

SNAP Feline Triple Test

Test for feline leukemia virus, feline immunodeficiency virus and feline heartworm with a single blood draw

Feline leukemia virus (FeLV) and feline immunodeficiency virus (FIV) infect cats worldwide.¹ Cats living in areas where *Dirofilaria immitis* is present in dogs are at risk of developing feline heartworm disease (FeHW).² The in-house IDEXX SNAP* Feline Triple* Test detects FeLV antigen, FIV antibodies, and *D. immitis* antigen in serum, plasma, or anticoagulated whole blood.

FeLV is a member of the retrovirus family and has the ability to insert a DNA copy of its RNA genome into the DNA of the host cell. Transmission occurs between cats with close contact to each other primarily through the oral nasal route or bite wounds. Vertical transmission can also occur between a queen and her kittens.¹ Clinical signs can be directly related to retrovirus infection or due to diseases that are secondary to the immunosuppressive effects of the retrovirus and may include coinfections (FIP, FIV, upper respiratory, hemotropic mycoplasma, stomatitis), lymphoma, anemia, thrombocytopenia, leukopenia, pancytopenia, leukemia, and myeloproliferative disease.³

FeLV has several distinct stages:

- + Abortive infection—The host immune system eliminates the virus after initial infection.¹
- + Regressive infection—The FeLV proviral DNA is integrated into the host cells, but an effective immune response suppresses viral replication, which decreases virus shedding.^{1,4} With proper care, these cats can live long lives. Reactivation of the virus can cause these cats to advance from a regressive stage to a progressive stage.¹
- + Progressive infection—An ineffective immune response allows viral shedding, which makes these cats a source of infection for other cats.^{1,4}
- + Focal or atypical infection—Some feline researchers consider a fourth stage of FeLV called focal or atypical infection. In this case, the infection is limited to a certain tissue or organ with intermittent shedding of the virus.⁴

For more information on staging FeLV, see *Updates in the Diagnosis and Management of Feline Leukemia Virus (FeLV)*.

FIV is also a member of the retrovirus family. It is shed in high concentrations in the saliva and is mostly transmitted through bite wounds during a cat fight. This makes outdoor cats more vulnerable to infection. A strong but ineffective host immune response is mounted leading to the production of antibodies. Cats typically do not show significant clinical signs after initial infection and enter a clinically asymptomatic phase. The clinical phase is characterized by clinical signs that reflect opportunistic infections, neoplasia, myelosuppression, and neurologic disease.³ FIV-infected cats can fluctuate between asymptomatic and clinical stages.⁵

Cats are not an ideal host for *D. immitis*, the causative agent of heartworm disease, but *D. immitis* is transmitted from dogs and other definitive hosts to cats by mosquitos in tropical and temperate climates. Endemic areas for heartworm are expanding due to warmer temperatures and longer warm seasons caused by global warming.⁶ The mosquito deposits third-stage larvae in the cat's tissues during a bloodmeal. The larvae then migrate through the subcutis to a peripheral vein with final maturation occurring in the pulmonary artery. In the cat, many immature parasites die during migration or after reaching the pulmonary artery. The death of immature and mature parasites can lead to severe pulmonary inflammatory reactions or heartworm-associated respiratory disease (HARD).⁶ Some cats are completely asymptomatic for heartworm disease, while others show clinical signs, such as chronic respiratory disease, vomiting, malaise, weight loss, and unexpected death.⁷ Screening cats for heartworm disease helps detect the presence of feline heartworm in the area.

Materials and methods

Excess volume from samples originally submitted to IDEXX's global reference laboratories for diagnostic purposes were obtained in accordance with laboratory terms and conditions. Samples were run on both the SNAP Feline Triple Test and the reference method. Sensitivity and specificity with 95% confidence limits were calculated.

Reference methods

+ FeLV—PetChek* Feline Leukemia Virus Antigen Test

+ FIV—FIV Western blot

+ FeHW—PetChek* Heartworm PF Antigen Test

Results

Analyte	SNAP Feline Triple result	Reference method result		Total	Sensitivity (95% CL)
		+	–		Specificity (95% CL)
FeLV	+	158	2	160	100% (97.7%–100%)
	–	0	247	247	99.2% (97.1%–99.9%)
FIV	+	95	4	99	100% (96.2%–100%)
	–	0	180	180	97.8% (95.4%–99.4%)
FeHW	+	37	0	37	90.2% (76.9%–97.3%)
	–	4	215	219	100% (98.3%–100%)

Source: Data on file at IDEXX Laboratories, Inc. Westbrook, Maine USA.

Conclusion

In conclusion, the SNAP* Feline Triple* Test provides excellent sensitivity and specificity for FeLV/FIV infection and good sensitivity with excellent specificity for heartworm antigen. This test offers a practical in-clinic solution to screen for heartworm with the same sample used to screen for FeLV and FIV.

References

1. Little S, Levy J, Hartmann K, et al. 2020 AAFP Feline Retrovirus Testing and Management Guidelines. *J Feline Med Surg*. 2020;22(1):5–30. doi:10.1177/1098612X19895940
2. Executive Board of ESDA. *Guidelines for Clinical Management of Feline Heartworm Disease*. European Society of Dirofilariosis and Angiostrongylosis. 2017. Accessed July 25, 2023. www.esda.vet/media/attachments/2021/08/19/feline-heartworm-disease.pdf
3. Sellon RK, Hartmann K. Feline immunodeficiency virus infection. In: Greene CE, ed. *Infectious Diseases of the Dog and Cat*. 4th ed. Elsevier; 2012:136–149.
4. Hofmann-Lehmann R, Hartmann K. Feline leukaemia virus infection: A practical approach to diagnosis. *J Feline Med Surg*. 2020;22(9):831–846. doi:10.1177/1098612X20941785
5. Hartmann K. Clinical aspects of feline retroviruses: a review. *Viruses*. 2012;4(11):2684–2710. doi:10.3390/v4112684
6. Pennisi MG, Tasker S, Hartmann K, et al. Dirofilariosis in cats: European guidelines from the ABCD on prevention and management. *J Feline Med Surg*. 2020;22(5):442–451. doi:10.1177/1098612X20917601
7. Jones S, Graham W, von Simson C, et al; Executive Board of the American Heartworm Society. *Current Feline Guidelines for the Prevention, Diagnosis, and Management of Heartworm (Dirofilaria immitis) Infection in Cats*. American Heartworm Society. 2020. Accessed July 25, 2023. https://d3ft8sckhnqim2.cloudfront.net/images/pdf/2020_AHS_Feline_Guidelines_11_12.pdf?1605556516