

University of Zagreb SCHOOL OF MEDICINE



**ACADEMIC PROFILE
AND EDUCATIONAL PROGRAMS**



Contents

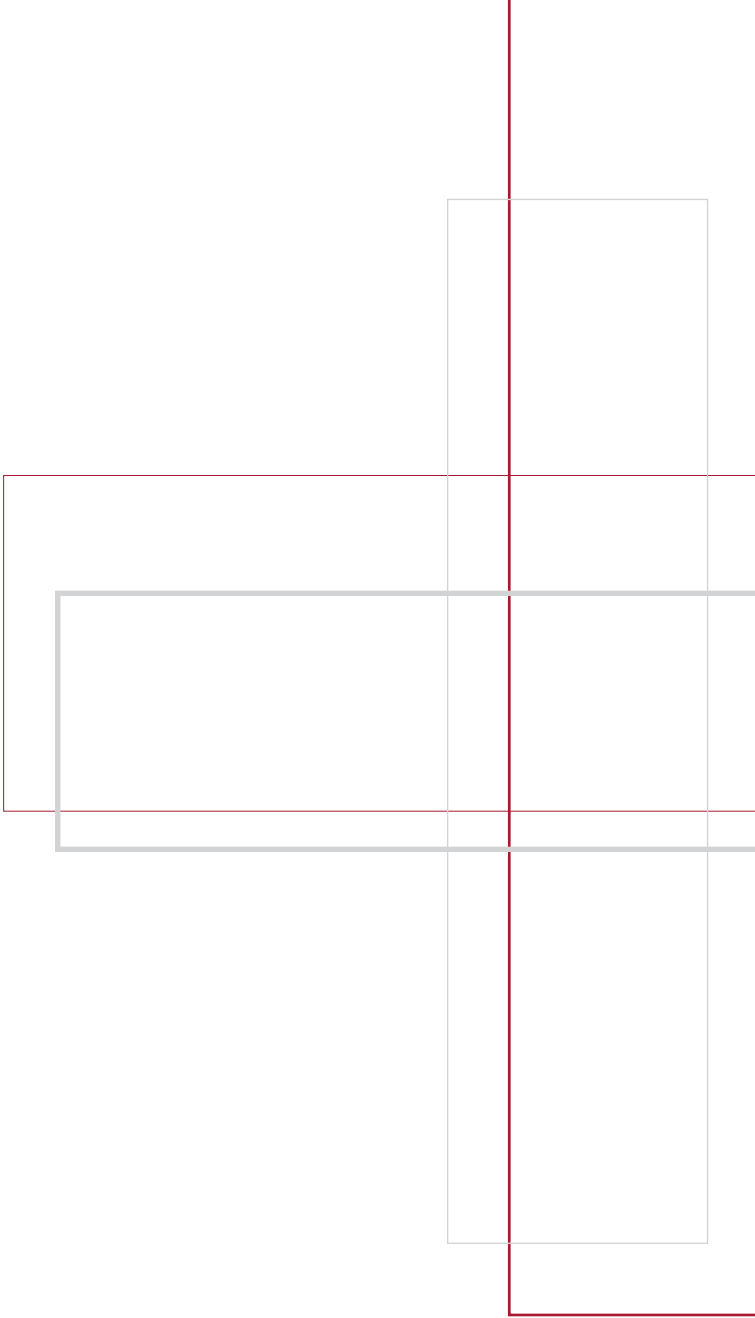
Zagreb - from the City Chronicle	2
University of Zagreb	4
School of Medicine - Foundation	5
Organization	6
Clinical Teaching	8
Affiliated Institutions	10
Croatian Institute for Brain Research	12
School of Public Health Andrija Štampar	13
Central Medical Library	14
Graduate Teaching	16
Medical Education in the European Context	18
Postgraduate Studies	20
Continuing Professional Development	21
Students - Life and Organizations	22
Research Visibility	24
Research Highlights	25
The Future: Our Vision	28

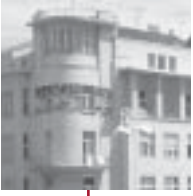


ZAGREB

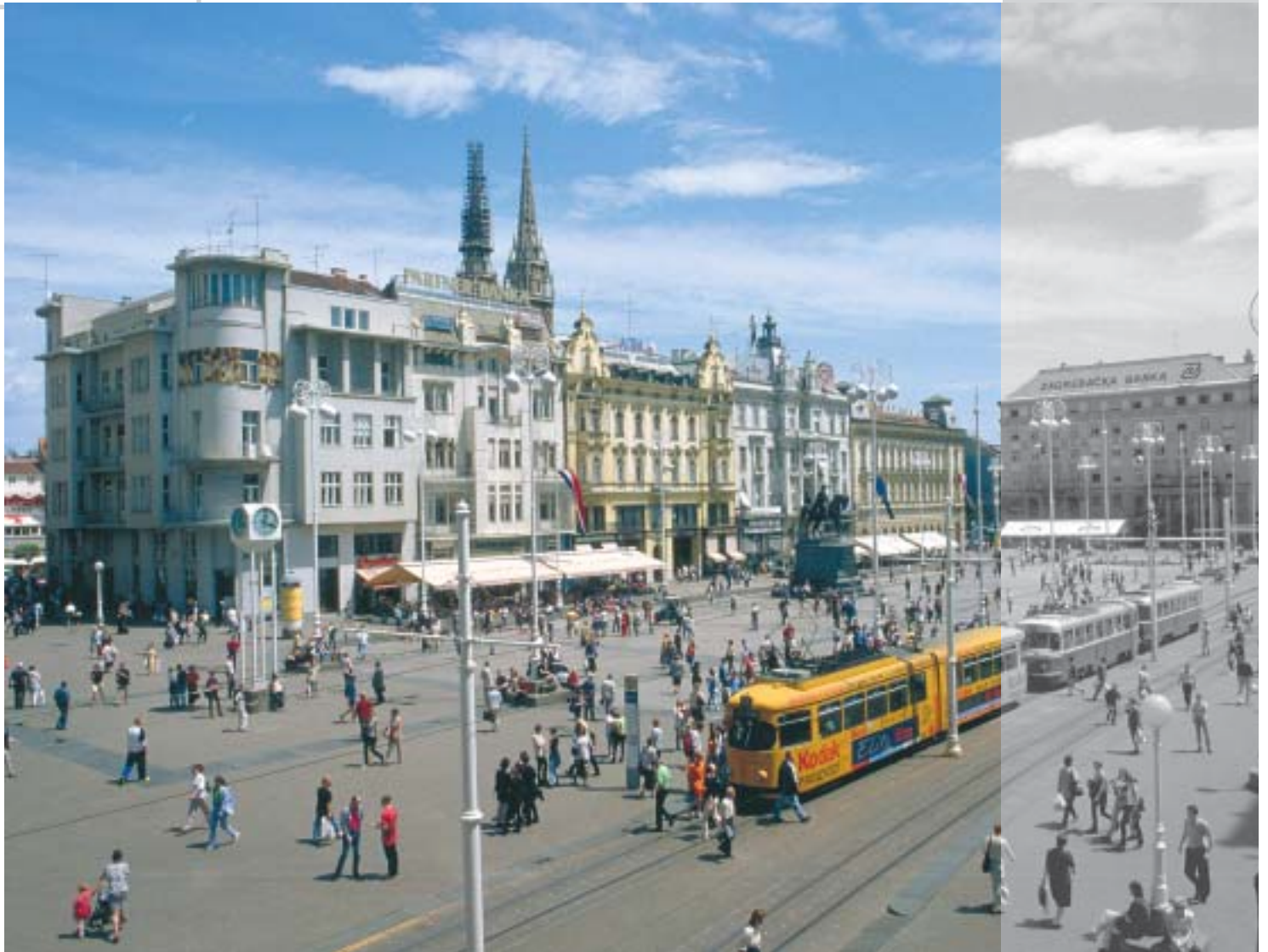
from the City Chronicle

- 879 The Zagreb area, between the rivers Sava and Drava, becomes part of the Croatian state under the rule of King Tomislav, crowned as the first Croatian king in 925
- 1094 The Hungarian King Ladislas establishes the Zagreb Diocese
- 1242 The Croatian-Hungarian King Bela IV grants the Golden Bull to Gradec (the Upper Town), as a token of appreciation for the citizens who provided him shelter during the Tatarian invasion
- 1355 Mention of the first pharmacy
- 1557 Another threat to the city - Turkish invasions. The first mention of Zagreb as the capital of Croatia and Slavonia
- 1607 Foundation of the Jesuit gymnasium on Kaptol (part of Zagreb dominated by the clergy)
- 1664 Foundation of the first printing house by the Jesuits
- 1669 The Croatian-Hungarian King Leopold I grants the right to the Royal Academy to be transformed into a University
- 1771 The first weekly paper published in Latin - Ephemerides Zagrebienses
- 1834 The first permanent theater opens on the southern side of St. Mark's Square
- 1850 Zagreb becomes a single administrative unit by unification of Kaptol and Gradec
- 1866 Supported by Bishop Josip Juraj Strossmayer of Đakovo, the Yugoslav Academy of Sciences and Arts is founded as the central academy of all South Slavs; to be later renamed into the Croatian Academy of Sciences and Arts
- 1880 A severe earthquake strikes the area of Zagreb
- 1896 The first movie projection
- 1901 The first car in the streets of Zagreb
- 1909 The first trade exhibition
- 1913 Completion of the building of the National University Library
- 1917 Foundation of the Zagreb School of Medicine
- 1926 The first radio station in this part of Europe starts broadcasting
- 1956 The first broadcast of Zagreb Television
- 1987 The World University Games
- 1990 The first session of the Croatian Parliament (Sabor) after the free, democratic multi-party elections on 30 May.

- 
- 2003 Foundation of the Medical Studies in English program
 - 2004 Croatian candidacy for the EU
 - 2007 90th anniversary of the Zagreb School of Medicine



Ban Josip Jelačić Square



UNIVERSITY of Zagreb

1669 Leopold I, Roman Emperor and Emperor of Austro-Hungary, issued a Diploma by which he accorded the status and privileges of a university to the Jesuit Academy in the Royal Free City of Zagreb. This date marks the beginning of the history of the University of Zagreb, to be formally established two centuries later after a period of unremitting effort and struggle.

1671 Leopold's *Privilegium* was confirmed by the Croatian Parliament, although with restricted authorities concerning the conferral of academic degrees.

1874 When the Emperor Franz Joseph visited Zagreb in 1869 he signed an Article of Law concerning the establishment of the University of Zagreb, giving it his Royal Assent five years later, on 5 January 1874. According to this Law the University should have had four faculties: Law, Theology, Philosophy and Medicine. The first two faculties were formally organized, and the Faculty of Philosophy started to expand into several independent faculties. Finally, in the academic year 1917-18 the School of Medicine was founded.

**Administration building of the University
of Zagreb with the Faculty of Law**



SCHOOL OF MEDICINE

Foundation

1917 Historic speech by Milan Rojc in the Croatian Parliament in which he put forward a proposal for the foundation of the School of Medicine in Zagreb. Ten months later the Croatian Parliament endorsed the foundation of the School of Medicine by proposing to the Court Office of Vienna three professors, Mašek, Wickerhauser, Čačković, the future founding fathers of the Zagreb School of Medicine, who were assigned the task to establish and staff the school and appoint its dean.

1918 On 12 January a young anatomy teacher, Dr. Drago Perović, delivered the first lecture in the University lobby entitled, *Guidelines for Teaching and Research in Anatomy*. That date marked the beginning of the institutionalized teaching and study of medicine at the School of Medicine of the University of Zagreb. The first three proposed teachers were appointed by the King and the first session of the School's Academic Senate took place on 11 May when Professor Miroslav Čačković was appointed the first dean and Professor Dragutin Mašek the vice-dean of the Zagreb School of Medicine.

1918 - 1919 years characterized by intensive adaptation works on the buildings at the Šalata premises; the former convent school housed the Institute of Anatomy and later the Institute of General and Experimental Pathology and Pharmacology, whereas the former women's lycée housed the Institutes of Morphology and Biology, Physiology and Medical Chemistry.

1920 - 1922 the establishment of the majority of university departments, such as: Department of Internal Medicine (1921), Gynecology and Obstetrics (1920), Surgery (1921), Neuropsychiatry (1921), Otorhinolaryngology (1921), Pediatrics (1922), Dermatovenereology (1922), Orthopedics (1922), Maxillofacial Surgery and Stomatology (1922), Institute of Radiology and Radiotherapy (1922). In 1922 the building of the Institute of Pathological Anatomy was completed.

Institute of Pathological Anatomy, Šalata 1925

University Departments of Pediatrics and Dermatovenereology, Šalata 1924

Founding fathers of the Zagreb School of Medicine (from the left): Milan Rojc, Dragutin Mašek, Teodor Wickerhauser and Miroslav Čačković



ORGANIZATION

DEAN

SCHOOL'S MANAGEMENT BOARD

VICE-DEANS

ASSISTANTS TO
THE DEAN

SCHOOL OF
PUBLIC HEALTH
Head

CROATIAN
INSTITUTE FOR
BRAIN RESEARCH
Head

SECRETARY

ACADEMIC
SENATE

ACADEMIC SENATE FOR THE
POSTGRADUATE STUDIES

COMMITTEES
BOARDS

COMMITTEES
BOARDS

DEPARTMENTS

SPECIAL SKILLS UNITS

AFFILIATES

ORGANIZATIONAL UNITS

SCHOOL OF PUBLIC HEALTH
CROATIAN INSTITUTE FOR
BRAIN RESEARCH

TEACHING

RESEARCH

ORGANIZATION OF TEACHING

ORGANIZATION OF RESEARCH

ADMINISTRA-
TION UNITS

University
Dpts.

Clinical
Institutes

Teaching
facilities

Institutes

Centers

Laboratories

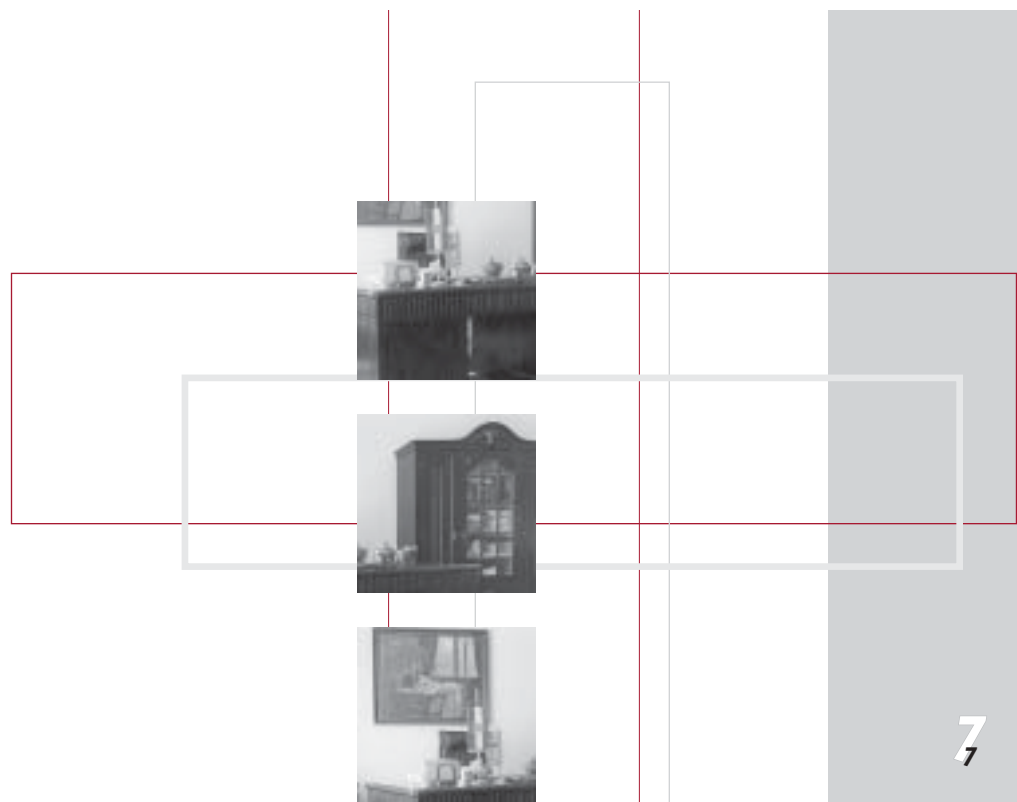
Sections

Libraries

Secretary's
Office



Dean's study



CLINICAL

teaching



University Hospital Center Zagreb

Sestre milosrdnice University Hospital



UNIVERSITY HOSPITAL CENTER ZAGREB

Department of Internal Medicine Department of Surgery Department of Pediatrics Department of Gynecology and Obstetrics Department of Neurology

Department of Ophthalmology Department of Urology Department of Orthopedics Department of Otorhinolaryngology Department of Neurosurgery

Department of Dermatovenereology Department of Psychiatry Department of Psychological Medicine Department of Cardiovascular Diseases Department of Oncology

Department of Rheumatic Diseases and Rehabilitation Department of Pathological Physiology Department of Diagnostic and Interventional Radiology Department of Nuclear Medicine and Radiation Prevention Department of Pathology

Department of Laboratory Diagnostics Center for Genomics, Proteomics and Metabolomics

SESTRE MILOSRDNICE UNIVERSITY HOSPITAL

Department of Internal Medicine Department of Surgery Department of Pediatrics Department of Rheumatology, Physical Medicine and Rehabilitation Department of Otorhinolaryngology

Department of Oncology & Nuclear Medicine Department of Diagnostic and Interventional Radiology Department of Clinical Chemistry and Biochemistry Department of Pathology Lj. Jurak

MERKUR UNIVERSITY HOSPITAL

Department of Internal Medicine Department of Gynecology and Obstetrics Department of Surgery Department of Diagnostic and Interventional Radiology Department of Pathology and Cytology

DUBRAVA UNIVERSITY HOSPITAL

Department of Internal Medicine Department of Surgery Department of Maxillofacial Surgery

JORDANOVAC UNIVERSITY HOSPITAL FOR PULMONARY DISEASES

Department of Pulmonary Diseases Department of Thoracic Surgery Department of Thoracic Radiology

FRAN MIHALJEVIĆ UNIVERSITY HOSPITAL FOR INFECTIOUS DISEASES

VUK VRHOVAC UNIVERSITY CLINIC FOR DIABETES, ENDOCRINOLOGY AND METABOLIC DISEASES

UNIVERSITY HOSPITAL FOR TRAUMATOLOGY

CHILDREN'S HOSPITAL ZAGREB

UNIVERSITY HOSPITAL FOR TUMORS

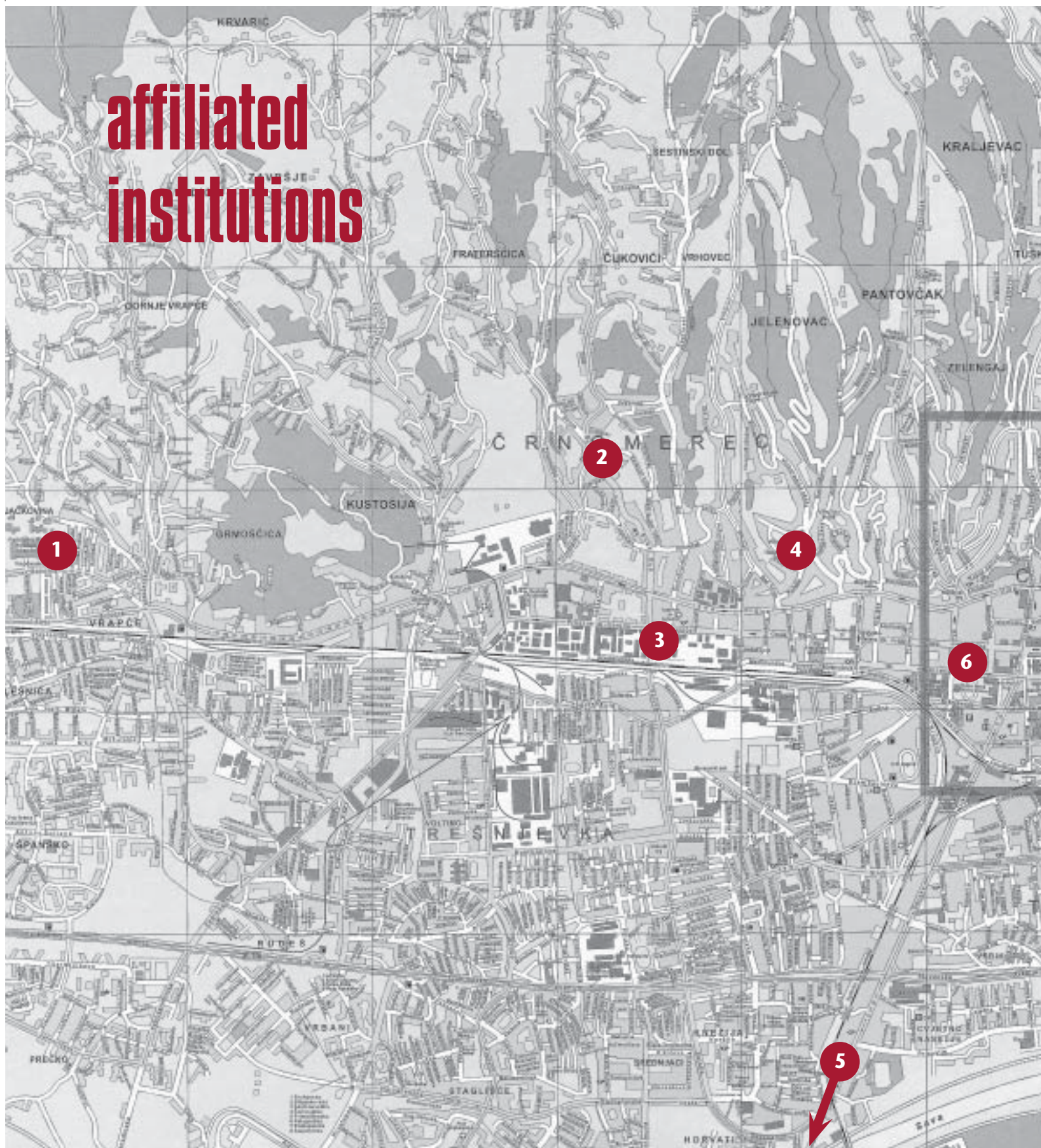
SVETI DUH GENERAL HOSPITAL

Department of Internal Medicine Department of Gynecology and Obstetrics

VRAPČE PSYCHIATRIC HOSPITAL

Department of General Forensic Psychiatry and Clinical Psychopathology

affiliated institutions



- 1.** Vrapče Psychiatric Hospital
- 2.** Sv. Duh General Hospital
- 3.** University Hospital for Tumors
- 4.** Sestre milosrdnice University Hospital
- 5.** Novi Zagreb Health Center
- 6.** Children's Hospital Zagreb
- 7.** Andrija Štampar School of Public Health
- 8.** Fran Mihaljević University Hospital for Infectious Diseases
- 9a.** UHCZ, Depts. of Pediatrics & Dermatovenereology, Šalata
- 9b.** UHCZ, Dpt. of Orthopedics, Šalata



- 9c.** UHCZ, Dpt. of Gynecology and Obstetrics, Petrova
- 9d.** UHCZ, Clinical Hospital Center Zagreb, Kišpatićeva
- 10.** University Hospital for Traumatology
- 11.** Croatian Institute for Brain Research
- 12.** School of Medicine - administration building

- 13.** Vuk Vrhovec University Clinic for Diabetes, Endocrinology and Metabolic Diseases
- 14.** Merkur University Hospital
- 15.** Jordanovac University Hospital for Pulmonary Diseases
- 16.** Dubrava University Hospital

CROATIAN INSTITUTE for Brain Research

As the leading national center in the field of neuroscience, the Croatian Institute for Brain Research (CIBR) is a specialized research and teaching unit of the University of Zagreb School of Medicine, responsible for multidisciplinary research and interuniversity teaching.

Current activities of the CIBR are focused on the research of the neurobiological basis of normal cognitive development, as well as the plasticity and repair in response to perinatal brain damage; research on neurological and mental disorders, which represent public health problems and significant socioeconomic burden to the society; and the development of modern neuroimaging and genomic approaches in human brain research. Those objectives are being realized through interdisciplinary interactions of almost 30 research teams active in various subfields of basic and clinical neuroscience, including almost one third of extramural research teams (located at other academic institutions of the University of Zagreb, as well as the Ruer Bošković Institute). These research teams have been successfully competitive at both national and international levels in their endeavor to bridge the gap between the basic neuroscience research and clinical experience and to develop translational research in neuroscience. In the long run, the CIBR aspires to become an internationally established center of excellence in the field of neuroscience.

From its outset, the CIBR has constantly been trying to raise the standards of interdisciplinary international collaboration of the Croatian

neuroscientists who are working on solutions in medical practice, as well as the standards of education and research through rational sharing of equipment and facilities in the following:

- the continuous collaborative program entitled Neurobiology of Cognitive Development and Cognitive Disorders (at present the largest research program at the Zagreb School of Medicine, encompassing 28 individual research grants);
- systematic recruitment of junior researchers and their education in the most significant areas of neuroscience (such as neuroimaging, neurophysiology, molecular neurobiology) through the doctoral program in Neuroscience;
- an increased mobility of Croatian and international researchers through programs of international exchange, visiting lectures, summer schools of the Federation of European Neuroscience Societies and the International Brain Research Organization, professional conferences, seminars and workshops.

Finally, the CIBR is also the seat of the Croatian Society for Neuroscience (CSFN), and together with the CSFN, in collaboration with which over the past six years it has been highly successful in increasing the visibility of neuroscience research in Croatia, through the organization of six consecutive Brain Awareness Weeks in Croatia.

**Basic sciences
building with the Croatian Institute
for Brain Research**



SCHOOL OF PUBLIC HEALTH

Andrija Štampar

The present Andrija Štampar School of Public Health originated from the 1947 merger of the former School of Hygiene (founded in 1927) and the Zagreb School of Medicine, whereupon public health concepts were given due importance in the teaching of medicine. Our present curriculum leading to the Doctor of Medicine degree contains a rather high percentage of public health courses such as social medicine, medical sociology and health economics, medical statistics and informatics, medical microbiology and ecology, epidemiology, organization of health care, family medicine with primary health care, as well as a number of electives offered to students at all stages of their graduate education.

At the level of postgraduate and continuing medical education the Andrija Štampar School of Public Health is offering courses which provide advanced training in public health disciplines. Since 1978 the School has been organizing numerous courses for health professionals from Croatia and abroad, such as Planning and Management of Primary Health Care in Developing Countries, Health for All, Social Gerontology in Inercultural Perspectives, Training of Teachers in General Practice, Self-Care, Human Rights in Medicine, HIV/AIDS, Health Management, held in Zagreb and at the Center for Advanced Academic Studies in Dubrovnik, as well as the Motovun International Summer School of Public Health.

The Andrija Štampar School of Public Health has been active as an organizer and partner in many community programs, such as Healthy Cities (Zagreb - Healthy City, and the Croatian Healthy City Network), the European Training Consortium in Public Health and Health Promotion, Health Promoting Schools (Croatian and European Network), Baby-Friendly Hospital, UNICEF programs and others.

At the beginning of 2002 the School initiated a preventive action campaign against smoking, which is a fine example of what has been called evidence-based public health. The School can also boast of the fact of being the first institution outside the European Union to be admitted into the European Health Policy Research Network.

During the years 2003-2006 the School's building was reconstructed completely to adapt the 80-year-old facility to meet the new requirements of recent educational trends. Thus, the new skills laboratory was established, together with technical facilities for distance learning, e-learning, and video conferences.



Andrija Štampar School of Public Health



Central Medical Library

The Central Medical Library (<http://smk.mef.hr>) is the biggest medical library in Croatia. Its primary function is to serve students, teaching and professional health staff of the parent institution, but also to provide medical information to all health information consumers.

- Organization: central library with two departmental libraries
- Collections: ca. 80,000 volumes of books and periodicals; 125 current print periodicals; a collection of over 4,500 textbooks, handbooks and atlases
- Facilities: Bibliographic and full-text databases (Medline, Current Contents, EBM Reviews, Web of Science, more than 4,000 e-journals etc.), locally generated and maintained bibliographic database Biomedicina Croatica (covering all items published by

Croatian authors in the field of biomedicine and border fields), 25 public workstations with Internet access

- Conferences and Workshops: annual conference on medical information (MICC), information literacy courses for students, physicians and nurses
- Personnel: 8 librarians, 6 assistant librarians
- Interlibrary co-operation: central ILL point in Croatia
- Budget: financed by the parent institution and the Ministry of Science, Education and Sports (e-resources)
- Locations: Šalata 3, Central Medical Library; Kišpatićeva 11 (mostly clinically oriented literature), Petrova 13 (gynecology and obstetrics)
- Working hours: Mon - Fri, 8 a.m.-12 p.m., Sat. 9 a.m.-3 p.m.

**Central Medical
Library - reading room**



CMJ - Croatian Medical Journal

- The Croatian Medical Journal (CMJ) is a general medical journal, published bimonthly (www.cmj.hr). Launched in 1992, it is an official journal of all Croatian medical schools, the Academy of Medical Sciences of Croatia, and the World Association of Croatian Physicians. CMJ aims to be a bridge between the medical communities in the mainstream science and the so-called scientific periphery, which includes Central and Eastern European countries and developing countries all over the world.
- Although a general medical journal, CMJ specializes in issues that are not dealt with elsewhere: medicine and war, health systems in transition, health and human rights, and other topics relevant for small and emerging medical scientific communities. Distinguished authors from various fields have published their papers on its pages.
- Since 1998, CMJ has been indexed in the prestigious Index Medicus/MEDLINE bibliographic database. Since 1999, the CMJ has been included in the Current Contents/Clinical Medicine, of the Thomson Institute for Scientific Information (ISI), as the first medical journal in the history of Croatian medicine to enter this bibliographic database. With the impact factor of 0.7 in 2004, CMJ is also indexed in Thomson ISI's Web of Science.
- CMJ pays great attention to promoting education in scientific research and writing. From its first issue in 1992, the CMJ has introduced an



"author-helpful" pre-review of manuscripts submitted by less experienced authors. In this way authors are helped to improve the presentation of their data.

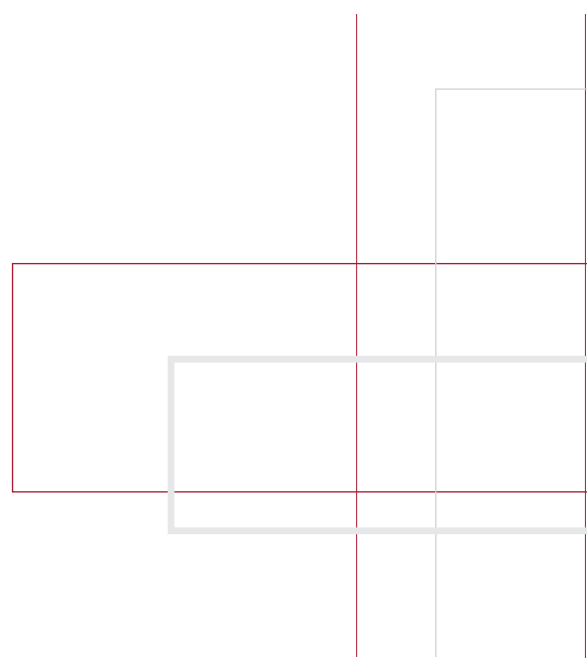
- CMJ also regularly organizes courses in scientific writing for clinical researchers in collaboration with colleagues from other international journals, such as The Lancet, JAMA, BMJ, Annals of Internal Medicine, BioMed Central, as well as the Cochrane Collaboration, and the Office for Research Integrity of the US Department of Health and Human Services. CMJ also offers continuing medical education courses for physicians interested in research and publishing.
- By introduction of the editorial position of Research Integrity Editor, CMJ has been actively involved in promoting high editorial standards in biomedical publishing.
- Since 2004, CMJ has been a member journal of the International Committee of Medical Journal Editors (ICMJE). Editors of the CMJ are active in editorial organizations, such as the European Association of Science Editors, the World Association of Medical Editors, and the Council of Science Editors.

mef.hr

- Mef.hr is the official information bulletin of the Zagreb School of Medicine, published semiannually and available online.



GRADUATE teaching



Degree

Courses taught at the University of Zagreb School of Medicine are tailored to the specific needs of prospective physicians, with the aim of acquiring a broad knowledge and a variety of skills which are indispensable for their future vocation in the national health care system. Upon graduation students are conferred the degree of Doctor of Medicine (MD).

Duration

The study of medicine lasts six years, thus uniting the undergraduate and the graduate level into one single entity (0+6), which has already been accepted by the majority of European universities.

Language of Instruction: Croatian and English

Organization of Study and Teaching Process

Today's Europe demonstrates a great variety of graduate programs in medicine. Yet certain principles in curriculum organization seem to be prevailing: medical education is becoming more student-centered, problem-based learning is gaining prominence as an educational methodology, horizontal and vertical integration is encouraged, students receive training both in hospital and community settings, and, finally, electives provide students with an opportunity to explore individual areas of interest. Thus teaching and learning, particularly in the clinical area, are becoming a more structured and carefully planned experience.

Although still faithful to its original mission of providing broad medical education for its students, the medical curriculum at the Zagreb School of Medicine contains all the above elements present in the innovative

curricula worldwide. In the course of the first three years of the program, premedical courses, basic medicine and preclinical courses organized in blocks are taught along with introducing students to communication skills, patient care and social aspects of medicine. The study of pre-medical disciplines comprises an introduction to the physical, chemical and biological basis of life, whereas in basic medical courses students acquire knowledge and understanding of the structure and function of the human body. The program of pre-clinical courses comprises the understanding of disease mechanisms, studying their effects on human bodies, drug action and the approach to and examination of patients. Clinical courses are taught in the period from the fourth to the sixth year, organized as clinical attachment blocks, consisting of educational contents and student clerkships during which students are focused on various diseases and expected to develop clinical reasoning, generate differential diagnosis and create diagnostic and management plans. Public-health courses are also represented early on in the curriculum and are developed progressively along the continuum of the curriculum, as students gradually mature in the world of patient care. Relevant to public health courses are matters concerning environmental and social health factors together with the physician's role in the prevention and treatment of diseases. The present curriculum takes into account the recommendations of international academic institutions and professional societies as far as the knowledge, skills and competencies at the level of student performance and understanding in a particular discipline are defined. The core curriculum, which defines the competencies of

Ac. year	I	%	II	%	III	%	IV	%	V	%	VI	%
1997/1998	238	100	204	85,7	180	88,2	151	93,8	142	94	140	98,6
1998/1999	240	100	205	85,4	154	75,1	138	89,6	137	99,3	134	97,8
1999/2000	242	100	180	74,3	150	83,3	145	96,6	141	97,2	139	98,6
2000/2001	240	100	148	61,7	140	94,6	128	91,4	123	96	123	100
2001/2002	241	100	154	63,9	135	87,6	133	98,5	132	99,2	131	92,2
2002/2003	234	100	157	67,1	139	88,5	133	95,6	132	99,2		
2003/2004	232	100	171	73,7	158	92,3	148	93,6				
2004/2005	243	100	175	71,7	165	94,2						
2005/2006	273	100	207	75,8								
2006/2007	282	100	266	94,3								
2007/2008	253	100										

Table 1:
Students' success rate in academic performance per year (%)*

*Students eligible for enrollment into the next academic year.



**Bust of Hippocrates
in the administration building**

the Croatian doctor of medicine as a basis of the national qualification framework, has been defined conjointly by all four medical schools in Croatia (Zagreb, Rijeka, Split, and Osijek), and is to be published in a separate catalogue of knowledge and skills based on our own long standing experience in medical education and the existing, widely acclaimed international models in defining learning outcomes and subject benchmarks that are specific to medical profession.

Along with regular academic courses, as a direct consequence of the enormous explosion in medical knowledge, electives are offered throughout the curriculum respecting individual inclinations of students and providing in-depth knowledge of specific areas of interest. As far as the teaching is concerned, the focus is shifted from lectures to other, more active forms of teaching, such as practicals, tutorials, seminars, demonstrations, consultations and clinical audits, where students gain experience in clinical settings, as well as at the facilities of local health centers. Integrated case-based modules have also been incorporated into the curriculum, such as Rational Pharmacotherapy, Diseases of the Musculoskeletal System and Emergency Medicine.

Students also gain insight into elementary research methods, statistics and medical informatics. A course in Medical English, aimed at mastering the academic skills needed for using professional literature is also taught.

Professional ethics is given special coverage throughout the whole course of study with a separate course in medical ethics offered in the sixth year.

In the final diploma exam taken at the end of the study, prospective physicians are expected to have gained knowledge and understanding of the most common diseases, their diagnostics, treatment and rehabilitation.

As far as the quality assurance is concerned, the University of Zagreb School of Medicine has been using central students' questionnaire as a part of its long-lasting quality assurance process. Attempts at enquiring about students' satisfaction with the program and its performance started at the end of the eighties. Present form of students' questionnaire was introduced in the academic year 2001/2002. Apart from the central questionnaire each department has its own evaluation with its own

methods of how to improve the teaching process and achieve greater satisfaction of students with a particular course.

After the introduction of the European Credit Transfer System (ECTS), an evaluation of students' workload has been done in 2000 and 2004 (before and after curricular changes), which significantly contributed to the evaluation the teaching quality in the new curriculum. All these experiences are also included in the Medical Studies in English program.

Additionally, since academic year 2005/2006 University of Zagreb has also been conducting its centralized quality assurance survey.

Number of students enrolled: 1,637 (294 first-year students).

Academic Courses:

Year 1: Introduction to Medicine with History of Medicine, Medical Physics & Biophysics, Medical Chemistry & Biochemistry I, Medical Biology, Anatomy, First Aid, Social Medicine, Psychological Medicine I, Medical English, Electives.

Year 2: Histology & Embryology, Fundamentals of Neuroscience, Physiology, Immunology, Medical Chemistry & Biochemistry II, Medical Sociology, Medical Informatics, Medical Statistics, Paper Writing in Medicine, Medical English, Electives.

Year 3: Microbiology & Parasitology, Pharmacology, Pathology, Pathophysiology, Clinical Propaedeutic, Psychological Medicine II, Medical English, Electives.

Year 4: Internal Medicine, Radiology, Infectious Diseases, Neurology, Neurosurgery, Psychiatry, Dermatovenerology, Oncology, Nuclear Medicine, Physical Foundations of Clinical Diagnostics, Medical English, Electives.

Year 5: Pediatrics, Surgery, Physical Medicine and Rehabilitation, Anesthesiology, Resuscitation and Intensive Care, Urology, Otorhinolaryngology, Orthopedics, Maxillofacial Surgery, Ophthalmology, Emergency Medicine, Medical English, Electives.

Year 6: Gynecology and Obstetrics, Family Medicine, School Health, Epidemiology, Medical Ecology and Occupational Medicine, Community Health Practice, Organization of Health Care and Health Economics, Medical Genetics, Medical Ethics, Forensic Medicine, Clinical Reasoning, Rational Pharmacotherapy, Medical English, Electives.



MEDICAL EDUCATION

in the European context



The international relations of the Zagreb School of Medicine reflect a dynamic process in the area of higher education, as defined by the International Mission and Policy of the University of Zagreb. The internationalization of higher education can be defined as the sum of pro-active institutional measures to enhance and facilitate the complex processes that create a truly international academic community, i.e., a community which prepares students to function in a globalized working and academic environment.

In particular, medical education has already gone global in such a way that certain principles in the organization of medical curricula seem to predominate. Medical education is becoming more student-centered, and problem-based learning is gaining prominence as an educational methodology. Horizontal and vertical integration is universally encouraged, students receive more practical training both in hospital and in community settings. Finally, electives provide students with an opportunity to explore individual areas of interest. Thus teaching and learning, particularly in the clinical area, are becoming a more structured and carefully planned experience.

As far as the European context of the Bologna process of harmonization of higher education is concerned, the main challenge for higher education institutions in the future will be to turn the different reforms into an everyday reality both for teachers and students. The creation of the European Higher Education Area (EHEA) by the year 2010 and how to link this space with the European Research Area (ERA) will be critical for the reform of the European higher education institutions. This link between EHEA and ERA is central to European higher education and should also be used as a defining feature for structuring strong research-based universities. Additionally, we are also very sensitive to recommendations of various international associations involved in the developments in the rapidly changing world of medical and healthcare professional education (AMEE, AMSE, WFME, etc.).

The development of a European dimension to quality assurance will also play a major role in the context of the creation of a European area for education and research. The formulation of the European qualifications framework will contribute to achieving the mutual recognition of educational credentials among the EU countries.

Although still faithful to its original mission of providing a broad medical education for its students, the management of the Zagreb School of Medicine is very observant of the above processes in the European higher education area and is consequently developing an outcome

-driven curriculum based on consensually derived national competencies. The main educational objective of the University of Zagreb School of Medicine is to produce knowledgeable and altruistic physicians who will be able to adapt to any given situation they encounter in their professional development.

Additionally, with its program of graduate medical studies in English, the Zagreb School of Medicine has achieved an integration of international and intercultural dimensions, thus raising the standards of both teaching and learning medicine in this part of Europe.

Evaluation and Development of the Educational Process

Ever since its outset, and particularly during the implementation of the Bologna process, the School has attempted to harmonize its curriculum by applying methods of teaching and assessment based on the latest evidence in medical education theory. The Croatian Society for Medical Education, active for the past twenty years, organizes lectures and meetings, as well as its nationally acclaimed workshop The Art of Teaching in Medicine, which has already been attended by 190 teachers, who have significantly contributed to the quality of teaching in their institutions. Moreover, during the past four years, 191 teachers and 240 students attended special workshops on problem-based learning and case-based teaching organized conjointly with internationally renowned educational partners. The present English program builds upon this educational experience.

Mobility-friendly Student Environment

The proposed curriculum stimulates student mobility on several levels: within educational institutions in the area of biomedicine at the University of Zagreb, within other faculties of the University of Zagreb, as well as within other Croatian and international medical schools. The harmonization of the core curricula of all four Croatian medical schools, along with defining the elective courses which will be offered by each school as their top-quality products, is a prerequisite for medical student mobility in Croatia. However, the realization of the above principles at the national level is a prerequisite for efficient student mobility at the international level. The proposed curriculum also makes provisions for the teaching of certain courses in the English language, to be offered to international students, as well as to students of our English program.



**Miroslav Čačković lecture hall,
the major venue for lectures and conferences**

The Miroslav Čačković Foundation

Miroslav Čačković was among the founding fathers and the first dean of the University of Zagreb School of Medicine. The foundation named in his honor was established for the purpose of promotion and care of the continued professional and scientific development of our young faculty, primarily for their education abroad.

The foundation started its activity on September 3, 2001, when its bylaws was passed and its organizational bodies were established. The initial funds were secured by the University of Zagreb School of Medicine. At its first meeting on October 4, 2001 the regulation on the criteria for obtaining grants were laid down.

Medical Studies in English (MSE)

The concept of global medicine and internationalization of higher education has been rooted in the University of Zagreb School of Medicine (UZSM) since its foundation in 1917. The founders of our School came from different European centers of academic excellence and transferred their expertise to the newly fledged institution. From that time the UZSM has tried to preserve and maintain this continuity of transfer of the latest trends in medical education and teaching by adding to it the specific creative component of its faculty, thus achieving the present integration into the international community of medical schools.

In its determination to raise the standards of medical education and introduce a new culture of teaching, the management of the Zagreb School of Medicine has decided to join the growing number of medical schools in the neighborhood which offer graduate and postgraduate programs in English by establishing its own English program. The English program of medical studies is primarily aimed at foreign citizens and candidates from the Croatian diaspora who are willing to pursue their academic career in medicine abroad or in the country of their ancestors. This program is entirely instructed in English, and is designed to meet both American (USMLE) and European Union standards with its internationally accredited exams. UZSM also has working relationships with a number of university medical schools in Europe and North America, including University of Toronto, McGill, and the Mayo Clinic.

In the summer 2002, after extensive preparations and marketing analysis the project for the establishment of medical studies in English was proposed to the Senate of the University of Zagreb. September 2002 marked the formal initiation of the English language program in medicine when the University Senate officially approved the proposed program. The program welcomes all applicants who are willing to study medicine in a stimulating environment that strives to incorporate the best features of Western medical education.

Presently, the program has enrolled its fifth generation of students coming from all parts of the world. Through small-group teaching encouraged throughout the program students have a unique opportunity to take part in laboratory sessions and conduct physical examinations at the bedside, which significantly improves both their clinical and research competencies. Consequently, the number of MSE applications is gradually rising each year. A detailed description of the application procedure with related information pertaining to academic opportunities and student life can be found on the following WEB page: <http://mef.hr/>.



POSTGRADUATE studies



HISTORY

For decades the University of Zagreb School of Medicine has been providing a wide range of postgraduate courses in biomedicine and health, organized as postgraduate academic (scientific) studies and postgraduate professional studies (now called specialist programs). Until 2000 the teaching of postgraduate academic studies for the attainment of the academic degree of Master of Science was organized through mandatory courses and electives for a period of at least two years, preparing the students for the presentation of the master's thesis. With the new legal provisions for research and higher education passed in July 2003, the former program for the master's degree was abolished.

POSTGRADUATE SPECIALIST PROGRAMS

The University of Zagreb School of Medicine offers numerous postgraduate study programs which are a constitutive part of the residency training in a particular field of specialty educational programs. The course of studies lasts for two years and is completed with the presentation of a professional thesis, in addition to a final examination. All candidates who have completed the appropriate undergraduate university or professional program in the duration of at least five years are eligible for enrollment into postgraduate studies. The postgraduate specialist programs offered cover 49 fields of medical interest. Depending on the additional interest of overseas students, some programs are offered in English.

DOCTORAL PROGRAMS

Motivated by the huge diversity of PhD programs in Europe and corresponding differences between the existing curricula, the University of Zagreb School of Medicine initiated the organization of two conferences on the harmonization of PhD programs in biomedicine and health sciences, hosted by the Zagreb School of Medicine in 2004 and 2005. The conferences resulted with two important documents, i.e. the Zagreb Declaration, defining for the first time the meaning and requirements of a European PhD program in biomedicine and health sciences, and the Guidelines for Organization of PhD Programs in Biomedicine and Health Sciences. Parallel to these international efforts, with the support of the National Foundation of Science and in cooperation with the Croatian Academy of Arts and Sciences, the Zagreb School of Medicine organized two conferences on Croatian harmonization and networking of PhD programs among all medical schools in the country. At the end of the Second European Conference (Zagreb 2005) all participants agreed on the need to initiate the action for ORPHEUS (ORganization of PhD Education in Biomedicine and Health Sciences in the EUropean System), with Zagreb presiding over the organiza-

tion. With all these activities in the field of doctoral studies, the University of Zagreb School of Medicine has attained a prestigious role among medical schools in Europe.

Based on this platform, along with the Bologna process in Croatia gaining momentum towards promoting greater harmonization among Europe's diverse systems of higher education, the program of doctoral studies which started in 1998 was systematically developed, and started with the new study program in the academic year 2002/2003, which is now called the Doctoral Study in Biomedicine and Health Sciences (PhD program). Additionally, the existing curriculum has been continuously expanded by a significant number of new courses, such as methodological courses, field-oriented courses and guided tutorials, now approximately reaching a number over 200. The European Credit Transfer System (ECTS) has been incorporated into the new system. Consequently, the scientific criteria for the applicants have been gradually raised. In the academic year 2006/2007 there was a total of 113 PhD candidates sitting for their degree in all fields of preclinical and clinical medicine and public health.

In addition to the PhD Program in Biomedicine and Health Sciences, the Zagreb School of Medicine has also introduced a PhD Program in Neuroscience with laboratory rotations and small classes, organized jointly with the University of Ljubljana School of Medicine. With the idea of internationalization gaining a wide momentum, this program should develop into a joint program of several universities from different countries.

The present criteria for the attainment of a PhD degree are in line with the Zagreb Declaration: each candidate should have a minimum of three papers published, one of which, with the candidate as the first author, should be in a journal indexed in the Current Contents with a minimum impact factor of 1 or more. Those criteria are comparable to or surpassing those of the neighboring countries, but are still not as high as those in larger scientific communities. Starting with the academic year 2007/2008, a PhD program in Biomedicine and Public Health is offered to foreign students in the English language. Several scholarships for students are available in Croatia, who can combine the educational part of the program with research conducted in their own countries.

CONTINUING professional development

From today's perspective, continuing medical education and continuing professional development (CME/CPD) is a professional and even ethical obligation of all physicians and health professionals, with the aim to constantly revise and add to their knowledge after the completion of their formal education. It comprises forms of graduate education and training that take place outside institutionalized forms of postgraduate education. CME/CPD courses are offered to general practitioners, physicians on residency training, specialists and other professionals involved in the delivery of health care. The majority of courses organized under the auspices of the Zagreb School of Medicine are structured in such a way as to express their professional educational value through a system of credits attributed to them as regards to objectives addressed, such as the acquisition of specific skills or revision of knowledge previously acquired. The most common forms of CME/CPD comprise lectures, workshops, seminars, consultations, clinical conferences, rounds, as well as modalities of computer-aided education (e-learning). CME/CPD courses are designed to provide most up to date information and treatment strategies indispensable for practicing physicians from all areas of medicine, ranging from molecular medicine to the most recent aspects of clinical diagnostics and treatment. The organization of courses is governed by the Regulations on Postgraduate Studies and Continuing Medical Education. The accredited courses scheduled for the coming year are advertised at the end of the current academic year by means of special editions and poster communications, as well as by available forms of electronic media. In the last few years the Zagreb School of Medicine has been organizing approximately 360 CME courses per year, whereas more than 150 courses, offered within the PhD program in biomedicine and health, can be attended as CME/CPD courses.

**Amphitheater at the
Drago Perović Department of Anatomy**



Continuing medical education program



STUDENT

Life and organizations

Participation of students in management bodies and committees of the Zagreb School of Medicine is ensured through their active involvement in the work of the following organizations:

The Students' Conference is an umbrella organization for the whole University with its branches established at all institutions of higher education. Through a system of delegated representatives students participate in the decision-making process of the School's Senate and are able to voice their opinions and suggestions concerning the improvement of teaching and their status at the Zagreb School of Medicine.

Published biannually, **Medicinar** is a student journal of the University of Zagreb School of Medicine. With its first issue published in 1946, the journal covers a variety of topics ranging from student life, culture and sports to most recent topics in biomedical science and teaching.

The European Medical Student Association (EMSA) is an independent, non-political and non-profit organization run by medical students for medical students. All medical students who study at European medical schools can become members of EMSA. Among the major objectives of EMSA are the promotion of contact and communication among medical students and their faculties throughout Europe at the educational, cultural and social level, stimulating joint action of students in those areas vital for their education and social status in the community. EMSA members are active in organizing conferences and projects on various topics such as medical education, specific medical terminology, cultural and social activities of medical students, etc. Since 2004 EMSA members have been active in organizing the Summer School in Emergency Medicine in Dubrovnik. By now the Dubrovnik Summer School has gained international reputation and is widely acclaimed for its excellent organization of practical workshops for senior students of medicine.

The Students' Section of the Croatian Medical Association was established in 1997 under the auspices of the Croatian Medical Association. Members of the Section help in the organization of conferences, symposia and lectures, and are encouraged to participate in lectures on current topics related to the health of the young population, such as drug addiction, contraception, sexually transmitted diseases, etc. Since 2001, in collaboration with EMSA the Section has been responsible for the organization of the annual Zagreb International Medical Summit for Students and Young Physicians.

Established for the purpose of the promotion of international cooperation of medical students, **The Croatian Medical Students' International Committee (CroMSIC)** is a full member of the **International Federation of Medical Students' Associations**





EMSA Summer School in Dubrovnik

(IFMSA). Its members actively participate in the work of IFMSA standing committees in different areas, such as professional and research exchange, public health and medical education. In the era of globalization of medical science, in which the mobility of students has become a necessity of modern medicine, CroMSIC primarily exists to promote the international co-operation of students of the Zagreb School of Medicine and to encourage them to participate in exchange programs with other medical schools worldwide. Presently comprising more than 200 members, CroMSIC is opened to all the students of the Zagreb School of Medicine.

CROSS stands for CROatian Student Summit. It is an international scientific congress for students and young scientists attending biomedical universities, where students have a unique opportunity to present and exchange their research results. Since 2005 the Zagreb School of Medicine has been host for three CROSS summits with a broad participation of international students.

The University of Zagreb School of Medicine rowing eight, ranking among the top-listed crews at races both at home and abroad for years.



RESEARCH

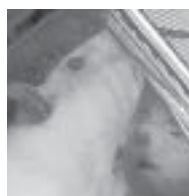
visibility



The new 3-Tesla MRI system at the Croatian Institute for Brain Research

At present, the majority of research grants at the Zagreb School of Medicine are supported by the Ministry of Science, Education and Sports of the Republic of Croatia. State support has been given to 25 research programs encompassing 88 individual research grants and 47 individual research projects. Several projects are offered conjointly with the pharmaceutical industry. In addition, researchers at the Zagreb School of Medicine successfully participated in a number of international research projects over the past six years: five projects were conducted within the European Framework Program FP5, seven projects in the FP6, and one project has recently been approved for the FP7; five other projects received support within the framework of COST actions, two within the TEMPUS program, and one in the recently established Croatian-Indian research collaboration. Finally, there is a number of research initiatives and bilateral collaborations between Croatian and international research groups supported by Fogarty International, Fulbright, DAAD, the Wilhelm von Humboldt Foundation, etc.

The number of scientific papers published in high-profile international journals is one of the best indicators of the scientific output of any academic or research institution. In this respect, the University of Zagreb School of Medicine best serves national interests in the field of biomedicine and health. During the 2000-2006 period, authors affiliated to the School of Medicine published 1,323 papers in journals covered by Current Contents, including 222 papers co-authored with foreign researchers (mainly from the USA, United Kingdom and Germany). In addition, our researchers are currently participating in various multicenter clinical studies, which resulted in 75 papers in the above-mentioned period. The School encourages its faculty to participate in international research in the following research areas: basic and clinical neuroscience, including neuroimaging and neurogenomics; molecular biology, genomics, proteomics and metabolomics; diagnostic ultrasound (esp. in cardiology and perinatal medicine); pharmacogenomics; bone morphogenetic proteins and biological regeneration of tissues; transplantation medicine; hematological malignancies; congenital metabolic diseases; clinical endocrinology and diabetes; and, finally, public health and environmental medicine.



RESEARCH

highlights

BASIC AND CLINICAL NEUROSCIENCE AND NEUROIMAGING

The Croatian Institute for Brain Research (CIBR) is the largest research unit of the Zagreb School of Medicine, which has been conducting research in the program entitled Neurobiology of Cognitive Development and Cognitive Disorders since 1997. This program currently encompasses 28 individual (intramural as well as extramural) projects in basic and clinical neuroscience, thus representing the single largest program in Croatia. Another program at the CIBR is related to the Pathophysiology of the Cerebrospinal Fluid. During the past six years, researchers at the CIBR published over 100 papers in high-profile international journals, with a focus on human developmental neurobiology, pediatric neuroimaging, and the biological basis and pharmacogenomics of mental and neurological disorders.

Over the past decade, the Department of Neurosurgery (in collaboration with the Croatian Institute for Brain Research, the Center for Clinical Implementation of Neuroscience, the Department of Electroacoustics of the Faculty of Electrical Engineering and Computing in Zagreb, and the Institute of Naval Engineering in Zagreb) has performed significant research on the use of high energy ultrasound on experimental animal neural tissue, and successfully constructed an endoscopic ultrasound contact probe for the use in neurosurgery (so far used in clinical work for third ventriculostomy and endoscopic surgery of third ventricle tumors, with a prospect for application in other fields of endoscopic surgery, such as urology, ENT, and orthopedics).



Ultrasound contact probe during neurosurgical operation at the University Hospital Center Zagreb



Ultrasonography at the Department of Cardiovascular Diseases

ULTRASOUND IN RESEARCH

The researchers at the School of Medicine who specialized in ultrasound diagnostics have attained international visibility, especially in the early detection of ovarian cancer by the original method of 3D-color Doppler assessment of pelvic tumor angiogenesis, in cardiology at the Clinical Department for Cardiovascular Diseases of the University Hospital Center Zagreb, and abdominal ultrasound at the Merkur University Hospital and Dubrava University Hospital. At the Department of Cardiovascular Diseases of the University Hospital Center Zagreb, interdisciplinary research has recently been initiated, bridging the gap between clinical practice in cardiology and fundamental research in imaging, engineering and physics. In collaboration with researchers from the Faculty of Electrical Engineering and Computing in Zagreb a model-based approach for the quantification of cardiac function, based on cardiac imaging is being explored.



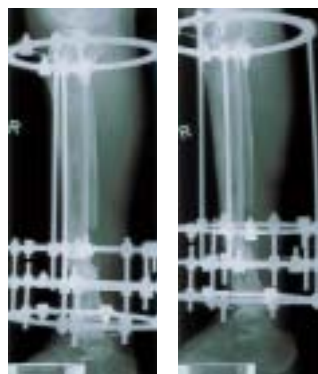
**Sterile unit for bone marrow transplantation,
Division of Hematology at the University Hospital
Center Zagreb**



**Cell and Molecular Biology Section
of the Laboratory for Biology of
Mineralized Tissues**

TRANSPLANTATION MEDICINE

The program of kidney transplantation started in the early 1970s at the University Hospital Center Zagreb, where the establishment of the Tissue Typing Center marked the beginning of a new era for the treatment of patients. Allogenic and autologous bone marrow transplantation programs started in the early 1980s, and programs of heart transplantation (University Hospital Center Zagreb and Dubrava University Hospital) and liver transplantation (University Hospital Center Zagreb and Merkur University Hospital) were routinely performed by the end of the 1990s. Transplantation medicine significantly contributed to the overall development of clinical medicine in Croatia, by triggering off the development of many diagnostic and therapeutic disciplines, such as transfusion medicine, microbiology, immunology, molecular biology, cytogenetics, biochemistry, pathology and cytology.



**Patient with congenital
non-union of the tibia was
successfully treated with
osteogenic protein-1
(BMP 7) at the Department
of Orthopedic Surgery**

BIOLOGICAL REGENERATION OF TISSUES

In the rapidly growing field of molecular medicine and tissue regeneration the Laboratory for Mineralized Tissues is one of the leading research units of the University of Zagreb School of Medicine. In collaboration with the Department of Orthopedic Surgery, bone morphogenetic proteins (BMPs) have been characterized in laboratory and in preclinical trials, and recently several patients with congenital non-union of the tibia were successfully treated with osteogenic protein-1 (BMP 7) at the Department of Orthopedic Surgery. In addition, BMPs and newly discovered cartilage-derived morphogenetic proteins (CDMPs) have been tested for regeneration of articular cartilage chondral defects in large experimental animals, while recent research on BMP-7 has opened a promising avenue for its potential use for kidney regeneration in human medicine.





**Department of Clinical Laboratory Diagnostics,
University Hospital Center Zagreb**

REPRODUCTIVE MEDICINE

On 23 October 1983 the first child was born by applying the in vitro fertilization procedure (IVF) at the University Hospital Center Zagreb, thus making Croatia the eighth country in the world where IVF was successfully applied. This was followed by the application of cryopreservation of embryos (1995), intracytoplasmic injection of spermatozoa (ICSI, 1995), aspiration of spermatozoa from epididymis and testis (PESA and TESA), as well as blastocyst transfer (1998), resulting in over 6,000 children born by IVF and 15,000 children born by other procedures of assisted reproductive technologies (ART) all over Croatia. Now all modern ART are used in Petrova Clinic. Endoscopic surgery in reproductive medicine has a long and successful tradition. Over the last 30 years microsurgical techniques have been successfully introduced and performed. Also, minimally invasive procedures (laparoscopy, hysteroscopy) are routinely used with the aim of preserving reproductive capacity.

CLINICAL BIOCHEMISTRY AND CENTER FOR GENOMICS, PROTEOMICS, AND METABOLOMICS

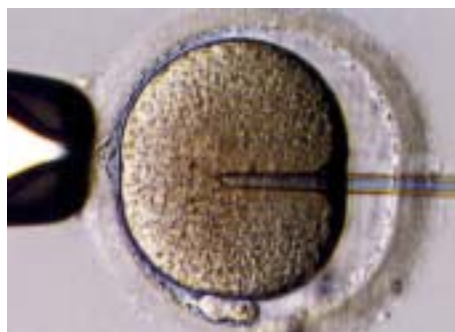
The Department of Laboratory Diagnostics, with its hematology, biochemistry, immunology, inherited metabolic disorders, toxicology, and transfusion medicine subdivisions, has traditionally been at the forefront of medical science in Croatia. The recently founded Center

for Genomics, Proteomics, and Metabolomics endeavors to enlarge the scope of that research and to secure the implementation of cutting-edge research technologies at the School of Medicine. Among a number of research projects and accomplishments, one may point out the discovery of a new mutation on the LDL-receptor gene, and new polymorphisms on cystic fibrosis and apoB100 genes. Other areas of investigation include the etiology and search for molecular markers for hemophilia and von Willebrand disease in Croatian patients.

ADVANCES IN ENDEMIC NEPHROPATHY

There is an ongoing interdisciplinary project on endemic nephropathy, chronic tubulointerstitial nephritis often accompanied by upper urothelial cancers in the strictly defined geographical areas, which points to a common etiological agent. Our Croatian-US team confirmed that aristolochic acid is a strong risk factor and obviously the causative agent. The most important findings of these outstanding results were published in the Proceeding of the National Academy of Sciences. In October 2006 the Zagreb School of Medicine hosted the International Symposium "Recent Advances in Endemic Nephropathy: The Role of Environmental Toxins" with basic scientists and clinical investigators from more than 30 universities; conclusions of the meeting were published in the Journal of the American Society of Nephrology (www.endemic-nephropathy.mef.hr).

Intracytoplasmic injection of spermatozoa (ICSI)



Assisted hatching



Blastocyst ready for transfer



THE FUTURE

our vision

As far as the global trends in medical education and training of the emerging third millennium are concerned, we are anticipating certain changes both in the structure of our curriculum as well as the responsibilities of our teachers and students towards the developments that are already influencing the way medicine is practiced and taught. Due to the enormous explosion of medical knowledge, cramming facts into students is no longer a legitimate educational objective and appropriate response to the growing needs of the patients. One of the major and inevitable trends is the shift from a predominantly knowledge-based, teacher-centered medicine and medical curriculum to evidence-based and practice-based medicine, which is becoming predominantly student-centered.

Simultaneously, we are also facing the challenge of integrating the principles of another generally accepted phenomenon at the European level, i.e. the Bologna process, with the global trends in medical education. Fortunately, the recent trends in medical education seem to be identical with the vast majority of the objectives outlined in the Bologna Declaration and Process.

In implementing the Bologna objectives, the specific features of medical curricula must be considered, particularly in relation to their strong bonds with particular health care systems. The harmonization of medical curricula should be viewed as a convergence process based on a

shared knowledge of best practice and respect for the diversity and autonomy of the institutions.

In the case of the University of Zagreb School of Medicine, we are trying to create such a curriculum that will meet the global requirements and standards for graduate medical education, as specified by relevant international organizations (the Association for Medical Education in Europe - AMEE, the World Federation for Medical Education - WFME, and the Association of Medical Schools in Europe - AMSE). We are also deeply aware of the fact that medicine and medical education are constantly changing together with rapid changes in the research area; in order to achieve the goals of a research-based medical school, we are simultaneously developing certain features specific to medicine, such as clinical and translational research, which have already been a part of numerous national and international research projects and programs. Therefore, we are committed to the establishment of a new educational culture that will support the proposed objectives by constantly adapting our educational behavior to the new academic standards. Over the years to come, our goal is to create a multidisciplinary, integrated educational continuum for medical students, practicing physicians and health care professionals, in order to enable them to be altruistic, knowledgeable, skillful and dutiful to their country and the people they will serve in the course of their careers at home or abroad.



Telecommunication network connecting medical centers throughout Croatia