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Potomac Fever— A health threat to horses

A team of medical detectives has been assembled to find the cause of Potomac Fever, a disease of horses first described as a new entity in 1979 in Montgomery County, Maryland. "That summer practitioners noticed a sudden increase in the number of horses with acute, often fatal diarrhea," explained Dr. Robert H. Whitlock, professor of medicine, at the University of Pennsylvania's School of Veterinary Medicine, New Bolton Center. "The disorder was called Acute Equine Diarrhea Syndrome (AEDS), but its common name quickly became Potomac Fever after the region where most cases had been found."

Since the disease was first described it has also been reported in other parts of the country, though the incidence appears to be highest in the Potomac River Valley (Montgomery County). "It is probably a disease which has been with us for some time," Dr. Whitlock stated. "The unusually high numbers in Maryland alerted the profession that we were dealing with a specific heretofore unrecognized disease entity and not one of the known equine diarrhea diseases."

The number of Potomac Fever cases has steadily risen since 1979. In 1983 Maryland, Virginia and Pennsylvania reported 173 afflicted horses of which 56 died or were euthanized for humane reasons. The animals affected were horses and ponies kept at farms and riding stables. Because Potomac Fever is seasonal, a number of horse owners have moved their stables out of the county during the summer months. The disease appears each year in June, peaks in July and August and continues through October, to vanish until the following year.

The symptoms and manifestations of Potomac Fever vary. In most cases the animal shows a loss of appetite, seems dull and depressed, then a fever is often recorded and followed by acute diarrhea. Not all horses develop diarrhea; others may be transiently "off feed," depressed, febrile with only mild diarrhea. Thus a spectrum of clinical signs (severity) occurs in horses affected with Potomac Fever. About 20 percent of the animals develop laminitis, and it is this complication which causes many of the horses to be euthanized for humane reasons. About 60 percent of the horses with the disease recover fully. However, treatment can be expensive because the animal must receive fluids, both orally and intravenously; analgesics, antibiotics and additional special care are required if laminitis develops.

Researchers from New Bolton Center, the Maryland Department of Agriculture, the Virginia-Maryland Regional College of Veterinary Medicine, Blacksburg, Virginia, and the National Animal Disease Laboratory, Ames, Iowa, joined forces and launched a study during the summer of 1983 to gather more data on Potomac Fever. One hundred-twenty-eight horses

were studied and epidemiologic data on 74 were collected. In addition clinical data were assembled for 81 animals and laboratory data along with convalescent data on many horses. The epidemiologic information was gathered by means of a 28-page questionnaire developed by Jonathan E. Palmer, V.M.D. from Penn's Veterinary School and by Bryan Perry, M.R.C.V.S., from the Virginia-Maryland Regional College of Veterinary Medicine. Owners of the 128 horses were asked to complete the document which included questions about the horse's medical history, its environment, its uses and movements away from the farm. Questions were also asked about the therapy employed to combat the disease, the laboratory findings and the necropsy results. The data are being analyzed by computer at New Bolton Center and also at Virginia Polytechnic Institute to determine relative risk factors as well as characterization of the clinical and laboratory hallmarks.

The only way a horse could be infected was through transfusion of blood from a diseased animal to a healthy one.

In addition to the questionnaire, daily blood and fecal samples were collected from the afflicted animals. These were examined and cultured at the Maryland State Department of Agriculture laboratory, at Blacksburg, Virginia, and at New Bolton Center where blood chemistry studies were done. Attempts to isolate a virus that can reproduce the disease have failed so far. Organisms commonly associated with equine diarrhea could not be isolated from the samples.



Because the disease is seasonal, it is suspected that an insect vector may be responsible for the transmission. During the summer of 1983 insects in the area were trapped and analyzed by entomologists. It was found that the number and species were not unusual. Insect studies will continue this summer. The vegetation was also examined for poisonous toxic plants; again, no unusual plants were found.

It appears that the first cases each year occur on farms close to the Potomac River. As summer progresses, more cases are seen in areas some distance from the river. Usually only one or two horses on a farm are affected but a few farms have had several horses affected in the same season. It does not appear to be a problem of foals and weanlings, rather the animals which contract Potomac Fever are two years and older.

In studies at New Bolton Center it was attempted to infect horses through contact with fecal material from horses with Potomac Fever. Researchers found that the disease could not be transmitted in that manner. They also found that it is not contagious through direct contact between diseased horses and healthy ones. The only way a horse could be infected was through transfusion of blood from a diseased animal to a healthy one. The New Bolton Center researchers produced Potomac Fever in a number of horses and ponies with this technique in an attempt to isolate an agent and to study the disease and its manifestations. They found that horses which recovered did not contract the disease when they received another transfusion from a diseased horse. "It appears that a protective mechanism develops," said Dr. Whitlock. "But we could not find any unusual levels of antibodies." The researchers also found it was difficult and more variable to induce the disease if they used frozen blood. This has made the research more costly as a horse has to be infected every two weeks to maintain a supply of blood from diseased animals.

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The New Bolton team is investigating blood samples from horses with Potomac Fever in an effort to identify the agent. It is hoped that once the agent is found, a diagnostic test can be developed and perhaps a vaccine. The study has been very expensive. It costs over \$700 a month to follow a pony and do the necessary tests just to be sure that the animal is sick from Potomac Fever. There are additional costs incurred for virology studies, microbiological techniques, electron-microscopy, special stains and other work needed in an effort to recover the new pathogen.

The studies so far have been supported by private funds and recently the Morris Animal Foundation has awarded a grant to the School to determine how the disease is transmitted, to find the agent causing it, and to determine whether animals develop immunity. The foundation also awarded a grant to the Maryland-Virginia Regional College of Veterinary Medicine for the study of Potomac Fever.

Dr. Whitlock is hopeful that a solution to Potomac Fever can be found. "We know that horses which have recovered from the disease do not get it when challenged," he said. "It may be possible to get a serum from these animals and use this as a temporary protection for threatened horses. It will take money to develop the serum and to determine the protocol; as we don't know the cause of the disease, this could be a good interim measure." He feels that horse owners can take some steps to protect their animals from Potomac Fever. "As we feel that it is probably transmitted by an insect, insect control is vital. Barns should be kept as free from insects as possible and insect repellent should be used on horses to minimize the chances of being bitten." He continued by stating that if an animal contracts the disease, supportive care and fluid therapy are vital and should be instituted at once by the veterinarian. He felt the risk is minimal for horse owners who might be attending sporting events in the Maryland area as Potomac Fever does not appear to be transmitted through contact. "Horses can be taken to horse shows," he said. "That's usually only one day." Additionally, over 90 percent of the horses studied are local horses. Some evidence exists to indicate the disease is widespread and similarly affected horses have been reported in New Jersey, Oklahoma, Texas, Wisconsin and Colorado. Thus the Potomac Fever agent may be present throughout the country but not recognized for what it is.

The researchers here at New Bolton Center and at the other institutions hope to have a solution to the Potomac Fever problem before the summer, but a lot of work and money will be required to isolate the, so far, elusive agent. Further studies are planned for the summer in an effort to find the cause and a method of preventing the disease.

The New Bolton Center team includes Dr. Charles E. Benson, microbiology; Dr. Helen Aeland, pathology; Dr. Peter C. Mann, necropsy evaluation; Dr. Jonathan E. Palmer, epidemiology; Dr. Robert H. Whitlock, gastroenterology; Dr. Fern Tahlin, electronmicroscopy; Dr. Jorge F. Ferrer, and Dr. Richard A. McFeely in an advisory capacity, and further supported by five laboratory technicians. The team is assisted by Dr. Gerald Woodle, College of Veterinary Medicine, University of Iowa, Ames, Iowa, and Dr. Allen Jenny from the National Veterinary Services Laboratory, Ames, Iowa. *Helma Weeks*

HOUSEHOLD PETS AS SENTINELS OF ENVIRONMENTAL RISKS FOR HUMANS

Dogs, in their long association with man, have had many roles, ranging from assisting the hunter to being a family pet. It is in the latter role that canines may play a vital part in providing an early clue to environmental risks.

A recent epidemiologic study at the School of Veterinary Medicine, University of Pennsylvania, examined records of eighteen dogs which had been admitted to VHUP with mesothelioma, a rare tumor found in humans who have been exposed to asbestos. "Dogs share man's environment, yet do not indulge in activities such as smoking or working which confound interpretation of epidemiologic studies," said Dr. Lawrence T. Glickman, chief of the section of epidemiology at the School. "Given the relatively short lifespan of these animals, the latent period for tumor development is decreased and accurate information regarding environmental history can be obtained."

It was found that the exposure of the owner to asbestos at work or through a hobby was significantly associated with the mesothelioma cases in the dogs.

Asbestos, a mineral fiber, is all around. It is found in insulation, brake linings, construction material, fireproof clothing, and is used in ship building. The substance is mined in Canada, Western Australia, and South Africa. The fiber composition of asbestos differs, depending on where it was mined. The primary product used in this country comes from Canada and is chrysotile, a straight fiber. The product from Africa and Australia is crocidolite which is a serpentine fiber. Asbestos fibers are minute, easily inhaled and ingested.

Pathologists found traces of these fibers in human patients who had died from mesothelioma, a rare tumor of the chest cavity. Epidemiologic studies showed that most cases occurred in persons who worked in shipyards or asbestos manufacturing plants. It was also found that peo-

ple exposed to the crocidolite fiber are at a higher risk of developing the tumor than people exposed to the chrysotile fiber. In animal experiments it appeared that the danger rate was about the same. Exposure to asbestos can result in a number of other debilitating and pulmonary diseases. In most cases asbestos-related symptoms and disease are not seen until twenty or thirty years after initial exposure to the mineral.

The Penn study evaluated records of dogs diagnosed with mesothelioma because it was felt that pet animals might be a resource for identifying environmental human carcinogens. The group of dogs consisted of eighteen histologically confirmed mesothelioma cases which had been diagnosed at VHUP between April 1977 and December 1981. Two control groups of cancer and non-cancer patients at the hospital were selected and matched by breed, age, and sex to the mesothelioma group. Information was solicited by telephone from the owners of the dogs in the three groups about the dog's medical history, residences, management, as well as the occupation and medical history of household members. Questions were also asked pertaining to occupations and medical history of household members, as well as about hobbies and occupations which might have exposed owners and their families to asbestos. Residences were classified as urban or rural and analyzed for the first, longest, or residence of diagnosis.

