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Susceptibility of the Sage Brush Vole, *Lagurus curtatus*, to *Listeria monocytogenes*

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Once isolated, *Listeria monocytogenes* is easily grown on ordinary bacteriological media; however, initial isolation from clinical specimens may be unsuccessful unless the organism is present in large numbers, or the specimen is refrigerated in broth for several days to several months. In the absence of refrigeration, organisms were not recovered from some specimens showing histological evidence of *L. monocytogenes* (Gray et al., J. Bacteriol. **55**:471, 1948).

Inoculation of animals with suspected material and subsequent recovery of *L. monocytogenes* has not been rewarding (Seeliger, *Listeriosis*, Hafner Publishing Co., New York, 1961). Although the white mouse, rabbit, and guinea pig can be infected experimentally with *L. monocytogenes*, the lethal dose is too large to be of value for recovery of small numbers of organisms. Dunaeva (J. Microbiol. Epidemiol. Immunobiol. **28**:1268, 1957) reported that one *L. monocytogenes* organism was lethal to the Russian steppe lemming. As the lemming was not available, the native sagebrush vole, *Lagurus curtatus*, was drawn to our attention. A limited number of *L. curtatus* was recently acquired, enabling us to describe the lethal response of this vole to small doses of *Listeria*.

The voles were divided into groups of four with individuals of each group selected at approximately the same weight. For comparative purposes, Swiss Webster mice (Rockland Farms) averaging 16 g each were inoculated with lower dilutions of the same culture used for the voles. All animals were inoculated intraperitoneally with 0.2 ml of the diluted culture. Livers of dead animals were examined grossly for focal lesions which were microscopically and culturally confirmed.

The inoculum was prepared from *L. monocytogenes* 19303 grown overnight in Brain Heart Infusion (BHI; Difco) at 37 C. Different doses of organisms were prepared by serial dilutions in 1:10 BHI maintained in an ice bath. Different dilutions were selected to provide an estimated low dosage of organisms contained in a 0.2-ml volume for injection. Concurrently with injection, 0.2 ml of each dilution being inoculated was spread on each of four plates of Tryptose Agar (Difco) containing 1% dextrose. Colonies were counted after 48 hr at 37 C. *Listeria* do not clump or chain; consequently, the colony counts are highly reproducible.

TABLE 1. *Lethal response of voles and mice to Listeria monocytogenes 4 to 8 days after inoculation*

Avg wt	Plate counts of inoculum	Animals dead/total inoculated
g		
Voles		
22	34, 34, 34, 38	4/4
20	12, 15, 15, 15	4/4
17	9, 12, 12, 13	4/4
16	5, 6, 7, 8	2/4
15	1, 2, 2, 4	3/4
Mice		
16	5×10^6	4/4
	5×10^5	2/4
	5×10^4	0/4

TABLE 2. *Lethal response of voles inoculated with small numbers of Listeria monocytogenes*

Wt	Plate counts of inoculum	No. of voles tested	No. of voles dead	Days post-inoculation
g				
21	5, 5, 5, 5	4	1	4
	6, 7, 9, 9		3	5
13	2, 2, 2, 3	3	1	12
	3, 4, 4, 4		1	16

The lethal dose for white mice was of the order of 10^5 *Listeria* (Table 1), killing the animals within 4 to 8 days after inoculation. Mice inoculated with approximately 10^4 bacilli did not die after holding for 1 month.

The largest dose given to the voles was of the order 34 to 38 organisms. This dose was lethal to all of the animals within 4 to 8 days after

inoculation. In the same period of time, most of the voles were killed by doses varying from one to eight *L. monocytogenes* cells. It is possible that the survivors might have succumbed had they been observed longer.

Seven remaining voles which were too small to be injected with the above sets subsequently were divided into two groups by weight. One group was given an estimated concentration of 10 bacilli, and the other, 5 bacilli. Eight plates were spread from 0.2 ml of each suspension at the time of inoculation. The suspension estimated to contain 10 organisms per dose gave a range of colony counts from 5 to 9; the estimated dose of 5 organisms, when plated, ranged in count from 2 to 4. All but one of the voles (Table 2) died, and *L. monocytogenes* was recovered at necropsy.

The marked susceptibility of *L. curtatus* merits its consideration for primary isolation of *L. monocytogenes*.

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