

Our winner of the Jim Steer Memorial Scholarship Fund goes to

Kristina Peacock first year veterinary student at Virginia-Maryland College of Veterinary Medicine
Congratulations!



Exercise Induced Pulmonary Hemorrhage

Exercise induced pulmonary hemorrhage (EIPH) is the presence of blood in the airway associated with strenuous exercise. It is also referred to as bleeders and may result in epistaxis (nose bleeds). Pulmonary hypertension, an overload of pressure in the capillary system, can result in edema, which causes fluid movement into the lungs. Even though the body manages mean arterial pressure well, extreme changes in pressure around the lungs can result in rupture. As a horse exercises, arterial pressure can quadruple and when he exhales he moves that blood out of the lungs, through the nasal passage. Over time, the damage from pressure causes formation of scar tissue in the lungs, resulting in persistent inflammation and gas exchange interference. The body is unable to adapt to immense increases in cardiac output, in order to meet the demands of extensive exercise. The horse's ability to perform due to decreased oxygen diffusion is compromised by EIPH. Most often, an increased effort to breathe is observed due to fluid blocking the airway.

Diagnosis is commonly made by endoscopic examination done within 30 to 90 minutes after the conclusion of exercise. If endoscopy is not possible, cytology can be done to quantitatively assess hemosiderophages (hemoglobin-degrading macrophages) in a bronchoalveolar fluid lavage (Hegedus 527). Diagnosis is fairly concrete and severity can be assessed on a scale of one to four. Incidence of EIPH is so frequent that the United States pays over \$100 million treating the condition each year. It frequents 62% of Quarter Horses and between 22 and 70% of Saddlebreds. Although only 44 to 75% of racehorses are considered to have EIPH, hemorrhage is detected in approximately 93% of racehorses. Approximately 60% of sudden deaths on the racetrack are attributed to pulmonary hemorrhage (Hinchcliff 76). In addition, EIPH is seen in association with other activities that require strenuous exercise, such as: polo, barrel racing and three-day eventing.

Risk factors of EIPH are poorly understood. Environmental temperature during races has been shown to have an influence. Horses racing at a temperature less than 20°C are two times more likely to incur EIPH. While some studies show that age, sex, weight carried, track hardness, speed of racing and air quality have no effect on EIPH, others have found that these factors are associated with sudden death caused by EIPH (Hinchcliff 228). There is a suspicion that predisposition to EIPH is heritable, but further studies are necessary in order to confirm such claims. Strides toward risk factor identification must be made in order to better manage equine athletes.

The most severe cases of EIPH cause sudden death. This poses risks to horses, riders and the industry as a whole. Less severe cases result in inhibited performance as a result of gas exchange interference caused by inflammation. Studies show that horses with a grade less than one are four times more likely to win than those with a grade greater than one. These horses are also about two times more likely to finish in the first three positions of a race and over three times more likely to be in the 90th percentile or higher for race earnings (Hinchcliff 768). Either way, EIPH significantly affects the well-being of the working horse. Treatments have helped improve EIPH, but there are still questions as to the humanity of using horses with this condition.

The most effective treatment involves avoiding specific EIPH associations. Unfortunately, a poor understanding of associations makes this method hard to instill. Studies have found that furosemide administration prior to racing decreases the incidence and severity of EIPH. Furosemide is a diuretic; it decreases fluid volume through increased urination, decreasing pressure buildup. It has resulted in an 80 to 90% reduction in bleeders having episodes during races. This is currently administered to approximately 92% of North American racehorses for treatment and prevention. Nasal dilator strips have also been found to be effective in preventing EIPH. Strips open up the nasal passage to allow a decrease in air movement resistance, which reduces the buildup of pressure in the lungs. The beauty of the strips is that there are no obvious negative side effects, but they do not appear to be as effective as furosemide.

Although furosemide and nasal dilator strips are proven methods of treatment, advances need to be made to improve the quality of equine athletes' lives. Concentrated equine serums decreased the incidence of EIPH by up to 60%, but more studies are required to identify the extent of its effectiveness. Studies have also found that angiotensin-converting enzyme activity was increased in horses with a higher degree of hemorrhage; therefore it may be a promising biomarker for EIPH (Costa 993). Research must continue in hopes that by decreasing the frequency of EIPH, the use of effected horses can be avoided altogether.

Exercise induced pulmonary hemorrhage causes problems across the equine industry, primarily the racing industry. If racing EIPH affected horses is not going to stop, then measures to prevent and treat EIPH must be explored. Researchers know enough about the mechanism of rupture to succeed in prevention and improved treatment methods. More work is required in order for the equine industry to treat and use effected horses in a proper, humane manner.