

Zoonotic and Infectious Disease Surveillance in Central America: Honduran Feral Cats Positive for Toxoplasma, Trypanosoma, Leishmania, Rickettsia, and Lyme Disease

MAJ Michael McCown, DVM; SFC Benjamin Grzeszak, 18D

ABSTRACT

A recent zoonotic and infectious disease field surveillance study in Honduras resulted in the discovery of Toxoplasma, Trypanosoma, Leishmania, Rickettsia, and Lyme disease with significantly high prevalence rates in a group of feral cats. All five diseases – toxoplasmosis, trypanosomiasis, leishmaniasis, rickettsiosis, and Lyme disease – were confirmed in this group of cats which maintained close contact to local civilians and U.S. personnel. These diseases are infectious to other animals and humans primarily through vector transmission or ingestion. In the austere Central and South American sites that Special Operations Forces (SOF) medics are deployed, the living conditions and close quarters are prime environments for the potential spread of infectious and zoonotic disease. This study's findings, as with previous veterinary disease surveillance studies, emphasize the critical need for continual and aggressive surveillance for zoonotic and infectious disease presence within animals in specific areas of operation (AO). The importance to SOF is that a variety of animals may be sentinels, hosts, or direct transmitters of disease to civilians and servicemembers. These studies are value-added tools to the U.S. military, specifically to a deploying or already deployed unit. The SOF medic must ensure that this value-added tool is utilized and that findings are applied to assure Special Forces Operational Detachment - Alpha (SFOD-A) health and, on a bigger scale, U.S. military force health protection and local civilian health.

INTRODUCTION

Deployment Health Surveillance (DHS) continues to be crucial to current and future military operations in order to protect U.S. servicemembers from disease, occupational, and environmental hazards.¹⁻³ The veterinary application to the DHS and the SOF medic's integrated and integral role was previously described in this *Journal*.⁴ These studies and articles specifically call upon the SOF medic to apply two U.S. Army veterinary public health mission priorities – zoonotic and infectious disease surveillance and food/water safety – to enhance mission success by protecting force health.

During recent deployments to Central America, zoonotic and infectious disease field surveillance studies were performed. A group of animals in contact with a specific segment of local population and U.S. troops was selected and blood tested. The goal of this study is to enhance mission success in Honduras and other Central American AOs by enhancing force health

protection. Disease surveillance findings increase mission planners' health knowledge for specific AOs and medical planning for select missions. This will assure force health protection and the force's ability to accomplish the mission. The politically and culturally sensitive Humanitarian/Civil Assistance (HCA) SOF missions will be enhanced by integrating disease surveillance into SOF operational planning.

This article's intent is to provide the SOF medic and SOF community the findings of zoonotic and infectious disease surveillance study in a Central American AO. Past SOF surveillance studies' findings of *canine ehrlichiosis*⁵ and *equine infectious anemia*⁶ in South American military working dogs and horses, respectively, should be referenced. These types of surveillance studies give a clearer picture of endemic or emerging disease and the medical risk of disease to U.S. personnel and the local civilian populations. This disease surveillance study was designed to determine dis-

ease prevalence rates and risk to US forces operating in the area. Data, if obtained, is usually incomplete or outdated from these types of rural regions.

DISEASE SURVEILLANCE RESULTS

The following disease surveillance study results are from an actual SOF AO in Honduras. The animal study group selected was feral/stray cats in the vicinity that had contact with U.S. personnel and local civilians. Further, this group of cats lived in an enclosed, fenced community limiting movement in or out. It was determined that the group consisted of 50 cats of varying ages. Some cats (an estimated 20%) were friendly enough to be held, fed, and housed. A representative sample of 12 cats, or 24%, out of the 50 cats were sampled. Cats were safely trapped by trained veterinary personnel. The cats were examined for outward signs of disease, and ectoparasites were collected for identification. Blood samples were obtained and an IDEXX SNAP® Feline Triple® Test⁷ was used on-site to test for Feline Immunodeficiency Virus (FIV), Feline Leukemia Virus (FeLV), and Feline Heartworm (FHW) disease.

None of the cats tested positive for FIV, FeLV, or FHW disease. More specific laboratory testing (IFA screen at 1:32 and 1:64) of the remaining blood samples confirmed the presence of *Toxoplasma gondii*, *Leishmania donovani*, *Trypanosoma cruzi*, *Rickettsia rickettsii*, and *Borrelia* species (Lyme disease).

The prevalence rates of disease in the representative sample group of 12 cats (from the 50 cat group) were as follows:

- *Toxoplasma gondii* 33% prevalence rate (4 positive out of 12 cats)
- *Leishmania donovani* 25% prevalence rate (3/12)
- *Trypanosoma cruzi* 16% prevalence rate (2/12)
- *Rickettsia rickettsii* 16% prevalence rate (2/12)
- Lyme disease 25% prevalence rate (3/12)

DISCUSSION

In the current austere Central and South American areas that SOF medics are deployed, the living conditions and close quarters set a prime environment for the spread of a variety of diseases, including these zoonotic diseases. The initial signs and symptoms of some of these zoonotic diseases can be similar to the usual symptoms of a sick teammate. These symptoms include headache, general malaise, diarrhea, dermatitis (i.e., rash), nausea, fever and vomiting, all of which a SOF medic commonly blame on the local water supply or food preparation. Given the results of the study, the SOF medic must see the value of disease surveillance testing in animals. The SOF medic can examine,

evaluate, and test the domestic animals near the detachment's living quarters at the beginning of the deployment to get an estimate on possible ectoparasites or zoonotic infectious diseases in the area. This information will give the SOF medic a hand in developing a differential diagnoses for future treatments of teammates while deployed, especially in remote areas where sending blood off to be cultured or tested is a complicated endeavor.

The parasitic protozoon, *toxoplasma gondii*, is the causative agent for toxoplasmosis. The SOF medic should be aware that Toxoplasmosis is implicated in causing fetal death in pregnant women and serious effects to an immunocompromised person.

T. gondii tissue cysts are ingested by a cat, the definitive host, when feeding on infected small animals such as rodents. *T. gondii* oocysts are then shed in the cat's feces. Other animals and humans may become infected after ingesting these oocysts.⁸ This may occur when eating improperly washed fruits/vegetables, when eating improperly cooked meats, or in cases of poor hygiene. Pregnant women should be advised not to clean cat litter boxes due to the potential for fecal-oral transmission. The SOF medic has the opportunity to educate U.S. personnel as well as a local civilian community on improving personal hygiene (proper hand washing) and prevention of this disease.

Trypanosoma cruzi is the parasitic causative agent for trypanosomiasis diseases in humans and animals. The Reduviidae bug vector deposits feces on the skin of an animal or human and then bites. The host then scratches the superficial bite area allowing penetration of the infected feces.⁹ The SOF medic must be aware that human American trypanosomiasis, also known as Chagas disease, is a very prevalent disease in Central and South American and is known to have fatal consequences.

The protozoon, *leishmania donovani*, is the causative parasite for leishmaniasis. Spread through the cutaneous bites of sand flies, the three types of leishmaniasis are cutaneous, mucocutaneous, and visceral leishmaniasis.¹⁰

Rickettsia rickettsii is the bacterium responsible for Rocky Mountain spotted fever. This bacterium is passed to humans and animals through the bites of *Dermacentor* species ticks, serving as both reservoirs and vectors.¹¹

Borrelia burgdorferi is the causative bacterium responsible for Lyme disease, passed through the bite of the *Ixodes* species tick (deer tick), the primary tick vector.¹²

Along with animal blood testing, concurrent ectoparasite surveillance, sampling, and identification provide useful information to mission and medical planners. The U.S. Army Center for Health Promotion and Preventive Medicine (USACHPPM) Tick Test Kits are now available [USACHPPM is now the U.S.

Army Public Health Command (Provisional)]. These kits provide sampling containers and shipping materials for ectoparasite field surveillance (see photo). The ectoparasite samples, such as ticks and fleas, are sent to USACHPPM [USAPHC (Prov)] to be identified and tested for disease organisms they may be carrying. Such diseases caused by ectoparasites include *Bartonella* (bartonellosis), *Borrelia* (Lyme disease), *Babesia*, *Dirofilaria* (heartworm disease), *Ehrlichia* (ehrlichiosis), and *Anaplasma* (anaplasmosis). To order test kits, call 410-436-3616 DSN 584.

CONCLUSION

The findings of this research confirm the presence of infectious and zoonotic diseases in a Central American SOF AO. The five diseases all have different vectors or means to infect humans and animals. Therefore, SOF medics must assure comprehensive preventive measures for all U.S. personnel operating in these areas, as well as educating local civilian communities.

The goal of this article is to increase the SOF medic's knowledge and awareness of zoonotic and infectious disease threats through surveillance studies in animals. Additionally, the USACHPPM [USAPHC (Prov)] Tick Test Kit ectoparasite field surveillance tool was identified for the SOF medic's use. These findings emphasize the critical need for continual and aggressive field surveillance for zoonotic and infectious disease presence within animals. These diseases have the capability of significantly impacting mission accomplishment by affecting force health. Without question, the surveillance studies are value-added tools to the U.S. military, specifically to a deploying or already deployed conventional or SOF unit. The SOF medic must ensure this capability is planned for, used, and directly applied to assure SFOD-A health and mission.

Note: The authors included the IDEXX SNAP® test kits as an example for the 18D, but do not endorse this product.

The authors extend a very special thanks to Mr. Ed Cooper for his invaluable laboratory testing and expertise.



REFERENCES

1. DoD Instruction 6490.03, Deployment Health, 11 AUG 2006.
 2. Memorandum from the Chairman (MCM) 0028-07, Procedures for Deployment Health, 2 NOV 2007.
 3. USSOCOM Directive 40-4, Deployment Health and Medical Surveillance, 20 MAR 2007.
 4. McCown M, Grzeszak B, Rada J. (2009). Veterinary public health essentials to deployment health surveillance: Applying zoonotic disease surveillance and food/water safety at SOF deployment sites, *Journal of Special Operations Medicine*; Vol 9,Ed 4:26-31.
 5. McCown M. (2005). Infectious disease discovered in Colombian military working dogs, *Journal of Special Operations Medicine*; Vol 5,Ed 2:66-70.
 6. McCown M. (2005). South American military working horses positive for equine infectious anemia, *Journal of Special Operations Medicine*; Vol 5,Ed 3:12-16.
 7. IDEXX Laboratories In-House Tests. Retrieved from (www.idexx.com/animalhealth/testkits/triple).
- ONLINE REFERENCES FOR FORWARD DEPLOYED MEDICS:**
8. (en.wikipedia.org/wiki/Toxoplasma_gondii)
 9. (en.wikipedia.org/wiki/Trypanosoma_cruzi)
 10. (en.wikipedia.org/wiki/Leishmania)
 11. (en.wikipedia.org/wiki/Rocky_Mountain_spotted_fever)
 12. (en.wikipedia.org/wiki/Lyme_disease)

MISCELLANEOUS TEXT REFERENCES

Fowler, Murray. *Biology, Medicine, and Surgery of South American Wild Animals*. Iowa State University Press, 2001.

Hugh-Jones, Martin. *Zoonoses*. Iowa State University Press, 1995.

Samuel, William. *Parasitic Diseases of Wild Mammals* (Second Edition). Iowa State University Press, 2001.

Wall, Richard. *Veterinary Ectoparasites: Biology, Pathology and Control* (Second Edition). Blackwell Science Ltd, 2001.

Dr. McCown is an UF CVM graduate and had the distinct honor and privilege to work with SOF medics and other SOF NCOs while serving on active duty with SOF thru 2005.

SFC Benjamin Grzeszak is a Special Forces Medical Sergeant currently assigned to 7th SFG(A). He has served three combat tours with 7th SFG(A) in Afghanistan in support of the Global War on Terrorism and two deployments to South America.