Trends of telemedicine development in Lithuania

http://tmc.kmu.lt

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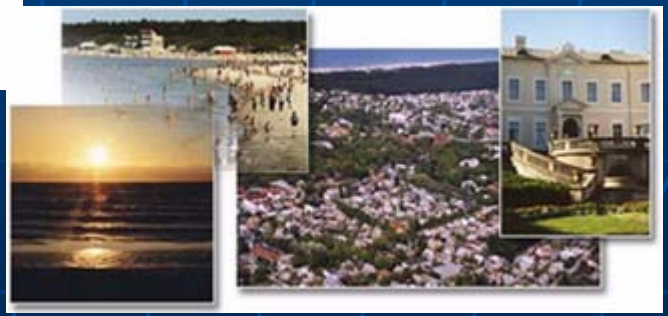
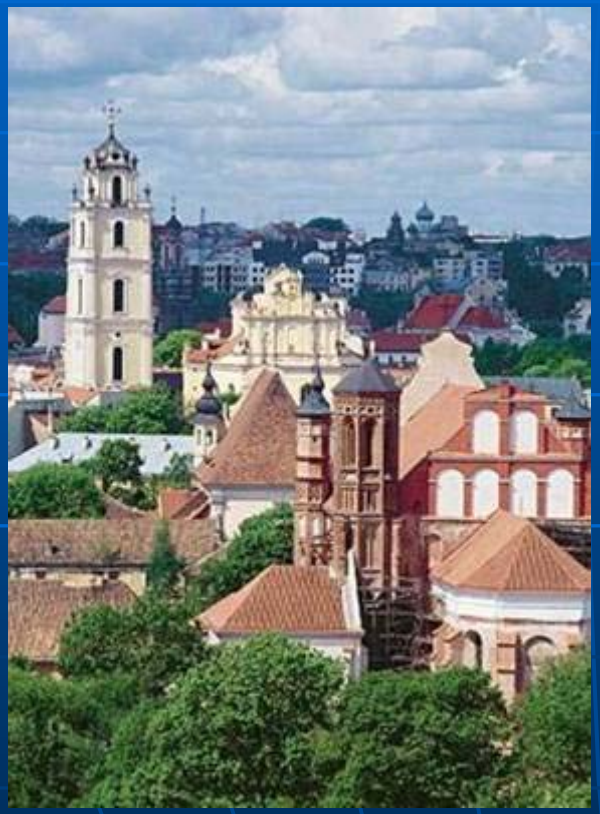
The population of Lithuania – 3.7 million



The capital of the Republic of Lithuania is VILNIUS.
The population of Vilnius is 600.000.



Kaunas - second largest city in Lithuania

Population: 400 thousand inhabitants

The main healthcare services concentrated in five cities:

- Vilnius
- Kaunas
- Klaipeda
- Siauliai
- Panevezys

Total number of physicians in Lithuania - 4000

Telemedicine activities in Lithuania started from joint telemedicine project between Sweden and Kaunas Medical University Hospital which connected medical societies of Sweden and Lithuania

- In 1997 the first videoconference between St.Erik Eye Hospital, Stockholm and Art Galery, Vilnius has been provided by TELIA company.

- On July, 1998 the next videoconference between Eye and ENT Clinics of Kaunas University of Medicine and International Telemedicine Conference in Visby was performed.

Purpose:
To develop technical infrastructure for telemedicine in Lithuania and to train doctors of the leading hospitals to use telemedicine facilities in Lithuania and also communicating with Swedish and other colleagues abroad.

- **Objectives:**
- To prepare the technical infrastructure for telemedicine in Lithuania and networking with foreign countries
- To develop specific telemedicine services and form a support organization for telemedicine development in the Region
- To access the use of telemedicine for patients, who are being presented for consultations
- To make accessible world-wide distance education for medical staff in Lithuania
- To create common international network and data bases ready for data exchange and research

Internet and ISDN based **eHEALTH NETWORK** for Integrated Support of Clinical Practice, Education and Research connecting **KAUNAS eHEALTH CLUSTER** created. The cluster consists of Kaunas Medical University Hospital (http://www.kmu.lt), Telemedicine Center of Kaunas University of Medicine (http://tmc.kmu.lt) and Telemedicine Support Center of Kaunas University of Technology (http://www.bmii.ktu.lt/)

Telemedicine Center of Kaunas University of Medicine

Telemedicine Support Center of Kaunas University of Technology

Kaunas Medical University Hospital

Telemedicine Support Center

Biomedical Engineering Institute of Kaunas University of Technology

Research groups	Telemedicine support centre
	Group of biomedical devices and sensors
	Group of biomedical signal processing
	Group of medical informatics
	Group of ultrasonic field and interaction research
	Group of ultrasonic transducers

TELEMEDICINE CENTER OF KAUNAS UNIVERSITY OF MEDICINE

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Phone: +370 37 338049, E-mail: apaun@medi.lt

Established on April 2002 http://tmc.kmu.lt

The aim of TC is to initiate, form and introduce the policy of telemedicine development in the University and in the country and to prepare recommendations for health care and government institutions.

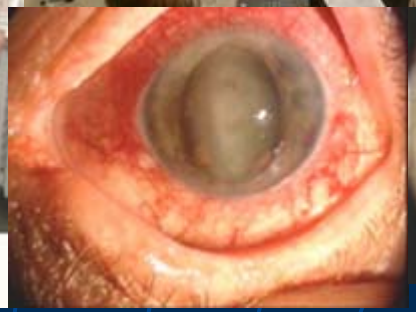
New telemedicine projects

BALTIC MEDWEB I project started in the 1st quarter of 2001 and one of its main goal is to establish high quality image databases and clinical routines of storing images within 4 medical disciplines.

BALTIC MEDWEB II -started in March 2002, and establish a pilot with Image management connected fron connection to PACS systems.

Project leader Peter Severgardh, Euromed Networks AB

http://www.balticmedweb.nu



International Telemedicine Network of Lithuania

- Ophthalmology
- Othorynolaryngology
- Dermatology
- Obstetric-gynecology
- Public Health

Switzerland

Kaunas

The main trends of telemedicine activities in Lithuania are:

Teleconsultations and second opinion.

The telemedicine network for clinical practice with main attention paid towards patient and physician next to him is used.

Distance education.

The use of existing distance education center in Kaunas University of Medicine allows the distant education of medical staff in Lithuania. Videolectures between foreign countries and different regions of Lithuania take place (to Klaipeda, Panevezys, Siauliai).

The courses of education ISDN and Internet based for general practitioners are under preparation. The live demonstrations from surgery and consultations will be used beside the usual teaching material (text, images).

Creation of international databases, information exchange and research.

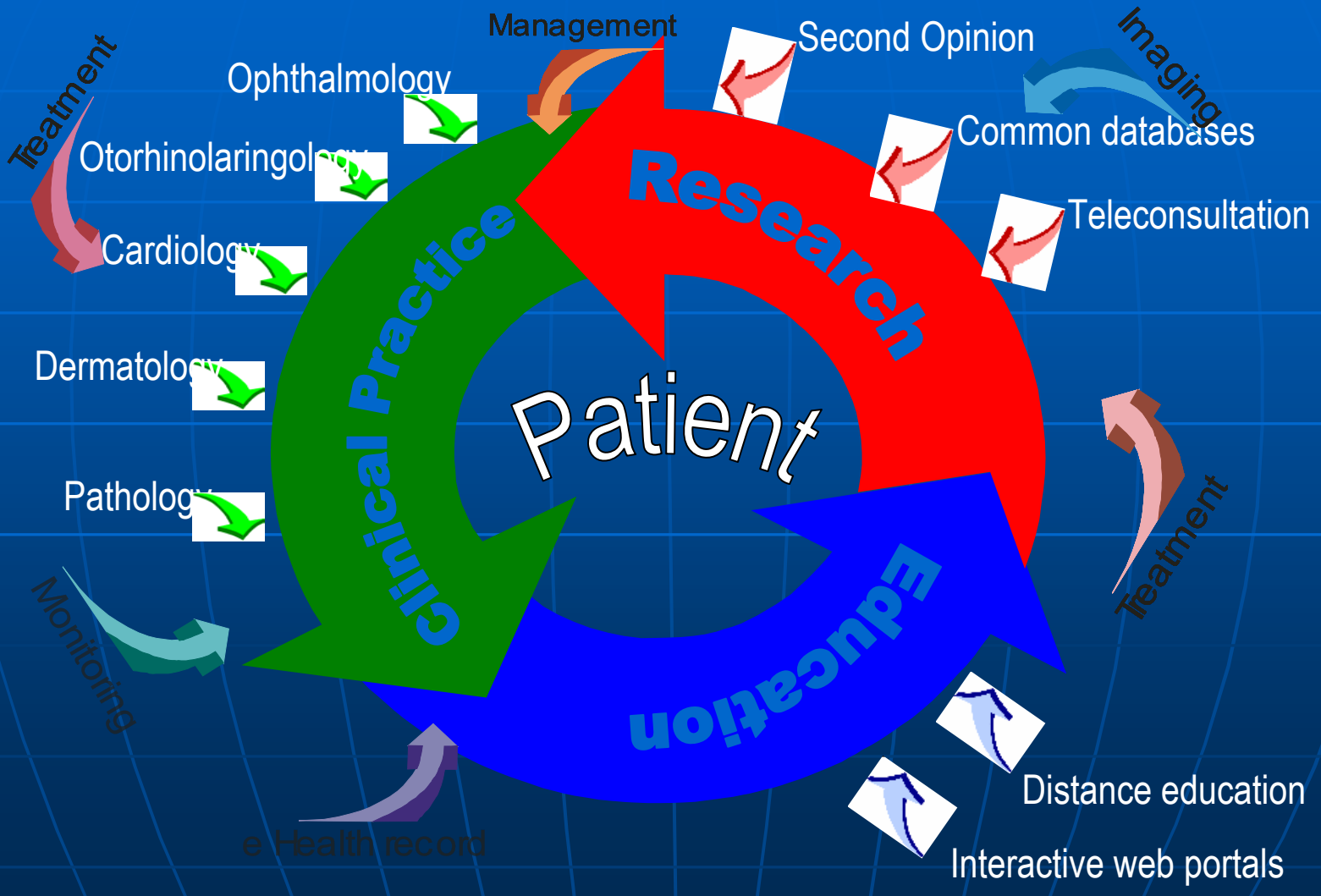
Research based on clinical practice and provided both on medical and technological sides. Research areas: ophthalmology, otorhinolaryngology, pathology, dermatology, cardiology, obstetrics-gynecology, teleconsultations and image processing with ophthalmologists from Lund University via Internet

The use of the telemedicine system allows world-wide and fast distant consultations by high skilled specialists, distant education and research from the best European medical centers to Kaunas and Vilnius university hospitals.

Telemedical networking is used in:

- **Ophthalmology** (with applications to retinal diseases, tumours) http://tmc.kmu.lt
- **Otorhinolaryngology** (with application to laryngeal diseases, rehabilitation of the patients after cochlear implantation) LITMED http://www.litmed.net
- **Cardiology** (user interface between cardiologist-experts with telemedicine system)
TELEMEDICARE www.telemedicare.net
- **Dermatology**, http://www.balticmedweb.nu
- **Pathology**, http://www.litmed.net
- **Obstetrics and gynecology**

The main target is Patient's wellbeing



Technical base

- **Equipment: telemedicine workstation Eurotel I, digital slitlamp Topcon SL 8Z, digital surgical microscope, digital dermatoscope with 3CCD Sony video camera attached, Fundus Camera Canon CF-60UVi**
- Networking: 3 ISDN (384kbps) and TCP/IP

Regular videoconferencing connecting partners sites in Kaunas, Lund, Stockholm and also other countries take part

Teleconsultations

Teleconsultation of Lithuanian Children during Rehabilitation after Cochlear Implantation

Surdopedagogue Neringa Ivoškienė from Kaunas and speech pathologist Ursula Willstedt-Svensson from Lund has use videoconference in lessons for Lithuanian children with cochlear implants. Surdopedagogue N.Ivoškienė - Speech Pathologist U.Willstedt-Svensson.

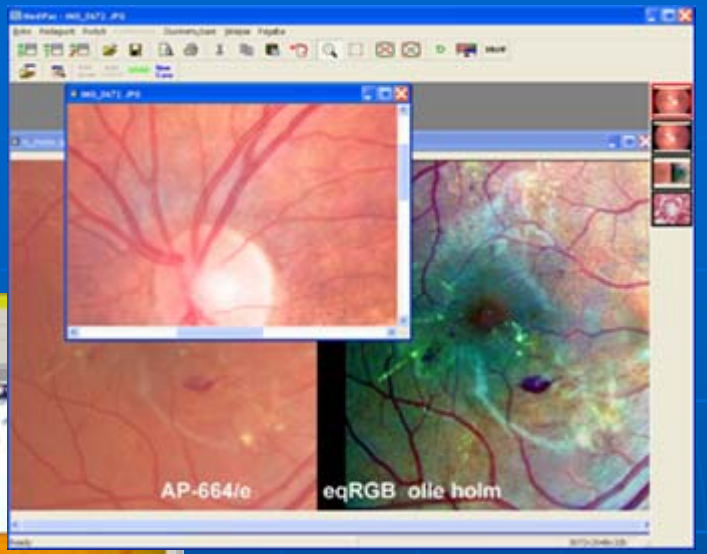
Live Teleconsultations

Teleophthalmology started from regular videoconferencing and distant consultations among Kaunas Eye Clinic, St.Erik Eye Hospital and Lund University on June, 2001.

The main ophthalmological disease for project framework was eye trauma, ophthalmic oncology, pathology, pediatric ophthalmology, rare diseases.

Live Teleconsulations

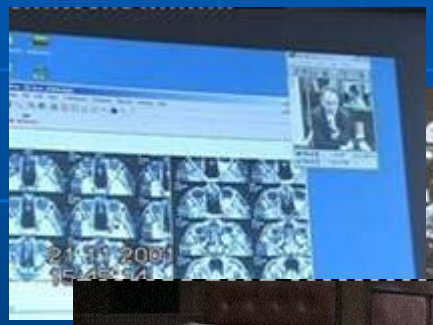
A new software Medipas – common "working table" during live videoconferencing and database, created in Telemedicine Support Center



There were two different opinions in KMU Eye clinic on ethiology of acute retinal necrosis. After common discussion with colleagues from St.Erik hospital, Stockholm the herpes viral ethiology of acute retinal necrosis has been established.

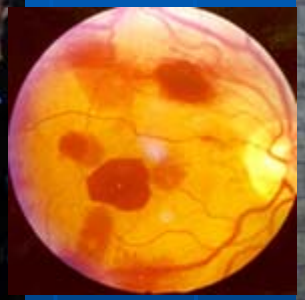
Live Teleconsulations

Distant multispeciality consultation from Kaunas Eye Clinic



- **Vascular genesis of the orbital tumor determined and after common discussion surgical treatment delayed.**

Distance Education



Distance education started with lectures, live cataract and vitreoretinal surgery demonstration from Stockholm and Lund, patient demonstration from Kaunas and common discussions.

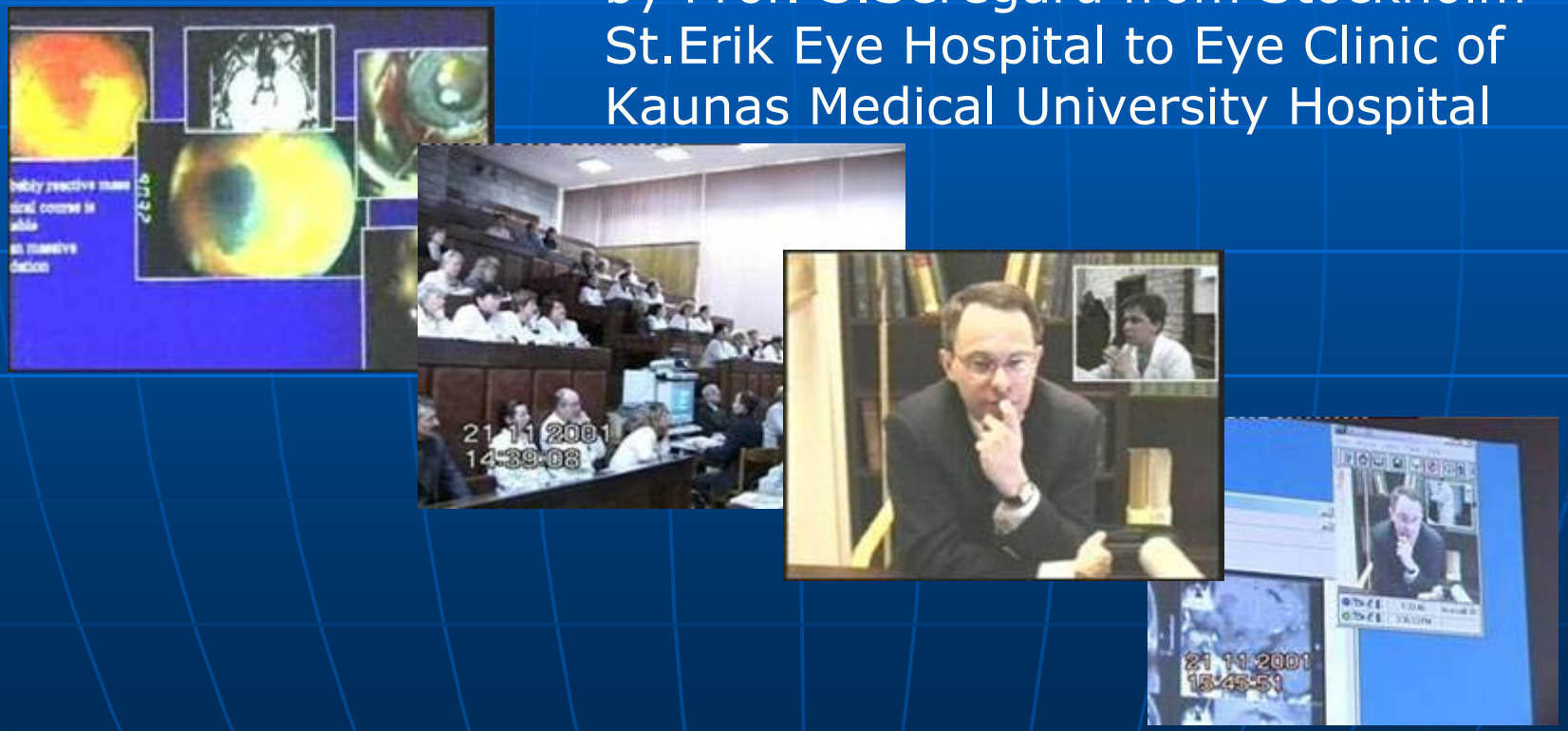
Live distance lectures, surgery demonstrations, and seminars held on.

Distance education

Lecture from Stockholm

"The vascular tumors of the eye, orbit and adnexa"

by Prof. S.Seregard from Stockholm St.Erik Eye Hospital to Eye Clinic of Kaunas Medical University Hospital



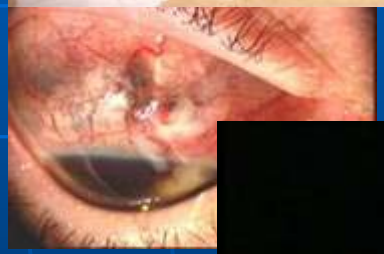
Distance education

Live ENT surgery

Laryngeal microsurgical operations performed by R.Rydel, MD in Lund were observed and discussed by ENT doctors in Kaunas.

Distance education

Lecture from Kaunas



- Dr. R.Gricius and Dr. E.Puodžiuvienė used videoconference for distance lecture on Eye trauma management to eye doctors in St.Erik Eye Hospital from Eye Clinic of Kaunas Medical University Hospital.

Distance education

Distance education in obstetrics-gynecology

started on 2002 Lithuania-Latvia-Estonia-Sweden

Distance education

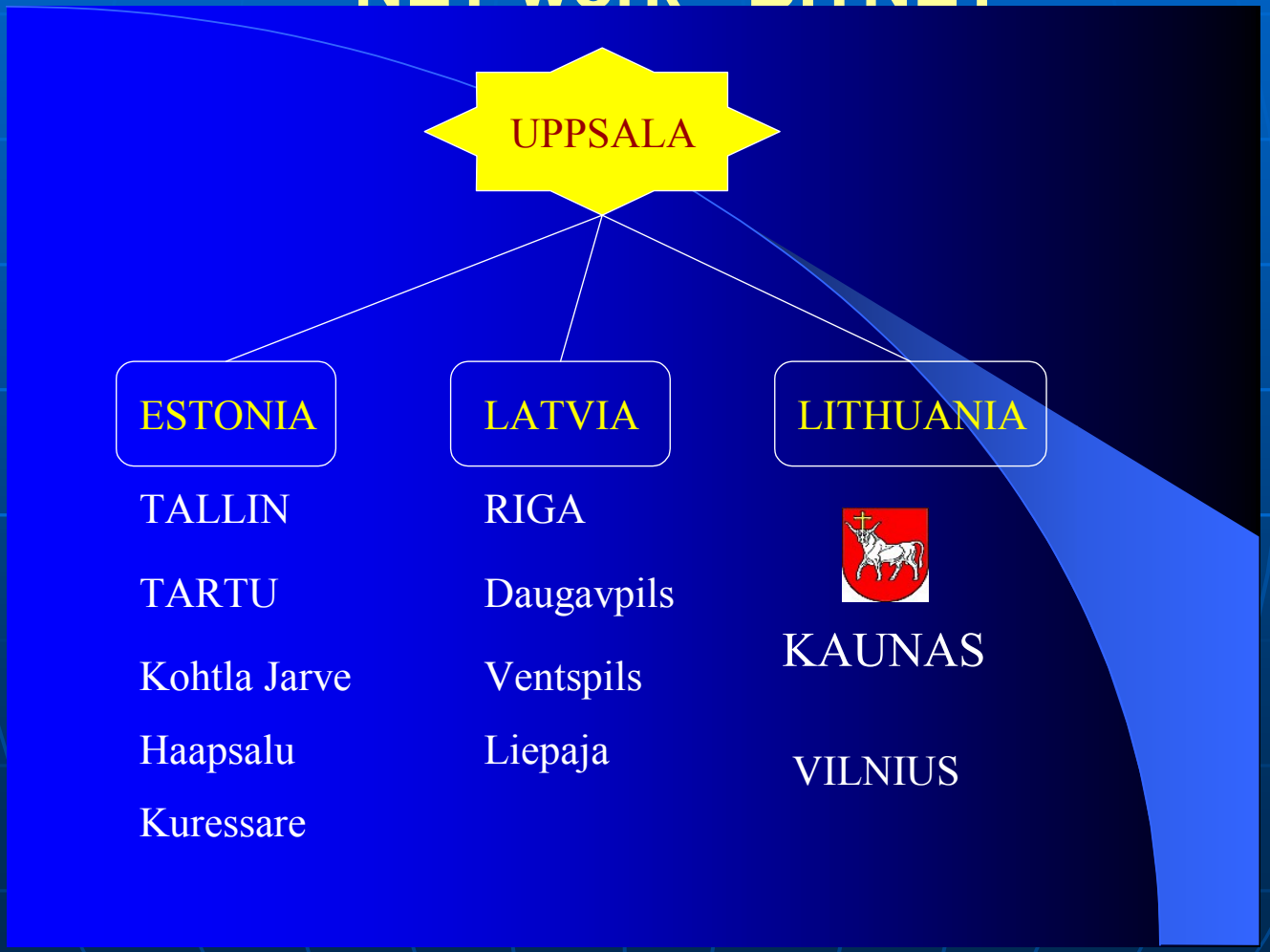
A multipoint videolecture

"Fine needle aspiration performed by the pathologist with emphasis on organizing a FNA clinic and the value of ancillary methods" by Dr. Henryk Domanski (head of the Pathology Department at Lund University Hospital) from Eye Clinic of Kaunas University of Medicine to Tartu University (Estonia), Ryga University Hospital (Latvia), Vilnius Santariskes University Hospital (Lithuania), Uppsala University (Sweden), Lund University Hospital (Sweden)20 May 2003

A joint videoconference between Vilnius Santariskes University Hospital and Telemedicine Center of Kaunas University of Medicine

Topics: e-Learning (preparation of joint studies program for graduate and postgraduate students)

Vilnius University Hospital Baltic International Telemedicine NET work - BITNET

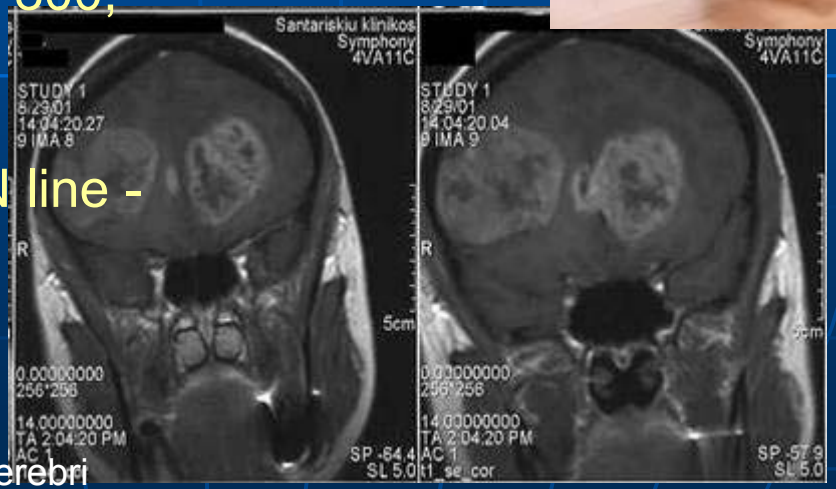


BITNET

Computed images-CT and MRT and conventional digital Xrays investigations as well as physiological digital signals like EEG, EMG, and ECG from brain, muscles, heart and other organs can be transferred within minutes for specialist evaluation.

Videoconference equipment :

- camera Tamberg Vission 800,
- document camera,
- two monitors,
- 3 telephones lines - ISDN line - 384Kb.



N.J. Dgn. Glioblastomatosis cerebri

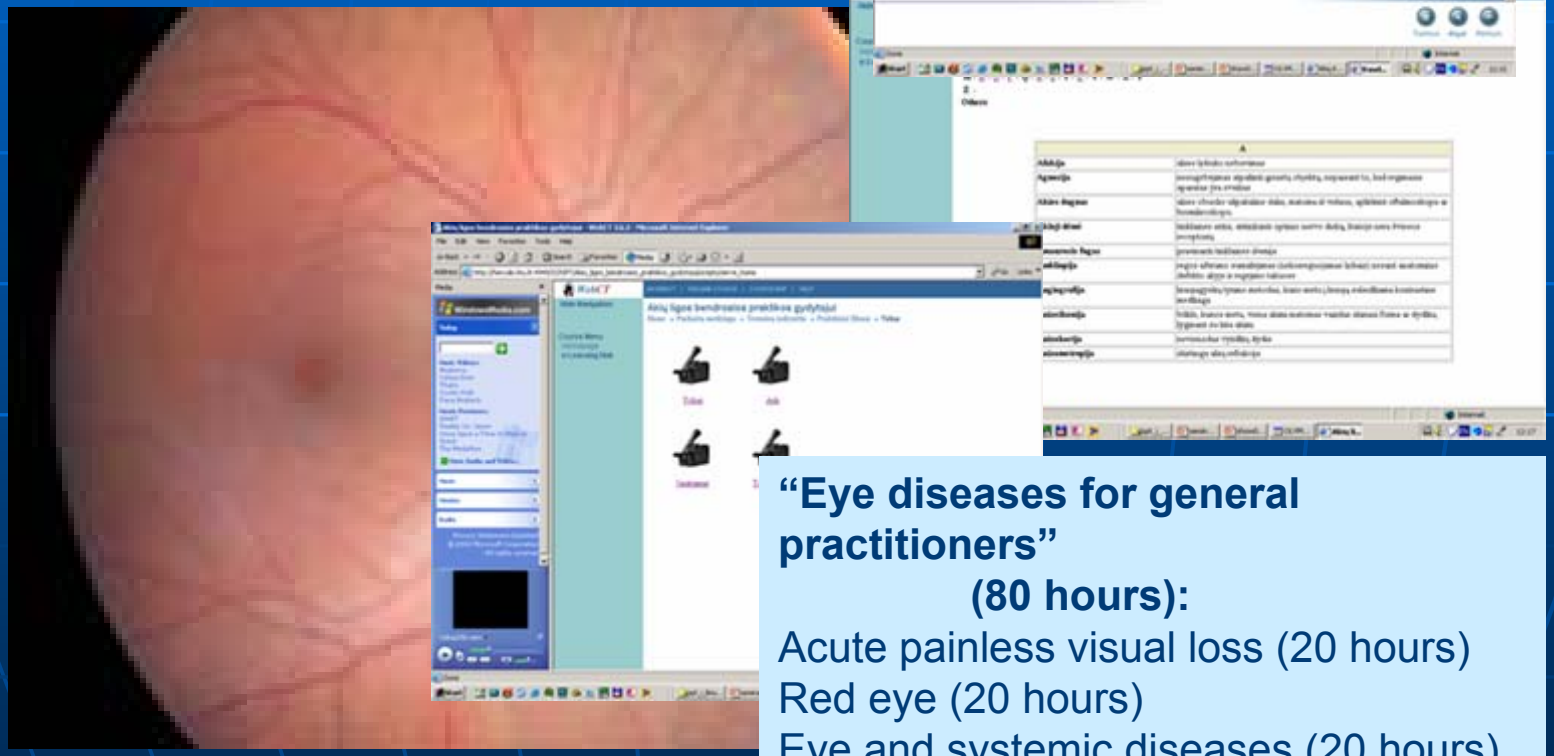
BITNET

- From the 26th of June 2001 videoconferences were started in VUHSK.
- 8 videoconferences on Neurology, Neurosurgery, Stomatology were organized.
- 1 patient was treated in UUH.
- The blood samples of I.B. were sent to UUH for the exact diagnosis.
- Before the videoconferences 321 images were sent using e-mail. 80 images for follow-up.
- On the 23rd of April 2002 direct line from the MagicView was opened from VUHSK and images were sent for consultation to UUH.

Distance education

e-Library, e – books

An Internet based distant education courses for general practitioners including dictionary and movies prepared



“Eye diseases for general practitioners”

(80 hours):

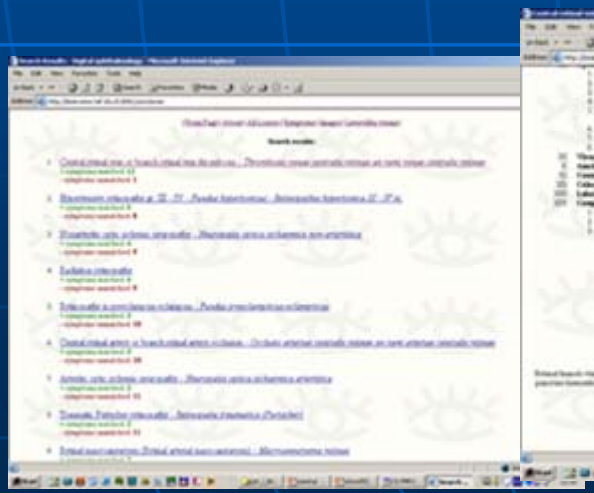
Acute painless visual loss (20 hours)
Red eye (20 hours)
Eye and systemic diseases (20 hours)
Eye trauma (20 hours)

e-Library, e – books

The essential development of this activities was creation of
Web site: DIGITAL OPHTHALMOLOGY – Informating system as clinical decision support for general practitioners in English and Lithuanian

Digital ophthalmology: Acute painless visual loss

http://bmii-www.tef.ktu.lt:8081/unrs/akys



Research based on clinical practice and provided both on medical and technological sides

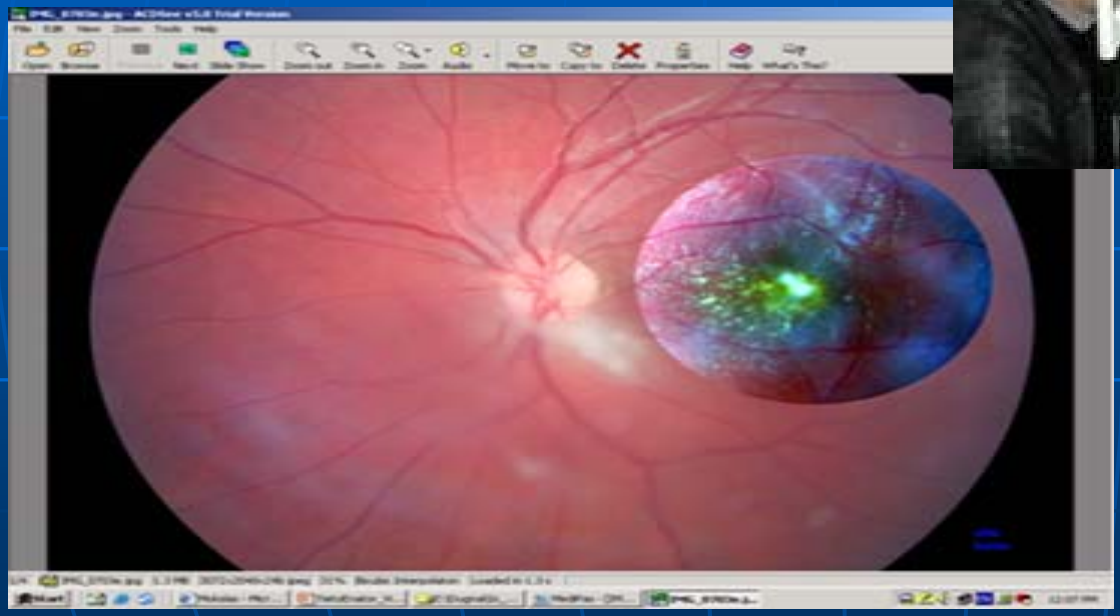
Research areas:

Otorhinolaryngology,
Ophthalmology,
Pathology,
Cardiology,
Obstetric-Gynecology,
Dermatology

Research

Image processing with ophthalmologists from Lund University via Internet started on January 2003

Assoc.Prof. Olle Holm



The eye fundus image before processing in Lund University Hospital

The eye fundus image after processing by eqRGB algoritms

The using of the eye fundus image processing is more informative

Data used for processing, parametrization and training of the decision support algorythms.

Research

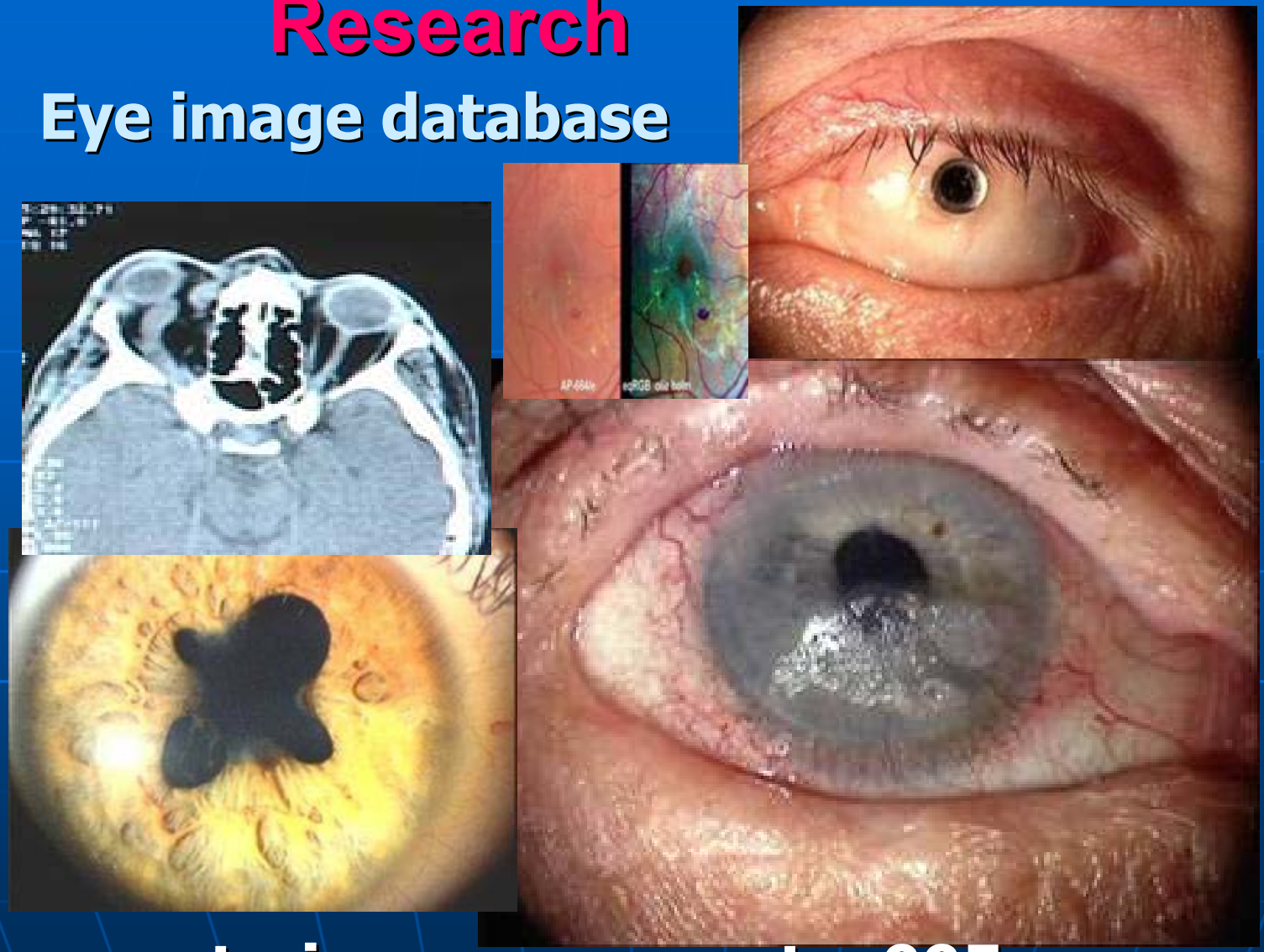
Data bases

- Eye image database
  - a) anterior eye segment – 995 cases
  - b) eye fundus – 194 cases
- Eye trauma registry
- ENT image database 800 cases
- Dermatology image database 153 cases

Safe international (SQL) and local data bases (MS access) for collecting ophthalmological signals and images are used. Collecting is performed by using a special original software Olympus Migra (Euromed AB, Sweden) and Medipas (Kaunas University of Technology), installed in telemedicine workstation Eurotel I.

Research

Eye image database



anterior eye segment – 995 cases

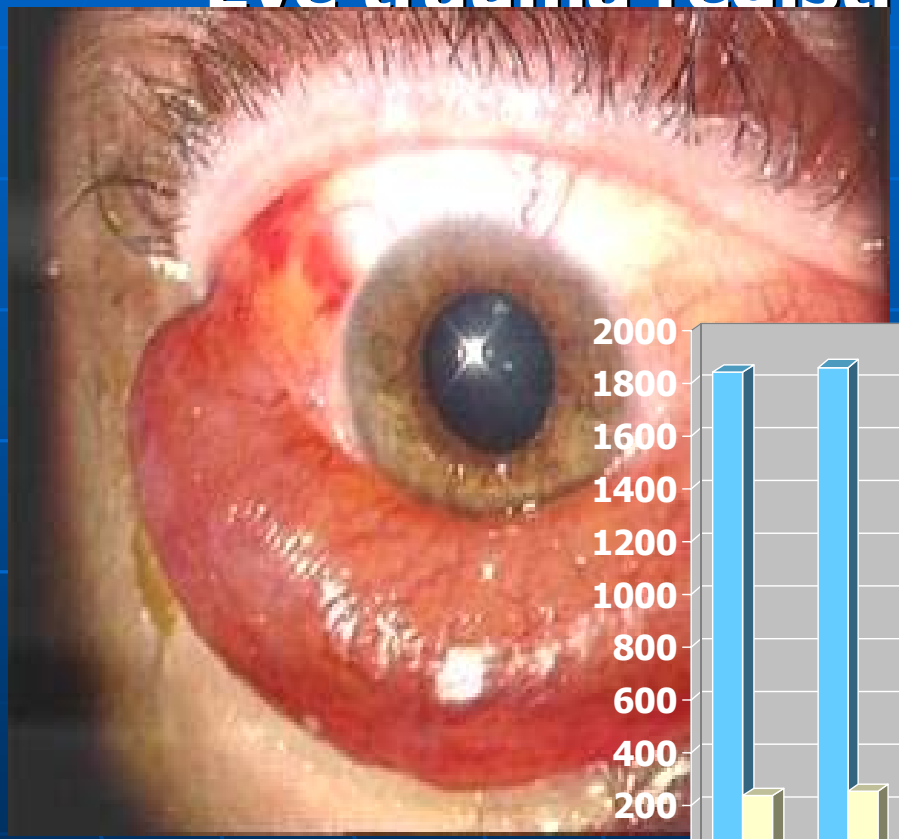
Research

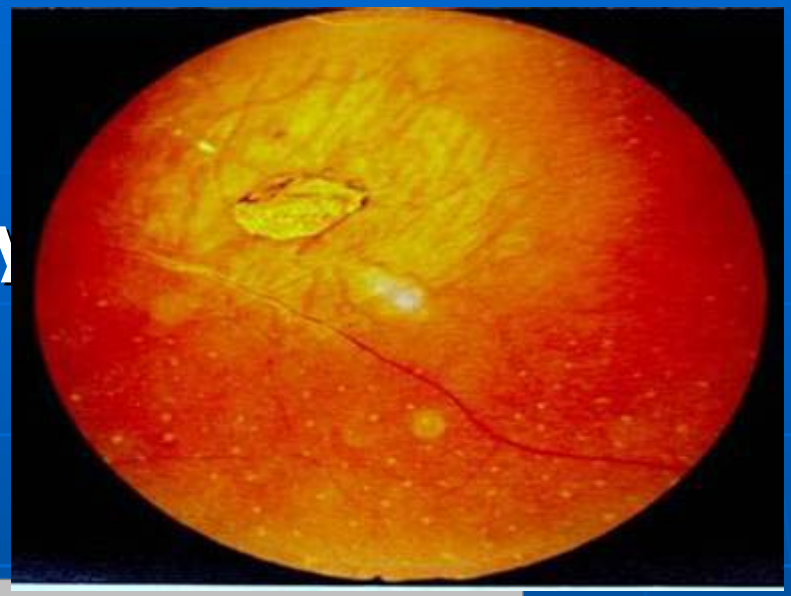
Eye image database

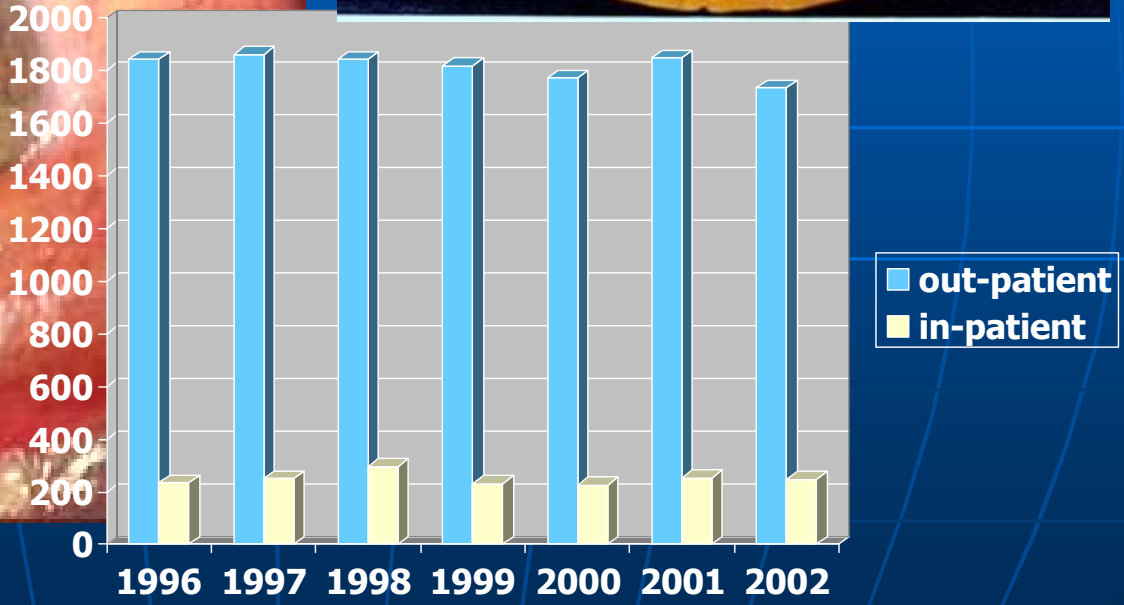
eye fundus – 194 cases

Research

Eye trauma registry

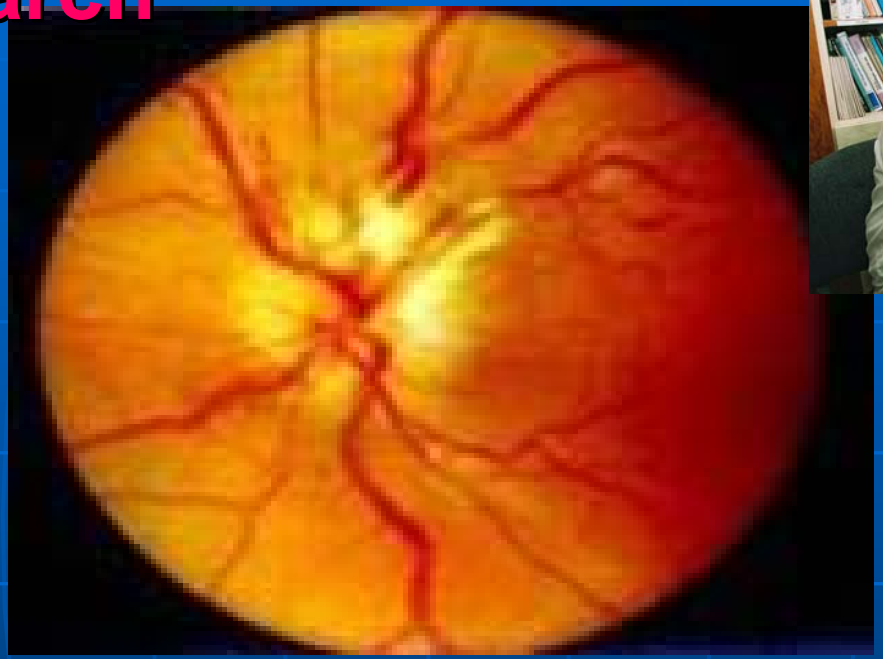






Eye trauma surgery in Kaunas Eye clinic - Number of patients

Research



Data bases

- Dermatology image database 153 cases

OBJECTIVES:

to create the database with clinical and dermatoscopical images of the typical and unusual manifestations of skin diseases

to use the standardized computer program of photodocumentation for the long follow-up of dermatological patients

to carry out the prospective scientific studies of dysplastic and congenital melanocytic nevi

to organize permanent tele-consultations on complicated clinical cases with dermatologists from Switzerland via Internet (2003)

Research

Data bases

- **ENT image database 800 cases**

Research

The new program supported by Lithuanian State Science and Studies Foundation started on September 01,2003.

Information technologies for human health

– clinical decision support

– “IT Health”

New programme IT-Health is devoted for primary storing, processing of biomedical information and for creation of multi-objective analysis based clinical decision support strategy.

Research

The aim of the programme:

To access the use of telemedicine for patients, make accessible world-wide distance education and create common international network for data exchange, research and clinical decisions support in ophthalmology and cardiology.

Objectives and tasks

- 1) **Development of multicriterial clinical decision support strategies**
- based on multi-objective analysis methods of patient - population data, ophthalmological and cardiological images and signals in pilot databases, using telemedicine networks;
- 2) **Creation of an ophthalmological and cardiological clinical decision support expert** – diagnostic – information system, based on storage and processing of digital diagnostic signals, images and clinical – experimental data;
- 3) **Using the connection between physician – user, expert – diagnostic – information system for clinical decision support** and international telemedicine net for decreasing of ophthalmic and cardiologic disease and visual disability risk.

The first year period of the programme was intended for analysis of the state, clinical decision support system strategies and structure formation, oriented to decision support in ophthalmology and cardiology

Research

Technical – experimental base

The system consist:

computer net (1 server, 12 computers, 1 telemedicine work station Eurotel I with frame grabber, slit lamp Topcon SL8Z with Sony 3CCD camera attached, digital fundus camera Canon C60UVi (6.3MPxls), ultrasound diagnostic equipment (Mentor Advent AB system, digital oscilloscope Tektronix 220, ultrasound dopler flowmeter UDD01), digital ECG, flowmeter equipment.

All this equipment is connected with the database through local net and used for collection of information about the patient into databases.

Medical data of different modality, e.g. text, medical images, long term recordings of high quality biomedical signals stored and used in the process of realization of the project.

Research

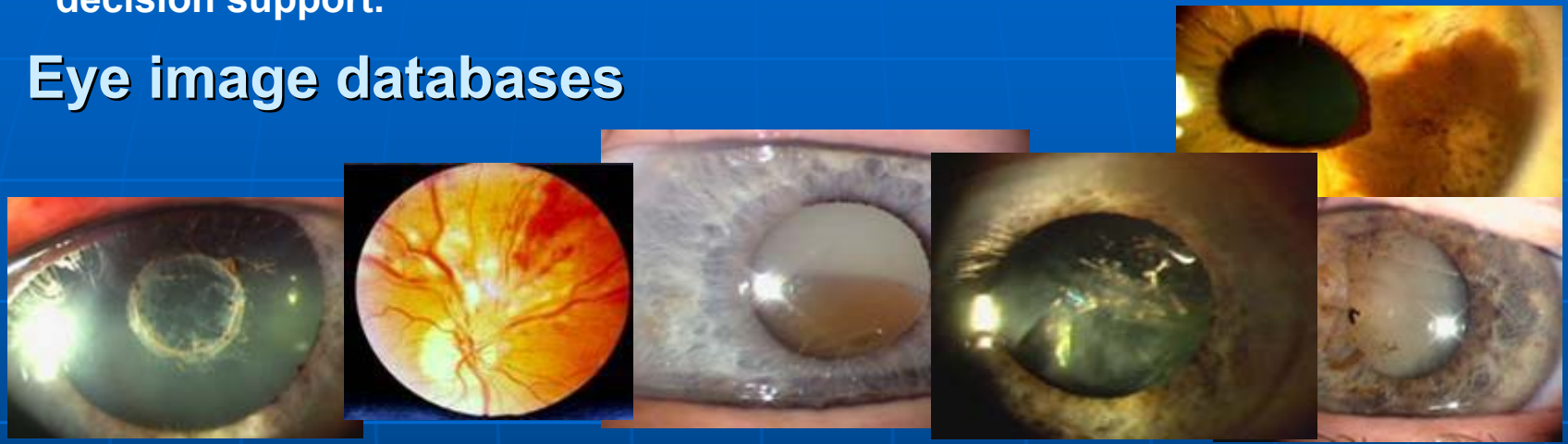
Software

- Safe international (SQL) and local data bases (MS access) for collecting ophthalmological signals and images are used.
- Collecting is performed by using a special original software Olympus Migra (Euromed AB, Sweden) and Medipas (Kaunas University of Technology), installed in telemedicine workstation Eurotel I.
- A special separate file – case for storing of patient information (ID, history, diagnosis, images, comments) has been created.
- All amount of data has been devided into two groups:
- 1. Anterior part of eye diseases;
- 2. Eye fundus diseases.

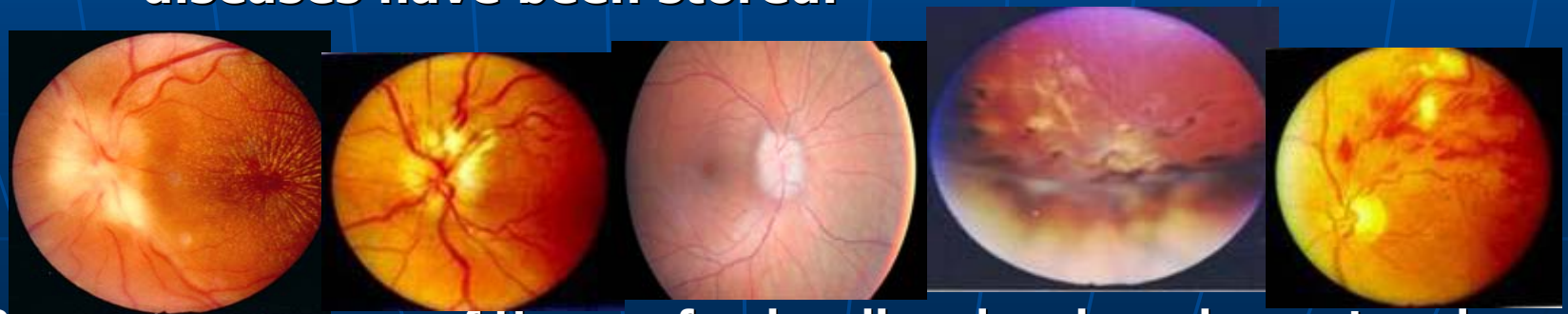
Research

The storing and processing of ophthalmological images and signals to databases with integration to international telemedicine network has been started in aspiration to find the most informative parameters for clinical decision support.

Eye image databases



995 different cases of anterior part of the eye diseases have been stored.



224 different cases of the eye fundus disorders have been stored.

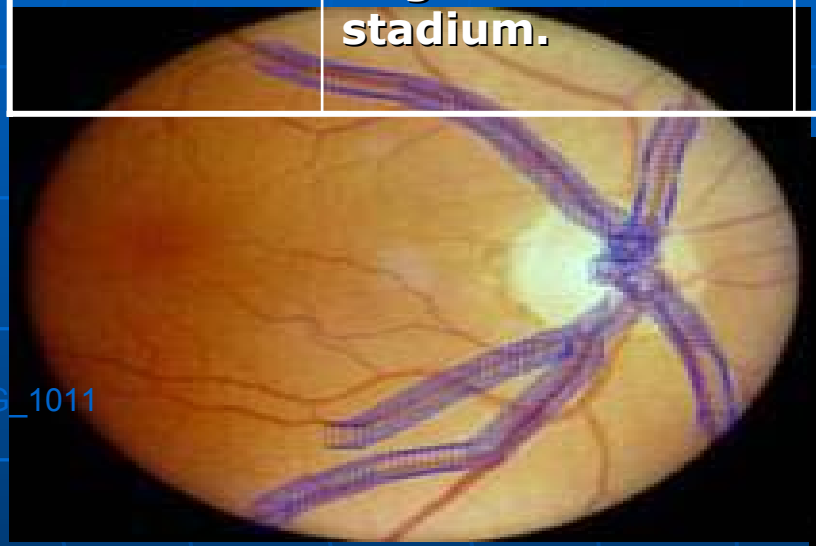
Research

For the first period of the project the fundus image parametrization was selected

- The sequence of eye fundus image parametrization following the logical eye fundus examination – assessment sequence established:
- 1) parametrization of the optic nerve head;
- 2) parametrization of the retinal focuses (derivatives);
- 3) parametrization of the retinal blood vessels.

Research

IMG_1011.jpg	**Optic nerve swelling (papilledema) of the right eye. Regression stadium.**	**Optic nerve changes.**	**Optic nerve head is swollen, pale (beginning of secondary optic nerve atrophy), with blurred elevated margins, deflection of vessels over edge of the disc.**



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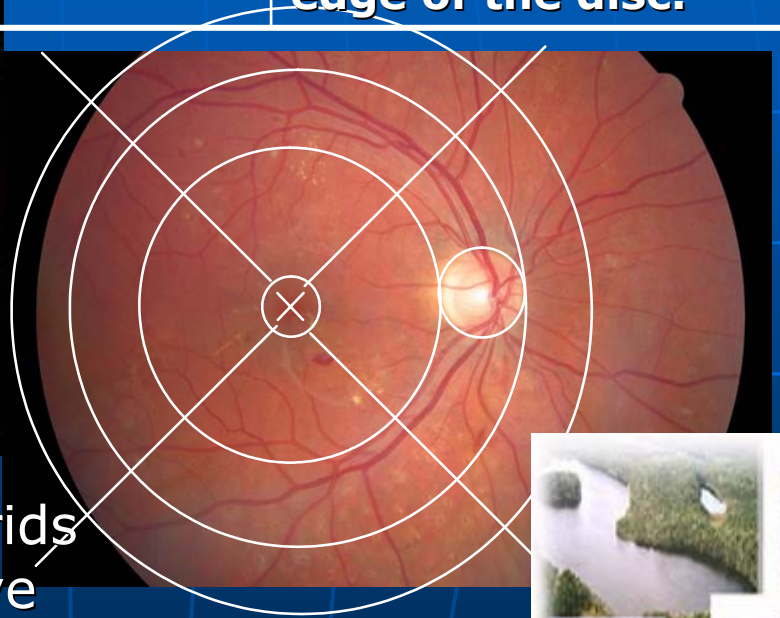


- Description table and grids for localization of the eye fundus changes and parametrization of retinal vessels.

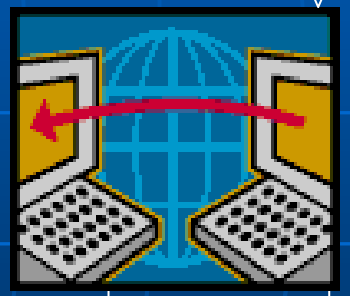
Research

PATIENT:
Complains
History
Inspection data
Examination data
Signals
Images

Diagnosis

Physician
Decision

Decision support



E-Library

Data bases:
Classified symptoms
Images
Signals


Thank You for attention!
http://tmc.kmu.lt
2004