

What Do Veterinary Medicine Specialists Think About EIPH?

Systematic Review of Published Evidence Regarding EIPH and Furosemide



Paul S. Morley, DVM, PhD, DACVIM
Professor of Epidemiology
Colorado State University



Purpose

- Effort initiated at request of ACVIM Specialists and Racing Industry Stakeholders
- Expert panel charged to review published evidence and provide a consensus view on aspects of exercise-induced pulmonary hemorrhage delineated in the commissioning brief from the Board of Regents of the ACVIM.
- Questions Addressed
 - Does EIPH impact the health and welfare of horses?
 - Does EIPH affect athletic performance?
 - Are there effective prophylactic treatments for EIPH?
 - Does furosemide affect athletic performance?

Expert Panel Members

- **Laurent Couetil** - Purdue University
- **Emmanuelle van Erck** - Equine Sports Medicine Practice, Belgium
- **Ken Hinchcliff** - University of Melbourne
- **Peter Knight** - University of Sydney
- **Paul Morley** - Colorado State University
- **Ed Robinson** - Michigan State University
- **Corinne Sweeney** - University of Pennsylvania

Exercise-Induced Pulmonary Hemorrhage (EIPH)

- Hemorrhage into lower airways
- Described for centuries
 - e.g. Bartlet's (Bleeding) Childers
 - by Darley Arabian (1716)
 - Grandsire of Eclipse
- Very prevalent with high intensity exercise
 - Occurs in at least 75% of racehorses (perhaps all)
 - Varying severity (Grade 0-4, epistaxis)



Furosemide & EIPH

- First reported use in horses in 1967
 - Vail, Beeman, and Johnson.
“Furosemide in equine practice.” Vet Med/Small Anim Clin. 1967:62;881
- Anecdotal reports of use in “bleeders” as early as 1964
 - Dr. Alex Harthill and Northern Dancer*



* Cited in “Run, Baby, Run.” Bill Heller 2003. Russell Meerdink Co., Neenah, WI. P. 38

Furosemide in Equine Practice

C. D. Vail, D.V.M.
G. M. Beeman, D.V.M.
H. W. Johnson, D.V.M.
Littleton Veterinary Clinic
Littleton, Colorado

EQUINE PRACTICE has long been handicapped by the lack of a consistently effective, safe and rapid-acting injectable diuretic. In the past, medications (ranging from hypertonic or massive isotonic parenteral solutions to mercurial or thiazide

SEPTEMBER 1967

VETERINARY MEDICINE/SMALL ANIMAL CLINICIAN

Let It **Bleed?**



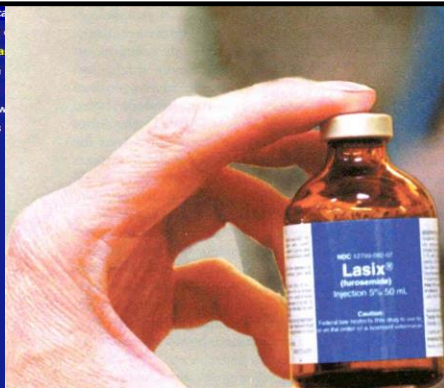
AMERICA'S
TURF
AUTHORITY
SINCE 1894

SPORTS | THE RAIL

Amid Crown Chase, a Battle for Racing's Soul

By JIM SQUIRES JUNE 2, 2014

aaep "on c
continuing
press relea
aaep store
exhibitors
marketview
other links



IT MAY START WITH THE SMALLEST TRICKLE OUT OF a blowing nose.

It may show up as an inexplicably poor performance, a failure to come down the stretch with vigor, a lack of effort from a normally hard-trying athlete.

And it may occur in more than 80 percent of horses racing around America's tracks.

Exercise-induced pulmonary hemorrhage, known as EIPH, is a fancy name to describe the blood that appears in a horse's respiratory system after strenuous activity. A horse that suffers this condition is called, for obvious reasons, a "bleeder."

Though it may not be easy to spot most bleeders at North American racetracks through physical evidence—less than 10 percent actually show external signs of



SPORTS

Jockey Club Wants U.S. Anti-Doping Agency in Charge

By JOE DRAPE MARCH 28, 2014

run, on average, a third second faster than colts not treated with the drug.

"It's probably the clearest evidence

the United States and 1.09 seconds for six furlongs. On average, Lasix-treated fillies and non-Lasix fillies differed by 0.70 seconds.

Veterinarians contacted Thursday declined to make specific statements on the study or its conclusions until they

commented. Earlier, EIPH studies point to an incidence rate of nearly

Katey Barrett photo

be a marker

Systematic Review

- Grades of Recommendation, Assessment, Development, and Evaluation (GRADE)
- A defined process for evaluating strength of evidence and making recommendations of varying strength on judgements about effectiveness of interventions or findings
- Strength of evidence is assessed using both the type and quality of reported research.

Quality of evidence

- High: We are very confident in the reported estimate of effect, and the magnitude is clearly important.
- Moderate: We are moderately confident in the effect estimate, but there is possibility that it is substantially different. The magnitude is likely important

Quality of Evidence

- Low: Our confidence in the reported effect is limited, and the true effect could be substantially different. In other words, both the direction of the effect and its magnitude are very likely to change with further research.
- Very low: Any estimate of the effect is very uncertain and the real effect of the intervention is unknown.

Quality of Evidence vs. Direction and Strength of Association

- Example – High Quality Evidence:
 - High quality evidence of **strong protective effect**
 - High quality evidence of **weak protective effect**
 - High quality evidence of **no effect (no difference)**
 - High quality evidence of **weak harmful effect**
 - High quality evidence of **strong harmful effect**
- Moderate quality evidence...
- Low quality evidence...
- Etc.

Results

- Evidence only for TB and STB racehorses
- Findings – 26 findings in total, 21 critical
- Topics
 - **Health and Welfare** – 9 outcomes
 - **Prophylaxis** – 10 outcomes
 - **EIPH and performance** – 5 outcomes
 - **Furosemide and performance** – 2 outcomes

Draft Conclusions

Does EIPH affect the health of horses?

- ***Consensus: EIPH Should be considered a disease.***
- ***Does EIPH produce clinical disease, other than bleeding?***
 - *Finding: There is **very low quality** evidence of consistent clinical abnormalities in horses with EIPH.*
- ***Does EIPH shorten the career of horses?***
 - *Finding: There is **moderate quality** evidence...*
 - *EIPH Grade 1-3 is not associated with a shorter racing career.*
 - *Horses with epistaxis or Grade 4 EIPH have a shorter career.*

Does EIPH affect the health of horses?

- ***Does EIPH cause structural changes in the lungs?***
 - *There is **high quality** evidence that horses with severe EIPH have extensive and characteristic pulmonary lesions.*
 - *There is **no evidence** that these changes contribute to the pathogenesis of other lung diseases.*
- ***Is EIPH a progressive condition?***
 - *There is **moderate** quality evidence that EIPH is progressive and related to load of racing.*

Is there effective prophylaxis for EIPH

- ***Is furosemide effective prophylaxis for EIPH?***
 - *Finding: There is **high quality** evidence that furosemide reduces the severity and incidence of EIPH.*
- ***Does furosemide affect pulmonary vascular pressure?***
 - *Findings: There is **high quality** evidence that furosemide reduces pulmonary vascular pressure during strenuous exercise.*

Is there effective prophylaxis for EIPH

- ***Are other pharmacological interventions effective as prophylaxis for EIPH?***
 - *Finding: There is **very low quality** evidence that other medications have no effect on EIPH.*
- ***Are nasal strips effective as prophylaxis for EIPH?***
 - *Findings: There is **low quality** evidence that nasal strips reduce the severity and incidence of EIPH*

Does EIPH affect performance?

- ***Is EIPH associated with the finishing position?***
 - *Finding: There is **moderate quality** evidence that moderate to severe EIPH worsens finishing position in a race.*
- ***Is EIPH associated with the margin of finish?***
 - *Finding: There is **moderate quality** evidence that horses with more severe EIPH finish further behind the winning horse in a race.*

Does furosemide affect performance?

- Does furosemide affect performance of horses running on a racetrack?
 - *Finding: There is **moderate quality** evidence that furosemide administered intravenously 4 hours prior to racing results in improved racing times.*
- Does furosemide affect performance of horses running on a treadmill?
 - *Finding: There is **low quality** evidence that furosemide administered intravenously 4 hours prior to treadmill exercise delays onset of fatigue and improves energetic cost of locomotion.*

Poor Quality Evidence

- Panel noted the low quality of evidence in many studies attributable to:
 - Poor reporting of study details
 - Lots of small studies... TOO SMALL
 - Inappropriate design and analysis
 - Use of indirect outcomes (physiological variables)
- **We must correct these mistakes if we are to provide evidence to guide the policy debates**

Future of this Effort

- Report is being drafted
- Submit for comment by ACVIM Diplomates and other stakeholders
- Approval by ACVIM Board of Regents
- Publication in the Journal of Veterinary Internal Medicine

Thank You!

