

## **CMV Viral Load Assay**

The UNC Hospitals Molecular Genetics Laboratory performs real-time polymerase chain reaction (PCR) to quantitate cytomegalovirus (CMV) DNA in plasma specimens. The test is used to assist in diagnosis and monitoring of CMV disease, primarily in transplant recipients and in AIDS patients.

### **Utility and Clinical Significance of CMV Viral Load Measurement-**

Cytomegalovirus is a significant cause of morbidity and mortality in solid organ and hematopoietic transplant recipients as well as in AIDS patients. CMV infection manifests in a variety of ways depending on the patient's underlying disease and immune status. Children and young adults with primary CMV infection are often asymptomatic or may develop a mononucleosis-like syndrome. Once infected, latent virus is maintained long-term under the control of the immune system. In immunocompromised individuals, CMV disease tends to be more severe with a possibility of life-threatening infection such as interstitial pneumonitis in marrow transplant recipients, hepatitis in liver transplant patients, and retinal destruction and blindness in AIDS patients. Graft injury and rejection may be indirect consequences.

Viral load testing allows early detection of active CMV infection, surveillance of high risk patients, and monitoring efficacy of therapy. Studies have shown that high viral load (>10,000 copies per mL of plasma) is associated with CMV disease; medical intervention may be considered even when levels are below 10,000 in high risk individuals, especially when serial testing shows that CMV loads have increased by over 10-fold.

### **Clinical indications for testing:**

1. Predict, diagnose, or monitor CMV disease.
2. Evaluate efficacy of therapy for CMV disease.

### **Laboratory Testing for CMV Viral Load:**

The preferred sample is EDTA anticoagulated blood (3ml, lavender-top). Refrigeration (up to 72 hours) permits blood samples to be shipped by overnight courier from outlying hospitals. Plasma is prepared, and DNA is extracted and subjected to real-time PCR amplification using primers and a TaqMan probe targeting a conserved sequence in the CMV polymerase gene. The product is quantitated on an Applied Biosystems 7500 instrument by extrapolating to a standard curve. CMV viral load results are reported as number of copies of CMV per mL of plasma. The assay is linear across 6 orders of magnitude and sensitive to as few as 10 copies of CMV per PCR reaction. The technical variability of the result is about 23% so, for example, a viral load reported as 1000 copies per mL represents a value between 770 and 1230 copies per ml. Measurable CMV DNA levels below 500 copies per mL of plasma are reported as "Detected, less than 500".

**Normal Range:** CMV is usually undetectable in plasma from healthy persons even if they were previously exposed to the virus. Immunosuppressed patients may have stable low viral loads in the absence of disease. Increasing viral load over time suggests progression of active disease.

### **References:**

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