

# Exercise Induce Pulmonary Hemorrhage (EIPH) in the Horse

*A PowerPage Presented By*



Exercise induce pulmonary hemorrhage (EIPH) is a common clinical finding in horses subjected to strenuous exercise and is considered by many to be a cause of reduced athletic performance in the horse. EIPH primarily affects race horses but may also be seen in other equine disciplines requiring intense bouts of exercise. The exact pathogenesis of EIPH is still under investigation. The intent of this PowerPage is to present basic information in regard to EIPH in the horse, including proposed pathophysiology, clinical signs, diagnosis and treatment.

## Key Points

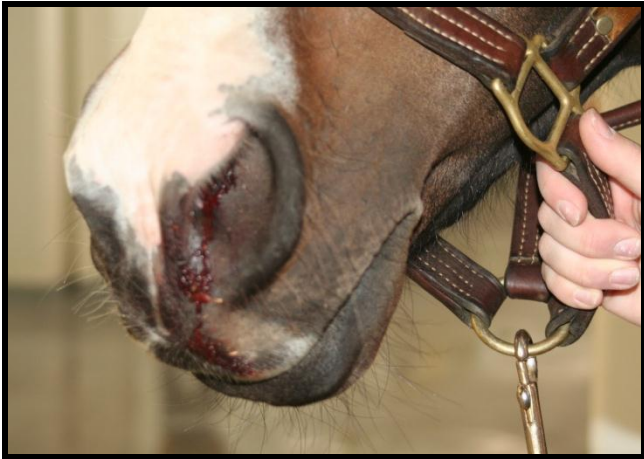
- Most commonly observed in Thoroughbred, Standardbred and Quarter Horse race horses
  - Can be seen in many other equine disciplines involving intense exercise.
- The most obvious clinical sign of EIPH is epistaxis
  - More subtle hemorrhage in the airway may not be observed without endoscopic examination of the airway cytologic examination of bronchoalveolar lavage fluid
- The exact pathophysiology of EIPH is debatable
  - Stress failure of pulmonary capillaries during intense exercise is a prevalent theory.
- Treatment often involves administration of the diuretic, furosemide (Lasix) prior to intense exercise
  - A variety of other medications have also been administered in an attempt to prevent EIPH suggesting that a universally accepted treatment is not available

## Pathophysiology

A number of pathophysiologic theories resulting in EIPH have been presented, although a consensus of these theories has not been reached. One theory suggests that EIPH results from rupture of pulmonary capillaries that are weakened by inflammatory disease while another hypothesis suggests stress failure of pulmonary capillaries. Other mechanisms suggested include upper airway obstructions, small airway disease, coagulopathies, redistribution of pulmonary blood flow during exercise and trauma, among others. It is possible that a combination of these theories may result in EIPH in the horse. Interestingly, the prevalence of EIPH is related to intensity of exercise rather than duration of exercise and on necropsy, the **caudodorsal lung fields** are most commonly involved. Some reports have documented no gender predilection but other reports have documented increased incidence in female horses. In addition, the incidence of EIPH may increase with age of the horse.

## Clinical Signs

**Epistaxis after exercise** is an obvious clinical sign, but **does not occur in all horses with EIPH**. Other purported clinical signs such as decreased performance, labored breathing, loss of speed during exercise or competition and/or coughing may be reported.



Epistaxis is noted from this 4-year old Thoroughbred after intense exercise during training, suggestive of EIPH.

## Diagnosis

The **presence of blood** at one or both nostrils (i.e. epistaxis) after exercise is an indicator of EIPH but **endoscopy and cytologic examination** of bronchoalveolar lavage (BAL) fluid have also been used to establish a diagnosis of EIPH. In fact, epistaxis after exercise is observed in only 0.2% to 13% of racehorses post-exercise; however, endoscopic examination of the airway of horses post-exercise reveals that a large majority of racehorses (75-100%) have evidence of blood within the upper airway or trachea suggesting that the majority of horses undergoing intense exercise have some evidence of hemorrhage within the pulmonary system. Moreover, if the diagnosis of EIPH was extended to horses that demonstrated erythrocytes or hemosiderophages in bronchoalveolar lavage fluid, the incidence is nearly 100% of horses involved in intense exercise.

## Treatment

A variety of treatments have been attempted for EIPH with variable results; however, the diuretic **furosemide (Lasix)** is the most commonly utilized therapy for EIPH and is permitted by racing officials if administered **4 hours prior to racing**. The use of furosemide has some documented success with reduction in RBCs in BAL fluid in horses administered the drug prior to exercise. In addition, laboratory studies have measured decreased plasma volume and attenuation of the increased pressures of the right atrium, pulmonary artery and pulmonary capillary in horses administered furosemide prior to treadmill exercise. Other remedies for EIPH include pro-coagulants, vitamin K, hormone therapy, and various nutritional supplements.

## Further Information

Birks EK, Durando MM, McBride S. Exercise induced pulmonary hemorrhage. *Vet Clin North Am Equine Pract* 2003;19(1):87-100.

Poole DE, Epp TS, Erickson HH. Exercise induced pulmonary hemorrhage (EIPH): mechanistic bases and therapeutic interventions. *Eq Vet J* 2007;39(4):292-3.

