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Research Laboratory of Military Therapy of the S.M. Kirov Military Medical Academy: From Its Origins to Present Day

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ABSTRACT

This article outlines the key milestones in the development of the Research Laboratory of Military Therapy. The laboratory was founded in 1981 during the height of the armed conflict in Afghanistan, when a high incidence of morbidity (particularly infectious diseases), a large number of complications in the wounded, and the prolonged and recurrent course of somatic conditions resulted in sanitary losses equating to combat losses. In 1984, based on data obtained in Afghanistan, Professor Novitsky formulated and substantiated the fundamental concept of chronic adaptive overstrain syndrome, elucidated its mechanisms, and defined its clinical manifestations. One of the laboratory's research areas was the study of the health status of individuals living in the areas of Belarus, Ukraine, and Russia contaminated with radioactive fallout from the Chernobyl nuclear power plant disaster. In 1996, studies were conducted at the Luga Artillery Range to examine the effects of air blast waves of varying intensity on the physical performance and conditioned reflex activity of laboratory animals, enabling the assessment of the potential use of new actoprotective agents. In collaboration with the Department of Military Field Therapy, the laboratory's staff investigated the characteristics of somatic conditions in individuals engaged in chemical weapons destruction. The Research Laboratory of Military Therapy staff developed and implemented a modern system for the medical examination of military personnel engaged in work with chemical weapons. Currently, the laboratory addresses research issues in areas such as improving the diagnosis, prevention, and treatment of injuries caused by highly toxic compounds; studying the chromosomal apparatus of cells in cases of occupational exposure to various chemicals and acute poisonings; and experimentally justifying the prevention and treatment of hepatotropic poisonings using glutathione disulfide- and inosine-containing drugs. In an organotypic culture model, changes in cell proliferation of various tissues under the influence of alkylating agents and the potential of using selected coded amino acids and oligopeptides to mitigate toxic effects were studied. In addition, organizational measures for preventing maladaptation disorders in military personnel serving in the Arctic zone of the Russian Federation have been proposed. Furthermore, the laboratory has examined the state of cellular and humoral immunity in patients with novel coronavirus infection.

Keywords: combat therapeutic injury; Afghanistan; somatic condition; adaptation; adaptive overstrain; Arctic zone; organotypic culture; chemical weapons destruction; novel coronavirus infection.

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Научно-исследовательская лаборатория военной терапии Военно-медицинской академии имени С.М. Кирова: от истоков до наших дней

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АННОТАЦИЯ

В статье перечислены основные вехи истории создания и становления научно-исследовательской лаборатории военной терапии. Лаборатория была создана в 1981 г. в разгар вооруженного конфликта в Республике Афганистан, когда высокий уровень заболеваемости, особенно инфекционной, большое число осложнений у раненых, затяжное и рецидивирующее течение соматической патологии приводило к тому, что санитарные потери приравнялись к боевым. В 1984 г. на основании материалов, полученных в Афганистане, профессором А.А. Новицким сформулирована и обоснована фундаментальная концепция синдрома хронического адаптивного перенапряжения, раскрыты механизмы его возникновения, определены его проявления. Одним из направлений лаборатории являлось исследование состояния здоровья лиц, проживающих на радиоактивно зараженных в результате аварии на Чернобыльской атомной электростанции территориях Белоруссии, Украины и России. В 1996 г. на базе Лужского артиллерийского полигона проводились исследования, посвященные изучению действия воздушной ударной волны различной степени тяжести на физическую работоспособность и условно-рефлекторную деятельность лабораторных животных, что позволило оценить возможность использования новых препаратов актопротекторного действия. Совместно с коллективом кафедры военно-полевой терапии сотрудники научно-исследовательской лаборатории военной терапии исследовали особенности возникновения и течения соматической патологии у лиц, занятых на работах по уничтожению химического оружия. Впервые сотрудниками научно-исследовательской лаборатории военной терапии разработана и внедрена современная система медицинского освидетельствования военнослужащих, занятых на работах с химическим оружием. В настоящее время в лаборатории исследуются и изучаются актуальные проблемы по таким направлениям, как совершенствование диагностики, профилактики и лечения поражений высокотоксичными соединениями; состояние хромосомного аппарата клетки при профессиональном контакте с различными химическими веществами, острых отравлений; экспериментальное обоснование профилактики и лечения препаратами, содержащими дисульфиды глутатиона и инозин, при отравлениях гепатотропными ядами. На модели органотипического культивирования исследуется изменение клеточной пролиферации различных тканей под действием алкилирующих веществ, оцениваются возможности использования ряда кодируемых аминокислот и олигопептидов для устранения токсического действия. Кроме того, предложен комплекс организационных мероприятий по предупреждению расстройств и нарушений адаптации у военнослужащих, проходящих службу в условиях Арктической зоны Российской Федерации. Проведено изучение состояния клеточного и гуморального иммунитета у больных новой коронавирусной инфекцией.

Ключевые слова: боевая терапевтическая травма; Афганистан; соматическая патология; адаптация; адаптивное перенапряжение; Арктическая зона; органотипическое культивирование; уничтожение химического оружия; новая коронавирусная инфекция.

Как цитировать

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The Research Laboratory of Military Therapy was established by directive No. 158/1/01557 of the Logistics Headquarters of the USSR Armed Forces dated July 27, 1981. During the armed conflict in the Democratic Republic of Afghanistan, medical officers encountered complex challenges that could not be addressed based on medical experience from previous wars such as the Great Patriotic War. Back then, the main casualties were combat casualties, and a relatively low incidence of diseases in the troops was recorded. In contrast, in Afghanistan, as a result of high morbidity, particularly infectious diseases, as well as a large number of complications among the wounded and protracted and recurring somatic disorders, the number of deaths due to diseases was comparable to that of combat casualties. There was an urgent need to address these issues, identify the causes, and mitigate the effects. At that time, Professor Novitsky, Deputy Head of Academic and Research Affairs at the Military Medical Department of the Kuibyshev Medical Institute, was tasked to create a research laboratory in Leningrad at the Kirov Military Medical Academy (MMA). The laboratory would employ skilled professionals from various areas of medicine, be equipped with the advanced equipment, and promptly identify the causes of immunoresistance in the wounded and sick and find ways to improve it.

The Research Laboratory of Combat Therapeutic Trauma should study visceral lesions in military personnel that developed from damage caused by weapons during combat missions and extreme environmental factors. It addressed the following national tasks:

- Improve the system of nonsurgical care in wartime and in local armed conflicts
- Study internal diseases developed as a result of wounds caused by advanced firearms and the clinical features, diagnostics, treatment, and rehabilitation of patients with somatic disorders during wartime and in local armed conflicts
- Develop advanced therapies for acute radiation injuries in total (subtotal) radiation exposure
- Study the injuries caused by toxic and highly toxic substances in a wide range of doses
- Identify visceral disorders in military personnel caused by exposure to professional military factors

The laboratory employed 20 people: 8 military researchers, 7 civilian researchers, and 5 junior support staff. The laboratory comprised a biochemical division headed by senior research fellow Lieutenant Colonel of the Medical Service I.I. Shantyr; an immunology division headed by senior research fellow O.N. Uspenskaya; an electron microscopic research division headed by senior research fellow V.A. Simonenkova; a toxicology division headed by senior research fellow A.E. Markova; and a group of combat GPs

headed by senior research fellow Professor P.P. Likhushin.

Since 1984, Novitsky has managed eight expeditions that actively involved the laboratory staff (Figs. 1–3).

These studies have made significant contribution to the development of environmental medicine. Based on the data collected in Afghanistan, Professor Novitsky (Fig. 4) developed and substantiated the fundamental concept of chronic adaptive exhaustion syndrome, described its mechanisms, identified its manifestations, and developed scientific procedures for prevention and correction and a theoretical basis for development of targeted programs aimed at maintaining health and preventing diseases in individuals working in various climatic and geographical regions that differ from their place of residence [1, 2].

Identification of chronic adaptive exhaustion syndrome as a preclinical form of impaired resistance provided evidence of the occurrence patterns of some crucial features of disorders in environments wherein a person is chronically exposed to extreme factors and experiences long-term psychoemotional stress.

In 1985, the first report on the topic commissioned by the Central Military Medical Office of the Ministry of Defense of the Union of Soviet Socialist Republics (USSR Ministry of Defense) was published. The report entitled “The State of the Immunological Status and Ways of Its Improvement in Chronic Environmental and Occupational Stress Syndrome in Military Personnel in Afghanistan” was published in 1987, and “Adaptation and Clinical Aspects of Combat Disorders in Afghanistan” was issued in 1988. In 1989, the scientific research conducted by the military therapy laboratory was summarized in the report “Morbidity and Features of



Fig. 1. A.A. Novitsky (left) with Head of the Main Hospital of the Afghan Army Surgeon Major General Valoyat Habibi. © Archive of the Research Laboratory of Military Therapy of the Kirov Military Medical Academy, 2025. Courtesy of the Academy's management.



Fig. 2. Laboratory staff in Afghanistan (left to right): Junior Researcher Surgeon Captain S.S. Aleksanin; Senior Researcher Surgeon Lieutenant Colonel V.R. Gritsenger; Senior Nurse of the ER Department of the Kabul Infectious Diseases Hospital N.A. Ivanova; Head of the Laboratory, Professor Surgeon Colonel A.A. Novitsky; Senior Researcher Surgeon Major V.I. Kuzenkov. © Archive of the Research Laboratory of Military Therapy of the Kirov Military Medical Academy, 2025. Courtesy of the Academy's management.

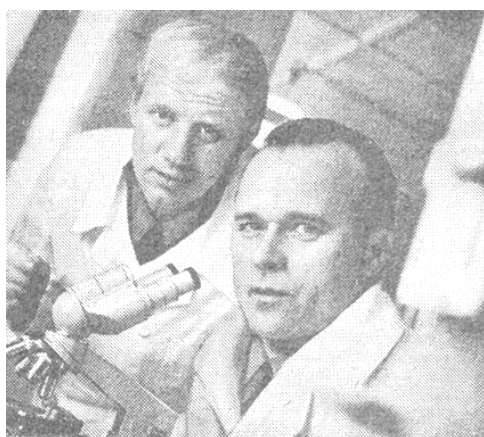


Fig. 3. "A Man in an Extreme Situation," that was how the Red Star newspaper (April 5, 1985) formulated the main topic of research at the research center in Kabul, conducted by laboratory staff: left, Senior Researcher Surgeon Major V.I. Kuzenkov; right, Laboratory Head Surgeon Colonel A.A. Novitsky. © Archive of the Research Laboratory of Military Therapy of the Kirov Military Medical Academy, 2025. Courtesy of the Academy's management.



Fig. 4. Professor Novitsky at the hospital of the 40th Army (Kabul, 1987). © Archive of the Research Laboratory of Military Therapy of the Kirov Military Medical Academy, 2025. Courtesy of the Academy's management.

the Most Common Visceral Diseases in Military Personnel of the 40th Army." Moreover, under the supervision of Professor Novitsky, theses for the degree of candidate of medical sciences in Internal Medicine were defended by laboratory employees V.N. Komarevtsev and A.S. Kryuchkova and, in 1990, by S.S. Aleksanin and V.F. Reznicek.

During the same period (1985–1989), the laboratory's toxicology division, including senior researcher A.E. Markova, junior researcher A.S. Kryuchkova, and laboratory assistant O.K. Livotova, investigated the effects of anticholinergic toxicants on the higher nervous function of animals using the resources of the Institute of Military Medicine of the Ministry of Defense and Institute of Experimental Medicine of the USSR Academy of Medical Sciences. Junior researchers have mastered over 20 complex conditioned reflex methods and revealed that the critical time of blockade of cholinergic receptors in the brain, which is 6 days for potent anticholinergics, leads to long-term effects of intoxication in animals (dogs), persisting for ≥ 2 years. Such effects may be prevented by administering aminostigmine after poisoning, which was synthesized at the time, as an antidote. Later, this medicine was tested by the laboratory staff and was approved as a standard antidote for injuries caused by psychotomimetic toxic substances in the Armed Forces of the Russian Federation.

The greatest disaster of the 20th century, namely, the accident at the Chernobyl Nuclear Power Plant, prompted a new round of scientific research by the laboratory staff. To study the effect of low doses of X-radiation on the health and psychoemotional status of people living in contaminated areas, a group of professionals, including clinicians, radiologists, biochemists, immunologists, and psychophysicologists, was established in 1989. The laboratory staff actively took part in this large-scale scientific project

(>30,000 people examined). Consequently, no causal relationship was found between morbidity and direct exposure to radiation. However, individuals living in areas with radioactive contamination for a long time developed chronic adaptive exhaustion syndrome as a preclinical form, leading to secondary immunodeficiencies of varying severity and, as a consequence, higher morbidity.

Obtained data were published in the reports "On Medical Examination of Residents and Radiation and Sanitary Examination of Permanent Posts of the Belarusian, Moscow, and Carpathian Military Districts Deployed in the Areas with Radioactive Contamination Following the Chernobyl Accident" (1991) and "The Comprehensive Clinical and Laboratory Examination of Residents of the Khoyniki District, Gomel Region (Belarus)" (1993). Later, the reported materials were included in theses for the degree of Doctor of Medical Sciences of laboratory employees V.N. Komarevtsev [3], S.S. Aleksanin [4], and V.R. Gritsenger and some employees from other departments of the MMA.

Directive No. 314/1/2124 of the General Staff of the Armed Forces of the Russian Federation dated November 1, 1995, assigned the Research Laboratory of Military Therapy to the Department of Battlefield Medicine; since then, it has been known as the Research Laboratory of Combat Medical Therapy at the Department of Battlefield Medicine. The laboratory, which was located at the 49th permanent military camp, was a well-equipped unit with high scientific potential. It employed two doctors of medical sciences, four candidates of sciences, and experienced research staff and laboratory assistants. The laboratory was headed by candidate of medical sciences, Surgeon Colonel V.N. Komarevtsev, and candidate of medical sciences Surgeon Colonel V.F. Reznicek was appointed as his deputy.

The Research Laboratory of Combat Medical Therapy was designed to study the fundamental mechanisms of development of combat-related injuries and traumas; to look for new techniques and methods of accelerated rehabilitation of the injured; and, in the context of events in the North Caucasus, to study visceral diseases associated with local armed conflicts. In this period, the Research Laboratory of Combat Medical Therapy and Department of Department of Battlefield Medicine conducted joint research in advanced areas, which resulted in the reports "Severity and Structure of Visceral Injuries in Victims at Different Times After Wounds Inflicted in Local Wars" and "Clinical Aspects of Regulatory Metabolic Disorders in Military Personnel with Morbid Weight Loss in Extreme Conditions" [5].

During the operation to restore constitutional order in the Chechen Republic, the laboratory's experience gained in Afghanistan was again highly demanded. The unit's employees V.N. Komarevtsev, A.N. Zhekalov, and S.V. Petlenko repeatedly traveled to the Mozdok hospital and

combat areas to collect data to study nonsurgical disorders related to local armed conflicts [6, 7]. In 1997, the collected data and analysis of several thousand medical records of military personnel who participated in the armed conflict in the Chechen Republic enabled the laboratory employees to propose methods to improve medical support for troops in local conflicts, generalizing the experience of the medical service in North Caucasus. In 1996, the staff of the Research Laboratory of Military Therapy together with colleagues from the Research Laboratory of Battlefield Surgery at the Luga Artillery Firing Range studied the effect of mild and moderate air shock waves on physical performance and conditioned reflex activity of laboratory animals and assessed the possible applications of new actoprotective drugs proposed for research by the Department of Pharmacology of the MMA (Figs. 5 and 6) [8].

The joint investigation of the laboratory and department staff significantly expanded the range of research in the main areas of battlefield medicine and submitted proposals to the scientific and technical committee of the Chief Military Medical Directorate to include various scientific trends in the research plan as commissioned ones. In addition, a mobile scientific division was established, which studied the development, progress, treatment, and prevention of acute pneumonia in military personnel of the Russian Ministry of Defense group of forces in Chechnya (V.N. Komarevtsev, A.N. Zhekalov, S.V. Petlenko, and A.E. Oksas).

In 2000, Surgeon Colonel A.N. Zhekalov [9], who defended his doctoral thesis in 1997, became head of the laboratory. He contributed to the development of the medical support organization for the Federal Target Program Destruction of Chemical Weapons Stocks in the Russian Federation; a significant part of this work was performed by the staff of the Department of Battlefield Medicine and the Research Laboratory of Military Therapy. The staff of the Battlefield Medicine Clinic together with those of the Research Laboratory of Military Therapy began to study the onset and progression of somatic disorders in individuals involved in chemical weapons destruction.

The Research Laboratory of Military Therapy staff were the first to develop and implement an advanced two-stage system of medical examination of military personnel involved in operations with chemical weapons [10]. The first stage was implemented on-site by the professionals who selected military personnel requiring inpatient examination based on examinations and tests. At the second stage, an in-depth inpatient examination was conducted at the MMA to determine the fitness category and causal relationships between the diagnosed condition and service environment. Scholars and specialists at the Academy have substantiated theoretical approaches to and issued guidelines for creating a comprehensive medical support system for these activities.



Fig. 5. Personnel of the research laboratories of military therapy and battlefield surgery who conducted tests at the Luga Testing Ground. First row (left to right): Senior Researcher N.P. Burkova; Laboratory Assistant T.B. Panchenko; and Junior Researchers S.M. Kaloshina and L.G. Arzhavkina. Second row: Junior Researcher E.V. Dmitrieva; Senior Researcher A.S. Kryuchkova; and Heads of Divisions Surgeon Colonels M.Yu. Tyurin and V.F. Reznicek. © Archive of the Research Laboratory of Military Therapy of the Kirov Military Medical Academy, 2025. Courtesy of the Academy's management.



Fig. 6. Senior Researcher A.S. Kryuchkova conducts a field study of the physical performance of rats exposed to an air shock wave (a swimming to failure test). © Archive of the Research Laboratory of Military Therapy of the Kirov Military Medical Academy, 2025. Courtesy of the Academy's management.

A mobile team conducted an in-depth medical examination of the site personnel at chemical weapons storage and destruction facilities; inpatient examination and treatment of military personnel was provided by the academy's clinics, establishing a causal relationship between the diseases and operations with toxic chemicals [11].

Since 2005, laboratory staff have traveled annually to chemical weapons storage and destruction facilities to examine military personnel and conduct research. The research materials on the comprehensive assessment of the health and improvement of the medical monitoring

system of the examined personnel laid the basis of candidate theses of laboratory employees D.A. Sinyachkin [12] and L.V. Pikalova [13] and the doctoral thesis (special topic) of T.V. Kharchenko.

For this large-scale project (>1000 military personnel were stationed at each facility, and the working day of the academy employees often ended late at night), laboratory researchers A.N. Zhekalov, O.V. Protasov, L.G. Arzhavkina, A.S. Kryuchkova, N.A. Tkachuk, and B.L. Gavriluk were awarded medals "For Assistance in Destruction of Chemical Weapons," commemorative tokens, and certificates of honor signed by head of the Federal Directorate for the Safe Storage and Destruction of Chemical Weapons Colonel General V.P. Kapashin (Fig. 7).

Mobile team operations were supervised by heads of the Research Laboratory of Military Therapy A.N. Zhekalov, D.A. Sinyachkin, and M.B. Ivanov. Surgeon Lieutenant Colonel D.A. Sinyachkin is a former head of the medical service at Russia's first chemical weapons destruction facility in Gorny, Saratov Region. He was head of the laboratory from 2011 to 2012 and soon took up the position of assistant head of the battlefield medicine clinic.

Surgeon Lieutenant Colonel M.B. Ivanov, who headed the laboratory from 2009 to 2011, repeatedly visited chemical weapons storage and destruction facilities as Chairman of the military medical board. He was the first to formulate and implement informed consent forms signed by the military personnel undergoing military medical examination. After his discharge from the military, M.B. Ivanov was invited to the Institute of Toxicology of the Federal Medical and



Fig. 7. The mobile military medical board, 2016. © Archive of the Research Laboratory of Military Therapy of the Kirov Military Medical Academy, 2025. Courtesy of the Academy's management.



Fig. 8. Senior Researcher L.G. Arzhavkina examines unstable chromosomal aberrations in peripheral blood lymphocytes. From the personal archive of A.S. Zhukov.

Biological Agency of Russia as Deputy Director for Research, and he subsequently headed the Institute.

At this stage, one of the areas of the Research Laboratory of Military Therapy was the study of somatic mutations in workers at chemically hazardous facilities. The most accurate and sensitive biomarker, the gold standard for identifying early biological effects of damaging environmental factors on humans, was change in the frequency and spectrum of chromosomal aberrations in peripheral blood lymphocytes (Fig. 8).

Thus, the relationship between cytogenetic indicators in individuals exposed to various factors from chemically hazardous facilities and occupational diseases was studied. The Research Laboratory of Military Therapy staff have proven that a multiple increase in the frequency, a change in the spectrum of chromosomal aberrations with occurrence of a large number of exchange aberrations, and an increase in the number of chromosomal aberrations per

one aberrant metaphase indicate a pronounced genotoxic effect in personnel of chemically hazardous facilities. A distinctive feature of the genotoxic effect of chemically hazardous facilities is the high incidence of exchange aberrations of chromatid and chromosomal types, including ring chromosomes, a high frequency of cells carrying multiple exchange aberrations, and a significant increase in the proportion of individuals of high and ultra-high genetic risk groups. Thus, cytogenetic indicators can be a criteria for assessing individual occupational risk in personnel of chemically hazardous facilities [14–16].

In 2011 (directive No. 314/10/2803 of the General Staff of the Armed Forces of the Russian Federation, dated June 9, 2011; and order No. 7/287 of the Head of the Academy, dated July 5, 2011), the Research Laboratory of Military Therapy was included in the research department of experimental medicine of the Academy's research center (Fig. 9).



Fig. 9. The Research Laboratory of Military Therapy staff, 2011. © Archive of the Research Laboratory of Military Therapy of the Kirov Military Medical Academy, 2025. Courtesy of the Academy's management.

Along with medical support for destruction of chemical weapons, the laboratory performed some other activities. The study of adaptive capabilities of the body in individuals who have been in extreme situations for a long time is crucial and relevant even today.

Under the supervision of D.M. Ukhovsky, who was head of the laboratory from 2012 to 2017, the occupational adaptation of various categories of military personnel to the conditions of the Far North was investigated. This long-term study showed that chronic adaptive exhaustion syndrome, which developed in combat conditions as secondary immunodeficiencies of varying severity, leads to the development of metabolic syndrome without proper physical activity [17–19]. The identified patterns allowed for developing measures for professional screening of military personnel to perform official duties in the Arctic zone of the Russian Federation and enabled proposing organizational measures to prevent adaptation disorders in them [20, 21]. At present, the laboratory staff, together with the Department of Battlefield Medicine, continue to conduct advanced research into the pathogenetic mechanisms of metabolic syndrome and polar tension syndrome in military personnel [22, 23], and they received a patent for method for prevention and treatment of polar desynchronization.

In 2017–2021, the laboratory was headed by Doctor of Medical Sciences, Professor of St. Petersburg State University (part-time), Surgeon Lieutenant Colonel A.E. Korovin. Under him, the study of occupational adaptation of various categories of military personnel to the conditions of the Far

North continued [24, 25]. The study became more profound with the introduction of pathogenetic causes of adaptation disorders and sanogenetic prevention of adaptation disorders. A detailed report on the subject commissioned by the Chief Military Medical Directorate of the Ministry of Defense of the Russian Federation and guidelines on modern methods of improving adaptation of military personnel in the Arctic zone were promptly prepared [26].

In 2017, by order of the Academy command, A.E. Korovin, as the editor-in-chief, resumed publication of the *News of the Imperial Military Medical Academy*. A.E. Korovin remained the academic editor of the international journal *Clinical Pathophysiology* throughout his term as head of the Research Laboratory of Military Therapy.

The next national task was establishing a research laboratory for cellular technologies by A.E. Korovin in 2018 at the newly founded ERA Military Innovations Technopolis. He rapidly drew up relevant terms of reference and soon organized the delivery and personally participated in timely and accurate installation and adjustment of state-of-the-art high-tech equipment. The ultimate commitment and diligence of Doctor of Medical Sciences A.E. Korovin prompted the command of the Academy and the Chief Military Medical Directorate to let him personally present a report on the creation of a new laboratory at the ERA Technopolis to the commander-in-chief. On November 22, 2018, the head of the Research Laboratory of Military Therapy successfully presented the report on new capabilities of the country's military medical service in the field of cellular technologies and tissue engineering to the President of Russia [27–29]. The scientific studies conducted during



Fig. 10. Senior Researcher O.V. Protasov assessing humoral immunity indicators in patients with COVID-19. From the personal archive of A.S. Zhukov.

the term of A.E. Korovin as head of the Research Laboratory of Military Therapy are reflected in the fundamental work edited by his teacher, Professor V.N. Tsygan, "Pathophysiology to Military Medicine" [30].

Since September 2021, the Research Laboratory of Military Therapy has been headed by Surgeon Lieutenant Colonel Alexander Zhukov, Doctor of Medical Sciences. Alexander Zhukov has continued the consistent development of the laboratory's core activities and furthered studying new trends in military occupational and occupational disorders associated with internal diseases relevant to military medicine in peacetime and wartime.

In addition, the laboratory actively conducts experimental studies, following which optimal patterns for the use of antidotes are tested and validated. In recent years, experimental models of toxic hepatitis and liver cirrhosis, herpetic stomatitis, and immersion hypothermia have been developed and tested on laboratory animals, providing new approaches to prevent and treat poisoning with hepatotropic poisons using drugs containing glutathione and inosine disulfides [31]. As part of the study of the effect of toxic agents and pathogenesis of toxic damage at the cellular level, the laboratory studies the changes in the cellular proliferation of various tissues under the influence of alkylating substances and assesses the possible use of some encoded amino acids and oligopeptides to treat the toxic effect [32, 33]. In studying the chromosomal apparatus of somatic cells during occupational contact with various chemical substances, the cellular mechanisms are studied, through which chronic exposure to subthreshold concentrations of xenobiotics is realized [34, 35]. Following these studies, several patents for inventions were issued. In addition, the effect of the most effective pharmaceuticals on physical performance and conditioned-reflex activity of

laboratory animals during hypothermia was assessed, and pathophysiological approaches for developing effective techniques of emergency care of hypothermia were substantiated [36–38].

During the COVID-19 pandemic that began in 2019, the laboratory staff faced new challenges. It commenced studies of immunological status in patients with COVID-19 to evaluate the possible use of immunological indicators to predict the risk of complications and disease outcomes (Fig. 10) [39–41].

Another key date for Russia was February 24, 2022, when the President of Russia announced the beginning of a modern armed conflict in Ukraine. Just a few months later, Surgeon Lieutenant Colonel O.V. Protasov, a senior research fellow at the Research Laboratory of Military Therapy, was sent to the armed conflict zone to perform special duties. He joined the task force of the Russian Ministry of Defense that was formed to address the challenges of increasing the combat resilience of personnel and took part in preventive efforts for military personnel who had temporarily lost their combat resilience. In 2024, during a mission to the armed conflict zone, Surgeon Lieutenant Colonel A.S. Zhukov, head of the laboratory, collected the data to study the structure and severity of visceral morbidity. Presently, the study is underway to improve the system for arranging and providing specialized medical care to the wounded and sick military personnel with visceral disorders associated with large-scale military conflict.

Thus, for over 40 years, the Research Laboratory of Military Therapy took a hand in all significant events related to military medicine, including the armed conflict in Afghanistan, the Chernobyl disaster, tests in Semipalatinsk, the Spitak earthquake, the armed conflicts in the North Caucasus and Ukraine, and medical support for destruction of chemical

weapons; this not a complete list of the hot spots where the laboratory's staff worked.

Currently, the laboratory staff is actively involved in the implementation of the Federal Program of Strategic Academic Leadership Priority 2030. The program includes research and development of safe radioprotectors based on natural compounds, improved treatment for severe pneumonia in the wounded, and the development of effective methods for restoring damaged nerves.

Contemporary global trends are shifting research into the pathogenesis, diagnosis, treatment, and prevention of occupational visceral disorders from the cellular to molecular and genetic levels. Advances in molecular biology and the complete decoding of the human genome have enabled the first step toward the development of personalized medicine. At present, knowledge is accumulating in this area as advancements in computing technology do not allow for a comprehensive analysis of the enormous amount of information presented in genomic, proteomic, and metabolomic studies. Molecular and genetic testing techniques are rapidly advancing, far ahead of the clinical medicine. The current period presents is on the threshold of great discoveries, and initial successes have already been achieved; genomic variants associated with a higher risk of certain multifactorial diseases have been identified, research into individual metabolic characteristics is underway, drug therapy is being selected based on a person's enzyme profile, knowledge on the regulation of gene expression is expanding, and new treatment methods are being developed.

The Kirov MMA is monitoring global science. Presently, the research activities of the Academy have been revamped. The research center operates in a new building, which houses laboratory facilities equipped with state-of-the-art equipment for medical and biological studies. Along with other scientific departments of the center, the Research Laboratory of Military Therapy staff are successfully working in the new environment. We wish them good luck and new achievements, recalling the laboratory's history and hoping for its long creative life.

ADDITIONAL INFORMATION

Authors' contribution: A.S. Zhukov: formal analysis, writing—original draft; O.V. Protasov: conceptualization, formal analysis; A.V. Denisov: formal analysis; A.E. Korovin: data curation, formal analysis. All the authors approved the version of the draft to be published and agreed to be accountable for all aspects of the work, ensuring that issues related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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ДОПОЛНИТЕЛЬНАЯ ИНФОРМАЦИЯ

Вклад авторов. А.С. Жуков — анализ данных, написание статьи; О.В. Протасов — разработка общей концепции, анализ данных; А.В. Денисов — анализ данных; А.Е. Коровин — систематизация и анализ данных. Все авторы одобрили рукопись (версию для публикации), а также согласились нести ответственность за все аспекты работы, гарантируя надлежащее рассмотрение и решение вопросов, связанных с точностью и добросовестностью любой ее части.

Благодарности. Авторы выражают особую признательность и огромную благодарность доктору медицинских наук, профессору Сергею Юрьевичу Матвееву, доктору медицинских наук, профессору Василию Яковлевичу Апчелу, кандидату медицинских наук Алле Сергеевне Крючковой, кандидату медицинских наук Дмитрию Александровичу Синячкину, за значимые замечания, важнейшие советы при проведении исторического исследования.

Источники финансирования. Отсутствуют.

Раскрытие интересов. Авторы заявляют об отсутствии отношений, деятельности и интересов за последние три года, связанных с третьими лицами (коммерческими и некоммерческими), интересы которых могут быть затронуты содержанием статьи.

Оригинальность. При создании настоящей работы использованы фотографии, заимствованные из архива НИЛ военной терапии НИЦ Военно-медицинской академии им. С.М. Кирова и авторов статьи, 2025 г. Фотография публикуется впервые с разрешения администрации учреждения.

Доступ к данным. Все данные, полученные в настоящем исследовании, доступны в статье.

Генеративный искусственный интеллект. При создании настоящей статьи технологии генеративного искусственного интеллекта не использовали.

Рассмотрение и рецензирование. Настоящая работа подана в журнал в инициативном порядке и рассмотрена по обычной процедуре. В рецензировании участвовали два рецензента: внутренний и внешний.

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