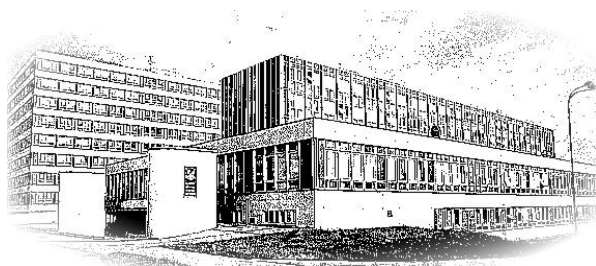


UNIVERSITY OF DEFENCE BRNO
FACULTY OF MILITARY HEALTH SCIENCES

ANNUAL REPORT

2019

HRADEC KRÁLOVÉ
CZECH REPUBLIC



Faculty of Military Health Sciences

Hradec Králové

EDITORIAL NOTES

Dear Reader,

This publication presents the main activities of the Faculty of Military Health Sciences of the University of Defence.

The 28th Annual Report includes the principal research and educational activities of the 8 departments, so that it may act as a basis for internal and external evaluation respectively.

Should you require more detailed information about our Faculty, it is available on our website <http://fvz.unob.cz> or <http://www.pmfhk.cz>.

In case of any suggestions or comments to our activities, do not hesitate to contact us at the address listed below.

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FOREWORD

The Faculty of Military Health Sciences of the University of Defence in Hradec Kralove represents a center of medical education and research of the Czech Army with long-term history in the Czech Republic. The military medical education began in Hradec Kralove in 1951. The school was established by an order of the President of the Republic as the Military Medical Academy, and later a honorary title of "Jan Evangelista Purkyně" was added. Later on, the name was changed to the Military Medical Research and Postgraduate Institute, but the name was reverted back in 1988. In 2004, during professionalization of the army and reorganization of military education the University of Defence was founded. Since then our Faculty has become an integral part of the University of Defence and has been renamed, once again, the Faculty of Military Health Sciences. At present, the Faculty is the only institution, which provides a military medical education at the university level. The Faculty provides an education in one accredited Bachelor's study program (Military Paramedic), three Master's study programs (Military General Medicine, Military Dentistry, Military Pharmacy) and eight doctoral study programs. However, our role is not only to educate and train all medical, pharmaceutical and nursing specialists and to maintain scientific excellence, but also to provide a general support to the Military Medical Service.

The very fact that the Faculty has survived all reforms and other changes demonstrates its uniqueness, as well as its high educational, professional and research level. The specificity of our educational model lies in a close cooperation with other scientific and educational workplaces. Thus the Faculty enjoys close collegial relationships with the Medical and Pharmaceutical Faculties of Charles University, the University of Hradec Kralove, the Faculty of Health Studies in Pardubice, the Faculty Hospital in Hradec Kralove and the Military Medical Agency. Especially the two faculties of Charles University and the University of Pardubice cooperate closely with our school in providing the education to our students. As a result, our Master degree students graduate both from our Faculty and from the respective Faculty of Charles University. In 2012, the Central Military Hospital in Prague was declared the Military Faculty Hospital. This medical facility, which we cooperate very closely with, creates a good background for military medical practice for our students. Finally, our school could not thrive without a support from representatives of the city of Hradec Kralove, which our school enjoys ever since its foundation.

At present, the Faculty covers the needs of troops concerning medical professional training in all specializations, medical science and research. The Faculty has educated a lot of specialists who have been subsequently awarded key positions both at national and international levels. These

positions have been held by former and present faculty personnel in important international institutions such as the NATO Surgeon General Office in Europe, memberships in various NATO and EU bodies, United Nations Security Council, and World Health Organization boards. The Faculty members are engaged in many research projects awarded by both national and foreign military, as well as civilian research agencies. The laboratory compartment houses state-of-the-art laboratory technologies focused mostly on projects advancing our knowledge of protection against CBRN agents. The scientific results are published in many respected international journals, such as the Lancet.

In spite of continuously lowering financial budget and personnel reduction, we aim to continue and even to increase most of our activities. Our scientific production rate is the highest at the entire University of Defence. The Czech (Medical Service) field hospitals are well-known around the world and highly valued among our NATO allies. Our approach is different from the majority of other services. Our training is both long-term and intensive, thus the students gain deeper knowledge and skills as well as awareness of a military life. Education, training and research should be joint and, to provide that, the Faculty strives to create a pool of excellent professors, scientists and teachers. The Faculty of Military Health Sciences is an open body for mutual cooperation with scientists and teachers from all democratic countries. In spite of changing priorities in the Czech Military, we have been still focusing on the specialization of the Czech Armed Forces in the nuclear, biological and chemical protection and we have been engaged in many humanitarian and military deployments of military medical services abroad. Our Faculty will play the key role in this demanding process. We will guarantee the research and fulfilment of training needs for medical corps, specialized forces and for some NATO countries. Nevertheless, our primary concern is to educate and train students and young physicians. This can be hardly possible without our closest partners, international collaborators and friends.

In conclusion, I would like to say that all results and successes I perceive as a consequence of the cooperation of teachers and students and other employees of our Faculty, developing relationships with our graduates and maintaining a close collaboration with our partners. The next period should, hopefully, bring us another step in the successful development of the Faculty and its dedicated employees.

Pavel BOSTIK, MD, PhD

Professor and Dean of the Faculty of Military Health Sciences

INTRODUCTION

HISTORY

The Purkyně Military Medical Academy has been a long-term educational and scientific center of the Czech Army Medical Service. There has been a very long history of systematic education of military medical personnel in our country. Its beginnings lie, as in many European countries, in the 18th century. Large, permanent armies were being built and the military medical service became a normal part of these armies. In 1776 the War Council of the Vienna Court issued an administrative order which definitely prohibited the employment of field surgeons in the armed forces who had not studied anatomy and who had not had their knowledge officially examined. This can be considered the beginning of organized education of military medical personnel in our country lasting up to the present days.

The fundamental milestone in the “Austrian” stage was, however, in 1785 with the establishment of the Military Medical (Surgical) Academy named the Josephinum after its founder, the enlightened monarch and father of many political and social reforms, Emperor Joseph II. He saw the mission of the school as fulfilling these tasks:

- education of qualified military surgeons (physicians)
- creation of a learned society for research in medical science
- creation of a permanent field sanitary commission for solving questions concerning combat casualty care.

A number of renowned physicians of Czech origin significantly contributed to nearly 90 years of the school’s history.

The foundation of the independent Czechoslovak Republic in 1918 meant at the same time the creation of a democratic army. The basic element of career military physician training was represented by the Military Medical School. Its establishment was the result of a decision by the Czechoslovak Republic government which by its resolution of 25 June 1926 defined the principles of recruiting professional medical and pharmaceutical personnel to the army. The Military Medical School provided professional training for military physicians and further qualification growth for the performance of higher command functions in the military medical service structure.

The development of the Czechoslovak Military Medical Service in our country was interrupted by the Second World War. When the army was disbanded a number of physicians and medical students participated in foreign and domestic resistance. The largest number of them were concentrated in England. The British government permitted medical students to complete their studies at British universities. They graduated from Oxford University. The Czechoslovak Military Hospital was created at London Hammersmith Hospital. A few courses of the Medical and Pharmaceutical Reserve Officer School were taught in Leamington and Walton-on-the-Naze where the Czechoslovak Brigade's out-patients' department was situated. Thus, the tradition of the Czechoslovak military medical educational system maintained its continuity.

In 1945, the pre-war practice of recruiting professional personnel to the Military Medical Service was rebuilt. The Military Medical School in Prague was renowned. At the same time tendencies referring to the practice of some medical services of the world's leading armies which required the establishment of an independent military medical university were increasing. The results of the Second World War and the growth of new knowledge in the field of medicine and especially military medicine played a significant role in this.

In 1951, a new period began in the development of the Czechoslovak military medical educational system. This period has been permanently connected with Hradec Králové for 55 years. Rapid establishment of the Military Medical Academy (MMA) was possible only due to the fact that it was built on the basis of being a theoretical and clinical part of the Faculty of Medicine – a branch of Charles University established in 1945. Thanks to the reputation of its workers, a majority of whom became employees of the MMA, the school became an educational and scientific center of the Czechoslovak Medical Service and within a short time gained a good reputation both at home and abroad. The MMA has educated a number of outstanding military medical specialists and the first steps of several contemporary top specialists of Czechoslovak medicine were connected with its existence.

Beginning in 1958 and for the next 30 years the military medical system was transformed into the form of the Purkyně Military Medical Research and Postgraduate Institute. Research tasks and activities in the area of further schooling and specialization of military physicians and pharmacists became a fundamental part of its activity. The main portion of a further basic task of the school – the pregraduate training of future military physicians – was taken over by the renewed Faculty of Medicine of Charles University in Hradec Králové. The development of mutual cooperation between these two partner schools, to which the Faculty of Pharmacy of Charles University in

HISTORY

Hradec Králové joined in 1976 as a significant guarantee of the education of military pharmacists, has become a part of the military medical system.

In 1988, the school changed its name to the Purkyně Military Medical Academy which, institutionally, reflects more precisely the wide variety of its activities.

In November 1989, the school entered a qualitatively new period of development. It has passed through a transformation which has basically changed some military-professional teaching programs, the organizational structure of the school, personnel support, the composition of the educational staff and so on.

The Academy has been included in the new university educational system and since 1993 (origin of the Czech Republic) has served as a training center for Czech Army medical professionals. It has trained nearly 2600 military surgeons, dentists, and pharmacists till now.

After the transformation of the Purkyně Military Medical Faculty into the Faculty of Military Health Sciences (seated still in Hradec Králové) in 2004, the basic functions and tasks of the school focused on a specialized training of the Czech Army medical officers and research work in the area of military health service.

The Faculty of Military Health Sciences is focused to provide university-level studies from medicine, stomatology, pharmacy and medical rescue. The faculty has also eight PhD programs and provides the upper form of education as well. Since its establishing, the Faculty of Military Health Sciences is a significant school providing not only graduates but also significant research like publications in journal or participating in scientific projects. The results from creative work can be learned just from this report printed annually.

THE MAIN AIMS OF THE FACULTY IN 2019

The Faculty of Military Health Sciences (FMHS) of the University of Defence in Hradec Králové represents a centre of medical education, training and research of the Army of the Czech Republic. It covers entirely the needs of the troops concerning medical professional training in all specializations, medical informatics, science and research.

1. Education

The main aims of the FMHS in the field of education were as follows:

- to provide university-level studies in the subjects of military general medicine (6 years), stomatology, pharmacy (5 years), and medical rescue (3 years)
- to provide postgraduate study for PhD degree (4 years) in the following accredited disciplines:

Epidemiology	Military Hygiene
Field Internal Medicine	Military Radiobiology
Field Surgery	Molecular Pathology
Infection Biology	Toxicology
Medical Microbiology	

According to the needs of the Surgeon General of the Czech Armed Forces and the Military Medical Service Administration, the Faculty provides specialized and lifelong education of doctors, pharmacists and other military medical service personnel in specified branches of the Act No. 95/2004 of the Code about conditions of receiving professional qualification and specialized qualification to perform a medical profession as a physicians, dentists, and pharmacist. It unifies the system of their training with requirements of EU.

The Faculty organizes and provides training for medical personnel in the active duty, physicians and nurses. The Faculty provides professional refresher courses for medical staff, non-medical staff and non-medical personnel serving field medical units and individual units of the military hospital base on select up-to-date topics. The school actively participates in continued training of physicians and health care personnel, who then serve

in missions abroad. However, the unique military know-how is also attractive for people, who work out of the military health care sphere. The FMHS provides courses on the advanced first aid in the field not only for Military Medical Service personnel but also for non-medical professionals of Military Police units, reconnaissance and special units within the frame of the Czech Armed Forces, Rapid Reaction Units of the Czech Republic Police and others.

All soldiers selected for foreign missions attend special courses of an advanced first aid. Training in emergency life support in field conditions is required for medical personnel. The Battlefield First-Aid Courses for physicians and nurses or health care personnel include the problems of CBRNE protection as well and became a standard not only for the entire military medical staff, but also for many other specialists, who are enrolled in foreign missions.

Other courses concentrate on teaching and training of a comprehensive knowledge necessary for providing medical care within the frame of Disaster Medicine. The FMHS also provides other teaching and training activities determined by "The Plan of Courses and Professional Residencies Training of the Czech Armed Forces Medical Service" and "Notification of Director of Personal Section of the Ministry of Defence – Teaching Activities at Military schools and Training Facilities in the Czech Republic and Abroad". It participates in medical personnel training of medical and non-medical specializations under the methodical and professional leadership, in providing instructors for training of advanced categories of medical personnel and in teaching instructors of lower medical specialists training.

2. Scientific and research work

The FMHS of the University of Defence provides and solves research tasks for the Czech Armed Forces Medical Service. Well assembled scientific teams focus on individual research tasks using state-of-the-art technologies. Within the Faculty, complex laboratory technologies for scientific work are utilized for scientific advancements, which lead to the improvement of life force protection against CBRNE agents. The high scientific level and the achieved results in scientific and research activities of present teams have enabled to for scientific cooperation with foreign partners. The FMHS is a leading institution in the Czech Republic performing military research within the sphere of CBRNE issues in NATO and EU.

The high-quality research capabilities and international recognition of the scientific teams form a solid base for scientific cooperation with partners in NATO countries, which is financed by the NATO and EU funds. Within the

sphere of the science and research, the FMHS fulfilled strategic purposes of the Czech Armed Forces transformation by targeting the priorities of the Army (biological agents, chemical agents, military health care). Furthermore, it joined the appropriate institutions and organizational structures of NATO and EU countries and obtained original results in these critical areas. From the point of view of specialization and direction of the Czech Armed Forces, the departments of the FMHS solve medical issues of biological, chemical and radiation protection. Previous and current scientific work focuses on medical aspects of the effects of CBRNE agents and several scientifically oriented departments within the FMHS work in collaboration in solving the specific tasks. This fully corresponds with set priorities in the field of scientific and research work of the Army of the Czech Republic. The military medical service organization and management, information systems, research activities of clinical and therapeutic preventive branches represent other important fields of scientific work.

Many invitations to international symposia and conferences as well as a number of publications prove that scientific knowledge is used in education. The FMHS personnel can publish achieved results of their research work, therapeutic preventive activities and educational activities in the journal *Military Medical Science Letters* – the oldest military specialized journal, which has been published since 1925. The journal is indexed in Scopus. As of the last year, the journal is published fully in English. Together with professional scientific results the pedagogical activities are subject of an annual evaluation. Based on the results, the academic staff is successful in keeping a good level of publication activities in journals with impact factor and in other national and foreign journals. This, in turn, enables for relatively broad and successful training activities in the accredited doctoral study programs.

Scientific, research and development activities in the field of medical support include the prevention, diagnosis and treatment of sick and wounded. An integral part of this work is to improve the system of the medical equipment administration and supply support.

Research and development is carried out at 8 departments – Epidemiology, Military Medical Service Organization and Management, Radiobiology, Toxicology and Military Pharmacology, Military Surgery, Military Internal Medicine and Hygiene, Emergency Medicine and Military General Medicine, Molecular Pathology and Biology.

In 2019, scientific work at the Faculty departments focused on CBRNE protection research, projects on pathogenesis of infectious diseases and potential intervention means, prevention in the field of hygiene and epidemiology, topical problems of the field surgery and field internal

medicine, topical problems of the organization, management, education and information technology in the Military Medical Service.

The continuous accreditation for proceedings to achieve professorships in the areas of Epidemiology, Medical Microbiology, Toxicology, Field Internal Medicine, Infection Biology and Molecular Pathology and the accreditation for habilitation (associate professorship) in the branches of Hygiene, Preventive Medicine and Epidemiology, Medical Microbiology, Toxicology, Field Surgery, Military Radiobiology, Field Internal Medicine, Infection Biology and Molecular Pathology gives the evidence about the excellent level of achieved results in scientific and research activities of FMHS.

3. Therapeutic activities

Special therapeutic activities were provided especially at the departments of Field Internal Medicine, Field Surgery and General and Emergency Medicine. Close cooperation between these subjects and the health service establishments in the region have been continuously developed. Therapeutic medical care was provided especially in the fields of hematologic intensive care, traumatology, hepatobiliary surgery, plastic surgery at the departments of internal medicine and surgery at the Teaching Hospital.

4. International cooperation

The main aims of international cooperation of the FMHS were to exchange scientific, educational and therapeutic information and to develop working contacts between military medical, medical educational and research institutions of the NATO and EU countries as well as civilian medical institutions with educational, defence research and development programs worldwide. Residency and exchange programs for numerous students, doctors and research workers took place at those institutions. As for study programs, the Faculty keeps close relations with partner educational institutions above all in NATO and EU countries.

5. Expert activities

The membership in work groups for coordination and cooperation of military medical research and professional training at NATO (COMEDS, BIOMEDAC, RTA/RTO) and at EDA (European Defence Agency), in work groups of government experts for the Convention on the prohibition of biological, bacteriological, and chemical weapons and their destruction in Geneva and UNO, organizing scientific conferences with international participation, and solving foreign research projects under the cooperation of the FMHS personnel are very important for the presentation of international cooperation results. The priority still remains in cooperation in the frame of the Human Factors Medicine of the NATO Research and Technology Organization and its work groups (TG, WG), CBRNE and Human Factors cooperation within the frame of EDA and additional collaborative research projects with other foreign scientific institutions. Our aim is to intensify international cooperation in NATO focused on scientific support of the armed forces structure.

6. Scientific and educational information services

Scientific and educational information services that support the Medical Service of the Czech Republic Army were provided by the Department of Information and Communication Technologies. Numerous literature retrievals, courses, library and printing workshops and other information services support for students, teachers, scientists, postgraduates, doctors, nurses and other medical experts were carried out.

7. Foreign missions

The FMHS performed the preparation of health personnel for humanitarian and peacekeeping missions and members of the FMHS staff participated in several foreign missions.

THE STRUCTURE OF THE FMHS



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THE DEAN OF THE FACULTY AND HIS DEPUTIES

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The Department of Epidemiology provides and carries out education of students of the University of Defence, Faculty of Military Health Sciences, the Faculty of Medicine and the Faculty of Pharmacy in Hradec Kralove and the University of Pardubice, in the field of general and special epidemiology, infectious disease medicine, travel and preventive medicine, and medical microbiology. Within the framework of the military medical subjects for students of the Faculty of Military health Sciences, the Department provides teaching of military epidemiology and the issue of the protection of living

forces against biological attack. Furthermore, the Department arranges and carries out professional fellowships and specialization training of the ACR Hygiene and Epidemiology Service workers, including the training of the ACR officers for foreign missions. In the military, the Department is the leading workplace in specialization training in Hygiene, Epidemiology and Medical Microbiology. Besides Epidemiology, the teachers of the Department also give lectures in Applied Microbiology, General and Special Immunology, problems of highly virulent infections and selected chapters from Infectiology and the complete issues of Vaccinology. Basic tasks in scientific work have been long term focused on the area of military health protection, CBRN protection with a focus on biological weapons, disaster relief and provision of preventive health care in specific conditions. In the year 2019, the Department was solving several research projects and tasks:

- Testing of resistant enterococci sensitivity to disinfectants
- Surveillance of vancomycin resistant enterococci
- Prevalence of ticks infected with tick encephalitis in military training areas
- Seroprevalence of tick encephalitis antibodies in the ACR soldiers
- Surveillance of tick encephalitis antibodies in adult civil population
- Seroprevalence of type E hepatitis virus antibodies in the ACR soldiers
- Bond of gB protein to chitosan; evaluation of the immune response in a mice model
- Evaluation of VZV strains virulence by the RTCA method
- Testing of the new KAS disinfection effectivity according to the standards; Synthesis and evaluation of novel compounds based on quaternary ammonium salts for eradication of microbial bio films
- AZV-17-31765A Project – The potential of xanthohumol and beta-bitter acids in the therapy of nosocomial infections

The Department is one of the most recognized centers in the field of vaccination, also respected abroad.

The Department of Epidemiology is the basic expert workplace of the ACR in the field of military health protection against the effects of biological weapons, biological agents and agents of infectious diseases, including the problems of preventive medicine and vaccination. The Department workers are responsible for development of these scientific branches and for the process of standardization in the stated branches within ACR and NATO.

RESEARCH PROJECTS

BIOFILM – Synthesis and evaluation of novel compounds based on quaternary ammonium salts for eradication of microbial bio films

Marková, A., Marek, J.

Supported by the Ministry of Education, Youth and Sports, 2018–2020 (Project No.: SV/FVZ201808)

Biofilm is community of microorganisms fixed to the various surfaces (in healthcare, for example, tissues, catheters, cannula plastic implants, teeth and dental implants). Biofilm formation is much better for a number of microorganisms than staying in a planktonic form. Microorganisms are able to differentiate during the biofilm formation and produce specific biofilm phenotype. Formations of flagella and fimbria are genetic modifications enabling initiation of adhesion, however production of extracellular polysaccharide matrix is significant for biofilm protection. Due to polysaccharide matrix are biofilms more resistant against external conditions (mechanical and chemical). In general, planktonic forms of microorganisms are more easily eliminated than their biofilms. Our main research activity will include synthesis of novel compounds based on quaternary ammonium salts and evaluating their eradication ability against pathogenic microorganisms. Minimum inhibitory concentration (MIC) will be measured for all substances, then we will focus on introducing a new MBEC-based methodology for measuring minimum biofilm eradication concentration (MBEC). Our laboratory has appropriate strains of biofilm forming microorganisms (*Pseudomonas aeruginosa*, *Staphylococcus aureus* etc.). Two or three suitable strains will be chosen and we will compare antimicrobial action of new compounds against biofilm and planktonic form. Furthermore, the effect of new compounds will be compared with standards (benzalkonium etc.) The most important outcome of this study is to show the differences in the effectiveness of disinfectants on the microorganisms in two different life forms.

BREASTFEEDING – Factors influencing initiation and continuation of breastfeeding in the South-East United States

Holmquist, I., Bošťíková, V.

Supported by the Ministry of Education, Youth and Sports, 2018–2020 (Project No.: SV/FVZ201812)

The purpose of this study is to determine and analyze changes in breastfeeding rates and to explore factors influencing initiation of breastfeeding in a hospital setting with specific focus on the South-East United States and the Czech Republic. Exploring factors that influence initiation of breastfeeding in hospital settings is especially important because most of currently available studies only review the effects of direct breastfeeding interventions, rather than the role of policies and pro-breastfeeding programs. Data about the effect of policies and pro-breastfeeding programs are rarely collected and reported. This study will compare and contrast practices, policies and pro-breastfeeding interventions in the South-East United States with practices, policies and pro-breastfeeding interventions in the Czech Republic.

MBEC – MBEC assay: The method modification for individual bacterial strains and multiple-species biofilms

Hympánová, M., Marek, J.

Supported by the Ministry of Education, Youth and Sports, 2019–2021 (Project No.: SV/FVZ201905)

Microorganisms can exist either as planktonic free floating cells or as three-dimensional single-species or polymicrobial communities which are embedded in a self-produced matrix. These microbial consortia called biofilms, are associated with biotic or abiotic surfaces and presented by higher resistance against antimicrobial agents. Methods as the determination of MIC (minimal inhibitory concentration) are essential conventional methods for the susceptibility testing. However, regarding the important role of microbial biofilms in the development of persistent infections, the research is nowadays more focused on MBEC (minimal biofilm eradication concentration) evaluation. The anti-biofilm agents would be more valuable in clinical practice. Regarding that, the aim of this project is to modified MBEC assay for individual bacterial strains and for multiple-species biofilms. Moreover, this method will be used together with standard MIC assay to determinate antimicrobial effect of certain agents commonly used in clinical practice.

The potential of xanthohumol and beta-bitter acids in the therapy of nosocomial infections

Boštík, P., Boštíková, V., Páral, J., Mikyška, A., Čermák, P., Bogdanová, K., Houška, M.

Supported by the Internal Grant Agency of the Czech Republic Health Service, 2017–2020 (Project No.: NV17-31765A)

The increasingly more prevalent bacterial resistance to antibiotics presents an important worldwide problem. Compounds of natural origin with a proven anti-bacterial effect may represent new resources in this area or serve as complimentary therapies utilized together with antibiotics. Certain compounds from hops, especially beta-bitter acids and xanthohumol possess strong inhibitory effects on Gram-positive (*Staphylococcus aureus*, including resistant variants such as MRSA) and anaerobic bacteria, namely *Clostridium perfringens* and *C. difficile*. Some of the other characteristics of these compounds, including their low solubility in water, low toxicity and low level of adsorption in the gastrointestinal tract (GIT), predispose them as useful tools for local infections of skin and GIT. Formulations containing these compounds, which will be developed and evaluated in this project, can thus represent much needed tools for a local therapy of infections caused by antibiotic-resistant strains of bacteria.

TICK – Evaluation of risk of infection with tick-borne encephalitis, Lyme borreliosis and ehrlichiosis during the training of soldiers of the Czech Army in selected military areas

Polcarová, P., Smetana, J.

Supported by the Ministry of Education, Youth and Sports, 2019–2020 (Project No.: SV/FVZ201903)

The tick *Ixodes ricinus* is the most important arthropod which transmitting diseases in Central Europe. There are mainly Lyme borreliosis and tick-borne encephalitis among the diseases transmitted by this type of tick in the Czech Republic. The less known anaplasmosis (ehrlichiosis) is also transmitted by the tick to humans, but its incidence is lower. The Czech Republic is an endemic country for these three tick-borne diseases. All three tick-borne diseases are zoonoses whose etiologic agent has a reservoir especially in forest animals. Humans are a random part in the cycle of these infections. As the incidence of ticks is currently increasing, the risk of tick-borne diseases also increases. People spending a lot of time in nature, including soldiers of Czech Armed Forces, are at the highest risk of infection. Natural foci of infections could be probably located in military training areas, where soldiers regularly exercise. The aim of this study is to investigate ticks collected in four major military areas (Boletice, Březina, Hradiště, Libavá) for

the presence of tick-borne encephalitis virus and bacteria *Borrelia burgdorferi* sensu lato and *Anaplasma phagophytophila*. The result will be an assessment of the risk of infection by mentioned pathogens during military service and proposing of appropriate preventive measures.

**DEPARTMENT OF MILITARY MEDICAL SERVICE ORGANIZATION
AND MANAGEMENT K-302**

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The Department of Military Medical Service Organization and Management is the primary department which offers military and professional training for the students of the Faculty of Military Health Sciences, particularly in the field of military medical service support in operations, disaster medicine, crisis management, emergency planning and psychology. Other covered subject areas are military history, military tactics & logistics, military communication, topography and CBRN defence. The Department organizes follow-up education for military doctors, stomatologists, pharmacists and bachelors in advanced courses. Likewise, it offers specialized training and refresher courses for paramedical personnel to the extent necessary to carry out required medical duties in military operations, e.g. military medical service organization, medical evacuation and crisis intervention. It participates in preparation of non-medical personnel located within the HQ and staff of the military medical units and facilities. It carries out training in medical support planning, working with maps,

deployment of field medical facilities, calculation of medical casualties and military medical units command, control and cooperation.

The subject „Organization and Tactics of the Medical Service“ makes students acquainted with terms and conditions of the medical service during wartime and in foreign operations, identifies tasks and principles of medical support and medical C2 issues that are fundamental to comprehension and correct application of knowledge in terms of other military medical branches. It familiarizes students with the principles followed from NATO documents and standardization agreements.

The Department's primary aim is to pass the knowledge on to students, develop their habits and skills to fulfill basic tasks and duties arising from their planned command functions. It is involved in preparation of medical personnel prior to deployment. The Department provides knowledge and passes previous experience on to control authorities and executive facilities of the medical services in crisis, a war or other emergency situations as well as in humanitarian missions. It applies the knowledge of military subjects to specific environment of medical service, respecting both military principles and requirements as well as the principles of International Humanitarian Law.

The research work of the Department focuses on improving the quality and efficiency of organization and management of the medical service in accordance with military doctrine of the Czech Republic. It contributes in optimization process of the organizational structure of the medical units, departments and facilities, elaborating principles of their operations and methods of their control during a war. It develops materials and proposals from these areas for conceptual authorities of the ACR Medical Service, including NATO STANAG assessment reports in terms of their ratification and options of implementation.

The Department is an expert guarantor in the field of military medical service organization and management. It provides expert statements for the Ministry of Defence and Military Medical Agency and gives consultations to managers of all military medical service levels.

DEPARTMENT OF RADIOBIOLOGY K-303

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The Department of Radiobiology was established at Purkyně Military Medical Research and Postgraduate Institute on September the 1st 1963. The first chief of the department became Colonel Prof. MUDr. Josef Mráz, CSc., who was in 1968 appointed the first professor of military radiobiology of Charles University. The main tasks of the department are teaching and research activities, which are closely connected.

In the field of research, the experimental work includes histology and cytology, in vitro methods, methods of proteomic analysis and methods of flow cytometry. Individual technological units allow in vitro and in vivo observation of post-radiation mechanisms on molecular, cellular, and organ levels.

Military research is focused on early diagnosis and therapy of post-radiation damage as the main objective of the department. The aim of investigation in the medium-term horizon is discovery and practical introduction of biodosimetric markers, study of molecular mechanisms of radiation-induced DNA damage repair and autophagy, development of radioprotection agents as well as continuous renewal of decontamination agents for the Army of the Czech Republic. Mutual cooperation with other CBRN research workplaces world-wide also remains an integral part of our research activities. Cooperation with civilian workplaces at the Faculty of Medicine and the University Hospital in Hradec Králové is focused on radiation oncology.

The Department of Radiobiology takes part in military medical-specialist education in the form of pre-gradual and post-gradual education mainly in doctoral studies. The main educational activity is lecturing military radiobiology. The main topics are: the nuclear weapons effects on the living organism, the possibilities of the protection and medical treatment of irradiated persons. Other specific military issues are disaster medicine, CBRN protection etc., which are taught at the Faculty of Military Health Sciences, including the topics, which are presented by the instructors of our department.

RESEARCH PROJECTS

BIOINDICATORS – Determination of DNA damage bioindicators after irradiation by electrochemical analysis

Jeličová, M., Šinkorová, Z.

Supported by the Ministry of Education, Youth and Sports, 2019–2020
(Project No.: SV/FVZ201904)

This specific research project continues the completed specific research project “Electrochemical detection of DNA damage after gamma irradiation”, which was focused on introducing and optimizing a new biodosimetric method based on the principle of electrochemical monitoring of DNA damage. The method of electrochemical detection for biodosimetry purposes has been developed at the workplace by the researcher since 2016 and the newly submitted project will continue in relation to the achieved results so far. The main aim of the research part of the project is to detect oxidative stress products as a result of damaged DNA by ionizing radiation using the already optimized electrochemical method. Part of the project will be to increase the sensitivity of the electrodes by modifying the surface to ensure the most sensitive detection of the level of oxidative stress products in the biological sample. The results of the electrochemical determination will be compared with the existing biodosimetric methods and the ELISA method. This method should then serve as a new approach to retrospective determination absorbed dose of ionizing radiation.

CILIA – Primary cilia as an indicator of cell stress

Filipová, A., Jeličová, M.

Supported by the Ministry of Education, Youth and Sports, 2017–2019
(Project No.: SV/FVZ201703)

Cellular stress is regarded as a pathophysiological damage mechanism in terms of homeostasis; it is triggered by diverse stimuli such as radiation, starvation, or chemical effects (e.g. cytostatics). Proliferating cells more sensitive to stress stimuli, particularly during cell division. From a homeostatic point of view, subliminal stimuli often induce repair mechanisms, and supra-threshold stimuli may induce apoptosis. The qualitative assessment of these processes is challenging and requires a comprehensive approach including both molecular biology and functional cell assays. Cellular stress could be defined as a complex system involving different levels of cell organization, i.e. genetic information, cytoskeleton structure, metabolism, and cell-to-cell contact. Cytoskeleton stability is an important indicator of cellular stress; therefore, an appropriate analysis of these changes could provide further insight on the development, and

consequences, of cellular stress, its environment and homeostasis. In this sense, ionizing irradiation is a known source of cellular stress as it often induces centrosome multiplication in addition to DNA double strand breaks; centrosomes are essential for correct chromosome segregation during the cell cycle as they anchor the mitotic spindle, these centrosomes are formed from the mother centriole which is also the basal body of primary cilia. Primary cilia are membrane bound structures which are dynamically regulated during the G0/G1 phase and absorbed before entry into mitosis; therefore, ciliogenesis is closely associated with centrosome duplication during the cell cycle. Under normal conditions, centrosome duplication occurs only once within the cell cycle; however, the effect of radiation on primary cilia has not been studied to sufficient extent. The objective of this project is to describe and evaluate the suitability of primary cilia as an indicator of cytoskeletal instability due to cellular stress, induced by ionizing irradiation, in proliferating fibroblasts.

Development of novel radioprotective agents based on small molecular inhibitors

Šinkorová, Z., Marek, J., Řezáčová, M.

Supported by the Czech Republic Grant Agency, 2017–2019 (Project No.: GA17-13541S)

Radiotherapy is a very important modality for treating cancer. Its therapeutic potential is however limited by normal tissue damage, which leads to a wide range of symptoms (impeding quality of life of oncologic patients), prevents delivery of intended dose and reduces the tumor-eradicating effect of the therapy. Both acute and chronic radiotoxicity have been associated with cell death. Whereas multiple cell death pathways are executed in cancer cells after irradiation, in radiosensitive tissues such as bone marrow or gastrointestinal tract, the cell death is dominantly mediated via apoptosis. Since a pro-apoptotic protein PUMA plays a key role in this process, its inhibition increases resistance against radiation. Inhibitors of PUMA seem therefore very promising in selective modulation of normal tissue damage during radiotherapy. Their clinical utilization could be very wide due to PUMA involvement in pathogenesis of myocardial reperfusion injury and neurodegenerative diseases.

New approaches in diagnostics and therapy of irradiated persons

Tichý, A.

Supported by the Czech Republic Ministry of Internal Affairs, 2017–2020 (Project No.: VH20172020010)

The aim of the project is identification and quantification of proteins by mass spectrometry. Subsequent bioinformatic data analysis will select significant plasma proteins that are quantitatively different in serum samples of leukemic patients before and after whole body irradiation. The result will be a list of proteins with a demonstrable relationship to exposure to ionizing radiation. Furthermore, we aim to identify new irradiation indicators by flow cytometry. First, we aim to quantify changes in hematological parameters (leukocytes, thrombocytes, hematocrit) of an experimental mammalian model including LD50/30 as a basic indicator of the severity of an acute radiation syndrome (ARS), to classify irradiated subjects into one of the five Radiation Categories. Furthermore, the radiosensitivity of the major lymphocyte populations and their decrease in peripheral blood will be determined as a significant indicator for determining the dose range needed to distinguish the severity of ARS development. Quantitative changes in the leukocyte cytoplasm will be analyzed for accurate sorting. The result will be a panel of biological indicators that allow, on the basis of predefined parameters, to determine whether or not an individual was exposed to ionizing radiation and to estimate ARS development depending on RC categorization. In the last part of the project we will focus on testing of new ways of ARS therapy by growth factors. The goal is to test several combinations of clinically available growth factors for more complex bone marrow stimulation in ARS. The tested factors will include: peg-G-CSF, KGF and IGF-1. In addition to the determination of experimental survival curves, the efficacy of treatment by histopathological examination of selected tissues will be assessed and we expect the treatment to be verified with the most appropriate combination of growth factors in the higher mammalian model. The results will be recommendations for the application of growth factors and the evaluation of the benefits for ARS therapy.

**DEPARTMENT OF TOXICOLOGY AND MILITARY PHARMACY
K-304**

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The Department of Toxicology was established in 1951. Since then, as an integral part of the Faculty of Military Health Sciences, it has been involved in education and scientific research work on chemical warfare agents for defensive and protective purposes only.

The Department of Toxicology and Military Pharmacy was established on the 1st September 2014 by integration of the Department of Toxicology, the Centre of Advanced Studies and the Department of Public Health. It comprises two groups – the military pharmacy group (biochemical laboratory, laboratory of organic synthesis, analytical laboratory, decontamination laboratory) and the toxicology group (toxicological laboratory, pharmacological laboratory, neurophysiological laboratory, neurobehavioral laboratory, laboratory of cell toxicology). This structure permits a complex study of highly toxic substances including chemical warfare agents with aims to determine their action on biochemical, neurobehavioral, histochemical, pharmacological and neurophysiological level, to study and develop antidotes, to analyze all types of samples with respect to the presence of known chemical warfare agents, to test decontamination effectiveness of developed and field decontamination kits. Present scientific research projects are focused on therapeutic, prophylactic and protective measures against the most toxic chemical warfare agents. Special attention has been paid to the most recent and most dangerous nerve agents and mustards. Department have participated in OPCW Biomedical Proficiency Test.

The main educational activity task was to give lectures for in undergraduate and post-graduate studies dealing with problems of biological effects of real and potential chemical warfare agents, the possibilities of the medical and chemical protection against them and the approaches to medical care of for persons intoxicated with chemical warfare agents, especially nerve agents. The Department provides and guarantees the teaching master's degree program, Military Pharmacy and also participates in the teaching of toxicology in Disaster Medicine.

In 2017, the Department of Toxicology and Military Pharmacy has continued in the cooperation, started by with the Armed Forces Biomedical Research Institute in Brétigny-sur-Orge (France), the Institute for Medical Research and Occupational Health in Zagreb (Croatia), WIHE in Warsaw (Poland), the Sahlgrenska Academy, the University of Goteborg (Sweden) and University of California, San Diego, Skaggs School of Pharmacy and Pharmaceutical Sciences (USA) – in the field of development of prophylactic and therapeutic means against nerve agents and organophosphorus insecticides. The cooperation has been mostly characterized by the exchange of scientific information. The cooperation with the Department of Organic Chemistry, Institute of Chemistry, P. J. Šafárik University in Košice

(the Slovak Republic), the University of Bologna (Italy), the School of Biology, the Environmental Sciences and Chemistry (Spain) and the University Bourgogne Franche-Comté (France) is continuing in the field of the development of new potential therapeutic means against Alzheimer's disease.

RESEARCH PROJECTS

AGENTS – Development of new agents with anti-inflammatory effect

Konečný, J., Korábečný, J.

Supported by the Ministry of Education, Youth and Sports, 2018–2020 (Project No.: SV/FVZ201803)

Nerve agents (NAs) are highly toxic organophosphorus compounds with rapid onset of action. Their mechanism of action involves irreversible inhibition of acetylcholinesterase (AChE), this process leads to accumulation of neurotransmitter acetylcholine (ACh) with cholinergic crisis as a consequence. According to previously published studies, NAs affect not only cholinergic receptors, but also other receptors like NMDA receptors that plays a pivotal role in inflammatory responses. The multi-target-directed ligands (MTDLs) approach includes compounds that are capable to simultaneously target multiple biological systems. The aim of the project is to verify the concept of new dual-targeted compounds, designed in accordance with the MTDLs strategy, amalgamating AChE inhibitors and NMDA receptor antagonists into single molecules. Tacrine, 7-MEOTA, 6-chlorotacrine and others will be used as AChE reversible inhibitors whereas memantine or neramexane will be applied as NMDA receptor antagonists. The project aims to investigate the effect of newly developed hybrid compounds on AChE inhibition as well as their effect on NMDA receptors under in vitro conditions.

BIOFILM – Synthesis and evaluation of novel compounds based on quaternary ammonium salts for eradication of microbial bio films

Marková, A., Marek, J.

Supported by the Ministry of Education, Youth and Sports, 2018–2020 (Project No.: SV/FVZ201808)

Biofilm is community of microorganisms fixed to the various surfaces (in healthcare, for example, tissues, catheters, cannula plastic implants, teeth and dental implants). Biofilm formation is much better for a number of microorganisms than staying in a planktonic form. Microorganisms are able to differentiate during the biofilm formation and produce specific biofilm phenotype. Formations of flagella and fimbria are genetic modifications

enabling initiation of adhesion, however production of extracellular polysaccharide matrix is significant for biofilm protection. Due to polysaccharide matrix are biofilms more resistant against external conditions (mechanical and chemical). In general, planktonic forms of microorganisms are more easily eliminated than their biofilms. Our main research activity will include synthesis of novel compounds based on quaternary ammonium salts and evaluating their eradication ability against pathogenic microorganisms. Minimum inhibitory concentration (MIC) will be measured for all substances, then we will focus on introducing a new MBEC-based methodology for measuring minimum biofilm eradication concentration (MBEC). Our laboratory has appropriate strains of biofilm forming microorganisms (*Pseudomonas aeruginosa*, *Staphylococcus aureus* etc.). Two or three suitable strains will be chosen and we will compare antimicrobial action of new compounds against biofilm and planktonic form. Furthermore, the effect of new compounds will be compared with standards (benzalkonium etc.) The most important outcome of this study is to show the differences in the effectiveness of disinfectants on the microorganisms in two different life forms.

Centrally acting antidotes for the treatment of organophosphorus poisoning

Soukup, O., Jun, D.

Supported by the Internal Grant Agency of the Czech Republic Health Service, 2017–2020 (Project No.: NV17-32801A)

Inactivation of acetylcholinesterase (AChE) in nerve and muscle by organophosphates is the toxic mechanism common to both nerve agents and pesticides. Standard countermeasures against OP poisoning involves muscarinic inhibition and the use of oxime – a reactivator. The latter, however, is limited by a versatility of oximes and by a low penetration of reactivators into the brain. The aim of this project is to develop oxime reactivators with better penetration of the blood brain barrier (BBB). Namely, monoquaternary oximes with balanced physico-chemical properties containing selected nucleophile capable of AChE reactivation and a ligand of peripheral anionic site ensuring the binding to the enzyme. Unique reactivators will be prepared and by application of series of in vitro and in vivo tests the compounds will be evaluated and described. The best candidate of preclinical development with practical potential will be identified.

Development of polyvalent decontamination mean

Jun, D., Marek, J.

Supported by the Internal Grant Agency of the Czech Republic Health Service, 2018–2021 (Project No.: NV18-09-00181)

Project is aimed at the development of new combined micellar decontamination systems based on quaternary nitrogen compounds having detergent and active decontamination properties, which will cause faster hydrolysis of chemical warfare agents. In the case of biological agents, these molecules are strong disinfectants, able to destabilize pathogen membrane structures. Several decontamination mixtures will be prepared and tested both in vitro and in vivo for their decontamination and disinfection properties against selected chemical and biological agents. The expected result of the project is efficient decontamination solution for personal skin decontamination with good tolerability.

EXPOSURE – Determination of toxicological parameters and markers of exposure to potential chemical warfare agents

Herman, D., Váňová, N., Jun, D., Múčková, L., Čechová, L., Mišík, J.

Supported by the Ministry of Education, Youth and Sports, 2018–2019 (Project No.: SV/FVZ201807)

Present scientific project follows up the previous project of Ministry of Education, Youth and Sports (SV/FVZ201505) and is focused on the development of analytical methods able to prove the exposure to potential warfare agents and to evaluate oxidative stress they might induce. Since the threat of misuse of such compounds is due to their high toxicity still actual, development of selective and sensitive techniques for their determination is highly demanded. After entering the blood, these compounds bind to the proteins by covalent bonding. Therefore, enzymatic cleavage of proteins and solid phase extraction are used in the process of sample preparation and specific cleavage products are subsequently determined by high pressure liquid chromatography – mass spectrometry (LC-MS). In vitro evaluation of oxidative stress will be based on determination of intracellular levels of reactive oxygen species (ROS) using 2',7'-dichlorodihydrofluorescein as a fluorescent probe. Biomarkers of oxidative stress (BOS) represented by malondialdehyde and 3-nitrotyrosine and thiol antioxidant status will be evaluated by LC-MS.

MARYSA – Research in chemical properties and methods of individual protection against the last generation of nerve agents

Florus, S., Hatlapatková, J., Hepnarová, V., Jošt, P., Jun, D., Junová, L., Pejchal, J., Žďárová Karasová, J., Kadlčák, J., Čapoun, T.

Supported by the Czech Republic Ministry of Internal Affairs, 2019–2022 (Project No.:)

Main goal of the project is physical properties and protection research against last generation of highly toxic agents with nerve effects O-ethyl-N-diethylaminoethylidenamidofluorophosphate type, signed as A-234 (group A). These agents are supposed to be used in terroristic attacks or as potential chemical weapons. The toxicity and antidotal therapy, verifying and suggestion of detection and identification methods and decontamination of these agents will be studied during the project.

MDCK – The development and validation of new in vitro methodology based on MDCK cell lines for the study of the penetration of potential drugs across the blood brain barrier

Kobřlová, T., Soukup, O.

Supported by the Ministry of Education, Youth and Sports, 2017–2019 (Project No.: SV/FVZ201708)

The organophosphates are considered as one of the most dangerous abusable toxic substances. The mechanism of action of organophosphates is inhibition of acetylcholinesterase enzyme. The treatment of intoxication included anticholinergics, anticonvulsants and reactivators of acetylcholinesterase. One problem of reactivators effect is poor penetration into the central nervous system in sufficient amount. It is necessary to develop compounds which will be able to cross the blood-brain barrier without a serious side effect. The penetration across the BBB is necessary to determine. The in vivo methods are expensive, time and animals consuming. One of the screening methods PAMPA, which was introduced in our laboratory, uses the lipidic membrane for simulation of BBB. The mechanisms present in live organisms are not included in the PAMPA method. The aim of this project is to develop a new methodology for assessing the BBB penetration which uses the MDCK cell line. A special kind of these cells can express transporters, e.g. P-glykoprotein. The method will be validated by standardly used drugs. The parameters of antidotes will be established for both organophosphates poisoning and new synthesized potential drugs. The national and international cooperation is expected due to the high demand for such methods.

PROPHYLAXIS – Development of novel prophylactic countermeasure against nerve agents based on reversible cholinesterase inhibitors

Svobodová, B., Górecki, L., Korábečný, J.

Supported by the Ministry of Education, Youth and Sports, 2019–2021 (Project No.: SV/FVZ201901)

The aim of this project is to design and prepare a new reversible inhibitors of AChE by organic synthesis methods. The project comprises the

synthesis of two series of compounds which could be potentially useful as prophylactics against nerve agents.

Research of oxime-CB[7] complexes for central nervous system penetration of quaternary acetylcholinesterase reactivators

Žďárová Karasová, J., Lísá, M.

Supported by the Czech Republic Grant Agency, 2018–2020 (Project No.: GA18-08937S)

Acetylcholinesterase (AChE; E.C. 3.1.1.7) reactivators (also known as oximes) represent class of antidotes that may be used as therapeutics in the case of pesticide or nerve agent poisoning (OPs). Their effectiveness is limited by low passage through the biological barriers. Oximes are highly hydrophilic compounds due to their quaternary nitrogens and hydrophilic oxime groups included in structure; on the other hand their preservation in structure is essential for reactivation effect. The main aim of this project is improved the oxime delivery via their encapsulation into cucurbit[7]urils (CB[7]). Oximes-CB[7] complexes should increasingly overcome the blood-brain barrier and thus diminish the OPs central effect with subsequent pathologic cascade. In our project we will comprehensively assess the impact of oximes-CB[7] complexation on in vitro and in vivo toxicity, pharmacokinetics profile (absorption, elimination and brain targeting), safety and antidotal effectiveness. These results may be subsequently used in further preclinical anti-OPs research.

SCAVENGERS - Butyrylcholinesterase reactivators for preparation of pseudo-catalytic scavengers applicable for organophosphorus intoxications

Musílek, K., Jun, D., Kuča, K.

Supported by the Czech Republic Grant Agency, 2018–2020 (Project No.: GA18-01734S)

Organophosphorus compounds are produced as chemical warfare agents or used as insecticides and cause life endangering intoxications. The concept of pseudo-catalytic bioscavenger which could bind organophosphorus compound, detoxify it and reactivate own bioscavenging activity was defined to prevent such intoxication. The truly human butyrylcholinesterase is now available as bioscavenger via purification by affinity chromatography with specific sorbent. However, for pseudo-catalytic concept, there is lack of small molecules (butyrylcholinesterase reactivators) which could reactivate butyrylcholinesterase bioscavenging function after detoxifying of organophosphorus compound. Thus, this project is focused on proof of concept of pseudo-catalytic bioscavenger by using human

butyrylcholinesterase and its reactivators, which will be developed for this purpose.

TENSIDES – Development of decontamination substances against chemical warfare agent based on surfactants

Matula, M., Jun, D.

Supported by the Ministry of Education, Youth and Sports, 2017–2019
(Project No.: SV/FVZ201702)

Decontamination of chemical warfare agents (CWA) is one of the possibilities of an efficient prophylaxis of poisonings. The Czech army has several decontamination mixtures mainly for the decontamination of equipment except of IPB-80 which can be used for skin decontamination. The aim of this study is to develop in vitro methods for evaluation of decontamination efficacy of decontamination mixtures. Subsequently, we will propose new mixtures and carry out evaluation of their effectiveness on CWA simulants and selected CWAs. The result would be the mixture which is capable to decontaminate nerve agents and also mustard gas.

**DEPARTMENT OF MILITARY SURGERY
K-305**

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Structure and main tasks of the department

Division of Traumatology and Burns Treatment

Lochman Petr – Head of the Group

Main tasks

- Undergraduate education of medical students
- Postgraduate training of military surgeons and other medical specialists
- Expertise and referential work for needs of the Czech Armed Forces
- Research in Military Surgery
- Preparation of medical health-care personnel before foreign missions of the Army of the Czech Republic

At present the Department of Military Surgery consists only of one division – The Division of Traumatology and Burns Treatment. Besides working at each Division of the Department of Surgery of the Teaching Hospital in Hradec Králové, members of the Department perform both, undergraduate courses in field surgery for students of the Faculty of Military Health Sciences, and postgraduate training of military physicians for their specialization exams in surgery and general medicine. The Department also participates in teaching of the Battlefield First-Aid Courses, disaster medicine and the first aid courses, organized by the Faculty of Military Health Sciences for the Czech Army members. Members of the Department participate in several specialised NATO working groups according to their expertise. Moreover, they are consultants of Surgeon General of the Czech Armed Forces. In the last several years, the Department has played important role in education and training of personnel of field hospitals operating in foreign missions (Yugoslavia, Bosnia-Herzegovina, Albania, Iraq, Afghanistan). Members of the Department also took part in those missions. Research and publication activities are also essential part of the Department members' work.

Participation in a foreign mission

- J. Páral – 11th Field Hospital, ISAF, Kabul, Afghanistan, 2002, 2011 (TSF)
- J. Páral – British Field Hospital, Op TELIC, Shaibah, Iraq, 2004
- P. Lochman – British Field Hospital, Op TELIC, Shaibah, Iraq, 2004
- P. Lochman – Czech Field Surgical Team, ISAF, Kabul, Afghanistan, 2008
- J. Páral – Czech Field Surgical Team, International Medical Treatment Facility (Role 3) KAIA, Kabul, Afghanistan 2012
- T. Dušek – Czech Field Surgical Team, International Medical Treatment Facility (Role 3) KAIA, Kabul, Afghanistan 2012
- J. Šimek – Czech Field Surgical Team, International Medical Treatment Facility (Role 3) KAIA, Kabul, Afghanistan 2012

National textbooks

- Small atlas of dressing techniques (Páral), 1st ed. Prague: Grada Publishing, 2008. 240 p. ISBN 978-80-247-2255-9
- Schein's Common Sense Emergency Abdominal Surgery. 1st Czech ed. Prague: Grada Publishing, 2011, 420 p. (Translated by Ferko, Klein et al.). ISBN 978-80-247-2357-0
- Acute mesenteric ischemia – Modern diagnostics and treatment of acute bowel ischemia (Páral), 1st ed. Prague: Grada Publishing 2012. 112 p. ISBN 978-80-247-3996-0
- Handbook of surgery (Šubrt), 2nd ed. Prague: Grada Publishing 2015. 512 p. ISBN 978-80-247-1005-1

International textbooks

- Gastrointestinal Stromal Tumors (Páral). In *Aperelho Digestivo* (Coelho), Editora Atheneau, Sao Paulo, Brasília, 2012, p. 325–336. ISBN 978-85-388-0296-9

RESEARCH PROJECTS

ADHESIONS – Prevention of postoperative intraabdominal adhesions: an experimental study

Sirový, M., Páral, J.

The project aim is to evaluate a protective effect of intraperitoneal application of phospholipids in the form of fat emulsions on formation of intraabdominal adhesions. In the experimental study on the animal model (pig), the cecal wall and adjacent peritoneum abrasion, the small intestine abrasion and ileoileal anastomosis are performed under general anesthesia.

Subsequently, 100 ml of fat emulsion on the basis of soya oil (group 1) or 100 ml of fat emulsion on the basis of fish oil (group 2) or 100 ml of physiological solution (control group 3) is applied into the abdominal cavity. Two weeks later, the second laparotomy is performed and the amount and macroscopic quality of intraperitoneal adhesions are evaluated using the Lauder scoring system. Histological processing and evaluation of the sample of tissue adhesions and the traumatized peritoneum are carried out with respect to the level of fibrosis, the amount of collagen, the inflammatory response and neovascularization. Furthermore, healing of the small intestine anastomosis is histologically assessed. Expression of TGF- β fibrinogen and α -smooth muscle actin (α -SMA) in tissues of peritoneal adhesions will be assessed using the ELISA method. Besides that, serum lipid level is evaluated in regular samplings 0th, 1st, 3rd, 6th and 14th day of the experiment as well as serum interleukin 6 level. Results of all three groups will be statistically processed (IBM SPSS Statistics) and evaluated.

Supported by the Ministry of Education, Youth and Sports, 2019–2021 (Project No.: SV/FVZ201902)

The potential of xanthohumol and beta-bitter acids in the therapy of nosocomial infections

Boštlík, P., Boštlíková, V., Páral, J., Mikyška, A., Čermák, P., Bogdanová, K., Houška, M.

Supported by the Internal Grant Agency of the Czech Republic Health Service, 2017–2020 (Project No.: NV17-31765A)

The increasingly more prevalent bacterial resistance to antibiotics presents an important worldwide problem. Compounds of natural origin with a proven anti-bacterial effect may represent new resources in this area or serve as complementary therapies utilized together with antibiotics. Certain compounds from hops, especially beta-bitter acids and xanthohumol possess strong inhibitory effects on Gram-positive (*Staphylococcus aureus*, including resistant variants such as MRSA) and anaerobic bacteria, namely *Clostridium perfringens* and *C. difficile*. Some of the other characteristics of these compounds, including their low solubility in water, low toxicity and low level of adsorption in the gastrointestinal tract (GIT), predispose them as useful tools for local infections of skin and GIT. Formulations containing these compounds, which will be developed and evaluated in this project, can thus represent much needed tools for a local therapy of infections caused by antibiotic-resistant strains of bacteria.

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The Department is divided into the group of Military Internal Medicine and the group of Military Hygiene.

Military Internal Medicine

The Department is divided into the group of Military Internal Medicine and the group of Military Hygiene. Military Internal Medicine The group of Military Internal Medicine is the clinical part of the department systematically focused on specialized part of Internal Medicine – Military Internal Medicine. Military Internal Medicine as a sub-speciality of Internal Medicine has been progressively developed into a recent shape and purpose in accordance with latest trends of military health support and modern therapeutic approaches. Military Internal Medicine provides knowledge of and practical experience with treatment of life-threatening non-surgical impairment in specific conditions of the military, especially during the armed conflicts. Nowadays, Internal Medicine is also of increasing importance in postoperative care, where multidisciplinary approach leads to improved prognosis of the most severe surgical affections. Furthermore, the knowledge of and practical experience with Military Internal Medicine are useful also in peacetime, especially in large-scale disasters – catastrophes. In fact, most of the skills obtained by Military Internal Medicine training are useful in a novel and progressive branch of medical specialization – **Disaster Medicine**.

Military Internal Medicine has been further developed into 3 basic branches: therapeutic-preventive, pedagogical-educational and research-scientific.

The therapeutic-preventive branch is the essential part of Military Internal Medicine. It provides specialized knowledge of and experience with treatment of the most severe medical affections. The group of Military Internal Medicine cooperates with internal departments of the University Hospital in Hradec Kralove, which provides its therapeutic and educational background.

Military Hygiene

The group of Military Hygiene monitors the living and working conditions of troops with the aim to develop, propose and assert measures for health protection and promotion of military professionals in order to maintain a good health state of troops and combat capability of the Army of the Czech Republic personnel in difficult conditions of military environment. In accordance with this function, the activity of the group of Military Hygiene is aimed at monitoring the impact of environmental factors on the organism, at evaluating their risk in working and living environment and at setting effective preventive measures to protect and promote health of soldiers..

Currently, the group of Military Hygiene complexly covers the basic issues of the relation between life and job environment and health of an individual.

The group can provide the analysis of selected physical and chemical factors of external environment in the conditions of the Army of the Czech Republic. It studies the possibilities of use of chemical substances for disinfection effects. The group is focused above all on response of the organism to work in protective clothing and severe climatic conditions and on evaluation of the degree of risk connected with environment contamination.

In the area of group of Military Hygiene, attention is paid namely to the incidence and prevalence of risk factors of non-infectious diseases of mass incidence, rational food, catering of troops in peacetime and wartime conditions – emergency food rations, assessment of the properly received and consumed energy.

Cooperation:

- Charles University, Faculty of Medicine in Hradec Kralove
- University Hospital in Hradec Kralove
- Military Medical Agency of the Army of the Czech Republic
- Central Military Hospital – Military University Hospital in Prague
- Military Hospital Brno
- Military Hospital Olomouc

- Health Institute in Hradec Kralove
- Hygienic Station in Liberec
- Military Health Institute in Prague
- Training Command – Military Academy in Vyškov
- Agricultural University in Nitra, Slovakia

TEACHING

Military Internal Medicine

The pedagogical-educational branch activities in Military Internal Medicine are closely related to therapeutic-preventive care. The department provides comprehensive education of Internal Medicine and Military Internal Medicine in both undergraduate and postgraduate degree programs. Almost all military medical specialists in Internal Medicine, including both Czechoslovakian and the Czech Army members, completed their postgraduate education of Internal Medicine at our department and gained specialization degree in Internal Medicine. We are proud to announce that during the history of our department, we assisted more than 1500 physicians in gaining the specialization degree in Internal Medicine.

Nowadays, the educational process involves undergraduate education in the program of Military Internal Medicine, Military Dentistry, Military Pharmacy and Military Health Assistant. The group of Military Internal Medicine participates actively in teaching in specialized courses, such as BATLS (Battlefield Advanced Trauma Life Support) and also provides medical support during specialized training operations of various units of the Army of the Czech Republic. In cooperation with the Internal Department of the Military University Hospital in Prague and internal departments of other military hospitals, the department provides necessary background for physicians in the military in order to gain the medical postgraduate certification in Internal Medicine.

Important and highly demanding assignment of the department is management and support of doctoral study program of Military Internal Medicine. This study program has been accredited since 1993. The department is also accredited for associate professor and professor degrees proceedings in the field of Military Internal Medicine..

Military Hygiene

The group of Military Hygiene takes part in undergraduate education of military hygiene and preventive medicine for all military students of the Faculty of Military Health Sciences including civilian students of the Faculty of Health Sciences in Pardubice.

The group members participate in teaching at Charles University, the Faculty of Medicine in Hradec Kralove and cover the final exam in hygiene, military hygiene and epidemiology.

The group can provide education of hygiene and preventive medicine in the doctoral study program Preventive medicine and health care.

The group is engaged in education of hygiene and preventive medicine of civilian and military doctors and nurses including training of NATO missions participants.

The group cooperates with the Military Academy in Vyskov and ensures education and special training of the employees of the Ministry of Defence in the field of occupational hygiene, occupational medicine and risk prevention.

RESEARCH

Military Internal Medicine

The scientific-research branch is the third main part of the group of Military Internal Medicine. In general, the department is focused on clinical research in internal medicine and its implementation in specific military practice. The research is aimed at covering requirements of the Army of the Czech Republic including field and foreign military operations.

The shape of our recent research activities was formed together with the development of organization structure of the department. The long history and development of our department was connected with the development of public society, the Army and both schools in Hradec Kralove, the University of Defence Brno, the Faculty of Military Health Sciences and Charles University, the Faculty of Medicine..

Main topics are:

- New trends in transplantation of hematopoietic stem cells and supportive care
- Optimization and individualization of treatment of disorders involving bone marrow and hematopoiesis, especially research in acute leukemias as a “model disease”

- Monitoring of side effects during treatment of hematologic disorders using various novel biochemical markers, especially for evaluation of cardiac toxicity
- Cardiovascular research with focus on acute coronary syndrome and heart failure
- The role of enteral and parenteral nutrition in intensive care
- Participation in international clinical trials, especially in fields of hematology and cardiology

Cooperation in clinical research

1. Hematopoietic stem cell transplantation (HSCT), transplant-related complications and supportive care, the role of cytokines, cytokine receptors and adhesion molecules in HSCT, acute leukemias and other hematologic disorders – the project has continued.
2. New biochemical markers of cardiac injury, complex monitoring of cardiotoxicity of antitumorous treatment – clinical and laboratory evaluation has continued.
3. Analysis of transplantation activities, indications and results in the Czech Republic – the National Stem Cell Transplantation Registry – the project has continued.
4. A study on application of enteral and parenteral nutrition in intensive metabolic care – the research project has continued.
5. International randomized clinical trials (PRAN-16-52, REACH 3, ASTRAL SGI-110-07, OPTIC 2L, CABL 001, ROBUST and others).
6. Academic studies of the Czech Hematology Society and the Czech Leukemia Study Group – for Life.

Military Hygiene

Scientific research is focused on primary prevention of chronic diseases and relation of life and job environment and life style. Realization of intervention study and project is focused on healthy status of professional soldiers.

Main topics are:

- Epidemiological studies of non-infectious diseases
- Evaluation of nutritional and health statuses
- Evaluation of energetic and metabolic requirements
- Combat rations in different climatic conditions
- Evaluation of response of the organism to work in unfavourable environmental and working conditions
- Evaluation of working energy expenditure
- Evaluation of physiological function in protective suits
- Elaboration of proposals for working and rest regimes, energy, fluids and minerals as a prevention of diseases

RESEARCH PROJECTS

PARENTERAL NUTRITION – Influence of parenteral nutrition on selected metabolic markers in critically ill patients

Skořepa, P., Horáček, J.

Supported by the Ministry of Education, Youth and Sports, 2018–2019
(Project No.: SV/FVZ201811)

The issue of rational and effective parenteral nutrition in critically ill patients is one of the main areas of interest in intensive care medicine and a number of other medical clinical disciplines. The metabolic changes related to the administration of total parenteral nutrition (TPN) are very complex and not fully understood. In critically ill patients, activation of anti-regulation hormones leads to gluconeogenesis, glycogenolysis and insulin resistance, which is important information regarding the composition of parenteral nutrition. The aim of this prospective randomized study is the measurement of plasma concentrations of non-esterified fatty, antioxidants, vitamins and other specific metabolic markers in critically ill patients randomized to receive either total parenteral nutrition containing non-protein calories entirely from glucose or total parenteral nutrition in combination with a fat emulsion (SMOFlipid). The results will give us deeper information on metabolic changes in critical conditions, which will help in planning an appropriate nutritional support.

Long-term organization development plan 1011 – Clinical branches

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GENERAL MEDICINE K-307**

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History of the Department started in 1983 at the J. E. Purkyně Military Medical Research and Postgraduate Institute. First as a Group of Military Medical Service Organization in Peacetime which was a part of the Department of Military Medical Service Organization. With increasing demands on training of the military health personnel, the Department of General Medicine was established. First Specialization Exams in this new basic specialization branch were held in February 1985. 525 military doctors passed the Specialization Exam in General Medicine at the Department of General Medicine till 31st December 2004. Now the Department collaborates in Specialization Exam with the Institute of Postgraduate Medical Education in Prague, the Chamber of Medicine, professional medical societies and associations in postgraduate training and specialized activities. It participates in establishing standards for special therapeutic care.

Since 1997, the work at this Department has focused more on pre-hospital emergency care and teaching the First Aid and Emergency Medicine. At the same time a significant modernization and a proper subdivision of teaching premises according to the type of courses were

carried out there. Now the Department is equipped with modern teaching models and simulators for teaching pre-hospital care, including the possibility of interactive teaching aids. Current innovations of medical material and equipment are applied in teaching process.

The Military Medical Service after the entry into NATO was one of the main contributors of the Czech Armed Forces to this international military organization. The Department of General Medicine and Emergency Medicine has been charged with specialization training of the military health personnel deployed on foreign mission. The extension of teaching activities in this new field called for changes in table posts at the Department. In 2001, the Healthcare Education and Training Group was established and other workers were engaged to teach the first aid. Since 2003, regarding the extension of teaching, the Department has had a new name – the Department of General and Emergency Medicine.

A new period of the Department started in 2014. After restructuring of the University of Defence and the Faculty of Military Health Science together with prevailing teaching topics in urgent medicine, the Department was renamed on **the Department of Emergency Medicine and Military General Medicine**. It consists of two groups – the Group of Emergency Medicine and the Group of General Medicine.

The main mission of the Department is education and training of medical officers in casualty medical care in both combat and disaster situations. For this purpose, the principles and procedures of emergency care in field conditions are taught at the Department through FEC – Field Emergency Courses. In the same area, the Department participates in training of medical personnel before their departure to foreign missions. The next important mission of the department is education and training of non-medical personnel in first-aid care. The most of the soldiers are trained in the Battlefield First-Aid Courses, some of them are trained in consequential Combat Life Saver Courses and Tactical Combat Casualty Courses. This course offers a lot of useful knowledge and skills, e.g. control life-threatening external hemorrhage, airway management and decompress the chest.

The Department of Emergency Medicine and Military General Medicine is the main department providing military-professional training in the subject called Military Medical Service Organization in Peacetime for students of the Master's Study Program in branches of General Medicine and Military Pharmacy, and for students of the Bachelor's Study Program in the branch of Military Medical Management and in various types of training and courses. It also provides further education for military doctors, pharmacists and other personnel of the Military Medical Service through refresher courses and specialization courses.

The subject called Disaster Medicine makes students acquainted with principles of emergency medicine and operation of individual parts of

integrated rescue system in conditions of serious accidents, natural disasters and catastrophes. In connection with this training, the Department provides its participants with knowledge and experience of the operation of the Military Medical Service institutions and facilities in crisis, in combat or other extraordinary situations. It applies the knowledge of military and military-professional subjects into specific conditions of operation of the Military Medical Service respecting both military principles and requirements as well as the principles of humanity, law and especially Geneva Conventions.

The Department is a co-ordinating centre in the branch of Military Medical Service Organization in Peacetime, Social Medicine, Emergency Medicine and Disaster Medicine. It participates in increasing the quality of organisational structure of medical units, formations and facilities. It elaborates their operation procedures and principles of their management in peacetime as well as in emergency situations. The Department provides expert activities and elaborates data and proposals from these areas for concept-making bodies of the Medical Service of the Armed Forces of the Czech Republic. The Department analyzes NATO regulations and directives and recommends their introduction in practice as well as in teaching process. It provides consultations for field leading officers of the Military Medical Service. The Department cooperates with civilian institutions, namely, with the bodies of the Ministry of Health of the Czech Republic in the issues concerning the cooperation between civilian and military medical services in extraordinary situations. It ensures publication activities focused on educational work requirements and on presenting scientific information. The Department is in charge of the education of talented students within the framework of students' scientific and professional activities. It participates in the solution of assignments within the organizational structure of the military health care in peacetime. It is the consultation and expert workplace in the branch of General and Emergency Medicine for the Armed Forces of the Czech Republic.

DEPARTMENT OF MOLECULAR PATHOLOGY AND BIOLOGY K-308

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DEPARTMENT DESCRIPTION

The Department of Molecular Pathology and Biology is a research and educational center focused on application of advanced technologies of functional genomics in bio-medical defence research. Scientific work is preferably aimed at the studies of the host-pathogen interactions at the molecular level. The objectives of this research are divided into three main areas: bio-molecular signatures of biological agents potentially abused for the military, terrorist attacks or bio-crime acts, intracellular fate of ingested microbes and finally the modulation of host cell signaling and gene expression by ongoing infection. The favorite microbial model is the live vaccine strain of *Francisella tularensis*, a gram-negative facultative intracellular bacterial pathogen that is included in the List A CDC as the potential biological weapon. The laboratories of the Department are currently equipped with:

- the animal, tissue culture and microbiological labs for preparing samples for subsequent analyses,
- 2-D electrophoresis, liquid chromatography and mass spectrometers for realization of complete classical and shotgun proteomic analyses,
- PCR, RT-PCR and quantitative real-time PCR technologies for the basic search of gene expression and the mutant construction,
- light and fluorescent microscopy, ELISA, Western blot and flow cytometry for the study of bacterial or bacterial component impact on the host.

The established technologies enable researchers, PhD., and undergraduate students to realize complex studies oriented on the analyses of living system response to external (and internal, modulatory) signals encompassing the chemicals, biologically active bio-molecules, physical influences (temperature, radiation, etc.), and microorganisms. Currently, the Department of Molecular Pathology and Biology has 16 full-time employees, 13 scientists, 2 technicians and 1 administrative worker. Four scientists are supported by the grant agencies. The Department had 10 PhD students in 2019 and, furthermore, several undergraduates have been working on their diploma thesis at the Department.

PARTICIPATION IN INTERNATIONAL PROJECTS AND NETWORKS

The Department traditionally cooperates with the research facility in Sweden (the Department of Clinical Bacteriology and the Laboratory for Molecular Infection Medicine of the Umea University) on identification of new factors of virulence of *Francisella tularensis*, molecular mechanisms of suppression of interferon beta production in host cells infected by *Francisella tularensis* and on the analysis of possible interaction between host and bacterial proteins. Further important collaborations concern the U.S. Army Medical Research Institute of Infectious Diseases (Fort Detrick, USA) on preparation and testing of bacterial proteins with immunostimulatory potential, the Department of Microbiology and Parasitology of the University of Rijeka on microscopic analysis of microbial intracellular trafficking, proteome analysis of phagosomes isolated from infected host cells, and, finally, the Aquila Bioscience Ltd. of the National University of Ireland in Galway on identification of glycan or lectin structures recognizing bacterial carbohydrate structures with the aim of new decontamination tools development. Within the frame of the Czech Republic, the Department has developed beneficial contacts with the Institute of Microbiology and the Institute of Molecular Genetics of the Czech Academy of Science in Prague, the Faculty of Science of Charles University in Prague, the Faculty of Medicine and the Faculty of Pharmacy of Charles University in Hradec Králové, the University Hospital in Hradec Králové, the Department of Pharmacology of the Faculty of Medicine in Hradec Králové, the Department of Oncological and Experimental Pathology of Masaryk Memorial Cancer Institute in Brno and the Veterinary Research Institute in Brno and Military Health Institute, Prague. The financial support for research activities performed in collaboration with the above-mentioned institutes comes from the programs and projects of the Czech Grant Agencies, the Ministry of Education, and Youth and Sports and the Ministry of the Interior.

RESEARCH PROJECTS

Colorimetric sensor for diagnosis of pesticides poisoning

Horna, A., Pohanka, M., Voříšek, V.

Supported by Technology Agency of the Czech Republic, 2018–2021
(Project No.: TH03030336)

The project is focused to construction of a colorimetric sensor for a fast diagnosis of pesticides poisoning and it will be suitable for the both human and veterinarian samples. Functional sample of the device will be verified on biological samples. Aims of the project will be reached in the of the project solving.

Construction of sensor for quantitative detection of antibodies against tissue transglutaminase for celiac disease diagnostics

Kostelník, A., Martinková, P., Kostelníková, A., Pohanka, M., Voženílek, J.

Supported by Technology Agency of the Czech Republic, 2018–2019
(Project No.: TJ01000478)

The main goal of this project is development of function model for a fast diagnosis of celiac disease via the determination of antibodies against tissue transglutaminase (anti-tTG). Tissue transglutaminase (tTG) is the most used marker in celiac disease which is hereditary disease manifested by intestinal mucosa inflammation and intolerance of gluten in diet, which has to be modify and replace by gluten free diet. This project is focused on construction of biosensor for anti-tTG determination from blood using QCM sensor as a platform for binding of tTG and selective binding of anti-tTG from the sample. The biosensor will be constructed as a simple tool suitable for homecare, small labs and surgeries. Goals of the project will be accomplished to the end of the project.

INFECTION – Analysis of changes in host cell ubiquitinylation system during infection of pathogen *Francisella tularensis*

Vozandychová, V., Řehulka, P.

Supported by the Ministry of Education, Youth and Sports, 2018–2020
(Project No.: SV/FVZ201802)

Ubiquitinylation of proteins is one of the most important cell processes, which is involved in degradation of proteins, cell signaling, altering function of protein substrates, changing protein activity or their subcellular localization. Deubiquitinylation enzymes (DUBs) are an important part of the system

controlling the reversible process of protein ubiquitinylation, including editing and controlling of mono- and polyubiquitine chains attached to the protein substrates. DUBs can remove ubiquitin from proteins and rescue them from degradation or functional change. These enzymes can also modulate the activity of important proteins during infection process, which was already shown in case of several known pathogens and their DUBs, e.g. bacterial strains *Salmonella* and *Yersinia*. This project is focused on the identification of potential DUBs in pathogenic bacteria *Francisella tularensis* that causes tularemia zoonosis and is listed in Category A Bioterrorism agents. Further analysis will be aimed at changes of DUBs host cells during infection with *Francisella tularensis*. This is important for a further understanding of the molecular basis of the disease process.

MICROORGANISMS – Isolation of enzymes from unique microbial species and their practical application

Válek, T., Martinková, P., Pohanka, M.

Supported by the Ministry of Education, Youth and Sports, 2017–2019 (Project No.: SV/FVZ201701)

Enzymes are necessary in all of types of organisms and they have a lot of functions in physiological and pathological conditions. Most of enzymes used in industry or medicine are produced by microorganisms like bacteria or fungi, because of easy production and specific abilities. Some of microorganisms are able to catalyze in extreme conditions such as warm, cold, low or high pH. Psychrophilic organisms live in cold environment and their biological activity is also high in temperatures around 0 °C. This ability is very useful in biosensor construction, so, biosensor containing enzymes from psychrophilic organism can be used in abnormal conditions. Biosensors based on microbial enzymes with unique properties present innovative tool in diagnostic methods appropriate for use in clinical practice or battlefield.

PHOSPHINE – Phosphine anad mechanism of phosphine toxicity on the organism of laboratory animal

Radochová, V., Pohanka, M.

Supported by the Ministry of Education, Youth and Sports, 2018–2020 (Project No.: SV/FVZ201806)

Phosphine is a harmful chemical substance with not well-known mechanism of toxicity. It is probably caused by high phosphine reactivity and a toxic effect having impact on more sites like inhibition of enzymes on one site and damaging of soft tissues on the other site. This thesis is focused on study of phosphine toxicity and choice of markers indicating poisoning. There

will be also proposed an animal laboratory model suitable for study of phosphine toxicity.

Preparation of a standard collection of biologically important toxins – EBLN (European Biodefence Laboratory Network)

Dresler, J., Kročová, Z., Myslivcová, A., Klimentová, J., Sheshko, V., Řehulková, H., Dřevínek, M.

Supported by the Czech Republic Ministry of Internal Affairs, 2017–2020 (Project No.: VH20172020012)

The subject of the public contract is the creation of a collection of standards of difficult to obtain toxins using modern vector cultures / bacterial, insect or plant lines) that would allow the development and testing of targeted and highly specific techniques, where so far forensic analytical approaches are not available. Furthermore, the implementation and verification of procedures for working with difficult to cultivate agents / *Coxiella* spp./ whose detection and identification capabilities are not sufficient at present in most of the security units in the Czech Republic.

PROTEIN – Testing of protein expression system in the *Francisella tularensis* microbe

Sheshko, V., Stulík, J.

Supported by the Ministry of Education, Youth and Sports, 2018–2019 (Project No.: SV/FVZ201801)

Francisella tularensis is a gram-negative intracellular pathogen causing tularemia (1). The low infectious dose, high virulence and environmental resistance, and the ability to be disseminated as an aerosol make this organism a potential agent for bioterrorism; therefore, *F. tularensis* is currently classified as A Military and Terroristically Abusive Agents (2). The administration of antibiotics is the standard procedure for the treatment of tularemia. This treatment is only effective for early diagnosis of the disease. Symptoms of tularemia in humans are non-specific that may delay the diagnosis of the disease and subsequent therapy. For this reason, recombinant subunit vaccine is attractive target for the development of new *F. tularensis* vaccine for military and medical personnel as well as for civilian populations (3). As part of the ROZHN project as well as the international DTRA project (collaboration with USAMRIID), we focused on the identification of bacterial proteins with significant immunogenic potential that could be used to design the subunit vaccine against the *F. tularensis* infection. Recombinant proteins were prepared in *E. coli* expression system. However, original protein modifications are not retained in this system that can affect their immune-stimulatory potential and protective capabilities. The

development of the protein production system in *F. tularensis*, which will maintain all posttranslational modifications, is another necessary step in the preparation of an effective subunit vaccine against *F. tularensis*. Fully functional proteins can be used for immunization, host-pathogen interaction studies, modifications and structure determination, as well as definition their biological function. Historically, difficulties in the genetic manipulation of *F. tularensis* were due partially to poor recognition of exogenous promoter elements by *Francisella* transcriptional machinery. A recent study showed that the transcriptional machinery of this organism is quite unique (4). Unlike all other bacteria, *F. tularensis* possesses two distinct α subunits of RNA polymerase, and these subunits are divergent even within the domains involved in promoter contact. These complications necessitated the design of genetic tools in which the expression of selectable and counterselectable markers was driven by *Francisella* promoters. Some promoter sequences have been characterized and adapted for use as a genetic tool for *F. tularensis*. One of the most frequently exploited and well-studied *F. tularensis* promoters is groEL that has been widely used for gene expression both in vivo and in vitro. Other promoters include the acpA promoter, which was used to drive the expression of green fluorescent protein (GFP) in *F. tularensis* strain LVS during a murine macrophage infection (5), and the FTN_1451 promoter (6), which was used to express the kanamycin resistance gene in the process of adapting the Targeton system for use in *F. tularensis*. In other studies, the bfr promoter, which appears to be about 10 times more potent than the groEL promoter, is identified as one of the most potent promoters in the *F. tularensis* microbe (7). Regulated expression systems are important tools for the manipulation of gene transcription for the study of organismal biology. Currently, there are no many suitable genetic control systems for *Francisella tularensis*. Two of the most widely used systems for recombinant gene expression in microorganisms based on the classic lactose- and arabinose-inducible promoters do not work in *F. tularensis* (8-10). A conditional expression system was developed for *F. tularensis* that relies on the *F. tularensis* glucose-repressible promoter, FGRp (11). This system is active in macrophages, but it relies on a ubiquitous carbon source and is not flexible. Additionally, a regulatory system for the expression of *F. tularensis* genes was developed to utilize tetracycline transcription control (TetR). This system can be used for both induction and gene repression (12). Recently, selection of constitutive and controllable promoters from the library of synthetic DNA molecules having activities similar to those of the most potently identified promoters of *F. tularensis* (13) has been completed. The aim of the project is a testing of the existing regulated *F. tularensis* (FTRp) expression system and preparing a new genetic tools based on endogenous and exogenous promoters (14,15). Based on previous results of proteomic and immunological studies, proteins with different localization, structure and molecular properties will be selected. The genes of selected proteins will be amplified from the *F. tularensis* chromosomal DNA and subsequently cloned into vectors under different

promoters. The subsequent production of the proteins will take place in *F. tularensis* cells. Detection of expression will be performed by SDS-PAGE electrophoresis, Western Blot and mass spectrometry. His-tagged proteins will be purified under native and denaturation conditions by affinity chromatography. The results will be evaluated and compared.

Proteome analysis of potential markers of dilation cardiomyopathy

Pudil, R., Stulík, J., Řehulka, P.

Supported by the Internal Grant Agency of the Czech Republic Health Service, 2019–2022 (Project No.: NV19-02-00297)

Left ventricle remodeling and its reversal are the key factors affecting the longterm survival of the patients with dilated cardiomyopathy (DCM). Therefore, the prediction of future left ventricle remodeling at initial diagnosis is of prognostic significance. Based on the results of our pilot study, where we revealed more than 50 unique proteins for DCM, we assume, that proteomic methods can identify new markers for DCM, and could have a potential to be useful for risk stratification. Hence in the proposed project we plan to employ state of art non-gel proteomic analysis in combination with bioinformatics to discover and validate new plazma protein markers, which can early distinguish patients responding or non-responding to standard therapy. Left ventricle remodeling will be evaluated with the use of established and proved methods (echocardiography) in accordance with recommended standards.

Study of the secretion of outer membrane vesicles in *Francisella tularensis* and their role in the interaction with the host

Stulík, J., Klimentová, J., Pávková, I., Kubelková, K.

Supported by the Czech Republic Grant Agency, 2017–2019 (Project No.: GA17-04010S)

Francisella tularensis is a gram-negative intracellular bacterium causing a severe disease known as tularemia. As one of the most infectious pathogens (as few as ten bacteria can initiate the disease) it has been classified as a potential biological warfare agent. Outer membrane vesicles secreted by gram-negative bacteria play an important role in bacterial physiology as well as in virulence and host-pathogen interaction. Isolated vesicles of number of bacteria have also been studied for their immunomodulatory potential. *F. tularensis* secretes vesicles of unusual tubular structure. The project aims to study the relationship of vesiculation and virulence in *F. tularensis*. The major goal presents the characterization of these vesicles and nanotubes composition, their production and description of their fate during interaction with the host cell. Consequently,

their potential protective effect in vivo will be studied. The acquired information will help elucidating their role in the host-pathogen interaction and extend our knowledge about mechanism of virulence of *Francisella tularensis*.

VESICLES – Study of the secretion of outer membrane vesicles in *Francisella tularensis* and their role in the host-pathogen interaction

Bavlovič, J., Klimentová, J.

Supported by the Ministry of Education, Youth and Sports, 2018–2020 (Project No.: SV/FVZ201804)

The aim of the presented project is to describe at the cellular level the interaction of the outer membrane vesicles (OMVs) isolated from the *F. tularensis* bacterium with the host cell. Model host cells will be mouse bone marrow macrophages (BMDM). The host cell response will be evaluated via changes in cytokine secretion and mapping of the localization of OMVs within the cell.

VIVARIUM**Educational and Research Staff**

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The Vivarium at the Faculty of Military Health Sciences of the University of Defence fulfils science, research and teaching tasks of the departments and specialized workplaces of the Faculty of Military Health Sciences. The vivarium is subordinated to the Vice-Dean for Research.

The separate vivarium for mice and sewer-rats is a part of the Department of Toxicology and Military Pharmacy.

From the point of view of the capacity the Faculty of Military Health Sciences is able to carry out experiments, place and take care of laboratory mice, sewer-rats, guinea-pigs, rabbits, pigs or mini pigs. In the area of the vivarium there are also laboratory workplaces and operating theatres, which are equipped for experiments on laboratory animals. All studies have to be allowed by the Ethical Board of the Faculty of Military Health Sciences fully in compliance with the legal standards of the protection against cruelty to animals.

The Vivarium with the operating block is intensively used above all for experiments on large experimental animals. The courses CLS (CLS, R-CLS, CLS LVO), UPP/R and UPP/FEC are held there. During the courses different model situations and cases of emergency medicine are performed for military doctors and participants of foreign mission including war injuries on dead and live experimental animals.

On December 2015, the Vivarium was accredited for use again for 5 years (till January 2021) by the Central Board for Animal Protection.

The above-mentioned range of the activities shows that it is necessary to time work and also co-ordinate it personally including permanent presence of a veterinary surgeon, veterinary technicians and breeders of laboratory animals.

RESEARCH PROJECTS

PHOSPHINE – Phosphine and mechanism of phosphine toxicity on the organism of laboratory animal

Radochová, V., Pohanka, M.

Supported by the Ministry of Education, Youth and Sports, 2018–2020 (Project No.: SV/FVZ201806)

Phosphine is a harmful chemical substance with not well-known mechanism of toxicity. It is probably caused by high phosphine reactivity and a toxic effect having impact on more sites like inhibition of enzymes on one site and damaging of soft tissues on the other site. This thesis is focused on study of phosphine toxicity and choice of markers indicating poisoning. There will be also proposed an animal laboratory model suitable for study of phosphine toxicity.

COMMUNICATION AND INFORMATION SYSTEMS OFFICE

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The Communication and Information Systems Office provides the top quality information service to ensure efficient scientific, research and teaching activities for teaching and research staff as well as under- and postgraduate students of our faculty.

The Communication and Information Systems Office provides the operation of the faculty network, enables access to army, specialized and public information systems and supplies the needs of the Faculty with modern information technologies. Main activity is ensuring the access to INTERNET and to specialized information systems. Management of data network, central management of software, servicing as well as specialized support of users is also provided.

Part of the Communication and Information Systems Office are also graphic services that create graphic documents and posters for presentations, make arrangements and changes of drafts for printing, make digital pictures and do other associated work. It also provides the operating and updating of the web site of the Faculty (<http://fvz.unob.cz>).

The library provides students, research and teaching staff of the Faculty of Military Health Sciences and members of the Czech Army Medical Service with scientific and information services. The main information services are provided by the library with 63 000 library units concerning medicine as well as associated branches.

Information sources in the field of military medicine, emergency medicine and disaster medicine are specificity of this library. The library enables access to various information databases (WoK, ScienceDirect, SCOPUS, SpringerLink, BiblioMedica, etc.) and provides systematic help when being used.

The library participates in teaching activities in the doctoral study programmes and scientific education (PhD) by giving lectures in Basics of Informatics focused on retrievals, processing and publication of scientific information.

VISITORS TO THE FACULTY OF MILITARY HEALTH SCIENCES

Belgium

- COL VEKERDI Zoltan MD PhD (Brussels) – 19th Conference of the Professional Society of Military Doctors, Pharmacists and Veterinary Doctors of the Czech Medical Association of J. E. Purkyně, 13 November 2019–13 November 2019

Jordan

- BANY DOUMI Mohammad Isam Ali, MD; BARAKAT ALSHWAYAT Mohammad Subhi, MD; AHMAD ALZYOUUD Essam Ibrahim; MOUSA ALQATAMIN Omar Tawfiq; OVERID ALJBOOR Mansour Okleh; HILAL AL-ABDALLAT Awwad Yousef, MD; SWEILEM ALKHAWALDEH Abdul Kareem; HAMDAN OBEIDAT Ali Badi; MOHAMMAD AL-TWAHEH Haytham Abdulluh; ALI ALALWAN Ahmad Salem; ALLAH AL-AMRYIN Haitham Bassam, MD; ABED RAWASHDEH Eyad Walid, MD (aMMAN) – Field Emergency Care (FEC) Course, 07 October 2019–09 October 2019

Portugal

- LOUREIRO MELO Sara Maria (Coimbra) – Erasmus+ Internship, 02 September 2019–30 October 2019

Slovakia

- KOPEROVÁ Erika; KRUTÁKOVÁ Mária (Bratislava) – Specialized Internship, 08 July 2019–12 July 2019

Ukraine

- LTC NEHODUIKO Volodymyr Volododomyrovič; LTC BABII Vadym Juryjovych; 1LT GANIUK Vatalii Mychajlovych; LTC TELISTNYKOV Oleksii Volodymyrovič; CPT MURADIAN Karen Rubenovyč; MAJ TYTYNIUK Andrii Juryjovych; CPT PRYTULA Volodymyr Mychajlovych (Kiev) – Field Emergency Care (FEC) Course, 18 February 2019–20 February 2019

VISITS ABROAD**Austria**

- Chlíbek, R. (21st Annual Meeting of the International Scientific Working Group on Tick-Borne Encephalitis (ISW-TBE), Vienna, 15 May 2019–17 May 2019)
- Řehulka, P. (30th MassSpec-Forum Vienna, Vienna, 18 February 2019–20 February 2019)
- Smetana, J. (21st Annual Meeting of the International Scientific Working Group on Tick-Borne Encephalitis (ISW-TBE), Vienna, 15 May 2019–17 May 2019)

Belgium

- Boštík, P. (CapTech National Coordinators meeting – ESM4 EDA, Brussels, 13 February 2019–15 February 2019)
- Vašek, T. (Military Committee Medical Standardization Board, Brussels, 20 January 2019–24 January 2019)

Bulgaria

- Vašek, T. (6th International Multidisciplinary Scientific Conference on SOCIAL Sciences & Arts, SGEM 2019, Albena, 24 August 2019–02 September 2019)
- Žďára, J. (6th International Multidisciplinary Scientific Conference on SOCIAL Sciences & Arts, SGEM 2019, Albena, 24 August 2019–02 September 2019)

Croatia

- Chlíbek, R. (CEEPAG 9th Meeting, Zagreb, 28 March 2019–29 March 2019)
- Stulík, J. (Bilateral negotiations on scientific collaboration, Rijeka, 24 April 2019–26 April 2019)

Finland

- Pohanka, M. (Eurotox 2019, Helsinki, 08 September 2019–12 September 2019)

France

- Górecki, L. (3rd International Conference CBRNE Research and Innovation, Nantes, 20 May 2019–23 May 2019)
- Górecki, L. (26th Young Research Fellows meeting, Paris, 20 February 2019–22 February 2019)
- Jakl, M. (ESC Congress 2019, Paris, 30 August 2019–05 September 2019)
- Jeličová, M. (47th IUPAC World Chemistry Congress (IUPAC 2019), Paris, 07 July 2019–12 July 2019)

VISITS ABROAD

- Kassa, J. (3rd International Conference CBRNE Research and Innovation, Nantes, 20 May 2019–23 May 2019)
- Konečný, J. (26th Young Research Fellows meeting, Paris, 20 February 2019–22 February 2019)
- Korábečný, J. (3rd International Conference CBRNE Research and Innovation, Nantes, 20 May 2019–23 May 2019)
- Korábečný, J. (26th Young Research Fellows meeting, Paris, 20 February 2019–22 February 2019)
- Kostelník, A. (47th IUPAC World Chemistry Congress (IUPAC 2019), Paris, 07 July 2019–12 July 2019)
- Soukup, O. (3rd International Conference CBRNE Research and Innovation, Nantes, 20 May 2019–23 May 2019)
- Svobodová, B. (26th Young Research Fellows meeting, Paris, 20 February 2019–22 February 2019)
- Šinkorová, Z. (StTARS 2019 – Software tools for Triage of the Acute Radiation Syndrome: a practical workshop, Brétigny sur Orge, 08 October 2019–12 October 2019)
- Tichý, A. (StTARS 2019 – Software tools for Triage of the Acute Radiation Syndrome: a practical workshop, Brétigny sur Orge, 08 October 2019–12 October 2019)

Germany

- Jošt, P. (17th International Medical Chemical Defence Conference, Munich, 26 March 2019–29 March 2019)
- Kassa, J. (17th International Medical Chemical Defence Conference, Munich, 26 March 2019–29 March 2019)
- Matula, M. (17th International Medical Chemical Defence Conference, Munich, 26 March 2019–29 March 2019)
- Šinkorová, Z. (Becton Dickinson - Customer Support & Training Center, Heidelberg, 06 May 2019–10 May 2019)
- Tichý, A. (23rd ConRad Nuclear Medical Defense Conference, Munich, 13 May 2019–16 May 2019)
- Válek, T. (2nd MCDC project meeting, Munich, 22 April 2019–26 April 2019)
- Vašek, T. (NATO Medical Sharing Group meeting, Leipzig, 07 October 2019–11 October 2019)

Greece

- Kubelková, K. (16th International Conference on Innate Immunity, Rhodos, 07 June 2019–13 June 2019)

Hungary

- Vašek, T. (2nd WS Medical Modular Approaches – Employment, Budapest, 02 December 2019–06 December 2019)

Iraq

- Fink, M. (Combined Joint Task Force – Operation Inherent Resolve (CJTF-OIR) mission, 01 August 2019–29 February 2020)

Israel

- Hrabínová, M. (16th International Symposium on Cholinergic Mechanisms, Rehovot, 07 December 2019–14 December 2019)
- Jun, D. (16th International Symposium on Cholinergic Mechanisms, Rehovot, 07 December 2019–14 December 2019)

Jordan

- Plodr, M. (Expert Medical Services Meeting, Amman, 22 September 2019–27 September 2019)
- Púdelka, L. (Expert Medical Services Meeting, Amman, 22 September 2019–27 September 2019)

Kenya

- Janášová, M. (Specialized Internship, Itibo, 11 January 2019–11 February 2019)

Philippines

- Kubelková, K. (Symposium on Biological Response Mechanisms and the Practice Application to Health, Disease and Prevention, Manila, 17 June 2019–23 June 2019)

Poland

- Hrabínová, M. (44th FEBS Congress, Krakow, 06 July 2019–11 July 2019)

Portugal

- Benková, M. (3rd International Caparica Conference in Antibiotic Resistance 2019, Caparica, 10 June 2019–13 June 2019)
- Boštík, P. (3rd International Caparica Conference in Antibiotic Resistance, Caparica, 08 June 2019–13 June 2019)

Romania

- Vašek, T. (Experiment MMA-Emp (MCDC), Făgăraș, 02 April 2019–14 April 2019)

Singapore

- Dušek, T. (5th Asian Congress of Robotic and Laparoscopic Surgery, Singapore, 12 November 2019–17 November 2019)
- Páral, J. (5th Asian Congress of Robotic and Laparoscopic Surgery, Singapore, 12 November 2019–17 November 2019)
- Plodr, M. (5th Asian Congress of Robotic and Laparoscopic Surgery, Singapore, 12 November 2019–17 November 2019)

Slovakia

- Chlíbek, R. (4th Primary Pediatrics Days, Demänovská Dolina, 17 May 2019–19 May 2019)
- Chlíbek, R. (10th Slovak Vaccination Congress, Tatranská Lomnica, 11 April 2019–13 April 2019)
- Pavlík, V. (27th International Conference Life Conditions and Health, Nový Smokovec, 23 September 2019–25 September 2019)
- Pavlík, V. (ERASMUS+ Internship Program, Nitra, 02 December 2019–06 December 2019)
- Smetana, J. (10th Slovak Vaccination Congress, Tatranská Lomnica, 11 April 2019–13 April 2019)
- Válek, T. (24th Interdisciplinary Toxicology Conference, Vyhne, 26 June 2019–28 June 2019)
- Vašek, T. (Visegrad Military Medicine Conference – VIMIMED 2019, Liptovský Mikuláš, 03 February 2019–06 February 2019)
- Vašek, T. (ERASMUS+ Internship Program, Liptovský Mikuláš, 25 November 2019–29 November 2019)
- Žďára, J. (ERASMUS+ Internship Program, Liptovský Mikuláš, 25 November 2019–29 November 2019)
- Žďára, J. (Visegrad Military Medicine Conference – VIMIMED 2019, Liptovský Mikuláš, 03 February 2019–06 February 2019)

Slovenia

- Chlíbek, R. (ESPID 2019 – 37th Annual Meeting of the European Society for Paediatric Infectious Diseases, Ljubljana, 08 May 2019–10 May 2019)
- Smetana, J. (ESPID 2019 – 37th Annual Meeting of the European Society for Paediatric Infectious Diseases, Ljubljana, 06 May 2019–10 May 2019)

Spain

- Bavlovič, J. (Bacterial networks (BacNet19), Sant Feliu de Guíxols, 01 September 2019–06 September 2019)
- Klimentová, J. (Bacterial networks (BacNet19), Sant Feliu de Guíxols, 01 September 2019–06 September 2019)
- Pávková, I. (Bacterial networks (BacNet19), Sant Feliu de Guíxols, 01 September 2019–06 September 2019)
- Pohanka, M. (Nutrients 2019 – Nutritional Advances in the Prevention and Management of Chronic Disease, Barcelona, 24 September 2019–27 September 2019)

Sweden

- Klimentová, J. (18th Swedish Proteomics Society Symposium, Göteborg, 24 November 2019–25 November 2019)
- Stulík, J. (18th Swedish Proteomics Society Symposium, Göteborg, 24 November 2019–25 November 2019)

Switzerland

- Ďuráčová, M. (Presentation of Scientific Results, Davos, 22 June 2019–26 June 2019)
- Sheshko, V. (Presentation of Scientific Results, Davos, 22 June 2019–26 June 2019)

The Netherlands

- Herman, D. (Evaluation of Results of OPCW Biomedical Proficiency Tests, Haag, 17 July 2019–21 July 2019)
- Pohanka, M. (Industry's European meeting for Antibody and Protein Therapeutics Science, Technology and Networking, Amsterdam, 10 June 2019–14 June 2019)
- Prchal, L. (Evaluation of Results of OPCW Biomedical Proficiency Tests, Haag, 17 July 2019–21 July 2019)
- Váňová, N. (Evaluation of Results of OPCW Biomedical Proficiency Tests, Haag, 17 July 2019–21 July 2019)

United Kingdom

- Filipová, A. (ICRR 2019 – 16th International Congress for Radiation Research, Manchester, 24 August 2019–29 August 2019)
- Marková, A. (Eurobiofilms 2019, Glasgow, 02 September 2019–06 September 2019)
- Šinkorová, Z. (ICRR 2019 – 16th International Congress for Radiation Research, Manchester, 24 August 2019–29 August 2019)
- Tichý, A. (NATO HFM-291 Research Task Group „Ionizing Radiation Bioeffects and Countermeasures“ meeting, Gosport, 01 September 2019–06 September 2019)

United States

- Boštíková, V. (Presentation of the Faculty of Military Health Sciences of the University of Defence and his scientific results, Atlanta, 08 December 2019–18 December 2019)
- Boštíková, V. (CDC, Atlanta, 30 June 2019–11 July 2019)
- Horáček, J. (61st ASH Annual Meeting and Exposition, Orlando, 07 December 2019–10 December 2019)
- Kassa, J. (Chemical and Biological Defense Science & Technology (CBD S&T) Conference, Cincinnati, 17 November 2019–22 November 2019)

VISITS ABROAD

- Kobrlová, T. (American Association of Pharmaceutical Scientists (AAPS) workshop, Herndon, 28 April 2019–01 May 2019)
- Kopečková, M. (Microbial Pathogenesis Conference: Mechanisms of Infectious Disease, Snowmass Village, 20 July 2019–28 July 2019)
- Matula, M. (Chemical and Biological Defense Science & Technology (CBD S&T) Conference, Cincinnati, 17 November 2019–22 November 2019)
- Pejchal, J. (Chemical and Biological Defense Science & Technology (CBD S&T) Conference, Cincinnati, 17 November 2019–22 November 2019)
- Řehulka, P. (67th ASMS Conference on Mass Spectrometry and Allied Topics, Atlanta, 01 June 2019–05 June 2019)
- Stojková, P. (Microbial Pathogenesis Conference: Mechanisms of Infectious Disease, Snowmass Village, 20 July 2019–28 July 2019)
- Vašek, T. (Multinational Capabilities Development Campaign 2019-2020, Portsmouth, 11 February 2019–15 February 2019)

**WORKSHOPS, COURSES, RESIDENCIES AT THE FACULTY IN
2019**

Radiobiology

- Specialized course – Radiation accident – protection and basic measures, 14 May 2019–15 May 2019

Military Hygiene

- Specialized basic course – Teaching on foodstuff I, 25 February 2019–26 February 2019
- Specialized follow-up course – Teaching on foodstuff II, 15 April 2019–16 April 2019, 18 November 2019–19 November 2019
- Specialized course – Overweight and obesity, diagnosis, prevention and therapy, 04 November 2019–05 November 2019
- Specialised course – Nutrition state assessment, 14 January 2019–15 January 2019
- Specialized course – Evaluation of workload and health protection at work, 21 October 2019–22 October 2019
- Specialized course – Muscle imbalance – prevention and compensation exercises, 11 March 2019–13 March 2019

Language Courses

- Terminology course for nurses 2, 04 February 2019–15 February 2019, 18 November 2019–29 November 2019
- Combined language courses – English (STANAG 3), 03 September 2018–31 May 2019
- Combined language courses – English (STANAG 2), 03 September 2018–31 May 2019, 09 September 2019–03 April 2020
- Terminology course for MEDOPS, 17 June 2019–28 June 2019
- Combined language courses – English (STANAG 1), 09 September 2019–03 April 2020

Military Epidemiology

- Specialized course – Current infectious diseases – news in epidemiology and microbiology, 14 October 2019–16 October 2019
- Specialized course – Vaccination in adulthood, 18 March 2019–19 March 2019
- Specialized course – Highly dangerous infections, new infectious diseases, 14 January 2019–16 January 2019

Military Medical Service Organization

- Specialized course – MS PowerPoint, 28 January 2019–30 January 2019

WORKSHOPS, COURSES, RESIDENCIES AT THE FACULTY IN 2019

- Specialized course – Aeromedical evacuation, 09 April 2019–11 April 2019
- Specialized course – MS WORD, 11 November 2019–13 November 2019
- MEDEVAC specialized course – Use of helicopter, 30 September 2019–04 October 2019
- Specialized course – Microsoft Office 2013 Professional, 25 November 2019–27 November 2019
- Specialized course – MS Excel, 11 March 2019–13 March 2019, 04 November 2019–06 November 2019
- Specialized course for Medical operations officers – MedOps – The tenets of the use of Medical Service forces and assets, 10 June 2019–12 June 2019, 18 November 2019–20 November 2019, 26 November 2019–28 November 2019

General Medicine

- Specialized course – Transportation of casualties in the field, 24 May 2019–28 May 2019
- Special course – Extended first aid in the field (CLS Course), 28 January 2019–08 February 2019, 01 April 2019–12 April 2019, 20 May 2019–31 May 2019, 10 June 2019–21 June 2019, 14 October 2019–25 October 2019
- Special course – Repetitory of extended first aid in field conditions (R-CLS Course), 13 May 2019–17 May 2019, 04 November 2019–08 November 2019
- Specialized course – First aid in field conditions (health training) for Military High School Moravska Trebova, 25 March 2019–26 March 2019, 27 March 2019–28 March 2019, 23 April 2019–24 April 2019, 25 April 2019–26 April 2019
- Specialized course – First aid in field conditions for military paramedics, 24 July 2019–26 July 2019
- Specialized course – Repetitory of field emergency care, 21 January 2019–24 January 2019, 09 September 2019–12 September 2019, 11 November 2019–14 November 2019
- Specialized course – Defibrillators and their operation, 21 February 2019–21 February 2019
- Specialized course – Repetitory of first aid for non-medical personnel, 09 December 2019–11 December 2019
- Special course – Extended first aid in the field (CLS Course) for military paramedics, 19 August 2019–30 August 2019
- Special course – Extended first aid in the field for the Police of the Czech Republic (CLS Course), 11 March 2019–15 March 2019
- Specialised course – Basics of non-professional first aid, 10 July 2019–10 July 2019, 15 November 2019–15 November 2019

WORKSHOPS, COURSES, RESIDENCIES AT THE FACULTY IN 2019

- Specialized course – Field emergency care, 18 March 2019–21 March 2019, 03 June 2019–06 June 2019, 18 November 2019–21 November 2019
- Specialized course – Field emergency care for foreign armies (Ukraine, Jordan), 18 February 2019–20 February 2019, 07 October 2019–10 October 2019
- Specialized course – First aid in field conditions, 14 January 2019–18 January 2019, 11 February 2019–15 February 2019, 04 March 2019–08 March 2019, 25 November 2019–29 November 2019

Military Toxicology

- Specialized course – Dealing with extremely dangerous poisons, drugs and psychotropic substances, 14 January 2019–17 January 2019, 27 May 2019–30 May 2019, 01 July 2019–04 July 2019, 07 October 2019–10 October 2019

Molecular Pathology

- Specialized course II – advanced – Collection and transport of biological samples, 21 January 2019–22 February 2019
- Specialized course I – basic – Collection and transport of biological samples, 11 March 2019–22 March 2019

Multidisciplinary Studies

- Preparatory course for entrance examination, 10 June 2019–15 June 2019

Military Pharmacy

- Specialized course – Basics of pharmacology and self-treatment, 18 February 2019–21 February 2019

INTERNATIONAL COOPERATION

Cooperation at the military medical facility level

France

- Armed Forces Biomedical Research Institute, Brétigny-sur-Orge

Germany

- Institute of Microbiology of Federal Armed Forces Medical Academy, Munich
- Bundeswehr Institute for Radiobiology, Munich

Norway

- Norwegian Defence Research Establishment – FFI, Kjeller

Poland

- Military Institute of Hygiene and Epidemiology, Department of Pharmacology and Toxicology, Warsaw

Slovakia

- Central Military Hospital, Ruzomberok

Sweden

- Swedish Defence Research Agency, Department of Threat Assessment, Division of CBRN Defence, Umea

Scientific cooperation with civilian institutions abroad (on the basis of individual agreements and joint projects)

Austria

- Institute of Chemical Technologies and Analytics, Vienna University of Technology, Vienna

Croatia

- Department of Microbiology and Parasitology, University of Rijeka, Rijeka
- Institute for Medical Research and Occupational Health, Zagreb

France

- University of Burgundy – Franche-Comté,

Germany

- Department of Solid States Nuclear Physics, University of Leipzig, Leipzig
- German Cancer Research Center, Heidelberg

Italy

- University of Bologna, Bologna

Portugal

- University of Porto, Faculty of Pharmacy, Department of Biological Sciences, Laboratory of Biochemistry

Republic of Korea

- Korea Research Institute of Chemical Technology, Daejeon

Slovakia

- P. J. Safarik University, Kosice
- Agricultural University in Nitra, Nitra

Spain

- University of Alcalá, Environmental Sciences and Chemistry, School of Biology, Department of Organic Chemistry and Inorganic Chemistry, Alcalá de Henares
- Centre for Research of Environmental Epidemiology (CREAL), Barcelona

Sweden

- Sahlgrenska Academy, University of Goteborg, Goteborg
- University of Umea, Umea

United States

- Emory University, Atlanta
- MMRHVLB/CCID/CDC, Atlanta
- University of California San Diego, Skaggs School of Pharmacy and Pharmaceutical Sciences, San Diego

INTERNATIONAL COOPERATION

- University of Pennsylvania, Perelman School of Medicine, Departments of Medicine and Pathology, Philadelphia

Participation in international projects and networks

Ireland	National University of Ireland in Galway
Spain	Centre for Research of Environmental Epidemiology (CREAL), Barcelona
Switzerland	European Study Group on Nosocomial Infection,
United Kingdom	Public Health England – Centre for Radiation, Chemical and Environmental Hazards, Didcot
United States	U. S. Army Medical Research Institute of Infectious Disease, Fort Detrick

Other expert commissions

- L. Andrejsová – member of the European Radiation Research Society
- P. Boštík – national coordinator for CBRN in Cap Tech ESM04 EDA
- P. Boštík – member of NATO LTSS HFM 273
- P. Boštík – council member of the European Society of Clinical Virology
- P. Boštík – member of Regional Cooperation for Health Science and Technology
- P. Boštík – member of the Association of UICC Fellows
- P. Boštík – member of the American Association of Immunologists (AAI)
- P. Boštík – member of the Federation of American Societies for Experimental Biology
- P. Boštík – member of the American Society of Microbiology
- P. Boštík – member of Editorial board of „*the Open Infectious Diseases Journal*“
- V. Boštíková – member of the International Board for the Investigation and Control of Influenza and Other Epidemic Diseases
- V. Boštíková – member of the European Society of Clinical Virology
- V. Boštíková – member of Editorial board of „*Journal of Clinical Virology*“
- T. Dušek – member of the European Society of Coloproctology

- J. Horáček – member of the European Society for Blood and Marrow Transplantation (EBMT)
- J. Horáček – member of the European Society of Hematology
- R. Chlíbek – European Centre for Disease Control (ECDC) – member of Potential shortages of Vaccines and treatment for rare communicable diseases in Europe Group
- R. Chlíbek – European Centre for Disease Control (ECDC) – member of Expert Panel Hepatitis A
- R. Chlíbek – member of the Global Pertussis Initiative(GPI)
- R. Chlíbek – supervisor of the Central European Vaccination Awareness Group (CEVAG)
- R. Chlíbek – member of the Central and Eastern Europe Pertussis Awareness Group
- R. Chlíbek. – member of C.O.P.E. – Consensus on Pertussis Booster Vaccination in Europe
- M. Jakl – member of the European Society of Cardiology
- L. Jebavý – member of the European Group for Blood and Marrow Transplantation (EBMT)
- L. Jebavý – member of the Multinational Association of Supportive Care in Cancer (MASCC)
- L. Jebavý – member of the European Study Group on Nosocomial Infections (ESGNI)
- D. Jun – member of Editorial board of „*Scientifica*“
- J. Kassa – member of NATO CBRN Medical Working Group
- J. Kassa – member of the European Society for Neurochemistry
- J. Kassa – member of Editorial board of „*Journal of Medical Chemical, Biological and Radiological Defence*“
- J. Kassa – member of Editorial board of „*Challenge Medical CBRN Defense International*“
- L. Klein – Secretary General, Committee of the International Association for Humanitarian Medicine Chisholm - Gunn (IAHM)
- L. Klein – Assistant Secretary General, International Committee of Military Medicine (ICMM)
- L. Klein – member of the European Burns Association (EBA)
- L. Klein – member of the International Society for Burn Injuries (ISBI)
- L. Klein – member of the Mediterranean Council for Burns and Fire Disasters (MBC)
- L. Klein – member of the Academic Council on the United Nations System (ACUNS)
- L. Klein – Honorary member of the United States Army Medical Department Regiment
- L. Klein – member of the Editorial board of „*Annals of Burns and Fire Disasters*“
- L. Klein - member of the Editorial board of the „*European Journal of Burn Care*“

INTERNATIONAL COOPERATION

- J. Korábečný – member of the Society for Neuroscience
- K. Kubelková – member of the European Radiation Research Society
- M. Link – member of the Human Proteome Organization (HUPO)
- P. Lochman – member of the European Society of Surgical Oncology
- P. Lochman – member of the European Wound Management Association
- P. Lochman – member of the FACS – American College of Surgeons
- V. Pavlík – member of NATO RTO HFM-154
- J. Pejchal – member of the CBRN Joint Assessment Team
- M. Pohanka – member of Editorial board of *„Mini Reviews In Medicinal Chemistry“*
- M. Pohanka – member of Editorial board of *„Sensors“*
- M. Pohanka – member of Editorial board of *„Interdisciplinary Toxicology“*
- M. Pohanka – member of Editorial board of *„Journal of Mellomics and Nanotechnologies“*
- M. Pohanka – member of Editorial board of *„BioMed Research International“*
- O. Soukup – member of the Society for Neuroscience
- H. Střítecká – member of Editorial board of *„Journal of Obesity & Weight loss Therapy“*
- H. Střítecká – member of Editorial board *„Journal of Food Security“*
- H. Střítecká – member of the International Association for the Study of Obesity
- H. Střítecká – member of the European Association for the study of obesity (EASO)
- H. Střítecká – member of the European Federation of the Associations of Dietitians (EFAD)
- J. Stulík – member of Editorial board of *„Frontiers in Cellular and Infection Microbiology“*
- Z. Šinkorová – member of NATO CBRN Medical Working Group
- Z. Šinkorová – member of the NATO RTO HFM - 222
- Z. Šinkorová – member of the European Radiation Research Society
- P. Špidlová – member of the American Society for Microbiology
- M. Špliňo – member of the European Study Group on Nosocomial Infection
- M. Špliňo – member of the International Board for the Investigation and Control of Influenza and Other Epidemic Diseases
- M. Špliňo – member of the International Biographical Centre - Advisory Council
- M. Špliňo – member of the American Biographical Institute
- M. Špliňo – member of the International Society for Tropical and Travel Medicine

- M. Špliňo – member of the International Society for Infectious Diseases
- A. Tichý – member of the NATO HFM Panel RTG-291
- A. Tichý – member of the American Society for Mass Spectrometry
- A. Tichý – member of the European Society of Radiation Biology
- A. Tichý – member of the European Society for Radiotherapy and Oncology (ESTRO)
- T. Vašek – member of the Multinational Capabilities Development Campaign (MCDC)

SCIENTIFIC AND RESEARCH ACTIVITIES

Completed associate professorships

Pavlík Vladimír

- Depaertment of Military Internal Medicine and Military Hygiene, Faculty of Military Health Sciences, University of Defence, Hradec Králové

area of specialization: Hygiene, Preventive Medicine and Public Health Protection

habilitation thesis: Non-infectious diseases of mass incidence in the Army of the Czech Republic

habilitation lecture: The program of preventive medical care in the Army of the Czech Republic and primary prevention benefits

Dissertation defences

Plzáková Lenka

- Department of Molecular Pathology and Biology, Faculty of Military Health Sciences, University of Defence, Hradec Králové

study programs: Infection Biology

dissertation: The role of B lymphocytes in the early immune response against the intracellular pathogen *Francisella tularensis*

Salajková Šárka

- Department of Toxicology and Military Pharmacy, Faculty of Military Health Sciences, University of Defence, Hradec Králové

study programs: Preventive Medicine and Public Health Protection

dissertation: Quaternary ammonium compounds for potential prevention or treatment of diseases

Váňová Nela

- Department of Toxicology and Military Pharmacy, Faculty of Military Health Sciences, University of Defence, Hradec Králové

study programs: Toxicology

dissertation: Determination of oxidative stress markers by HPLC

Zelená Hana

- Department of Epidemiology, Faculty of Military Health Sciences, University of Defence, Hradec Králové

study programs: Epidemiology

dissertation: Molecular epidemiology of hantavirus infections

Dyrhonová Markéta

- Department of Epidemiology, Faculty of Military Health Sciences, University of Defence, Hradec Králové

study programs: Epidemiology

SCIENTIFIC AND RESEARCH ACTIVITIES

dissertation: Epidemiology of chronic HCV infection and quality of life of patients treated with pegylated interferon alpha and ribavirin

Górecki Lukáš

- Department of Toxicology and Military Pharmacy, Faculty of Military Health Sciences, University of Defence, Hradec Králové

study programs: Toxicology

dissertation: Development of novel cholinesterase modulators

Kučera Tomáš

- Department of Toxicology and Military Pharmacy, Faculty of Military Health Sciences, University of Defence, Hradec Králové

study programs: Toxicology

dissertation: Interaction of small molecules with proteins in silico

**THE REVIEW OF RESEARCH PROJECTS CARRIED OUT AT THE
FACULTY OF MILITARY HEALTH SCIENCES IN 2019**

**THE INTERNAL GRANT AGENCY OF THE CZECH REPUBLIC
HEALTH SERVICE**

Principal investigators

• **Pavel Boštík**

(NV17-31765A) The potential of xanthohumol and beta-bitter acids in the therapy of nosocomial infections

• **Daniel Jun**

(NV18-09-00181) Development of polyvalent decontamination mean

Co-investigators

• **Vanda Boščíková**

(NV17-31765A) The potential of xanthohumol and beta-bitter acids in the therapy of nosocomial infections

• **Jiří Páral**

(NV17-31765A) The potential of xanthohumol and beta-bitter acids in the therapy of nosocomial infections

• **Daniel Jun**

(NV17-32801A) Centrally acting antidotes for the treatment of organophosphorus poisoning

• **Jiří Stulík**

(NV19-02-00297) Proteome analysis of potential markers of dilation cardiomyopathy

• **Pavel Řehulka**

(NV19-02-00297) Proteome analysis of potential markers of dilation cardiomyopathy

THE CZECH REPUBLIC MINISTRY OF INTERNAL AFFAIRS

Principal investigators

• **Aleš Tichý**

(VH20172020010) New approaches in diagnostics and therapy of irradiated persons

Co-investigators

• **Zuzana Kročová**

(VH20172020012) Preparation of a standard collection of biologically important toxins - EBLN (European Biodefence Laboratory Network)

• **Alena Myslivcová**

(VH20172020012) Preparation of a standard collection of biologically important toxins - EBLN (European Biodefence Laboratory Network)

• **Jana Klimentová**

(VH20172020012) Preparation of a standard collection of biologically important toxins - EBLN (European Biodefence Laboratory Network)

• **Valeria Sheshko**

(VH20172020012) Preparation of a standard collection of biologically important toxins - EBLN (European Biodefence Laboratory Network)

• **Helena Řehulková**

(VH20172020012) Preparation of a standard collection of biologically important toxins - EBLN (European Biodefence Laboratory Network)

• **Vendula Hepnarová**

(VI20192022114) MARYSA – Research in chemical properties and methods of individual protection against the last generation of nerve agents

• **Petr Jošt**

(VI20192022114) MARYSA – Research in chemical properties and methods of individual protection against the last generation of nerve agents

• **Daniel Jun**

THE REVIEW OF RESEARCH PROJECTS CARRIED OUT AT THE FMHS

(VI20192022114) MARYSA – Research in chemical properties and methods of individual protection against the last generation of nerve agents

- **Lucie Junová**

(VI20192022114) MARYSA – Research in chemical properties and methods of individual protection against the last generation of nerve agents

- **Jaroslav Pejchal**

(VI20192022114) MARYSA – Research in chemical properties and methods of individual protection against the last generation of nerve agents

- **Jana Žďárová Karasová**

(VI20192022114) MARYSA – Research in chemical properties and methods of individual protection against the last generation of nerve agents

- **Jana Hatlapatková**

(VI20192022114) MARYSA – Research in chemical properties and methods of individual protection against the last generation of nerve agents

THE CZECH REPUBLIC GRANT AGENCY

Principal investigators

- **Zuzana Šinkorová**

(GA17-13541S) Development of novel radioprotective agents based on small molecular inhibitors

- **Jiří Stulík**

(GA17-04010S) Study of the secretion of outer membrane vesicles in *Francisella tularensis* and their role in the interaction with the host

- **Jana Žďárová Karasová**

(GA18-08937S) Research of oxime-CB[7] complexes for central nervous system penetration of quaternary acetylcholinesterase reactivators

Co-investigators

- **Jana Klimentová**

THE REVIEW OF RESEARCH PROJECTS CARRIED OUT AT THE FMHS

(GA17-04010S) Study of the secretion of outer membrane vesicles in *Francisella tularensis* and their role in the interaction with the host

- **Ivona Pávková**

(GA17-04010S) Study of the secretion of outer membrane vesicles in *Francisella tularensis* and their role in the interaction with the host

- **Klára Kubelková**

(GA17-04010S) Study of the secretion of outer membrane vesicles in *Francisella tularensis* and their role in the interaction with the host

- **Daniel Jun**

(GA18-01734S) SCAVENGERS – Butyrylcholinesterase reactivators for preparation of pseudo-catalytic scavengers applicable for organophosphorus intoxications

THE MINISTRY OF EDUCATION, YOUTH AND SPORTS

Principal investigators

- **Tomáš Válek**

(SV/FVZ201701) MICROORGANISMS – Isolation of enzymes from unique microbial species and their practical application

- **Alžběta Filipová**

(SV/FVZ201703) CILIA – Primary cilia as an indicator of cell stress

- **Marek Matula**

(SV/FVZ201702) TENSIDES – Development of decontamination substances against chemical warfare agent based on surfactants

- **Tereza Kobrlová**

(SV/FVZ201708) MDCK – The development and validation of new in vitro methodology based on MDCK cell lines for the study of the penetration of potential drugs across the blood brain barrier

- **Valeria Sheshko**

(SV/FVZ201801) PROTEIN - Testing of protein expression system in the

Francisella tularensis microbe

- **Pavel Skořepa**

(SV/FVZ201811) PARENTERAL NUTRITION – Influence of parenteral nutrition on selected metabolic markers in critically ill patients

- **Ivana Holmquist**

(SV/FVZ201812) BREASTFEEDING – Factors influencing initiation and continuation of breastfeeding in the South-East United States

- **Věra Vozandychová**

(SV/FVZ201802) INFECTION – Analysis of changes in host cell ubiquitylation system during infection of pathogen *Francisella tularensis*

- **Jan Bavlovič**

(SV/FVZ201804) VESICLES – Study of the secretion of outer membrane vesicles in *Francisella tularensis* and their role in the host-pathogen interaction

- **Věra Radochová**

(SV/FVZ201806) PHOSPHINE – Phosphine anad mechanism of phosphine toxicity on the organism of laboratory animal

- **Jan Konečný**

(SV/FVZ201803) AGENTS – Development of new agents with anti-inflammatory effect

- **David Herman**

(SV/FVZ201807) EXPOSURE – Determination of toxicological parameters and markers of exposure to potential chemical warfare agents

- **Aneta Marková**

(SV/FVZ201808) BIOFILM – Synthesis and evaluation of novel compounds based on quaternary ammonium salts for eradication of microbial bio films

- **Barbora Svobodová**

(SV/FVZ201901) PROPHYLAXIS – Development of novel prophylactic

countermeasure against nerve agents based on reversible cholinesterase inhibitors

- **Marcela Jeličová**

(SV/FVZ201904) BIOINDICATORS – Determination of DNA damage bioindicators after irradiation by electrochemical analysis

- **Petra Polcarová**

(SV/FVZ201903) TICK – Evaluation of risk of infection with tick-borne encephalitis, Lyme borreliosis and ehrlichiosis during the training of soldiers of the Czech Army in selected military areas

- **Michaela Hympanová**

(SV/FVZ201905) MBEC – MBEC assay: The method modification for individual bacterial strains and multiple-species biofilms

- **Miroslav Sirový**

(SV/FVZ201902) ADHESIONS – Prevention of postoperative intraabdominal adhesions: an experimental study

Co-investigators

- **Pavla Martinková**

(SV/FVZ201701) MICRORGANISMS – Isolation of enzymes from unique microbial species and their practical application

- **Miroslav Pohanka**

(SV/FVZ201701) MICRORGANISMS – Isolation of enzymes from unique microbial species and their practical application

- **Marcela Jeličová**

(SV/FVZ201703) CILIA – Primary cilia as an indicator of cell stress

- **Daniel Jun**

(SV/FVZ201702) TENSIDES – Development of decontamination substances against chemical warfare agent based on surfactants

- **Ondřej Soukup**

THE REVIEW OF RESEARCH PROJECTS CARRIED OUT AT THE FMHS

(SV/FVZ201708) MDCK – The development and validation of new in vitro methodology based on MDCK cell lines for the study of the penetration of potential drugs across the blood brain barrier

- **Jiří Stulík**

(SV/FVZ201801) PROTEIN - Testing of protein expression systém in the *Francisella tularensis* microbe

- **Jan Horáček**

(SV/FVZ201811) PARENTERAL NUTRITION – Influence of parenteral nutrition on selected metabolic markers in critically ill patients

- **Vanda Bošťíková**

(SV/FVZ201812) BREASTFEEDING – Factors influencing initiation and continuation of breastfeeding in the South-East United States

- **Pavel Řehulka**

(SV/FVZ201802) INFECTION – Analysis of changes in host cell ubiquitylation system during infection of pathogen *Francisella tularensis*

- **Jana Klimentová**

(SV/FVZ201804) VESICLES – Study of the secretion of outer membrane vesicles in *Francisella tularensis* and their role in the host-pathogen interaction

- **Miroslav Pohanka**

(SV/FVZ201806) PHOSPHINE – Phosphine anad mechanism of phosphine toxicity on the organism of laboratory animal

- **Jan Korábečný**

(SV/FVZ201803) AGENTS – Development of new agents with anti-inflammatory effect

- **Nela Váňová**

(SV/FVZ201807) EXPOSURE – Determination of toxicological parameters and markers of exposure to potential chemical warfare agents

- **Daniel Jun**

(SV/FVZ201807) EXPOSURE – Determination of toxicological parameters and markers of exposure to potential chemical warfare agents

- **Ľubica Múčková**

(SV/FVZ201807) EXPOSURE – Determination of toxicological parameters and markers of exposure to potential chemical warfare agents

- **Lenka Čechová**

(SV/FVZ201807) EXPOSURE – Determination of toxicological parameters and markers of exposure to potential chemical warfare agents

- **Jakub Mišík**

(SV/FVZ201807) EXPOSURE – Determination of toxicological parameters and markers of exposure to potential chemical warfare agents

- **Jan Marek**

(SV/FVZ201808) BIOFILM – Synthesis and evaluation of novel compounds based on quaternary ammonium salts for eradication of microbial bio films

- **Lukáš Górecki**

(SV/FVZ201901) PROPHYLAXIS – Development of novel prophylactic countermeasure against nerve agents based on reversible cholinesterase inhibitors

- **Jan Korábečný**

(SV/FVZ201901) PROPHYLAXIS – Development of novel prophylactic countermeasure against nerve agents based on reversible cholinesterase inhibitors

- **Zuzana Šinkorová**

(SV/FVZ201904) BIOINDICATORS – Determination of DNA damage bioindicators after irradiation by electrochemical analysis

- **Jan Smetana**

(SV/FVZ201903) TICK – Evaluation of risk of infection with tick-borne

THE REVIEW OF RESEARCH PROJECTS CARRIED OUT AT THE FMHS

encephalitis, Lyme borreliosis and ehrlichiosis during the training of soldiers of the Czech Army in selected military areas

- **Jan Marek**

(SV/FVZ201905) MBEC – MBEC assay: The method modification for individual bacterial strains and multiple-species biofilms

- **Jiří Páral**

(SV/FVZ201902) ADHESIONS – Prevention of postoperative intraabdominal adhesions: an experimental study

TECHNOLOGY AGENCY OF THE CZECH REPUBLIC

Principal investigators

- **Adam Kostelník**

(TJ01000478) Construction of sensor for quantitative detection of antibodies against tissue transglutaminase for celiac disease diagnostics

Co-investigators

- **Miroslav Pohanka**

(TH03030336) Colorimetric sensor for diagnosis of pesticides poisoning

- **Pavla Martinková**

(TJ01000478) Construction of sensor for quantitative detection of antibodies against tissue transglutaminase for celiac disease diagnostics

- **Anna Kostelníková**

(TJ01000478) Construction of sensor for quantitative detection of antibodies against tissue transglutaminase for celiac disease diagnostics

- **Miroslav Pohanka**

(TJ01000478) Construction of sensor for quantitative detection of antibodies against tissue transglutaminase for celiac disease diagnostics

RESEARCH AIMS

THE REVIEW OF RESEARCH PROJECTS CARRIED OUT AT THE FMHS

Daniel Jun

A long-term organization development plan 1011 – Health problems of the weapons of mass destruction

Jiří Páral

A long-term organization development plan 1011 – Clinical fields

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