NOTICE: When government or other drawings, specifications or other data are used for any purpose other than in connection with a definitely related government procurement operation, the U. S. Government thereby incurs no responsibility, nor any obligation whatsoever; and the fact that the Government may have formulated, furnished, or in any way supplied the said drawings, specifications, or other data is not to be regarded by implication or otherwise as in any manner licensing the holder or any other person or corporation, or conveying any rights or permission to manufacture, use or sell any patented invention that may in any way be related thereto.
PATHOLOGIC PHYSIOLOGY OF THE INFECTIOUS PROCESS

- USSR -

U. S. DEPARTMENT OF COMMERCE
OFFICE OF TECHNICAL SERVICES
JOINT PUBLICATIONS RESEARCH SERVICE
Building T-30
Ohio Dr. and Independence Ave., S.W.
Washington 25, D. C.

Price: $0.50

Best Available Copy
FOREWORD

This publication was prepared under contract for the Joint Publications Research Service as a translation or foreign-language research service to the various federal government departments.

The contents of this material in no way represent the policies, views or attitudes of the U. S. Government or of the parties to any distribution arrangement.

PROCUREMENT OF JPRS REPORTS

All JPRS reports may be ordered from the Office of Technical Services. Reports published prior to 1 February 1963 can be provided, for the most part, only in photocopy (xerox). Those published after 1 February 1963 will be provided in printed form.

Details on special subscription arrangements for JPRS social science reports will be provided upon request.

No cumulative subject index or catalog of all JPRS reports has been compiled.

All JPRS reports are listed in the Monthly Catalog of U. S. Government Publications, available on subscription at $4.50 per year ($6.00 foreign), including an annual index, from the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C.

All JPRS scientific and technical reports are cataloged and subject-indexed in Technical Translations, published semimonthly by the Office of Technical Services, and also available on subscription ($12.00 per year domestic, $16.00 foreign) from the Superintendent of Documents. Semiannual indexes to Technical Translations are available at additional cost.
PATHOLOGIC PHYSIOLOGY OF THE INFECTIOUS PROCESS


TABLE OF CONTENTS

SECTION I
THE INFLUENCE OF BACTERIAL TOXINS AND ANTIGENS ON THE NEUROHUMORAL REGULATION OF FUNCTIONS

Ado, A. D., Problems of the Pathologic Physiology of the Infectious Process

Abrosimov, V. N., On the Action of Diphtheria Toxin on the Central Nervous Regulation of Respiration

Abrosinov, V. N., Disturbances in the Nervous Regulation of Respiration under the Influence of the Toxic Components of Pertussis Bacilli

Yershina, G. A., Electrophysiological Studies of the Action of Serum Proteins and Certain Bacterial Toxins on the Receptors of the Skeletal Muscles

Yershina, G. A., Electrophysiological Studies of the Functional State of the Muscle Receptors in Local Tetanus

Sverdlov, Yu. S., The Problem of the Mode of Action of Tetanus Toxin on the Spinal Centers


Alekseyeva, T. A., Pathophysiological Studies of the Mechanism of the Toxic Action of the Influenza Virus

Gushchin, I. S., On the Mechanism of the Changes in the Pressor Carotid Sinus Reflex in Anaphylaxis

Pytskiy, V. I., On the Problem of the Mechanism of Development of Tolerance to the Pyrogenic Effect of Certain Bacterial Antigens
TABLE OF CONTENTS (Continued)

Ishimova, L. M. and Nguyen Van An, On the Mechanism of Different Phases of the Anaphylactic Contraction of Smooth Muscles of the Small Intestine

Abrosimov, V. N., On the Changes in Reactivity of the Organism under the Influence of the Toxic Components of Pertussis Bacilli

Odegova, V. V., The Influence of Single Sensitization on the Conditioned Reflex Activity of Dogs

Lazareva, V. N., On the Causes of Changes in the Reaction of Cardiovascular System of Rabbits Infected with B. Typhimurium on the Sympathetic Substance

Ivanova, L. A., On the Content of Adenosine Triphosphoric Acid, Creatine Phosphate, and Mineral Phosphate on the Heart, Brain, and Skeletal Muscles of White Rats in Diphtheria Toxidity

Pytskiy, V. I., On the Changes in the Course of the Febrile Reaction during the Use of Cortisone

Ivanov, V. V., Changes in the Resistance of White Rats to the Toxic Effects of Vaccine under the Influence of Adrenalectomy and the Administration of Certain Hormones

Ivanov, V. V., On the Mechanism of the Neuro-endocrine Influences on the Resistances of White Rats to Diphtheria Toxin

Gushchin, I. S., On the Participation of the Hypothalamus in the Development of Anaphylactoid Shock in White Rats

Ma Dao-li, The Role of the Adrenal-Pituitary System in the Anaphylactoid Reaction and Certain Aspects of the Mechanism of Tachyphylaxis

Xhe Chiu-wzyao, The Role of the Adrenal-Pituitary System in the Development of Anaphylaxis in White Rats
TABLE OF CONTENTS (CONTINUED)

SECTION II
ON THE INTERSTITIAL ANTIGENS IN BRAIN TISSUE

Ado, A. D., On the Interstitial Antigens in the Brain Tissue of Animals Infected with Neuroviruses
Kanchurin, A. Kh., On the Study of the Interstitial Antigens in Fixed Substances of the Brain Tissue Infected with Virus by the Method of Agar Precipitation
Kanchurin, A. Kh., On the Formation of Interstitial Antigens Substances upon the Proliferation of the Poliomyelitis Virus in Brain Tissues

Ado, A. D., Timova, I. M., Lovkovich, N. A., On the Demonstration of Interstitial Antigens in Mouse Brain Vaccine against Spring-Summer Tick Encephalitis

Skorin, V. I., The Demonstration of Interstitial Antigens in the Tissues of the Brains of Animals Infected with Herpes

Skorin, V. I., Specificities of the Antigenic Properties of Brain Tissues in Experimental Herpes

SECTION III
ON THE SENSITIVITY OF THE LYMPH NODES AND THE LEUCOCYTE

Kanchurin, A. Kh., On the Problem of the Role of the Lymph Nodes in the Immune Reactivity of the Organism

Timova, I. M., The Action of the Virus of Influenza Group on the Phagocytosis of Carbohydrates by the Leucocytes of Healthy and Non-Immune Cats

SECTION IV
ON THE EXCRETION OF BACTERIAL ANTIGENS AND PHAGES
BY THE KIDNEYS

Fellerer, A. A., On the Excretion by the Kidneys of the Macromolecules of Dysentery Antigens

Udritsov, N. I., The Distribution of the Dysentery Antigen in the Organism of the Cat

Udritsov, N. I., The Excretion by the Kidneys of the Dysentery Antigen Labeled with Radioactive Phosphorus
(1) In the mechanism of disturbances of respiration during experimental diphtheria toxicity, disturbances of the cholinergic mechanism of synaptic transmission in the respiratory center is of great importance.

(2) As a result of disturbances of the central regulation of respiration in diphtheria toxicity, there are changes in the frequency and amplitude of the respiratory movements, disturbances of the respiratory reflexes (Hering-Breuer reflex and the respiratory reflex to stimulation of the sciatic nerve).

(3) Recording of action potentials from the peripheral end of the vagus nerve did not exert a substantial influence of diphtheria toxin on the stretch receptors of the lungs.

(4) Diphtheria toxin elicits, in rats and in cats, disturbances of respiratory movements which are enhanced by the administration of small doses of eucaine into the fourth ventricle.

DISTURBANCES OF NERVOUS REGULATION OF RESPIRATION UNDER THE INFLUENCE OF THE TOXIC COMPONENTS OF PERTUSSIS BACILLI

(1) The toxin of the pertussis bacillus, in contrast to diphtheria toxin, causes an increase in the reflex.
stimulability of the inspiratory portion of the respiratory center with subsequent intensification of the stimulability of the expiratory center.

(2) It may be suggested that the toxin of the pertussis bacillus directly affects the respiratory center, causing disorders in regulation of respiration.

ELECTROPHYSIOLOGIC STUDIES OF THE ACTION OF SERUM PROCRINE AND CERTAIN BACTERIAL TOXINS ON THE RECEPTORS OF SKELETAL MUSCLES

(1) Equine and bovine sera, diphtheria and tetanus toxins, complete typhoid fever antigens injected into the blood vessels of the gastrocnemius muscle (of cats and of rabbits) cause negligible changes in the background pulses of sensory nerves of these muscles.

(2) The injection of the above-mentioned antigens into the vessels of the muscles of sensitized animals is accompanied by a marked acceleration of the biocurrents of the sensory nerve.

(3) Under the conditions of our experiments, we did not notice any particular specific pulsation in the sensory nerves of muscles which would characterize the effect of a definite type of antigen on the muscle receptors.

ELECTROPHYSIOLOGIC STUDIES OF THE FUNCTIONAL STATE OF THE MUSCLE RECEPTORS IN LOCAL TETANUS

(1) Spontaneous pulsations of the muscle fibers of a "tetanic" extremity is intensified as compared with a control extremity. After transection of the anterior roots, the electrical activity of the fibers of the extremity which is poisoned with the toxin noticeably declines.

(2) The injection of the tetanus toxin into a preliminarily de-efferented extremity is not accompanied by the development of local tetanus. The electrical activity of the fibers in such a case is distinguished by a lower level
of activity of the fibers of the control extremity.

(3) The same result is observed under the conditions of combined poisoning of an animal first with the toxin of botulism, and then by the induction of paralysis with the tetanus toxin.

(4) The muscle fibers of the extremity infected with the tetanus toxin shows a more intense series of pulses in response to stretching the muscle with a weight than do the fibers of the control extremity. After transection of the anterior roots, which contain gamma fibers, there is an almost identical reaction of the muscle fibers of the "tetanic" and the control extremities.

(5) Changes in the functional state of the muscle fibers in local tetanus depends not on a direct effect of the toxin on the receptors but rather are connected, it would seem, with its fixation in the corresponding cells in the spinal cord. It is possible that these are the gamma-motor neurons, or perhaps with other nerve structures which are functionally connected with the gamma-motor neurons, which participate directly in the regulation of the tone of the muscle fibers.

ON THE PROBLEM OF THE MODE OF ACTION OF TETANUS TOXIN ON THE SPINAL CENTERS

(1) The development of local tetanus is accompanied by a considerable intensification of the polysynaptic reflex discharges on the side of the injection of toxin. In this case, during the first two to three days of the disease, there are no substantial differences in the magnitude of the monosynaptic responses to the "tetanic" and the control sides.

(2) Along with an enhancement in the polysynaptic reflexes, there is a disappearance of the different types of synaptic inhibition of motor neurons of muscles of the "tetanic" extremity.
The changes described in the character of the reflex activity of the spinal cord, which accompany the development of local tetanus on the first day after the injection of the toxin, are similar to those which are seen upon injection of tetanus toxin into the spinal cord of the animal's muscular or directly into the spinal cord (Brooks, Curtis, and Eccles, 1957).

By the fourth to fifth days, and sometimes even on the third day after injection of the toxin, the "tetanic" extremity shows a marked reduction in the magnitude of the maximal mono-synaptic reflexes, even to the extent of complete disappearance of them. At the same time, the poly-synaptic reflexes remain markedly enhanced.

Upon testing the inhibition of the motor neurons of the extensor muscles with pulses from the different fibers of groups 2 and 3, in a number of cases on the side of injection of the toxin there is a replacement of the inhibitory effect by a facilitation of it.

The action of tetanus toxin on the spinal centers is not limited to the suppression of the processes of central inhibition, but also consists in a weakening of the stimulatory influence on the motor neurons.

The Action of the Herpes Virus on the Functional State of the Sympathetic Nervous System

The virus of herpes strain LB, applied to a scarified cornea of a rabbit's eye, causes the development of keratoconjunctivitis in this eye.

In the injured cornea of the rabbit, the virus can be detected from the second to the eleventh days after infection.

Upon application of the virus to the scarified cornea of the rabbit's eye, the virus can be recovered from the superior cervical sympathetic ganglion of the ipsilateral side beginning with the fourth day after infection.
(4) Soon after infection, at a time when the virus cannot be recovered even from the superior cervical sympathetic ganglion, there is an increase in the functional mobility of the cells of the ganglion on the side of infection and a corresponding reduction in the threshold strength of stimulation by three-fold as compared with the healthy side.

(5) Later following infection, when the virus can be recovered from the superior sympathetic ganglion, there is a reduction in the functional mobility of the ganglion cells on the infected side and an increase in the threshold of stimulation by 2.6 fold as compared with contralateral side.

PATHOPHYSIOLOGIC STUDIES OF THE MECHANISM OF THE TOXIC EFFECT OF THE INFLUENZA VIRUS

(1) Electrophysiologic studies have shown that the normal allantoic liquid of a 15-day chick embryo does not modify the functional mobility of ganglion cells.

(2) An allantoic culture of the influenza virus of the Shklyaver strain in hemagglutination titers of 1:320 to 1:1386 exerts a toxic effect on ganglion cells which takes the form of a reduction in the functional mobility and a decline in the sensitivity to acetylcholine.

(3) Allantoic cultures of the influenza virus type A of the Shklyaver strain in low hemagglutination titers (1:80 to 1:160) stimulate the cells of the sympathetic ganglion by increasing their functional mobility.

(4) In animals which are actively immunized to the influenza virus, the latter does not exert any toxic effect. The action of the influenza virus on the cells of the sympathetic ganglion are immunologically specific. In cats immunized with the influenza virus type A, the toxic effect of the virus type B is manifest to the same degree as in healthy animals.

(5) Ideas are developed in this work concerning the
importance of the data obtained for our understanding of certain aspects of the pathogenesis and immunity of influenza infection.

ON THE MECHANISM OF CHANGES IN THE PRESSOR CAROTID SINUS REFLEX IN ANAPHYLAXIS

(1) Against the background of anaphylactic shock, there is a complete disappearance of the carotid sinus pressor reflex.

(2) In the pressor zone of the reticular zone of the brain stem, during the course of anaphylactic shock, a state of inhibition develops which is evidenced by a disappearance of the pressor effect upon stimulation of this zone and a preservation of the pressor effect upon stimulation of the preganglionic trunk of the splanchnic nerve.

(3) The injection of aminasine into a sensitized animal stabilizes the level of the blood pressure with respect to the subsequent injection of the antigen, and prevents a fatal outcome from the anaphylactic shock.

THE PROBLEM OF THE MECHANISM OF DEVELOPMENT OF TOLERANCE TO THE PYROGENIC EFFECT OF CERTAIN BACTERIAL ANTIGENS

(1) The development of an antipyrogenic tolerance is related to a certain extent to the participation of pathophysiological mechanisms of immunity.

(2) On the basis of the pathophysiological mechanisms of antipyrogenic tolerance lie the changes in the functional state of the heat regulating center, obviously involving an inhibition of it.

(3) The antipyrogenic tolerance to the antigen may be reversed in the process of developing a conditioned reflex hyperthermic reaction.
ON THE MECHANISM OF DIFFERENT PHASES IN THE ANAPHYLACTIC CONTRACTION OF SMOOTH MUSCLES OF THE SMALL INTESTINE

(1) The isolated intestine of guinea pigs and white rats is more sensitive to acetylcholine than to histamine.

(2) The anaphylactic contraction of the guinea pig sensitized rats and guinea pigs takes the form of a biphasic reaction: an initial rapid part -- the peak phase, and a subsequent slow portion -- the plateau phase.

(3) Histamine is not an intermediate link in the mechanism of the first phase, since diprazin does not influence the development of it.

(4) In the mechanism of the first phase of the anaphylactic contraction of the small intestine, stimulation of the cholinergic intramural ganglia is essential. This is proved by the fact that atropine diminishes, while eserine enhances this phase.

(5) The first phase of the anaphylactic reaction of the isolated intestine -- the peak phase -- is diminished by the action of the ganglion-blocking substances.

ON THE CHANGES IN THE REACTIVITY OF THE ORGANISMS TO THE INFLUENCE OF THE TOXIC COMPONENTS OF THE PERTUSSIS TOXIN.

(1) Experimental pertussis poisoning is characterized by a heightening of the general sensitivity of animals not only to histamine but also to acetylcholine and carbocholine.

(2) Under the influence of the toxic on Moraxseptica components of the pertussis bacillus, there is a rise in the sensitivity of the smooth muscle of the trachea and bronchi to acetylcholine and to carbocholine.

THE INFLUENCE OF SINGLE SENSITIZATION TO CONDITIONED REFLEX ACTIVITY IN DOGS

(1) Single sensitization with horse serum with type of the strong type does not cause prolonged and substantial changes in higher nervous activity.
(2) In dogs of the weak type of higher nervous activity, following sensitization there is a disturbance in the differential inhibition. The strength of the stimulatory process is noticeably increased.

(3) A non-specific stimulus in the form of injection of physiologic saline solution causes changes in the higher nervous activity which are similar to the changes observed upon single sensitization.

ON THE CAUSES OF THE CHANGES IN THE REACTION OF THE CARDIOVASCULAR SYSTEM OF RABBITS INFECTED WITH B. TYPHIMURIUM TO SYMPATHOMIMETIC SUBSTANCES

(1) In rabbits infected with B. typhimurium, there is a reduction in the pressor reaction of the blood pressure not only to adrenalin but also to ephedrine.

(2) Upon injection of solutions of adrenalin, the constriction of the vessels of the ears in sick rabbits was more pronounced than in the control rabbits. Hence, it may be suggested that the lesser increase in the blood pressure in sick rabbits upon injection of sympathomimetic amines is not a consequence of the reduction in the sensitivity of the adrenoreactive system.

(3) One of the causes of the increased sensitivity of the adrenoreactive system is, it would seem, a reduction in the content of adrenalin in the blood, since frequently, against a background of atropine, a greater pressor reaction to adrenalin corresponds to a smaller concentration of adrenalin in the blood.

(4) There is a definite relationship between the content of adrenalin and the pressor reaction to ephedrine. Apparently, the reduction of the concentration of adrenalin is one of the causes of the lesser increase in pressure upon injection of ephedrine.
ON THE CONTENT OF ADENOSINE TRIPHOSPHORIC ACID, CREATE
PHOSPHATE, AND MINERAL PHOSPHORUS IN THE BLOOD, BRAIN, AND
SKELETAL MUSCLES OF WHITE RATS DURING DIPHTHERIA TOXICITY

(1) In the cardiac muscle and in the brain of white
rats, adenosine polyphosphoric compounds are present in
smaller amounts than in the skeletal muscles.

(2) Experimental diphtheria toxicity in white rats
is accompanied by a negligible increase in creatine phosphate
in the cardiac muscle and in the brain by a more noticeable
increase of it in the skeletal muscles.

(3) In the skeletal muscles, a reduction in the content
may be noted regardless of the degree of manifestation of the
diphtheria toxicity, whereas in the heart, such a reduction
is noted only in the presence of a severe degree of toxicity.

(4) Mild diphtheria toxicity in white rats is
accompanied by a reduction of mineral phosphorus in the
heart, brain, and skeletal muscles, whereas a more severe
toxicity is accompanied by an increase of it only in the
heart and in the brain.

(5) Disturbances of phosphorus metabolism in
diphtheria toxicity occur primarily in the skeletal muscles,
and subsequently in the heart and brain.

(6) The position regarding the resistance of white
rats to diphtheria toxin has been confirmed essentially by our
experimental data, through studies of phosphorus metabolism.

ON THE CHANGES IN THE COURSE OF THE FEBRILE REACTION DURING
THE USE OF CORTISONE

(1) Cortisone inhibits the development of the
febrile reaction caused by the streptococcal vaccine.
With prolonged daily injection of cortisone, it gradually
loses its antipyrogenic properties and the febrile reaction
again emerges.
(2) During the process of prolonged administration of cortisone, the heat-regulating centers are first inhibited, and then begin to escape from this inhibitory influence, which serves as a basic demonstration of the development of the febrile reaction in the presence of pyrogenic factors in the organism.

CHANGES IN THE RESISTANCE OF WHITE RATS TO THE TOXIC EFFECT OF VACCINE UNDER THE INFLUENCE OF ADRENALECTOMY AND THE ADMINISTRATION OF CERTAIN HORMONES

(1) The bilateral removal of the adrenal glands or the injection of insulin is accompanied by a marked reduction in the resistance of the rats to the toxic effects of vaccine made from the Gertner bacillus.

(2) The administration of cortisone completely, and of thyroid hormone only partially, restores the resistance to the toxic effect of vaccine, which has been diminished by adrenalectomy.

(3) Cortisone (in the dose used) does not reduce the resistance of normal animals to the toxic action of vaccine.

ON THE MECHANISM OF THE NEUROENDOCRINE INFLUENCES ON THE RESISTANCE OF WHITE RATS TO DIPHTHERIA TOXIN

(1) The removal of the pituitary gland is accompanied by a reduction in the resistance of white rats to diphtheria toxin.

(2) ACTH, administered to rats in which the pituitary has been removed, restores their resistance to diphtheria toxin.

(3) Disruption of higher nervous activity alters the reaction of animals in the direction of enhancing their sensitivity to diphtheria toxin.

(4) Disruption of higher nervous activity does not
exert any dilatarius influence on the resistance of rats to the diphtheria toxin under conditions of absence of the pituitary.

(5) Upon administration of ACTH, the resistance of neurotic rats to diphtheria toxin is increased.

(6) The pituitary, it seems, participates in the realization of the influence of disruption of higher nervous activity on the resistance of white rats to diphtheria toxin.

ON THE PARTICIPATION OF THE HYPOTHALAMUS IN THE DEVELOPMENT OF ANAPHYLACTOID SHOCK IN WHITE RATS

(1) Upon inflicting damage upon the ventromedial nuclei of the mid-hypothalamicus, there is atrophy of the adrenal glands which appears by the 15th day and reaches its greatest extent at later times following operation (35th to 40th day).

(2) On the 7th and 13th days after operation, changes in the sensitivity of white rats to intravenous injection of egg albumin cannot be demonstrated.

(3) By the 35th to 40th days after operation, there is a reduction in the value of the DL50 of egg albumin by three-fold as compared with the control animals.

THE ROLE OF THE ADRENAL-PITUITARY SYSTEM IN THE DEVELOPMENT OF ANAPHYLAXIS IN WHITE RATS

(1) Anaphylactic shock in white rats may be produced by sensitizing them to foreign serum admixed with vaseline.

(2) Adrenalectomy reduces the resistance of rats to anaphylaxis. Cortisone increases their resistance to anaphylaxis whereas DCCA and adrenaline proved to be ineffective in this respect. The removal of the pituitary gland did not change the sensitivity of rats to the first injection of foreign protein, but substantially changed their susceptibility to sensitization. ACTH increases the resistance of rats from
which the pituitary has been removed simal to the level of
the resistance of non-sensitized animals. Cortisone is less
effective in this regard than ACTH. Adrenalins shows no
influence.

(3) The permeability of the skin capillaries in rats
sensitized with horse serum in vaseline is increased.
Removal of the pituitary or the administration of ACTH to the
operated animals in not reflected in the state of permeability
of the skin capillaries.

(4) There is no parallelism between the anaphylactic
reaction in vitro and the general reaction of the organism.
The isolated intestine of rats sensitized to foreign serum in
vaseline does not show any pronounced anaphylactic contraction.
Removal of the pituitary or of the adrenal glands heightens
the sensitivity of the small intestine to foreign serum and
to histamine both in sensitized and in non-sensitized rats.

(5) The intensity of anaphylactic shock does not
depend on the degree of accumulation of precipitins in the
blood. The titer of precipitins in the blood of sensitized
rats is low. Adrenalectomy or the administration of cortisone
exerts no marked influence on the titer of precipitins.
Removal of the pituitary reduces the titer of precipitins,
whereas injection of ACTH increases it slightly.

(6) The role of the adrenal-pituitary system in
anaphylaxis consists in its non-specific protective and
adaptive function; in the realization of this function, an
important link is the cortex of the adrenal glands.

- END -

1650

CSC:7506-9