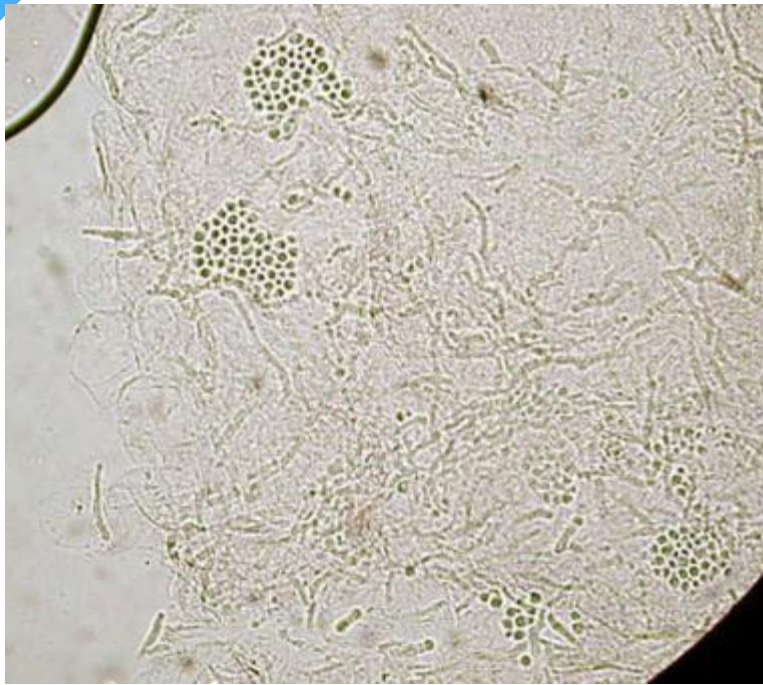
# Procedural ways to distinguish between common culprits in dermatology

- + KOH can diagnose dermatophyte infection of the nail, tinea versicolor, tinea corporis, scabies, demodex rosacea
- + Culture can diagnose bacterial, fungal (nail, hair, tissue), viral infection
- + Shave Biopsy can diagnose non melanoma skin cancer
- + Punch Biopsy can diagnose inflammatory skin disease, infection, cancer

# KOH – Potassium Hydroxide

- + Use 15 blade, Glass slide, solution of 10-20% KOH (potassium hydroxide), chlorazol black, cover slips
- + Scrape the leading edge of the scaling, burrow, or the subungual debris around a nail
- + Keep the blade perpendicular to the skin and scrape the blade onto the skin catching the scale with the glass slide
- + Add 2-3 drops of KOH and chlorazol black and cover slip, wait
- + Use low power and then higher power (10 objective) on the microscope to look for:





# Culture – Bacterial, Viral, Fungal

## + Bacterial or viral culture:

- + Use 15 blade to unroof a pustule, or vesicle and swab the bacterial swab or viral culture swab on the blade and the base of the lesion

## + Fungal culture -

- + Nail: clip the nail down, use 15 blade or curette to obtain the chalky subungual debris, you can use nail clippings that also contain this debris
  - + These typically can take 3-4 weeks for results.
- + Tissue for fungal culture obtained by doing a punch biopsy and placing the tissue in a sterile urine cup with saline soaked gauze

# Skin Biopsy Principles

- + Provide complete, accurate clinical description and differential diagnosis to the pathologist → if this is not possible refer to avoid taking the wrong type of biopsy
- + Inflammatory conditions can involve the subcutaneous fat and blood vessels and need a punch biopsy
- + If melanoma is suspected biopsy the entire lesion (depth is important for
- + Ulcers should be biopsied from the edge of the lesion
- + Tumors should be sampled from the thickest portion when possible
- + Annular lesions biopsy from the leading edge

# Skin Biopsy Principles

- + Prepare for bleeding in vascular areas like scalp
- + If possible avoid biopsies below the knee, especially in diabetics, as they are prone to infection and long healing times
- + Prepared patients for the type of scarring expected
- + Do not put multiple specimens in one container

# Tangential Shave biopsy



- + Materials required: alcohol prep swab, local anesthetic (xylocaine with epi), drysol, cotton tipped applicator, Vaseline, bandage, stainless steel blade
- + Cleanse the area with alcohol prep swab
- + Inject local anesthetic
- + Remove the entire lesion by applying pressure to the ends of the blade to bend the blade and using a back and forth sawing motion to remove the lesion from the skin, you need at least pin point bleeding to ensure correct depth
- + Apply drysol to the wound for bleeding
- + Place specimen in formalin bottle for pathology



# Punch Shave biopsy



- + Materials required: alcohol prep swab, local anesthetic (xylocaine with epi), gauze, topical surgical prep swab, gloves, punch biopsy tool (2-8mm in size) forceps, scissors, needle holder, formalin, sutures, Vaseline, bandage, stainless steel blade
- + Cleanse the area with alcohol prep swab
- + Inject local anesthetic
- + Surgical prep scrub applied to the skin in concentric rings from the lesion
- + Stretch the skin perpendicular to the relaxed skin tension lines, punch instrument inserted into skin in a rotating fashion down to the subcutaneous fat. Forceps used to grab the specimen at the subcutaneous fat, curved sharp scissors used to cut the specimen at the fat.
- + Suture with interrupted sutures
- + Place specimen in formalin bottle for pathology