Measles
Clinical manifestations

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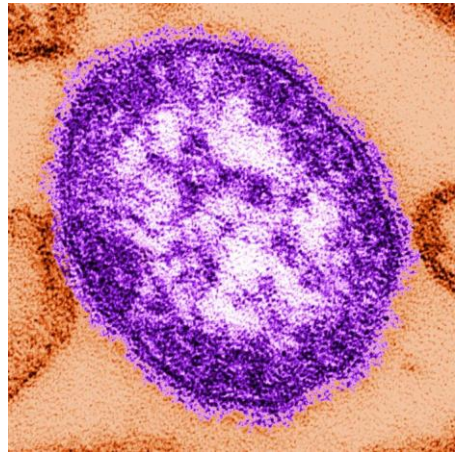
- **Measles** is a highly contagious viral illness that occurs worldwide.



- The infection is characterized by **fever, malaise, cough, coryza, and conjunctivitis, followed by exanthem.**

- **Following exposure, approximately 90 percent of susceptible individuals will develop measles.**

- The period of contagiousness is estimated to be from **five days before the appearance of the rash to four days afterward**.

- The illness may be transmitted in public spaces, even in the absence of person-to-person contact.

Measles virus infection can cause a variety of clinical syndromes including:

✓**Classic measles** infection in immunocompetent individuals

✓ **Moifdied measles** infection in patients with pre-existing but incompletely protective anti-measles antibody

✓**Atypical measles** infection in patients immunized with the killed virus vaccine

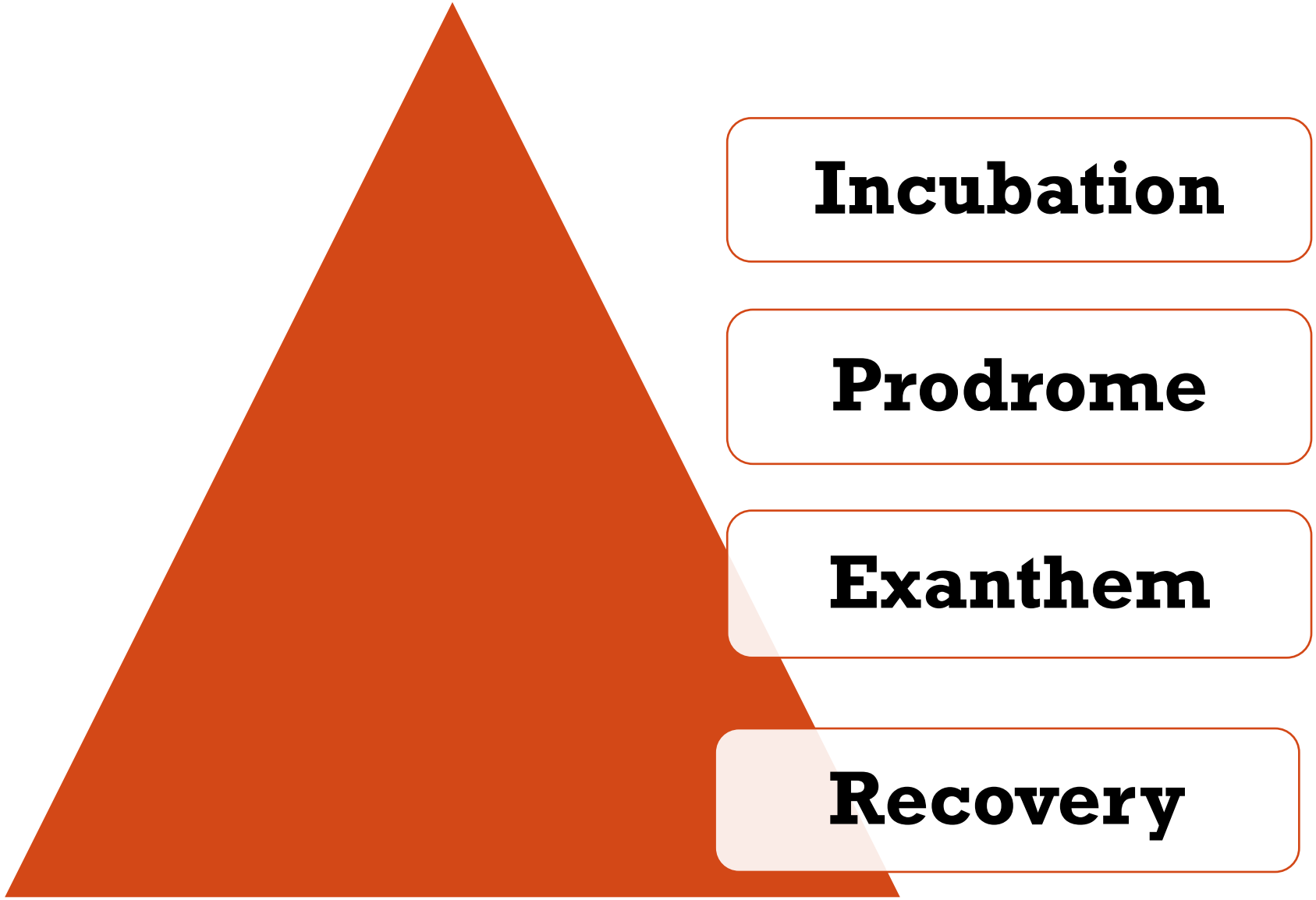
✓**Neurologic syndromes** following measles infection, including acute disseminated encephalomyelitis and subacute sclerosing panencephalitis

✓**Severe measles** infection especially in immunocompromised individuals

✓**Complications** of measles including **secondary infection**, **giant cell pneumonia**, and **measles inclusion body encephalitis**

Clinical manifestations of classic measles

STAGES OF INFECTION



INCUBATION PERIOD

✓**6 to 21** days (median 13 days)

✓ it begins after virus entry via the respiratory mucosa or conjunctivae

✓The virus replicates locally, spreads to regional **lymphatic tissues**, and is then thought to disseminate to other reticuloendothelial sites via the bloodstream, which is considered the first viremia

✓The period of contagiousness is estimated to be from **five** days before the appearance of rash to **four** days afterward

- Infected individuals are characteristically **asymptomatic** during the **incubation period**, although some have been reported to experience transient respiratory symptoms, fever, or rash.

- **The dissemination of measles** virus due to viremia, with associated infection of endothelial, epithelial, monocyte, and macrophage cells, may explain the variety of clinical manifestations and complications that can occur with measles virus infection.

- A **second viremia** occurs several days after the first, coinciding with the appearance of symptoms signaling the **beginning of the prodromal phase**.

PRODROME

- The **prodrome** usually lasts for **two to four days** but may persist for **as long as eight days**

- it is defined by the appearance of **symptoms** that typically include **fever, malaise**, and **anorexia**, followed by **conjunctivitis, coryza, and cough.**

- **The severity of conjunctivitis** is variable and may also be accompanied by **lacrimation** or **photophobia**

- The **respiratory symptoms** result from mucosal inflammation from viral infection of epithelial cells.
- **Fever** is typically present.
- Various fever patterns have been described, and **fever as high as 40ºC** can occur.

ENANTHEM

- The prodromal symptoms typically **intensify a few days**

Before the exanthem appears .

- Approximately **48 hours prior to onset of the exanthem**,

patients may develop **an enanthem characterized by Koplik spots.**

- **Koplik spots** :these are **1 to 3 mm whitish, grayish**, or **bluish** elevations **with an erythematous base**, **typically seen** on the **buccal mucosa opposite the molar teeth**, though they **can spread to cover the buccal and labial mucosa as well as the hard and soft palate.**

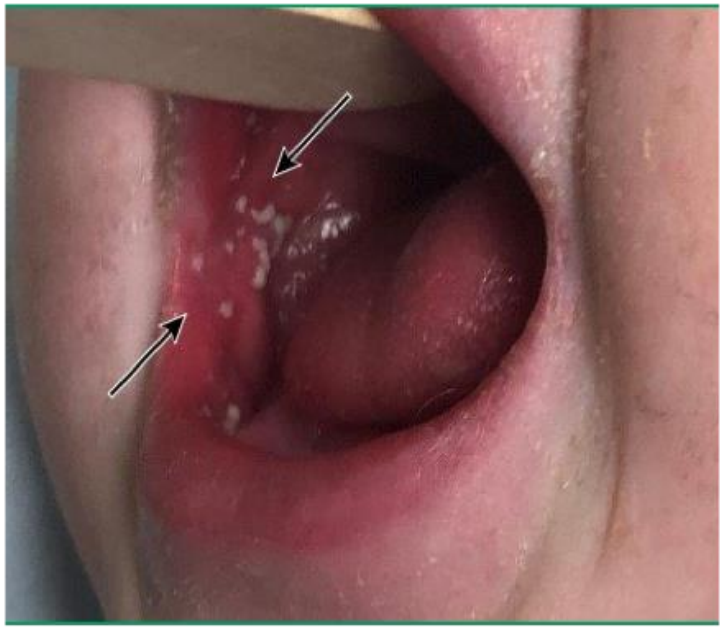
They have been described as "**grains of salt on a red background**".

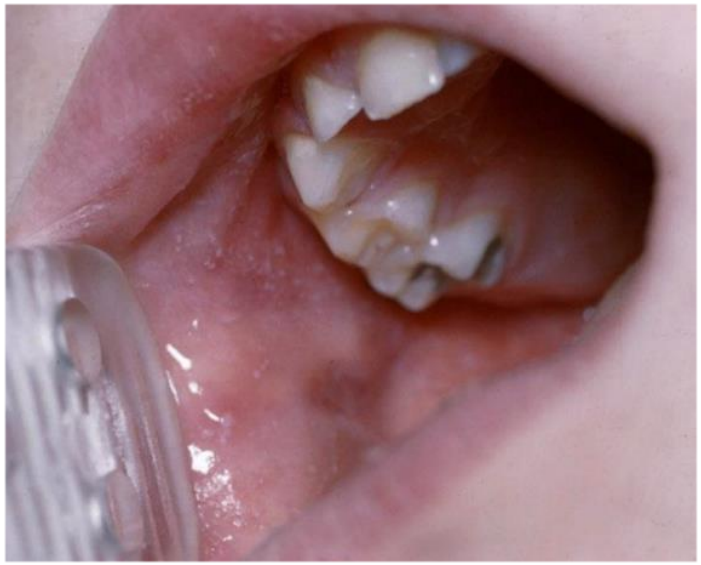
Koplik spots may coalesce and generally **last 12 to 72 hours** .

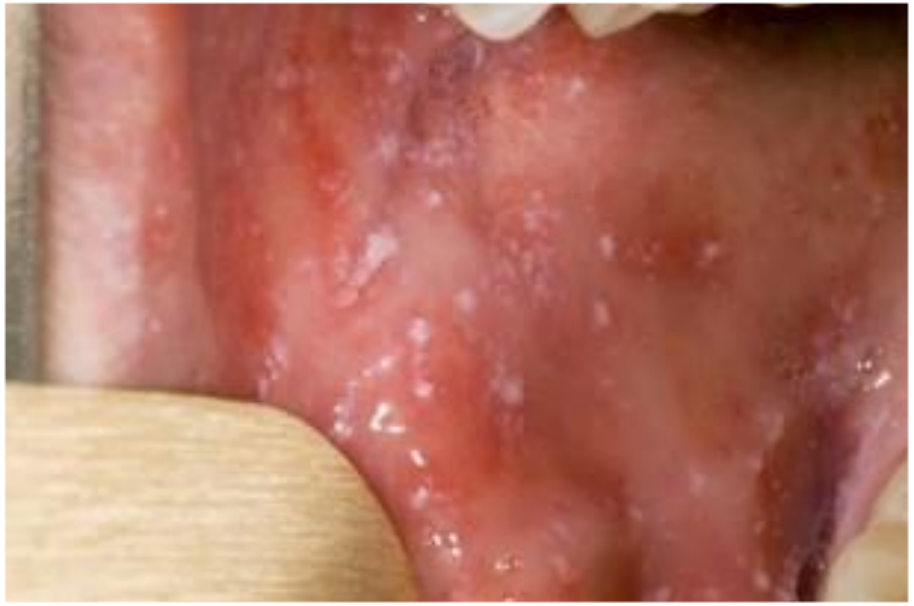
Koplik spots often begin to slough when the exanthem appears.

It is important to **search carefully for Koplik spots** in patients with suspected measles, since they can improve the accuracy of clinical diagnosis .

However, this **enanthem does not appear in all patients** with measles.

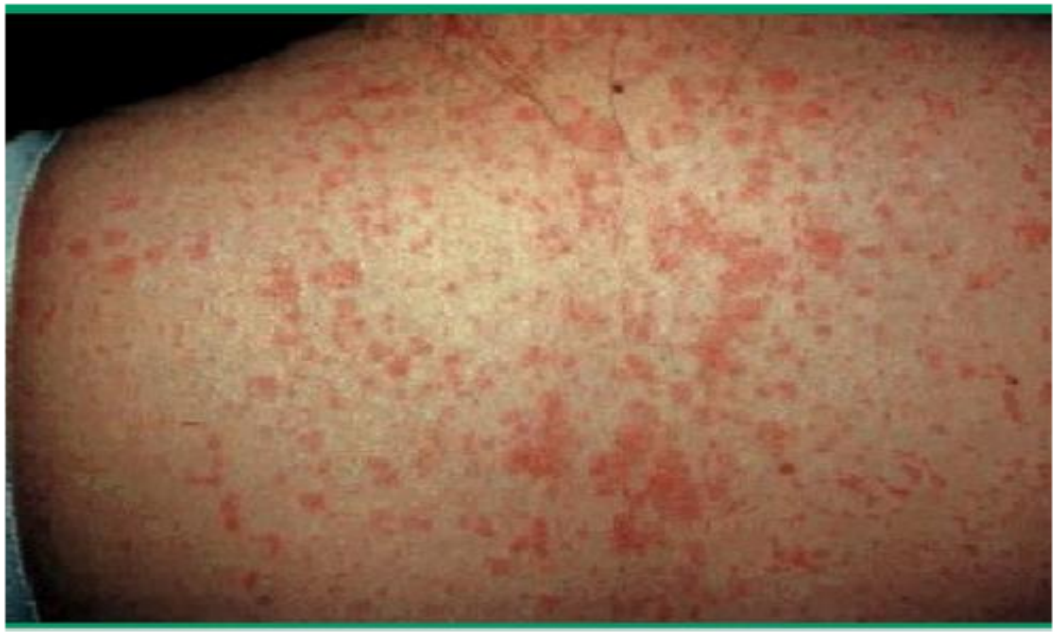




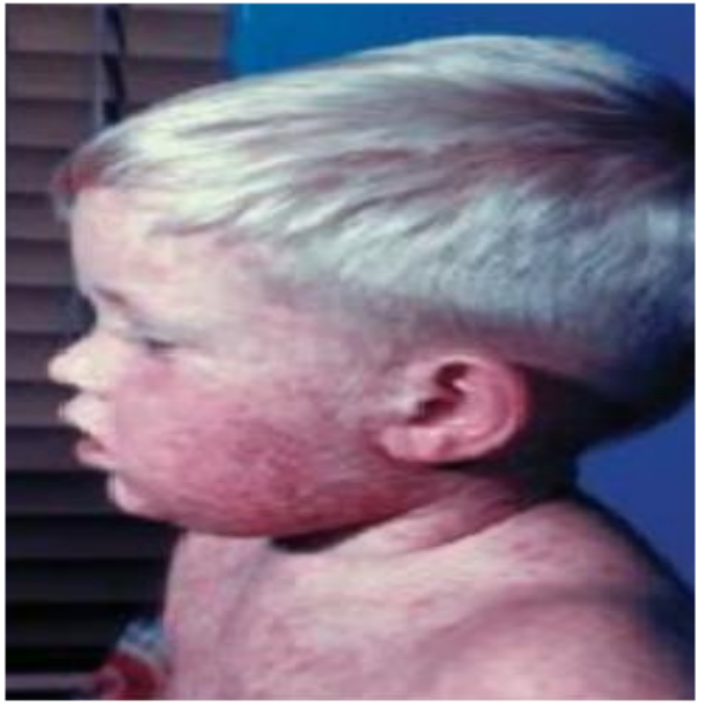


EXANTHEM

- The **exanthem** of measles arises approximately **two to four days after onset of fever**; it consists of an **erythematous, maculopapular, blanching rash**, which **classically begins on the face** and **spreads cephalocaudally** and **centrifugally to involve the neck**, **upper trunk, lower trunk, and extremities**.
- Early on, the lesions are blanching; in the later stages, they are not



Blanching erythematous macules with some conuent areas on the trunk in a patient with measles

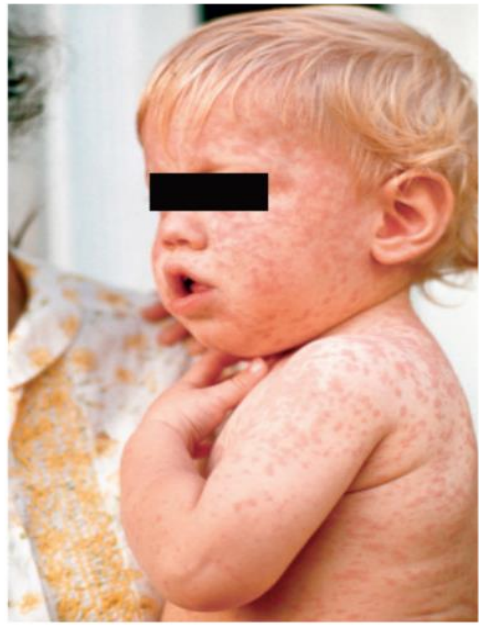


Boy with measles

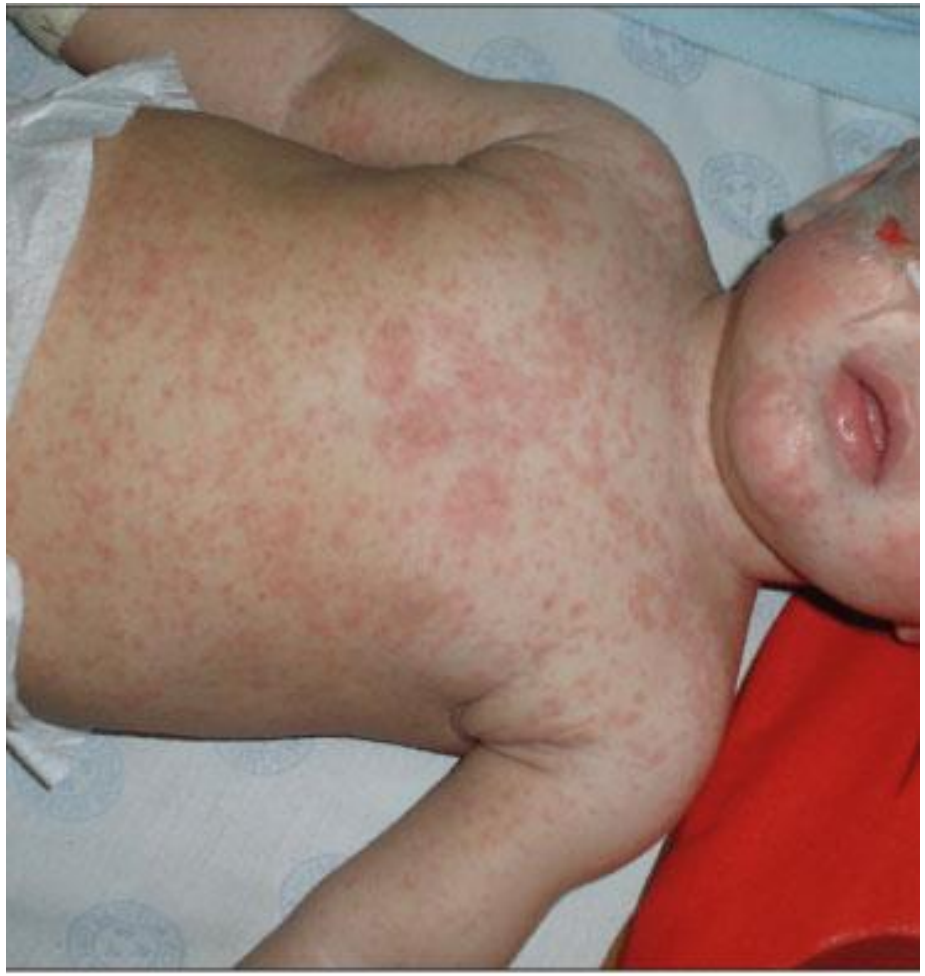
- The **rash** may include **petechiae;** in severe cases, it **may appear hemorrhagic**.
- **In children**, the extent of the **rash and degree** of confluence generally **correlate** with the **severity** of the illness.

- **The palms and soles are rarely involved.**
- The **cranial to caudal progression** of **the rash is characteristic of measles but** is **not pathognomonic**.

- **Other characteristic findings** during the **exanthematous phase** include **lymphadenopathy** , **high fever** (**peaking two to three days after appearance of rash**), pronounced respiratory signs including **pharyngitis, and nonpurulent conjunctivitis**.

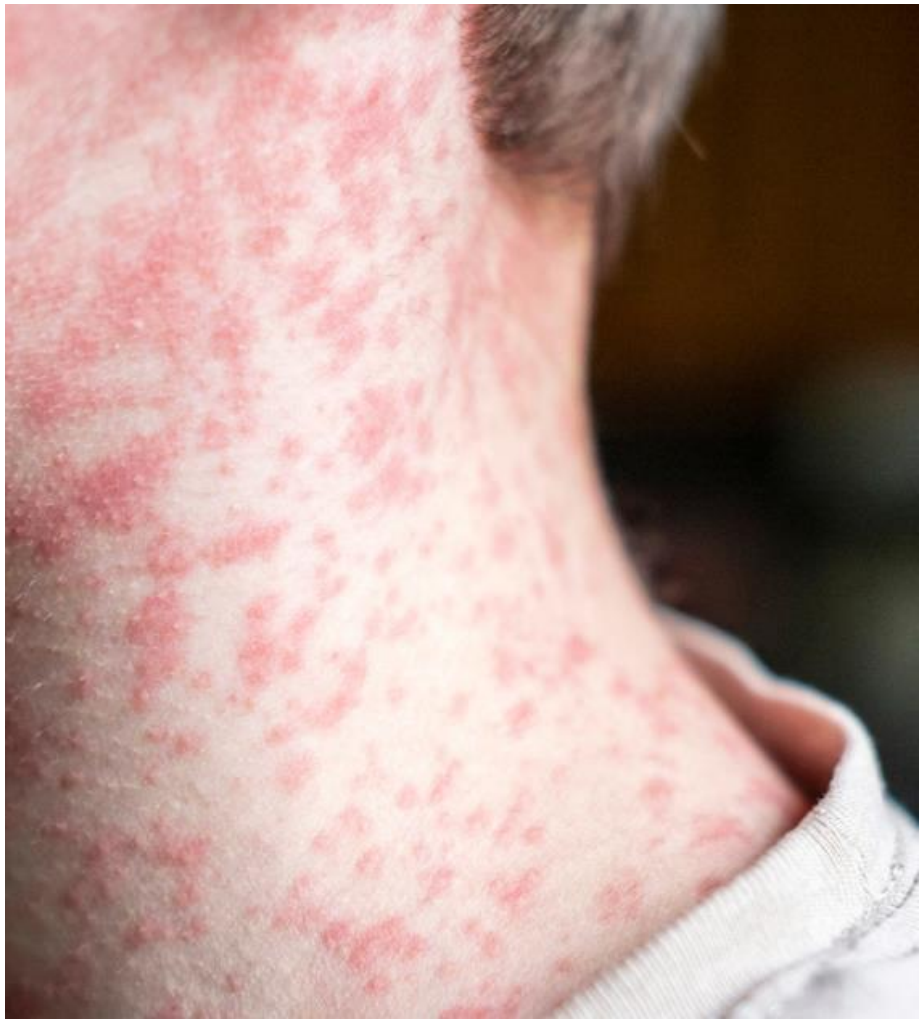


Typical rash on a patient with measles



2. Morbilliform eruption, part of the 'classic' measles dermatolo
entation which included Koplik's spots, other oral manifestations suc
natitis, conjunctivitis and a history of cephalocaudal spread of the ra

Caption



Caption

- **Uncommonly**, patients with severe measles develop generalized lymphadenopathy and splenomegaly.

- Clinical improvement typically ensues **within 48 hours** of the appearance of the rash.

- **After three to four days , the rash darkens to a brownish color** (in patients of White European descent though not patients of African descent) and begins to fade, followed by **fine desquamation** in the more severely involved areas.

- The rash usually **lasts six to seven days** and fades in the order it appeared.

RECOVERY AND IMMUNITY

- Cough may persist for one to **two weeks** after measles.
- The occurrence of fever beyond **the third to fourth day** of rash suggests a measles-associated complication.
- **Both humoral and cellular** measles-specic immunity are important for viral clearance and lasting protective immunity.
- Children with defects in humoral immunity, such as agammaglobulinemia, generally recover from measles, while individuals with T cell deciencies often have severe measles infection and high mortality rates.
- **Immunity after measles virus infection is thought to be lifelong**, although there are **rare** reports of measles **reinfection**.
- Measles virus infection is associated with immunosuppression that can persist.

CLINICAL VARIANTS

Modified measles

Atypical measles

Modified measles

is an attenuated infection that occurs in individuals with pre-existing measles immunity (either via wild-type disease or vaccination).

It is similar to classic measles except the clinical manifestations are generally **milder** and the **incubation period is longer** (**17 to 21 days**).

Individuals with modified measles **are not highly contagious**.

Individuals with nonprotective immunity to measles can develop modied measles; **nonprotective immunity may occur in one of the following ways:**

✓ **Transplacental transfer of anti-measles antibody from mother to infant**. This antibody is generally cleared by three to nine months of age; clearance is earlier among infants born to vaccinated women than infants born to women with history of natural infection .When **antibody titers reach levels that** are not considered protective, the infant is at risk for measles infection, but low antibody levels may prevent severe disease.

✓ **Receipt of immunoglobulin**

✓ **Measles vaccination resulting in antibody titers lower** than those considered seroprotective

✓ **Prior history of measles**

Atypical measles

refers to measles virus infection among individuals **immunized with the killed virus vaccine**, which was used in the United States between 1963 and 1967; **atypical measles is now rare.**

The killed virus vaccine sensitized the recipient to measles virus antigens without providing full protection.

Individuals with atypical measles develop **high fever and headache 7 to 14 days after exposure to measles.**

Atypical measles is characterized by **higher and more prolonged fever** .

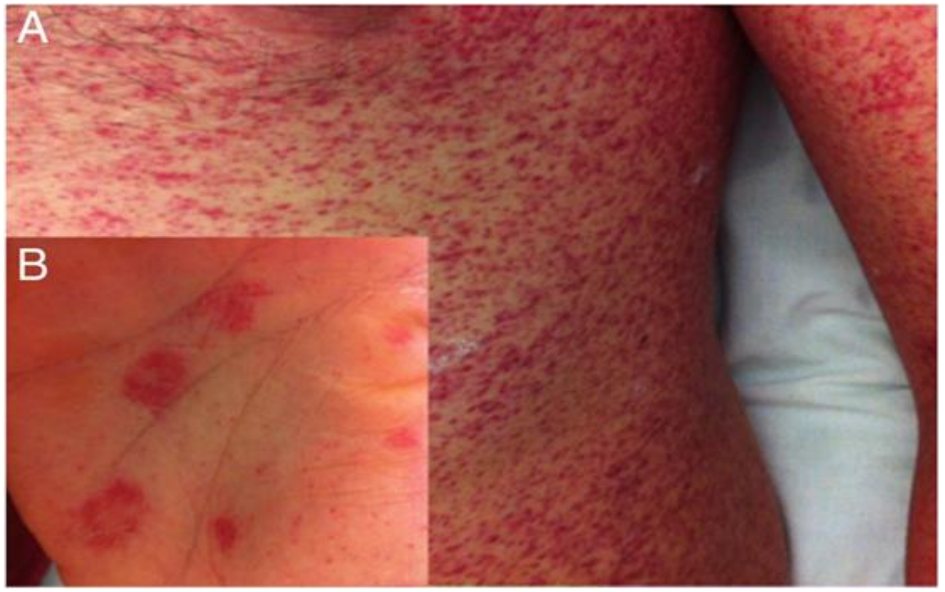
A maculopapular rash develops **two to three days later**, **beginning on the extremities** (**instead of the head as seen with typical measles**) and **spreading to the trunk**.

The rash **may involve** the **palms and soles and tends to spare the upper chest, neck, and head.**

The **rash may be vesicular, petechial, purpuric, or urticarial**; it may have a hemorrhagic component.

The distribution and varied appearance of the rash can make diagnosis difficult.

A dry **cough** and **pleuritic chest pain** are often present; **pneumonitis** can be severe.



Atypical measles

Chest radiograph typically demonstrates **bilateral pulmonary nodules** and **hilar lymphadenopathy.**

often results in severe illness; many individuals develop **respiratory distress.**

Some individuals develop **peripheral edema**, **hepatosplenomegaly, and/or neurologic symptoms such as paresthesias or hyperesthesias.**

Laboratory findings can include elevated serum aminotransferases .
Atypical measles is associated with a characteristic antibody pattern: **before or at the onset of the exanthem, the titer is usually <1:5 but, by day 10 of illness**, the **titer is typically ≥1:1280**. The height and rapidity of antibody titer rise is much higher than in primary natural measles infection.
The pathogenesis of atypical measles is not entirely understood.

Individuals with atypical measles do not appear to transmit measles virus to others .

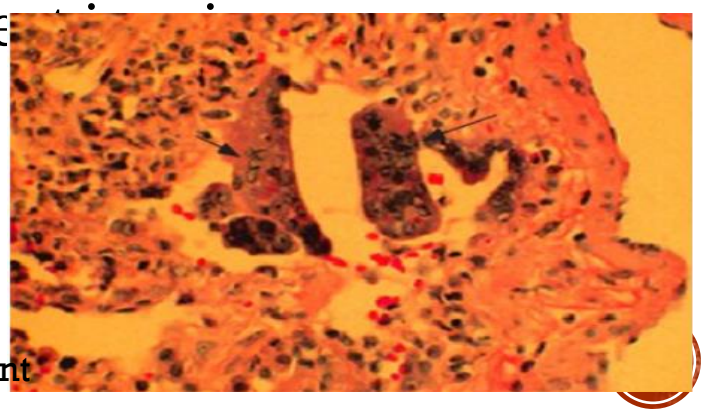
Laboratory findings

•Thrombocytopenia, leukopenia, and T cell cytopenia may be observed during measles infection.

•Chest radiography may demonstrate interstitial pneumonitis .

•Biopsy samples of lymphoid tissues before the appearance of the exanthem may demonstrate reticuloendothelial giant cells. Histologic analysis of enanthem or exanthem and cytologic examination of nasal secretions may also demonstrate epithelial giant cells .

•Histologic evaluation of conjunctival, nasopharyngeal, or buccal epithelial cells may demonstrate giant cells with inclusions; these cells may also be prese



Medium power view of a lung biopsy from a patient with measles pneumonia shows a nodular pattern with acute and chronic inammation and areas of necrosis and brosis. Multinucleated giant cells with inclusions

IMMUNOCOMPROMISED PATIENTS

- Patients with **defects in cell-mediated immunity** (eg, AIDS, lymphoma or other malignancies, and those receiving T cell-suppressive medications) are at risk **for severe**, **progressive measles virus infection**.
- **The clinical presentation of measles in immunocompromised hosts may be atypical** .
- Exanthem may be absent, evanescent, or severe and desquamative; purpura has also been described.
- Therefore, a high level of suspicion should be present when an immunocompromised host presents with pneumonia or encephalitis, particularly after measles exposure and despite history of previous immunization.
- Some unique measles-associated manifestations have been described in immunocompromised patients; these **include giant cell pneumonia** and **measles inclusion body encephalitis**.

IMMUNOCOMPROMISED PATIENTS

- **Giant cell pneumonia** is characterized by multinucleated giant cells in lung tissue. It can develop in immunocompromised patients after classic measles infection or after a vague prodromal illness that may **not include an exanthem** .
- **In patients without a rash, lung biopsy may be required to make the diagnosis.**

- **Measles inclusion body encephalitis (MIBE)** is characterized by histopathologic evidence of inclusions in neurons and glial cells.
- Patients present **one to six** months after exposure to measles with seizures, mental status changes, and myoclonus.
- MIBE may sometimes present in conjunction with giant cell pneumonia. The pathogenesis of this disorder is uncertain

- Children with human immunodeciency virus (HIV) infection may present with measles at an earlier age than HIV-uninfected children (11 versus 15 months).

- Measles virus infection may have a transient suppressive effect on HIV replication; it has been hypothesized that measles infection results in immune activation with factors that are suppressive to HIV viral replication.

- Serology may not be useful for diagnosis of measles in immunocompromised patients because of deficient antibody synthesis .

- In these cases, alternative diagnostic approaches should be taken, as described below. Biopsy of involved tissues may be necessary for a denitive diagnosis.

Persons With Tuberculosis It has long been thought that tuberculosis is aggravated in persons who contract natural measles, presumably because of a depression of cellmediated immunity by Measles Virus.

the tuberculin test has been reported to become **negative for about 1 month** after measles or measles vaccination.

It seems prudent to defer measles vaccination in persons with known tuberculosis until antituberculosis therapy is underway.

In geographic areas and populations where tuberculosis is rare, it is not mandatory to perform a tuberculin test on an infant before administering measles vaccine

OCCURRENCE IN ADULTS

Measles has long been regarded as an illness of childhood. When it occurs in adults, it is often a more severe illness.

the incidence of complications was higher in those **older than 20 years** than in children.


Thank You For Your Attention