

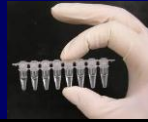


## Diagnosics

### 1. Methods to Detect Agent (Infection)

- A. 1. Immunologic – Ag Capture (examples: FeLV, fecal parvovirus)
- 2. Immunologic – Antibody (e.g. FIV)
- B. Molecular – PCR\* (examples: CDV, CPV-2, FHV-1, FPV, FCV, Leptospira, Bordetella)

\* Positive may not show infectious agent is present in samples, but does show the nucleic acid is present.



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## Diagnosics

### 2. Methods to Detect Antibody (Infection or Immunity)

- A. Virus Neutralization (VN, SN): CDV, FCV, FHV-1, CAV-1,2 - Immunity
- B. Hemagglutination Inhibition (HI): CPV-2, FPV, CIV- Immunity
- C. Agglutination (eg MAT): Leptospira
- D. ELISA – FIV, CPV/FPV, FeLV – Infection
- E. Fluorescence – Lyme – immunity and infection

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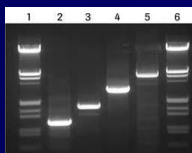
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## Diagnosics



### PCR for Infectious Agents

Many shelters and practices are having samples tested by this method. Excellent test, as it has high sensitivity and specificity! (Very New = Quality Control Lacking)

Idexx Lab and various State Diagnostic Laboratories

Interpretation of Results?  
Cost? Very Expensive Test

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## Diagnostics: PCR

How to interpret results:

Sensitivity – Cycle No.

$\leq 35$ : pos

$> 35 \leq 39$ : suspect

$\geq 40$ : neg

(These values vary somewhat among laboratories that perform the PCR.)

The lower the cycle number, the more positive the result!

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## How Does Vaccination Affect the Results of PCR Testing?

We and hopefully others are now and have been doing studies to try to answer this question!

Ideally, collect samples prior to vaccination with infectious (modified live) vaccines!



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## PCR Testing (cont.)

Our results suggest: Samples collected after vaccination can be positive for up to 2 or more weeks\*, depending on immune status of animal at time of vaccination and the vaccine.

\* Fecal samples for CPV-2 or FPV may be pos for more than 2 weeks! Use clinical signs of parvovirus infection and fecal SNAP test for diagnosis of CPV-2 or FPV, not PCR in animals vaccinated during previous 3 weeks.

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## PCR Testing (cont.)

CPV-2/FPV, CDV, CAV-2, FHV-1, FCV vaccinated\* dogs and cats positive for 2 or more (CPV-2/FPV) weeks when MLV vaccines are used.

\*rCDV and noninfectious vaccine do not cause the animal to become PCR Pos.!

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## PCR Testing (cont.)

Be very careful when collecting samples, as you can readily cross contaminate samples.

Contamination from another animal, from a sample, from a vaccine!

Remember – PCR is very sensitive!



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## PCR (cont.)

- When Collecting samples for PCR, be very careful to not contaminate samples e.g. change gloves
- Use PCR to ensure animal is no longer infected and shedding

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## Infectious Diseases Commonly Seen in Shelters

### Canine and Feline Infectious Respiratory Disease Complexes (“Canine and Feline Cold”)

PCR is of limited value  
as most animal will be  
Positive!



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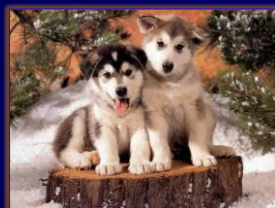
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## Canine Diseases

- Canine Distemper (CDV)  
– Vomiting/Diarrhea/Respiratory
- Canine Parvovirus (CPV-2)  
– Vomiting/Diarrhea

PCR is of value!  
Ag Fecal Parvo Snap



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## Feline Diseases

- Feline Parvovirus (Feline Panleukopenia)  
– Vomiting/Diarrhea

PCR is of value!  
Ag Fecal Parvo Snap



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## Miscellaneous

### Diseases/Infections To Test For:

- Idexx Feline Combo
  - Feline Leukemia Virus (FeLV) Ag
  - Feline Immunodeficiency Virus Ab (FIV)
- Idexx 4DX
  - Heartworm Ag
  - Ehrlichia Ab
  - Anaplasma Ab
  - Lyme (Borrelic) Ab (C6)
- Idexx Fecal Parvo Snap

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## What Do The Test Results Tell You?

### Dog That is CDV Positive

- Antibody (Ab) – Immune
- PCR – Infected
- Ab & PCR
  - Virus was or is present and antibody has developed
  - Virus may be neutralized and not infectious!

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## How to Reduce Costs When Using PCR

### Pool Samples

- Nasal swabs CDV
- Fecal swabs CPV-2, FPV



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## Dogs Infected with CDV

- Dogs with signs of kennel cough may be infected with CDV!
- CDV can cause kennel cough like condition!
- Incubation period can be up to 6 weeks!
- PCR – Positive



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## CDV

Incubation Period – up to 6 weeks  
PCR Pos. no Clinical Signs

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## Cats and Dogs with FPV or CPV

- Incubation period is usually 3 to 4 days.  
Can be up to 7 days!
- PCR - positive



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## FPV/CPV

Incubation period 3 to 7 days

PCR Pos. no Clinical Signs

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## PCR Positive Animals CDV, CPV-2, FPV

- Do not adopt these animals
- Hold them until PCR – Neg.
- Can Use PCR to ensure animal is no longer infected and shedding
- When collecting samples for PCR, be very careful to not cross contaminate samples e.g. change gloves
- Very sensitive test

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## Antibody Testing Can Be Performed By a Diagnostic Lab or In-House Tests are Available

Diagnostic labs often perform serologic tests that provide an antibody titer such as serum neutralization tests for CDV, CAV-1, rabies or hemagglutination inhibition (HI) tests for CPV-2, FPV. In-house tests are often ELISA based.

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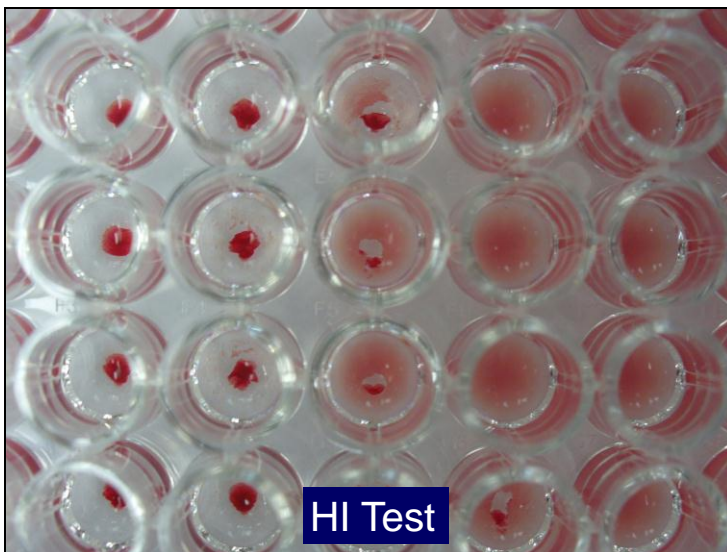
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**In House (On Site) Tests**

1. Titer CHEK™ - CDV and CPV-2 – ELISA – 96 well plate, multiple tests
2. VacciCheck™ - CDV, CPV-2, CAV-1 – Dog; FPV, FCV, FHV-1 – Cat – ELISA, Immunocomb, individual or multiple tests

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## On Site Tests

- There are two commercial “in-office” or “on-site” ELISA tests, TiterCHEK™ and VacciCheck™ that have been correlated with serum samples from dogs that resisted challenge with CDV and CPV-2 and also with the Gold Standard serologic tests

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## On Site Tests

### — TiterCHEK™ and VacciCheck™ —

- Very useful in puppies to ensure that there was an immune response to CDV/CPV-2 after their series of vaccinations
- If serum sample is collected 2 or more weeks after the last puppy vaccination the test should be positive for both viruses



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## TiterCHEK™ and VacciCheck™

- When the test is not positive, revaccinate and test again
- If the test is not positive after revaccination, further testing using the Gold Standard Test may be required



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## TiterCHEK™ and VacciCheck™

- A negative shows there is no antibody or it is lower than the minimum amount that can be detected

Titerchek -

<http://www.zoetis.com/>

VacciCheck -

<http://vaccicheck.com/>



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## Antibody Testing

Serum antibody correlates with protection from the following diseases:

Dog: CAV-1, CDV, CPV-2, Rabies, Lyme (borreliacidal Ab)

Cat: FPV, FCV?, Rabies

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## Antibody Response to Vaccines

The detection of antibody as a result of vaccination with an infectious vaccine (MLV, attenuated, viral vectored recombinant) demonstrates development of B and T cell immunity! All complex antigens require T cell help to get a B cell to differentiate and produce antibody.

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## Antibody Testing (cont)

When using antibody tests to demonstrate vaccinal immunity, they are useful:

1. To demonstrate immunity after completing the puppy or kitten series. Take a blood sample 2 or more weeks after last vaccination at 14 to 16 weeks or older. If the test shows antibody is present, the animal has developed immunity!

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## Antibody Testing (cont)

2. To demonstrate the animal is immune one year or more after vaccination – I don't recommend retesting more often than every 3 years after demonstrating the animal is positive at one year.



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## How Can Antibody Testing be Used in Kennels/Shelters?

Shelters having significant problems with dogs getting infected with CDV or CPV-2 or cats getting infected with FPV, antibody testing and vaccination at admission are important in controlling and/or eliminating the problem!



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## Outbreaks – PCR Pos. Animals CDV, CPV-2, FPV

Do not adopt these animals.  
Keep them until PCR – Neg.

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## How to Reduce Costs When Using PCR

### Pool Samples

Nasal swabs CDV

Fecal swabs CPV-2,  
FPV



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## Vaccines that Every Shelter Animal Should Receive at or Prior to Admission

- Canine: (Shelter Core Vaccines)

- CDV/CPV-2/CAV-2/CPI-5 (Combo)
- Bb/CPI – IN or Bb – IN or Oral

- Feline: (Shelter Core Vaccines)

- FPV/FCV/FVR

- Canine & Feline: Receive at Adoption

- Rabies Vaccine – 3 yr. product



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Additional Notes: