



VIRGINIA VETERINARY NOTES

VIRGINIA-MARYLAND REGIONAL COLLEGE OF VETERINARY MEDICINE

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Kent C. Roberts, DVM
Extension Veterinarian

LYME BORRELIOSIS: AN IMPORTANT ZONOTIC DISEASE

Lyme borreliosis is a multisystemic, spirochetal disease which affects man and other mammals. Veterinarians are considered at risk for this disease.

Transmission: Borrelia burgdorferi, the causative agent, can be transmitted by several species of ticks, but other insects have been questioned as biological or mechanical vectors. Spread without presence of a vector has been shown in animals. Urine transmission has been considered by several researchers.

Clinical Signs: The following information is from the human literature. Man may be a good animal model.

Skin lesions: The erythema migrans rash may not be present in a significant number of human cases. Other skin lesions include hives, reddening of the cheeks, red patches, and swelling of the eye lids. Some patients manifest no skin lesions.

Arthritis: The arthritis may be brief with no objective findings, or severe with marked synovitis and effusion. Large joints are most commonly affected, but any joint may be involved. Diagnoses consistent with Lyme disease include juvenile rheumatoid arthritis, lupus suspects, and collagen vascular disorders.

Neurologic symptoms: These symptoms are due to a low grade meningitis with a low grade encephalitis (in some cases). Severe fatigue, malaise, generalized pain, and memory loss are common findings. Additional findings include headache, neck and back pain, tremor, and low grade, fluctuating fevers. The patient may be cold and clammy, and unable to keep warm. These symptoms are often fluctuating. Differential diagnoses include; depression, disc disease, brain tumors, Alzheimer's disease, multiple sclerosis, and Chronic Fatigue Syndrome.

Cardiac findings: Palpitations are common and may be dismissed as normal. Bradycardia, tachycardia, and heart block can occur. Congestive heart failure may also occur.

Reproductive symptoms: Both sexes may have gonadal pain and loss of libido. Women may have irregular cycles and stop cycling altogether. Miscarriage, still birth, and congenital problems have occurred in pregnant women infected with B. burgdorferi.

Eye: Uveitis, vitritis, edema of the optic nerve, and chronic conjunctivitis can occur. Blindness has been documented.

Other systems: There are reports of infections involving muscle, vertebrae, liver, kidney, and spleen. Gastrointestinal problems have been associated with this disease.

Animal Borreliosis: All of the symptoms above may occur in animals. I strongly believe I have seen neurologic, rheumatic, and cardiac disease in dogs, and neurologic disease in cats.

Diagnostic Tests: Testing for this disease is in its infancy. Serologic tests and urine antigen tests may have false positives and false negatives. Culturing is generally unrewarding. At this time, response to antibiotic treatment has been my best diagnostic tool in animals.

Diagnostic Criteria: These criteria have not been officially published for man. The CDC criteria of the EM rash or positive serology with one major symptom (rheumatic, neurologic, cardiac) are not to be used as diagnostic criteria but for surveillance purposes only. At this time, many physicians group patients as; definite (culture proven, and those meeting CDC criteria), probable (2 or more major symptoms, other diseases ruled out) and possible (1 major symptom).

Treatment: Doxycycline has replaced tetracycline as the oral treatment of choice, with amoxicillin showing major promise at high doses in late stage Lyme disease. I.V. antibiotics used most commonly are ceftriazone (Rocephin), cefotazime (Claforan), and ampicillin. Successful treatment of late stage human Lyme borreliosis may require months to years of continuous antibiotic therapy. The use of cortisone is controversial. --Wendy P. Feaga, DVM, December 1990. Dr. Feaga is a small animal practitioner. (Dr. Feaga will speak in Charlottesville on March 28).

Note: This paper is a condensation of a 45 page handbook Dr. Feaga has prepared from health department material and papers presented at the Lyme Borreliosis Foundation symposium held in Florida in March, 1990. If you think you have Lyme disease, have clients with the disease, or want to learn more, please write. The cost is \$5 including postage. Wendy P. Feaga, DVM, 13151 Triadelphia Rd., Ellicott City, MD 21043.

B-MODE REAL TIME ULTRASOUND OF THE CANINE FETUS

Between 14 and 16 days of gestation, fetal sacs may be detected with close inspection. By day 20 or 21, the fetal pole with a fetal heart beat can be detected. Fetal membranes become evident and change in position between days 21 and 30. Fetal structures are also beginning to be recognized during this time. By day 31-33, fetal motion and early fetal mineralization is observed. This mineralization is first detected in the fetal mandible. Mineralization of the fetal skull and spine follow rapidly. Visceral organs such as the heart, liver and bladder become recognizable at around days 33 to 36. There is not a good distinction between the thoracic cavity and the abdominal cavity until approximately day 45. At that time the lungs become more hyperechoic (i.e., seen as white on ultrasound screen). Fetal vessels are identified approximately by day 35. By day 39, the fluid-filled stomach, the ventricles of the brain and the fetal blood flow in the umbilical vein, artery and ductus venosus are clearly defined. The kidneys are identified by day 43. Mineralization of the ribs is sufficient to create shadows over the thorax. By day 53, the visceral organs, including the duodenum, and stomach arteries are distinctly seen. The thymus and cranial mediastinum and faint motility are seen by days 58 to 63.

Fetal death is identified by the lack of a fetal heart beat. There may be differences between fetuses in size and maturity that may suggest a potential problem with a fetus. A slowed heart beat may be indicative of probable fetal demise. After fetal death, the normal echoic appearance between the thoracic and abdominal cavities (after fetal age of 45 days) become confluent. Visceral organs become indistinct and hypoechoic. The fluid in the fetal sac changes from anechoic (i.e., seen as black on ultrasound screen) to echoic. Gas may be detected in the fetus. --Kathy Spaulding, DVM, Diplomate, ACVR, "Ultrasound of the Reproductive Tract in the Dog and Cat", Animal Ultrasound Seminar and Wet Lab Syllabus, Oct. 13-15, 1989, Raleigh, North Carolina as reported in Veterinary Quarterly Review, Volume 5, Number 4, Winter 1989-90 and Animal Health Beat, University of Nevada, Reno, Vol. 6, No. 9, November 1990.

BRAINSTEM AUDITORY EVOKED RESPONSES

A more objective assessment of hearing function can be made with Brainstem Auditory Evoked Response (BAER) testing. The BAER is a group of small waves (evoked potentials) that can be recorded from subcutaneously placed head electrodes within the first 10 msec following a sound (click) stimulus. The click stimulus generates an electrical impulse that traverses the auditory pathway from the ear, through the brainstem, and to the auditory cortex.

The BAER can be recorded in awake animals if they are cooperative. Sedation or general anesthesia is occasionally necessary. Subcutaneous electrodes are placed beneath the ears and over the head. Earphones are placed in both ears and auditory stimuli or clicks are delivered to one ear at intensity levels ranging from 60 to 105 decibels. Five hundred to one thousand clicks of 0.1 msec are delivered at the rate of 10-20/sec. The wave forms visible within the 10 msec after each click are averaged using a signal averager. White or masking noise is delivered to the ear not being tested. The BAER is then interpreted.

The BAER can be useful in the evaluation of hearing deficits caused by conduction or neurologic abnormalities. We use it most often to evaluate dogs that have suspected congenital deafness due to cochlear agenesis. It can be a valuable screening tool for prospective breeding stock or determining a hearing problem in pups before they are sold. Acquired hearing impairment in older animals can also be confirmed in a more objective manner. --Linda Shell, DVM, Diplomate ACVIM/Neurology, Virginia-Maryland Regional College of Veterinary Medicine, Blacksburg, VA 24061-0442.

SALINE SOLUTION HELPS RESUSCITATE SHOCK PATIENTS

Hypertonic saline solution, with a salt level above normal body fluid content, is being used quite successfully to treat shock in dogs with bloat, according to a study at The Ohio State University (OSU).

"The focus of this treatment is on immediate resuscitation," says researcher Dave Allen, DVM, clinical instructor of small animal surgery, Department of Veterinary Clinical Sciences at OSU.

The study, headed by William Muir, DVM, PhD, of OSU and funded by the Morris Animal Foundation, is using hypertonic saline solution on one set of animals and lactated Ringer's solution for others.

The results of using a hypertonic saline solution have been characterized as "immediate" and dramatic.

Allen explains, once administered, the solution helps normalize the cardiovascular system. The purpose of the saline is to stabilize the dog so its chances of surviving surgery are increased, he adds.

Researches point out the benefits of hypertonic saline solution are that it requires less solution to produce the same effect as conventional treatments. In addition, the animal can be taken to surgery more quickly once stabilized, Allen says. --VM Magazine, July 1990, Vol 21, No. 7 as reported in Nebraska Veterinary Science Newsletter Volume 19, Number 8, September 1990 and Animal Health Beat, University of Nevada, Reno, Vol. 6, No. 9, November 1990.

NEW TREATMENT FOUND FOR SERIOUS HORSE DISEASE

The disease is called equine degenerative myeloencephalopathy or "EDM." It results in nervous system degeneration and is one cause of a "wobbling" syndrome that can make an animal unstable, prone to fall at any time and dangerous to its handlers. As the number one neurological disease of horses, the wobbler syndrome affects thousands of thoroughbreds and purebred horses across the United States every year, including many valuable racing or show animals.

The onset of EDM wobbler disease has been definitively correlated to low metabolic levels of vitamin E, according to Dr. Linda Blythe, a professor of veterinary medicine at Oregon State University. The findings of a three-year study should enable the equine industry to effectively address this widespread horse disease problem, researchers say, resulting in a major economic impact on the industry. The research findings have been accepted for publication in the American Journal of Veterinary Research, the scientists said. "We've clearly demonstrated that horses with EDM problems had a vitamin E deficiency during their young, rapid stages of growth," Blythe said. "A supplementation with high levels of vitamin E at the right time can prevent this disease problem."

Although horses that develop EDM digest and absorb vitamin E normally, Blythe said, they apparently have some problem in transport or metabolic use of the nutrient. Supplementation levels of 2,000 I.U. of vitamin E per day appears to prevent EDM from developing in young horses, and levels up to 6,000 I.U. daily can help treat the disease even after symptoms have begun to appear.

Blythe and A. Morrie Craig, an associate professor of veterinary medicine at OSU, were co-principal investigators on this research along with Dr. Duane Lassen, an associate professor of veterinary medicine and Dr. Lori Walker, a research associate at OSU. The OSU scientists are international leaders in the study of this "wobbling" syndrome, partly because the university has cultivated a unique herd of Appaloosa horses with genetic predisposition to the disease.

While EDM can be the cause of wobbling in up to 50 percent of affected horses, the clinical signs can also be caused by spinal cord inflammation and bony abnormalities, the scientists say. Veterinarians must conduct diagnostic tests to determine the exact cause of the syndrome. According to Craig, wobbling caused by EDM can strike horses aged five months to two years old, causing premature aging in some brain and spinal cord neurons and resulting in weakness of movement and loss of coordination.

Preventive vitamin E supplementation is most effective when given to horses between the age of two and 18 months, Craig said. Partly as result of this research and other studies like it, the National Research Council has already dramatically increased the "minimum daily requirement" recommendations for dietary vitamin E in horses, Craig said. Horse owners should be aware of the genetic characteristics of EDM and contact their veterinarian if they believe any of their animals have a history of the problem. Blood tests can help identify nutritional deficiencies at an early age, when the problem can most easily be addressed by vitamin E supplementation. In continuing studies, OSU scientists plan to further outline the most effective levels of vitamin E supplementation for prevention and therapy, and hope to identify the exact mechanism for the metabolic vitamin deficiency. --Oregon State University, Corvallis, OR.

CHLAMYDIA PSITTACI

Chlamydiosis, originally observed in humans and psittacine birds, was called psittacosis. The term "ornithosis" was introduced to differentiate the disease in wild and domestic fowl from that in psittacine birds. This distinction is considered to be somewhat artificial because 'psittaci' isolates from either psittacine or nonpsittacine birds have been shown to cause an identical disease in birds of either group (and in humans).

Initially, avian chlamydiosis was thought to be a disease of colonially nesting wild birds. However, increased awareness of its disease potential in pet birds and its zoonotic implications have placed this condition as an important ruleout for enteric and respiratory disease in psittacine birds and finches. Infective chlamydia are shed primarily in feces, but also in lacrimal and nasal secretions. They remain infectious for several months. Transmission occurs primarily through aerosols of fecal dust. Although respiratory exposure to humans is the most common route of infection, a trachoma-like follicular conjunctivitis has also been reported with increasing frequency. In most human cases of C. psittaci, there is a transient influenza-like syndrome with nausea, fever, vomiting, chills, headache, and malaise.

Clinicians and diagnosticians should be more aware of the zoonotic potential of C. psittaci for at least two reasons. First, chlamydial infections are a primary ruleout for human patients with influenza-like disease and a history of handling birds, either as pets or in the workplace (aviaries, poultry houses, poultry processing plants).

Secondly, although this traditional mode of C. psittaci transmission likely accounts for most human cases, there is an emerging awareness that other domestic animals can serve as a source for human infection. Chlamydia psittaci infections in domestic animals have been associated with a variety of signs ranging in severity from localized involvement of the eye to systemic infections resulting in arthritis and abortion. Chlamydia psittaci infection has been recognized not only in livestock, but also in human companion animals such as cats, dogs, and horses. When taken together, our understanding of the sources for human chlamydial infections must be expanded so as to include not only birds, but also livestock and companion animals.

Its potential for spread to susceptible humans, i.e., young children, pregnant women, and aged individuals, is essential in term of prevention and control. The ever increasing knowledge regarding zoonotic dangers of C. psittaci, taken together with the known zoonotic agents capable of being transmitted by pets to humans, make it imperative that pets are screened before placement in high disease-risk environments (e.g., day care centers for children, senior citizen retirement centers and convalescent centers). The animal health screen should include a thorough examination by a veterinarian and monitoring of body excretions for the shedding of infectious agents.

Psittacosis is one of several diseases for which veterinarians have a special responsibility. In Virginia, licensed veterinarians are required to report confirmed or suspected cases of psittacosis to the State Veterinarian within 24 hours of diagnosis. --Population Medicine News, February 1990, as reported in the State Veterinarian, Richmond, VA, Vol. 4, No 1, July 1990.

SUCCESS IS NO ACCIDENT

One common complaint from dissatisfied clients is; "they don't seem to listen to what I'm saying". This should tell us as client oriented practitioners that perhaps we should pay more attention to listening, no matter whether it is clients or employees doing the talking. Here are some rules for improving listening skills - because a skill it is.

Listening is an active process - be an active listener.
 The listener doesn't have to agree with the speaker.
 Listen without prejudice - listen to, not against.
 Focus on content - not on the delivery.
 Be patient - and don't interrupt
 Look at the speaker - eye contact is critical to listening.
 Beware of emotional triggers - "red flag" words.
 Give feedback to the speaker - at the proper time.
 Listen with empathy - don't prejudge.

Please note; actively listening to subordinates can build their self esteem. And remember, if you're talking, you can't be listening. --Kent Roberts, VA-MD Regional College of Veterinary Medicine, Blacksburg, VA.

ALLERGIES COMMON TO MAN AND ANIMALS

Eighty percent of all human allergic skin diseases also appear in animals according to Peter Ihrke, Associate Professor of Dermatology at the University of California, speaking at the BSAVA Congress.

The most common allergy presented was that to fleas, he said, with some 60 percent of dogs and 20 to 25 percent of cats suffering as a result.

Allergies to cats, dust, and human dandruff have been found in dogs, although only 30 percent of dogs showed clinical signs of allergy to dust, and fewer than 10 percent to pollen and food.

In the USA, Dr. Ihrke has found that dogs were presented most commonly at one to three years of age with clinical signs of allergic disease, and that allergic diseases did not seem to develop in dogs older than seven years.

His studies have indicated that there may be breed specificity to allergies with the Golden Retriever topping the list of most susceptible breeds followed by the Wirehaired Fox Terrier, Dalmatian, West Highland White, and Irish Setter. Interestingly, the Golden Retriever also tops the list of dogs presented with the most non-allergic skin problems, followed by the American Cocker Spaniel and the Doberman.

Those breeds showing a much lower incidence of atopy were the German Shepherd, Dachshund, American Cocker Spaniel, and the Poodle. --Vet Rec, April 23, 1988, as reported in DVM News, South Dakota State University, Brookings, SD.

VETERINARY COLLEGE NEWS

John Jacobson has joined the faculty as an assistant professor of anesthesiology. A Texas A&M graduate, John completed his residency and received a masters degree from the same institution before coming to Blacksburg. He has practiced in Illinois and Texas and is married to Dru Forrester, DVM, a small animal medicine clinician on the CVM faculty.

Frank Pearsall, a member of the College's first graduating class in 1984, has been appointed development officer for the College of Veterinary Medicine. Following graduation, Frank practiced in Pennsylvania and Florida. He was a lobbyist for the Florida Veterinary Medical Association in Tallahassee before returning to Blacksburg.

Michael Reardon is pioneering the newly created position of veterinary student career advisor. This faculty addition is funded by a grant from the Pew Trust. Mike is a retired Army colonel, most recently serving as director of the Army's Medical Chemical Defense Research Program at Fort Detrick in Frederick, Maryland. A veterinary graduate of Ohio State, he is a veteran of service in Okinawa and Vietnam. He commanded an Army medical research unit in Kenya, East Africa and earned a PhD in pathology from Texas A&M.

Pam Ray, a 1985 graduate of the college, is a PhD student in clinical nutrition under Dr. Craig Thatcher. Dr. Ray worked in small animal practice in eastern North Carolina prior to returning to Blacksburg.

NEW SENIOR CURRICULUM

A new fourth year curriculum will be implemented when the class of '92 starts their senior year on April 29, 1991. Each member of the class will select a track for their clinical work as seniors from these choices: small animal, food animal, equine, mixed or government/corporate practice.

All seniors will take eight core rotations plus five required track courses and then select four electives, one of which may be vacation. All rotations are three weeks in length and many are off campus with private practices, specialists and government or corporate laboratories and agencies.

Each track will have faculty advisors to help students plan their rotations to best fit their career goals. Student advising is under the direction of Dr. Mike Reardon.

AND NOW THE SAD NEWS

It is becoming increasingly clear that the continued reductions in the University's operating budget will mean charging for many services previously provided at no charge to taxpayers. The Extension budget has been particularly hard hit, and Virginia Veterinary Notes is printed and distributed with Extension funds. A paid subscription plan will be presented in the next issue as the only practical way to continue publication of the newsletter.

This development is announced with both sadness and frustration concerning the lack of adequate operating funds. --Kent Roberts, DVM, Editor

**VIRGINIA-MARYLAND REGIONAL COLLEGE OF VETERINARY MEDICINE
CONTINUING EDUCATION OPPORTUNITIES
SPRING 1991**

<u>Date</u>	<u>Program</u>	<u>Location</u>	<u>Contact Hours</u>
*March 15-16	Practical Lab Diagnostics	Blacksburg	10
*March 22-23	Small Animal Thoracic Radiology	Blacksburg	10
March 28	Small Animal Medicine Update	Charlottesville	4
April 7	Small Animal Medicine Update	Charleston, WV	4
*April 12-13	Gastrointestinal Endoscopy (Basic)	Blacksburg	10
*April 19-20	Orthopedic Surgery-Canine Forelimb	Blacksburg	10
April 27	Food Animal Practitioners Workshop	Staunton	6

*Limited enrollment courses featuring hands-on laboratories

Note: Program brochures are mailed six-eight weeks prior to the course date.
For CE course information or assistance, please contact:

Kent Roberts, DVM
Virginia-Maryland Regional College of Veterinary Medicine
Blacksburg, VA 24061
(703) 231-7181

AQUATIC ANIMAL SYMPOSIUM

The student chapter AAZV will sponsor a program on Aquatic Animals in Blacksburg on April 13-14 at the College of Veterinary Medicine. Featured speakers are Michael Stoskopf, DVM, PhD, Suzanne Kennedy-Stoskopf, DVM, PhD, NC State University, R. H. George, DVM, Gloucester, VA, and George Libey, PhD, Virginia Tech. For more information, please contact Ms. Melanie Bell or Dr. Kent Roberts at the College in Blacksburg. Program brochures are available.

LYME DISEASE SYMPOSIUM

A symposium on Lyme Borreliosis as it affects man and animals is planned for Thursday, August 29, 1991 in Charlottesville. A number of knowledgeable speakers will discuss the symptoms, diagnosis and treatment of this important disease. A program brochure will be available by July 1.

CLINICAL FACULTY LIST

A list of VMRCVM faculty with clinical duties in the Veterinary Teaching Hospital is provided on the following pages.

**VIRGINIA-MARYLAND REGIONAL COLLEGE OF VETERINARY MEDICINE
VETERINARY TEACHING HOSPITAL FACULTY**

SMALL ANIMAL MEDICINE

Linda Shell, DVM, Diplomate ACVIM

Ellen Codner, DVM, MS, Diplomate ACVIM
Karen Dyer, DVM, PhD
Dru Forrester, DVM, MS, Diplomate ACVIM
Michael Leib, DVM, MS, Diplomate ACVIM
Edward Monroe, DVM, MS, Diplomate ACVIM
Phillip Pickett, DVM, Diplomate ACVO
Kay Schwink, DVM, Diplomate ACVO
Greg Troy, DVM, MS, Diplomate ACVIM
Sharon Campbell, DVM
Ed Fallin, DVM
Mary Ann Mann, DVM

Section Chief, Internal Medicine, Neurology
Internal Medicine, Dermatology
Internal Medicine, Neurology
Internal Medicine, Oncology
Internal Medicine, Gastroenterology
Internal Medicine, Endocrinology
Ophthalmology
Ophthalmology
Internal Medicine
Resident-Internal Medicine
Resident-Internal Medicine
Resident-Internal Medicine

SMALL ANIMAL SURGERY

Robert Martin, DVM, Diplomate ACVS, ABVP
Spencer Johnston, VMD
Peter Shires, BVSc, MS, Diplomate ACVS
Mark Smith, VMD, Diplomate ACVS
Donald Waldron, DVM, Diplomate ACVS, ABVP
Terry Dew, DVM
Douglas Kern, DVM
Peter Trevor, BVSc, MRCVS

Sectin Chief, General Surgery
General Cardiovascular and Surgery
Orthopedics
General Surgery and Dentistry
Soft Tissue and Neurosurgery
Resident-Surgery
Resident-Surgery
Resident-Surgery

ANESTHESIOLOGY

Charles McGrath, DVM, Diplomate ACVA
Melissa Holland, DVM, Diplomate ACVA
John Jacobson, DVM, MS

LARGE ANIMAL CLINICAL SERVICES

Kent Scarratt, DVM, Diplomate ACVIM
Mark Crisman, DVM, MS, Diplomate ACVIM
Martin Furr, DVM
Paula Modransky, DVM, MS
David Moll, DVM, MS, Diplomate ACVS
Frank Bimbo Welker, DVM, MS

Section Chief, Internal Medicine
Internal Medicine
Internal Medicine
General Surgery
General Surgery
General Surgery

THERIOGENOLOGY

Jim Bowen, B. Vet Med., FRCVS, Diplomate ACT
William Ley, DVM, MS, Diplomate ACT
David Matsas, DVM, Diplomate ACT
Beverly Purswell, DVM, MS, PhD, Diplomate ACT

RADIOLOGY

Martha Moon, DVM, MS, Diplomate ACVR
 Don Barber, DVM, MS, Diplomate ACVR
 Colin Carrig, BVSc, PhD, Diplomate ACVR

Section Chief

PRODUCTION MANAGEMENT MEDICINE

Craig Thatcher, DVM, MS, PhD, Diplomate ACVN
 Calvin Larsen, DVM, MPH, PHD
 Pierre Lessard, DVM, PhD
 Gareth Moore, DVM, MS
 Kevin Pelzer, DVM, MPVM, PhD
 Terry Swecker, DVM, Diplomate ACVN
 Dee Whittier, DVM, MS
 William Burkholder, DVM
 Neal Bataller, DVM
 Pam Ray, DVM

Section Chief, Clinical Nutrition
 Avian Medicine
 Epidemiology
 Small Ruminant
 Epidemiology
 Clinical Nutrition
 Bovine Medicine
 Graduate Student-Clinical Nutrition
 Graduate Student-Clinical Nutrition
 Graduate Student-Clinical Nutrition

LABORATORY SERVICESClinical Pathology

Holly Bender, BS, DVM, PhD
 William Chickering, DVM, PhD
 Bernard Feldman, DVM, PhD

Laboratory Director

Parasitology

Anne Zajac, DVM, PhD

Laboratory Director

Anatomical Pathology

Geoffrey Saunders, DVM, MS, Diplomate ACVP
 Donald Cordes, BVSc, MS, MACVSc, Dipl. ACVP
 Bernard Jortner, VMD, MS, Diplomate ACVP
 John Robertson, VMD, PhD
 Phillip Sponenberg, DVM, PhD
 Hugo Veit, DVM, PhD

Laboratory Director

Clinical Microbiology

Thomas Inzana, MS, PhD
 Nammalwar Sriranganathan, BVSc, MVSc, PhD,
 Diplomate ACVM

Laboratory Director

Clinical Immunology

Ota Barta, MVDr, PhD, Diplomate AVCM

Toxicology

Dennis Blodgett, DVM, PhD, Diplomate ABVT
 Blair Meldrum, DVM, PhD
 Marion Ehrich, RPh, PhD, Diplomate ABT

Laboratory Director

Clinical Pharmacology/Pharmacy

Jeff Wilcke, DVM, MS
 James Kenny, RPh

Virginia-Maryland Regional College of Veterinary Medicine Extension Staff:

Dr. J.M. Bowen - Extension Specialist - Equine
Dr. C.T. Larsen - Extension Specialist - Avians
Dr. K.C. Roberts - Extension Specialist - Companion Animals
Dr. W. Dee Whittier - Extension Specialist - Cattle

K.C. Roberts, Editor

Maura M. Wood, Production Manager of VIRGINIA VETERINARY NOTES

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