

# Keratoconjunctivitis sicca and diabetes mellitus in a dog

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A 9-year-old sexually intact female Poodle with bilateral epiphora was referred to our clinic. According to the owner, the dog had always had epiphora, but this condition had worsened over the preceding 2 months. Results of physical examination, fluorescein tests, bacterial culture, and microscopic evaluation of conjunctival smears did not reveal a cause for the epiphora.

Six months later, the dog was returned to the clinic for evaluation of progressive weight loss, polyuria, polydipsia, and loss of vision; these signs had been noticed during the preceding 6 weeks. Examination of the eyes revealed blepharospasm, abundant mucopurulent exudate, and an opaque, dull, rough cornea. Schirmer's tear test values were 1 mm/min in the right eye and 2 mm/min in the left. Results of hematologic evaluation revealed anemia, with 3,075,000 RBC/ $\mu$ l (normal values = 5,610,000 to 7,460,000/ $\mu$ l), PCV of 23% (normal values = 40.4 to 55.3%), and 5 g of hemoglobin/dl (normal values = 14.2 to 18.9 g/dl); and leukocytosis, with 20,800 WBC/ $\mu$ l; (normal values = 5,939 to 16,650/ $\mu$ l), characterized by neutrophilia (18,512 neutrophils/ $\mu$ l; (normal values = 4,424 to 11,706/ $\mu$ l). Serum biochemical analysis yielded the following abnormal results: alanine transaminase, 174 IU/L (normal values = 15 to 52 IU/L); urea, 57 mg/dl (normal values = 7 to 23 mg/dl); creatinine, 1 mg/dl (normal values = 0.6 to 1.2 mg/dl); and glucose, 361 mg/dl (normal values = 77 to 120 mg/dl). Urinalysis revealed glycosuria (1,000 mg/dl), ketonuria (80 mg/dl), and proteinuria (100 mg/dl); specific gravity was 1.015 and pH was 6.0.

Diabetes mellitus and keratoconjunctivitis sicca were diagnosed. Crystalline protamine pork insulin (0.34 U/kg of body weight, sc, q 24 h) was prescribed, and the owner was asked to monitor glycosuria to adjust the insulin dosage. Keratoconjunctivitis sicca was treated with a collyrium containing neomycin sulfate (3.5 mg), polymyxin B

sulfate (6,000 U), and dexamethasone (1 mg), and with artificial tears,<sup>a</sup> applied to both eyes 5 or 6 times a day.

Serum glucose concentration was monitored on a daily basis for 9 days; at this time, the insulin dosage was 0.62 U/kg, and serum glucose concentration was within normal limits. Polyuria and polydipsia were considerably diminished, and Schirmer's tear test yielded values of 10 mm/min in the right eye, and 15 mm/min in the left. Treatment for keratoconjunctivitis sicca was suspended, and subsequent monthly examinations did not reveal evidence of relapse.

Keratoconjunctivitis sicca is a condition in which the cornea and conjunctiva become dry and inflamed as a result of inadequate tear secretion or blockage of the excretory ducts of the lacrimal gland. The total tear volume and the composition of any of the 3 layers of the precorneal tear film may be modified. In dogs, the most frequent modification affects the main component of the tear film, the aqueous layer, and reduces tear volume to amounts insufficient to bathe and protect the eye.<sup>1-4</sup>

Most of the factors known to predispose to keratoconjunctivitis sicca were not applicable to this dog. Most authors do not consider Poodles to be predisposed to this disorder.<sup>5,b</sup> Barnett and Samson<sup>2</sup> reported that this disease is most frequently observed in dogs between 4 and 7 years old, whereas the dog in this report was 9 years old; however, keratoconjunctivitis sicca is a chronic disorder, and it is therefore difficult to establish the exact age at which the process began. Keratoconjunctivitis sicca has been reported to develop more frequently in female dogs than in males.<sup>2,6</sup>

Several endocrine disorders may be associated with keratoconjunctivitis sicca. The relationship between hypothyroidism and keratoconjunctivitis sicca was studied by Peruccio,<sup>7</sup> and subsequently confirmed in 2 cases reported by Sansom and Barnett.<sup>2</sup> Keratoconjunctivitis sicca also has been reported as a result of estrogen deficiency by Barnett and Sansom.<sup>8</sup> On the basis of observations made in this dog, we suggest that there might be some link between diabetes mellitus and keratoconjunctivitis

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sicca. Clinical signs of the disorders developed simultaneously and resolved when diabetes mellitus was controlled with insulin.

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### **Hematologic and serum biochemical effects of long-term administration of anti-inflammatory doses of prednisone in dogs**

Results of routine hematologic and serum biochemical analyses from 12 healthy adult male dogs that were given prednisone (0.55 mg/kg of body weight, PO, q 12 h) for 35 days were compared with those of a control group of 6 dogs that were given gelatin capsules. Analyses were performed at 2-week intervals during and after prednisone administration. Lymphocyte and eosinophil counts were significantly ( $P < 0.005$ ) decreased after 2 and 4 weeks of prednisone treatment, compared with controls. Two weeks after treatment, eosinophil counts in prednisone-treated dogs were similar to those of control dogs, whereas lymphocyte counts remained low 4 weeks after treatment in treated dogs ( $1,869 \pm 145$  cells/ $\mu$ l), compared with that in control dogs ( $3,662 \pm 548$  cells/ $\mu$ l). Neutrophil and monocyte counts did not significantly change during prednisone administration. Mean platelet volume significantly ( $P < 0.001$ ) decreased after 4 weeks of prednisone treatment, but returned to pretreatment values by 2 weeks after treatment. Four weeks of prednisone treatment did not cause significant increased activity in serum alanine transaminase, total alkaline phosphatase, or the steroid-induced isoenzyme of alkaline phosphatase. Significant increases in serum albumin ( $P < 0.001$ ) and total protein ( $P < 0.05$ ) concentrations were detected after 4 weeks of treatment, but mean values were not significantly different from those of controls 2 weeks after treatment ended. Results of our study indicate that eosinophil and lymphocyte counts are the most sensitive indicators of long-term glucocorticoid administration at anti-inflammatory dosages of 1.1 mg/kg daily.—G. E. Moore, E. A. Mahaffey, and M. Hoenig in *Am J Vet Res* 53 (June 1992).