

# GERMAN MEASLES



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German measles is an acute infectious disease of childhood characterized by minimal or absent prodromal symptoms. A 3-day rash, enlargement and tenderness of the retroauricular, suboccipital and posterior cervical lymph nodes. It is usually a self-limiting disease with rare complication, however.

## Etiology

German measles is caused by a specific virus that has been shown to be present in the blood and nasopharyngeal secretions of patients with the disease. Under the electron microscope, this virus is revealed to be a moderately large virus, spherical in shape, having a central nucleoid 30 nm. in diameter, within an envelope of 60 to 70 nm. wide. It is a RNA virus which is quite sensitive to heat, to extremes of pH, and to a variety of chemical agents.

## Clinical Manifestations

German measles is spread usually by droplet infection or contact with secretion from the patient's nose or throat. It can also be transmitted by blood transfusion

from the patient with this disease. The incubation period for German measles is generally 14 to 21 days. The typical course is illustrated in Fig. 1.

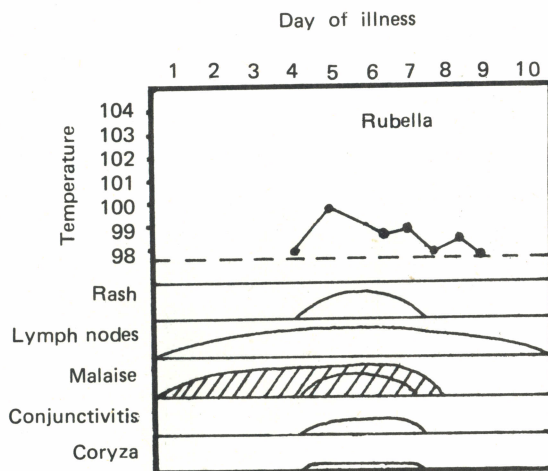


Fig. 1. Schematic diagram illustrating typical course of rubella in children and adults. Lymph nodes begin to enlarge 3 to 4 days before rash. Prodromal symptoms (malaise) are minimal in children (shaded area). In adults there may be a 3- to 4-day prodrome (hatched area). Conjunctivitis and coryza, if present, are usually minimal and accompany the rash.

(1) Lymph node involvement

Dr. Green pointed out that (Fig. II) the lymph node enlargement may begin as early as 7 days before the onset of rash. And the nodes most commonly involved are the retroauricular, suboccipital and posterior cervical lymph nodes. No other disease causes the tender enlargement of all these nodes to the same extent that German measles does. The tenderness of nodes subside within a day or two, but the palpable enlargement may persist for several weeks or more. As indicated in Fig. III, Dr. Krugman stated that the extent of the lymphadenopathy may be extremely variable, and occasionally it may even be absent.

(2) Exanthem

The rash, particularly in children, may be the first obvious indication of illness. It appears first on the face and then spreads downward rapidly to the neck, trunk and extremities within 24 hours. Then, it begins to fade in the same direction at about the third day after the rash appears. The rash may resemble the rash of measles on the first day and scarlet the second day, then disappears on the third day. The rash is rarely persisted more than 5 days. However, there is about 25% of German measles without a rash.

(3) Fever and blood picture

A typical temperature course is illu-

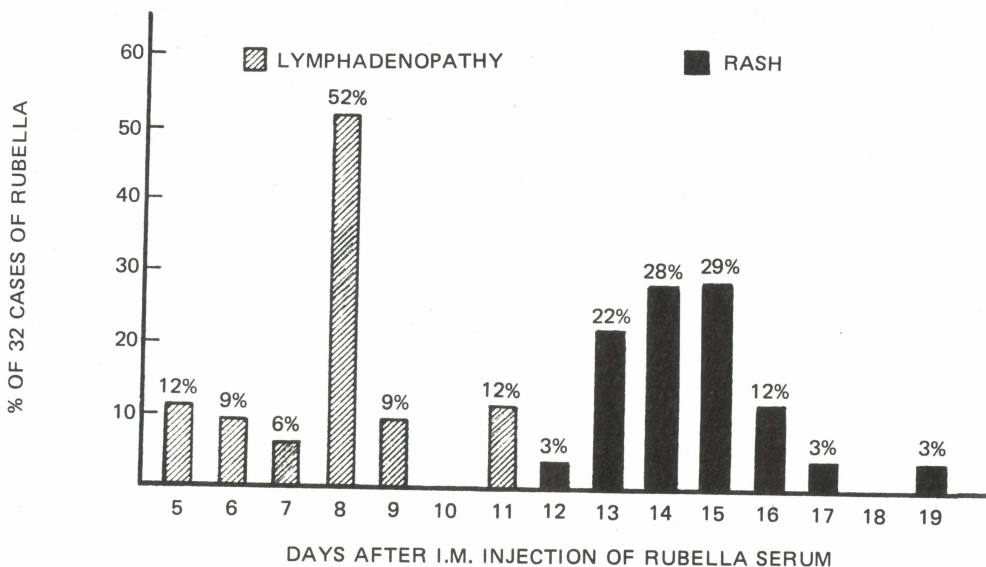


Fig. II. Time of onset of lymphadenopathy and rash in thirty-two cases of experimentally transmitted rubella. Note appearance of lymphadenopathy 5 to 7 days before onset of rash. (From Green: *Am. J. Dis. Child.* 110:348, 1965.)

strated in Fig. I. Experimentally induced rubella (See Fig. III) reveals the fever is usually normal or just slightly elevated.

Generally, the white blood cell count tends to be low, as indicated in Fig. III. However, the white blood cell count may be normal.

### Diagnosis

#### (1) Confirmatory clinical factors.

A diagnosis of rubella is suggested by the appearance of a maculopapular eruption beginning on the face, progressing rapidly downward to the trunk and extremities, and subsiding within 3 days.

Prodromal symptoms are minimal or absent, fever is low grade or absent, and lymphadenopathy precedes the appearance of the rash. A history of exposure, if available, is helpful.

#### (2) Detection of causative agent.

As indicated in Fig. IV, rubella virus may be recovered from the pharynx as early as 7 days before the onset of rash and as late as 14 days after the onset of rash. In contrast, viremia that is present before the onset of rash is rarely observed after the onset of rash.

#### (3) Serologic tests

The pattern of appearance and per-

Fig. III. Clinical aspects of experimental rubella in children\*

Patient	Maximum temperature (F.)	Rash	Lymph node enlargement	Leukopenia
C. R.	100.4	+	++	0
J. G.	101.6	0	+	0
P. K.	100.8	0	++	++
N. K.	99.6	++	+	++
E. T.	101.6	+++	+++	0
K. L.	100.4	++	+	+
J. S.	99.0	++	+	0
S. E.	99.4	++	0	0
G. O.	99.8	++	++	0
C. N.	99.4	+++	+++	-
P. A.	99.6	+++	++	-
T. B.	99.2	+	+	-
M. I.	99.4	++	+++	-

\* From Krugman, and Ward, J. Pediatr. 44:489, 1954.

Key: +, mild; ++, moderate; +++, marked; 0, none; -, not done.

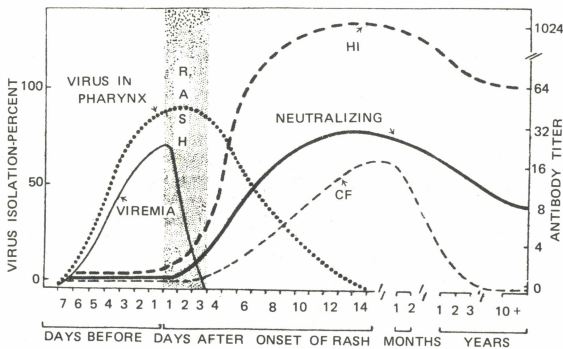


Fig. IV. Natural history of postnatal rubella. Pattern of virus excretion and antibody response. (Modified from Cooper, and Krugman,; Arch. Ophthal 77:434, 1967.)

sistence of rubella virus — Neutralizing, Complement-Fixing (C.F.), and Hemagglutination-Inhibition (H.I.) antibody is shown in Fig. IV. Antibody is usually detectable by the third day of rash, and peak levels are reached about one month later. C.F. antibody may be short lived, declining to nondetectable levels within a year or more after infection. Neutralizing and H.I. antibodies usually persist for life. The H.I. antibody test has the advantages of high sensitivity and speed with which results are obtained; results are available within 24 hours. A serologic diagnosis is possible if acute and convalescent-phase serum specimens are obtained. The acute phase serum should be obtained as early as possible after the onset of rash, convalescent-phase serum should be collected 2 to 4 weeks later. Evidence of a fourfold or greater rise in rubella antibody titer is indicative of a recent infection.

## Complications

Complications are rarely seen after the attack of German measles. However, during epidemic, the following complications have been reported.

### (1) Arthritis

Joint involvement in adolescents and adults with German measles are much more common than children. It usually develops just as the rash fades on the second and third day of illness, and usually clear spontaneously within 5 to 10 days.

### (2) Encephalitis

This complication is extremely rare, its incidence is about 1:6000 cases of rubella. Complete recovery is generally the rule, but fatalities have been reported. Electroencephalographic abnormalities, however, are relatively common and persistent. Generally, if the patient survives, the intellect is usually unaffected.

### (3) Purpura

Thrombocytopenic as well as non-thrombocytopenic purpura may, in rare instances, complicate rubella. In some reports, the clinical manifestation have included one or more of the following disorders: cutaneous hemorrhages, epistaxis, bleeding gums, hematuria, bleeding from the intestinal tract, and, rarely, cerebral hemorrhage. Most patients become symptom-free within 2 weeks.

## Prognosis

The prognosis is almost uniformly excellent. Rubella is one of the most benign of all infectious diseases in children.

### Immunity

#### (1) Active immunity

One attack of rubella is generally followed by permanent immunity. Many of the so called second attack represent errors in diagnosis. Active immunity is induced by infection after natural or artificial exposure. As indicated in Fig. IV, rubella neutralizing antibody may persist for many years after infection.

#### (2) Passive immunity

Neutralizing antibodies for rubella are present in gamma globulin and in convalescent-phase serum. Rubella is rarely observed in the early months of life because of transplacentally acquired immunity.

### Treatment

Treatment of rubella is usually symptomatic, because rubella is a self-limiting disease.

### Congenital German Measles

If a pregnant woman contracts rubella during her early gestation, the risk of congenital rubella occurring in the infant is about 20%. The newborn infant may be born with the following congenital abnormalities: intrauterine growth retardation, eye defects, cardiac defects, deafness, thrombocytopenic purpura, cerebral defects, hepatitis, bone lesions, pneumonia, and hepa-

tomegaly. Many of the infants continue to excrete the virus for the first 12 to 18 months of life (Fig. V)

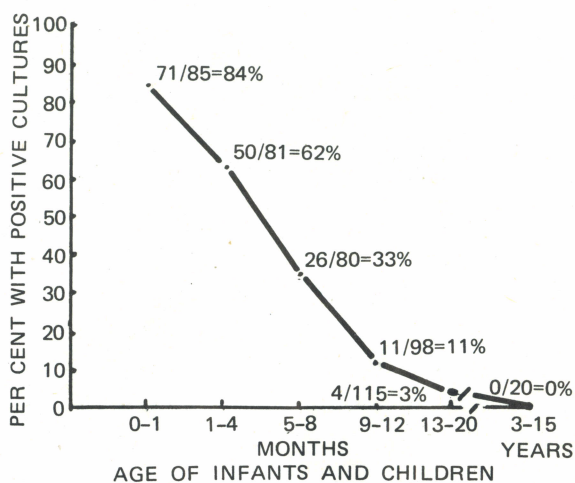


Fig. V. Incidence of rubella virus excretion by age in infants with congenital rubella. (From Cooper, L. Z., and Krugman, S.: *Arch. Ophthalmol.* 77:434, 1967.)

Therefore, preventive measures are utmost importance to protect the fetus. It is important for girls to be exposed and contract the disease before the childbearing age. Pregnant women, especially early in pregnancy, but also during the entire gestational period, should avoid exposure to rubella, regardless of the history of the disease during childhood.