Suspected Mefloquine Toxicity in a Colony of Humboldt Penguins (*Spheniscus humboldti*)

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Abstract: Avian malaria is an important cause of mortality in captive penguins housed in outdoor exhibits. Mefloquine was used as a prophylaxis to treat a colony of 19 Humboldt penguins (*Spheniscus humboldti*) for avian malaria. A target dose of 30 mg/kg was obtained from anecdotal literature for sphenisciforms that was not based on pharmacokinetic or toxicity studies. For this reason, preliminary plasma concentrations of mefloquine were acquired after the first dose in some penguins to ensure that plasma concentrations reached human malaria prophylactic concentrations. Afterward, each penguin in the entire colony received mefloquine (26–31 mg/kg [125 mg in toto] PO q7d). Regurgitation was frequently observed starting after the fourth weekly administration. Plasma concentrations of mefloquine after the seventh dose showed elevated concentrations, and the treatment was immediately terminated. Eight penguins died during and after the treatment period. The first fatality occurred after the fifth weekly administration, and 7 birds died within 7–52 days after the seventh weekly administration. Three penguins were found dead without previous symptoms. The other five presented with marked lethargy, dyspnea, poor appetite, and vomiting, and all died despite medical care. The remaining 11 penguins of the colony survived without any supportive care; 5 did not exhibit any clinical disease signs, while the other 6 showed a mild apathy and decreased appetite. Mefloquine toxicity was highly suspected on the basis of clinical signs, the elevated mefloquine plasma concentrations, and no other underlying pathologic disease conditions identified through postmortem examinations. Nonspecific lesions, including pulmonary congestion and edema and hepatic perivascular hematopoiesis, were noted in the birds that died. Additionally, 1 case presented with myocarditis, and mycobacteria were observed within granulomas in the respiratory tract of 2 penguins. Caution is advised, and further studies are encouraged before administering mefloquine to penguins.