Parvovirus B19

Parvovirus B19 is a non-enveloped single-stranded linear DNA virus that happens to be the smallest DNA virus. In children it causes erythema infectiosum, also known as fifths disease, which presents with a slapped cheek rash and fever. In adults, it usually presents as acute arthritis. However, in patients with hematologic abnormalities, like sickle cell, parvovirus infections can result in an aplastic crisis. In addition, it can cause hydrops fetalis in pregnant women. These complications are the result of parvovirus replicating in erythroid progenitor cells in the bone marrow, which inhibits RBC production and can result in RBC aplasia and anemia.

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Characteristics

DNA
DNA
Parvovirus is a DNA virus, meaning its genetic code consists of deoxyribonucleic acid as opposed to ribonucleic acid.

Single Stranded
(1) Wand with Single Stranded DNA ribbon
Parvovirus is the only single-stranded DNA virus that is clinically relevant. Typically DNA viruses are double-stranded.

Linear
Line
Parvovirus has DNA in a linear arrangement as opposed to a circular formation.

Smallest DNA virus
Magnifying-lens over Small Virus
Parvovirus is the smallest DNA virus at only 18-26 nm in diameter. Parvus means small in Latin.

Non-enveloped
Nun-envelope
Parvovirus is a non-enveloped virus, also called a naked virus. Many viruses have envelopes, which are outer membranes that cover their protein capsids that help to enter host cells. However because parvoviruses are non-enveloped, their capsids are responsible for attaching to host cells.

Signs and Symptoms

5th Disease
(5) Hand
Fifths disease, also known as erythema infectiosum, is one of the six common childhood exanthems. They were named for the order of dates they were first described.

Slapped Cheek Rash in Children
Slapped Cheek Baby
The slapped cheek rash is characteristic for erythema infectiosum in children caused by parvovirus infections. The rash begins on the cheeks and may later involve their trunk and extremities. It is erythematous and has a reticular (lacelike) pattern that sometimes looks like they were recently slapped on the face.

Erythema Infectiosum
Earth-red
Erythema infectiosum, also known as fifths disease, is how parvovirus B19 infections typically manifest in children. It starts as a nonspecific cold with fever, coryza, headache, nausea and diarrhea and then several days later they develop a characteristic slapped cheek rash.

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Hydrops Fetalis

Eye-drop Fetus

Parvovirus B19 infections in pregnant women can cause serious complications, such as miscarriage and hydrops fetalis. Hydrops fetalis is fetal death due to edema and increased workload on the heart usually due to anemia.

RBC aplasia

RBC Plate

Parvovirus replicates in erythroid progenitor cells in the bone marrow which can lead to problems in erythropoiesis. This RBC aplasia can result in anemia.

Arthritis in Adults

King-Arthur

Parvovirus B19 infections in adults can present as acute arthritis. Typically it is in symmetric joints of the hands, wrists, knees or feet, and in the absence of a rash it can be mistaken for rheumatoid arthritis.

Aplastic Crisis in Sickle Cell

A-plastic-bottle with Sickle

Parvovirus B19 infections can cause aplastic crises in patients with hematologic abnormalities, including sickle cell disease and spherocytosis, or in conditions with decreased RBC production like iron deficiency anemia. This is because parvovirus replicates in erythroid progenitor cells in the bone marrow, which causes problems in conditions requiring high RBC turnover.

Myocarditis

Mayo-heart-card

There is a high correlation with parvovirus causing myocarditis in patients who are infected. Myocardial cells are targeted by Parvovirus B19, leading to inflammation, both acutely and chronically with lymphocytes.

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