

UNCLASSIFIED

AD NUMBER
AD839187
NEW LIMITATION CHANGE
TO Approved for public release, distribution unlimited
FROM Distribution authorized to U.S. Gov't. agencies only; Administrative/Operational Use; 1968. Other requests shall be referred to U.S. Army Foreign Science and Technology Center, Washington, DC 20315.
AUTHORITY
US Army Foreign Science and Technology Center ltr dtd 8 May 1969

THIS PAGE IS UNCLASSIFIED

FSTC-HT-23-69-68

AD 839187

U.S. ARMY FOREIGN SCIENCE AND TECHNOLOGY CENTER



Soluble Toxins of Some Enterobacteriaceae

Country: USSR

D D C
 RECEIVED
 SEP 12 1968
 RECEIVED
 B

TECHNICAL TRANSLATION

The translation rights for this document have not been obtained. This document is not in the public domain.

Each transmittal of this document outside the agencies of the U. S. Government must have prior approval of the U. S. Army Foreign Science and Technology Center.

W. D. E. 203/15

TECHNICAL TRANSLATION

FSTC-HT-23-69-68

SOLUBLE TOXINS OF SOME ENTEROBACTERIACEAE

by

I. N. Yanishevskaya

Source: Meditsinskiy Zhurnal Uzbekistana
No 1, 1965, pp 43 - 50

Translated for FSTC by AGI

This translation is a rendition of the original foreign text without any analytical or editorial comment. Statements or theories advocated or implied are those of the source and do not necessarily reflect the position or opinion of the US Army Foreign Science and Technology Center. This translation is published with a minimum of copy editing and graphics preparation in order to expedite the dissemination of information. Requests for additional copies of this document should be addressed to the Defense Documentation Center, Cameron Station, Alexandria, Virginia, ATTN: OSR-2

SOLUBLE TOXINS OF SOME ENTEROBACTERIACEAE

Source: MEDITSINSKIY ZHURNAL
UZBEKISTANA (Russian)
1965, No.1, pp. 48-50

M.N. Yanishevskaya (From the
Uzbek Scientific Research Insti-
tute of Epidemiology, Microbiol-
ogy & Infectious Diseases)

The purpose of this work is to establish the presence of soluble toxic substances in different representatives of the Family Enterobacteriaceae which secrete these toxins during their vital activity.

Therefore, we examined 162 strains, being various representatives of the Family Enterobacteriaceae, of the genera Salmonella, Shigella, Escherichiae.

Cultures were sent from the L. A. TARASEVICH Control Institute and from the laboratories of Tashkent City's Sanitary Epidemic Post.

Toxic substances were obtained by cultivating bacteria on cellophane leaf according to the BIRCH-HIRSCHFELD method (1934), with subsequent centrifugation for 30 minutes (10,000 r.p.m.).

Soluble toxins were discovered almost in all representatives of the Family Enterobacteriaceae (Salmonella, Shigella, Escherichiae). B. faecalis alkaligenes (5 strains) did not form toxin at all. The strongest were the toxins of Sh. Griogor'yeva-Shiga, Sh. Largia-Sachs (Q771, Q902), S. paratyphi B, whose individual series contain 200 MLD in 1 ml of toxin. It was also established that diverse series of the toxin detected in different strains of one and the same species showed variation in toxicity (2 -20--30-- 200 MLD in 1 ml of toxin).

All toxins were characterized by clearly marked thermostability: --- their heating at 100°C temperature for 2 - 3 hours did not reduce their toxicity, and all animals contaminated with them died. Toxicity was lost only after a 30-minute autoclaving at 120°C.

The toxins were not dialysed, precipitated by trichloroacetic acid (pH=3, 5), saturated ammonium sulfate solution, acetone, and 90° ethanol.

Attempt to get toxoid ended in failure.

The immunogenic properties of toxins were verified in the following way. Increasing toxin doses in dilutions 1:80, 1:20, 1:10, 1:2 MLD per 0.5 ml were administered to white mice subcutaneously at 3 - 5 days' intervals. We tested samples of toxins obtained from S. typhi, S. paratyphi A, S. paratyphi B, Sh. Grigor'yeva-Shiga, Sh. Schmidt-Stutzer, Sh. Largia-Sax (serotypes Q₇₇₁, Q₉₀₂, Q₄₅₄, Q₁₀₃₀, Q₁₁₆₇), Sh. Flexner (serotype C), Sh. Newcastle, Sh. Boyd-Novgorodskiy (serotype III), Sh. Kruze-Sonne.

Each toxin sample was administered to 20 white mice. The immunity was checked 10 days after the last immunization with intraperitoneal administration of native toxins containing 2--20--80--200 MLD per 0.5 ml.

As a result of the tests, it was established that active immunization helped the survival of inoculated mice, while all animals of the control group died.

Thus, toxic products obtained on cellophane leaves from different representatives of Salmonella and Shigella possess immunizing properties.

The antigenic properties of soluble toxins were checked in precipitation reactions (by the usual modification and by the diffusional variety in gel according to WUCHTERLOHN. In the tests, antimicrobial and antitoxic sera of Sh. Grigor'yeva-Shiga, Sh. Largia-Sax (serotype Q₇₇₁) were used which were prepared in our laboratory.

The titres of antimicrobial sera were the following: --- Sh. Grigor'yeva-Shiga 1:6400, Sh. Largia-Sax Q₇₇₁ 1:800, antitoxic serum of Sh. Grigor'yeva-Shiga 1:1024, Sh. Largia-Sax Q₇₇₁ 1:512. For antigens we used soluble toxins of the listed representatives of the group of bacteria as well as a combined antigen obtained according to the method of BUAVERA for Sh. Largia-Sax Q₇₇₁.

In the arranged reactions, the heterogeneity of soluble toxins and the presence of general antigenic complexes was distinctly determined. Of very great interest are negative results of the reactions with the BUAVERA Sh. Largia-Sax Q₇₇₁ antigen and with the homologous antitoxic serum. At the same time, tests were arranged with the use of a specific antimicrobial Sh. Largia-Sax Q₇₇₁ serum which gave positive reaction with the appearance of one precipitation line according to WUCHTERLOHN. These observations prove that the complex Sh. Largia-Sax Q₇₇₁ (S form) antigen which was extracted according to BUAVERA's method is different antigenically from the soluble toxin obtained from the same strain at its cultivation on cellophane leaf.

Finally, we studied cytopathological changes in the organs and tissues of killed laboratory animals killed by the soluble toxins of various species of the Family Enterobacteriaceae (Sh. Grigor'yeva-Shiga, Sh. Largia-Sax serotypes Q₇₇₁, Q₉₀₂, Q₄₅₄, Q₁₀₃₀, Q₁₁₆₇, Sh. Flexner serotype C, Sh. Newcastle, Sh. Boyd-Novgorodskiy serotype III, Sh. Kruze-Sonne, S. paratyphi B). For this purpose, toxins of different concentrations (100 MLD, $\frac{1}{2}$ MLD, 1/80 MLD) were administered intravenously to 78 rabbits and intraperitoneally to

260 white mice. No specific differences were found in the effect of soluble toxins obtained from different Enterobacteriaceae upon the organism of animals.

The introduction of 100 MLD toxin to rabbits was associated with an increase in temperature, frequency of respiration, with convulsions; death followed after 18 to 24 hours. Injections of $\frac{1}{2}$ MLD toxin of Sh. Grigor'yeva-Shiga, Largia-Sax, Flexner, Newcastle, Boyd-Novgorodskiy, Kruze-Sonne, S. paratyphi B led to the appearance of paresis and paralysis of the rear extremities in 18 rabbits out of 26 contaminated animals, and in 32 white mice out of 65 infected animals. Repeated administration of 1/80 MLD of any of the listed toxins caused development of marked cacheia (20 rabbits out of 26). All white mice, infected with $\frac{1}{2}$, 1/80 MLD, survived. At the autopsy of dead animals, overfilling of the urinary bladder and hyperemia of the internal organs was noted.

Histological examinations did not detect any specific changes as an effect of toxins of various species of Enterobacteriaceae. Depending upon the dose, in individual cases their effect varied only as to the intensity of cell damage.

After the administration of soluble toxins of Sh. Grigor'yeva-Shiga, Largia-Sax, Flexner, Newcastle, Boyd-Novgorodskiy, Kruze-Sonne, S. paratyphi B, in doses of 10 -- 100 MLD, dystrophic changes were noticed in the organs of experimental animals. The greatest changes occurred in the central nervous system, especially in the motor cells of the anterior horn of the spinal cord. This proves the profound damage of motor cells in the spinal cord and pathogenetically it corresponds to the development of paresis and paralysis in the experimental animals.

Thus, in various representatives of the Family Enterobacteriaceae, of the genera Salmonella, Shigella, Escherichiae, which were cultivated on cellophane leaf, soluble toxic substances could be obtained. They are thermostable, do not dialyze, possess antigenic and immunogenic properties. Their neurotoxic effect was also detected.

2 December 1963.

DOCUMENT CONTROL DATA - R & D

(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)

1. ORIGINATING ACTIVITY (Corporate author) Foreign Science and Technology Center US Army Materiel Command Department of the Army	2a. REPORT SECURITY CLASSIFICATION Unclassified
	2b. GROUP

3. REPORT TITLE
Soluble Toxins of Some Enterobacteriaceae.

4. DESCRIPTIVE NOTES (Type of report and inclusive dates)
Translation

5. AUTHOR(S) (First name, middle initial, last name)
M.N. YANISHEVSKAYA

6. REPORT DATE 1965	7a. TOTAL NO. OF PAGES 3	7b. NO. OF REFS N/A
-------------------------------	------------------------------------	-------------------------------

8a. CONTRACT OR GRANT NO. b. PROJECT NO. c. 8223628 2301 d.	9a. ORIGINATOR'S REPORT NUMBER(S) FSTC-HT-23-69-68
	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report) ACSI Control Number J-4963

10. DISTRIBUTION STATEMENT
Each transmittal of this document outside the agencies of the U. S. Government must have the prior approval of the US Army Foreign Science and Technology Center.

11. SUPPLEMENTARY NOTES The translation rights for this document have not been obtained. This document is not in the public domain.	12. SPONSORING MILITARY ACTIVITY US Army Foreign Science and Technology Center
--	---

13. ABSTRACT

Various representatives of the Family Enterobacteriaceae, including the genera Salmonella, Shigella, Escherichiae, produce soluble toxic substances during their life. These toxins are able to produce various damages, even death, in the experimental animals, depending upon the amount of administered dose. Experiments on rabbits and white mice proved that the toxins are thermostable, and they have antigenic and immunogenic properties, but they are not suitable for toxoid preparation. They have neurotoxic, paralytic effect upon motor cells of the anterior horn in the spinal cord.

14. KEY WORDS	LINK A		LINK B		LINK C	
	ROLE	WT	ROLE	WT	ROLE	WT
Soluble toxins						
Enterobacteriaceae						
Salmonella paratyphi B, Toxin						
Shigella, Toxin						
Escherichia, Toxin						
Immunization in dysentery (bacillary)						
Immunization in paratyphoid fever						

UNCLASSIFIED

Security Classification

SUPPLEMENTARY

INFORMATION

DISTRIBUTION AND AVAILABILITY CHANGES

IDENTIFICATION	FORMER STATEMENT	NEW STATEMENT	AUTHORITY
AD-839 187L Army Foreign Science and Technology Center, Washington, D. C. Rept. no. FSTC-HT- 23-69-68 1968	USGO: others to Army Foreign Science and Technology Center, Washington, D. C.	No limitation	USAFSTC ltr, 8 May 69