Infectious Exanthems

Original Duke's Classification

- First disease: measles (rubeola)
- Second disease: scarlet fever aka scarlatina
- Third disease: rubella (German measles)
- Fourth disease: probably never existed
- Fifth disease: erythema infectiosum (parvovirus B19)
- Sixth disease: roseola

Others

- Nonspecific viral exanthem
- Hand foot mouth disease
- Chickenpox, smallpox, mpox
- Kawasaki disease
- Staph scalded skin syndrome
- Toxic shock syndrome
- Meningococcemia
- Rocky Mountain Spotted Fever
- Lyme disease

Some bonus infectious rashes

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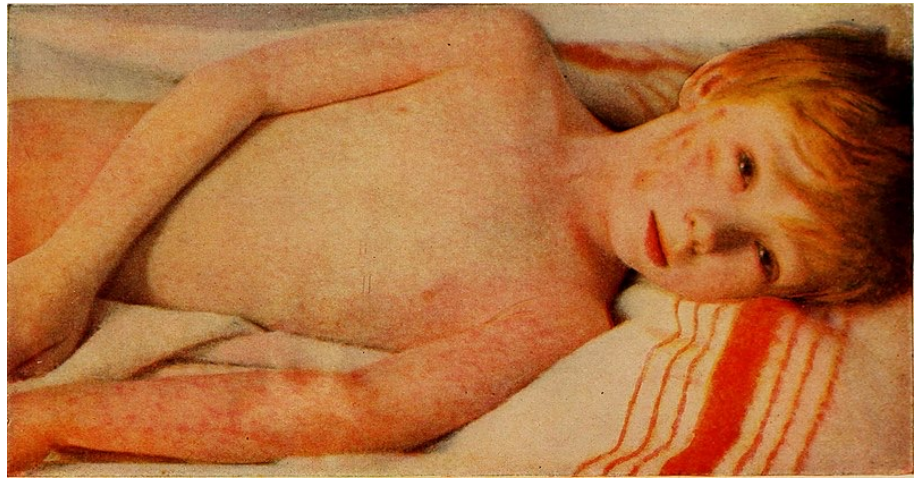
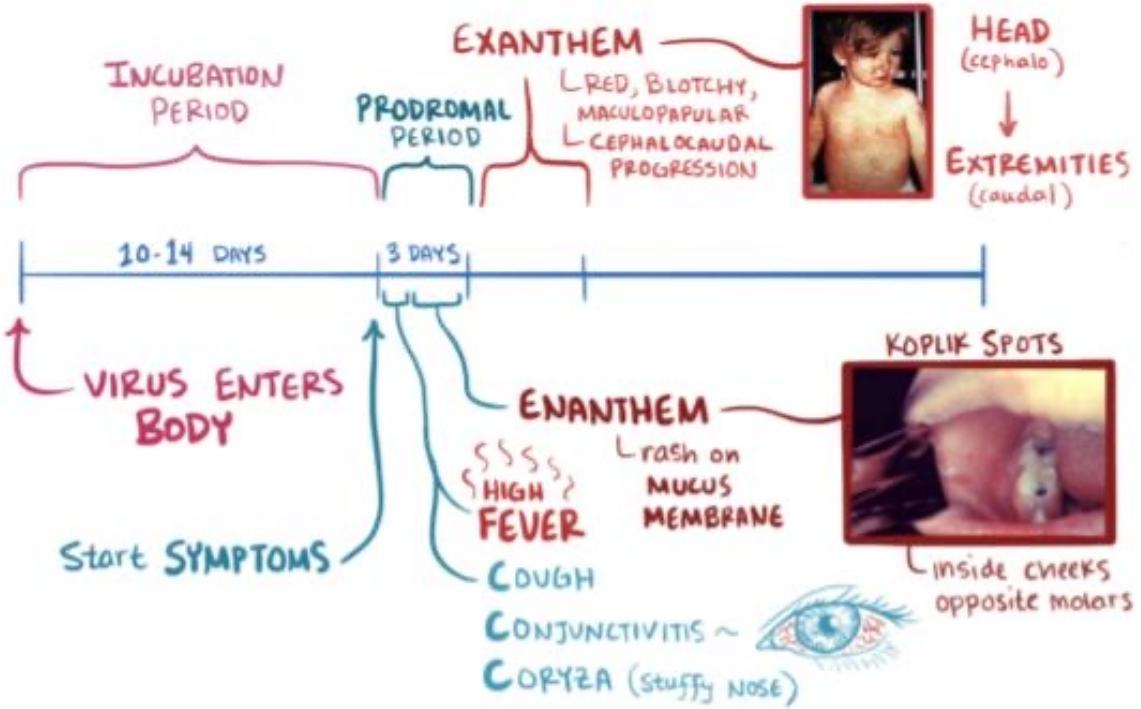
Measles (rubella virus)

- Droplet or airborne transmission
  - 90% close contact attack rate – highly contagious (from 5 days before rash to 4 days after)
  - 1st vaccine @ 12-15mo = 93% effective
  - 2nd vaccine @ 4-5yo = 97% effective
  - Unvaccinated (↑ prevalence) = unprotected
  - Herd immunity of 95%+ needed to stop outbreaks
- Incubation period 8-12 days generally
- Prodrome: fever, cough, coryza (runny nose), conjunctivitis, ill-appearing
  - May have Koplik spots (pathognomonic enanthem):1-3mm white/gray/blue on red base buccal mucosa lesions, opposite molars
- Exanthem: blanching maculopapular rash spreading from head to toe (like a paint can tipped over the head), rare on palms, soles
  - Lasts 6-7 days, fades in the order appeared
- Diagnosis: NP swab PCR, serology
- Treatment: supportive, consult ID



https://commons.wikimedia.org/wiki/File:Medical_diagnosis_for_the_student_and_practitioner_(1922)_(14761731976).jpg



https://commons.wikimedia.org/wiki/File:MeaslesOsmosisPic8.jpg

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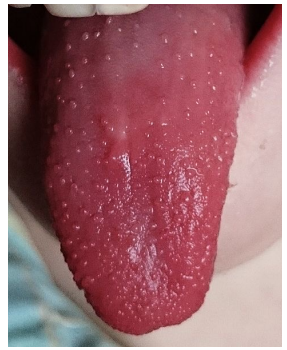
Scarlet fever

- Caused by *Strep pyogenes*
  - Delayed type skin reaction to pyrogenic toxin
  - Usually assoc strep pharyngitis, but can be SSTI
- Fever, sore throat / pharyngitis, exanthem
- Fine 1-2mm papules → sandpaper rash, starts groins & axillae, spreads to torso & extremities, spares palms and soles
- Circumoral pallor, strawberry tongue, Pastia's lines (confluent rash in antecubital fossae)
- Rash often desquamates as resolves, for up to 2 weeks – warn parents
- Confirm diagnosis with rapid strep throat swab and/or throat culture
- Treat with penicillin or amoxicillin (same dosing as for strep throat)
  - Emphasize importance of finishing entire course (to prevent rare rheumatic fever, rheumatic heart disease) complications

sandpaper rash and Pastia's lines

circumoral pallor



strawberry tongue

https://commons.wikimedia.org/wiki/File:Skarlatina.jpg
https://commons.wikimedia.org/wiki/File:Scarlatina_tongue.JPG
https://commons.wikimedia.org/wiki/File:Scarlet_fever_1.1.JPG

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Rubella (aka German measles)

- Droplet transmission
- Incubation period 14-18 days, contagious a few days before to 7 days after rash development
- Like a milder version of measles: low-grade fever, measles-like rash, lymphadenopathy
  - May have cough, coryza, conjunctivitis prodrome
  - Morbilliform (= measles-like) rash starts on face, spreads to body within 24 hours, lasts ~3 days
  - Lymphadenopathy esp occipital, post auricular
  - Polyarthralgia/arthritis may occur, esp adolescent and adult females
  - Many cases asymptomatic, esp in adults
- Diagnosis: serology
- Treatment: supportive
- Congenital rubella – highest risk 1st trimester, unlikely if maternal infection after 18-20 weeks gestation (3rd trim)
  - Deafness (sensorineural), congenital heart defects, cataracts, “blueberry muffin” dermal lesions

https://commons.wikimedia.org/wiki/File:Rash_of_rubella_on_back_(crop).JPG

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Fifth disease (erythema infectiosum)

- Caused by parvovirus B19
- Transmission: respiratory secretions
  - 50% close contact attack rate, 20% school contacts
  - Unlikely infectious once rash appears
- Incubation period 4-14 days
- May have prodrome: low-grade fever, malaise, myalgias, headache, diarrhea, one week before rash
- “Slapped cheek” redness with circumoral pallor
- Lacy macular rash on trunk and extremities
  - Rash may recur with sunlight, heat, stress, exercise
- ~10% have arthralgias, ↑ in adult women
- Parvovirus B19 can rarely cause a transient aplastic crisis
- Diagnosis: clinical, rarely: serology
- Treatment: supportive
- Stay away from pregnant women (can cause hydrops fetalis), immunosuppressed
- Rare variant: papular purpuric gloves and socks syndrome

https://commons.wikimedia.org/wiki/File:B19_virus.png

https://commons.wikimedia.org/wiki/File:Erythema_infectiosum_(%E5%8F%B3%E8%85%95).jpg

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Roseola (aka exanthem subitum)

Nagayama spots

- Caused mainly by human herpes virus 6 (HHV-6)
  - Other viral causes, including HHV-7
- Peak in age 6-12 months, 90% are < 2 years old
- Transmission: shed by asymptomatic contact in upper resp secretions
- Incubation period 9-10 days for HHV-6
- Classic presentation: 3-5 days of high fever in otherwise well-appearing infant; as fever resolves, rash breaks out
  - Blanching maculopapular rash starts on neck / torso, spreads to face & extremities, resolves in 1-2 days
  - 10-15% febrile seizures during fever phase
  - Other findings: bulging fontanelle (25%), swollen eyelids/conjunctivitis (25%), Nagayama spots (red macules or ulcers on soft palate and base of the uvula (65%)
- Diagnosis clinical, treatment supportive / reassurance in rash phase if classic presentation

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Nonspecific viral exanthem

- Numerous causes: rhinovirus, RSV, influenza, adenovirus, parainfluenza, enteroviruses, COVID
- Nonspecific morbilliform (blanching maculopapular measles-like) rash, typically on the whole body, sparing the palms and soles
  - Influenza and enterovirus may cause petechiae
  - Fever + petechiae raises concerns for meningococcemia
- May have associated fever, upper respiratory tract symptoms, gastrointestinal symptoms
- Diagnosis: clinical
- Treatment: supportive– antipyretics, reassurance
- Common scenario: child seen during febrile phase and no rash, prescribed amoxicillin, returns with rash that could be viral exanthem or could be due to amoxicillin

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Chickenpox, Mpox, Smallpox

	Chickenpox (varicella)	Smallpox (variola)	Mpox (monkeypox)
Transmission	Aerosolized droplets, airborne, highly contagious	Respiratory shedding, direct contact	Direct contact with sores or body fluids mainly
Epidemiology	Vaccine-preventable; mild breakthrough cases	Eradicated, bioterrorism concern	Sporadic cases and outbreaks
Incubation period	10-21 days	10-14 days	5-13 days generally (up to 21 days)
Fever/prodrome	1-2 days, fever, malaise, sore throat	2-4 days, high fever, headache, backache, vomiting (50%)	1-5 days, fever, headache, back pain, sore throat, malaise
Rash	Successive crops of macule → papule → vesicle → crust, itchy, first on torso, then spreads to face & extremities; “dew drop on rose petal” appearance; lesions in different stages	Enanthem first, then rash on face & extremities spreading in towards torso; small macules (“herald spots”) → papules → vesicles → crusts; lesions all in same stage	Macule → papule → vesicle → pseudopustules (filled with cell debris, not pus) → crust, painful, often umbilicated, outbreaks mainly genital and perioral, 1-20 (<100) lesions
Photos	https://www.immunize.org/clinical/image-library/varicella/	https://www.immunize.org/clinical/image-library/smallpox/	https://www.cdc.gov/poxvirus/mpox/clinicians/clinical-recognition.html

Continued on Next Slide

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Chickenpox, Mpox, Smallpox

- Diagnosis and treatment
  - Chickenpox: diagnosis - clinical, PCR lesion fluid, serology
    - Supportive care, avoid salicylates (risk of Reye syndrome), ibuprofen controversial (risk of secondary SSTI), consult ID re: anti-virals if mod-severe disease or high risk
    - Anti-itch (colloidal oatmeal, calamine), cut nails short, acetaminophen, maintain hydration
    - Breakthrough varicella in vaccinated: few lesions, no or low-grade fever, supportive care
  - Smallpox: CDC algorithm for diagnosis; consult ID and report to public health
  - Mpox: PCR on lesion samples; analgesics, sitz baths, consult ID re: antivirals
- Vaccine-preventable
  - Varicella vaccine given at 12-15 months, 4-5 years
    - 1 dose 82% effective, 2 doses 92% effective against all varicella
    - 1-2 doses 100% effective against severe varicella
  - Smallpox vaccine given to lab researchers, military
  - Mpox vaccine for high risk individuals

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Staph Scalded Skin Syndrome (SSSS)

- Caused by exotoxins released by *Staph Aureus*
  - Exotoxin-producing strain of S. Aureus first causes a skin infection or other infection (wound, pneumonia, pyomyositis, septic arthritis, etc.)
- Mostly young children < 6yo, immunocompromised adults
- Prodrome: fever, irritability, malaise, painful skin
- Macular erythema, esp in skin folds (neck, axillae, groin) → flaccid bullae → erosions & desquamation
- Thick periorbital, perinasal & perioral crusts and fissuring (SSSS “sad facies”)
- Positive Nikolsky sign (gentle pressure causes skin to slough)
- No mucous membrane involvement
- Diagnosis: lesion culture; obtain CBC, blood culture
- Admit to hospital, consult ID, start anti-staphylococcal parenteral antibiotic ASAP, maintain hydration with IV fluids, pain control, wound care similar to burn care

https://phil.cdc.gov/Details.aspx?pid=4647

Additional images:
https://dermnetnz.org/images/staphylococcal-scalded-skin-syndrome-images

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Toxic Shock

- Caused by toxin-producing MSSA (less commonly MRSA) or Group A Strep
  - Menstrual cases of staph (tampons) and non-menstrual (wound, post-surgical, other invasive staph infections)
  - Toxin-producing strain of GAS causes an invasive infection, often starting with minor trauma
- Rapid onset of symptoms
- Staph: fever, hypotension, sunburn-like erythroderma, mucosal hyperemia, AMS, abd pain, vomiting, diarrhea
- Strep: fever or hypothermia, flu-like symptoms, pain at site of minor trauma, hypotension, AMS, 10% diffuse erythema
- Both may progress to multi-organ failure
- Blood cultures + in 5% staph, 60% strep cases
  - Wound or mucosal sites with staph 80-90% + cultures
- Stat transfer to higher level of care, Admit to ICU, obtain vascular access, stabilize shock (fluids, pressors), early parenteral antibiotics, remove any infected foreign body

https://facty.com/ailments/body/10-symptoms-of-toxic-shock-syndrome/2/

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Meningococcemia

- *Neisseria meningitidis* infection with or without meningitis
- Sudden onset flu-like symptoms: fever, nausea, vomiting, headache, myalgias, malaise, +/- AMS, stiff neck
- Clues: severe leg pain, cold hands & feet, mottling, prolonged capillary refill
- Petechiae (esp in areas of pressure e.g. beltlines) may → purpura, ecchymoses, necrosis
- Sepsis, shock, DIC
- Stat transfer to higher level of care, Admit to ICU, obtain vascular access, parenteral antibiotics ASAP (do *not* delay for LP) – ceftriaxone 50 mg/kg (2gm) IV or IM, supportive care for shock (fluids, pressors)
- Early prophylaxis (ideally within 24 hours) with rifamipin, ciprofloxacin, or ceftriaxone indicated for close contacts (including HCW) of a case – consult ID
- Fever + petechiae in well-appearing child: some guidelines
  - RCH Melbourne NHSGGC DFTB study & guideline

https://commons.wikimedia.org/wiki/File:Petechiaesmall.jpg

https://phil.cdc.gov/Details.aspx?pid=1334

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Rocky Mountain Spotted Fever

How to remove a tick

Wikimedia Commons

- Tick-borne *Rickettsia rickettsii* infection
  - Transmission after tick attached 6-10 hours
  - 1/3 patients do not report a tick bite
  - Symptoms usually start 5-7 days after bite
- Throughout N. America (not just Rocky Mountain area) and parts of S. America
- ↑ with dogs, outdoor activities, wooded areas, high grass
  - Most cases Spring and early Summer
- Fever, headache, malaise, myalgias, arthralgias, nausea, vomiting, abdominal pain, +/- pedal edema
- Rash in ~90% on day #3-5 macules → petechiae, ankles/wrists → trunk; affects palms & soles
- Dx: serology
- Tx: doxycycline (start empirically based on clinical suspicion), consult ID
- Prevention

https://commons.wikimedia.org/wiki/File:Rocky_mountain_spotted_fever.jpg

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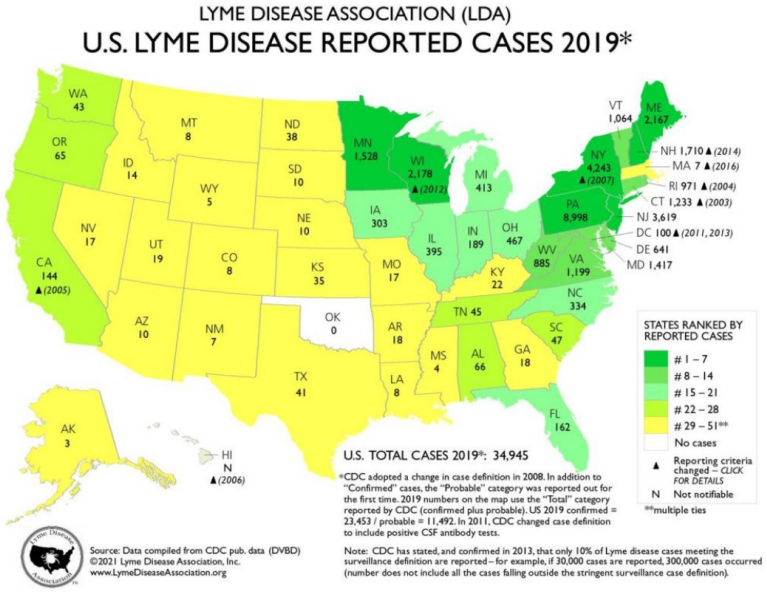
Lyme Disease

- Tick-borne infection with *Borrelia burgdorferi*
- Early localized disease within 2-3 weeks of infection
  - Erythema migrans classic macular bullseye rash at site of tick bite within 7-14 days of bite usually (range 3-30 days)
    - Expands over days to weeks to 5-70cm diameter
    - Present in ~90%
  - May have fever, myalgias, arthralgias, headache, fatigue, neck pain
- Early disseminated disease weeks to months after bite: multiple erythema migrans lesions, carditis (heart block), cranial nerve palsy (esp VII), meningitis, fever, fatigue, headache, arthralgias
- Late disease: weeks to months → arthritis
- Diagnosis: consult ID re: serologic testing
- Treatment: doxycycline, consider amoxicillin if < 8yo
- Prevention



https://commons.wikimedia.org/wiki/File:Bullseye_rash_linked_to_Lyme_disease_rotated.jpg

Tick Removal

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Bonus Infectious Rashes

- Erythema multiforme
- Gianotti-Crosti
- Papular purpuric gloves and socks syndrome
- Laterothoracic exanthem
- Pityriasis rosea
- Tinea versicolor
- Molluscum contagiosum

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Erythema Multiforme

- Immune-mediated skin reaction to (90%) infections, drugs (esp penicillins)
  - Common infections: HSV, mycoplasma
  - 3-14 days prior
- Target lesions (not always present) with dusky center
  - Extensor extremities first, spread to rest of body
  - Usually asymptomatic, but itch / burn
  - Lesions appear over 3-5 days, resolve over 2-3 weeks
  - EM minor: no mucosal involvement
  - EM major: mucosal involvement → ddx Stevens Johnson, admit if extensive mucosal lesions
- Diagnosis: clinical
- Treatment: remove offending agent, supportive

https://commons.wikimedia.org/wiki/File:Erythema_multiforme_EM_02.jpg

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Gianotti Crosti

- AKA papular acrodermatitis
- Usually associated viral infection: esp EBV, HBV; occasionally with vaccines
- Most common in children < 5 years old
- Symmetric flat-topped, flesh to pink to brown colored papules or papulovesicles
  - Face, extensor forearms and legs (esp elbows and knees), buttocks
  - May coalesce into plaques
  - No mucosal lesions (but underlying viral illness may have)
- May have URI or GI illness prodrome
- Can persist for up to 6 months

Additional Images from DermNetNZ.org

Additional Images from Skin Deep

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Papular purpuric gloves and socks syndrome

- Usually caused by parvovirus B19 but also can be caused by other viruses and drugs
- More often in young adults than children
- +/- prodrome: fever, malaise, myalgias, arthralgias
- Painful swelling and petechial progressing to purpuric rash on hands and feet
  - Involves palms and soles
  - May be sharply demarcated at wrists and ankles creating “gloves and socks” effect
- Diagnosis: clinical
  - Obtain CBC to r/o thrombocytopenia
- Treatment: supportive
  - Self-resolves in 1-3 weeks, sometimes with peeling

https://dermnetnz.org/topics/papular-purpuric-gloves-and-socks-syndrome

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(Unilateral) Laterothoracic Exanthem

- AKA asymmetric periflexural exanthem of childhood
- Mostly children 1-5 years old
- Etiology unclear but associated with URIs = suggests viral cause
- Usually prodrome low-grade fever, URI or GI symptoms
- Rash starts on one side of thorax, extends to axilla, may generalize to bilateral
  - Less commonly starts in inguinal crease
  - Small lesions with pale halo → eczematous papules
  - Often itchy
- Diagnosis: clinicial
- Treatment: supportive
- Self-limited, resolves in 2-5 weeks

Source: dermatologyadvisor

More Images from DermNet

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Pityriasis rosea

https://commons.wikimedia.org/wiki/File:Pityriasis_rosea-4.jpg

https://commons.wikimedia.org/wiki/File:Pitiriase,_Manchas_Vermelhas.jpg

https://commons.wikimedia.org/wiki/File:Pityriasis_ros%C3%A9_de_Gibert_-_peau_noire_-_d%C3%A9tails.jpg

- Unknown etiology, but viral etiology thought likely
- Mostly older children and young adults
- 50-90% have herald patch first
  - 2-5cm round/oval lesion, may be mistaken for ringworm
- Days to 1-2 weeks later, smaller crops of similar lesions on torso and proximal extremities
  - Long axis oriented along lines of cleavage = “Christmas tree” distribution
  - Fine collarette of scale
  - Resolve over 4-6 weeks (sometimes takes months)
  - Post-inflammatory hyperpigmentation common
- Children may have inverse distribution: face, distal extremities
- Diagnosis: clinical
- Treatment: supportive, may need anti-itch therapy

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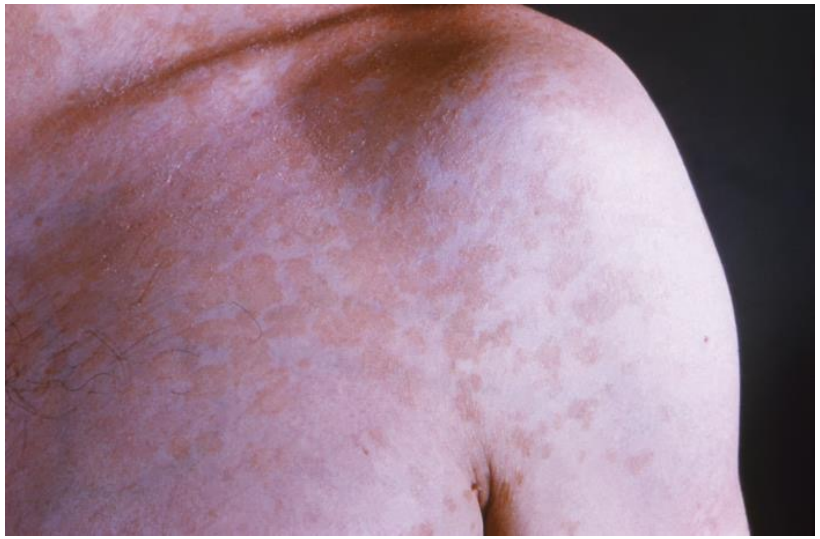
Tinea versicolor

- Superficial fungal infection caused by *Malassezia* species
- More common in adolescents and young adults
- Increased with hot, humid weather
- Small oval-round macules and flat papules
  - May be hyper or hypopigmented, or erythematous
  - May coalesce into patches and plaques
- Diagnosis: clinical, KOH prep if uncertain
  - ~50% fluoresce with Wood's lamp
- Treatment: topical ketoconazole, terbinafine, or selenium sulfide



https://phil.cdc.gov/Details.aspx?pid=22847

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Molluscum contagiosum

- Caused by molluscum poxvirus
- Common in children, seen in all ages
- Spread skin to skin contact, fomites
- Incubation period 2-6 weeks
- Firm dome-shaped papules with central umbilication, 2-5mm diameter
  - Axillae, antecubital and popliteal fossae, trunk, groin
  - Can occur anywhere but palms & soles
  - Sometimes pruritic
- Diagnosis: clinical
- Treatment: supportive, reassurance
  - Resolves spontaneously in 2-12 months
  - If numerous / bothersome to patient / parent, consider referral to dermatologist (possible treatments: cryotherapy, curettage, topical agents)

https://commons.wikimedia.org/wiki/File:Molluscum_bumps.jpg