

TWO-PHASE CLEARANCE OF LITHIUM FROM PLASMA IN RATS^{1,2}

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Summary.—Data from 10 Philippine rice rats show the two-phase pattern of lithium elimination from plasma, confirming and extending earlier work.

Lithium chloride (LiCl) is the emetic drug of choice in most studies of conditioned taste aversion (CTA) with rats (see 1, 2). However, few reports of conditioned taste aversion have examined the pharmacokinetics of Li in rats' blood and resultant CTA responses.

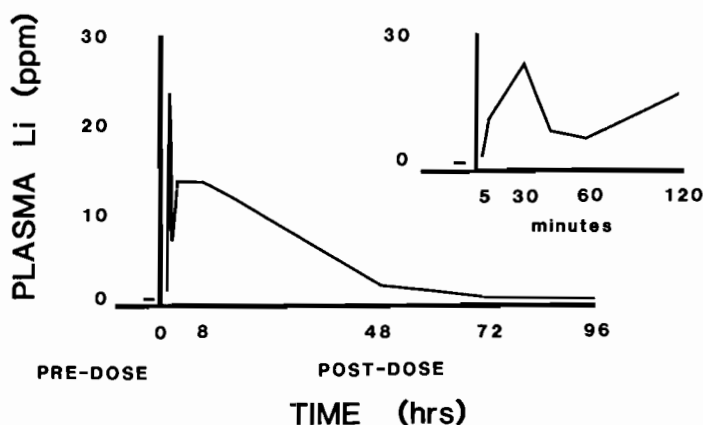


FIG. 1. Time course of plasma Li levels in individual Philippine rice rats; the predose value is for a control rat gavaged with 1 cc of deionized water and immediately bled. (Note.—The insert shows the immediate effect of probable uptake and removal of Li by the liver within 2 hr. after dosing.)

Fig. 1 presents the pattern of Li elimination from the plasma of 10 Philippine rice rats (*R. r. mindanensis*) gavaged with single 375 mg/kg doses of a 7% (w/v) LiCl-deionized-water solution. Approximately 1.5 cc samples of blood were taken (i.c.) from an individual rat at 0.08, 0.5, 0.66, 1, 2, 8,

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24, 48, 72, and 96 hr. after dosing, respectively. These samples were centrifuged (15 min. at 4000 rpm), refrigerated, and analyzed for Li by a commercial laboratory (Analytotox, Inc., Denver, CO).

Fig. 1 shows that (a) Li was totally eliminated from the rats' plasma at 96 hr. postdose and (b) the clearance pattern involved a 2-phase process. Plasma Li increased to a peak of 27 ppm within 0.5 hr. of gavage, then abruptly decreased (probably indicative of liver function) between 0.5- to 1.0-hr. postdose. This was followed by a second increase to moderate levels of plasma Li (probably liver saturation) between 2 to 8 hr. after dosing and a gradual elimination thereafter.

These data confirm and extend results of an earlier report (3). Circulating Li is both dose and time dependent but is eliminated from the blood of rats quickly. A single 375 mg/kg dose of LiCl extends Li removal about 24 hr. relative to single doses of 120 and 240 mg/kg (see 3). Research is needed to assess relationships between plasma Li uptake and the onset, intensity, and extinction of the effects of conditioned taste aversion in rats.

REFERENCES

1. RILEY, A. L., & TUCK, D. L. Conditioning food aversions: a bibliography. *Annals of the New York Academy of Sciences*, 1985, 443, 381-437.
2. RILEY, A. L., & TUCK, D. L. Conditioned taste aversions: a behavioral index of toxicity. *Annals of the New York Academy of Sciences*, 1985, 443, 272-292.
3. STERNER, R. T. Plasma lithium as a marker of lithium chloride in wild Norway rats (*R. norvegicus*). *Physiology and Behavior*, in press.

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