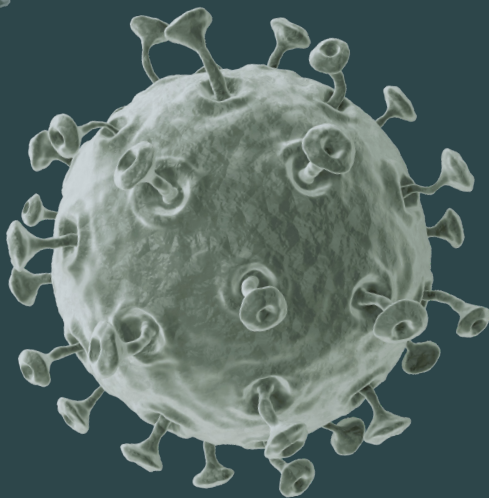
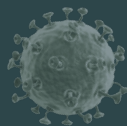
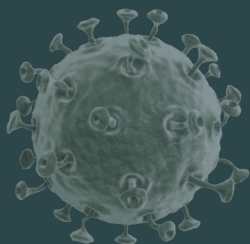


Understanding Cytomegalovirus (CMV):



A Guide for Solid Organ Transplant Recipients

An educational resource
provided by Kamada Ltd.



Why Did I Get This Resource?

A healthcare professional gave you this resource because you or someone you know has just received a solid organ transplant and may be at risk for infection by a virus called cytomegalovirus (CMV).¹ This information will help you understand the risk of CMV and its potential health complications.

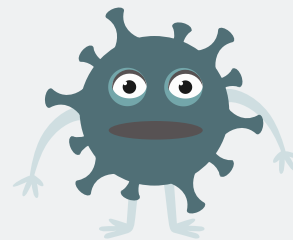
The Goal After Solid Organ Transplant: Prevent Rejection While Reducing the Risk of Infection

Your immune system is your body's defense team—it can tell what belongs to you and what doesn't, like bacteria or viruses, and works hard to protect you from anything unfamiliar.²

When you receive a solid organ transplant, your immune system thinks the new organ is "foreign" and will try to reject it because it does not belong. To stop this from happening, medications known as immunosuppressants are taken to prevent rejection of the new organ. However, these medications also reduce your body's ability to fight serious infections that can harm you and damage your transplanted organ.¹⁻³

One of these infections can be caused by a virus called **cytomegalovirus (sy·toe·MEG·a·low·vy·rus)**

or CMV.¹ CMV is called "the troll of transplantation" because it can stay hidden in the body and come back when the immune system is weak.⁴



What Is CMV?

CMV is a virus that is part of the herpes virus family. More than half of all adults have been exposed to CMV by age 40, and for non-immunosuppressed individuals, CMV exposure does not usually cause noticeable symptoms. Once infected, **your body retains the virus for life.**^{5,6}

For solid organ transplant recipients who have a weakened immune system, CMV is particularly concerning because infection can lead to serious health problems, organ rejection, and even death. **With prevention and timely treatment of an active infection, these risks can be lowered.**^{7,8}

If CMV becomes active and is untreated, it can cause symptoms and complications, including fever, fatigue, organ damage, and organ rejection.^{1,5} **Watch out for these symptoms before and after hospital discharge** and speak to your healthcare team if any of these occur^{3,5}:



Nausea, diarrhea, vomiting, or stomach ache



Fever or chills



Headache, seizures, or confusion



Flu-like symptoms (body aches, sore throat, swollen lymph nodes)



Blurry vision or loss of vision



Shortness of breath



Tiredness or fatigue

CMV Risk Factors

The risk of getting CMV after a solid organ transplant is different for everyone and depends on several factors⁹:

- All recipients of solid organ transplants, including small bowel, lung, heart, liver, kidney, or pancreas transplants, are at risk.
- The risk is higher if you've never had CMV but receive an organ from someone who has had it.

Your CMV status and your donor's CMV status are important factors that medical providers assess before your solid organ transplant.⁸

Based on both your CMV status and that of your donor, your transplant team will create an individualized care plan to reduce your risk for CMV infection and disease, which may include medications and regular monitoring.⁸

CMV Monitoring

Before a solid organ transplant, patients typically have a blood test to check for **antibodies** to see if they've been exposed to CMV. After the transplant, regular blood tests are done to detect any active CMV infection.¹⁰

Typically, patients are tested weekly after solid organ transplant surgery or once they finish preventative medication such as valganciclovir. The duration and frequency of testing and follow-up will be determined by your solid organ transplant team.¹¹

Antibodies are proteins made by your immune system to help your body find and fight viruses and bacteria.²



You may be tested for CMV in these situations⁸:

- If your medical provider thinks you have a CMV infection
- To check if your CMV treatment is working
- As a way to monitor if you are developing CMV
- After CMV treatment, to make sure it has not returned

Minimizing Your CMV Risk



Taking and receiving medications that prevent CMV after a solid organ transplant may protect your health and help ensure the success of your new organ⁸:

- You may receive different medications to prevent CMV, such as an antiviral medication alone or an antiviral medication along with CMV immune globulin.
- Your transplant clinician will decide which medication or group of medications is your best course of therapy.

Following your transplant provider's instructions

for taking these medications as prescribed helps keep CMV under control, giving you the best chance for a healthy outcome.⁸

When Should I Call the Clinic?



Call your transplant team with any questions or if you experience any symptoms that worry you.

After your solid organ transplant, **watch for signs that may require urgent medical attention**, like fever, chills, nausea, trouble breathing, chest pain, decreased urine, or pain near the transplant.¹²

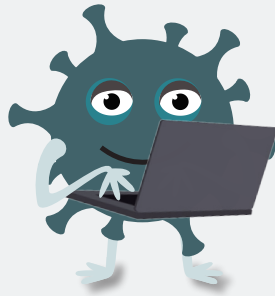
Other warning signs include extreme tiredness, persistent headache, diarrhea, abdominal pain, or unexplained weight loss. These could indicate an infection like CMV.¹²

If you are concerned about anything unusual, contact your transplant provider or clinician immediately to prevent complications and ensure transplant success.

If you are experiencing an emergency, call 911.

There Are Helpful Resources Online.

Your transplant team is the first point of contact if you have any questions about your post-transplant care.



Transplant Living Website offers more information about infections and immunity after a transplant.



American Society of Transplantation offers additional educational materials and support networks tailored for transplant recipients.

References: **1.** Kotton CN, Kamar N. New insights on CMV management in solid organ transplant patients: prevention, treatment, and management of resistant/refractory disease. *Infect Dis Ther.* 2023;12:333-42. doi:10.1007/s40121-022-00746-1 **2.** Overview of the immune system. Merck Manual Consumer Version. Revised February 2024. Accessed March 3, 2025. www.merckmanuals.com/home/immune-disorders/biology-of-the-immune-system/overview-of-the-immune-system **3.** Transplant rejection. Medline Plus. Reviewed April 18, 2023. Accessed March 3, 2025. medlineplus.gov/ency/article/000815.htm **4.** Balfour HH Jr. Cytomegalovirus: the troll of transplantation. *Arch Intern Med.* 1979;139(3):279-280. **5.** Cytomegalovirus (CMV). Cleveland Clinic. Updated October 20, 2022. Accessed March 3, 2025. my.clevelandclinic.org/health/diseases/21166-cytomegalovirus **6.** Cytomegalovirus (CMV) and congenital CMV infection. Centers for Disease Control. Updated May 30, 2024. Accessed March 3, 2025. www.cdc.gov/cytomegalovirus/about/index.html **7.** Grossi PA, Kamar N, Saliba F, et al. Cytomegalovirus management in solid organ transplant recipients: a pre-COVID-19 survey from the Working Group of the European Society for Organ Transplantation. *Transpl Int.* 2022;35:10332. doi:10.3389/ti.2022.10332 **8.** Kotton CN, Kumar D, Caliendo AM, et al; The Transplantation Society International CMV Consensus Group. The third international consensus guidelines on the management of cytomegalovirus in solid-organ transplantation. *Transplantation.* 2018;102(6):900-31. doi:10.1097/TP.0000000000002191 **9.** CMV and transplant patients. Cedars-Sinai. Accessed March 3, 2025. www.cedars-sinai.org/health-library/diseases-and-conditions/c/cmv-and-transplant-patients.html **10.** Ramanan P, Razonable RR. Cytomegalovirus infections in solid organ transplantation: a review. *Infect Chemother.* 2013;45(3):260-71. doi:10.3947/ic.2013.45.3.260 **11.** Razonable RR, Humar A; AST Infectious Diseases Community of Practice. Cytomegalovirus in solid organ transplantation. *Am J Transplant.* 2013;13(Suppl 4):93-106. doi:10.1111/ajt.12103 **12.** What are the signs and symptoms of problems after my transplant? Find your voice toolkit. American Society of Transplantation. Accessed March 3, 2025. www.myast.org/findyourvoice/what-are-signs-and-symptoms-of-problems-after-my-transplant

The information contained in this resource is provided for your general information only. It is not intended as a substitute for seeking medical advice from a healthcare provider. Kamada Ltd. and its US subsidiary Kamada Inc. are not in the business of providing medical advice and do not engage in the practice of medicine. Kamada Ltd. and Kamada Inc. under no circumstances recommend particular treatments for specific individuals and in all cases recommend consulting a physician or healthcare center before pursuing any course of treatment.

To download this
brochure, scan
the QR code.

