E-Learning Applications for Basic and Advanced Education in Medicine and Dentistry

Herbert K. Matthies

Peter L. Reichertz Institute for Medical Informatics (PLRI)
Hannover Medical School, Hannover, Germany

http://www.plri.de/

The Peter L. Reichertz Institute for Medical Informatics

The University of Braunschweig - Institute of Technology and the Hannover Medical School has been united their medical informatics institutes as a joint institute, named “Peter L. Reichertz Institute for Medical Informatics“ (PLRI).

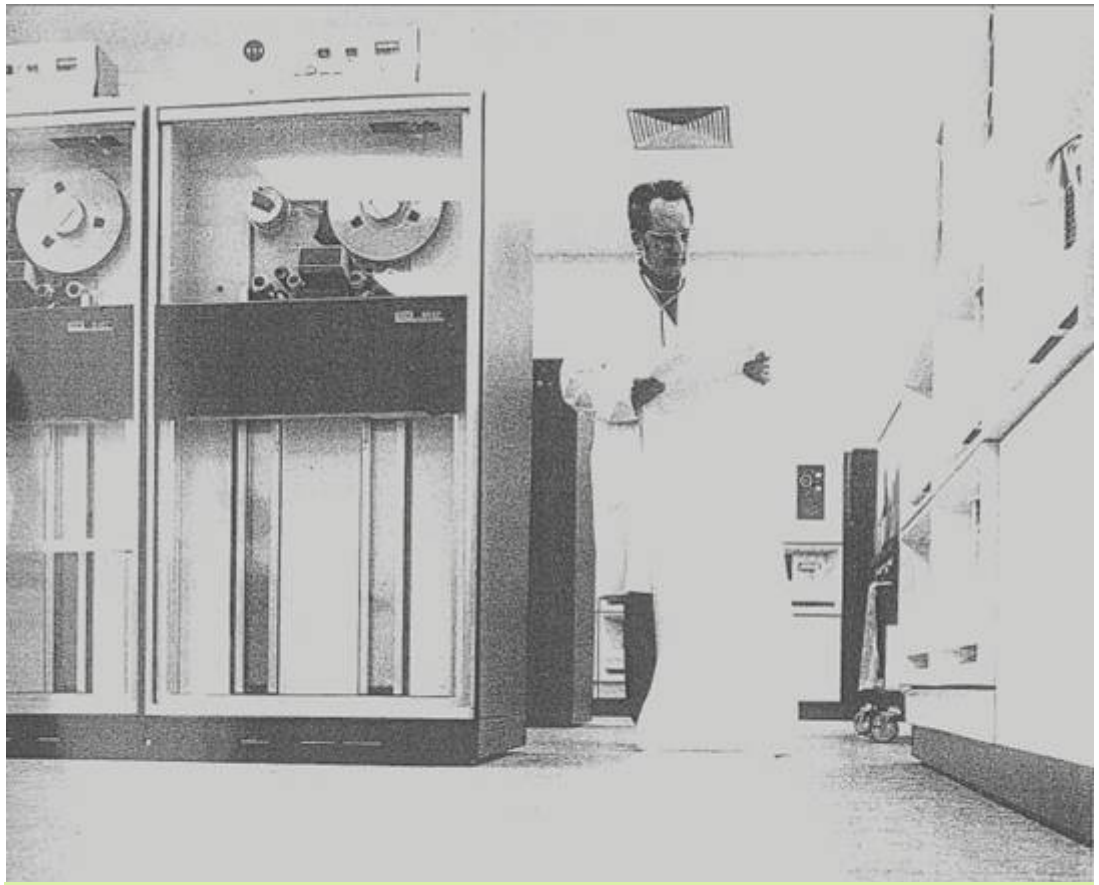
PLRI consists of two institutes, located

- at Braunschweig (director: Prof. R. Haux)
- at Hannover (director: Prof. H. K. Matthies).

➔ Aim: regional ‚center of excellence‘

Peter L. Reichertz

(1930-1987)



a pioneer of Medical Informatics

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The Peter L. Reichertz Institute for Medical Informatics

The PLRI staff is member of both universities.

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PLRI – education

medical informatics courses for students of

- **business information technology** (TU)
- **computer & communication engineering** (TU)
- **computer science** (TU)
- **medicine** (MHH)
- **dental medicine** (MHH)

medical informatics program (B.Sc., M.Sc., PhD)

at TU Braunschweig

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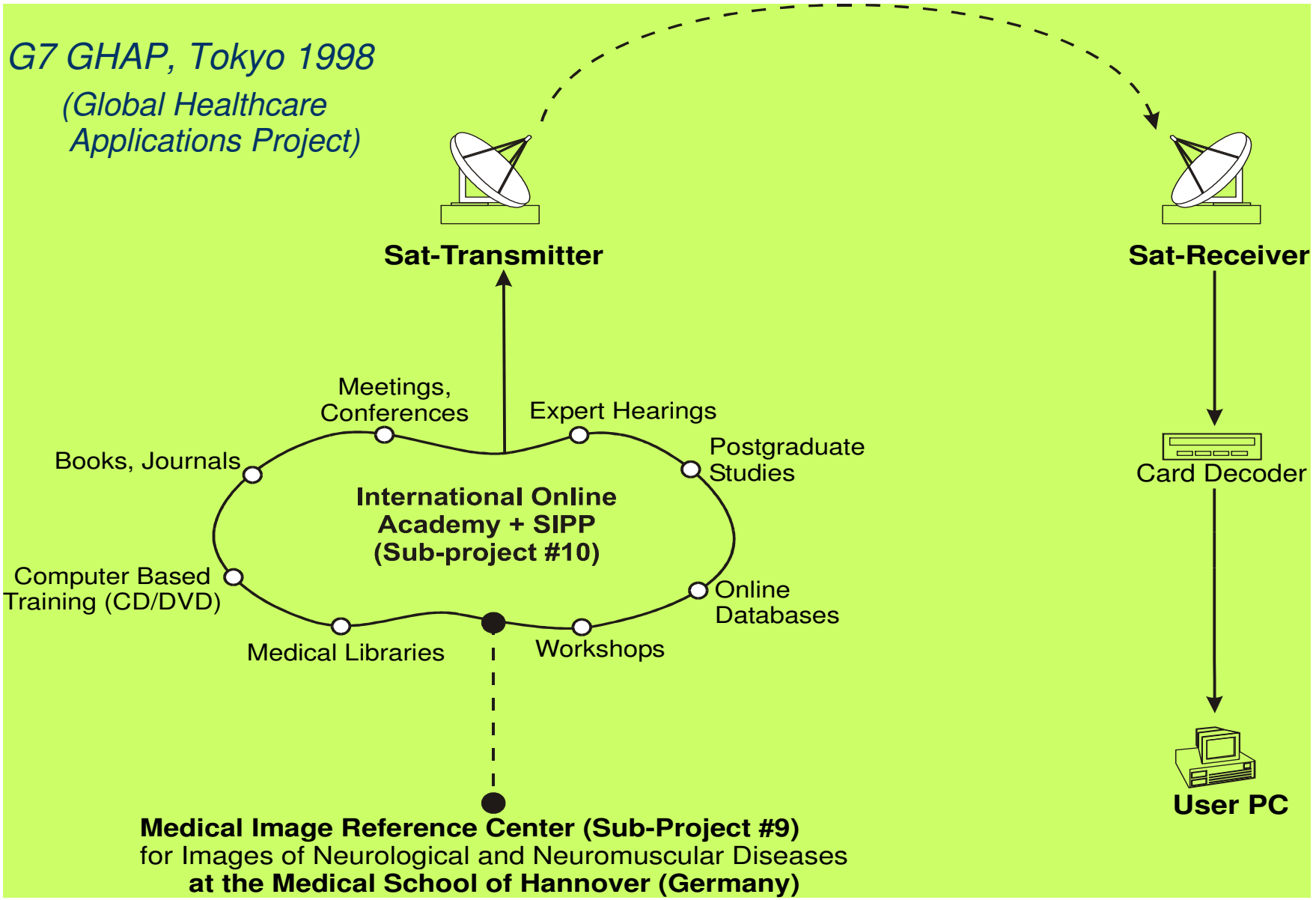
PLRI – fields of research

- **health-enabeling technologies**
  (R. Haux, Braunschweig)
- **eLearning in medicine and dentistry**
  (H.K. Matthies, Hannover)
- **health information systems and management**
  (R. Haux, Braunschweig)
- **medical imaging and visualization**
  (H.K. Matthies, Hannover)

G7 GHAP, Tokyo 1998

(Global Healthcare Applications Project)



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Virtual Education System for Brain Diseases

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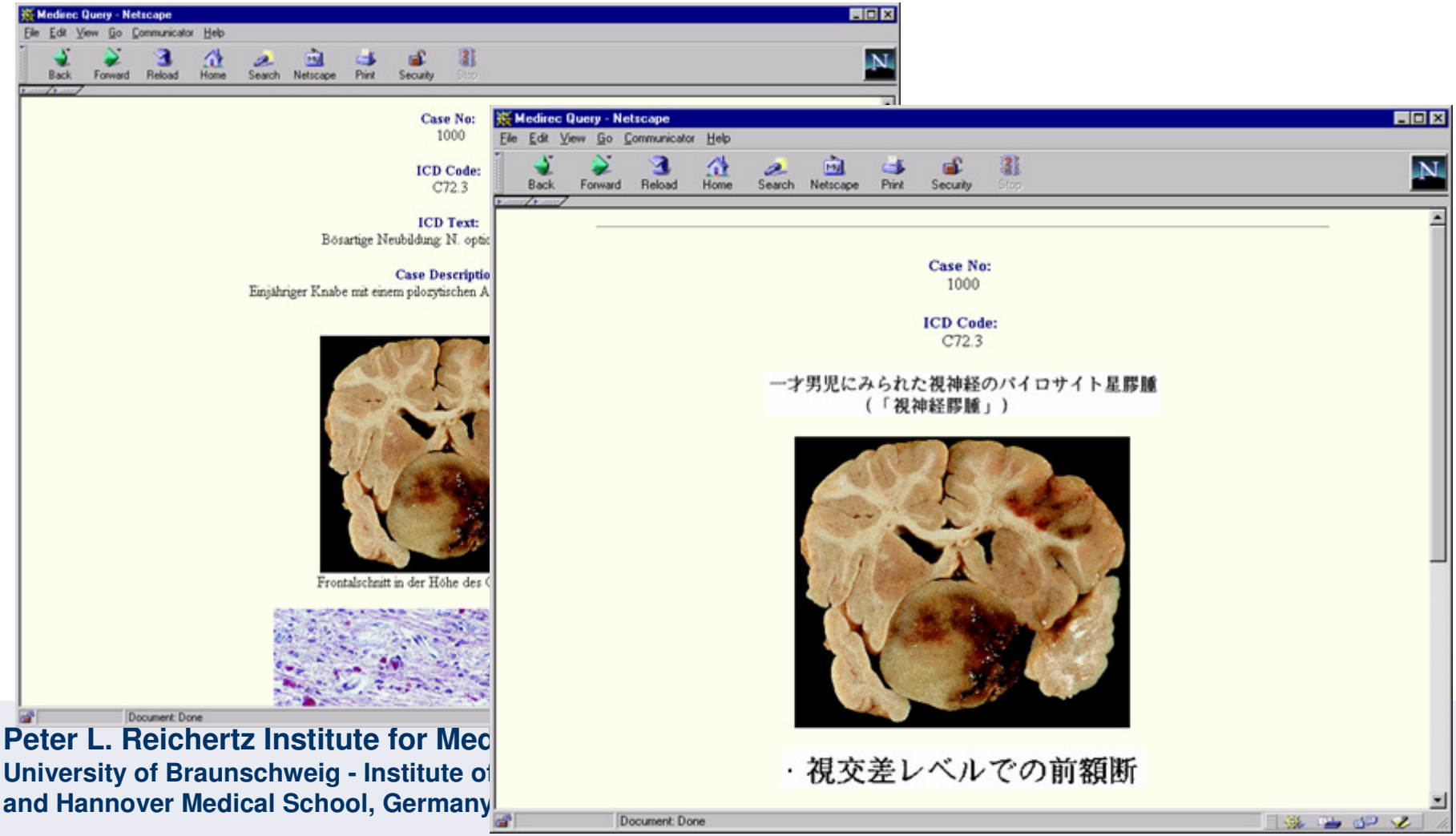
Virtual Education System for Brain Diseases



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Web and New Information and Communication Technologies

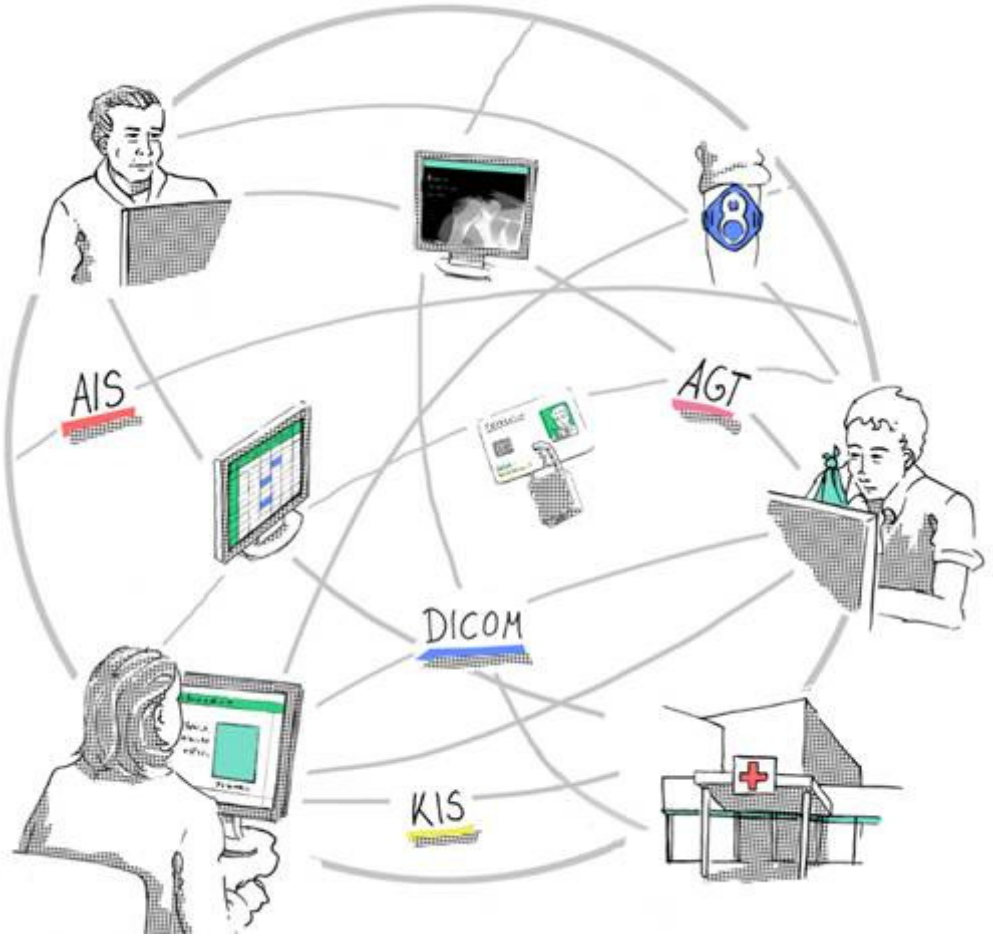
➔ dramatic changes

of

business,

live,

learn



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New Ways of Education

New educational concepts, technologies, course contents will be required:

- teaching/learning strategies
- eLearning environments (LMS, CMS)
- blended learning courses (both face to face and eLearning)
- development and production of learning modules
- web-based learning resources/tools
- virtual learning labs/classrooms in conventional universities
- collaborative learning in small groups
- public private partnerships (PPP) between universities and publishing companies
- policies, ethics and worldwide standards

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eLearning Requirements at the Hannover Medical School (MHH)

- Implementation of the model curriculum “HannibaL”: a more patient oriented approach to teaching medicine leads to special requirements concerning eLearning
- Additional ways to convey knowledge have to be found for continuing medical education
- Various departments (not necessarily medical) want to use eLearning

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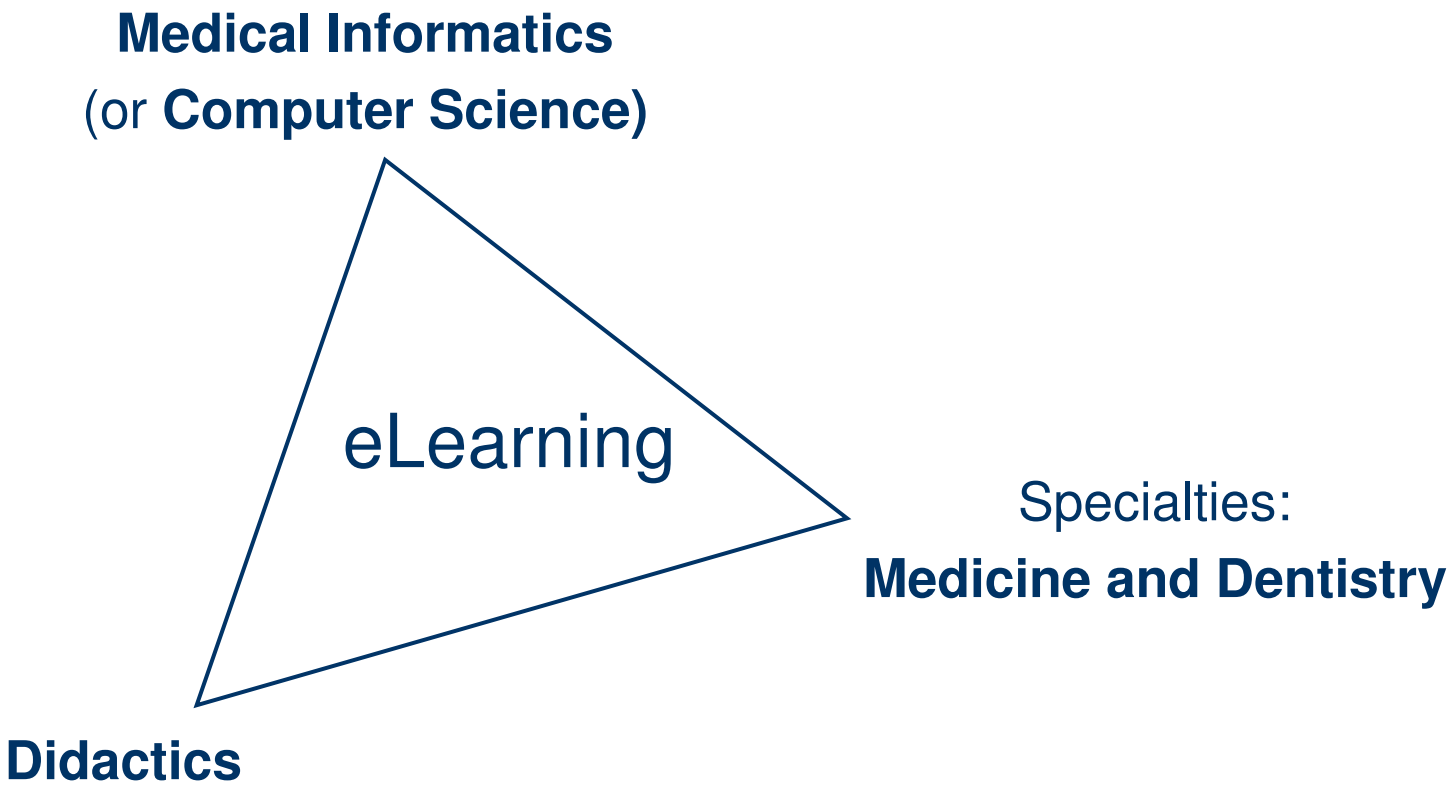
eLearning at the MHH

- **To fulfill all requirements, "eLearning" at the MHH includes different variants of**
  - computer based (not limited to web applications),
  - interactive,
  - multimedia,
  - …
  - learning methods

- **It is in use in various areas:**
  - education, organizational needs, technical, …

eLearning in Medicine Requires an Interdisciplinary Approach



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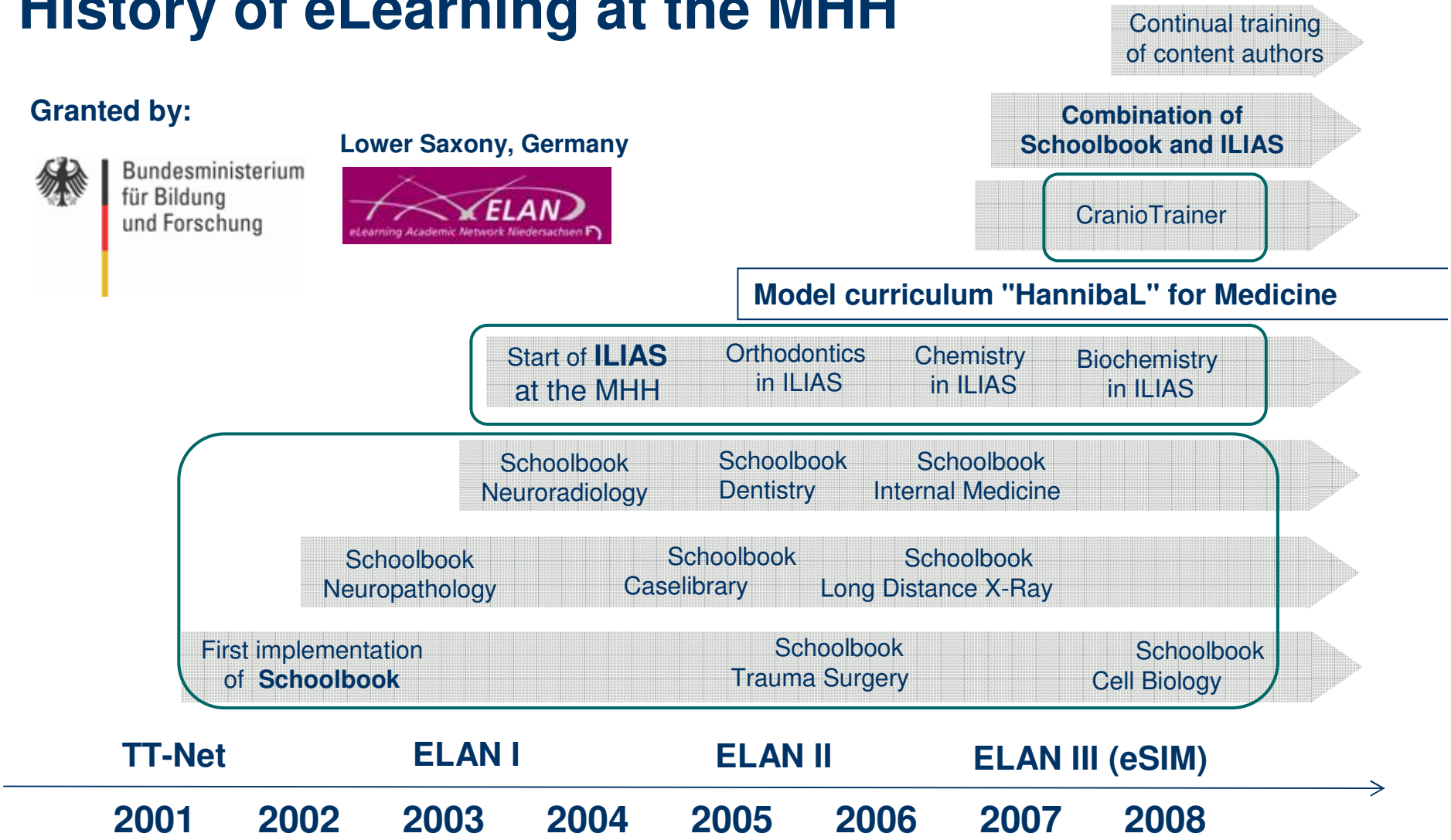
History of eLearning at the MHH

Granted by:

Bundesministerium für Bildung und Forschung

Lower Saxony, Germany

ELAN eLearning Academic Network Niedersachsen



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eLearning at the Hannover Medical School

- **Examples for different eLearning implementations currently in use:**
  - Web-based
    - ILIAS: Learning management system
    - Schoolbook: Content management system including medical case libraries for different specialities
  - Interactive training software
    - CranioTrain: Craniotomy training for neurosurgery and trauma surgery
  - e-Examination software
    - Q-exam

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Web-based: ILIAS and Schoolbook

- **ILIAS**
- Learning management system
- Portal system for learning, communication and organizational issues
- Modules are built according to the curriculum

- **Schoolbook**
- Content management system
- Medical case library
- Uses semantic networks internally to allow access to content using different pathways:
  - "Networked Knowledge"

- Open source
- Assign user and author rights according to rights management
- Web-based access for learners and authors
- LAMP: Linux, Apache, MySQL, PHP

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Web-based eLearning – ILIAS

- **Developed at the University of Colonia (Germany):** http://www.ilias.de/
  + **Military Univ. Hamburg**
- **at the MHH, ILIAS is used for developing content for**
  - the model curriculum "HannibaL"
  - continuing medical education as well as
  - various projects for other (medical) professionals
- **at the NATO** for military education

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ILIAS – Organization of Modules for HannibaL

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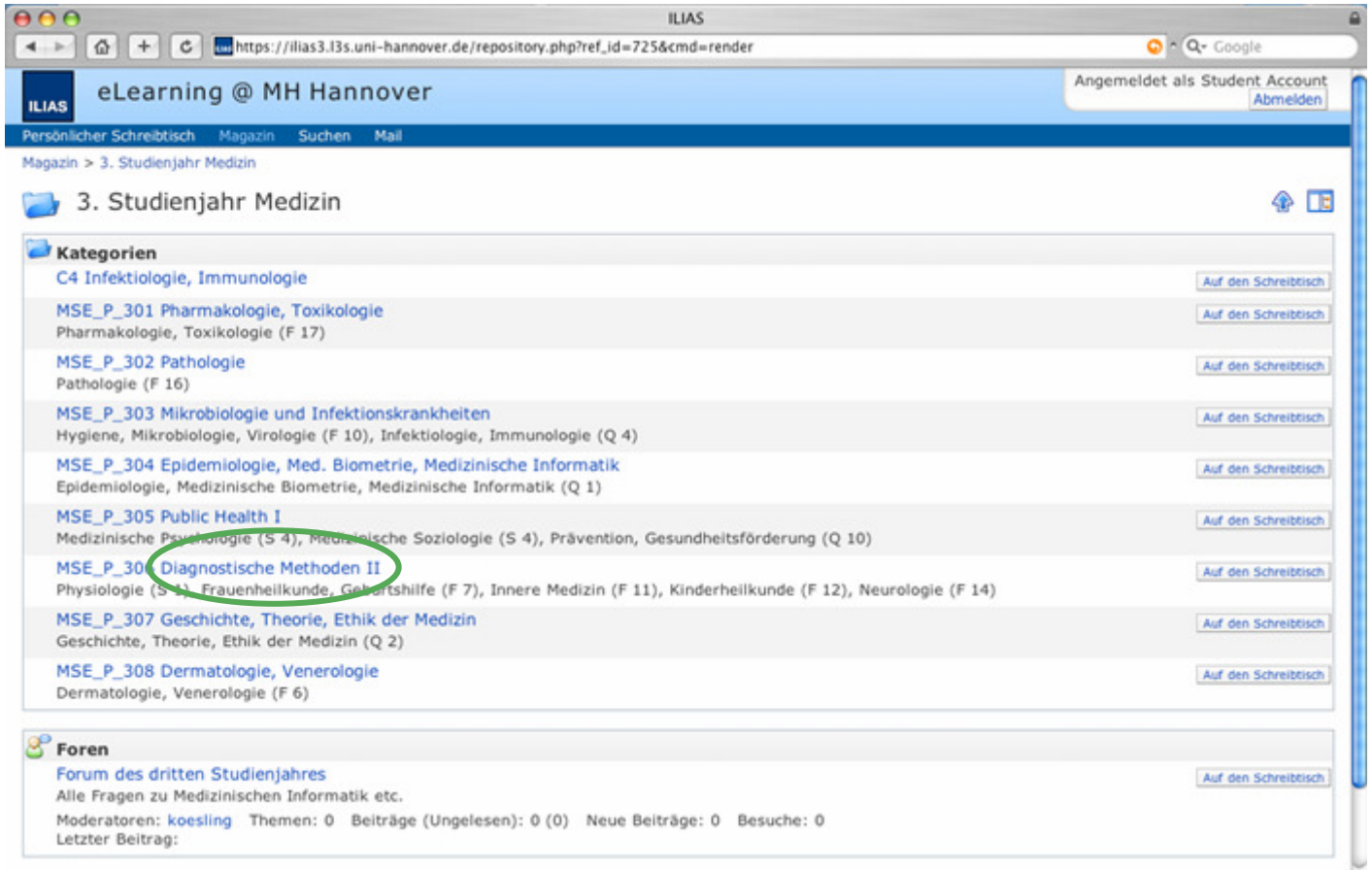
ILIAS – Organization of Modules for HannibaL



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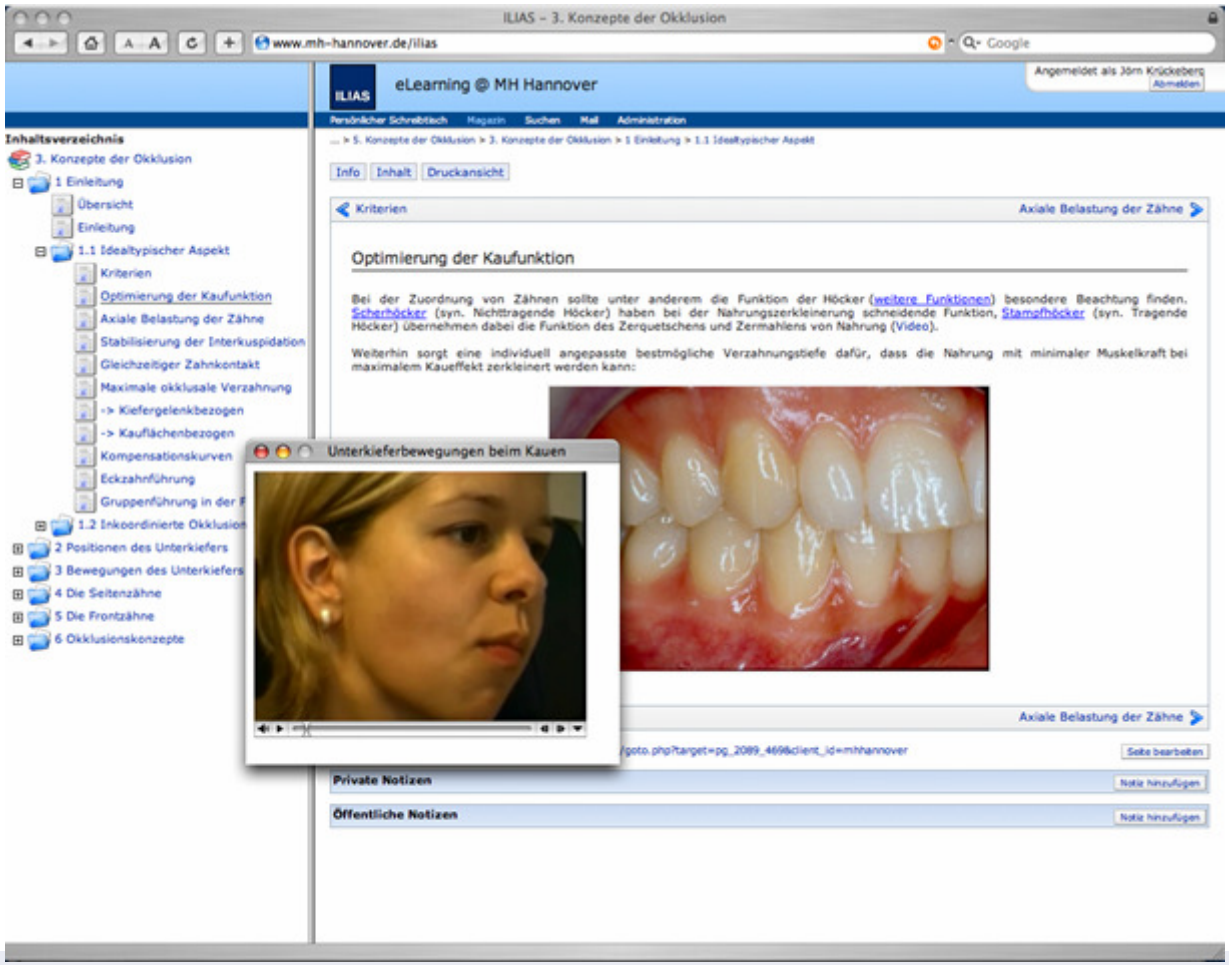
ILIAS – Dentistry / Concepts for Occlusion



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ILIAS – KFOcast – Der Podcast aus der Kieferorthopädie

eLearning @ MH Hannover

ILIAS / KFOcast – The Podcast of Orthodontics

Persönlicher Schreibtisch | Magazin | Suche | Mail | Administration | Zuletzt besucht

Magazin > Zahnmedizin > Kieferorthopädie > 7. Funktionsdiagnostik > KFOcast - Der Podcast aus der Kieferorthopädie

KFOcast - Der Podcast aus der Kieferorthopädie

Inhalt | Info | Einstellungen | Rechte

Mediacast

Mediacast-Einträge

KFOcast

Folge: Funktionsdiagnostik

Dateiname: kfo_cast_funktionsdiagnostik.flv
Laufzeit: 00:01:56
Zugriff: Angemeldete Benutzer
Erzeugt am: 2008-10-06 13:24:40
Letzte Aktualisierung: 2008-10-06 13:24:40

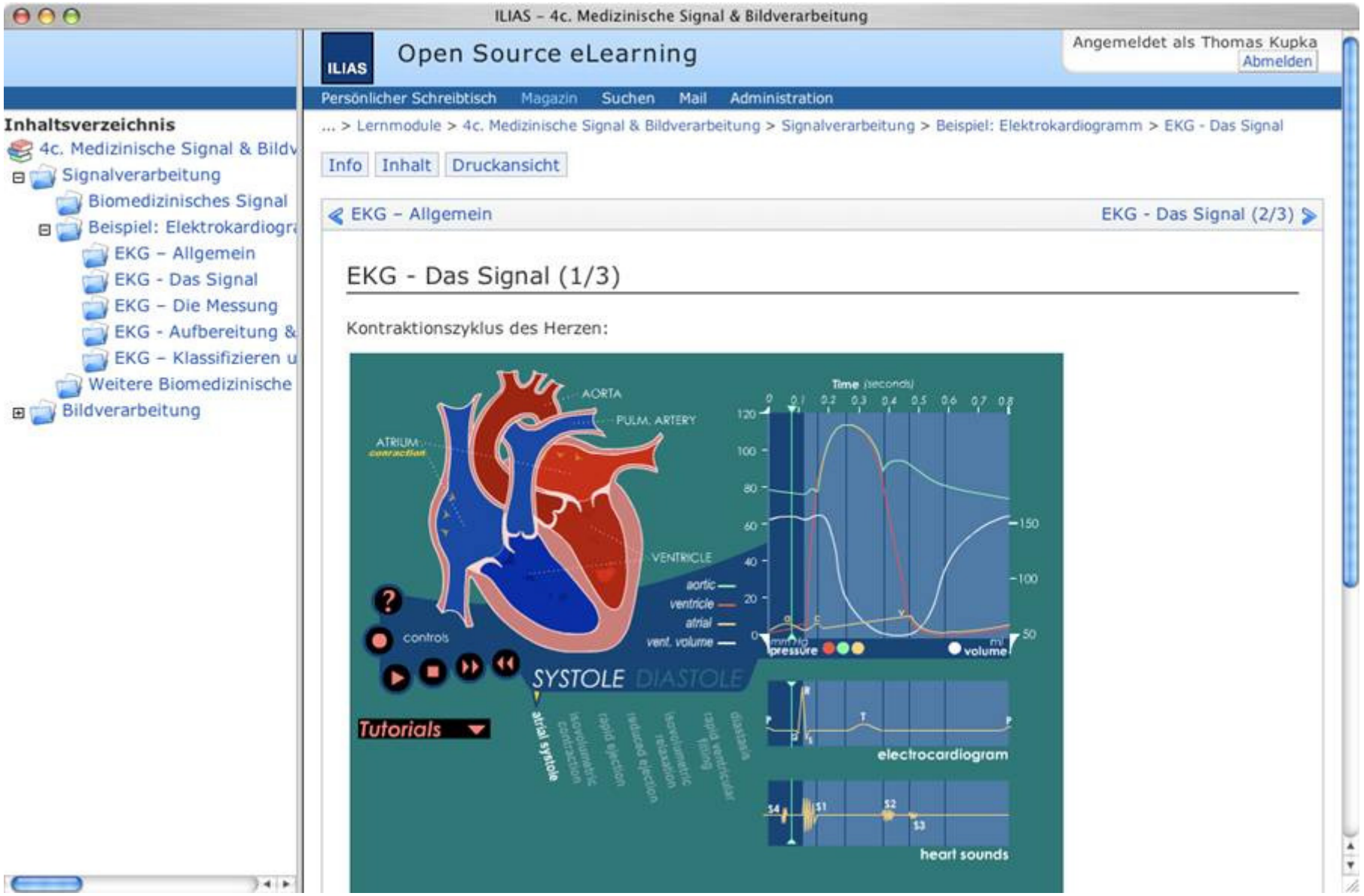
Bearbeiten | Laufzeit übernehmen | Herunterladen

Alle auswählen

(Eintrag 1 - 1 von 1)

Löschen | Ausführen | Hinzufügen

powered by ILIAS (v3.9.5 2008-08-04)



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Blood pressure data transfer via NFC

(Near Field Communication)

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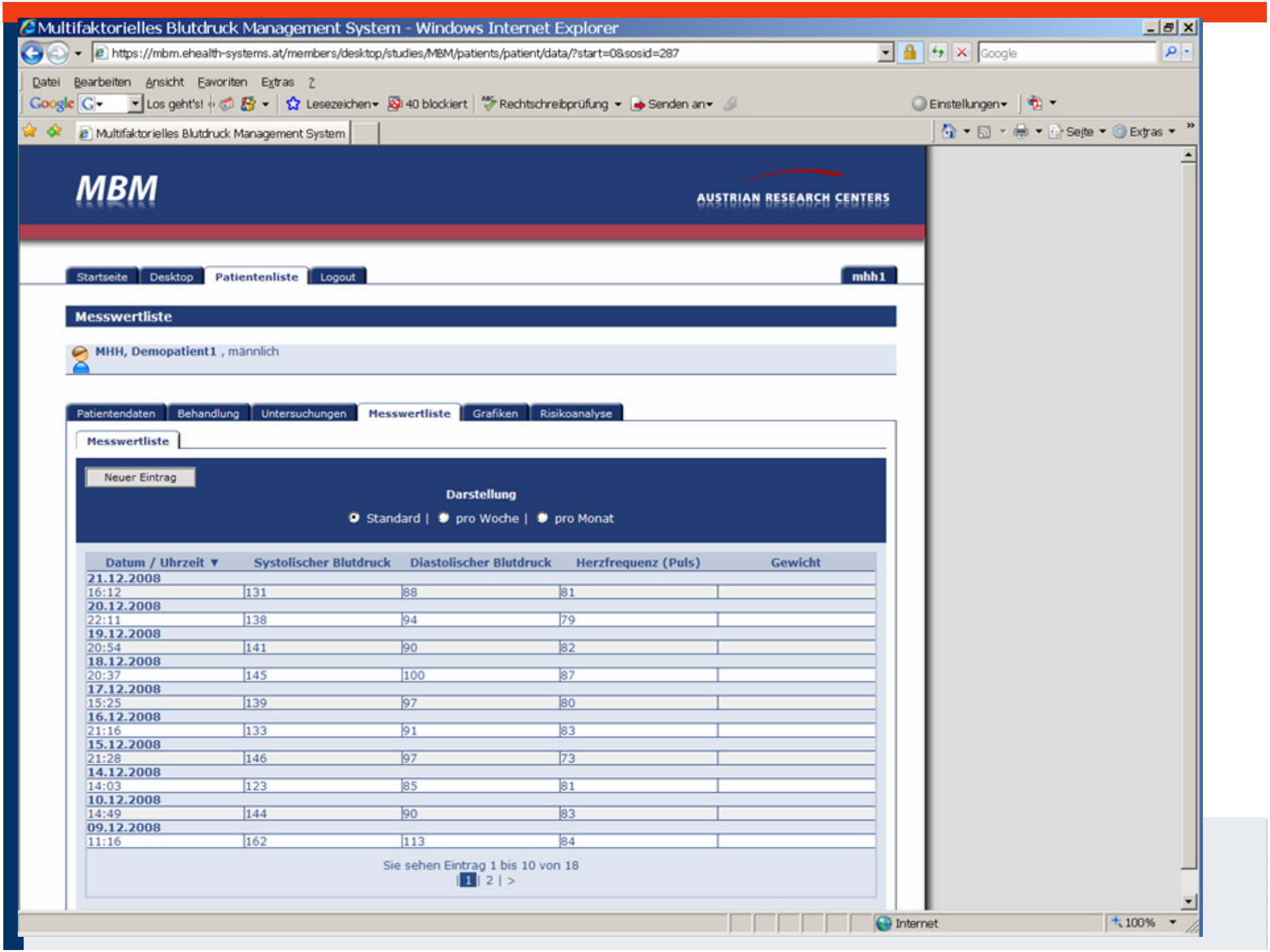
Austrian Research Centers /e-Health

http://www.arcsmed.at/ehs


Multifaktorielles Blutdruck Management System - Windows Internet Explorer
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Multifaktorielles Blutdruck Management System
MBM
AUSTRIAN RESEARCH CENTERS
Startseite
Desktop
Patientenliste
Logout
mhh1
Messwertliste
MHH, Demopatient1 , männlich
Patientendaten
Behandlung
Untersuchungen
Messwertliste
Grafiken
Risikoanalyse
Messwertliste
Neuer Eintrag
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22:11 | 138 | 94 | 79
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18.12.2008
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17.12.2008
15:25 | 139 | 97 | 80
16.12.2008
21:16 | 133 | 91 | 83
15.12.2008
21:28 | 146 | 97 | 73
14.12.2008
14:03 | 123 | 85 | 81
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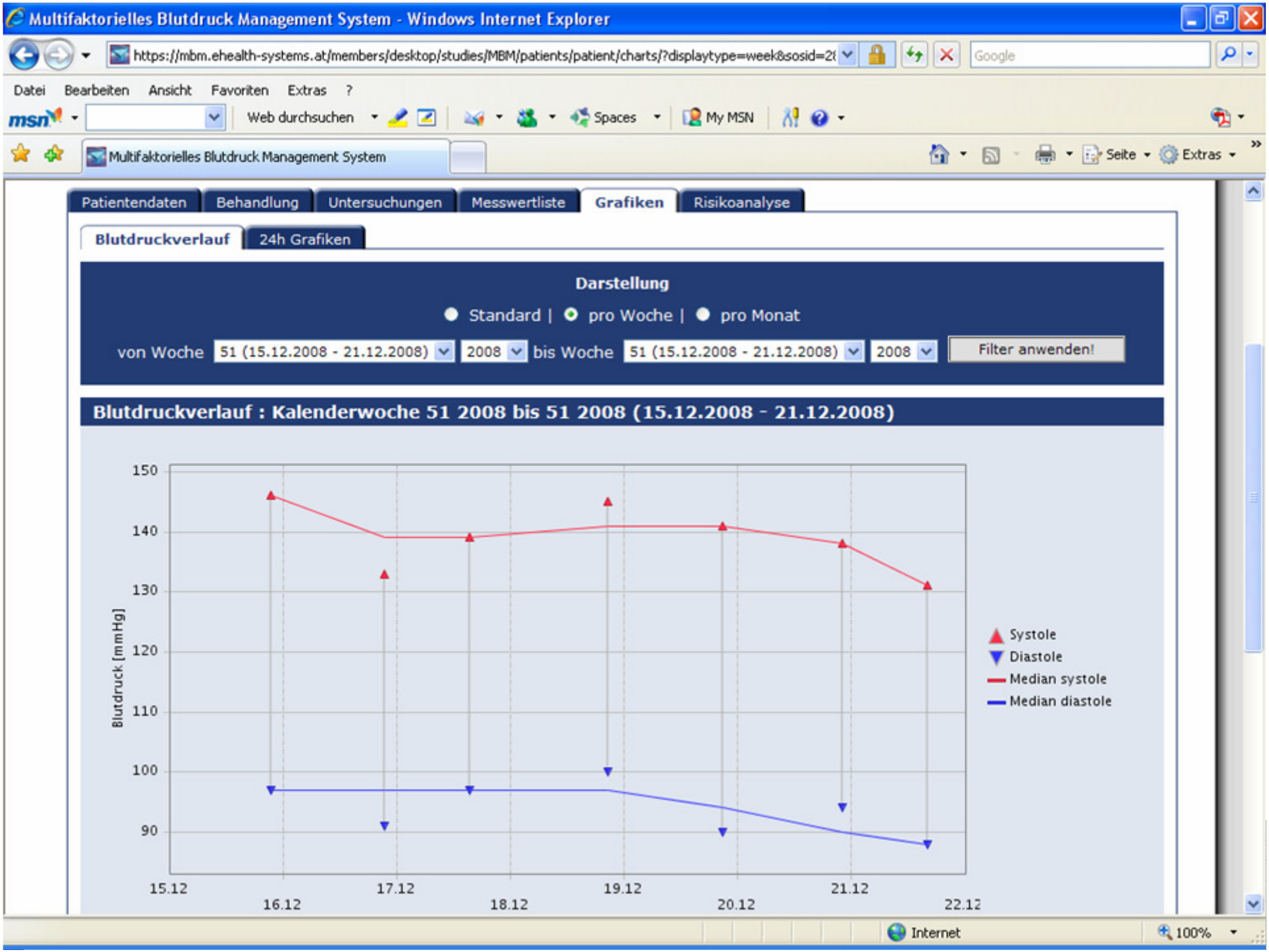
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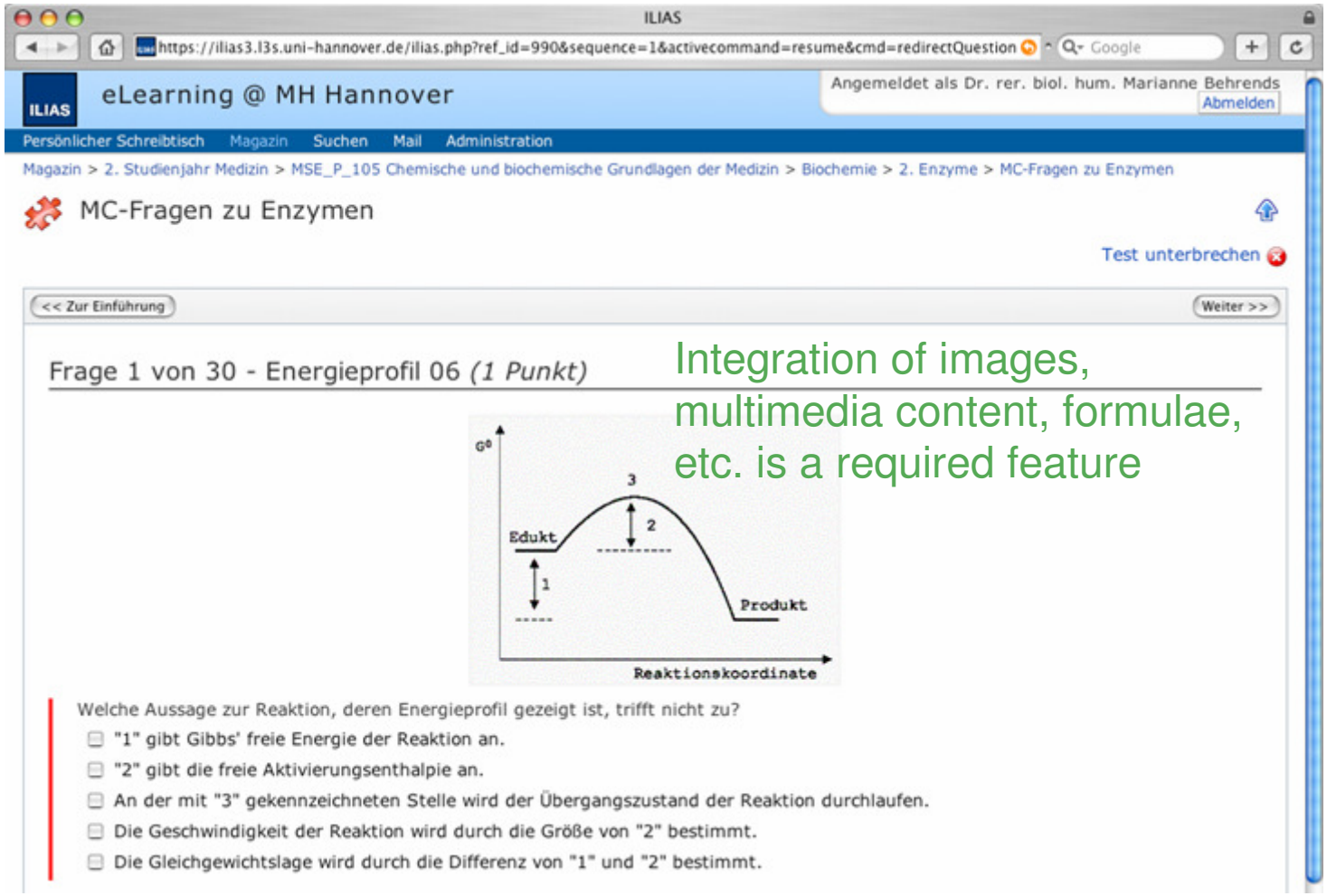
ILIAS – Testing What You've Learned



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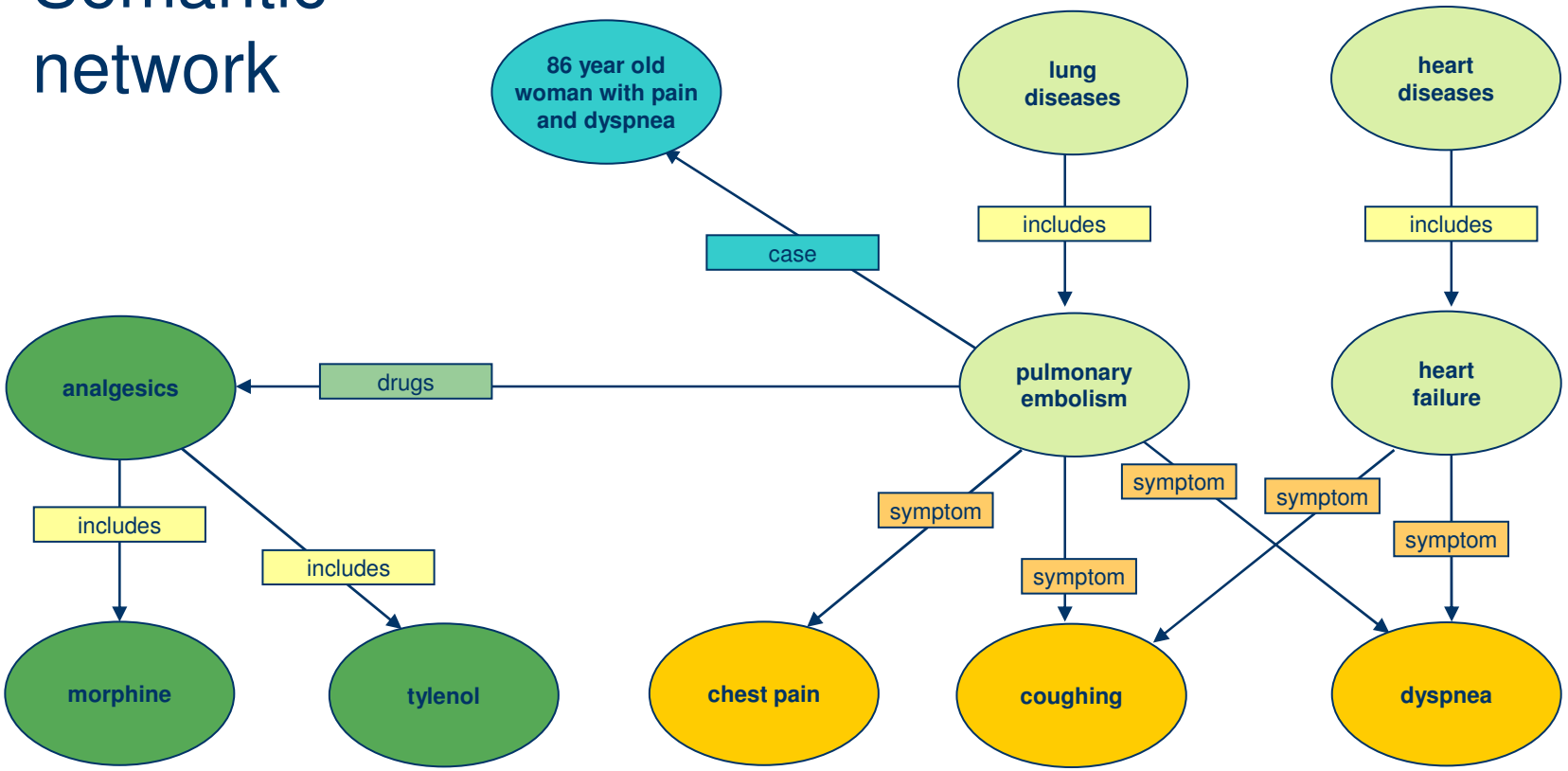
Web-based eLearning – Schoolbook

- Developed by the PLRI (Hannover Medical School) (http://www.medicalschoolbook.de/project/)
- Is used in various settings
  - Within the classroom (lectures)
  - Blended learning seminars (see – hear – train)
  - Learning at home
  - …
- Advantage over other solutions:
  - Content can be interlinked in a unique way to support the "medical way of thinking"

Schoolbook – Unique Presentation of Contents

- Semantic network



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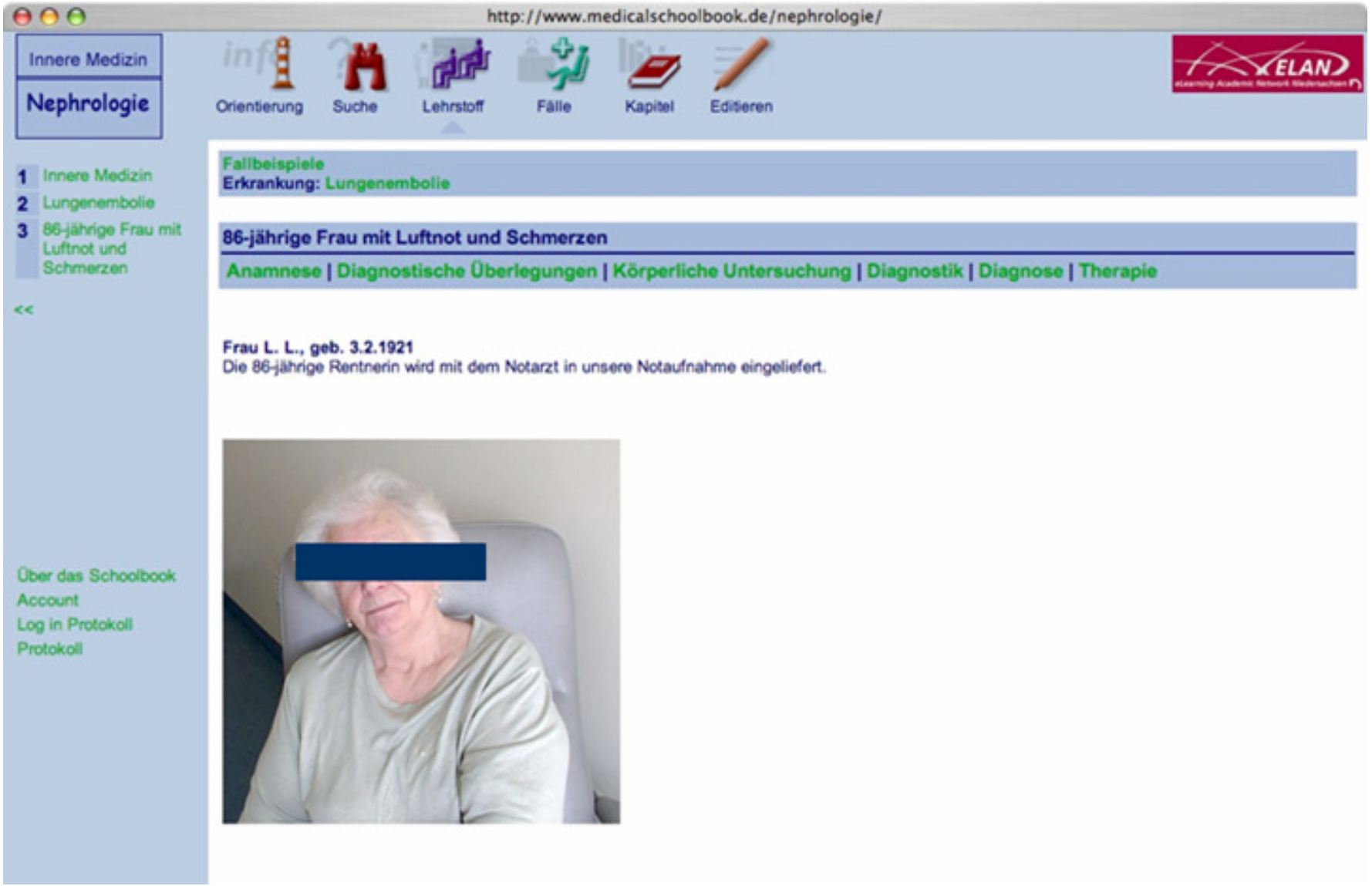

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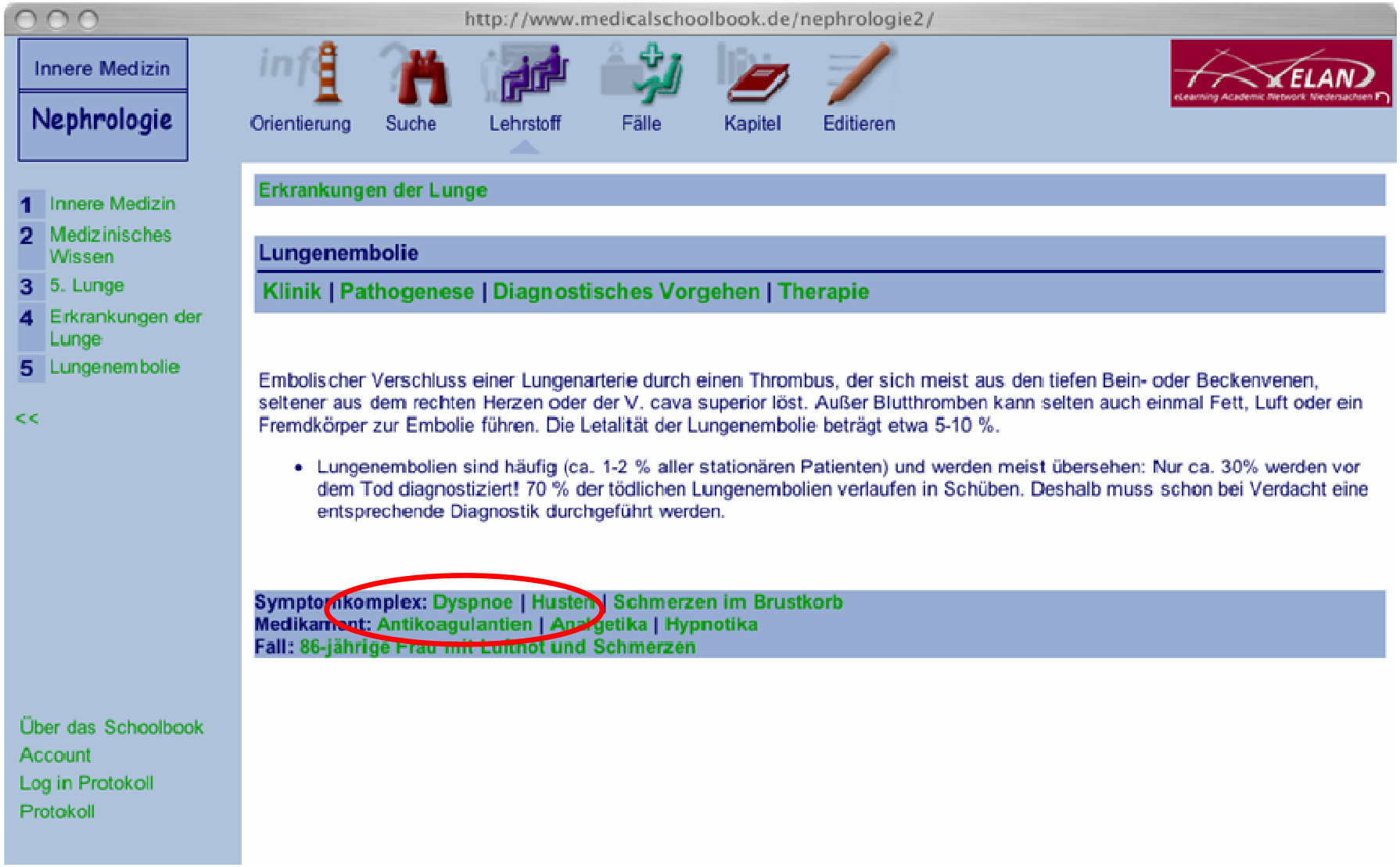
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Innere Medizin
Nephrologie
Orientierung
Suche
Lehrstoff
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ELAN
1 Innere Medizin
2 Medizinisches Wissen
3 5. Lunge
4 Erkrankungen der Lunge
5 Lungenembolie
<<
Über das Schoolbook
Account
Log in Protokoll
Protokoll
Erkrankungen der Lunge
Lungenembolie
Klinik | Pathogenese | Diagnostisches Vorgehen | Therapie
Embolischer Verschluss einer Lungenarterie durch einen Thrombus, der sich meist aus den tiefen Bein- oder Beckenvenen, seltener aus dem rechten Herzen oder der V. cava superior löst. Außer Blutthromben kann selten auch einmal Fett, Luft oder ein Fremdkörper zur Embolie führen. Die Letalität der Lungenembolie beträgt etwa 5-10 %.
Lungenembolien sind häufig (ca. 1-2 % aller stationären Patienten) und werden meist übersehen: Nur ca. 30% werden vor dem Tod diagnostiziert! 70 % der tödlichen Lungenembolien verlaufen in Schüben. Deshalb muss schon bei Verdacht eine entsprechende Diagnostik durchgeführt werden.
Symptomkomplex: Dyspnoe | Husten | Schmerzen im Brustkorb
Medikament: Antikoagulantien | Analgetika | Hypnotika
Fall: 86-jährige Frau mit Luftnot und Schmerzen

Schoolbook – Blended Learning (also) for Continuing Medical Education

See – Hear – Train

Lectures

Interactive training

Demonstrations

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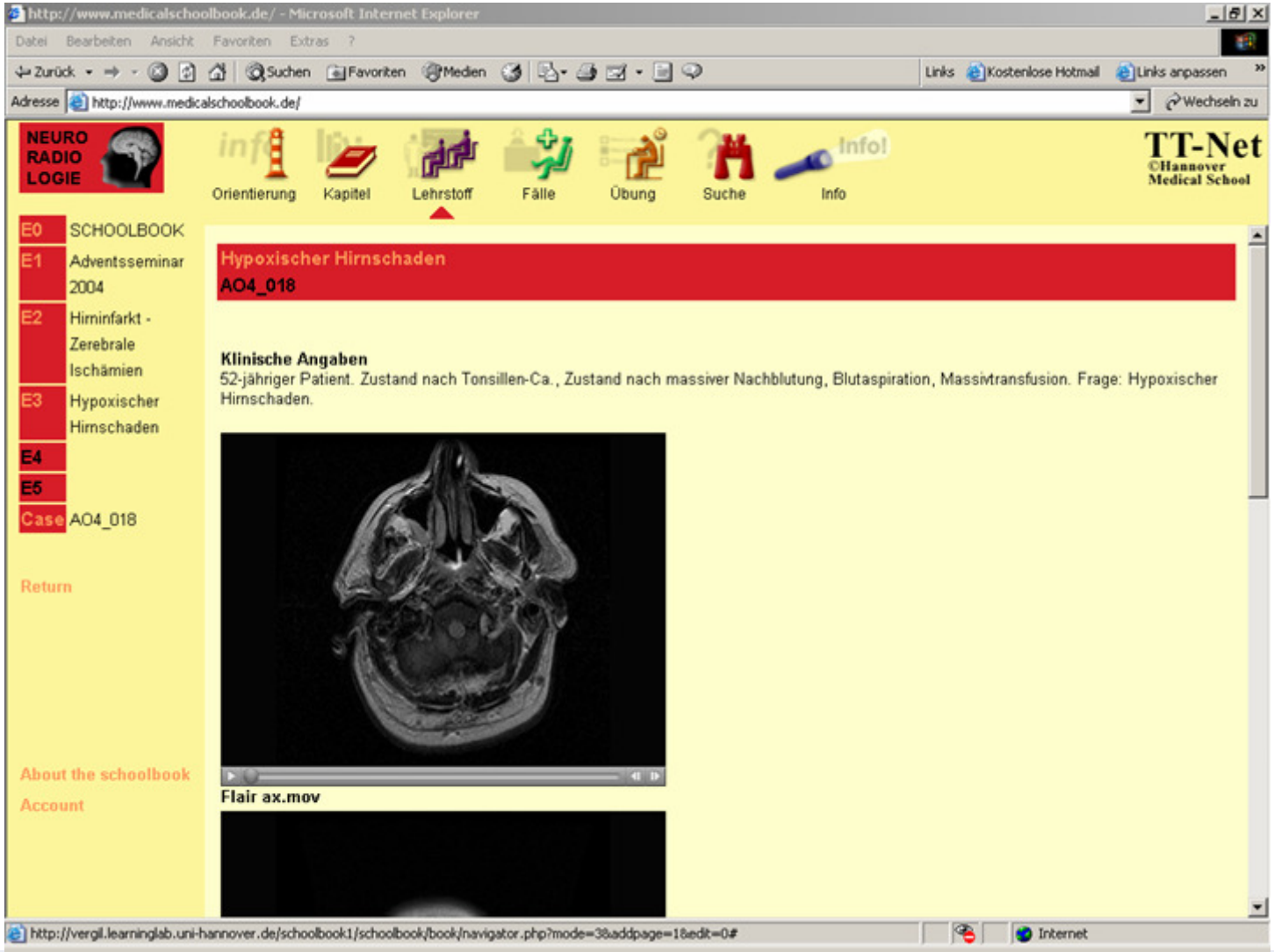
Schoolbook Neuroradiology



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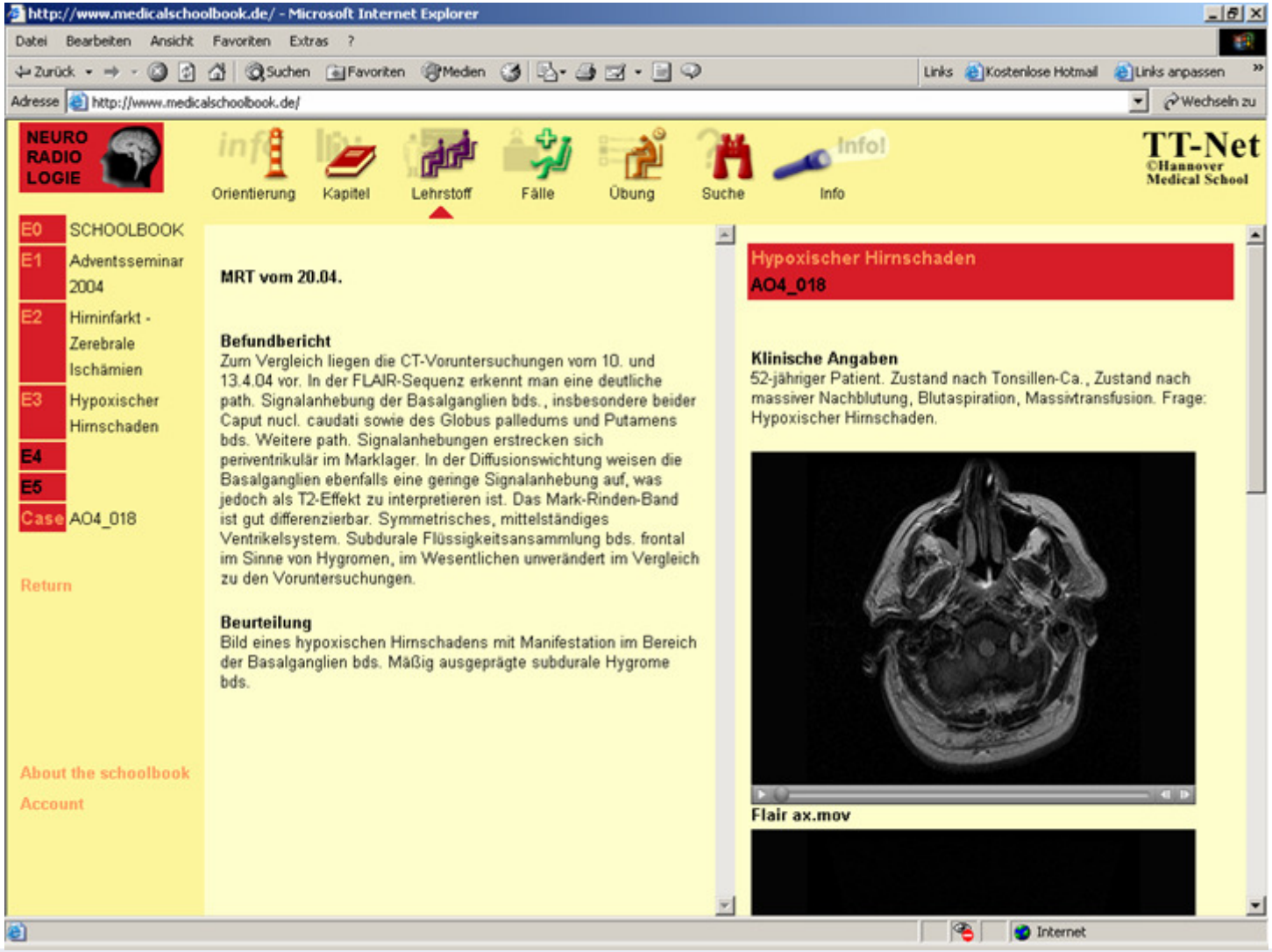
Schoolbook Neuroradiology



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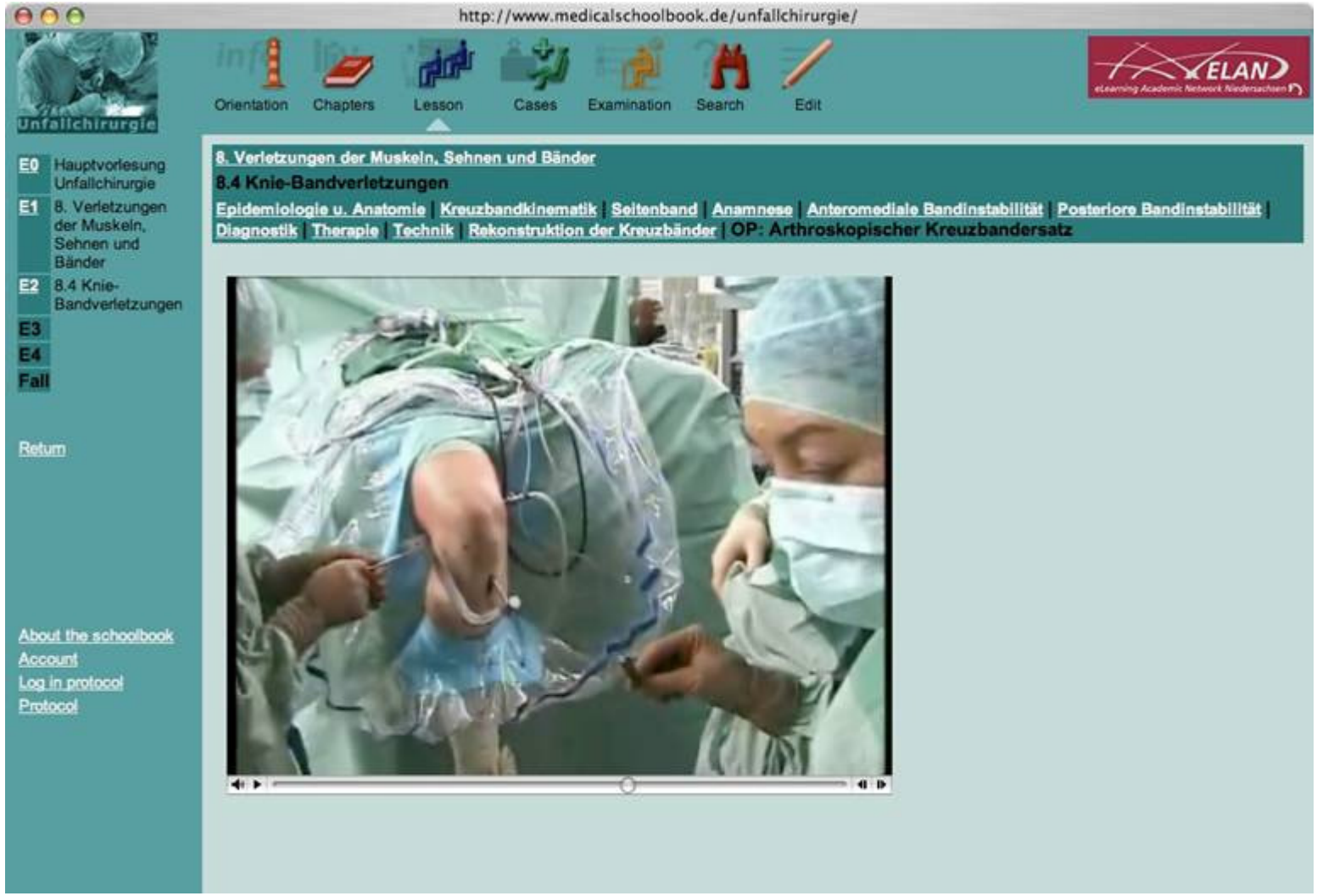
Schoolbook Traumasurgery



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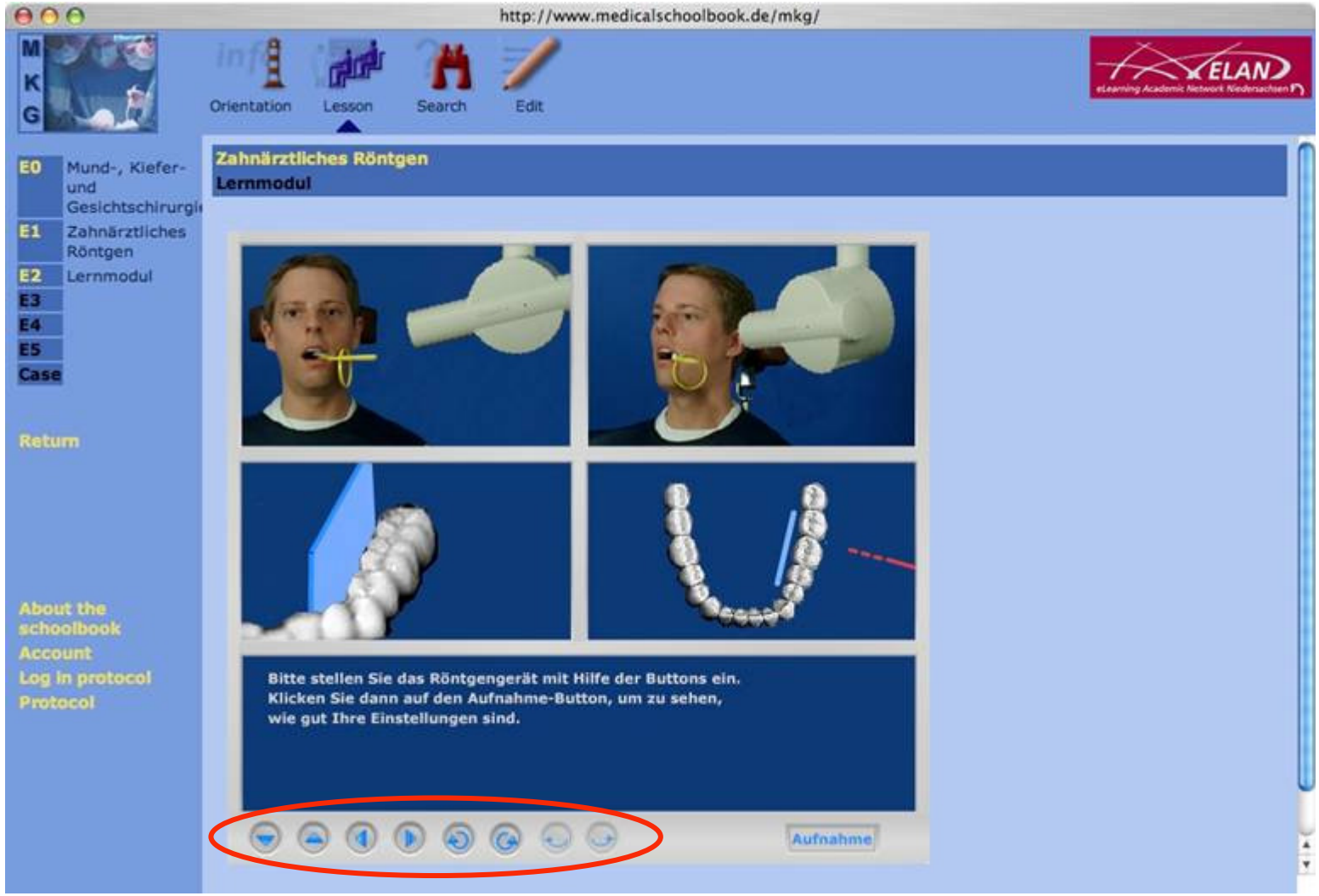
Schoolbook for Oral and Maxillofacial Surgery



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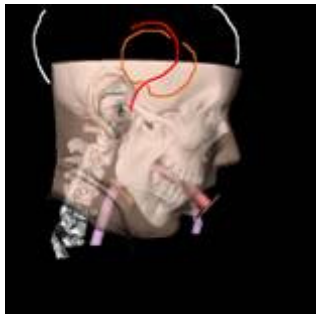
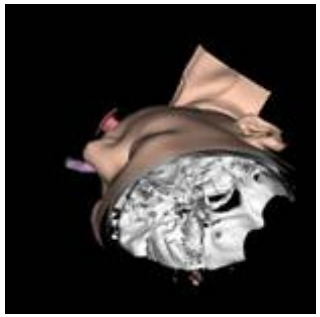
Interactive Training Software: CranioTrain

- In Neurosurgery or emergency medicine, determining the ideal placement of a craniotomy
  - is important during the surgery and also decisive for the outcome
  - may be complicated due to the angulation of the CT and/or MR image data





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The Aim of CranioTrain

- How to correctly place a craniotomy is usually learned during training in neurosurgery or emergency surgery
  - Preliminary evaluations of learners with little experience showed very imprecise results
- Development of an interactive, software based training concept
  - Software is supposed to help learners to "transfer" the 2D image information to the patient's 3D anatomy

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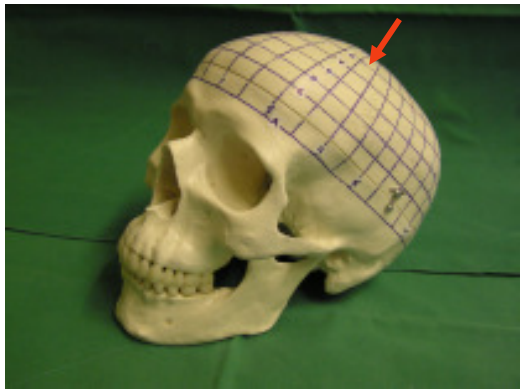
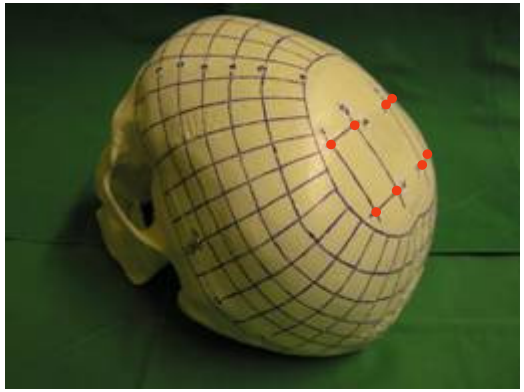
CranioTrain – Skull Model

- Standard anatomical skull model A20 (plastic)





- Horizontal lines, distance 10 mm
- Vertical lines 0-360°, one line every 10°
- Additionally 8 points on the top of the skull
- Crosspoints of the grid are labeled for further reference

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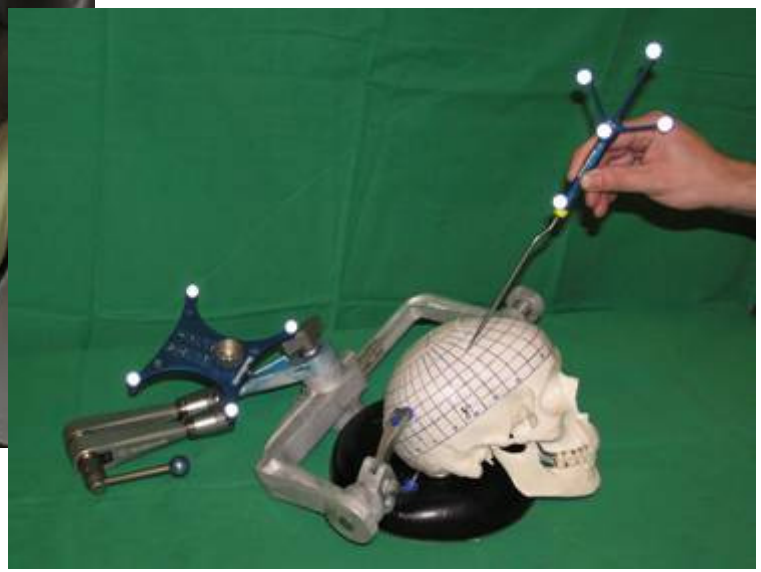
CranioTrain – Data Acquisition

Multislice CT



Geometry of the grid & skull is recorded with an optical tracking system

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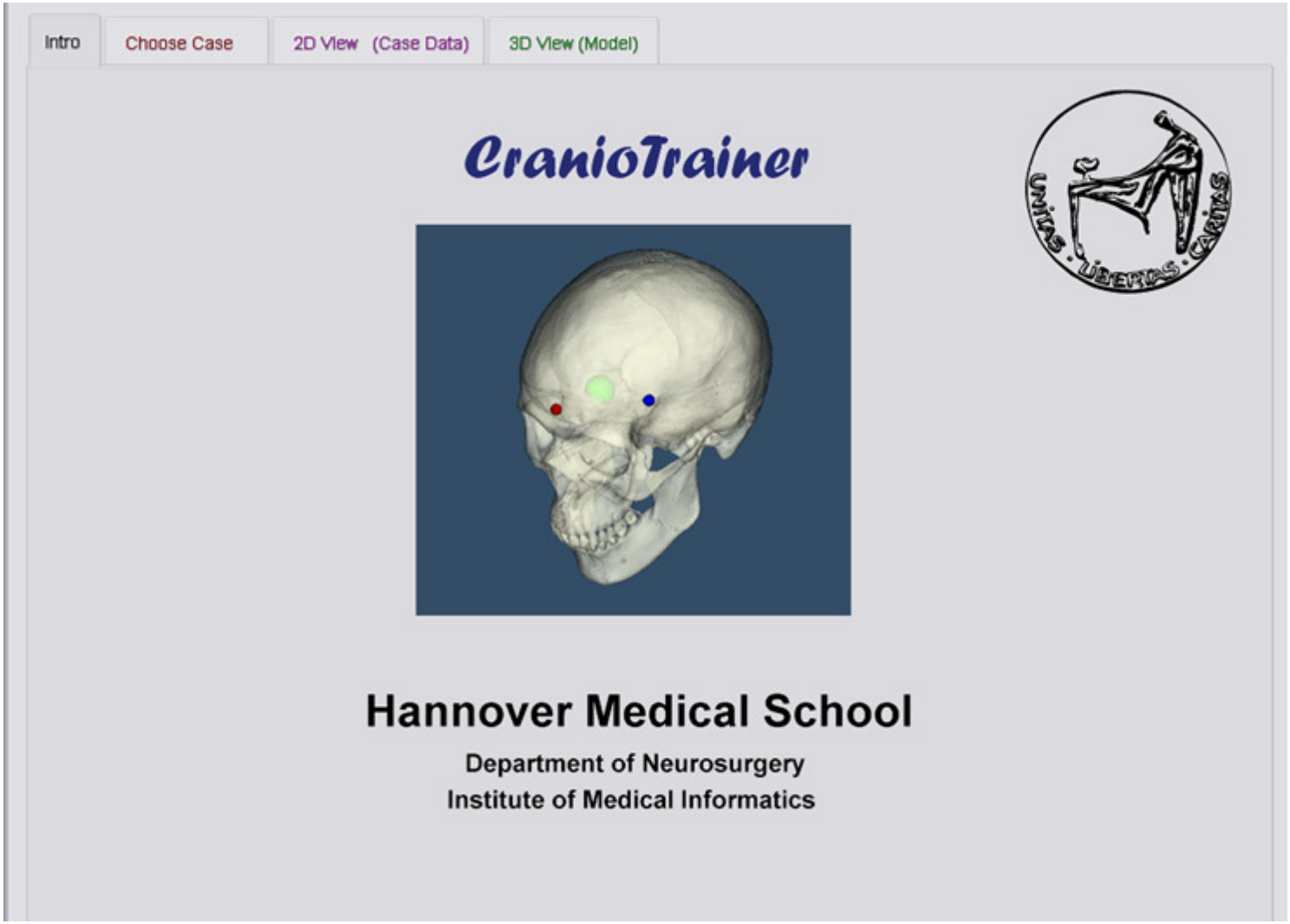
CranioTrain – Software

- Platform-independent development:
  - Windows
  - Linux
  - MacOS
  - …
- Based on freely available programming libraries
  - FLTK (graphical user interface)
  - VTK (visualization)



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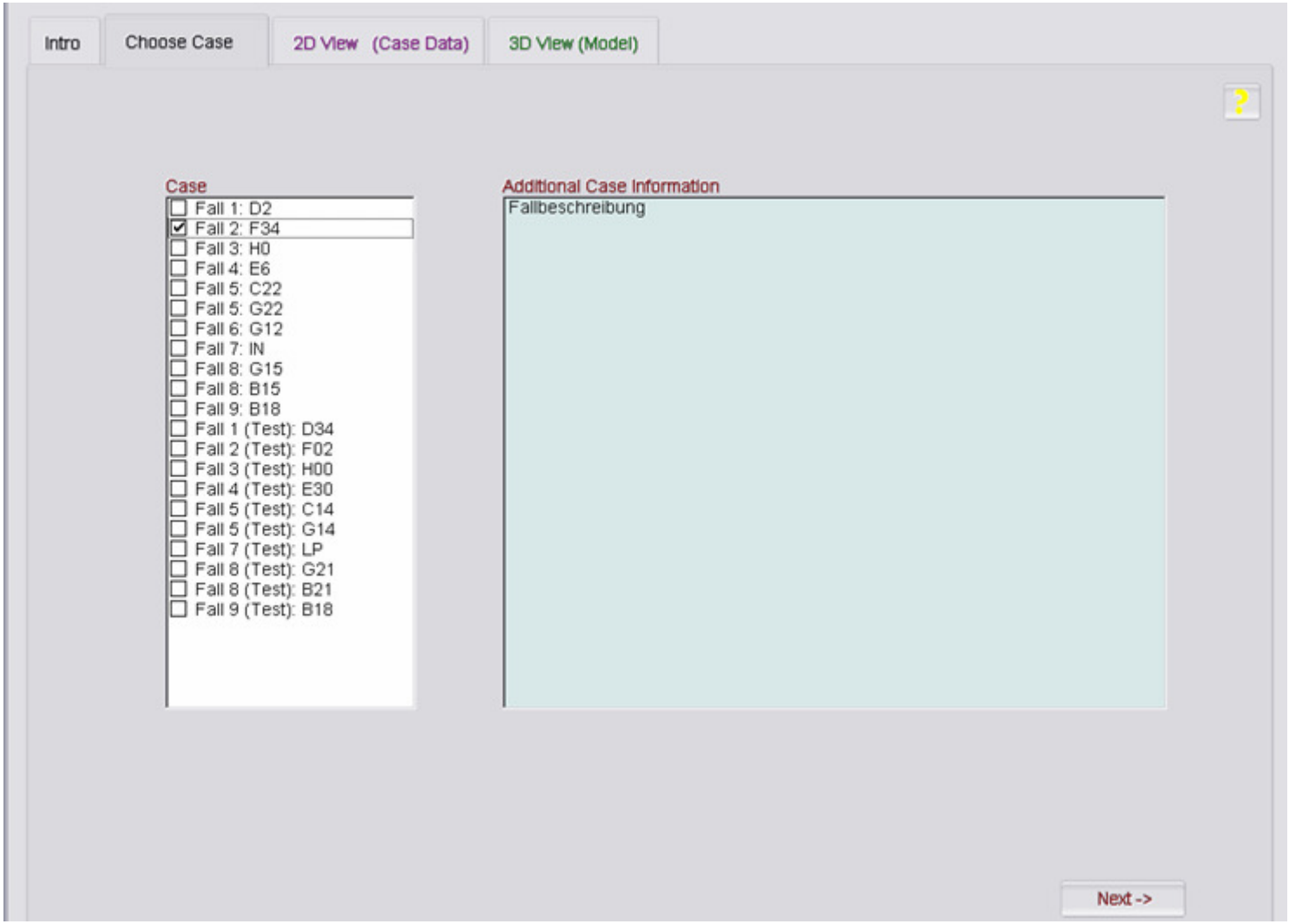

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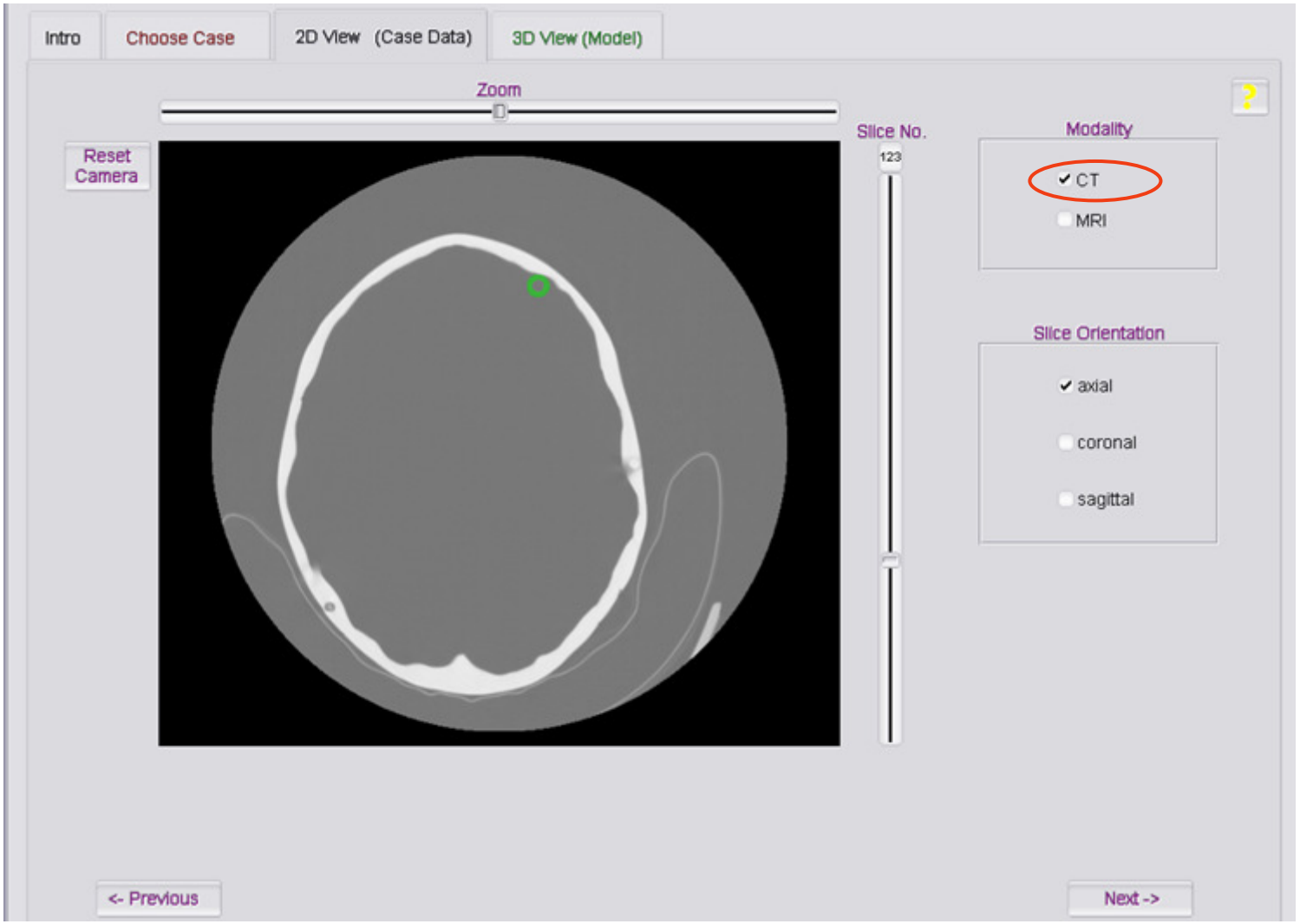

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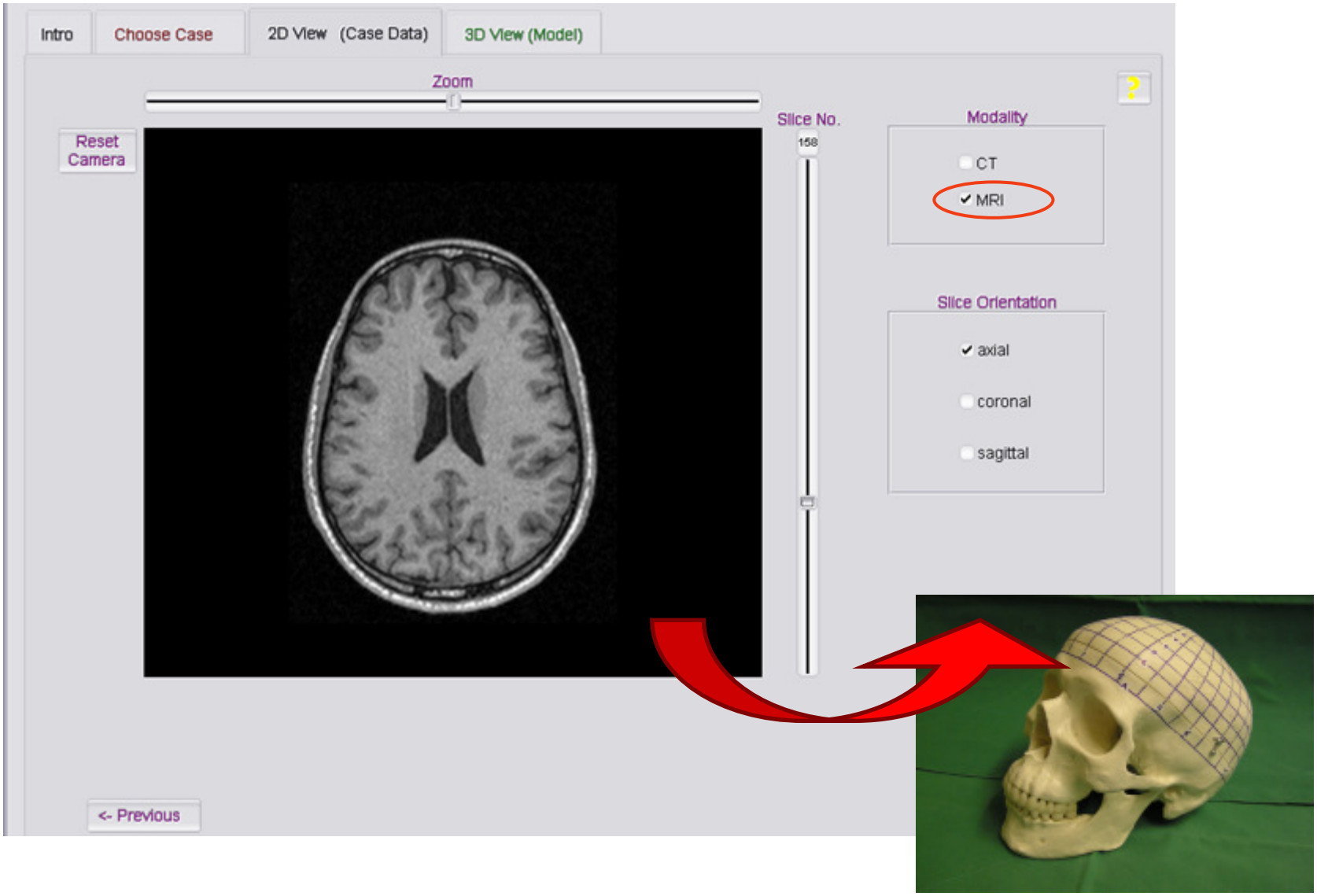

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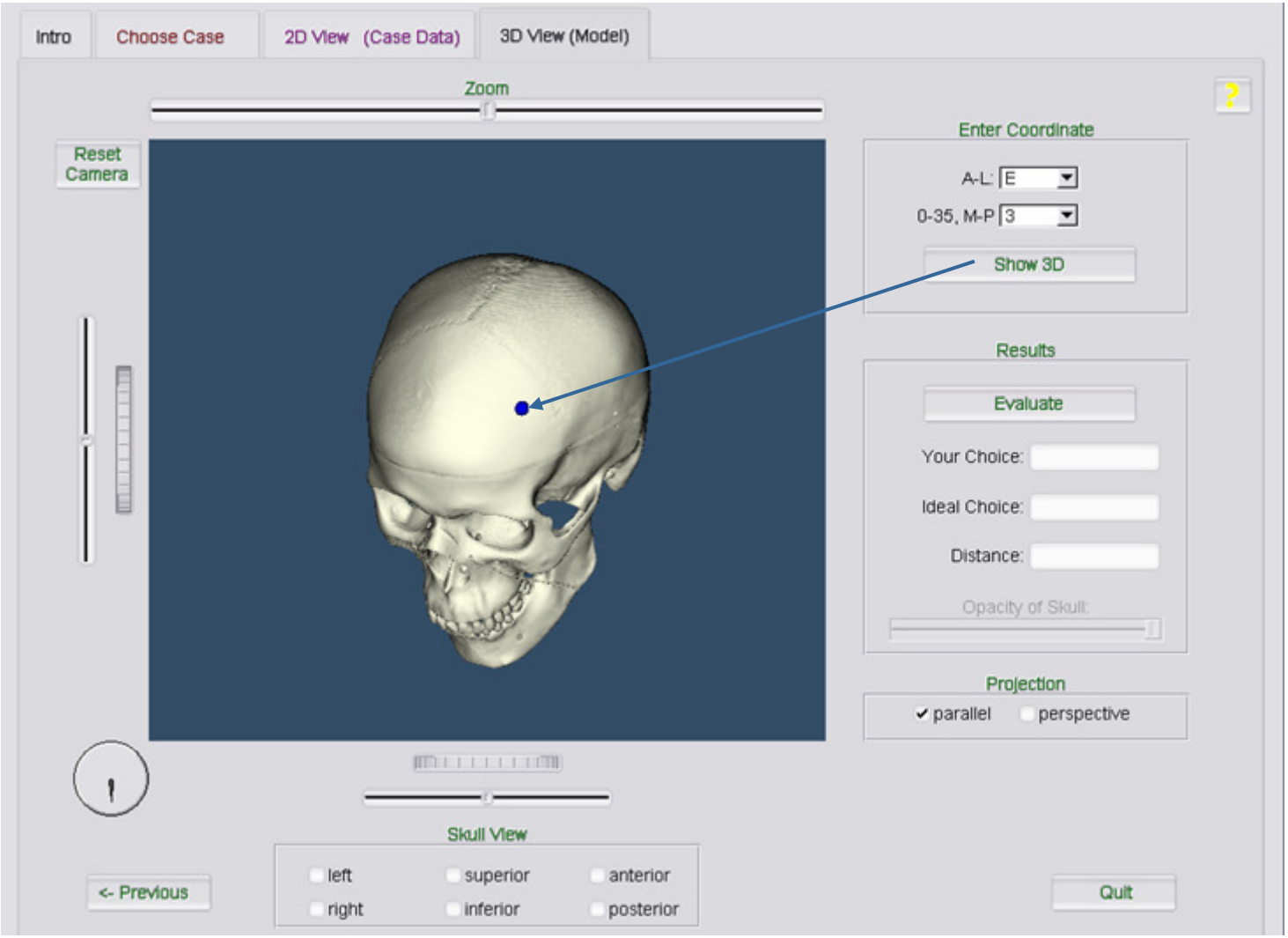

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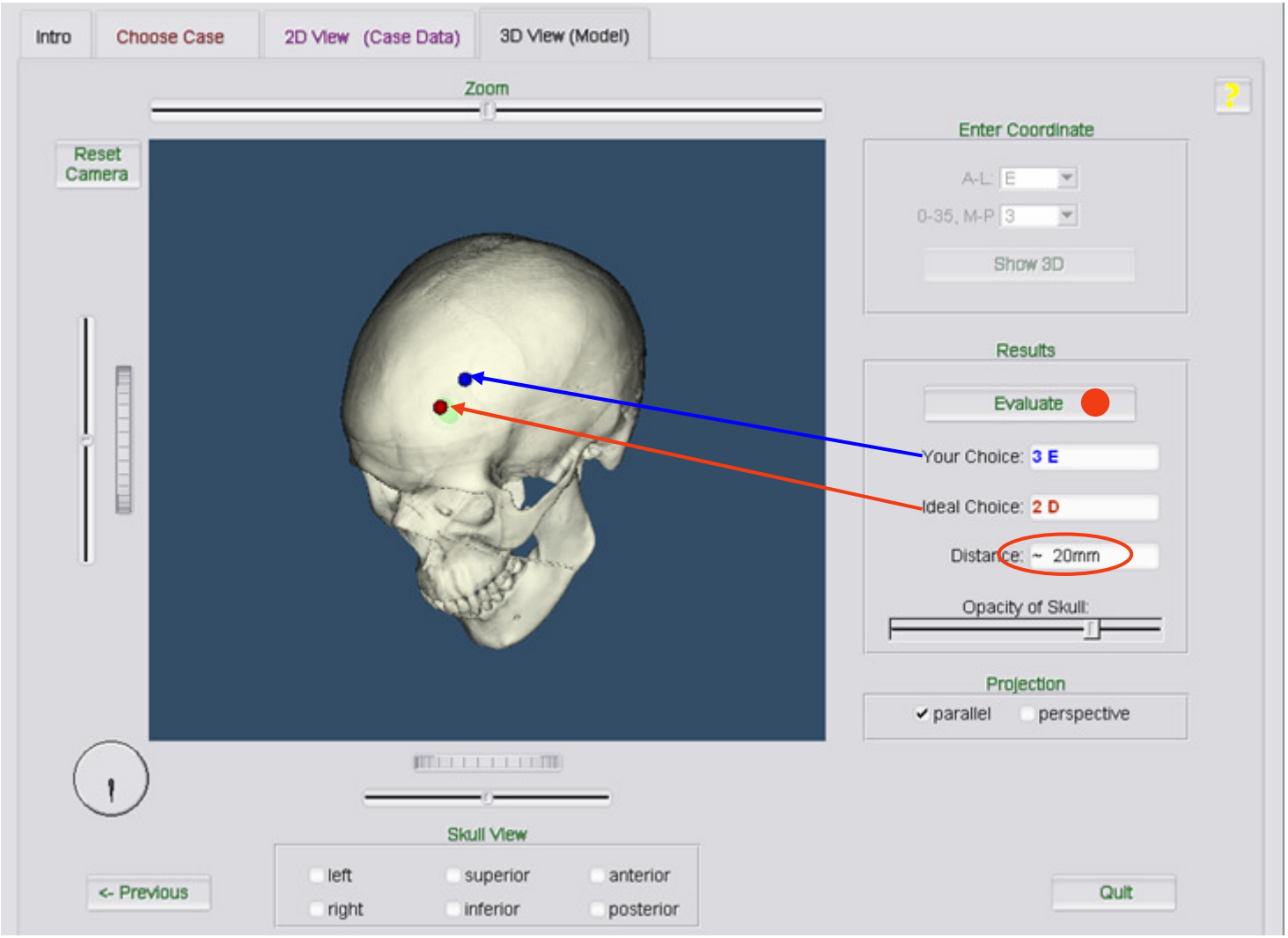

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CranioTrain – Summary

- "Craniotrain" won't replace good training
- Still, it's an alternative to using anatomical specimen in training and thus saves costs
- Initial trials showed positive results for learners. Learning the correct placement needed considerably less effort.

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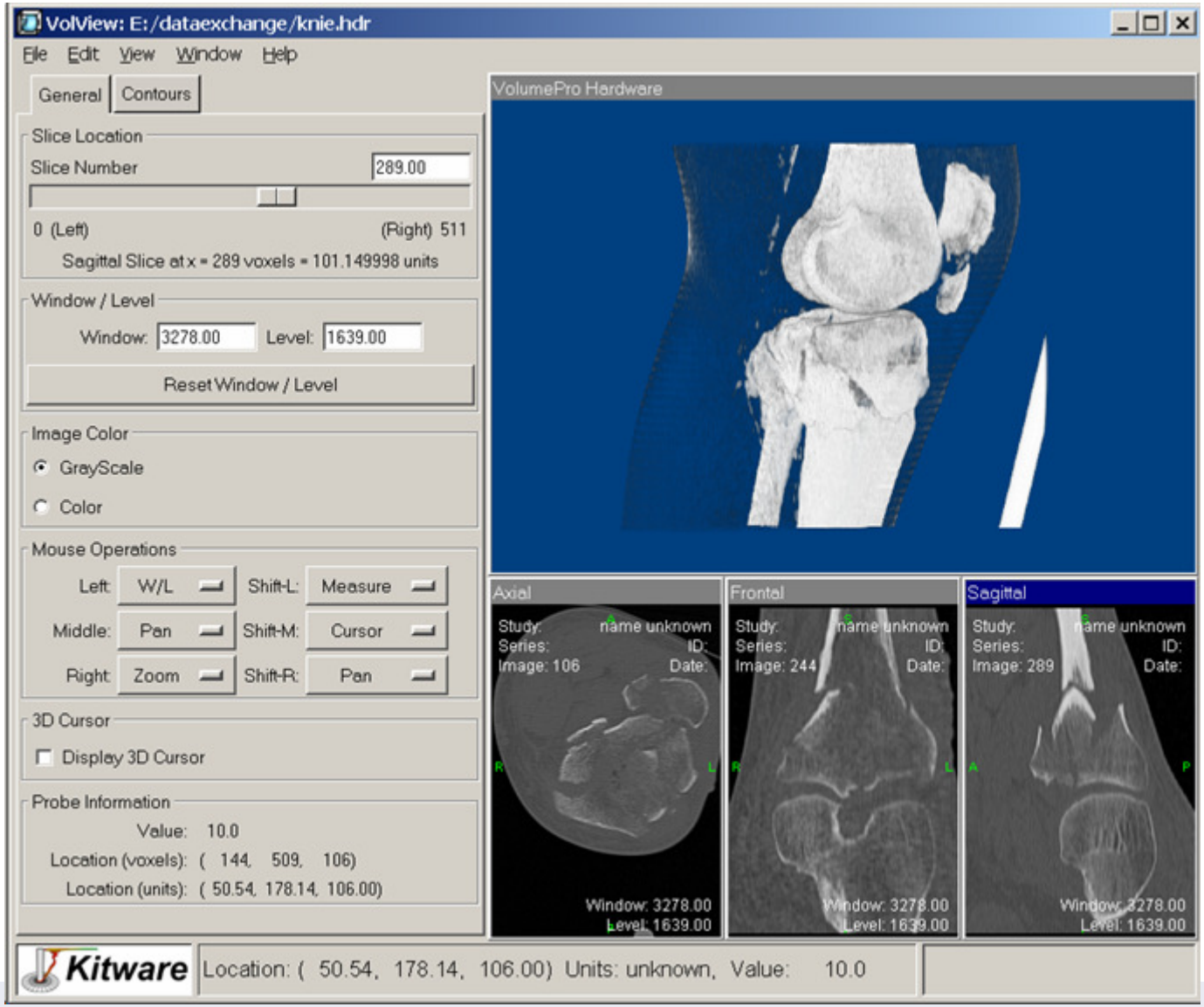
3D Training: Knee *(563 kB)*



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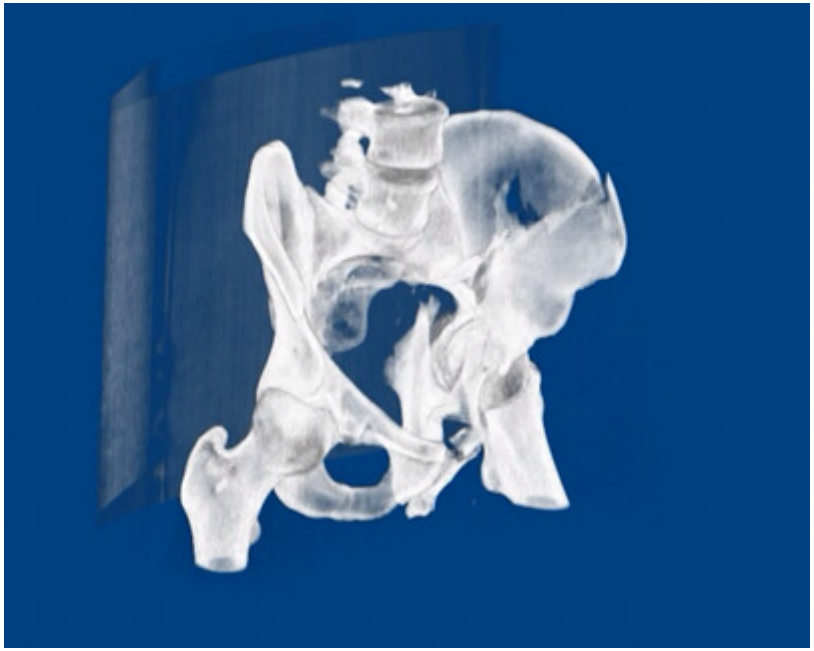
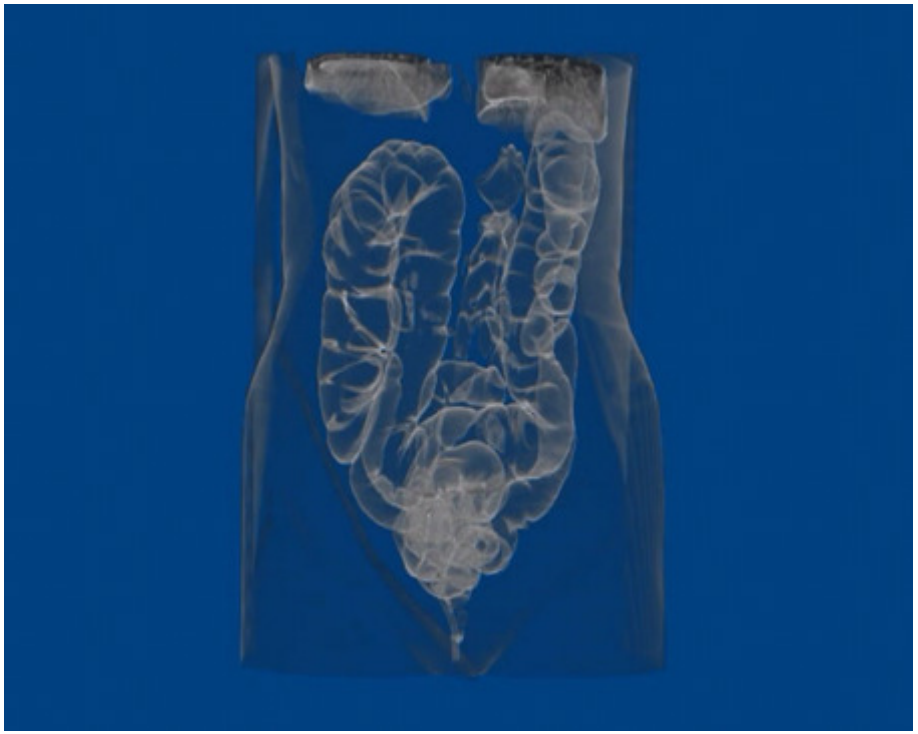
3D Training

pelvic fractures *(1.243 kB)*



coloscopy *(883 kB)*



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Biomechanical evaluation of miniscrew implants in vitro

Selectively demineralized bone technique

Language: English

Authors:
Assoc. Prof. Boonsiva Suzuki, DDS. PhD, Dr. Eduardo Yugo Suzuki, DDS. PhD, Dr. Kanchana Doungsaard, DDS, Dr. Prakarn Prasoothavee, DDS, Dr. Weeranuch Thong-ngarm, DDS, Dr. Sorapong Chuensombat, DDS,
Department of Orthodontics, Faculty of Dentistry
Dr. Apirum Janhom, DDS, MS, PhD,
Department of Radiology, Faculty of Dentistry
Chiang Mai University, Thailand

Date/Event/Venue:
December 14th-16th, 2007
The 6th Asian Implant Orthodontic Conference (AIOC)
Taichung, Taiwan

Poster Award
Outstanding Poster Award - 1st place

Introduction

Bone quality plays an important role in the success of orthodontic miniscrew implants. (1, 2) The mechanical properties of bone are highly related to the mineral content, which varies widely according to function and histology. However, in vitro methods for evaluating biomechanical properties of miniscrew implants have not been reported.

Objectives

The aim of this study was to assess the biomechanical performance of miniscrew implants using bone samples which were demineralized by timed chemical immersion to alter the mineral content. (3)

Material and Methods

Mobiles Computing in Medicine

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