Epstein-Barr Virus-Related Neoplasia by EBV viral load assay

Real-time PCR can quantify EBV DNA in blood plasma or cerebrospinal fluid (CSF). Results contribute to diagnosis and monitoring of patients with post-transplant lymphoproliferative disorder (PTLD), nasopharyngeal carcinoma, or AIDS-related brain lymphoma.

Pathobiology of EBV infection and Clinical Utility of EBV Viral Load Measurement

Nearly every human becomes EBV infected before adulthood. The vast majority of infections are brought under control by the immune system, although EBV is never eliminated and it persists for the duration of its human host’s life. A small fraction of patients develop EBV-related tumors such as PTLD, nasopharyngeal carcinoma, gastric adenocarcinoma, Hodgkin lymphoma, and selected subtypes of non-Hodgkin lymphoma including AIDS-related brain lymphoma. In affected tumors, viral DNA is localized to all malignant cells, suggesting viral entry before malignant transformation. EBV thus serves as a tumor marker, and serial plasma EBV DNA levels reflect tumor burden over time.

Clinical Indications for Testing:

Transplant patients at high risk for developing PTLD are monitored so that pre-emptive therapy may be considered. Therapeutic efficacy is gauged based on circulating EBV load as a surrogate for tumor burden. Healthy recipients usually have plasma EBV levels below 700 IU/mL.

In HIV infected patients suspected of having CNS lymphoma (per clinical and radiographic findings), EBV DNA in CSF strongly favors a diagnosis of lymphoma, potentially avertng the need for brain biopsy.

In nasopharyngeal carcinoma patients, plasma EBV load correlates with tumor stage, and serial EBV load reflects tumor burden and is a harbinger of relapse.

Specimen requirements and methods: The preferred sample is EDTA anticoagulated blood (3mL purple-top) or cerebrospinal fluid (1mL). Real-time PCR amplifies a conserved segment of the EBV genome. Assay calibration is traceable to the World Health Organization International Standard. Viral load results are units reported in IU/mL.

EBV viral load measurement can also be done on fresh or paraffin-embedded tissue (10 sections on plain glass slides, each 5um thick), although a better method for demonstrating localization to lesional cells is EBER in situ hybridization which is done in surgical pathology on biopsy material.

EBV serology is used to diagnose primary infection in immunocompetent hosts.

Normal Range: EBV DNA is undetectable by PCR of plasma or CSF of healthy individuals. Acute, chronic, or reactivated EBV infection, as well as EBV-related neoplasia, is associated with detectable EBV DNA.

References:

To consult a pathologist about indications for testing or the significance of a result, call the Molecular Genetics Lab at (984) 974-1825 or Dr. Gulley at (919) 843-4595. Email: margaret_gulley@med.unc.edu

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University of North Carolina Molecular Genetics Laboratory 6-22-15