

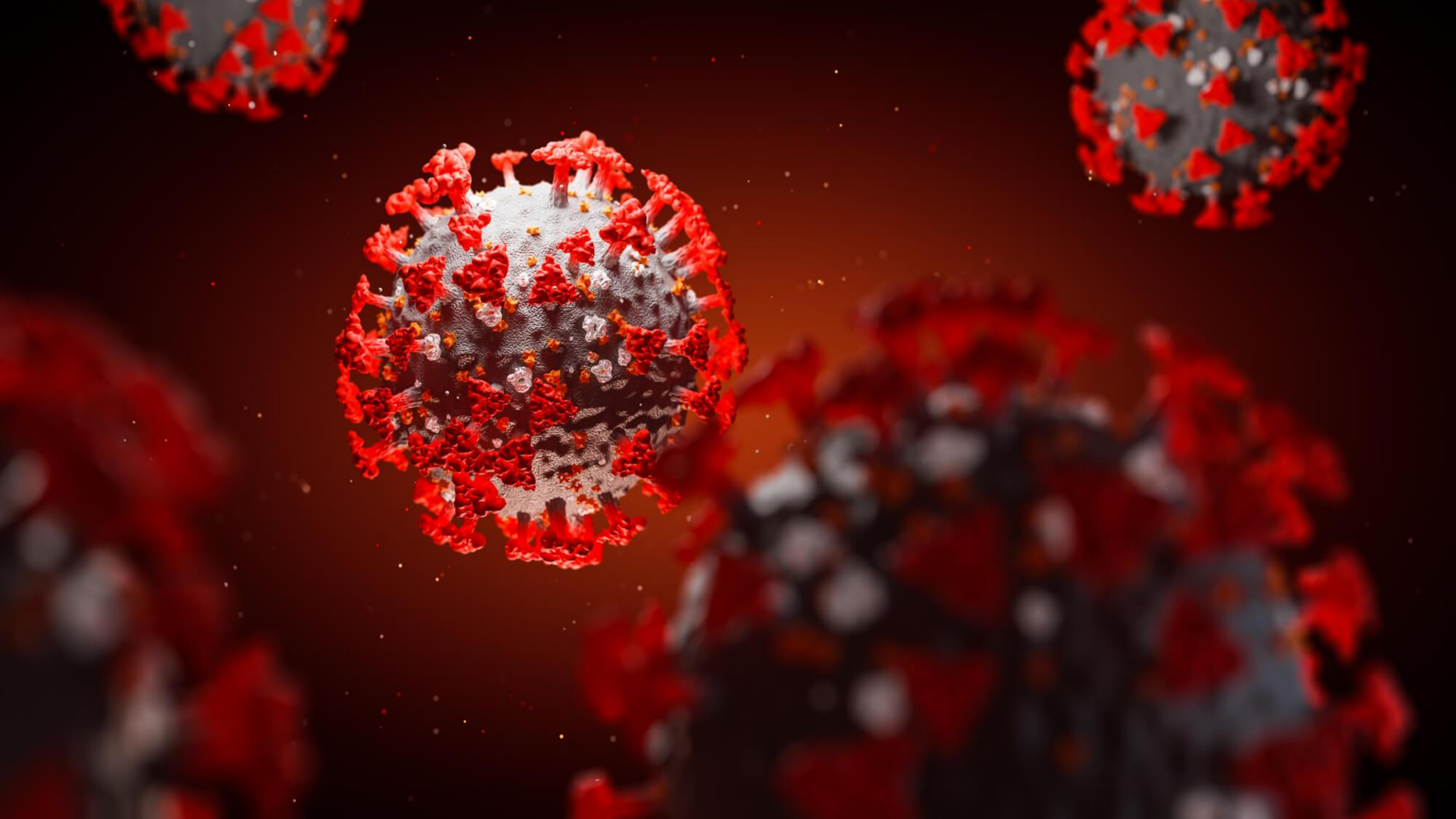
MULTISYSTEM INFLAMMATORY SYNDROME IN CHILDREN

“ MIS-C ”

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- Multisystem inflammatory syndrome in children (MIS-C), also called pediatric multi-system inflammatory syndrome temporally related to SARS CoV-2 (PMIS or PIMS-TS), is a potentially serious illness in children that appears to be a delayed, post-infectious complication of Covid-19 infection.

- MIS-C has varied symptoms that affect several organs and systems in the body.
- Many children have symptoms resembling :
toxic shock syndrome or
kawasaki disease, in which the coronary arteries enlarge or
form an aneurysms
- Also common are heart inflammation with impaired heart function
and low blood pressure, rash or red eyes, and gastrointestinal
symptoms.
- These symptoms can occur in different combinations.

- If you think your child might have MIS-C, consult with your primary care provider or bring your child to the Emergency Department.
- Blood tests may be recommended, depending on your child's symptoms.
- Children with MIS-C need close observation by pediatric specialists in rheumatology, cardiology, critical care, and sometimes hematologists and infectious disease doctors.

- Most children recover to an excellent state of health with careful observation and treatment.
- Children with MIS-C need to be hospitalized, but only a very small percentage have passed away



SYMPTOMS OF MIS-C



- Symptoms of MIS-C may vary from child to child.
- The main symptoms to watch for are:
- **a persistent fever** (lasting **more than 24 hours** and usually present for **several days**),
- your child appearing fatigued and ill, rash, red eyes, abdominal pain, vomiting, diarrhea, or loss of appetite or not drinking enough fluids.
- MIS-C symptoms can get worse quickly, so seek timely medical attention if you see anything concerning.

Specific features of MIS-C may include:

- Skin/mucous membrane signs and symptoms:

Rash, bloodshot eyes, swollen or red hands and feet, inflamed mucous membranes in the mouth, cracked lips, and a swollen tongue that looks like a strawberry.

- Symptoms and signs of shock or heart problems, such as cold, clammy skin, very low blood pressure, difficulty breathing, severe shortness of breath with exertion, dizziness or light headedness, and a very high heart rate or irregular heartbeat

- **Gastrointestinal** symptoms: diarrhea, vomiting, or abdominal pain.
- **Respiratory** symptoms such as cough and shortness of breath.
- **New neurologic** symptoms, such as headache, neck pain, confusion, numbness/tingling in the hands and feet, or seizures .



- The cause of MIS-C is not yet fully understood.
- Some researchers suspect that MIS-C is caused by a **delayed immune response** to the coronavirus that somehow goes into overdrive, causing inflammation that damages organs.
- It's also possible that the **antibodies** children make to the virus, or some of their immune cells, are creating the illness.
- Since only a small number of children develop MIS-C, it is possible that there are **genetic factors** that make some children susceptible.

- It is important to remember that overall, children fare very well with COVID-19 as compared to adults.
- Only a small number of children seem to develop signs and symptoms of MIS-C, and most have recovered quickly



HOW IS MIS-C DIAGNOSED?

- Currently, MIS-C is diagnosed based on symptoms (persistent fever and dysfunction of one or more organs, such as the heart or gastrointestinal system), together with laboratory tests to look for signs of inflammation in the body.
- Children should also have a positive test for COVID-19. Testing is also done to rule out other possible causes of the symptoms, such as other infections.

Once MIS-C is diagnosed, children will need to **be followed** over time with :

- laboratory tests to assess inflammation, blood clotting, liver function, heart function, and other aspects of their illness.
- Children should also have echocardiograms to evaluate their heart and coronary arteries,
- and some children with heart problems may also require additional testing such as cardiac MRI, Holter monitors, or exercise testing.

DIAGNOSTIC CRITERIA

- 1- An individual aged < 21 years presenting with fever(a), laboratory evidence of inflammation(b),
and evidence of clinically severe illness requiring hospitalization, with multisystem (≥ 2) organ involvement (cardiac, renal, respiratory, hematologic, gastrointestinal, dermatologic, or neurological); **AND**
- 2- No alternative plausible diagnoses; **AND**
- 3- Positive for current or recent SARS-CoV-2 infection by RT-PCR, serology, or antigen test; or COVID-19 exposure within the 4 weeks prior to the onset of symptoms



- (a) :Fever $> 38.0^{\circ}\text{C}$ for ≥ 24 hours, or report of subjective fever lasting ≥ 24 hours
- (b) :Including, but not limited to, 1 or more of the following:
an elevated CRP ,ESR, fibrinogen, procalcitonin, D-dimer, ferritin, LDH, or IL-6, elevated neutrophils, reduced lymphocytes, and low albumin

Additional comments :

- Some individuals may fulfill full or partial criteria for Kawasaki disease but should be reported if they meet the case definition for MIS-C
- Consider MIS-C in any pediatric death with evidence of SARS-CoV-2 infection



HOW IS MIS-C TREATED?

- Children diagnosed with MIS-C need close observation.
- All need to be admitted to the hospital, and some may need intensive care.
- Pediatric specialists in rheumatology, critical care, and cardiology can anticipate and address different aspects of the illness.

- **Treatments include :**
- IV immunoglobulin (used to treat Kawasaki disease),
- and anti-inflammatory drugs (corticosteroids, and drugs blocking IL-1 or IL-6).
- Other treatments may be used depending on the results of laboratory tests.
- Children are also treated with low-dose aspirin to decrease the risk of blood clots.

- Children need to be followed after discharge from the hospital, with repeat echocardiograms to monitor their heart and coronary arteries, even if they didn't have serious problems in the hospital.
- Children who are fully recovered at six months no longer need close follow-up.

WISHING FOR A BETTER WORLD FOR CHILDREN



THANKS FOR YOUR ATTENTION

