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BDRL D/A Ltr, 22 Oct 1971.

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PULMONARY ANTHRAX  
AND CHLORINE POISONING:  
MINIMUM INFECTIOUS DOSE  
OF SPORES

TRANSLATION NO.

547

JULY 1962

AS 30 10  
JUL 1 1962  
U.S. ARMY  
BIOLOGICAL LABORATORIES  
FORT DETRICK, MARYLAND

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NO OTC

GCBL: FD2-3742 (T-6-9)  
JPRS: R-2624-D

17 July 1962

**PULMONARY ANTHRAX AND CHLORINE POISONING:  
MINIMUM INFECTIOUS DOSE OF SPORES**

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PULMONARY ANTHRAX AND CHLORINE POISONING:  
MINIMUM INFECTIOUS DOSE OF SPORES

Following is the translation of a French-language scientific paper by H. Velu, P. Soulie and B. Bellocq in Comptes Rendus de la Societe de Biologie, (Reports of the French Society of Biology), Vol. 137, Paris, 1943, pp. 160-1.

The investigation of the factors contributing to the development of pulmonary anthrax in carriers of the spores of bacillus anthracis in industries processing contaminated animal products (1), induced us to accurately determine the minimum doses of spores established in the lung and required for triggering an infection in conjunction with a single acute exposure to chlorine irritation.

The necessity for anticipating all types of cases (very slight, light or severe irritation together with an intense or discrete contamination) made it necessary to utilize 33 groups of 5 mice each, not including the control groups subjected to chlorine irritation only. We did not employ any control groups for spore presence only because we stayed continuously below the minimum infectious dose in the absence of contributory factors (2). A very slight irritation was obtained with a dose of less than 100 milligram per cubic meter for 10 minutes, a light irritation with 150 mg and a severe irritation with a dose 5 times higher.

The mortality from pulmonary anthrax of these mice was shown to be a function of the number of spores and the extent of the lesions as shown in the following table:

<u>Chlorine Poisoning</u>	<u>Contamination</u>	<u>Ratio</u>	<u>%</u>	<u>Mortality</u>
Severe	100-300 spores	25/25	100	5 groups, 0 non-affected
"	20-35 spores	14/15	93.3	3 groups, 0 non-affected
"	3-8 spores	8/15	53.3	3 groups, 0 non-affected
light	500 "	20/20	100	4 groups, 0 "
"	14-80 "	27/50	54	10 groups, 0 "
"	2-5 "	0/15	0	3 groups, all "
very light	500 "	0/10	0	2 groups, all "
"	33-63 "	0/15	0	3 groups, all "

Subjected 10 days later to very severe chlorine intoxication, 3 mice of the next to the last groups died of chlorine intoxication and 2 of pulmonary anthrax.

Absolutely identical results were obtained with an attenuated, sporule-containing anthrax vaccine.

Summary: Very slight intoxication by chlorine does not sufficiently inhibit the natural defense of the broncho-pulmonary tract to enable the germination of spores, regardless of their number. With a slight intoxication, more than 10 spores are required whereas 3-8 spores are sufficient in the case of severe intoxication. It may be assumed that a single spore may be able to trigger the infection.

#### References

- 1 - Bull. Acad. med., 1941, Vol. 125, p. 159.
- 2 - C.R. de la Soc. de biol., 1941, Vol. 134, p. 1352.

6198

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