In the World of Modern Medicine

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700 YEARS CHARLES IV
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The Faculty of Medicine in Hradec Králové is the oldest school providing university education in Eastern Bohemia. It came into existence on October 13, 1945, first of the medical faculties founded after WW II, and became a part of the Charles University, the oldest university in central Europe and north of the Alps. It offers undergraduate and postgraduate education and organizes courses focused on the continuing education of doctors.

Excellent preparation for practice

Today’s doctors cast perform real miracles compared with what they could do just several years ago. Contemporary medical science is based on a wide interdisciplinary approach and helps make what was once impossible now possible. However, employing such new approaches requires great skill and mastery to connect and link in an innovative way and to become familiar with the latest devices and equipment. This is why we put stress on modern teaching methods using IT technology. The students then strengthen their theoretical knowledge by using them in practice.

The spirit of cooperation

We closely cooperate with the University Hospital Hradec Králové, where specialized classes for students are run by head doctors of individual clinics and by other experts from the University Hospital Hradec Králové.

Pharmaceuticals are an inseparable part of a doctor’s work. This is why we closely cooperate with the Charles University Faculty of Pharmacy in Hradec Králové. There is a common Department of Physical Education shared by both faculties.

Improvements in technology continue

Modern technology of the leading world-renowned companies can be found in all workplaces throughout the faculty. The equipment is continuously updated and modernized.

Inexhaustible source of information

The medical library offers an enormous collection of the latest publications as well as classical works. In addition, users have access to on-line editions of leading scientific journals.

International partnership and student mobility

The Erasmus student exchange program offers the possibility to spend one or two terms at European universities. Similar programs are also offered by the IFMSA organization.

Our faculty has a long-standing and above-standard partnership with the prestigious MAYO Clinic in Rochester, USA. This unique long-term cooperation surpasses other faculties of medicine in the Czech Republic and enables us to send approximately 10 undergraduate or postgraduate students on a three-month study stay to Rochester. The stays are of a scientific nature, usually linked to the sphere of interest and a prospective field of the future professional interest of our students. Such a partnership often brings publication outcomes. All those who have participated in this stay at the MAYO Clinic unanimously agree that it is an extraordinarily stimulating activity, which in some cases continued in the form of a fellowship at other prestigious clinics in the USA.

Another often used option of cooperation with foreign institutions is the agreements between individual faculties. Moreover, there are hundreds of other agreements held between our university and other such institutions which open up avenues of international cooperation for our students and staff.

Rich cultural life

We organize annually a spring concert where well-known artists of the musical world like P. Spořil, J. Švábeček, D. Biťa, O. Havlíček and the Melody Makers, J. Suchý and J. Molavcová perform. We really value our autumn concert where the students of our faculty perform. Our medical faculty also contributes to the cultural life of the town and organizes various exhibitions.

Since 1990, we have organized many such exhibitions in the faculty building. Paintings, drawings, graphics, art and documentary photographs, textile art or cartoons are exhibited in the Na Hradt Gallery, in the building which also hosts the medical library. Various authors not only from East Bohemia but from other regions present their works here. We could see works from artists like O. Zoubek, V. Komárek, I. Jandová, B. Votavová, B. Borovský, J. Anderle, V. Renčín.

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A basic field of medicine

The biggest portion of teaching is concentrated in both terms of the first study year in the master’s degree program. Systematic and topographic anatomy are taught to the students in the Czech program as well as those in the English program. The dentistry students have applied anatomy of the head and neck in their third study year and the course is taught in cooperation with the Department of Dentistry. We offer an optional subject called Clinical Anatomy and Chosen Chapters from Topographic Anatomy to the second year students of general medicine. These subjects are offered in both the Czech and English language programs. The seminars are organized in cooperation with teachers from clinical fields, mostly from surgery, radiology, otolaryngology, orthopedics and physiotherapy. Anatomy lessons are also included in the 1st year of the bachelor’s degree study program in General Nursing.

To help the students

Through electronic teaching supports the Department of Anatomy offers students of all study fields a complete groundwork for lectures and practical seminars; collections of photographs from the Museum of Anatomy or e-learning courses on more difficult topics, for example neuro-anatomy and topographic anatomy. Discussions and feedback are ensured by an e-learning forum and a Facebook profile of the department.

Research activities of the department

1. Scanning electron microscope of biological samples – Cardiac valves and vascular grafts – morphological examination of aortic valves and pulmonary valves in a tissue bank, explanted pathologic valves, and valves from experiments on animals.
2. X-rays and dental implants (in cooperation with the Department of Dentistry).
3. Materials implanted into the bones of experimental animals (in cooperation with the Department of Orthopedic Surgery).
4. Examination of biodegradable esophageal stents, artificial eye lenses, and similar items.
5. Experimental intoxication of the central nervous system, inhibitors of cholinesterase and observations concerning the effect of prophylactic administering of antitoxins by histochimical methods.
6. Research of the permanent cartilage development and the importance of calcification of rib cartilages in men.
7. Research of blood supply and vein drainage of the heart.

From cells to tissues and organisms

Medical biology is a traditional part of the study programs of General Medicine and Dentistry. The classes cover two semesters. The contents of the first semester is cell biology; we try to introduce the cell as the basic element of life. At the same time, we emphasize the dynamic aspect of the cell’s life and the interactions of individual cell structures and compartments involved in basic cell functions. The students have the opportunity to become acquainted with microscopic techniques which enable a long-term observation of living cells, such as phase-contrast microscopy, time-lapse video microscopy, and fluorescent microscopy using color fluorescent proteins. Another important teaching topic is the use of cells grown in vitro as a biological model for research as well as for testing cytotoxicity. The second semester is devoted to the basics of molecular biology, medical genetics, and the genetics of tumors. The students isolate DNA, carry out gel electrophoresis of nucleic acids, and prepare karyotypes during the practical seminars. Other student activities are focused on praciticing the basics of Mendelian genetics, including analysis of pedigrees, and on using molecular methods for diagnosing hereditary diseases and for identifying people. In addition, during the course, students have to prepare their own presentation concerning the latest discoveries in the field of biomedicine. The follow-up of the mandatory subject Medical Biology is the elective subject Clinical Applications of Molecular Biology.

Research

Since the 1960s, the basic research focus of the department has been the same: the study of the dynamics of basic cell processes. We have always employed phase contrast microscopy in connection with time-lapse microcinematography for observing cell dynamics. In this respect, our department has always been a pioneer within the whole of Europe. Currently, a dynamic time-lapse cytometry is still our basic experimental approach. The knowledge from dynamic cytology is used for the study of biological characteristics of chosen groups of substances, namely drugs and food supplements. The focus of this area of toxicology in vitro was both linked with the research of biological mechanisms of the studied entities and also with another much wider area of study – the effort to introduce so-called alternatives to experiments on laboratory animals. Our department has been at the forefront of this field of research in the Czech Republic, which is reflected in our close cooperation with similar European centers for alternative methods such as FRAME, ZEBET, ECVAM.
Modern instruction on how organisms work

The traditional approach to practical physiology teaching based upon animal experiments is already a thing of the past. Ethic, legislative, economical as well as scientific reasons have caused a significant limitation to experiments on animal models not only in our country but worldwide. We either use alternative approaches when measuring, observing and carrying out non-invasive experiments on human volunteers, which means on the students themselves, or other alternatives represented by computer programs that simulate chosen physiological processes.

The spectrum of research methods

The laboratory of tissue cultures provides facilities for research into the primo-cultures of hepatocytes isolated from rodents. Many fluorometric methods have been introduced to evaluate liver damage (for example by statins). We prepare histologic samples, slices of tissue which we induce via local injection of hepatotoxic substances and the regenerative effect. Furthermore, we research liver regeneration induced by partial hepatectomy or toxic liver damage, sensitivity of the liver to hepatotoxic substances and the regenerative response of the liver when affected by a non-alcoholic fatty liver disease (NAFLD, NASH), extraplastic cholestasis induced by ligation of the biliary tree, and mitochondrial respiratory enzymes. The appearance of new methods of modulating the growth and differentiation of stem cells has expanded this scope. In 1995, we became the first institution in Central Europe to introduce computer programs that simulate the growth and differentiation of cells, the possibility of modelling the growth and development of any cell type.

The theam of experimental hepatology

Under the leadership of Professor Červinková, the team has the long term goal of researching liver injury, including mechanisms of the impact of model hepatotoxins and substances with a possible hepatoprotective effect. For this purpose, we use a three-dimensional reconstruction of cells and tissues grown in 3D cell cultivations. Understanding the histological structures of organs is demanding on the imagination as we have to link the view of the studied structure in the light microscopic level to its ultrastructure and at the same time we have to understand the three-dimensional arrangement of its building components. For this purpose, we use a three-dimensional reconstruction of cells and tissues. In their practical coursework students now have the chance to make their own digital images of tissues and to use them together with interactive e-courses during their self-study.

Metabolism of proteins and amino acids

This research is led by Professor Holeček and is focused on experimental studies into the metabolism of amino acids in relation to the pathogenesis of proteocatabolism in diseases complicated by cachexia (acute and chronic conditions of the liver, renal insufficiency, sepsis). A further focus of the research is the side effects of nutrition supplementation recommended to induce positive protein balance in costal muscles and the importance of change of aminoacidaemia in the pathogenesis of liver encephalopathy. In addition, Professor Holeček’s research interests for many years have focused on amino acids with branch-hained chains and glutamine.

Experimenetal cardiology

Associate Professor Adamcová is a leading person in this field in our department. Her work is closely linked with the research of the cardiology group from the Department of Physiology. Her present research activities are focused on the study of the cardiotoxicity of antineoplastic substances, namely on the use of cardiotoxic drugs like doxorubicin and tamoxifen T and I in the evaluation of the cardiac and neurotoxic and cardio-protective effects of new drugs, and on predicting the development of anthracycline cardiomyopathy with the help of biomarkers of cardiac damage. Further research involves the problem of re-modelling the myocardium under various pathological conditions and the possibility of using pharmacologically hypertrophic and fibros.

A unique means for studying tissues and cells

A histologic approach is irreplaceable when examining tissues and multicellular structures grown in 3D cell cultivations. Understanding the histological structures of normal tissues is a prerequisite for the study of physiology and pathology. This field is demanding on the imagination as we have to link the view of the studied structure from the light microscopic level to its ultrastructure and at the same time we have to understand the three-dimensional arrangement of its building components. For this purpose, we use a three-dimensional reconstruction of cells and tissues. In their practical coursework students now have the chance to make their own digital images of tissues and to use them together with interactive e-courses during their self-study.

A broad interdisciplinary approach

We prepare histologic samples, slices (for example paraaffin-embedded, semi-thin or ultrathin for transmission electron microscopy), special staining of tissues (histochemical or immunohistochemical detection), microscopic examination, description and interpretation of findings, image analysis as well as taking micro-photographic images. We also have laboratories for cultivation of stem cells and a laboratory for molecular morphology. We provide a base for the experimental endeavors of students from other fields of natural science, preparation of their bachelor or diploma theses or even for PhD dissertations. We are also expanding our contacts abroad. Our postdocorial fellows do their research fellowships, for example, at the University of Oslo, Singapore or Galway (Ireland) and their research topics range from research of stem and cancer cells to the analysis of mitochondrial complexes.

The first in Central Europe

Traditional research topics at our department are the healing of tissue lesions, including regeneration of axons and angiogenesis. The appearance of new methods of isolating tissue specific stem cells has expanded this scope. In 1995, we became the first institution in Central Europe to introduce the method of isolating and cultivating neural stem cells and characterizing their behavior and differentiation potential in vitro and after transplantation in recipients. We provided the findings from our research to other work places and we used them as well during the research of other types of stem cells and progenitor cells, for example cells from bone, dental pulp and periodontal ligaments, and ES and iPS cells. We have received funding for the research of menenchymal cells within the 7th framework EU program called Purstem. Besides in vitro analysis, we study the tissue microenvironment (niche) of stem cells in the subependymal layer during the neurodevelopmental process in striatum caused by Huntington’s disease. We also use animal models for observing cell participation in the healing of tissue, for example regeneration of muscle tissue which we induce via local injection of cardiotinom, while irradiation (either local or of the entire body) serves for suppressing a homograft and immune response of organism. With the availability of pluripotent cells, the possibility of modelling the growth of tissue in 3D cultures has begun to appear, as has the study of signalling pathways involved in the regulation of self-renewal and the differentiation of cells. The application of knowledge of such regulation to a guided differentiation enable us to induce generation of any cell type.

Department of Physiology

Charles University Faculty of Medicine in Hradec Králové

Department of Histology and Embryology

Charles University Faculty of Medicine in Hradec Králové
For the better health of the population

The field of hygiene and preventive medicine is an inseparable part of curricula at all medical schools. It deals primarily with specific and nonspecific primary prevention, including the evaluation of health risks. Specific primary prevention focuses on specific risks and diseases (health prevention). Nonspecific primary prevention includes the overall strengthening and development of health (support of health). The objective of hygiene and preventive medicine is to protect and support health in terms of activities and measures that will create and protect healthy living conditions, prevent the occurrence and spread of infectious diseases and epidemics and other significant health disorders.

The field closely cooperates with other branches aimed at epidemiology as well as with fields focused on diagnosis and treating diseases which appear on a mass scale and which are preventable and of a determined nature.

Assessment of the level of health risks

We are focused in the long term on the toxicology of polycyclic aromatic hydrocarbons. The research is aimed at the study of their absorption and how they influence genotoxic and epigenetic mechanisms of mutagenesis and carcinogenesis through bio-transformation. In addition, we focus on the observation of post-exposure changes in the function of the immune system. Other research directions that have to be mentioned are the study of biological interactions in mixtures of substances, the parameters of the kinetics of dermal absorption, the evaluation of low frequency noise and their effect on health and also mathematical models for substances carried on the air.

Population study

We focus on perceiving and objectifying health risks resulting from specific life-styles, personal strain, and/or work. Within the study on work risks, we use questionnaires – a traditional method – and we quantify it by analyzing the level of salivary cortisol as an indicator of chronic stress. The studies we perform are also aimed at observing the quality of life in various professions and groups of healthy patients. Particular attention is devoted to parameters evaluating the quality of treatment and preventive care and their effect on the quality of life of senior citizens.

The basic means of communication

The Department of Languages is responsible for specialized language preparation of students of medicine in all master’s degree and bachelor’s degree programs. In addition, we organize examinations of students in the doctoral study program and tests of language skills for applicants who want to participate in the fellowship program at the prestigious Mayo Clinic, Rochester, USA or other internships within Erasmus and other EU programs. We also regularly organize tailored evening language classes for employees and students.

An important role which the Department of Languages plays, in addition to teaching, is expert translations and proofreading of various articles, essays or other texts for the staff of the Faculty of Medicine or the University Hospital and other specialists from all fields of medicine.

Though the work of the department is very diverse and wide, its basis has always been and still is the mandatory language preparation of students. In Czech programs, mandatory courses of English are taught and, vice versa, in English language programs Czech is taught. In both the Czech and English language programs students must take mandatory courses in Latin medical terminology.

English – indispensable at every step

English is taught as a mandatory subject and is taught as ESP (English for Specific Purposes). The focus of the course is specialized medical vocabulary in all basic medical fields. Everyone who finishes the course will be an active user of medical English, will be able to read bibliographies in English, and present results of scientific work in English. The courses are held in the third study year and thus the student can bring to the study of Medical English knowledge gained in theoretical subjects during the first two years of study.

Latin – the basis for medical terminology

Latin has always been a traditional part of medical education. Even today Latin medical terminology is an inseparable part of the students’ knowledge – the knowledge of future doctors and nurses. The department organizes classes for all programs in the first year of study. The contents are the medical Latin and Greek necessary for a good understanding of theoretical subjects like anatomy and later for successful use in the medical practice.

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Czech in the hospital, medical Czech and Czech for advanced students

Subjects lasting one year (Czech in the Hospital, Medical Czech, Advanced Medical Czech) are held in the first year of study. Subjects of Czech for international students. These courses practice and deepen language skills and focus on doctor-patient communication. The topics covered within these specialized subjects taught at the hospital. The aim is to develop good language competence in students so that they can be able to communicate with patients and take the patient’s history. We consider speaking, active usage of language and listening to be the most important language skills. To improve the language competence of students and widen the word stock the latest teaching technologies are used during the classes.
Rich clinical coursework

We have succeeded in introducing clinical biophysics classes that focus on clinical examination and evaluation in which students have the opportunity to examine and perform medical evaluations using the basic theoretical knowledge of the perimeters, audiometers, refractometers, ultrasound, EKG, and others. This type of clinical class has been introduced within the last ten years with the help of several development projects. The student laboratory represents a virtual doctor’s office in which students are in the role of patients as well as examining doctors. Each laboratory examination and measurement thus simulates one examination, including writing notes in the patient’s file in an outpatient information system. The data obtained are processed by the students and then stored into this system in the format that is usual and common in normal medical practice.

Research

As for research, the department focuses namely on applied research and development in cooperation with clinical working places and regional producers of medical and health technology (ELLA-CS). We have gradually expanded our congruity and equipment of our own construction, specifically the Instron system for measuring the load characteristics of materials or medical and medicobiological prototypes made of such materials. Examples of such products are various reinforcements, filters, or orthodontic springs and arches. The system is complemented by a special heated air chamber with a Julabo thermostat for testing materials with shape-memory. In addition, we have developed a special measuring device of our own construction for measuring the load characteristics of stents, a Nikon imaging system for analyzing the surface characteristics of materials or studying more complex structures with the use of fluorescence. The measuring systems are fully automatic and computer controlled with the use of our own software or the use of a modular system from National Instruments and the LabVIEW laboratory. For the purpose of modelling and simulations, we use compatible programs such as Comsol, Matlab and Simulink. The outcome of our research work in this field is, besides many publications, industrial designs which were accepted and recognized by the Industrial Property Office in 2009, 2010, and 2014.

Department of Medical Biophysics

The chemistry of life

Chemistry and biochemistry have always been among the subjects that students are interested in ever since the beginning of the Faculty of Medicine. Because of the worldwide development in this field, biochemistry has come to dominate and the role of chemistry which has diminished to the basic necessary of understanding the biochemical processes. We have gradually introduced seminars into the classes which, together with laboratory classes, provide the students basic information on metabolic processes in organisms and give a good foundation for understanding pathology. Biochemistry is a dynamically developing field and a lot of new crucial information must be introduced into classes. For this reason, we welcome the possibility of introducing elective subjects. In cooperation with clinical workplaces we have introduced a subject devoted to the pathobiocchemistry and metabolic disorders. Other subjects include pathobiocchemistry of cells and toxicology. All of these elective courses are available in English as well. To make up for any lack of knowledge from secondary school, we offer our students the elective subject of Basics of Chemistry.

Another aspect of our department is the teaching of future dentists. A portion of the biochemistry hours is dedicated to the newly introduced subject Materials for Dental Medicine. From the students experiment and work in the chemical laboratory with basic stomatology materials. They then continue to work in the phantom laboratories of the Department of Dentistry. For many years we have also organized secondary school competitions at various levels. We also participate in preparatory courses for study at our medical school.

Mechanisms of cell death and reparation of DNA

Our interest in the problems of molecular mechanisms initiated by DNA mutations is also observed in our long-term cooperation with the Department of Radiotherapy at the Faculty of Military Medicine at the University of Defense. The effort to find more efficient antineoplastic treatment or to lower the side effects of traditional chemotherapeutic drugs requires searching for other approaches, including the study of new potentially effective substances and their combinations with already established treatments.

In the effort to find more efficient antineoplastic treatment or to lower the side effects of traditional chemotherapeutic drugs, we have been working on the molecular basis of the repair and regeneration of cells induced by ionising radiation. DNA damage can be seen in our long-term cooperation with the Department of Radiotherapy at the Faculty of Military Medicine at the University of Defense. The effort to find more efficient antineoplastic treatment or to lower the side effects of traditional chemotherapeutic drugs requires searching for other approaches, including the study of new potentially effective substances and their combinations with already established treatments.

Proteins of connective tissue and expression of appropriate genes

Our third traditional research area is the study of connective tissue and fibrogenesis. Many diseases are connected with a changed metabolism in connective tissues. We study the influence of extracellular matrix on the behavior of normal and carcinoma cells.
For a healthier society

Social medicine is an interdisciplinary medical field which connects the health status of an individual patient or a group of patients with a certain disease. It studies the health of the population and the care of health within the framework of the whole society. It asks three basic questions: What is the health of the population? Why is it so? What can improve it?

When we began to teach this subject field in English, we had to adapt the curriculum so that it was culturally sensitive and provided students with the opportunity to study various approaches to systems of health care so that the students could show fellow classmates the specifics of the health care in their home country.

We endeavored to highlight three important aspects. The first concerned linking social medicine with clinical medicine and clinical fields. The second was close cooperation with preventive medicine (see the topic of the type of citizen’s health) and the third was, and still is, how the patient or individual views his or her own state of health and healthcare. The interest of students had been gradually rising, and when some 95% of students signed up for the optional state exam in social medicine (involving defending of a thesis – not a very common practice at other medical schools), the management of our faculty decided that the state exam in this subject will again become compulsory for all students, including those from abroad.

General medicine

The Department of Social Medicine provides instruction for students of general medicine. Classes are held in the winter terms of the 2nd and 5th study year. For those who are interested, we also offer this subject as an elective in the summer term of the 5th study year. At the end of the 5th study year, the students go for a week-long stay at a general practitioner of their own choosing. At the end of the 6th study year, the whole subject is reviewed and appears as part of the state exam on preventive medicine.

Nursing

The Department of Social Medicine, within the framework of a separate division, teaches students in the 2nd year of the medical program and, in cooperation with the University Hospital, in the first through third year of the bachelor's degree program in General Nursing.

Principal research programs

The main research program is the psychosocial and medical problems of children and adolescents. We do research on pain in children, how adolescents and children cope with difficult situations, social support for children and adolescents, and the quality of life in children and adolescents. Another focus of research is a broad international study financed by the World Health Organization – Health Behavior in School-Aged Children, 2010. The second research program, which ran from 2009 to 2011, concerned psychosocial problems in the adult population, specifically how individuals viewed their own illnesses.

The third research program, begun in 2012 and still being undertaken, is financed by the PRVOUK 37/09 project of the Charles University. It focuses on the psychosocial and health problems of senior citizens.

The fourth research program, begun in 2007 and still active, is devoted to improving the work of practicing doctors. We studied the approach of general practitioners to the prevention of cardiovascular and gastrointestinal diseases (an international comparative study in the countries of Middle and Eastern Europe).

Teaching in the digital age

We have gradually created and continuously upgrade study texts available to our students at the webpages of our department, and have introduced three supporting computer applications. The first such applications were interactive presentations purchased from the companies Pharmacos-a-logy and Pharmatutor. They provide students with illustrations, descriptive presentations of fundamental problems in the field. This has been closely related to the usage of computer simulations which have gradually replaced demanding experiments on animals or on isolated organs and help demonstrate the mechanisms of the effect of the chosen drugs or their pharmacokinetics. The third supporting application is case reports from clinical practice which were prepared in cooperation with clinical practitioners from individual clinics and presented in the form of interactive web applications describing solutions to specific pharmaco-therapeutic situations. All the created teaching materials are at present available on our faculty's secure server – moodle.lfhk.cuni.cz.

Research in clinical pharmacology

We focus on the usage of individual and population modelling of pharmacokinetics, pharmacodynamics, and bio-indicators of therapeutic and toxic effects of drugs for individualization in pharmacotherapy. In the field of clinical pharmacology, we have been cooperating for 15 years with the Department of Dermatology and Venerology at the University Hospital Hradec Králové on the topic of methotrexate in curing-focal psoriasis. Other areas of clinical pharmacology research are the treatment of idiopathic juvenile arthritis, Crohn’s disease, and the usage of non-invasive methods of examining bio-indicators in respiratory tract disease with inflammation.
When and how disorders occur in the body

In the curriculum of General Medicine at our Faculty, pathophysiology comprises 157 instruction hours in the 3rd study year before students move on to clinical coursework in the fourth year. Pathophysiology is quite unique as it does not have to introduce many new facts but has to teach (force) the students to integrate their theoretical knowledge to understand the origins (etiology) and development (pathogenesis) of diseases so that those diseases (or their complications) may be prevented or adequately treated.

In our instruction a comprehensive (global, holistic) approach is maximally applied to help students understand the basics of the disease. Such an approach is often mistakenly considered to be the exclusive domain of alternative/complementary medicine. Pathophysiology is a field that can be very unpleasant for students who are accustomed mainly to memorizing facts. However, it is always better for the patient if the doctor does not mechanically apply the “best clinical practices” (guidelines). During the final oral exam, students are evaluated not only in terms of their knowledge but also in terms of how trustworthy they would seem to be as doctors.

Electrophysiology of vision

The electrophysiology laboratory currently represents the main aim of the department’s research and involves pursuing new variants of visual evoked potentials and cognitive brain potentials, especially during different variants of motion stimulation, with testing of their new diagnostic applications. The importance of the laboratory in Czech clinical neurophysiology is documented by the fact that Assoc. Prof. Kremlík is the president of the Neurophysiological Society of the Czech Medical Association of J.E. Purkyň.

Immunotoxicology

Since 1997, research in immunotoxicology has been the responsibility of Associate Professor Lenka Boršáková, M.D., Ph.D. It takes place in cooperation with a number of theoretical and clinical departments of the Charles University Faculty of Medicine and University Hospital and also foreign institutions (Faculté de Médecine – Université de Montréal, National Institute of Occupational Health, Oslo). In the last ten years, research has focused specifically on assessing the benefits and risks arising from the Greekerman method of psoriasis treatment (pharmacetical coal tar with a high content of poly cyclic aromatic hydrocarbons + UV radiation). This research includes tests such as genotoxicity, oxidative stress, epigenetic analysis (methylation of the p53 protein), and protective capacity (25-hydroxides of D vitamin). Furthermore, we investigate the pathophysiology of inflammation in patients suffering from psoriasis and associated comorbidities, focusing on the risks arising from metabolic syndrome.

Examination of visual evoked potentials

The Goeckerman regimen for the treatment of psoriasis.
In direct contact with the patient

The 1st Department of Internal Medicine - Cardiology has a long tradition of teaching internal pedipecducts and internal medicine. It has a long tradition of high-quality bedside teaching with special emphasis on cardiology and angiography. Echocardiography and cardiac catheterization labs are also part of the curriculum. Postgraduate seminars and workshops are held on a regular basis for physicians not only from the region but also from the entire country, such as the popular international workshop held by the Association of Interventional Cardiology of the Czech Society of Cardiology, weekly cardiology refresher courses and others. The annual Rokitanski day provides updates on recent developments in cardiology in general and on services provided by the department. It is organized on a multidisciplinary basis and is always very well attended, not only by GPs and cardiologists.

Gastroenterology

Our department is among the largest and most technically and technologically advanced centers in the Czech Republic. It uses all available tools for modern diagnostics and therapeutic procedures at the highest level. Coronary interventions, bilateral cardiac catheterizations and other invasive interventions like atrial septal defects/FOG, paravalvular leaks and left atrial appendage closures are part of routine practice. Furthermore, we perform endovascular interventions on aortic and on mitral valves (aortic valve dilation, TAVI and Mitralclip implantations). The Department of Non-invasive Cardiology and Department of Angiography perform EKG examinations, Doppler and 2D studies of blood vessels, stress echo tests including CPET and other investigations. It is equipped with a modern 3D echocardiography system. We also have counselling units which provide specialized care. There has recently been a significant development in the treatment of patients with peripheral vessels disorders.

Rheumatology

We focus on the diagnostics and treatment of systemic connective tissue disorders. The work (diagnostics and therapy, research and teaching) of our rheumatologists concerns systemic lupus erythematosus, systemic sclerosis, inflammatory muscle diseases (polymyositis / dermatomyositis), autoimmun vestibulitis, rheumatoid arthritis, anklosing spondylitis and other systemic diseases requiring highly professional diagnostics or intensive treatment. Rheumatology provides comprehensive care which includes specialized examinations (joint ultrason and synovial fluid analysis, capillaroscopy) and the prevention and treatment of osteoporosis. The workplace has become a pioneer in intense pulse treatment of severe rheumatic diseases, both with the usage of glucocorticoids and immunosuppressive drugs or immunomodulating immunoglobulins.

Research

The department participates in a number of prestigious international clinical trials. Clinical research concentrates on, amongst others, biomarkers in acute coronary syndromes, circulation support systems, CMR in myocardial and vascular disorders, secondary hypertension, and out-of-hospital cardiac arrest.

All for a healthy heart

The department operates with two general cardiology wards, one angiology ward, and intensive and high dependency units. We treat cardiac rhythm disorders and perform cardiovascular implantplants, cardiac pacemakers, cardiacverter-defibrillator implantplants, and invasive treatment of various arrhythmias with modern equipment such as the CARTO system. The Department of Interventional Cardiology performs a comprehensive range of the latest diagnostic and therapeutic procedures at the highest level. Coronary interventions, bilateral cardiac catheterizations and other invasive interventions like atrial septal defects/FOG, paravalvular leaks and left atrial appendage closures are part of routine practice. Furthermore, we perform endovascular interventions on aortic and on mitral valves (aortic valve dilation, TAVI and Mitralclip implantations). The Department of Non-invasive Cardiology and Department of Angiography perform EKG examinations, Doppler and 2D studies of blood vessels, stress echo tests including CPET and other investigations. It is equipped with a modern 3D echocardiography system. We also have counselling units which provide specialized care. There has recently been a significant development in the treatment of patients with peripheral vessels disorders.
How does the human body work?

Having been established in 1990, the department offers standard instruction in internal medicine. Simultaneously, we teach gerontology, diabetology, and intensive metabolic care. The field of intensive metabolic care is new and the instruction is at a very high level and unique in the Czech Republic. metabolic care, diabetology, and gerontology are also taught in the context of specialized and postgraduate training of doctors.

Versatile care

The department consists of two intensive care units, internal and geriatric, and four standard inpatient wards – metabolic, geriatric, diabetological, and follow-up care. The department is a professional and technical base for the Intensive Care Diabetes Center and provides outpatient and inpatient medical care with a particular focus on:

- diagnoses and treatment of acute conditions in old age
- diagnoses and treatment of internal diseases with a special focus on internal diseases in old age and the problem of premature aging
- treatment of patients with acute and chronic renal failure undergoing hemodialysis and peritoneal dialysis (in cooperation with the Hemodialysis Center, University Hospital)
- monitoring and managing hospitalized patients following renal transplantation
- treatment of patients with acute leukemia; transplantation; supportive care; hemodynamics center; myelodysplastic syndrome and myeloproliferative disorders; chronic lymphatic leukemia;
- diagnostic and treatment of acute conditions in old age
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- monitoring and managing hospitalized patients following renal transplantation
- treatment of patients with acute leukemia; transplantation; supportive care; hemodynamics center; myelodysplastic syndrome and myeloproliferative disorders; chronic lymphatic leukemia;

Admission of seriously ill patient

Research

Since the establishment of the department in 1990, research has focused on nutrition support, metabolic care, and geriatrics. This program has been gradually extended for diabetology, nephrology, and transplanta-

Research laboratory at the department

Research in new directions

Autoimmune and alloimmune transport programs and their clinical treatment associated complications are also among our research priorities. This research is aimed at early diagnosis of opportunistic infections and treatment of associated complications. We are among the few centers in the Czech Republic which uses extracorporeal photopheresis to treat such reactions. We are also engaged in the treatment of renal and gastroenterology disorders; chronic lymphatic leukemia;

In the hands of a well-coordinated team

Currently, our department is developing a ward for standard hematological, endocrinological and general internal care. In addition, we have a ward section for lower level intensive care with patients with chronic myeloid leukemia, thrombocytopenia, and acute lymphoid leukemia; 500 05 Hradec Králové

Hemapheresis Center

How to treat patients even better

The main research in hemato-oncology is focused on developing more refined diagnostic and treatment using immunological and molecular-genetic methods. Important therapeutic advances have been introduced in the form of tyrosine kinase inhibitors in the treatment of chronic myeloid leukemia, antibodies in lymphoproliferative diseases, and immunomodulation in the treatment of myeloma. The financial demands in such procedures have led to an increased number of patients placed into clinical studies and to the establishment of a data center. An important overall change in the field was the necessity of using molecular-genetic methods in diagnosing hematological and oncological diseases. Therefore, even here at the University Hospital we have seen rapid development of such methods. In 1997, besides the ongoing routine autologous transplantation program, the allogeneic transplant program was launched. In 2015, one thousand patients underwent transplantation therapy at our department.
Work and health

The department serves as a center for assessing occupational diseases in the Hradec Králové region. Furthermore, we provide our clients with high quality comprehensive occupational services, care in the field of travel medicine, and the comprehensive curative-preventive care of general practitioners. Good health is of the utmost importance for all human beings and we try to ensure it by preventing its deterioration due to unfavorable work environment factors. We have fully qualified medical and nursing staff with many years of experience in the field and we have at our disposal quality and validated diagnostic methods. Our surgeries are therefore equipped with the latest technologies necessary for a comprehensive examination within preventive care. We provide instruction for students at the Charles University Faculty of Medicine in Hradec Králové in the field of occupational medicine and occupational diseases, and post-graduate training for doctors in the field of occupational medicine.

Outpatient department

We provide occupational health services (preventive care) for contractors (enterprises, companies, institutions, schools, etc.). We perform examinations of the health condition of their employees in accordance with the decision of the public health authority (hygiene services) concerning entry, periodic, ordinary, extraordinary, exit and follow-up preventive check-ups, workplace inspections, assessment of medical fitness of employees to perform work activities, counseling on health risks and opportunities of preventing occupational diseases, supervision of the working environment and working conditions of employees. The department cooperates with public health authorities when assessing occupational risks and investigating occupational diseases.

Accurate methods, close cooperation

In terms of the physiological examination methods, the department performs EKG, spirometry using the flow-volume curve method, water cooling tests and plethysmography of peripheral vessels of the upper extremities, screening of hearing with threshold tone audiometry with hearing loss calculations based on Fowler, otoscopic examinations, eye examinations using optotypes, and examinations of color perception. The department closely cooperates with other medical professionals at the University Hospital and outpatient specialists in internal medicine, infectious medicine, neurology, orthopedics, pulmonary medicine, allergology, and immunology, angiology, otolaryngology, radiology, nuclear medicine, psychiatry, and others. The department also closely cooperates with a consultant physician, Jansalva Vantěcková, M.D., for occupational skin diseases.

When assessing the conditions for the onset of occupational diseases, the department cooperates with public health authorities.

In the interest of lungs

The department is involved in the instruction of students at the Faculty of Medicine in Hradec Králové and serves also as a postgraduate training center for some specialized procedures. It performs comprehensive diagnostics and treatment of diseases of the respiratory system, including intensive care. In addition, it provides specialized counseling for severe forms of chronic obstructive pulmonary disease (COPD), severe forms of bronchial asthma, cystic fibrosis in adults, interstitial lung processes and sarcoidosis, and patients treated with oxygen. The pulmonary oncology care center is part of the Comprehensive Cancer Center. The Department of Pulmonology is heavily involved in the National Research Database of COPD, as well as in COPD research in multicenter projects of European significance. Doctors at the department are the authors of several recommended procedures for diagnostics and treatment of lung diseases in the Czech Republic.

Pulmonary Intensive Care Unit

The Pulmonary Intensive Care Unit is designed to care for patients at risk for lung failure. In particular, it specializes in the treatment of acute hypercapnic respiratory failure from various causes, in the treatment of severe pulmonary infections, and in thoracic drainage of inflammatory diseases of the pleura. It is equipped with monitors to observe basic life functions and ventilators to provide invasive and non-invasive ventilation. Doctors at the ICU have introduced a technique of ultrasound navigated drainages, biopsies, and c measure. A sleep lab monitors patients with sleep disorders and is a component of the unit.

Standard department

We provide diagnostic tests and therapy for patients with diseases of the airways, lung parenchyma, pleura, and mediastinum. Examinations for the indication of long-term oxygen therapy or prior to transplantation are also performed here.

Oncological Counseling and Cancer Center

The center provides diagnosis and treatment in patients with lung cancer. There are 5 beds in which chemotherapy is applied during normal working hours. The patients are in a pleasant environment and can spend the time required for drug administration in the company of friends and family. After the medicine has been administered, they may return home with their family or be taken home in an ambulance.

Diagnosis of lung cancer

Functional laboratory

The laboratory provides basic examinations of pulmonary function using spirometry (flow-volume curve, bronchodilator test), and a complete lung function examination with pulmonary plethysmography, including a six-minute walk test (6MWT) to evaluate lung capacity. We also perform bronchial provocation tests as part of the diagnosis of bronchial asthma. When desaturation on exertion has been determined or when long-term, in-home liquid oxygen therapy is indicated, a six-minute walk test (6MWT) is performed.
How to fix what is wrong in the body

The Academic Department of Surgery provides training for the Charles University Faculty of Medicine in Hradec Králové. It consists of 5 departments and one ward. We teach surgery of the abdominal organs, especially benign diseases of the colon and its anorectal region. We deal with peripheral arterial and venous diseases, surgery of neck, heart, spine and chest injuries, and bone fractures and other injuries of the limbs. We are interested in new trends in surgery of the skeleton, breast surgery and surgical intensive care. In addition, we teach general methodology of surgery and physical examinations of the entire body. The instruction also focuses on diseases of the central nervous system, its vascular diseases and infection. The students are introduced to the basic issues of plastic surgery and burn treatment, orthopedics, and urology.

Nursing practice in surgical fields

The subject is approached as a theoretical and practical whole. It is part of a complex of subjects on clinical nursing. It introduces the students with basic clinical conditions and diseases in the surgical fields.

Summer program at the University Hospital – Surgery

Students in their 4th year study attend a 10-day (2-week) program at the clinical workplaces of the Academic Department of Surgery or, by agreement, at other surgical wards in the Czech Republic and abroad. Students get to know standard wards, outpatient departments, operating rooms, and intensive care units.

Pre-state examination program in surgery

In the 6th study year, students prepare for the state exam in the individual departments of the Academic Department of Surgery and in some regional clinics and departments led by senior consultants. The pre-state examination program is in the form of a 2-week stay in which students actively attend the wards of general surgery, urology, traumatology, and vascular and plastic surgery. One week is spent at the Departments of Urology, Cardiac, and Thoracic Surgery, Neurosurgery and Orthopedics. The other week is devoted to seminars led by tutor specialists.

Course on suturing and surgical skills

This course, open for 10-15 students in the General Medicine program, takes place in the 4th study year during the summer semester. The participants have the possibility to learn basic suturing techniques on synthetic skin or on the skin or organs of domestic animals. The method of hands-on training and theoretical information is followed by hands-on practice. At the end of the course, students can suture a 3-cm wound.

Surgery under extreme conditions

In this elective subject, physicians of the Academic Department of Military Surgery inform the interested students about possible emergency situations that may occur in our country or any other location in which our medical experts are often placed in the context of internationally provided aid and assistance. The subject does not repeat topics co-presented in the basic surgery training, but rather complements information about skills necessary for medical procedures provided in exceptional circumstances or under extreme conditions, e.g. war or natural disasters.

Treating and curing

The Department of Surgery in Hradec Králové, with its size and range of activities, is among the largest departments in the Czech Republic. It is an accredited center for the education of young surgeons and a research center of national importance.

General surgery and oncology

We provide care for surgical diseases throughout the digestive tract. We perform operations both for benign and malignant diseases. We perform standard operations on the esophagus, stomach, duodenum, small intestine, colon, and rectum. Standard operations on the liver, gallbladder, bile ducts, and pancreas as well as performed, as well as operations on all types of hernias and stomach surgeries to treat obesity. We carry out standard operations on the neck for thyroid disorders and malignant thyroid disease as well as operations on the parathyroid glands. We offer specialized care for both male and female patients with mammary gland diseases. In 2015, robotic surgery was launched.

Plastic surgery

We are involved in the specialized diagnosis and therapeutic care of congenital and acquired defects, damage and deformities, treatment of fresh injuries and their consequences in so far as these conditions necessitate plastic surgery. We provide medical care for complicated hand and facial injury and their consequences. We surgical treat congenital and acquired tumors, both benign and malignant, which mainly affect the skin. We treat burns to the extent specified by the professional company within our department. We offer cosmetic procedures to our patients. We also perform cosmetic procedures for which the trauma surgeon bears the responsibility. The admission ward is complemented by sites for diagnos-

Vascular surgery

We are involved in the specialized diagnostic and therapeutic care for patients with chronic and acute disorders of the arteries and veins (including injuries) throughout the body, with the exception of the coronary arteries, the ascending aorta and the aortic arch, which are the domain of cardiovascular surgery. The most typical problem we treat is injury to the arteries due to atherosclerosis. Vascular surgery also deals with patients suffering from various complexes of the lower limbs and dialysis patients with chronic renal insufficiency, for whom we perform arteriovenous fistulas for connection to the artificial kidney. Our department provides comprehensive care and counseling for patients and their relatives.
We have only one heart

The Department of Cardiosurgery provides a full range of care for patients with problems concerning adult cardiac and thoracic surgery. We provide care for the entire region, an area with an overall population between 1.5 to 1.7 million. The range of cardiac surgeries includes also the latest trends. In recent years we have annually performed 800 to 900 surgical procedures.

One of the primary responsibilities we have is the teaching of medical students and postgraduate students. We are currently involved in cardiac and thoracic surgery. Prof. Dominík and Asso. Prof. Záček have published several textbooks. The book on surgery of heart valves has also been published in English and Chinese. The department has a long-term accreditation for habilitation and professorship in cardiac surgery and it participates in specialized training (including for board certification).

The field of thoracic surgery, led by Petr Habal, M.D., Ph.D., has received accreditation for training in thoracic surgery. Annually, there are about 250 operations on the lungs, mediastinum, and chest wall.

Catheter aortic valve implantation

Transapical aortic valve implantation

Coronary surgery

In the treatment of ischaemic heart disease we focus on mini-invasive procedures. These include operations without extracorporeal circulation and procedures using mini-invasive (“heart friendly”) approaches. In this field, our workplace participates in the international grant study CORONARY, organized by McMaster University, Canada.

Reconstructive surgery of the aortic valve

These are the so-called valve sparing procedures, out of which the most common are various repairs of incompetent bicuspid and tricuspid aortic valves and further extensive reconstruction of the aortic valve according to the Yacoub procedure (remodelling) or operations according to the David procedure (reimplantation). At our department, we have started up the program of the Ross procedure (the replacement of the aortic valve by autograft from the pulmonary artery and pulmonary valve replacement by homograft). Prof. Jan Vojáček, M.D., Ph.D., deserves much credit for the successful development of this program.

Catheter aortic valve implantation

Transapical aortic valve implantation (introduction of a catheter-based technology into the valve via the apex of the heart) is a gentle way of implanting the aortic valve without the use of extracorporeal circulation and without cardiac arrest. This method is the priority of our workplace in cooperation with the 1st Department of Internal Cardiodynamics.

How to fix the brain, spine, and nerves

Our teaching focuses primarily on issues of traumatology, tumors, and spondylopathy. This allows overlapping of topics shared with neurology. The postgraduate students attend the department during compulsory pre-board certification placement programs. The department is involved in the system of board examinations that take place at various university departments. We are active in training doctoral students. Seven students at the department are currently involved in scientific research (issues of vascular spasms, gliomas, hydrocephalus, trauma, and brain metastases).

In cooperation with doctoral programs of the Academy of Sciences we investigate problems of ischemic spinal cord lesions using the application of human mesenchymal stem cells.

Supporting research programs

In recent years the department has focused especially on clinical programs of electrophysiologically controlled navigated procedures for intracranial tumors. Other research (lead by Dr. Bartoš) involves resection of gliomas in conscious patients and their comprehensive treatment in cooperation with Dr. Plačalová from the Department of Oncology. In cooperation with the Department of Radiotherapy (Prof. Krajinová), we specialize in vascular issues (Dr. Český, Dr. Hobza). In the area of spondylosurgery (Dr. Málek, Prof. Rehák), the Department of Neurosurgery is among the best.

Modern examination methods

Neurosurgeries are unthinkable without good diagnostic imaging. Therefore, during the construction of the new neurosurgical pavilion in 1971, a large area was dedicated to the neuroradiological ward. In 1978, computed tomography (CT) was installed here as the first in the Czech Republic. It enabled us to obtain information concerning the size, location, and pathologic vascularization of brain pathologies, which at that time was unthinkable. In the majority of cases, it allowed us to specify the etiology of the lesion as well.

Another major advance in the diagnostics allowed the introduction of magnetic resonance imaging (MRI). In comparison with CT scans, MRI reveals significantly more anatomical detail in the brain and spinal cord. Nowadays, we cannot imagine surgery of the brain, spinal cord, and spine without the information we receive from MRI.

Technological advances in operating theaters

We use modern operating microscopes, which allow patient-friendly physiological operations during mini-operational approaches. Electrophysiological monitoring (Dr. Mužíková) is also important. Extensive neutralization operations on the brachial plexus are also performed at the department (Dr. Karda). Devices such as an ultrasonic aspirator and laser technology have made it possible to shift the radicalization of the surgeries and thus increase the safety of the patient. A significant shift in the radicalization of the surgeries has meant computer navigation, which enables precise localization of intracranial structures. Endoscopic operations, which are safer for nerve tissue compared to the traditional neurosurgical approach, have developed significantly.

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Teaching associated with practice

The Department of Orthopedic Surgery participates in medical education within the Academic Department of Surgery. Students in the General Medicine and Dentistry programs are involved in lectures, clinical exercises and seminars, including internships prior to state exams in surgery. The same conditions also apply for foreign students who are taught in English. The clinic is also frequented by foreign students in the Erasmus exchange program. For those students who are interested in the field of orthopedics, we organize an optional course where specialists of the clinic lecture and in which students can visit the manufacturer of joint replacements and have the possibility to be acquainted with the production process of implants. In addition, students can practice on models of bones and perform surgery on the models. Part of the training is also specialized in preparing residents. We currently have five residents preparing for board certification in orthopedics and traumatology. The clinic also provides preparation for board certification for young doctors from other orthopedic departments or other fields. An integral part of graduate education is the organization of regular educational seminars. These are mono-thematic oriented events with the participation of experts from the Czech Republic and abroad, conclusions of which reflect major consequences in clinical practice.

Enabling healthy movement

The current priorities include implantation of joint replacements (mainly hip, knee, shoulder) and surgical treatment of the complications of these procedures, including extensive reconstruction and periarticular joint fractures. In the field of general orthopedics, we perform mainly arthroscopic procedures (treatment of meniscal injuries, reconstruction of ligaments and cartilage defects of the knee, surgery of the rotator cuff and instability of the shoulder joint), which enable shorter hospitalization and improved patient comfort. Part of our duties involve the diagnosis and treatment of patients with malignant tumors of the locomotor system. Secondary tumors (often causing pathologic fractures) and soft tissue tumors are treated at the clinic in cooperation with oncologists and vascular and plastic surgeons. Generally, we use methods of limb-salvage surgery. In pediatric orthopedics, our priorities are surgery of femoroacetabular impingement syndrome, pelvic osteotomies, and complex reconstructions. In addition, we perform foot reconstruction for children and conservative treatment of scoliosis. Within bone and joint infections, we give priority to patients with infectious complications of joint arthroplasties, with infectious complications of injuries, particularly caused by resistant bacterial agents, and to patients with diabetic foot problems.

Operations: from traditional to robotic

The Department of Urology provides not only standard and highly specialized healthcare, but it also focuses on research and experimental methods. In the past, one of the major research projects was kidney transplantation. In 1961, the department carried out the first kidney transplantation in the former Czechoslovakia in cooperation with leading experts from other departments. Currently, we are the main kidney transplantation center in the Czech Republic for lower urinary tract dysfunction. Another research program we are involved in is kidney transplant in incompatible blood groups. Other research directions of the department deal with geriatric surgical treatment, including options of prevention, and increasing the safety of minimally invasive operation methods.

Teaching associated with practice

Instruction in urology is organized as part of the curriculum at the Department of Surgery as it is in other surgical fields. Students are taught in the fourth and fifth years of study and then clinical training is provided in the sixth year. The study of urology is organized both in Czech and English and the goal is to teach future doctors basic skills and the latest treatment methods. Postgraduate training also takes place at the Department of Surgery. Postgraduate students are not only doctors from the Department of Urology but also from external urological centers. Specialized education has changed considerably since 2012, and it is provided by separate medical faculties. Starting in December 2013, we began providing board certification examinations at the Department of Urology.
We share information and experience

The department provides teaching of university students in the subjects of First Aid, Basis of Health Care, Principles of Emergency Care, Nursing in Acute and Critical Conditions and, since 2010, we offer a separate 4th-year study in the Den- tistry program. Furthermore, the lectures on dermatology and venereology form a reg- ular part of the undergraduate program in Nursing. Our students benefit from our ar- chives of color slides of both common and less frequently occurring (and even rare) dermatoses. This archive has been used as the basis of our clinical documenta- tion for today’s way of teaching using computer presentations.

Photodermatology and skin topical immunomodulation by phototherapy have been included as an elective subject offered to fourth-year medical students, provid- ing them with the chance to acquire knowledge of how climate change can effect dermatology.

The department is accredited for postgraduate training in dermatology and vene- reology (including dermatology) and corrective dermatology.

Teaching: seeing it all with your own eyes

Dermatology and venereology are taught in the second half of the 4th study year in the General Medicine program and in the first half of the 4th study year in the Den- tistry program. Dermatology is the basis of all dermatological care, including procedures such as superficial skin tumors, psoriasis, etc. We also offer skin problems that are mostly treated by dermatology: covering of wounds, contact dermatitis, and atopic dermatitis. Recent research focuses on photodermatology (photodyna- mic therapy, photoclinimetry, phototherapy and photo- protection) and some aspects of viral skin diseases (VZV genome, autoimmune blistering disorders, food allergy in atopic dermatitis, and epidemiology of sexually trans- mitted diseases. There are ongoing programs like TACR (i.e. Color Hours – Individual doseometry of UV radiation) and the European program COST (aimed at the preven- tion of skin and occupational diseases, including skin cancer).

The participation in international dermatological or- ganizations (EADV, EDF, AAD) allows us to be involved in multinational cooperation. The phototherapy section of our department is one of the best equipped in the Czech Republic and provides refreshed courses in photo- therapy. The current focus of photobiology research is the monitoring of the success of photodynamic therapy in treating psoriasis and superficial skin tumors.

Helping to advance scientific knowledge

Research is carried out both in the clini- cal and experimental area. The main topics include organ perfusion studies, its patho- physiology, and the possibility of influencing tissue perfusion under various patho- physiological conditions, particularly in perinatal medicine and intensive care. An important area of activity is research into cardiopulmonary resuscitation.

We have introduced highly standardized experimental models of sepsis, cardiopul- monary resuscitation, and invasive hemody- namics. For assessing tissue perfusion, we use a variety of technologically advanced de- vices and equipment, including Sidestream Dark Field (SDF) imaging, Laser Doppler velocimetry and tissue oximetry. Our current research priorities include application of

Helping to advance scientific knowledge

No to allergies, yes to health!

In other projects, we deal with food al- lergy in atopic dermatitis and osteoporosis

Treating a wide spectrum of conditions

The department provides medical care for adults and pediatric patients over a wide spec- trum of dermatological conditions, in particu- lar phototherapy of psoriasis, atopic eczema and other dermatoses. Within the Hradec Králové region, we carry out patch tests for de- termining occupational skin diseases. For deca- des now, another key aspect of our work has been diagnosing, managing, and monitoring patients with malignant melanoma. Recent technologies such as digital dermatoscopy have proven beneficial for such activities.

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Department of Infectious Diseases

Teaching

The Department of Infectious Diseases represents an integral part of the education provided by the Faculty of Medicine. The education of medical students at the department is carried out in the form of lectures, seminars and clinical exercises in both the Czech and English language programs. Emphasis is put on travel medicine, tropical diseases, and highly contagious diseases. The members of the department also serve as consultants for antibiotic policies and prevention of nosocomial infections. The department is accredited as a teaching facility for postgraduate medical training, i.e. residency training in infectious diseases, which is available for physicians from the surrounding regions.

Medical care

The department provides comprehensive medical care on both an inpatient and outpatient basis (including intensive care) for patients with infectious diseases. The department currently has 47 beds, 5 of which are designated for those patients who require intensive care. Patients with highly communicable diseases that require special isolation measures (tuberculosis, influenza etc.) can be placed in two rooms equipped with air filtration systems. Care is provided to patients of all age groups, from newborns to geriatric patients. The most frequently treated diseases include diarrheal diseases, CNS infections, viral forms of hepatitis, respiratory infections, infections caused by streptococci, Lyme disease and HIV, and occasionally imported tropical diseases such as malaria. Diagnostics and medical care for patients with tuberculosis is provided in collaboration with the Department of Pulmonology, especially in cases requiring intensive care or when circumstances do not permit the patient to be transported.

Members of the department are also responsible for providing demonstrations of special procedures for handling patients suspected of highly communicable diseases.

Research

The department has been involved in international multicenter studies focused on antiviral treatments of chronic hepatitis B and C, influenza therapy, and studies evaluating the efficacy and safety of new vaccines. The department members actively participate in research projects funded by various grant agencies. For example, an ongoing project funded by the Agency for Medical Research of the Ministry of Health focuses on predictive immunological markers in hepatitis patients. A developmental project has led to faster and more specific diagnosis of Clostridial colitis, a growing problem in today’s hospitals. The outcome of this study has led to faster and more specific diagnosis, including the ribotyping of Clostridium difficile.

Department of Neurology

Necessary for the functioning of the human body

The priorities of the department are teaching students in the General Medicine and Dentistry programs. In 2005, Assoc. Prof. Waberžinek, M.D., Ph.D., and Dagmar Krajíčková, M.D., Ph.D., issued a textbook at Charles University in Prague entitled Basics of General Neurology and in 2007 another one entitled Introduction to Specialized Neurology. For medical students both textbooks are primary sources for the study of neurology. In April 2014, the department was joined by renowned expert Prof. Roman Herzig, M.D. Ph.D., FESO. Dagmar Krajíčková, M.D., Ph.D., successfully completed habilitation at the 3rd Medical Faculty of Charles University Prague and was appointed associate professor of neurology, effective from July 2014. We have fulfilled the conditions for obtaining accreditation for postgraduate studies in the field of neurology and the first students began their studies in 2019.

Also in 2019, the Department of Neurology held postgraduate course for doctors from all over the Czech Republic. In August 2015, we organized the ESO Stroke Summer School, which was attended by more than 40 physicians.

Health and sleep

Since 2011, when the Department of Neurology branched off from the main building of the University Hospital, our research has been focused on headaches, cerebrovascular disease, demyelinating and extrapyramidal disorders of the nervous system, seizure, dementia, pediatric neurology, and sleep disorders. We succeeded in setting up a network of sites for EEG at the University Hospital, electromyography labs, evoked potentials, and polysomnography and polygraphy.

We are engaged in centralized, specialized neurological care. The center has been involved in diagnosing and treating demyelinating diseases since 1996 and biorythms since 2004. In 2010, neuromuscular centers involved in diagnosing and treating demyelinating diseases and biological rhythms.

Sleep laboratory

Research

We are involved in international multicenter studies aimed at treating demyelinating diseases and epilepsy, the international genetic research of moyamoya disease, and other projects in the field of neurology. In recent years, the department has received many awards, for example the National Psychiatric Prize and the Rector’s award for best monograph. We are also the recipient of the Praski national prize in 2013 for our article entitled Periprocedural Risk and Long-term Outcome of Intracranial Angioplasty Based on a Single-Center Experience. The Clinic for Sleep Disorders is involved in diagnosing different types of deep disorders and biological rhythms.
How to restore function

The Department of Rehabilitation was founded in 1991 and is engaged in teaching and research. It is a teaching, educational, scientific research, methodological, and medical institution in the field of medical rehabilitation. We provide teaching for students of the General Medicine program and the bachelor’s degree programs in Physiotherapy and Nursing. Within the specialized study of applied physiotherapy and occupational therapy we regularly provided clinical training of physiotherapists and occupational therapists. The Department of Rehabilitation has full accreditation from the Czech Ministry of Health for specialized education of physicians in the field of physical medicine and rehabilitation.

Inpatient rehabilitation department

The department treats conditions and impairments related to illness, injury or following surgery, as well as primary conditions of the musculoskeletal system. In addition to nursing care and physiotherapy, we provide a full range of occupational therapy, including the use of technical aids, to help patients regain self-sufficiency in everyday activities. Our department also employees a psychologist, a social worker, and a speech therapist.

Outpatient clinic

We provide physiotherapy, exercise therapy, and hydrotherapy. We also evaluate functionality potential as it relates to the patient returning to work. The clinic specializes in dynamic splints, lymphotherapy, and comprehensive care for patients with painful conditions of the musculoskeletal system. We also provide outpatient rehabilitation for children.

Kinesiological laboratory

We perform diagnostics for stability and gait on a stabilographic platform.

Inpatient section for prosthetics

This section provides comprehensive care for patients with disabilities of the musculoskeletal system, especially following limb amputation. We provide training in the use of prosthetic devices. We also treat skin conditions in connection with amputation.
Teaching with direct broadcast of operations

The department provides undergraduate and postgraduate teaching. The department uses its own modern textbook on otolaryngology which was created in the 1980s and 1990s. A current edition of Medicine of the Head and Neck has been published for postgraduate education. We now increasingly use our own teaching methods with the help of modern computing, for example direct broadcasting of operations from within the operating theaters for educational purposes. We have created a database of videos of pathologies and individual operations and we also use interactive whiteboards in our instruction. The ENT department serves as a center for the postgraduate education of physicians in the field of otolaryngology. Currently, the department has accreditation in the fields of otolaryngology, pediatric otolaryngology, and phoniatics. For the retraining of specialists, the ENT department organizes courses in endonasal surgery. Since 2011, the ENT department has hosted an annual dissection course (larynx, nose, throat) at the Institute of Anatomy in Brno and holds an interdisciplinary symposium in Hradec Králové. It also participates in temporal bone surgery in the Czech town of Svitavy and has recently held courses in skin suturing of the head and neck. In 1992, the department was granted accreditation for doctoral studies in the field of otolaryngology. Since 2004, we have offered a doctoral degree in surgery.

Supporting research programs over the years, current priorities

Our research has been focused on functional rehabilitation and reconstruction of the middle ear, intracranial complications, and cancer surgery of the head and neck. We have published results on our research into auditory evoked potential testing and electromyography of the laryngeal muscles. Further research deals with developing functional endoscopic surgery of the paraanal sinuses and thyroid surgery as well. We also focus on issues dealing with intracranial inflammation complications, functional testing of hearing and balance, and the histopathology of the temporal bone.

Head and neck cancer

The sub-projects include early diagnosis of tumors (NBI imaging techniques), studies of cancer prognostic markers, the diagnosis of micrometastases and the importance of TNM classification, swallowing rehabilitation, and modern methods of surgical treatment, including endoscopic and laser procedures.

Diagnosis and treatment of hearing disorders

We deal with methods for early detection of hearing impairment in neonates, screening for hearing disorders in preschool and school-aged children, and new methods for rehabilitation and treating hearing disorders (auditory implants).

Finding the final diagnosis

The main objective of the department’s activities includes a description of complex diagnostic surgical pathology cases, including intraoperative frozen sections, cytology (both gynecological and non-gynecological), and autopsy diagnostics for all clinical departments of the University Hospital as well as for the regional hospitals. Our department is an important consultation center, collaborating closely with a number of hospitals in the Czech Republic and Slovakia. Our facilities and skilled team of employees (consultants, medical scientists and laboratory technicians) ensure the most accurate biopsy diagnosis. We use both classic and modern laboratory techniques, such as immunohistochemistry, histochemistry, immunofluorescence, electron microscopy, molecular pathology, computer image analysis, as well as telepathology and virtual digital microscopy.

Research

Currently, we cover the entire spectrum of routine and research methods used in pathology – from autopsy diagnosis through surgical pathology and cytology, including gyneco-cytological screening. Our laboratory uses many modern diagnostic tools and equipment – electron microscopy, direct and indirect immunofluorescence, a wide spectrum of immunohistochemical methods, in situ hybridization techniques, PCR diagnostics as well as next generation sequencing. With the introduction of modern technology, the department has begun to carry out experiments on tumor cell lines. The department has become a reference laboratory for the predictive diagnosis of cancer.
**Pediatric Clinic – a contemporary look**

**Treating young patients**

The entire department serves as a training facility for the Charles University Faculty of Medicine in Hradec Králové. We provided instruction for students in both the General Medicine and Dentistry programs as well as for foreign students in the English language programs of General Medicine and Dentistry. In addition, there are expanding options for students of the bachelor’s degree program. We offer year-round postgraduate training for physicians specializing in pediatrics and the department also serves as a training facility for the School of Nursing.

**All for the health of children**

We provide the highest level of specialized care in pediatrics and prenatal cardiology, nephrology (including renal biopsy), endocrinology (center for growth hormone treatment and a treatment center for precarious puberty), including diabetology and insulin pump therapy, pulmonology (center for the treatment of cystic fibrosis), gastroenterology (with a focus on Crohn’s disease), allergology (focusing on uncontrolled asthma), immunology (focusing on immunodeficiency), hematology, hematopoiesis (treatment of children with lymphoblastic leukemia), and oncological care for children.

**In the care of professionals**

The department consists of the standard wards (for infants and for older children) and the Intensive Care and Resuscitation Unit for critically ill children from the regions of Hradec Králové, Pardubice, and Liberec (in cooperation with the Children’s Trauma Center there). The neonatal section of the department provides intensive and resuscitation care of neonatal pathologies.

**The latest investigative methods, advanced research**

The department is committed to implementing the latest diagnostic and therapeutic methods. In recent years, for example, such methods include controlled hypothermia in critically ill newborns and even older children, ligation of ductus arteriosus Botalli, monitoring brain function in hypoxic newborns, and organizing in-home artificial ventilation for seriously chronically ill children. Ongoing research activities predominantly deal with premature neonates, chronic non-specific illnesses of the gastrointestinal tract in children, and care for pediatric patients at the center for diabetes. Research interests also focus on diagnosing kidney disease, allergic diseases, and metabolic diseases. In the future, we hope to place greater emphasis on specialized outpatient care, the development of in-home care, and on further increasing the quality of diagnostics and the treatment of pathological conditions in newborns.

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**Department of Obstetrics and Gynecology**

**Center with European accreditation**

The Department of Obstetrics and Gynecology is a perinatal and oncogynecological center which was awarded a four-year accreditation by the European Board and College of Obstetrics and Gynecology (EBCOG) in February 2015. Given that the University Hospital is the only such large medical facility in Hradec Králové, we provide specialized health care for the city and the region at large. In 2003, the center underwent a complete renovation. The clinic has a simple layout which complements functionality. We currently have 86 beds for intensive obstetric care, postoperative intensive care and standard care. Our clinic provides chemotherapy as well as biological and supportive therapy for patients with oncological malignancies. In 2014, the clinic admitted 4,513 patients and there were 2,429 births (of which 669 were cesarean sections).

We also treated 147 patients suffering from newly detected gynecological carcinomas. The clinic is currently involved in several scientific grants and nine ongoing clinical studies. In addition to medical care and research activities, teaching is also an important aspect of clinic life. We provide instruction for medical students, students in Midwifery studies, and postgraduate students.

**Starting a happy life**

Along with the pediatric clinic, our maternity hospital is among the network of perinatal centers in the Czech Republic that provide the highest available level of neonatal care, including care for infants born prematurely. Each year in the clinic there are over 2,500 births.

**Leading publications, main research directions**

Assoc. Prof. Jiří Špaček, M.D., Ph.D., IFEPAG, has been head of the department since January 2013. The chief of staff is Ivo Kalousk, M.D., Ph.D. The main professional focus of the current head is gynecological oncology. Dr. Špaček is the main author of the monograph Falloposal Discomfort and Disorders of the Vaginal Environment, which was awarded best scientific monograph in 2013 by the Czech Gynecology and Obstetrics Society. With 75 articles in prestigious international journals over a period of 7 years on the topic of intrauterine inflammation in preterm births, the results of the research team led by Assoc. Prof. Marian Kacerovský, M.D., Ph.D., have been quite significant. We study uterine dysfunction and the vaginal environment, while in the field of oncological gynecology ovarian cancer is the main topic, with a focus on using targeted treatment in chemoresistant tumors. The clinic cooperates with many foreign institutions in Europe and in the USA. With the introduction of robotic surgery at the University Hospital, the clinic has now become a center of such operations.
Department of Psychiatry

We provide education for all sub-disciplines

For the Faculty of Medicine, we provide lectures and exams on the topics of psychiatry, psychology for students of dentistry, medical psychology, and nursing psychiatry, all in Czech as well as in English. In the field of psychiatry there is also a PhD program, and the clinic has permission to the world of management in this field. It also involves in specialized education; the workplace is accredited in the disciplines of psychiatry, children and adolescent psychiatry, and addictive diseases. Board certification exams in psychiatry took place in the spring and autumn of 2014.

To restore mental health

The clinic has 60 acute care beds and 56 beds for subsequent care (the sanatorium for addictive diseases in Nechanice). It provides psychiatric emergency and planned care across the spectrum of mental disorders. The sanatorium for addictive diseases in Nechanice is a separate workplace of the Department of Psychiatry. Therapeutic care for men and women addicted to psychoactive substances is provided there, including care for those addicted to alcohol and for pathological gambling. Treatment in the form of short-term and medium-term withdrawal treatment (5 - 14 weeks) is offered only to patients who agree to voluntary hospitalization. In addition to general psychiatric care, our outpatient clinic provides services for the treatment of addictive disorders, for childhood and adolescent psychiatric disorders, and for the treatment of alcoholism and other drug addictions (AT outpatient section). Since the year 2000, the methodological substitution program for the chronically ill dependent on opioids takes place at the AT outpatient clinic. Part of the general psychiatric outpatient clinic is a counseling center for the treatment of psychotic disorders and a clinic for sleep disorders.

Center for sleep disorders and biorhythms

The Department of Psychiatry (together with three other departments) is involved in the activities of the center for sleep disorders. It diagnoses a variety of sleep disorders and biological rhythms: insomnia, hypersomnia, narcolepsy, sleep disorders associated with physical or mental illness, disorders of the rhythm of sleep and wakefulness, parasomnia (night terrors, nightmare, somnambulism), other sleep disorders of biological rhythms, and psychological complications of disorders of breathing in sleep. In addition to standard and special examinations, it carries out somnological examinations and actigraphy (examination of biological rhythms). Appropriate treatment is then selected according to the result of the examination.

So that medicine does no harm

One of the current priorities of the department is the research program ANTRE (led by Assoc. Prof. Maasoprasp). The research deals with hematological and cardiometabolic side effects of antipsychotics in the treatment of psychiatric disorders.

Can we uncover the causes of schizophrenia?

On the initiative of Professor Housák, the research of endophenotypes in schizophrenia and their genetic substrate takes place at the department and serves as a viable way of gradually revealing the causes of this major mental illness.

Diagnostic and treatment

We supply a wide and comprehensive range of radiodiagnostic and intervention procedures, and thanks to interdisciplinary collaboration we even participate in other diagnostic and intervention methods (such as PET/CT, radioablation, vertebroplastics, etc.). The professional staff is responsible for the appropriate implementation of the imaging examination and the correct interpretation of the obtained findings. Every year, tens of thousands of procedures are carried out using X-ray instruments (imaging, fluoroscopy), ultrasounds, computer tomography devices (CT), magnetic resonance imaging (MRI), and angiography catheters in a wide spectrum of indications. The mammography section of the department is involved in a national program researching the early stages of breast cancer.

The interventional-radiological workplace focuses on minimally invasive investigations and therapeutic procedures which use special devices and materials (needle, catheters, braces, spirals, tissue adhesives, drugs) introduced by means of percutaneous injection into the target organs under the direct visual control of imaging methods. In addition to routine procedures (such as sampling of tissue, drainage of purulent deposits and biliary tract, clearing the arteries and veins), we also perform highly specialized treatment of hemorrhagic aneurysms in cerebral arteries, portal hypertension, injuries to the thoracic aorta, fractures of vertebral bodies in osteoporosis, etc.

Fundamental research programs

In the present research, the department focuses on the diagnosis and classification of emphysema, diagnostics and endovascular treatment of acute vascular strokes, diseases of the aorta, and endovascular treatment of portal hypertension. Among fundamental research programs at the Department of Nuclear Medicine are radionuclide imaging and treatment of malignant tumors. Nuclear cardiology, nuclear neurology, and nuclear endocrinology have been added to these programs in recent years.

Department of Radiology

With the help of particles and waves

The field of radiology was accredited in the framework of Charles University in 1989. The workplace carries out teaching for the bachelor’s and master’s degree programs at the Charles University Faculty of Medicine in Hradec Králové and the University of Pardubice and also performs research. In 2007, cooperation with the Department of Radiology IPVZ in Prague was launched and our department became the clinical base.

Diagnostic and treatment

The Department of Interventional and Anglo-Radiology performs minimally invasive therapeutic procedures.

Fundamental research programs

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FACULTY OF MEDICINE IN HRADEC KRÁLOVÉ

Department of Oncology and Radiotherapy

Fighting cancer

The department provides basic courses on oncology and radiotherapy and an optional subject of oncolgical care in the master’s degree program. Our department is accredited for specialized education in the field of clinical oncology and radiation oncology. In 2005, the lecture notes General Oncology (Karolínium, Prague) were published. Learning materials for the specialized program are continuously updated in the form of e-learning. In 2006, doctoral program accreditation was obtained. So far, 12 students in total have successfully participated.

In the new and newly

In 1997, construction of a new oncology pavilion was completed and three departments moved into the new location: the Department of Oncology and Radiotherapy, the Department of Clinical Hematology and the Department of Nuclear Medicine. Simultaneously, the instrumentation and equipment for radiotherapy was completely updated, and the department is now equipped with 2 linear accelerators and a Varian simulator, an automatic GammaMed afterloading system for brachytherapy, ultrasound hyperthermia, and 2 therapeutic X-ray devices. A modern clinic for outpatient chemotherapy was built.

Research activities of the department are focused on advanced technologies of external beam radiotherapy, brachytherapy, and immunotherapy.

Comprehensive cancer center

In 2008, the clinic became a comprehensive oncological center backed by the Czech Society for Oncology and Societies of Radiology, Biology, and Physics. In 2008, 2 new Varian linear accelerators and a Siemens Somatom Sensation CT simulator were installed. This equipment allows image-guided radiotherapy, intensity modulated radiotherapy, and four-dimensional radiotherapy. PET-CT is intensively used for radiotherapy planning. The department can administer all forms of systemic antimtumor treatment. In 2009, a centralized location was established for preparing cytostatics.

Getting better treatment

Intense research focused on molecular biology, stem cells, modern techniques of radiotherapy, and new oncology drugs has been taking place at the clinic. The clinic is involved in grant projects and a number of clinical studies, including the EORTC European studies. In a number of foreign publications it consistently ranks first among clinical workplaces at the University Hospital and Faculty of Medicine in Hradec Králové.

Building of the Department of Oncology and Radiotherapy

All for a healthy mouth

The Department of Dentistry is concerned with the diagnosis and treatment of a wide spectrum of dental and oral diseases and disorders. The department consists of ten divisions and counseling centers for both outpatients and hospitalized care.

The Department of Dentistry provides both undergraduate education of dental students and postgraduate courses and training for dental practitioners and specialists as well. The department also organizes certificate courses and scientific symposia. The most widely known is Sazama’s Day, an annual conference which for more than 20 years has provided both dental practitioners and students with up-to-date knowledge and practical information.

Applying the best current knowledge with a view towards innovation

At present, there are several basic research projects being carried out at the Department of Dentistry. For many years, J. Suchánek has led a research team focusing on implant dentistry. Dental pulp stem cells are the research topic of J. Suchánek and his colleagues. Chronic stomatitis and oral manifestations of various systemic diseases are studied by V. Radičová and R. Stezák. Musculoskeletal disorders, a recent “hot” topic of great concern to a majority of dentists, are being studied by Z. Sušová and M. Kapitán and their co-workers. K. Koberová-Juřáčková deals with modern methods of caries prevention and its epidemiology. Other clinical activities include treatment of periodontal disease, prophylaxis, and the diagnosis and therapy of orofacial malignancies.

Advances in diagnostics and treatment

Research activities are closely joined with the implementation of new diagnostic procedures and modern treatment methods, of which the most noteworthy are the following: oncologic surgery and brachytherapy, oralfacial traumatology, dental implants and subsequent prosthodontic reconstructions in edentulous individuals, both non-invasive and invasive treatment of periodontal disas-
Necessary knowledge of the microscopic world

We teach medical microbiology in the master’s program for students of General Medicine and Dentistry and for bachelor’s degree students in the General Nursing program. We emphasize the practical aspects of the field, i.e. the possibilities of microbiological diagnostics and its indications, the evaluation and interpretation of the clinical significance of microbiological findings, the evaluation of antibiograms and indications of antibiotics in relation to antibiotic resistance. Students learn the basic techniques of microbiological diagnosis – microscopy, culturing, and serology in clinical teaching. Students of general medicine can deepen their knowledge in the optional Clinical Microbiology course, which investigates in detail the topics of the rational use of antibiotics, antibiotic resistance and infections associated with health care. For foreign students, we offer an optional subject entitled Microbiological Aspects of Tropical Infectious Diseases.

We regularly organize regional scientific workshops on various topics of clinical microbiology for doctors and lab technicians at the University Hospital and other medical facilities of Eastern Bohemia. The ATB center annually takes part in the European Antibiotic Awareness Day, a campaign to promote responsible use of antibiotics.

Revealing microscopic pests

Concerning diagnostic care, our institute provides comprehensive services in the field of medical microbiology (bacteriology, virology, mycology, parasitology) and monitors the same time functions as an independent antibiotic center and national reference laboratory for cytomegaloviruses. In cooperation with the Clinic of Biochemistry and Diagnostic Microbiology, molecular-biological diagnostics is provided mainly in the fields of virology, mycology, and mycobacteriology. Staff at the Laboratory of Bacteriology and Mycology, in addition to routine diagnostics, deal with selected special diagnostics of infectious complications of ICU patients, patients in immunosuppression, patients with infections of the bloodstream, the CNS, bones, joints, and mycobacterial infections. A major activity of our laboratories is microbiological control of the hospital environment, sterility of equipment, cells, and tissues used for treatment. The antibiotic center systematically monitors antibiotic resistance and is involved in the European Antimicrobial Resistance Surveillance Network (EARS-Net, ECDC, Stockholm).

Examining the effectiveness of new substances

Currently, our research focuses mainly on the area of the mycology and pharmacology. In cooperation with the Faculty of Pharmacy, we research and evaluate the antimicrobial effect of newly synthesized substances. Also significant is our cooperation with the Faculty of Military Health at the University of Defense. In addition, we cooperate with the scientific workplace in the University of Defense. In cooperation with the 2nd Internal Clinic of the Teaching Hospital, we have been engaged for several years in research into intestinal bacterial microflora in idiopathic inflammation and colorectal neoplasia and Helicobacter pylori infection in experimental models.

Biobank – the project BBMRI

The bank of clinical samples (BBMRI) is part of the European project (OP VaMP, RECAMO) for long-term retention of biological material of cancer patients with the intention of research and development in the hope of finding new methods of prevention, diagnosis and healing. It even collaborates with clinical workplaces to help introduce new diagnostic methods, in particular in the field of hemato-oncology. In terms of activities carried out, it is among the largest such workplaces in the country. The practical activities of the department are ensured by qualified experts who bring with them strong, international reputations and place our institute at the forefront of departments and institutes at the medical faculty and University Hospital. The outpatient part of the workplace takes care of patients with metabolic lipid disorders and nephrolithiasis and, first and foremost, patients suffering from metabolic diseases of the musculoskeletal system. It provides highly specialized care for patients.
To teach the body’s defense system

We provide the teaching of immunology in the context of both the Czech language and English language master’s degree program in General Medicine and in Dentistry at the Charles University Faculty of Medicine in Hradec Králové. We are accredited for doctoral study in medical immunology, habilitation, and nomination proceedings for professorship candidates. Our department is a training center for doctors serving in allergology and clinical immunology. We have also implemented internships in clinical laboratories and internships in biomedical study programs at the Charles University Faculty of Pharmacy and the University of Pardubice.

Clinical and laboratory diagnostics of immune disorders

We provide diagnostic and therapeutic care to patients with allergic diseases and disorders of the immune system. We apply functional diagnostics for this purpose. In our clinical lab we have at our disposal all labora-
tory procedures necessary for the diagnostic decision of doctors of all disciplines. The main technology is multicolor flow cytometry and various immunochemical methods, mainly ELISA, immunofluorescence, immunoblot, and the newly introduced Luminex technology. We cultivate and analyze cell cultures for diagnostic and research purposes.

Application of immunoglobulin saves the lives of patients with immune system disorders

Immunofluorescence demonstration of antibodies is irreplaceable in the diagnostics of immune-pathological diseases. Flow cytometry is indispensable in the diagnosis of immune system disorders and in scientific applications.

In the service of justice

The Department of Clinical Immunology and Allergology at the Charles University Faculty of Medicine and University Hospital has from the very beginning been as an academic workplace focused on research. Research programs have been implemented that investigate autoimmune and inflammatory diseases. We study the dynamics of inflammatory response following cardiac surgery in cooperation with the Department of Cardiac Surgery and with the University Hospital.

Together with experts from the Department of Obstetrics and Gynecology, we have looked into the proportion of inflammation on the pathogenesis of premature rupture of the fetal membranes. Our initial findings have already been published. We are also involved in research concerning topics from a variety of clinics at the University Hospital.

For example, we are involved in the long term research projects that investigate immunity affected by apheretic procedures in hematopoietic, infectious inflammation in dermatology, gastroenterology, dentistry, and infectious medicine.

3D laser scanning and virtual modelling of the skull for the purpose of individual identification and diagnosing traumatic changes

Examples of the outputs of multicolored flow cytometry

Examples of the outputs of multicolored

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Teaching in the third millennium

The Department of Forensic Medicine provides undergraduate teaching of forensic medicine for 5th year students (including foreign students) in the programs of General Medicine and Dentistry at the Charles University Faculty of Medicine in Hradec Králové. Moreover, the workplace functions as a sub-department of the Department of Forensic Medicine at the Institute for Postgraduate Medical Education in Prague, which is responsible for continuous professional training in the field.

Besides the teaching activities, we also focus on scientific and publication activities. The doctors at the department specialize mainly in the issue of asphyxia, gunshot injuries, death as the result of extreme physical strain, and the use of modern optical and imaging methods in post-mortem.

Our most important recent publication is a scientific monograph entitled Gunshot Injuries (2010). It was written by Miroslav Šafír, M.D., and Associate Professor Petr Hejna. The book won two prestigious awards: the Fingerland Prize for the best publication in the morphological disciplines and the Czech Society of Forensic Medicine and Forensic Toxicology award for the best monograph. In 2011, we participated in the release of a monography entitled Blunt Injuries in Forensic Medicine. In 2012, the doctors of the institute compiled a multimedia teaching aid atlas for forensic medicine. It is a web application containing over one thousand color photos and twelve short teaching films. Between 2010 and 2014, we published over one hundred entries in professional journals, of which more than fifty were published in foreign journals with impact factor.

Among our important activities for the Czech police and other authorities active in criminal proceedings is the provision of expert services. Our department, along with the Department of Clinical Biochemistry, is responsible for the sampling of biological material at forensic autopsies and examining it for the presence of alcohol and other toxic substances (this analytical service is provided by the partner institute in the framework of the concept of a "common workplace"). In addition to histological, technical, our laboratories are also engaged in serological and immunological examinations of biological material (for example, identification of biological material, revealing the species classification, determining the blood groups, etc.).

3D laser scanning and virtual modelling of the skull for the purpose of individual identification and diagnosing traumatic changes

In the service of justice

The Department of Forensic Medicine in Hradec Králové ensures medicolegal service for the Hradec Králové region. We carry out autopsies in accordance with Czech law, including post-mortem examinations ordered by law enforcement authorities in criminal proceedings. The doctors at our department provide consulting and conciliatory activities for health care facilities in the Hradec Králové region, and professional and ex-

Research

The doctors at our institute cooperate with a number of domestic and foreign forensic and medical workplaces. Research tasks in recent years have focused mainly on the issue of forensic and medical phenomenology of suicide behavior, firearms, morphological findings in asphyxia, autopsies and biochemical diagnosis of poisoning in organisms, photography, optical scanning and the use of advanced imaging methods in forensic and medical diagnostics.
Animals necessary for research

Radioisotope laboratories and a vivarium are used for medical research by staff and postgraduate students at the Faculty of Medicine and in the University Hospi-
tal Hradec Králové. We also cooperate with the workplaces of the Faculty of Phar-
macy and the Faculty of Military Health, and even with the private sector. We per-
form animal experiments for many areas of medical research: tumor growth influ-
ted by newly synthesized agents, ex vivo and in vivo, the effect of new drugs on the
cardiototoxicity of cytostatic agents, changes in liver metabolism and how these
changes influence liver cirrhosis, fibrosis or hepatocellular damage, improving
wound healing in diabetic laboratory rats, pharmacokinetic studies of newly syn-
thesized substances, i.e. potential new drugs, tolerance of extraneous materials to be
used as clinical materials intended for implants, monitoring tissue metabolism
influenced by different composition of diet or drugs added to compound feed. We
ourselves prepared these special diets at our workplace. A significant part of our
experiments monitors the regeneration and repair of neural tissue using stem cells.
We perform tests on the abnormal toxicity of individual batches of medications dur-
ing their production.

Decreasing the use of animals

The radioisotope laboratories and vivarium are scientific facilities intended typically
for graduate students whose research topics focus on experiments on small laboratory
animals. In undergraduate teaching, we con-
tinue to decrease the use of research animals
in compliance with the global trend. Instead,
we have increased our use of teaching movies
and computer programs.

We breed genetically modified animals

In 2005, the Faculty of Medicine in Hra-
dec Králové registered in the list of users of
genetically modified organisms so that the
genetically modified breeding of laboratory
rats and mice in the vivarium could be un-
taken. Since 2013, the workplace can breed genetically valuable animals to be
used in experiments thanks to our accredi-
tation as a breeding institute.

We can perform tests instead of you

We perform animal testing for the less
experienced scientists with the help of the
labouratory staff, and this way tests are per-
formed in a shorter time and with fewer animals. Experiments with laboratory ani-
mal end at our workplace. Transport of the
animals out of the building is restricted.

A sound mind in a sound body

The aim of the regular semester teaching is to maintain or improve the physical
condition of the students and to help balance out the mental demands of studying
medicine. We try to cultivate a lasting habit of an active lifestyle that will remain with
the students even after they have finished their studies. In addition to the normal team
sports (volleyball, basketball, football), we also teach individual sports (tennis, squash,
spanning, canoeing, yoga, body form, table tennis, aerobics, dance aerobics, Zumba,
smartfit, in-line, modern forms of exercise with music, Salsa, Hip-hop, wall climbing,
fitness training, relaxation exercises, self-defense for women, fighting techniques for
men, bou, H.E.A.T). The department is a joint department of the Charles University
Faculty of Medicine in Hradec Králové and the Charles University Faculty of Pharma-
cy. We organize summer and winter sports courses.
Electronic center for the Faculty of Medicine

The Department of Information Technology is a specialized institution for the provision of services in all areas of information technology for students and staff of the Charles University Faculty of Medicine in Hradec Králové. It secures and provides the management and development of the faculty’s network and all the technical service for IT. It develops and manages the faculty’s web and specialized information systems. The department also manages the information systems and is involved in their development. Finally, it provides research support to the other workplaces of the faculty in the field of mathematical statistics. In addition, the department helps prepare the accreditation process and participates in the faculty’s evaluation rating and in scientific meetings.

Traditionally among the best

In 1964, an ODRA 1003 computer was acquired in the cybernetic room of the then Department of Medical Physics. It was the first digital computer ever in medical education and health care in Czechoslovakia. In 1966, there was a changeover to a series of SM microcomputers, then the only common-
ly available minicomputers in the Eastern Block. Upon lifting the embargo after the Velvet revolution there was a major change: the mainframes began to be replaced by personal computers. The SM 1420 central computer was replaced by a DEC 5100, which took over not only the function of the central server to the local computer network of the Faculty of Medicine, but began to provide services in a project of the node of the CESNET academic Internet network in 1993. Our center of computer technology was the first institution of its kind in the region where the Internet was then available. The computers gradually have ceased to be the domain of a handful of dedicated individuals and instead have become an inseparable part of teaching and offer great benefit to faculty staff and students.

Sources of knowledge

The medical library of the Charles University Faculty of Medicine in Hradec Králové is a specialized library serving the information needs of professionals and students in medicine, nursing and other health sciences. The library offers a wide variety of resources, including many databases. It resides in the pleasant “Na Hradle” historical building and includes study rooms for students. Additionally, the library runs a study room in the Educational Center at the University Hospital.

Gathering information

The medical library collects data about the publication activity of the faculty and hospital staff. The data is entered into a database according to guidelines set by the national Research and Development Council. These guidelines work in accordance with the rules of the Chancellor’s Office and the internal instructions provided by the leadership of the Faculty of Medicine and University Hospital.

Quickly, clearly, from anywhere

The medical library provides access to electronic information resources, e-books and e-journals. The EZ Proxy system allows staff and students remote access to electronic resources from any location (e.g. from home, abroad, other workplaces at the University Hospital). The portal of electronic information resources of the Charles University provides access to other databases in all fields of science. The library website offers a sample of the most important medical databases, the databases of full text journals and e-books accessible to the Faculty of Medicine.

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Modernized classrooms at the faculty, with the latest IT and AV equipment

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Faculty of Medicine in Hradec Králové

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