Explanation of Lyme Disease Laboratory Testing

A diagnosis of Lyme disease is based on an individual's history of possible exposure to ticks that carry Lyme disease, the presence typical signs and symptoms, and the results of blood tests. So what exactly are these blood tests? What do they test for? And what do the results mean?

> (NOTE: If a person has been diagnosed by a clinician with erythema migrans (the characteristic "bulls-eye" rash) and has had a tick bite, then laboratory testing is not recommended.)

Blood Tests:
A **two-step process** is used when testing a person's blood for evidence of a Lyme disease infection. Both tests in this two-step process measure the body's immune system response to an infectious agent and do not test for the infectious agent itself.

The **first-step** uses an ELISA (enzyme-linked immunosorbent assay) test. The ELISA is used to check for past or current infection with the bacteria that cause Lyme disease *Borrelia burgdorferi)*. The ELISA test checks for antibodies (proteins made by the immune system to fight infection) made when the body's immune system responds to the bacteria that cause Lyme disease. The ELISA test is designed to be very "sensitive," which means that almost everyone with Lyme disease, and some people who do not have Lyme disease, will have a positive result. If the test result comes back negative, it is highly unlikely that the person has Lyme disease. Simply put, it is very possible that a positive ELISA test is a false positive and very unlikely that a negative test is false negative.

If the ELISA comes back positive or indeterminate (sometimes called "equivocal"), a second-step test should be performed to confirm the positive ELISA result.

The **second-step** uses a western blot test (protein immunoblot test). The western blot test is designed to be "specific," which means that most of the time it will be positive only if a person has been truly infected. The western blot test is more specific for the *Borrelia burgdorferi* bacteria than the ELISA. A negative western blot test usually indicates that the ELISA test was a false positive.

There are two types of western blot test that are used, an IgM western blot and an IgG western blot. These are separate tests that look for two different antibodies. Most of the time, the IgG western blot must be positive in order to indicate a potential infection with Lyme disease.

The IgM antibodies are the first antibodies to be produced in the body in response to an infection. IgM antibodies are larger than IgG antibodies and when present in high numbers, may indicate a recent or new active infection. In short, a positive IgM may be a sign of a current, or very recent, infection.

The IgG antibodies are produced once an infection has been going on for a while, and may even be present after the infection has been resolved. The presence of IgG antibodies to an organism when accompanied by a negative IgM test for the same organism means that the person was exposed to that organism at one time and developed antibodies to it, but does not have a current active infection of that organism. People who test positive by IgM but not IgG should have the test repeated a few weeks later if they remain ill. If the person is positive only by IgM and has been ill longer than one month, this is likely a false positive result for Lyme disease.

Other Types of Laboratory Testing:
Other forms of laboratory testing for Lyme disease are available, some of which have not been adequately validated. Some of these other tests include: cerebrospinal fluid test, urine antigen tests, immunofluorescent staining for cell wall-deficient forms of *Borrelia burgdorferi*, and lymphocyte transformation tests. In general, these tests are not recommended because they have not been validated.

Patients are encouraged to ask their clinicians about testing and test result interpretation.