

TULAREMIA IN ILLINOIS

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Tularemia is an acute blood stream infection due to the *Bacillus tularensis*. In 1911 the *Bacillus tularensis* was discovered by McCoy, who was examining ground squirrels for plague. In 1912 the organism was isolated and studied by McCoy and Chapin. Two years later Wherry discovered large numbers of rabbits in Kentucky and Indiana dying from tularemia. He also pointed out the possibility of the transfer of the disease from rabbit to man. By the year 1930 many reports were made on the presence of the disease in a large variety of wild and domesticated animals, chief of which were wild rats, meadow mice, sheep, quail, opossum, and fox squirrels. Since 1930 the disease has been found in cats, dogs, hogs, coyotes, and others.

The incubation period of the disease apparently depends upon: (1) the virulence of the infecting organisms; and, (2) the number of organisms, gaining entrance to the blood stream of the victim.

The onset of the illness may occur from one to twenty-one days after the time of the infection. The average in our study was 3.9 days. Persons of all ages, races and of either sex seem to be equally susceptible. The duration of the illness varies from two weeks to one year. The disease may present itself as any one of four different clinical pictures, all caused by the *Bacillus tularensis*.

The most common of these types was the ulceroglandular type, or 92.8 per cent of all infections. In this case the patient will have an ulceration at the site of the injury where the invading organisms have entered the body. The lymph glands draining this area become swollen and painful about twenty-four hours before inflammation occurs at the site of the infection. In about 50 per cent of the cases these glands will suppurate. A swollen, painful, papule appears at the site of the infection. This papule breaks down and frees a necrotic plug, leaving an ulcer about one centimeter in diameter.

The second type is the oculo-glandular infection, (0.8 per cent), usually caused by splashing infected blood into the eye, or rubbing the eye with a contaminated

hand. In this type the primary infection is in the conjunctiva rather than the skin. The papule appears and breaks down, leaving an ulcer. Permanent impairment of the vision may occur. Fulminating cases running a rapidly fatal course, do occur in this type.

The glandular type is the third in our series, (3.2 per cent). These cases are seen in persons, who after dressing rabbits, have swollen, painful lymph glands with no corresponding inflammation at the site of the infection.

The fourth classification is the typhoidal type (3.2 per cent). Here fever is the only outstanding symptom. Diagnosis must be made serologically, and from a history of having eaten improperly cooked rabbit meat. Fever is a cardinal symptom of the illness and is usually present for two to three weeks. Weakness, loss of weight, chills, sweats, and prostration accompany the fever. The recovery is slow and it is rare for a victim to be able to resume his occupation in thirty days. Some cases are not recovered a year later. Recovery is rarely accompanied by sequelae and it gives a very good immunity.

The diagnosis of the disease depends upon the history of contact with game, the finding of the dermal or conjunctival ulcer, inflamed glands, fever, chills, prostration and a negative tularemia agglutination test, followed by a positive test during or after the second week of the disease. One of our cases remained serologically negative until the fifth week after the onset of the disease.

The first case of tularemia reported to the Illinois Department of Public Health occurred in 1926. In the subsequent years we have had the following number of reported cases and deaths.

Year	Cases	Deaths	Year	Cases	Deaths
1926	1	---	1932	134	4
1927	14	---	1933	172	9
1928	10	---	1934	134	11
1929	36	---	1935	69	4
1930	139	2	1936	91	6
1931	126	2	1937	109	5
			1938	459	32

TULAREMIA REPORTED IN ILLINOIS BY MONTHS, 1924-1939

Month	1926	1927	1928	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938	1939
January		5	2	2	19	47	27	45	27	29	10	34	18	70
February					10	4	7	7	10	11	6	12	4	26
March					5	7	2	4	7	5	3	9	2	
April					2	2	3			1	1	2	4	
May						1	2		2	2		2		
June					2			1	1	1		2		
July			1			1	1	1	1		3	3	4	
August					2	2	2	2	1		2	1	6	
September					1		2	4	3	1	2		5	
October							1	2	5	1			54	
November	1	1	3	2	9	8	13	15	16	6		3	350	
December		8	4	32	89	54	76	92	61	12	49	39		
Totals	1	14	10	36	139	126	134	172	134	69	91	109	459	

The three principal factors to be considered in the spread of a disease are (1) the source, which was the cotton tail rabbit for 99.6 per cent of the human cases in Illinois in 1938; (2) the mode of transmission of the infecting organism; and (3) the susceptible individual.

Now to take up each of these three steps in order, we begin with the source. The source for our human cases has been the cotton tail rabbit. The disease is spread among the animals by fleas and ticks biting an infected rabbit and then passing the organism into the blood of another animal when it has an opportunity to change hosts.

The causative organism being carried in the blood stream may be found in any organ of the infected rabbit carcass.

Any method of transferring the *Bacillus tularensis* from the blood stream of the rabbit to that of the human is a possible mode of transmission. The bacteria usually gain entrance into the blood stream of the victim through an abrasion on his hand at the time of dressing or preparing the rabbit. It is also possible for the organism to enter the blood stream through the conjunctiva. The victim may be infected by blood splashed into his eye, or by rubbing his eye with a contaminated hand. Inasmuch as the organisms are carried in the animal's blood, they are found in all the tissues. Long periods of intense refrigeration will not kill the *Bacillus tularensis*. However, thorough cooking destroys them. We may safely eat properly cooked rabbit meat even though the animal was infected with tularemia. Likewise, the person that eats insufficiently cooked meat from the infected animal may expect to contract the disease. Thus, we have traced the disease from animal to animal by way of blood sucking parasites, and

from animal to man by way of skin abrasions, the conjunctiva, and gastro-intestinal tract.

We have at hand all the essential facts needed for the initiation of a program of control for tularemia. Namely, we know the causative organism, the reservoir of infection, and the mode of transmission. One desirable factor is lacking—a satisfactory method of immunization.

In reviewing the links in the continuity of the spread of this infection, we see that it is impossible to rid our wild animals of their parasites. The increase in the number of reported cases of tularemia in 1938 was more than likely due to the increase that has occurred in our rabbit population. This has been the result of the ruling of the Department of Conservation forbidding the sale of wild rabbits. Many farmer boys who previously earned pocket money selling dressed rabbits are no longer bothering to hunt them. This increase in the number of rabbits facilitates the spread of the disease among rabbits and leaves a greater number of them to be potential sources of the disease. However, the disease could never be eliminated even though we tried to exterminate the rabbit. Thus, we have no effective means of striking at the source. The mode of transmission is the weakest link in the chain. The simple precaution of wearing strong rubber kitchen gloves will prevent the entrance of the *Bacillus tularensis* into the blood stream of the person dressing or handling the animal carcass.

It is for this reason that the Illinois Department of Public Health is carrying on a program of education to combat this relatively new disease. The necessary information for the protection of the individual is carried to the public by means of radio addresses, newspaper releases and the distribution of free pamphlets.