MYCOBACTERIUM TUBERCULOSIS IN A BLACK RHINOCEROS (*Diceros bicornis)*

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A female, 31 year old black rhinoceros *(Diceros biconrnis)* was found to be positive on tuberculin skin test using 0.1 ml PPD bovis in October, 1992. The test was given in the eyelid and caudal fold and both sites were indurated and erythematous at 24, 48 and 72 hr. A blood sample was submitted and the ELISA test was positive. Gastric lavage was performed and culture results were negative.

Previous medical records for this animal indicated treatment with isoniazid for 1 year (1981) following a positive tuberculin test in an exhibit mate. No confirmation of mycobacterial infection was ever made. No dosage or indication of compliance was given. The rhinoceros was skin tested in 1989 using PPD bovis and was negative.

Due to positive tuberculin skin tests in an Asian elephant *(Elephas maximus)* housed in the building with this rhinoceros, 2 more gastric lavages were performed in January 1993. *Mycobacterium tuberculosis* was cultured and confirmed. The rhinoceros was started on 7 g p.o. isoniazid (INH) daily. Rifampin (RIF) was added to the regimen at 11 g daily. Sensitivity results indicated resistance to INH at 0.2 μg/ml, sensitivity at 1.0 μg/ml. In humans, if an INH resistant strain of *M. tuberculosis* is encountered, pyrazinamide (PZA) and ethambutol (EMB) are usually added to the RIF, or streptomycin is used. Initially the cost of PZA and EMB was prohibitive and it was felt that multiple injections of streptomycin were not feasible. Therefor, the INH dose was increased to 14 g in an attempt to raise serum levels to the organism's sensitive range.

In August 1993 (3 months into therapy; 2 months at the higher INH dose), another gastric lavage was performed and was culture positive. INH serum levels were 2.25 μg/ml and RIF was undetectable. In October, PZA (32 g) and EMB (26 g) therapy was initiated in addition to INH (14 g) and RIF (11 g). Sensitivity results showed the organism had developed total INH resistance, so INH was discontinued in November 1993. Gastric lavage results were negative in November and serum levels were as follows: EMB = 5.34 μg/ml; PAZ = 5.32 μg/ml; RIF = 0.46 μg/ml.

Since therapeutic levels in rhinoceros are unknown, adequate human serum levels were used as guidelines: EMB 2-6 μg/ml, PZA 20-60 μg/ml, RIF 8-16 μg/ml. Doses of PZA and RIF were increased to 64 g and 33 g respectively and EMB was continued at 26 g. Compliance was not a problem.

In January 1994, another gastric lavage was performed and found to be negative. Serum levels were EMB = 0.0 μg/ml, PZA = 6 μg/ml and RIF 0.0 μg/ml. The rhinoceros died suddenly in March 1994. Necropsy results showed pulmonary tuberculosis, pulmonary Abscesses with interlesional fungi (Aspergillus-like) and metastatic carcinoma adenocarcinoma. No liver pathology attruibutable to the anti-tuberculosis therapy was found. Despite the severity of lesions found on necropsy, this animal was asymptomatic until approximately 1 hr prior to death. At that time she was lethargic, developed dyspnea and died.