

LEAD INTOXICATION KINETICS IN CONDORS FROM CALIFORNIA

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ABSTRACT.—Lead intoxication is a major factor in morbidity and mortality of California Condors (*Gymnogyps californianus*) in the wild. Data were obtained on blood lead levels in condors in California from random blood testing in the wild provided by the US Fish and Wildlife Service and Ventana Wilderness Society. Since the year 2000 blood samples have been routinely collected from condors whenever birds were captured. An analysis of 469 blood samples taken from 95 different condors indicated that 79 of these condors have had at least one significant lead exposure incident. Some condors have been intoxicated many times: Condor 108 with 13 positive blood samples, Condor 98 with 12, three others each exposed at least 11 times. In total there have been 276 separate documented incidents of blood lead levels in excess of 10 µg/dL. 27 of these have been in excess of 50 µg/dL, and have required emergency clinical care to prevent permanent injury or death. The clinical consequences of recurrent lead poisoning is uncertain, but will likely result in long-term neurological injury.

Analysis of successive blood samples from individual condors allowed a determination of depuration kinetics and half-life of lead in blood. The relatively rapid half-life averaged 14 days (range 3–22 days), with uncertainty arising from the possibility of unobserved lead fragments remaining in the alimentary canal of exposed birds. The high incidence of exposure and rapid half-life indicate that most condors have been repeatedly exposed to lead in the wild. The behavioral consequences of lead exposure to birds will be discussed.

In 2007, the California State Legislature passed legislation requiring the use of “lead-free” bullets for big-game hunting within the condor range. The California Fish and Game Commission subsequently implemented regulation to allow hunting only with “lead-free” ammunition, defined as bullets containing not more than 1% lead. Toxicological modeling of this amount of lead impurity in bullet fragments indicates that even if condors consume major fragments of bullets, the dissolution of lead is unlikely to raise the blood lead levels above 1 µg/dL, a low level equivalent to the blood lead levels of condors being raised in Los Angeles or San Diego Zoos on a lead-free diet.

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