

Immunological Properties of the Smegma Bacillus in Experimental Tuberculosis in Rabbits.*

EUGENE DE SAVITSCH, KENNETH L. BURT, AND MOLLY H. RADFORD.
(Introduced by A. J. Carlson.)

From the Departments of Physiology and Pathology, University of Chicago.

Sewall and de Savitsch^{1, 2} have previously demonstrated a "biological antagonism" between the so-called smegma bacillus† and the tubercle bacillus. The present work was undertaken in the attempt to apply these findings to the problem of defense of the lungs against tuberculous infections.

Twenty-four male snuffle-free rabbits of uniform weight, averaging 2,500 gm., were divided into 3 groups of 8 animals each which were treated as follows: Group A received 4 intratracheal inoculations of 10 mg. each of young viable smegma bacilli at 2-day intervals. Twelve days following the last inoculation 2.5 mg. of a 22-day-old culture of virulent bovine tubercle bacilli‡ were given to each animal by the same route. (.01 mg. of this strain constitutes a lethal dose.) In each case the bacilli were suspended in 1 cc. of physiological salt solution. To avoid the possibility of the bacilli getting into the stomach instead of the lungs a larger catheter was introduced first into the esophagus. Groups B and C, the control groups, received smegma bacilli and tubercle bacilli respectively.

The results were evaluated on the basis of weekly weight curves, longevity, and pathological involvement. Autopsies were performed soon after death and the degree of tuberculous involvement was estimated macroscopically. Histological examination was carried out upon Zenker-fixed celloidin-embedded sections stained with hema-

* We wish to express our appreciation for the cooperation and advice of Professor Anton J. Carlson, Professor Paul C. Cannon, and Dr. Mercy Southwick. Indebtedness is acknowledged to Mrs. Virginia King of the Department of Pathology, and Miss Natalie Tupikova and Mr. Nathan Brewer, of the Department of Physiology, for their technical assistance.

† Sewall, H., and de Savitsch, E., Trans. 24th Ann. Meeting Nat. Tuberculosis Assn., 1928, 234.

‡ Sewall, H., and de Savitsch, E., Trans. 25th Ann. Meeting Nat. Tuberculosis Assn., 1929, 166.

† The original culture was obtained through the courtesy of Dr. G. C. Lake of the Hygienic Laboratory at Washington, D. C.

‡ We are indebted to Dr. H. J. Corper of the National Jewish Hospital in Denver for the culture of tubercle bacilli.

toxylin and eosin and upon a duplicate series stained by van Gieson's method for connective tissue. The lungs, liver and spleen were examined with reference to the extent of tuberculous involvement and to the type of lesions. The largest weight gain was shown by the animals in the smegma control group. The immunized group gained weight up to the 60th day, going down until practically the original weight was reached on the 260th day. The tuberculous controls with the exception of the first 20 days showed a sharp drop, the surviving animals retaining but 50% of their original weight on the 140th day.

The average life span of the tuberculous controls was 66 days as compared with 175 days plus for the experimental group of which 2 are still alive at the time of this writing. All rabbits in the smegma control group survived the period of the experiment. At the end of 290 days representative animals were sacrificed for post mortem study. No lesions could be demonstrated on either gross or microscopic examination.

On post mortem examination all of the animals in both the experimental and tuberculous control groups showed massive pulmonary tuberculosis. On microscopic study, however, the animals in which smegma bacilli preceded the inoculation with tubercle bacilli showed less caseation and more fibrosis in the lungs than did the rabbits receiving tubercle bacilli alone. The incidence of tuberculous involvement in the liver and spleen was rare. The liver was involved in 3 animals of the experimental group whereas no lesions were found in the tuberculous controls. The spleen was involved in only one animal of each group. No lesion could be demonstrated in any of the kidneys.

The authors believe that artificial immunity to tuberculosis is best induced, not by the tubercle bacillus itself, or by any of its fractions, but by a living non-pathogenic acid fast organism which is closely related to it. These requirements are admirably fulfilled by the smegma bacillus.