



Diagnostic Testing:

Which, Why, & What

What exactly happens when that blue dot on a point-of-care test pops up, indicating that a patient is infected with parvovirus? Or an abnormal pancreatic lipase? Or heartworm disease? Has a veterinarian asked you to submit a request for a tick titer or PCR? Veterinary technicians must have a basic understanding of the many tests available to diagnose veterinary diseases. The following demystifies various testing methods, why they are used, and what types of organisms and/or diseases they detect.

ELISA TESTS

One point-of-care test commonly used is the enzyme-linked immunosorbent assay (ELISA). This test works on the principle that an antibody or antigen can be linked to an enzyme, which can facilitate a color reaction that indicates a positive result.

To review, an antigen is any foreign substance (eg, a virus) that provokes an antibody response. An antibody is a protein (specifically, an immunoglobulin) that allows white blood cells to identify and attack antigens. The presence of either an antigen or antibody usually indicates infection by, or exposure to, an organism. Point-of-care tests for blood samples work in the following manner:

STEP 1: The blood sample is added to the special conjugate that contains an antibody to the known organism and an enzyme chemically attached to the antibody. If infection is present, the antigen in the blood will bind to the antibody in the conjugate sample.

STEP 2: The well is also impregnated with antibody. When the conjugate-antigen complex is added to the well, the free antigen binds to the antibody embedded in the well. The sample initially flows toward the results box. Note: Some products require a snapping motion while others do not; samples are left in the well until a color change occurs.

STEP 3: The fluid flows back across the sample pad and a wash solution is released to cleanse the sample. A colorless substrate, which will amplify the color reaction, flows across the sample pad.

STEP 4: The substrate reacts with the conjugate and causes a color reaction. The reaction will only occur if the antigen is bound to antibody, indicating a positive result (eg, infection or exposure).

STEP 5: The intensity of the color reaction relates only to the amount of antigen present, so a darker dot does not necessarily suggest a more severe infection.

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ELISAs are available through many manufacturers, including IDEXX Laboratories (idexx.com) and Abaxis (abaxis.com). The tests are available for the following conditions:

Disease or Condition	Substances Tested	Sample Type
Anaplasmosis	<i>Anaplasma phagocytophilum</i> , <i>A. platys</i>	Blood
Ehrlichiosis	<i>Ehrlichia canis</i> , <i>E. ewingii</i>	Blood
FIV/FelV infection	Feline immunodeficiency virus, feline leukemia virus	Blood
Giardiasis	<i>Giardia</i> spp organisms	Feces
Heartworm	<i>Dirofilaria immitis</i>	Blood
Lyme disease	<i>Borrelia burgdorferi</i>	Blood
Pancreatitis	Canine or feline pancreatic lipase	Blood
Parvoviral enteritis	Parvovirus	Feces

PCR TESTS

The PCR (polymerase chain reaction) test harnesses a complex reaction in the nucleus of a cell to amplify DNA of a suspected organism. For example, if Lyme disease (*Borrelia burgdorferi*) is suspected, the PCR test can attempt to amplify bacterial DNA present and create a positive result. The laboratory

may need some DNA of the specific organism to be potentially identified on the PCR test. A chemical reaction is created to remove pure DNA from the blood sample; the DNA is copied and amplified by several enzymes, which can be helpful when only a small amount of DNA is present.

If infection is present in the laboratory sample, the PCR test can identify the DNA present and definitively diagnose the infection.


Many veterinary diagnostic laboratories, including ANTECH Diagnostics (antechdiagnostics.com) and IDEXX Laboratories, can perform PCR analysis. Other veterinary laboratories, often at university teaching hospitals, can diagnose less common infections via PCR testing.

TITER TESTS

Before PCR testing was available, veterinarians relied on titer tests, which, like ELISAs, are categorized as serology

tests. Titer panels can be run via different methods, including the IFA (immunofluorescent antibody) test. The titer test uses a patient's sample, performs serial dilutions at various intervals, and provides the results. Each dilution is tested for detectable levels of antibody, and the titer is the degree to which a sample can be diluted and still contain detectable amounts of antibody, implying that a positive result at very high dilutions contains much more antibody or antigen. Again, these tests report antibody production; thus, while exposure is confirmed by a positive test, active infection may not be present.

BOTTOM LINE

A veterinary team with a basic understanding of point-of-care, PCR, and titer tests can make better-informed decisions about which tests to run in which patients, get more accurate results, and provide better care. 

Visit veterinaryteambrief.com/diagnostics-made-simple for the team handout.

