

# Systemic dexamethasone concentration in horses after continued topical treatment with an ophthalmic preparation of dexamethasone

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**Objective**—To determine concentrations of dexamethasone in serum and urine of horses treated repeatedly with a topically administered ophthalmic dexamethasone preparation.

**Animals**—4 clinically normal horses (2 mares, 2 geldings).

**Procedure**—0.1% dexamethasone ophthalmic ointment was administered to the left eye of each horse every 5 to 9 hours for 8 consecutive days, yielding an estimated cumulative dexamethasone dose of 6.4 µg/kg of body weight. Serum and urine samples were obtained before the first dexamethasone treatment, on days 4 and 8 of treatment, and 24, 48, and 96 hours after cessation of treatment. To detect small concentrations of dexamethasone, serum and urine samples were analyzed by use of a competitive enzyme immunoassay.

**Results**—During the period of continued topical treatment, serum dexamethasone concentrations increased to between 0.10 and 0.49 ng/ml, then decreased below the limit of detection (0.06 ng/ml) within 24 hours after cessation of treatment. Dexamethasone also was detected in urine samples at concentrations of up to 0.98 ng/ml.

**Conclusions**—Repeated topical administration of dexamethasone ophthalmic ointment generated low, but detectable glucocorticoid concentrations in serum and urine.

**Clinical Relevance**—Because treatment of performance horses with dexamethasone is prohibited for most types of competitions and because enhanced glucocorticoid detection methods may result in positive test results, owners and trainers may wish to reconsider entering horses in competitions during periods of treatment with ophthalmic dexamethasone preparations. (*Am J Vet Res* 1999;60:571–576)

Synthetic glucocorticoids have potent anti-inflammatory effects and are widely used in veterinary practice.<sup>1,2</sup> Short-acting glucocorticoids often are administered to horses with various allergic or autoimmune conditions,<sup>3</sup> and dexamethasone and other long-acting

glucocorticoids are used to treat lameness attributable to joint injury or swollen bursae and tendon sheaths.<sup>4</sup> In addition, synthetic glucocorticoids constitute a critical therapeutic component in horses with chronic recurrent uveitis, which is considered the leading cause of blindness in horses.<sup>5–9</sup> Recurrent uveitis is characterized by repeated episodes of inflammation in 1 or both eyes, interrupted by various intervals of clinical quiescence. The pathogenesis of this disease is complex, and in many instances, its cause cannot be identified unequivocally.<sup>10–15</sup> Regardless of the inducing agent, chronic recurrent uveitis is often treated with topically administered glucocorticoid preparations containing 0.1% dexamethasone. Three to 4 applications daily are indicated to treat mild uveitis, but administration should be repeated up to 10 times daily in more severe cases. Also, topical treatment for recurrent uveitis should be continued for several days to weeks after cessation of the inflammatory response and resolution of other acute signs of disease.<sup>14–16</sup> Although recurrent uveitis is the most common ophthalmic indication for topical glucocorticoid administration in horses, the same drugs also are effective against certain forms of noninfectious keratitis or keratoconjunctivitis.<sup>17</sup>

Glucocorticoids relieve pain, exert psychostimulating effects, and may improve performance.<sup>4,18,19</sup> As a consequence, these compounds are considered doping agents, and their administration to horses competing in races or other events is illegal.<sup>20–22</sup> The study reported here was motivated by the observation that horses with glucocorticoid-responsive ophthalmic diseases may be readmitted to competitions immediately after resolution of overt clinical signs of disease, such as blepharospasm, lacrimation, photophobia, or conjunctival injection. However, possible systemic effects of topically administered glucocorticoids have been poorly investigated. Therefore, the objective of the study presented here was to determine drug concentrations in blood and urine of horses repeatedly treated with an ophthalmic dexamethasone preparation. An appropriate sample extraction procedure was combined with an enzyme immunoassay to measure low serum concentrations of synthetic glucocorticoids in a quantitative manner; hence, we report a simple analytical method to assess systemic drug concentrations arising from topical dexamethasone treatment in horses.

## Materials and Methods

**Horses**—Two mares (denoted A and N) and 2 geldings (H and S) between 7 and 12 years old and weighing a mean

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