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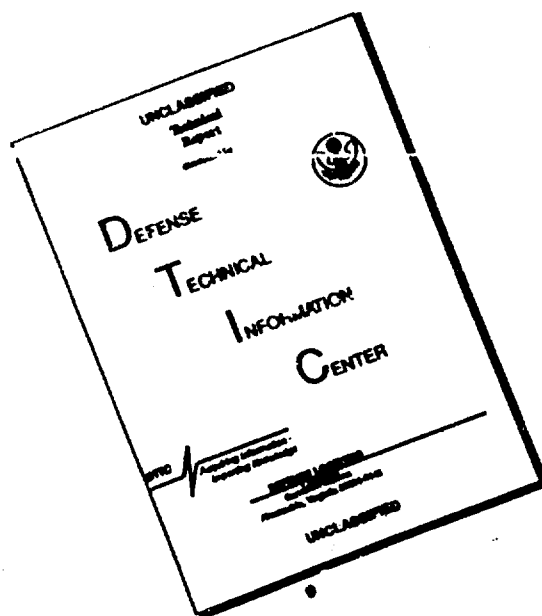
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EFFECT OF PENICILLIN ON THE NUCLEIC ACID CONTENT OF VITAL
ORGANS IN EXPERIMENTAL STREPTOCOCCAL INFECTION

Antibiotiki
(Antibiotics)

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Penicillin acts selectively on gram-positive microbes in which it suppresses protein and nucleic acid synthesis [1]. The purpose of this work was to study the effect of penicillin on the nucleic acid content of the vital organs of white mice infected with streptococci.

Procedure

The experiments were performed on 45 white male mice weighing 20 to 25 g. The animals were divided into 4 groups, the first of which was the control. The second group was injected with 2000 units of penicillin once a day for 7 days. The third and fourth groups were injected intraperitoneally with a sublethal dose of a one-day-old streptococcal culture (one billion microbial cells in 1 ml of physiological saline).

The fourth group of rats received 2000 units of penicillin subcutaneously every day for 7 days from the time of infection. After 7 days all the animals were decapitated, the viscera (liver, kidneys, spleen, and lungs) withdrawn, and their nucleic acid content determined by the Schmidt-Tanhauser method.

Fractionation was halted when an alkaline hydrolyzate was obtained because nucleic acid phosphorus in the kidneys and liver belongs chiefly to RNA and in the spleen, to DNA. Phosphorus was determined by the Fick-Subbarou method. The amount of nucleic acid phosphorus was calculated in 1 g of wet weight of the organ.

Results and Discussion

Injection of the animals with streptococci produced a malaise during the first 2 or 3 days that was evidenced in their sluggishness, dyspnea, anorexia, and slight weight loss. Later on, the behavior of this group of animals was indistinguishable from that of the animals that received penicillin after they were infected. Examination of an intraperitoneal punctate for the presence of streptococci 7 days after infection was negative. Large quantities of connective-tissue fibers and leukocytes were found in smears.

The results of all the experiments were processed statistically and tabulated. The probability of experimental error and the standard deviations were calculated. The difference between the mean values was considered significant if it was double the square root of the sum of the squares of the errors.

Nucleic Acid Phosphorus Content of Vital Organs (in γ/g) in Experimental Streptococcal Infection Treated with Penicillin

Group of animals	Liver	Kidneys	Spleen	Lungs
Control (healthy animals)	1,252 \pm 79	898 \pm 46	2,376 \pm 104	738 \pm 59
Second (healthy animals given penicillin)	1,220 \pm 64	814 \pm 45	2,456 \pm 107	885 \pm 58
Third (animals inoculated with streptococci)	1,490 \pm 47	1,000 \pm 51	2,295 \pm 96	831 \pm 65
Fourth (animals inoculated with streptococci and treated with penicillin)	1,207 \pm 75	812 \pm 60	1,960 \pm 110	867 \pm 57

It is apparent from the table that penicillin had no effect on the amount of nucleic acid phosphorus in the organs of the healthy animals. The reason is that an enzyme that destroys penicillin is present in the liver. This enzyme is not identical to bacterial penicillinase [2]. The blood contains a new factor that blocks antibiotics, and this explains the cases of ineffective antibiotic therapy [3].

Inoculation of white mice with streptococci increased the nucleic acid content of the liver, probably because of the synthesis of specific protective antibodies of protein nature [4]. There was a tendency for the nucleic acids to increase in the kidneys and lungs.

In the animals treated with penicillin, the nucleic acid level in the liver and kidneys dropped to normal. It dropped below normal in the spleen, but remained unchanged in the lungs.

Conclusions

1. The nucleic acid content of the vital organs of healthy animals was not changed when they were administered penicillin.
2. The nucleic acid content of the liver increased in experimental streptococcal infection.
3. The nucleic acid content of the liver, kidneys, and spleen decreased in infected animals treated with penicillin.

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