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# Canine Infectious Diseases: Potential Transferability to Humans?

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## INTRODUCTION

Operating in austere environments and far-forward combat zones, Air Force military working dogs (MWD) are responsible for the detection of IEDs, mines and other explosives based on their heightened olfactory abilities. MWD are also recognized force multipliers and effective psychological deterrents in an operational environment.

**Enhance Operational Effectiveness:** Ensuring deployed MWD have 100% olfactory capability improves mission success by maximizing hazard identification of explosives and alerting human handlers to the presence of contraband.

**"War Dogs" are unique assets in force preservation, and thus canine respiratory health is an important factor in maximizing operational effectiveness.** Infection with a Canine Infectious Respiratory Disease<sup>1</sup> (CIRD) pathogen may lead to respiratory tract damage in the MWD and subsequent superinfection with a pathogen of greater severity. Bacterial superinfection with a pathogen such as *Streptococcus equi* subspecies *zooepidemicus* may lead to pulmonary hemorrhage, pleural effusion, and sudden death within 24 hours unless rapidly diagnosed and treated with effective antibiotics.<sup>2</sup>

As with many communicable diseases, early detection facilitates early treatment for infected animals. Enhanced detection capabilities can reduce deployment and operational delays caused by illness in handler-canine teams. Additionally, some canine pathogens can be transmitted to human handlers or caretakers. Rapid diagnosis afforded by a diagnostic tool can prevent respiratory outbreaks in MWD training populations, detect pathogens in deployed MWD, and enhance job effectiveness/efficiency of human handlers and veterinarians caring for the MWD.

The immediate goal of this effort is to maximize the effectiveness of US military canine assets. The objective is the design and validation of a rapid point of care diagnostic intended for use "cage-side" to detect pathogens and diagnose respiratory infections in Military Working Dogs (MWD) at the Lackland-Medina Canine Facility. The goal is to develop a handheld tool that reduces the current turn-around time from 3-7 days to < 1 hour.

**Supports MWD medical needs (JBSA-Lackland and Worldwide):** Enhances the capability to rapidly detect, diagnose and facilitate treatment of respiratory infections in MWD housed in CONUS facilities and can be developed for use in OCONUS environments.

The long-term impact of this study is to develop the rapid POC methodology for use in austere environments. This platform can also be modified to augment and improve health and security initiatives or objectives in Veterinary Global Health Engagement. Ultimately, the utility of a single, well developed and validated diagnostic tool can be applied in a deployed environment to assist the Combatant Commander in achieving Theater Campaign objectives by improving human security.

**Advances Veterinary Global Health Engagement (GHE) and TCP objectives:** Bridges identified gaps in public and animal health surveillance and detection, which strengthens animal health capacity in military assets and within partner nation framework.

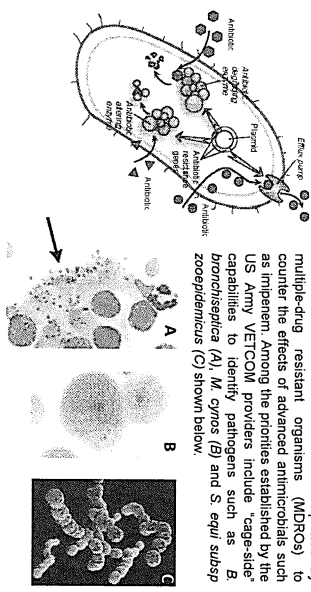
## Strategic Plan

Phase I— Develop diagnostic tools for three common CIRD bacterial pathogens including *Streptococcus equi* subspecies *zooepidemicus*, *Mycoplasma cytos*, *Bordetella bronchiseptica*, and validate to determine diagnostic parameters.

Phase II— Adapt chip technology developed for use in veterinary pathogen POC diagnostics. Validate hand-held platform for field use. Stress test in rugged environments using real-world samples.

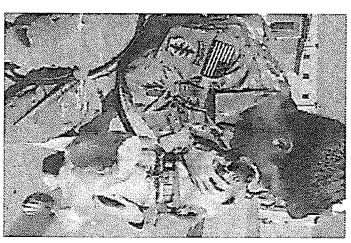
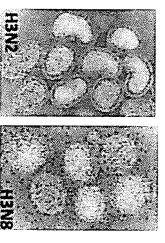


As force multipliers, strong team bonds form between MWDs and their human handlers. Therefore it is critical both halves of the team remain healthy. In support of full spectrum readiness, handlers must also recognize how seasonal respiratory pathogens can affect their MWDs in different geographical areas of responsibility.



LEFT: Some of the mechanisms exploited by multiple-drug resistant organisms (MDROs) to counter the effects of advanced antimicrobials such as imipenem. Among the priorities established by the US Army VETCOM providers include "cage-side" capabilities to identify pathogens such as *B. bronchiseptica* (A), *M. cytos* (B) and *S. equi* subspecies *zooepidemicus* (C) shown below.

RIGHT: Canine Influenza Virus (CIV) H3N2 and H3N8. Due to recent outbreaks in the Midwest and along the Appalachian Mountains, a nation-wide CIV monitoring network has been established which includes Texas A&M University and Cornell University among other Veterinary Diagnostic Labs.



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