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Bellwether

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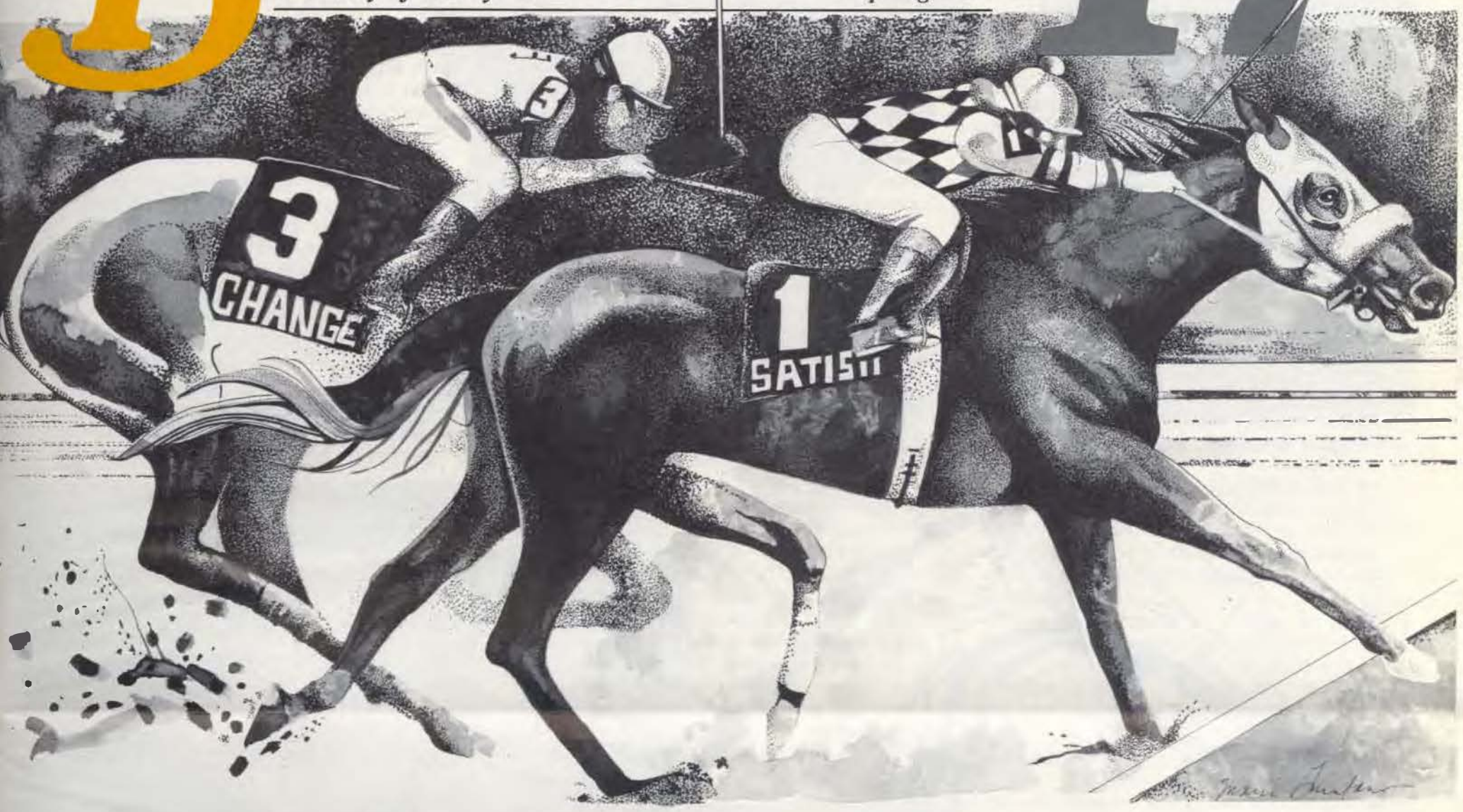

EIPH in Race Horses

After racing or a demanding work-out, many horses will have blood in their airways. Most of the animals show no outward evidence, though some may have blood in their nostrils. For many years it was thought that the condition affected only a small number of horses. It was speculated that the bleeding occurred in the nasal cavities. In the early 1970s a study was published in Britain by Dr. W. R. Cook. He suggested that the blood originated in the lungs. As the flexible fiberoptic endoscope became available to veterinary medicine, the upper airways of horses could be examined. It was discovered that a large number of animals had evidence of bleeding after racing or work-outs. The disorder was named exercise-induced pulmonary hemorrhage (EIPH).

Dr. Corinne R. Sweeney and Dr. Lawrence Soma at the University of Pennsylvania School of Veterinary Medicine have studied EIPH in a large number of horses at Pennsylvania and New Jersey race tracks.

The initial studies were conducted in 1980, and 191 Thoroughbred horses were examined within two hours of racing. In 147 horses endoscopic evidence of bleeding was found, 13 of which had blood in the nostrils. An additional 107 horses were examined after training "work-outs" and it was found that 41 showed endoscopic evidence of bleeding, while only one horse had blood in the nostrils. The researchers then examined horses after steeplechase, flat turf, and timber races and found that a large number of these animals, too, showed evidence of EIPH. It was found that a relationship existed between the age of the horse and the distance raced. Older horses bled with greater frequency, and as the distance raced increased the likelihood of bleeding was greater.

Trainers feel that EIPH does affect the performance of a great number of horses, and they are looking for ways to prevent bleeding

Dr. Soma indicated that the cause of EIPH is unknown. "It occurs in race horses when high speed is demanded in a short period of time," he said. "It has not been found in horses which cover long distances, such as 50- or 100-mile endurance races. When maximum performance is demanded by racing, the increase in resistance to the flow of air may contribute to pulmonary hemorrhage. One theory is that in horses with EIPH the small airways which terminate into the minute alveoli (air sacs), which handle the gas exchange in the lung, may be partially obstructed. When the horse is breathing hard during racing, these small terminal airways may collapse during exhalation and not reopen during the next breath. The consequence of this is that the alveoli (air sacs) will not re-expand during this inhalation. Because of this unequal expansion of the lungs, an undue stress may be placed on lung tissues causing small capillaries to break. The higher blood flow through the lungs may also contribute to the capillary rupture." The bleeding usually subsides and the horse shows no signs of illness. EIPH cannot be detected by listening to the horse's lungs. Rarely though, there is a horse which will have massive pulmonary hemorrhage and die.

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EIPH in Race Horses

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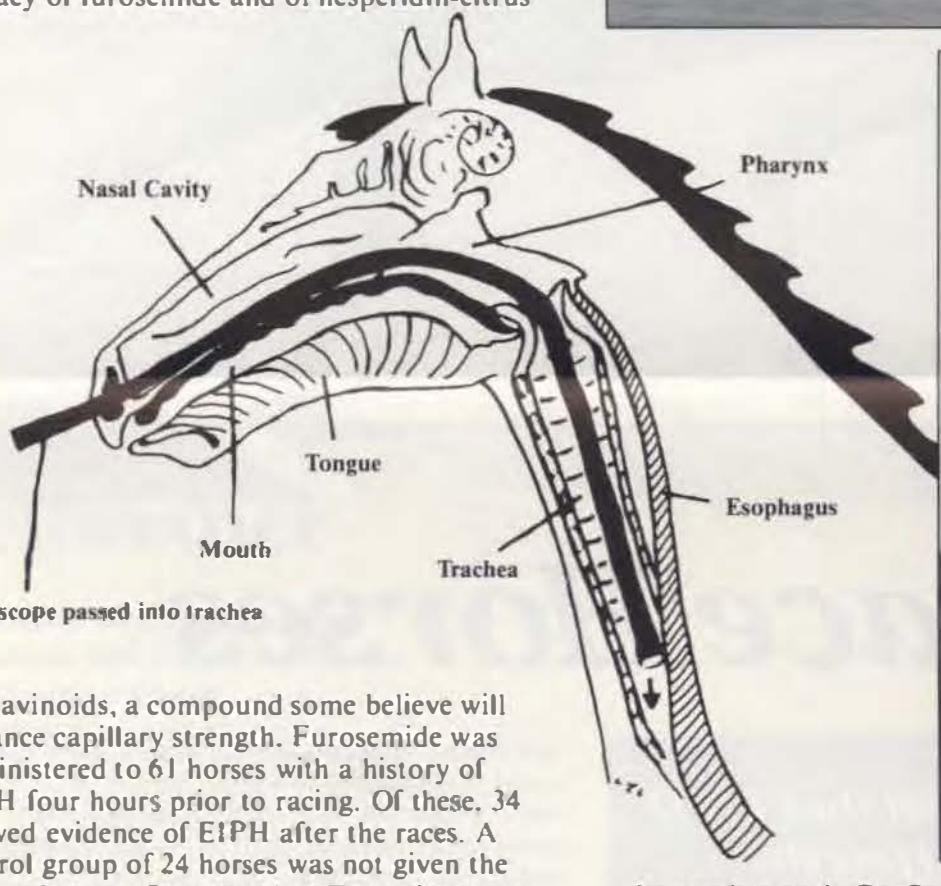
are looking for ways to prevent bleeding. In view of the stringent drug regulations at race tracks, only one approved drug can be administered. Drs. Sweeney and Soma have studied a number of bronchodilators to determine whether bleeding could be prevented by reducing resistance to gas flow in the lung. In a small experiment, known bleeder horses were given four different drugs during separate trials. When atropine was administered one hour prior to training, the occurrence of bleeding decreased.

When cromolyn was administered, no change in the incidence of bleeding occurred. Ipratropium was given to two of the horses and stopped the EIPH on almost all occasions.

Atropine and ipratropium are bronchodilators. The former drug is injected while the latter is inhaled. Cromolyn is not a bronchodilator; it is believed that it prevents constriction of smooth muscles in the airways.

Later the two researchers studied a large number of horses with EIPH to determine the efficacy of furosemide and of hesperidin-citrus bioflavinoids, a compound some believe will enhance capillary strength. Furosemide was administered to 61 horses with a history of EIPH four hours prior to racing. Of these, 34 showed evidence of EIPH after the races. A control group of 24 horses was not given the drug; of these, 17 horses bled. The animals on the hesperidin-citrus bioflavinoids regime were given the substance in their feed for 90 days prior to racing. It was found that 35 out of the 45 horses in the study bled after racing. The control group consisted of 40 horses which did not get the supplement. Out of these, 32 continued to bleed. All the animals were examined with the flexible fiberoptic endoscope shortly after racing. The criteria used to determine the efficacy of furosemide or hesperidin-citrus bioflavinoids was the absence of blood in the trachea after racing. No assessment of partial reduction of hemorrhage could be made. In their report Drs. Sweeney and Soma point out that in some horses remission occurs without treatment. They concluded that there was no statistically significant difference between the treated and the control groups when no hemorrhage was used as criteria. Studies by others have shown a reduction of the amount of hemorrhage in some horses after furosemide administration.



Endoscope passed into trachea

In another study Dr. Soma and his associates examined the effects of furosemide on the racing times of horses with EIPH. The horses were confirmed bleeders and were grouped according to three methods used to diagnose EIPH: group one, observation of pulmonary hemorrhage at the nostrils within one hour after a work-out or race; group two, observation of pulmonary hemorrhage only by endoscopic examination after a race or work-out; group three, observation of hemorrhage at the nostrils during a race or immediately after a race. There was a control group of horses, selected randomly from the animals running during the study period. These horses were not bleeders. For the statistical analysis the value of the horses was also taken into account. Horses were studied for five races prior to being admitted to the bleeders program, when they were not given furosemide. They then were given the drug prior to races 6 through 10 based on the rules of racing. The researchers did not find significant differences in the racing times in all groups. However, it was found that the higher valued horses in the group which showed gross evidence of hemorrhage while racing and the horses diagnosed by endoscopic examination had a progressive reduction in racing times during races 1 to 6, followed by an improvement to prior performance during races 6 through 10 when furosemide was administered. The effect of furosemide appears to be more pronounced in the faster horses and in horses in which a reduction in racing times was evident. The researchers also found that EIPH may be incapacitating in some horses, manifested in reduced racing times. The study revealed that furosemide does not produce an improvement or return to previous performance levels in all horses, nor does EIPH affect all horses uniformly.

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However, a testing program with rigorous selection against carriers and affected animals can reduce the incidence in a breed, as demonstrated in Scottish terriers. Here the incidence once was 44 percent. It has been reduced to about 10 percent through testing and removal of affected animals and carriers from the breeding stock. Specialized tests that measure the plasma level of von Willebrand's factor are required to diagnose VWD. Routine clotting tests are not diagnostic. Dr. Dodds' laboratory provides VWD testing free of charge.

VWD disease is difficult to deal with. Animals may have chronic mucosal bleeding into the bowel, manifested by bloody diarrhea. Also, such animals are quite susceptible to the effects of parvovirus infections. Animals with mild bleeding tendencies often succumb to or show more severe signs of the disease. Studies have shown that there is a high mortality rate due to parvovirus disease in Doberman pinschers and Rottweilers, breeds with a higher incidence of VWD. The disease also manifests itself early in breeds which need cropping and docking, in some cases posing severe problems. Dr. Dodds pointed out that simply not breeding those puppies who bled profusely during these procedures will not eliminate the trait. "The whole litter must be tested to identify carriers."

Thyroid function plays an important role in VWD. "If the animal is hypothyroid, the disease will be more severe," she said. "Thyroid dysfunction affects clotting by producing reduced numbers of platelets and less von Willebrand's factor. Thus, a thyroid imbalance will promote the expression of VWD. We are now seeing it again with increasing frequency in Scotties and goldens, because of their increase in hypothyroidism.

Dr. Dodds briefly discussed inherited platelet function defects in otterhounds and basset hounds. These are two different disorders and the carrier status of breeding animals can be determined through specialized tests.

To eliminate or at least reduce the incidence of these bleeding disorders, those working in breeds with such diseases should test all breeding stock, or else breed carriers important to the breed's future only to normal mates and screen their pups for the gene. More than one breed has demonstrated, through a rigorous testing program, that the incidence of these defects can be reduced or eliminated if only clear stock is used or carriers are bred under the controlled circumstances mentioned above. Dr. Dodds recommended that clubs sponsor screening clinics, similar to eye clinics, to identify mildly affected animals and carriers.

Immune-mediated blood diseases are also a concern. "These are on the increase," she said. "Here the individual develops antibodies to its own tissues or fluids; it is like an allergic reaction."

Immune-mediated diseases can affect platelets alone (autoimmune or immune-mediated thrombocytopenia, idiopathic thrombocytopenia purpura) or red blood cells (autoimmune hemolytic anemia, immune-mediated anemia). Many cases involve destruction of both platelets and red blood cells. Immune-mediated diseases in general affect females over males (2:1) and there is clearly a familial/genetic predisposition. Pregnancy is a major trigger. According to Dr. Dodds animals with hormonal irregularities, abnormal heat cycles, pyometra, pseudopregnancy and thyroid dysfunction are prime candidates for immune-mediated blood diseases, particularly if bred. While in hypothyroid animals this tendency can be controlled with a thyroid supplement, the predisposition can still be passed on to the next generation. She advised to not breed animals having experienced immune-mediated diseases.

Immune-mediated blood disorders can also be triggered by viral infections, stress, the lymphoma-leukemia complex and vaccination with modified live vaccines. "Vaccinations are a controversial subject right now," she said. "Our work has shown that some individuals cannot handle the multiple dose combination vaccines at an early age. The vaccine or exposure to the street virus can trigger an immune reaction. Most likely these animals are genetically predisposed and so have an inherent susceptibility or weakness. It is unfortunate that we usually don't know which animals these are until a problem arises." She also mentioned that modified live virus rabies vaccine can trigger immune-mediated blood disorders and recommends the use of killed vaccine to be administered separately from other booster vaccines. Weak or sick puppies, such as those suffering from parasite infection or diarrhea, or puppies and adults from families known to have immune-mediated diseases, should not be vaccinated while ill. When recovered, it is advisable to separate the parvovirus and DHLP vaccines when modified live products are used. The interval between vaccinations should be 10 to 14 days or more. "When these animals are stronger and older (after 12 weeks of age) they can be given the combined shots. This is just a precaution to protect those with a tendency to immune-mediated blood diseases."

Dr. Dodds is developing a new program called Pet Life-Line, a national project involving blood products for dogs, cats and horses. "Currently there are no blood products available on a national basis for animals," she said. "We hope to provide, in a few years, the same services as are available in human medicine for transfusions to animals. It is a much needed service and veterinary schools have begun to emphasize transfusion medicine in anticipation of these advances."

During the question and answer period Dr. Dodds described a simple test which can be performed by an owner or veterinarian to determine whether an animal has bleeding tendencies. "Place the dog on its side, cut a nail too short, leave it undisturbed, and then monitor the bleeding time. If the animal is normal, bleeding should stop within two to three minutes. Even five to six minutes is not abnormal. However, if it takes longer than that, there is something wrong. This test should be performed prior to any surgery so that the veterinarian can be prepared for complications, particularly in breeds known to be susceptible to bleeding disorders."

Dr. Dodds' message to the audience was to test breeding stock for bleeding disorders, be aware of the increasing problem of immune-mediated blood disorders, and to be cautious and not use affected animals in a breeding program. Blood tests are performed free of charge by her laboratory and samples can be submitted by the veterinarian.

Dr. W. Jean Dodds is adjunct associate professor of medicine (hematology) here at the School, Chief, Laboratory of Hematology, New York State Department of Health, Albany, and the current AKC delegate for the American Pointer Club.

—H.W.

EIPH in Race Horses

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Currently furosemide is the only permitted race day medication for EIPH in 19 of the 22 states that have Thoroughbred racing. Pennsylvania, New Jersey, Delaware, and Maryland are among them. Horses with EIPH are admitted to a bleeder program and must adhere to specific criteria established by the state. The drug is administered four hours prior to racing, and the horse is supervised in a detention barn until its start.

This is a cumbersome and expensive procedure, and Dr. Soma is looking for alternatives to prevent EIPH. Currently, he is working with a number of bronchodilators to determine in the experimental horse their effects on lung resistance and other respiratory parameters. "It is difficult to get substances deep into the airways when a nebulizer is used," he said. "We use an old method to make the horse breathe deeply. A tube is affixed to the breathing mask, causing the animal to inhale its own carbon dioxide. After about one minute it will breathe deeply and we administer the bronchodilator over a three-minute period." The researchers are determining effects, dose ranges and the most suitable compound. The next step is to determine whether it will lower the incidence of EIPH in affected animals.

Dr. Soma is also investigating the use of a transpirator. This equipment delivers completely humidified, warm air to a face mask and the horse inhales this for two hours a day for two to three days prior to a race. "Horses don't object to it at all," he said. "They doze and stand contentedly, breathing the warm, moist air." This treatment helps the animal to clear foreign material from its air passages.

Another study by Drs. Sweeney and Soma has shown that most horses at the racetrack have signs of chronic bronchitis, which could potentially be helped by the humidified air. Researchers have found the preliminary data encouraging; some horses stop bleeding and improve their performance. "These horses spend a great deal of time indoors, in dusty barns, inhaling all kinds of material which can set up an irritation," he said. "The transpirator facilitates the removal of this material and better breathing. It helps the horse to clear its lungs." Drs. Soma and Sweeney feel that this device might be valuable as an adjunctive treatment of animals with respiratory disease and that it could be a great help for the treatment of foals with respiratory problems.

The primary sponsor of much of the research is the Pennsylvania State Horse Racing Commission, which is one of the first, and one of the few, Racing Commissions which sponsor research in the Thoroughbred.

In addition to the EIPH research, Dr. Soma in collaboration with Dr. Peter Felsburg, a clinical immunologist, has developed a new technique to detect drugs in blood and urine. The basis is the use of antibodies to detect the presence of drugs and is a system which uses a color change to determine if a drug is present. So far one test has been developed for one specific drug. He hopes that this work will lead to a quick method of screening.

Lawrence R. Soma, V.M.D., is Professor of Anesthesia and Clinical Pharmacology at New Bolton Center, and Corinne R. Sweeney, D.V.M., is a Lecturer in Large Animal Medicine at New Bolton Center. *—H.W.*