# EVALUATION OF THE EFFICACY OF EFORMOTEROL ON EXERCISE-INDUCED PULMONARY HEMORRHAGE IN TRAINING THORUOUGHBRED HORSES.

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OBJETIVE: Excercise-induced pulmonary hemorrhage (EIPH) is a major medical problem in competitive horses, with a great economic impact, but its pathophysiology is poorly understood. Current pharmacological treatment is inadequate because of questionable efficacy and potentially severe side effects. Eformoterol is a β2 adrenergic agonist with vascular, bronchial, and anti-inflamatory effects. We evaluated the efficacy of intramuscular eformoterol to prevent EIPH in thoroughbred horses during competitive training.

METHODS: We studied 90 thoroughbreds (2-4 years-old, 400-500 kg) with endoscopically confirmed EIPH classified in mild or severe. Horses were fed normally, worked on a similar training schedule (speed 15.57 to 17.73 m/sec, 600-1200 m) in a sand race-track, 2 h after receiving 0.040 (mild EIPH), or 0.080 (severe EIPH) mg eformoterol (Arterol®, Laboratorio Fundación, Argentina); and underwent blind physical evaluation and endoscopy by a veterinarian 40 and 60 min after the training session, as well as blind performance assessments by jockeys and trainers using a qualitative scale.

RESULTS: Administration of eformoterol resulted in a marked decrease in bleeding episodes (table 1). Epistaxis was not observed after eformoterol regardless of the previous classification of the horses. Light bleeders showed less than 2+ blood under endoscopy after administration of 0.04 mg eformoterol (95% were read as normal or less than 1+). Only one horse classified previously as heavy bleeder showed endoscopic bleeding greater than 2+ after administration of 0.08 mg eformoterol (85% were between normal and 1+). Vital signs returned to baseline within 40 minutes after exercise in treated horses, but rarely in untreated animals. Performance assessments by jockeys and trainers, who were blind to the treatment, were "outstanding" in every case, whereas baseline assessments were on average "good". No significant side-effects were observed.

| | Light bleed | | Heavy bleed | |
|---|---|---|---|---|
| | baseline | 40' post | baseline | 40' post |
| Heart Rate | 35±0.5 | 46±1.7 | 38±0.7 | 45±4.7 |
| Arrythmia | 0 | 0 | 2 | 0 |
| Resp rate | 14±0.4 | 21±1.3 | 16±0.7 | 19±1.8 |
| Deep breathing | no | yes | no | yes |
| Blood pressure | 158±3.5 | 175±5 | 150±4 | 160±2.2 |

Table 1. Vital Signs.

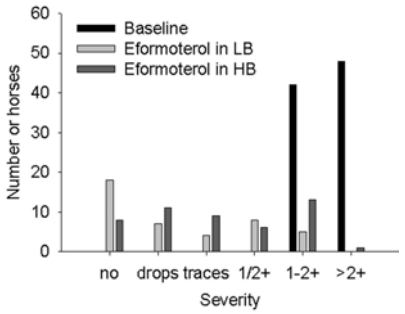


Figure 1. Effects of eformeterol on EIPH.

CONCLUSIONS: Administration of eformoterol resulted in a significant decrease in the severity of the bleeding episodes. This could be attributed to a direct effect of the decrease bleeding, but we cannot exclude alternative explanations such as improved ventilation or perfussion. Most likely, the remarkable protective effect of eformoterol is due to a combination of vasodilatation, reduction of microvascular permeability and avoiding edema, inhibition of inflammatory factors, and reduction or closing of the endothelial gap Eformoterol-induced bronchodilation may reduce transmural alveolar pressure and also contribute to the protective effect against EIPH.