



# Cutaneous infections that manifest in maculopapular rashes (1)

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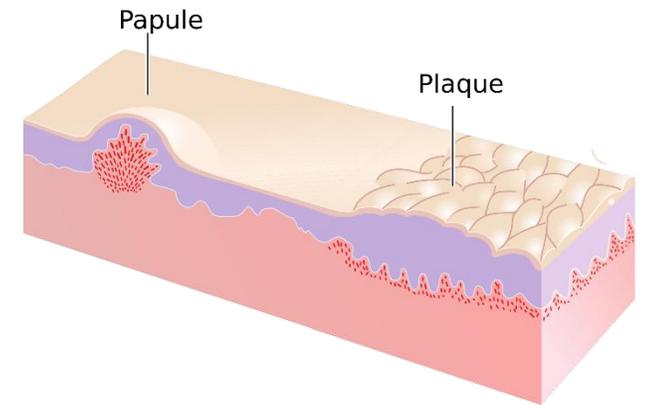
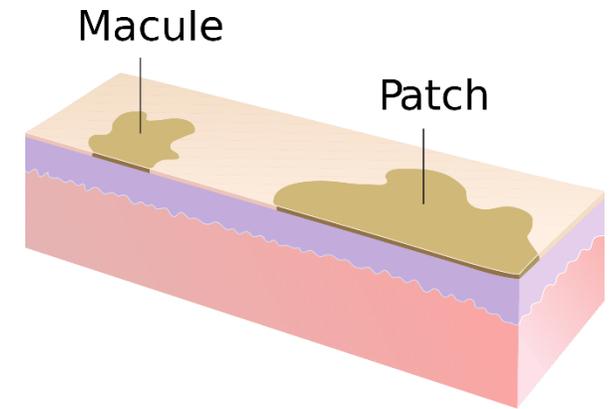
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# Macules, Papules, and Maculopapular Rashes

- **Macules** are flat lesions under 1 cm, notable for color changes. Macule colors can vary brown, blue, red, or hypopigmented.
- **Papules** are solid, raised lesions with clear borders, under 1 cm. Papules are distinct from macules by their elevation above the skin.
- **Maculopapular rashes**: Red or erythematous lesions, featuring both flat and slightly raised areas.





## Maculopapular rashes

Category	Diseases
Childhood Exanthems	<b>Enteroviral rashes</b>
	<b>Erythema infectiosum (Fifth disease/Slapped-cheek syndrome)</b>
	<b>Roseola infantum (Exanthem subitum)</b>
	<b>Scarlet fever</b>
	<b>Rubeola (Measles)</b>
	<b>Rubella</b>
Other Conditions	<b>Infectious mononucleosis</b>
	<b>Secondary syphilis</b>
	<b>Rocky Mountain spotted fever</b>
	<b>Toxic shock syndrome</b>



# Childhood exanthems

- Examples include like erythema infectiosum, scarlet fever, exanthem subitum, rubeola, rubella, and enteroviral rashes.
- Childhood exanthems are grouped together due to **similar clinical presentation** and **common occurrence in pediatric populations**.





# Childhood exanthems

- **Childhood exanthems:** rashes often accompanied by fever, malaise, and headache.
- These exanthems can be related to the effect of microbial toxins, direct microbial effect on the skin, or an immune/inflammatory reaction in response to an infection.
- Viruses are the primary etiologic agents of exanthems, **except for scarlet fever (bacterial)**.
- Childhood exanthems are usually similar, which makes accurate diagnosis difficult. However, some distinct features for each disease can aid to reach the correct diagnosis.



# Common Viral Childhood Exanthems

<b>Virus</b>	<b>Disease</b>
<b>Coxsackie viruses</b>	Enteroviral rash
<b>Echoviruses</b>	Enteroviral rash
<b>Erythrovirus B19</b>	Erythema infectiosum (Slapped-cheek syndrome/Fifth disease)
<b>Human herpesvirus 6B (HHV-6B) and HHV-7</b>	Roseola or Exanthem subitum
<b>Varicella-zoster virus</b>	Chickenpox and Zoster (Shingles)
<b>Measles virus</b>	Rubeola (Hard measles)
<b>Rubella virus</b>	Rubella (German measles)



# Erythema Infectiosum: Stages of Skin Lesions

- Before the rash, a prodromal phase with headache, coryza, low-grade fever, pharyngitis, and malaise.
- Stage 1: **Slapped-cheek rash**: Bright red erythema suddenly appearing on the cheeks, sparing the nose, mouth, and eyes area. This rash resembles a sunburn and fades within 2-4 days.
- Stage 2: 1–4 days post-slapped-cheek rash, an **erythematous macular-to-morbiliform rash** appears, primarily on extremities and sometimes affecting palms and soles.
- Stage 3: The rash evolves into a **lacy, net-like pattern**, especially on proximal extremities, distinctive to erythema infectiosum. This stage can last 3 days to 3 weeks.



# Erythema Infectiosum: Stages of Skin Lesions



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Credit: Children's Minnesota is registered as a 501(c)(3) non-profit  
organization.

<https://www.childrensmn.org/educationmaterials/parents/article/8311/fifth-disease/>



# Roseola Infantum

- Prodrome: a high fever (40°C), followed by a sudden decrease in temperature. Early signs also include lethargy and irritability. Patients may also experience seizures and cough.
- Rash: Appears after the fever subsides, presenting as a macular or maculopapular erythematous rash.
- The rash begins on the trunk and moves to the extremities. The lesions do not merge. The rash disappears within 2 days.



# Roseola Infantum



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# Scarlet Fever

- The prodrome starts with pharyngitis, fever, and headache.
- 1-2 days after the prodrome, the rash starts on the neck, spreading to the trunk and extremities. The rash is erythematous, **sandpaper-like**.
- Distinctive features include the intensification of rash in skin folds, forming **Pastia lines** (also called the **Thompson sign**).
- Initially, the tongue appears has a white coating and swollen red papillae (**white strawberry tongue**).
- The rash is followed by a desquamation phase, where the rash fades 3-4 days after onset, followed by peeling, starting from the face. Tongue peeling occurs 2 days post-rash, resulting in a red, swollen tongue with prominent papillae (**strawberry tongue**).



# Scarlet Fever



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# Rubeola (Measles)

- The prodromal phase is characterized by **C**oryza, **C**onjunctivitis, non-productive **C**ough (the "three Cs"), and fever. This is followed by the **pathognomonic Koplik spots** that are blue-gray macules on an erythematous base on the buccal mucosa.
- The measles rash starts at the hairline, spreading to the trunk and extremities. The rash is most concentrated above the shoulders, often merging (morbilliform rash).
- The rash lasts 4-6 days, fading from the head down, with full recovery within 7-10 days.
- The disease is highly contagious from four days before to four days after the rash appears.



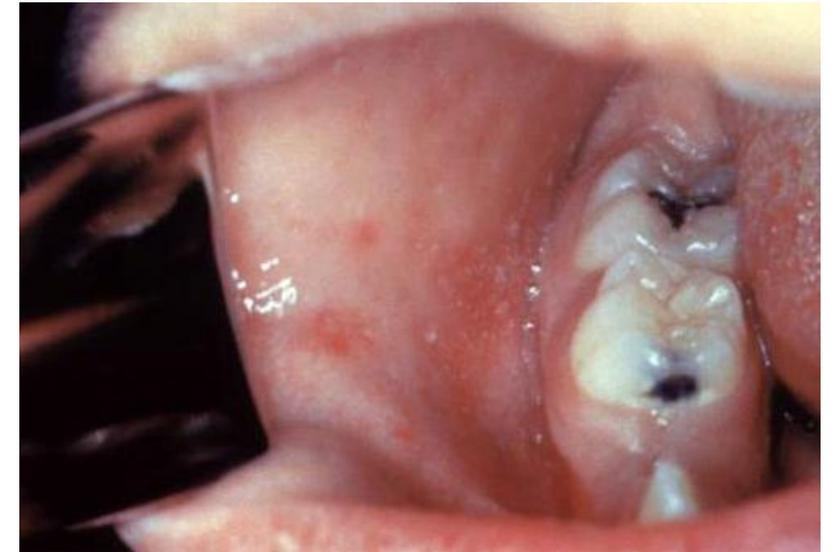
# Rubeola (Measles)



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# Rubella (German Measles)

- The prodromal symptoms include fever, malaise, headache, coryza, and mild conjunctivitis without cough.
- The rash is maculopapular that emerges 1–5 days post-prodrome, starting from the forehead and face, then spreading to the trunk and extremities. The rash may merge into a scarlatiniform (sandpaper-like) appearance and fades within 3 days, starting from the forehead and face and moving downward.
- Additional signs include **Forchheimer spots** (petechial lesions on the soft palate) in addition to **postauricular and suboccipital lymphadenopathy**.
- The disease is contagious from 1 week before the symptoms start and for 5 days after the rash first appears.



# Rubella (German Measles)



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<https://doi.org/10.2169%2Finternalmedicine.4368-19>



# Enteroviral rashes

- Typical symptoms: Fever, general discomfort (malaise), and headache.
- The rash may appear with the fever or after the fever has declined.
- The rash appearance is variable depending on the specific enterovirus involved.
- Echoviruses can cause rashes like rubella, measles, or roseola.
- Echovirus 16 specifically leads to a roseola-type rash, referred to as **Boston exanthem**.
- Coxsackie A viruses result in pustular stomatitis and extensive **vesicular** lesions.



# Epidemiology of childhood exanthems

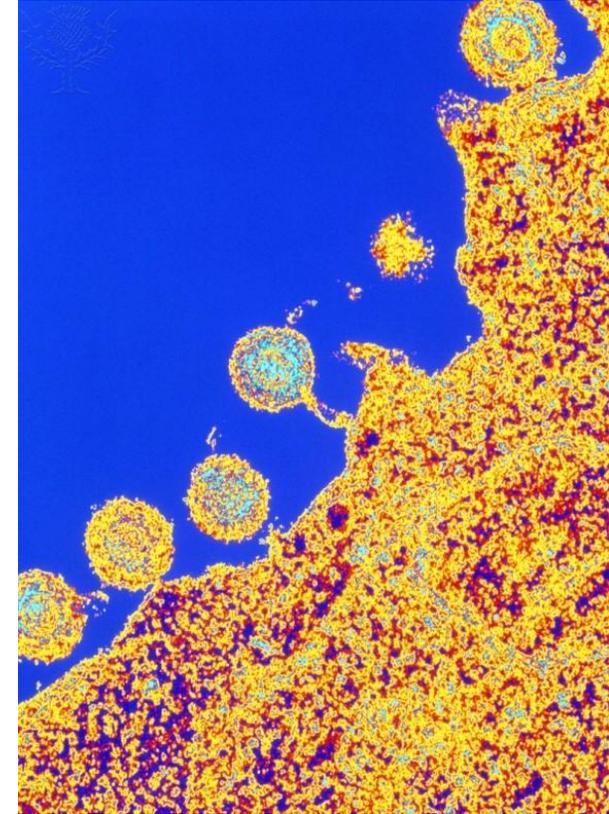
- Exanthems are prevalent worldwide, mostly in children.
- **Transmission routes:**
- Primarily spread through aerosolized respiratory droplets.
- Virus particles can become airborne from skin contact, leading to infection.



# Roseola infantum: Epidemiology and transmission



- The peak seasons are spring and fall.
- Common in children aged 6 months to 3 years.
- By age 4 years, almost all children are seropositive.
- The roseola viruses are spread through saliva, often from latently infected adults to children.



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# Scarlet fever: Epidemiology and transmission

- Mainly affects children.
- Develops 12–24 hours following a pharyngeal infection with a toxin-producing Group A *Streptococcus*. The carriers can be the source of infection with toxin-producing Group A *Streptococcus* present in the oropharynx of 15–20% of healthy children and adults.
- The disease spreads via airborne respiratory droplets from both symptomatic patients and asymptomatic carriers.



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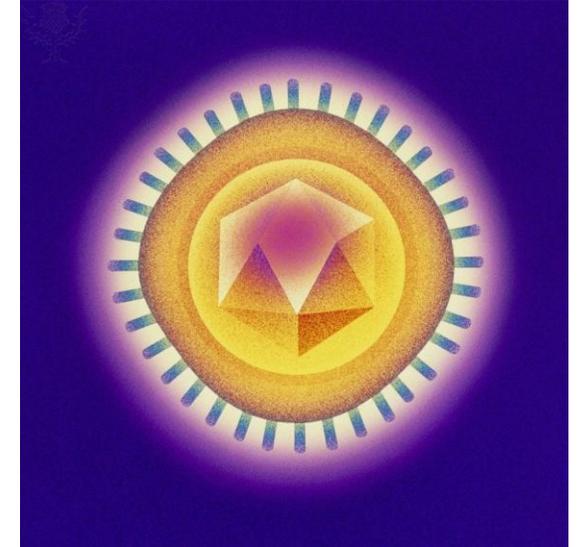


# Measles and German Measles (Rubella): Epidemiology and transmission

- Measles spread through direct contact, contaminated objects, or inhalation of droplets. **It is highly contagious**, with a 90-95% transmission rate among close contacts. Universal vaccination significantly reduced cases.
- Rubella spread through respiratory droplets, primarily among unvaccinated children. Universal vaccination has led to a decrease in cases.



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# Enteroviral rashes: Transmission and prevalence

- Enteroviruses spread from person to person through contact with saliva or feces of infected individuals.
- Enteroviral rashes are seen most in infants during the **summer**.
- About 10–15 million cases are reported yearly in the US.
- Enterovirus infections are very common and endemic worldwide.



# Pathogenesis: Erythema infectiosum

- The disease is caused by an **immune reaction** to viral infection.
- Erythrovirus B19 infection leads to the production of specific IgM antibodies, leading to immune complex formation.
- The symptoms arise from immune complex deposition in the skin and joints.



## Pathogenesis: *Roseola infantum*

- The disease is caused by HHV-6 and HHV-7 (roseola viruses) replication in WBCs and salivary glands resulting in virus presence in saliva.
- Possible early invasion of the CNS occurs, which may result in seizures (besides the high fever) and other neurological complications (aseptic meningitis).
- After initial infection, roseola viruses become latent in lymphocytes and monocytes.



# Pathogenesis: Scarlet fever

- Following pharyngeal infections, or less commonly infections in the skin, surgical wounds, or uterus caused by *Streptococcus pyogenes*, scarlet fever can occur.
- The rash is a result of **erythrogenic toxins (pyrogenic exotoxins)** (SPE A, B, C, and F) produced by *Streptococcus pyogenes*.



# Pathogenesis: Measles

- Measles virus gains access to the body through the upper respiratory tract or conjunctivae, replicating initially in the oral mucosa and regional lymph nodes.
- The virus spreads to all lymph nodes and major organs.
- The emergence of circulating antibodies stops viremia, leading to symptom resolution.
- The rash is not immune-complex mediated but rather result from immune reaction to the virus manifesting in the skin.



# Pathogenesis: Rubella

- Rubella virus initially replicates in the upper respiratory tract and in the cervical lymph nodes and is carried in the bloodstream to the skin, other lymph nodes, spleen, liver, joints, and CNS.
- Viremia can be detected several days before the rash appears.
- Neutralizing antibodies are detectable in the bloodstream, and the exanthem results the immune reaction in the skin.



# Pathogenesis: Enteroviral rashes

- Enteroviral rashes occur following ingestion of the virus.
- The virus attaches to epithelial cells in the gut and invades and replicates in the Peyer patches.
- Viremia occurs seeding many organ systems, including the CNS, heart, lungs, heart, and **skin**.



# Diagnosis of childhood exanthems



- **Usually clinical diagnosis.**
- The distribution and the type of rash can be valuable in achieving an accurate diagnosis.
- Serologic tests can also be helpful to confirm the diagnosis
- Scarlet fever can be detected by culturing for *S. pyogenes* or with a rapid strep antigen test.
- *S. pyogenes* produces beta hemolysis on sheep blood agar plates and is sensitive to bacitracin.



# Treatment and prevention of childhood exanthems

- **Supportive care is used in the treatment.**
- Mumps-measles-rubella (MMR) vaccine is effective in preventing measles and rubella. Testing pregnant women for the presence antibodies to rubella is important to determine if the fetus is at risk of infection following exposure to a person with rubella.
- Patients with **scarlet fever** are usually treated with **antibiotics**. Treatment within 10 days of the appearance of symptoms can significantly reduce the chances of the patient developing rheumatic fever.



**Thanks for listening!**