

HORSE HEALTH

This horse health resource sheet is produced by the Western College of Veterinary Medicine's Equine Health Research Fund (EHRF).

With grassroots support from Western Canada's horse industry, the EHRF conducts vital horse health research, trains graduate students in specialized areas of horse health, provides a summer research program for veterinary students, and promotes awareness of horse health care and management among western Canadian horseowners.

Visit www.ehrf.usask.ca for more information about the EHRF.



EHRF 2009-10 Research Grants

The Western College of Veterinary Medicine's Equine Health Research Fund has allocated a total of \$69,000 to five new equine health research projects — all of which cover topics of vital importance for researchers and for horse owners.

This year's studies focus on several critical conditions in horses including equine sarcoids, equine influenza, endotoxemia and endometritis. A fifth study is an analysis of a new analgesic (pain killer) — an investigation that focuses on WCVN's continued efforts to improve the effectiveness of anesthetic protocols for horses and other species.

Dr. Gillian Muir, acting associate dean of research at the WCVN, says all of the projects will help to advance ongoing investigations of these health issues and take things to the next step.

“Backed by the team members' extensive knowledge of the subject and their experience, our research teams will quickly reach the point where they're exploring new possibilities for solving key issues related to these conditions.”

What does that mean for horse owners and equine veterinarians? As Muir points out, the College's scientists are continuing to make significant research contributions toward the world's development of new diagnostic and therapeutic options for horses. At the same time, EHRF-supported studies provide graduate students with specialized training in equine health research.

What's the best way to characterize and localize BPV?

Drs. Andy Allen, Bruce Wobeser, Janet Hill and Beverly Kidney, WCVN

Many scientists consider *bovine papillomavirus* (BPV) as the cause of sarcoids, benign skin tumours that are often diagnosed in horses. However, recent studies have shown that BPV DNA is also found in the normal skin and in non-sarcoid skin lesions of horses. These findings compromise researchers' understanding of the cause and transmission of sarcoids.

Determining the role of BPV in sarcoids and developing effective non-invasive tests will have a positive impact on diagnosis and treatment. During the next year, a WCVN research team will detect and determine the genotype of BPV in 100 biopsies of inflammatory skin lesions taken from equine patients in Western Canada. Next, researchers will compare the data with BPV information that they previously collected during an investigation of sarcoid tissue biopsies taken from western Canadian horses.

The research team will examine all BPV-positive samples using three novel techniques — laser capture micro-dissection followed by polymerase chain reaction (PCR), *in situ* PCR, and *in situ* loop mediated isothermal amplification (LAMP) — for the purpose of determining the precise location of BPV within each biopsy. These three techniques will be evaluated as possible test methods for sarcoids and may potentially benefit other studies at WCVN.

Can we find better ways to block the equine flu virus?

Drs. Matthew Loewen and Hugh Townsend, WCVN

Equine influenza A virus is a common respiratory disease that causes fever, cough, and runny noses and sometimes death in affected horses. Although its effects are usually short term, the

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virus is considered a serious threat to the horse industry. This is especially true for the racing sector where flu outbreaks can cause huge financial losses. The influenza virus is highly contagious, spreading very quickly through an equine population, and it easily mutates, developing resistance to current antiviral medications. Four antiviral medications are currently available, but their effectiveness for prevention and treatment decreases as the virus mutates.

In this study, Drs. Matthew Loewen and Hugh Townsend of the WCVM will analyze millions of commercially available compounds and identify those possessing the characteristics needed to combat the virus. Specifically, the researchers are seeking compounds that effectively block the *M2 proton-selective ion channel* whose function is essential for viral replication. Within that group of identified compounds, future testing will determine their viability as antiviral medications. The researchers will also develop a physiological screening tool for the purpose of generating new compounds with antiviral capabilities that can be developed into medications.

This study's findings and future research will establish an arsenal of antiviral medications that can provide additional options as the virus gains resistance to current drugs.

Is long pentraxin-3 (PTX-3) a therapeutic target?

Drs. Baljit Singh and Sarabjeet Suri, WCVM

Horses are extremely susceptible to sepsis-associated multiple organ inflammation and mortality — one of the major causes of economic losses to the horse industry. Sepsis and endotoxemia are generally associated with acute lung injury and acute respiratory distress syndrome. Blood-borne bacteria and endotoxins activate *neutrophils* — blood cells that act as first responders in bacterial inflammations and are central to acute lung injury and tissue damage. These neutrophils contain *long pentraxin-3 (PTX-3)*, a newly identified protein that has been recognized as a factor in human lung injuries but has not yet been characterized in horses.

Because PTX-3 may play an important role in this inflammation, investigating its structure as well as the signalling mechanisms that regulate it may lead to effective new therapies. In this two-year study, Drs. Baljit Singh and Sarabjeet Suri will compare normal and activated blood neutrophils as well as normal and inflamed lungs of the horse. They will investigate the gene code of PTX-3 and will study *cytokines*, the proteins that signal immune cells, to determine their role in inducing production of PTX-3. Researchers will also investigate the cell signalling pathways that regulate the structure of PTX-3.

Is remifentanyl a useful analgesic for equine patients?

Drs. Tanya Duke, Peter Brassel and Joe Bracamonte, WCVM; and Dr. Jane Alcorn, College of Pharmacy and Nutrition, U of S

Because general anesthetics like isoflurane don't have strong analgesic properties, surgical teams must administer additional analgesic drugs intravenously during procedures such as the surgical repair of bone

fractures. These procedures require manipulations that can cause intense pain for equine patients. Although morphine has been widely used to control this pain, it often triggers undesirable side effects in horses such as excess excitement during the recovery period.

Finding an effective analgesic with minimal side effects, particularly in horses, is critical. *Remifentanyl* is a potent opioid currently used in dogs that has a fast and unique metabolism and quickly leaves the system, thus minimizing side effects and speeding the recovery period. This new drug could potentially provide adequate pain relief and reduce recovery time of horses without compromising them during or after surgery.

In this study, Dr. Tanya Duke and anesthesia resident Dr. Peter Brassel will work with six research horses to compare the effectiveness of remifentanyl to that of morphine. They will assess its usefulness as an analgesic, observe any side effects during surgery and recovery, and analyze the process by which it leaves the circulatory system. Based on their findings, the researchers will be able to determine whether remifentanyl is a suitable opioid analgesic for horses.

How do TLRs and cytokines regulate immune response in the uterus?

Drs. Claire Card, Sarah Eaton, Baljit Singh and Manuel Chirino-Trejo, WCVM

Endometritis (excessive uterine inflammation) is caused by a mare's immune response to sperm, debris and to bacteria such as *Streptococcus equi subsp zoepidemicus* and *E. coli*. This condition, which affects more than 15 per cent of broodmares, costs the equine industry millions of dollars each year from high veterinary costs, poor conception rates, late foals and more barren mares.

Recent research points to the role of Toll-like receptors (TLRs) and cytokines in regulating immune responses in the uterus. TLRs recognize conserved molecular structures of bacterial pathogens and activate downstream production of pro-inflammatory cytokines.

During the next two years, WCVM researchers will continue to investigate the role of TLRs and pro-inflammatory cytokine expression in mares receiving intra-uterine challenges with *S. equi subsp zoepidemicus*, *E. coli*, seminal plasma or sperm. Specifically, the research team will compare TLRs and pro-inflammatory cytokines of mares resistant or susceptible to endometritis to these common uterine challenges.

By gaining a better understanding of the role of TLRs and cytokines and learning more about the reactions of mares resistant or susceptible to endometritis, the WCVM research group hopes to develop more effective treatment strategies for the disease.

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