

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

Herbert K. Matthies

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<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).



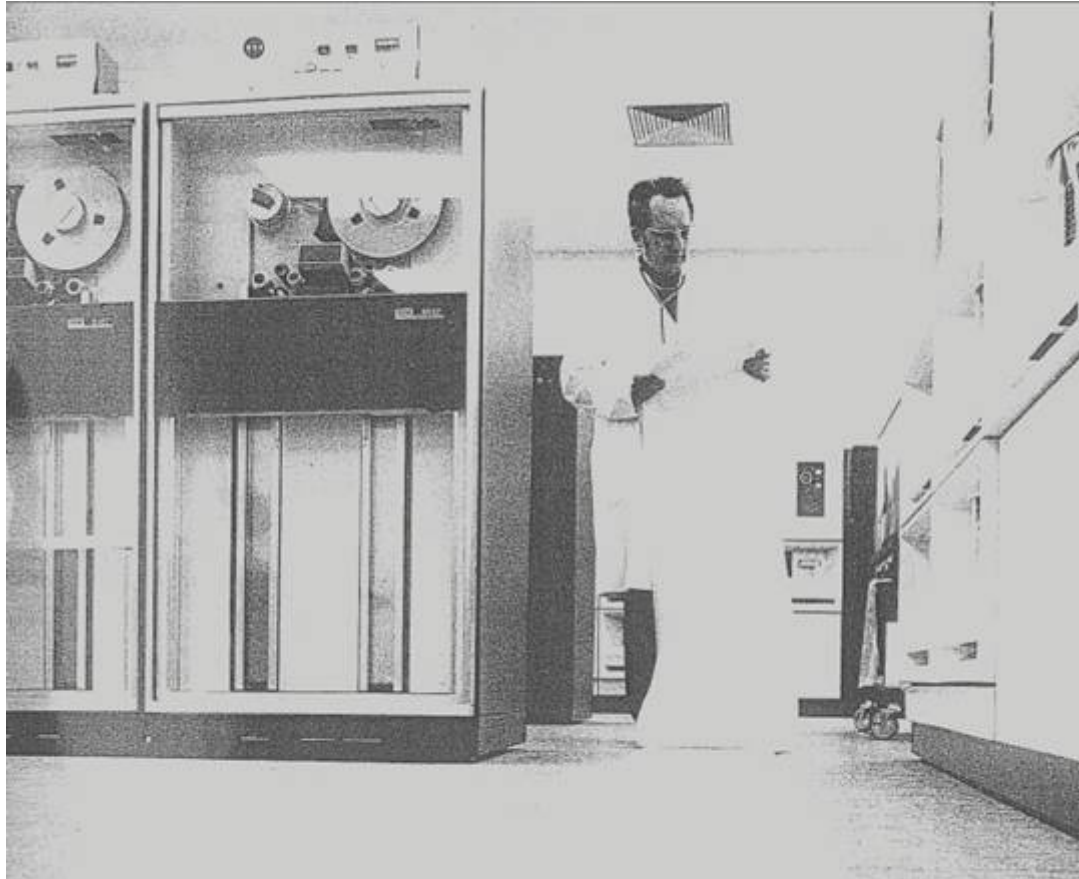
→ Aim: regional
,center of excellence‘



Peter L. Reichertz Institute for Medical Informatics
University of Braunschweig - Institute of Technology
and Hannover Medical School, Germany

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)**

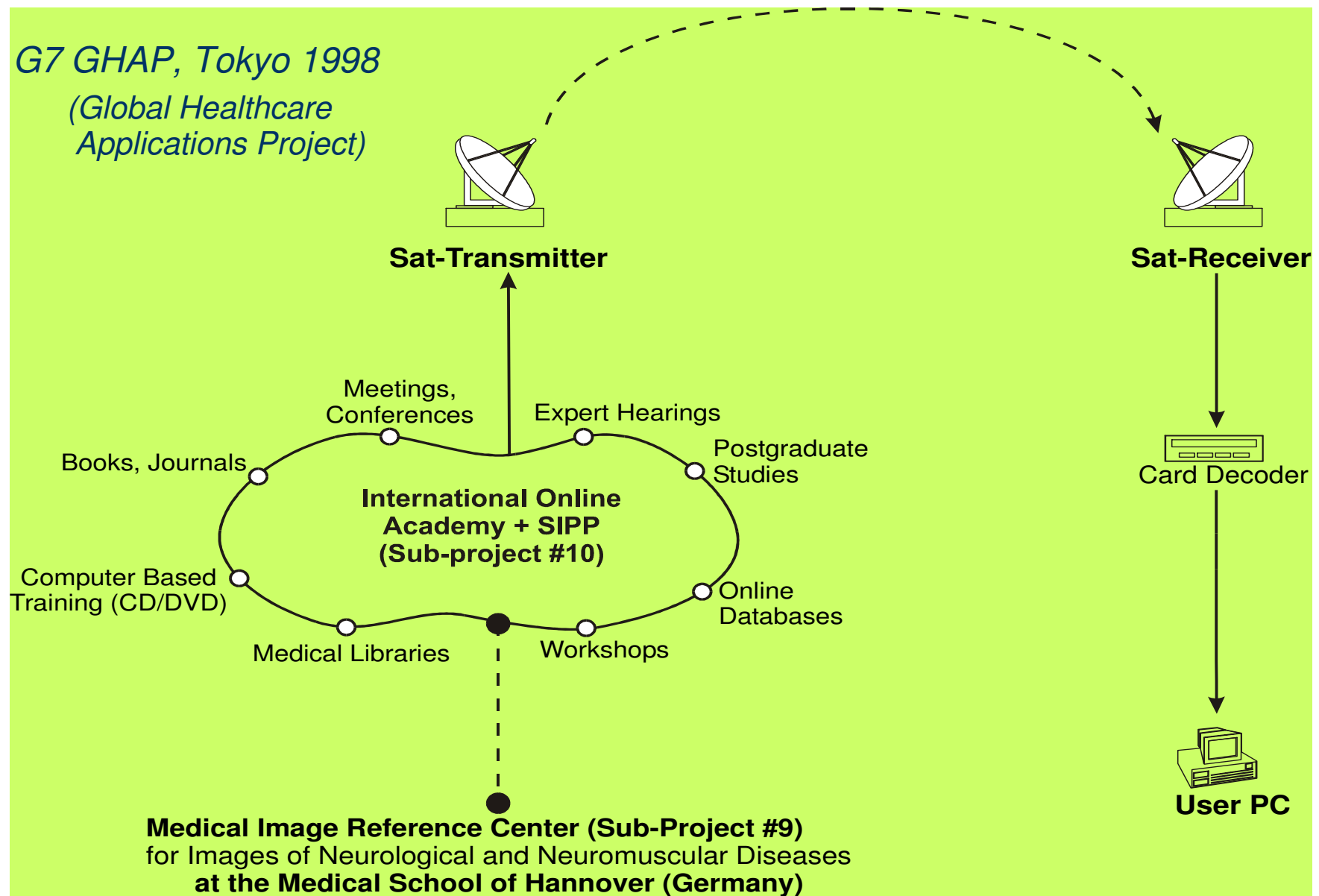
medical informatics program (B.Sc., M.Sc., PhD)
at TU Braunschweig

The Peter L. Reichertz Institute for Medical Informatics

PLRI – fields of research

- **health-enabling 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

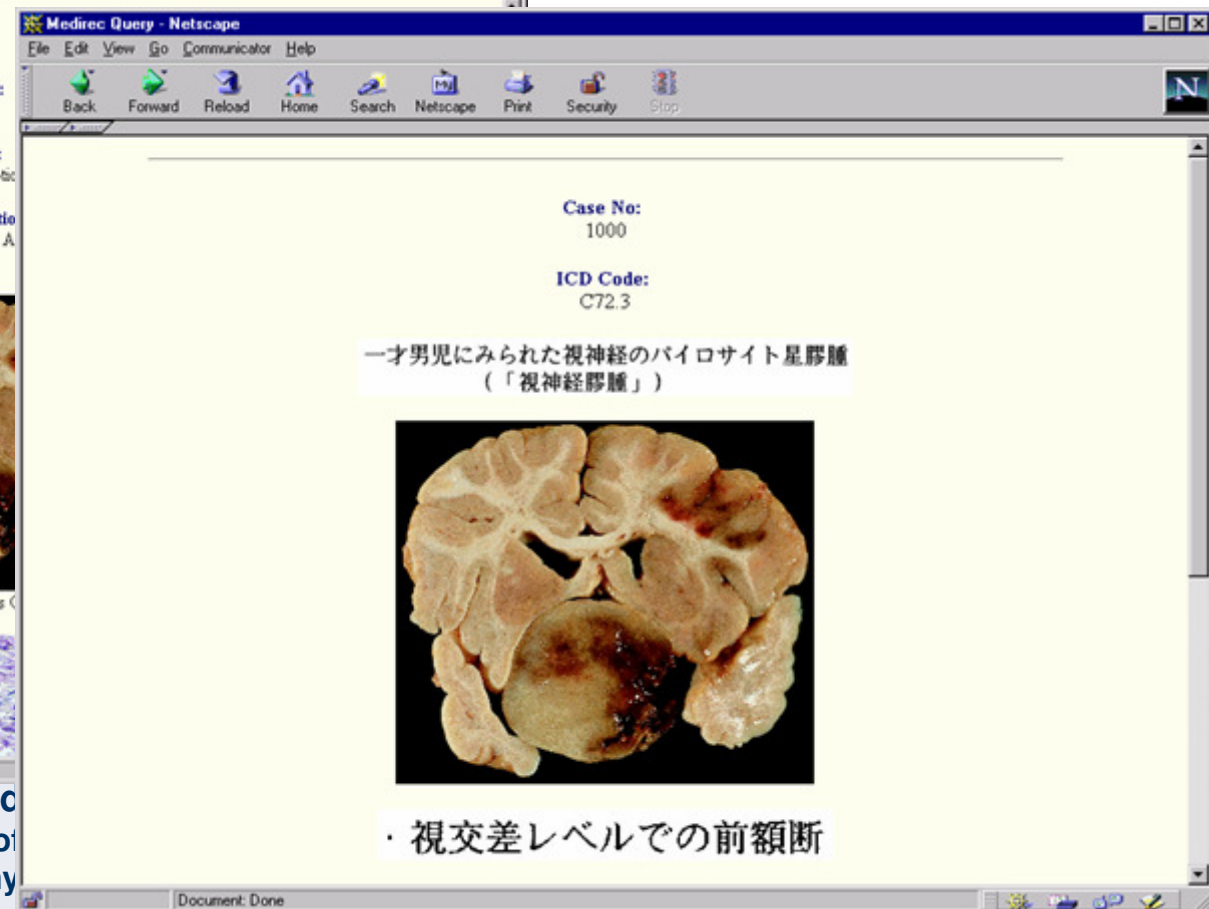
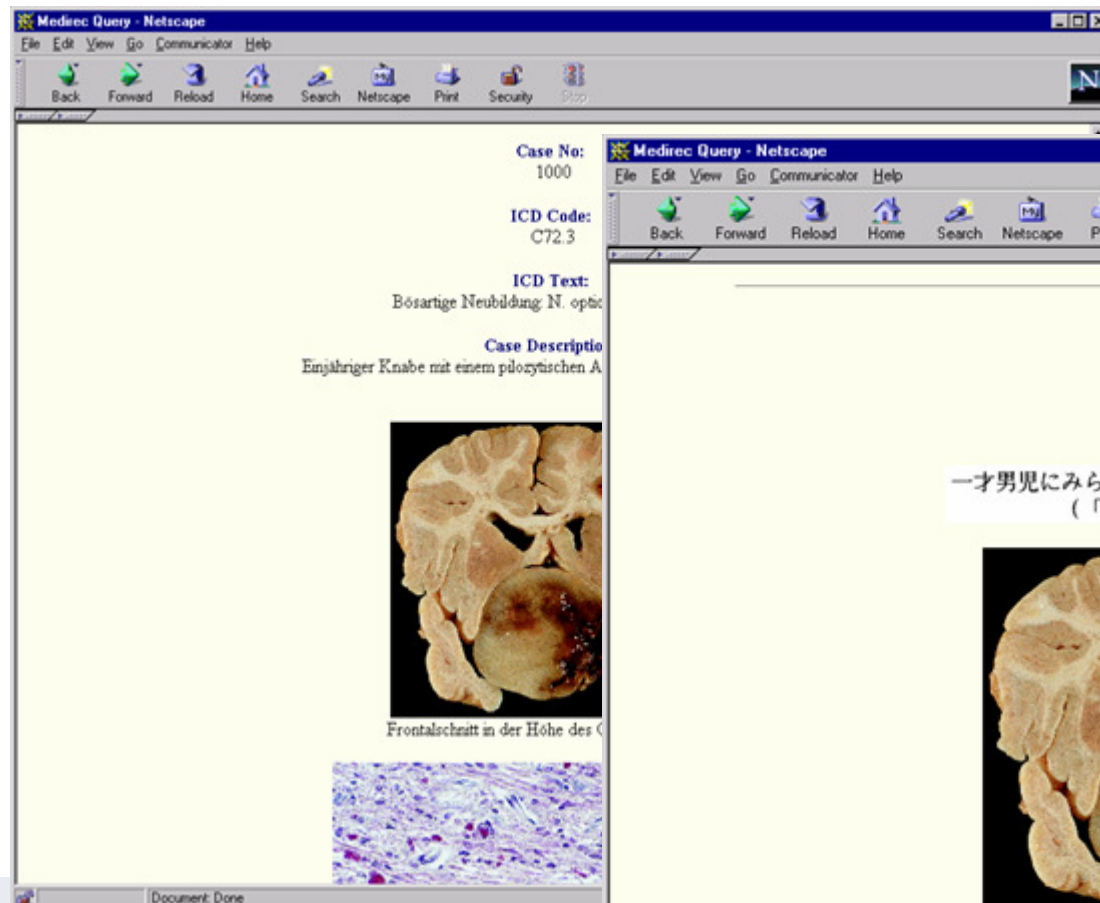
Myoclonias

Myoclonias and fasciculations in chronic cervical radicular compression C6

University of Braunschweig - Institute of Neurology and Hannover Medical School, Germany



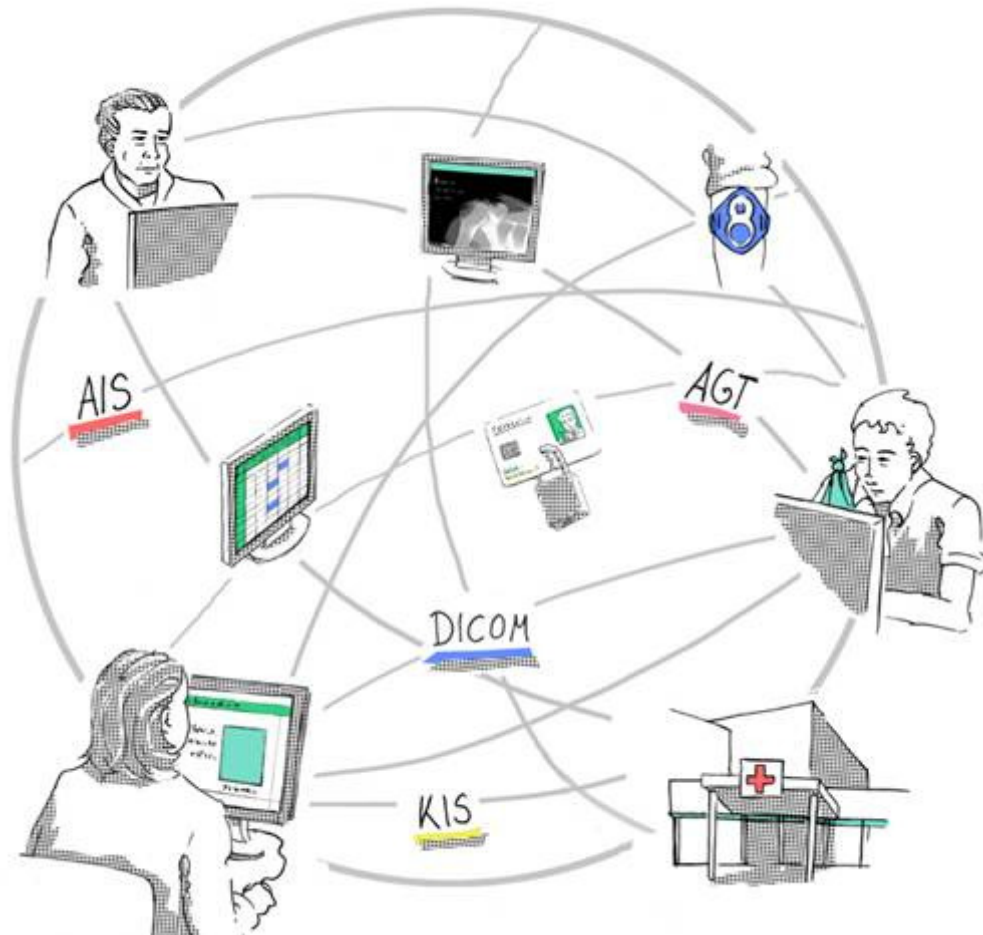
Virtual Education System for Brain Diseases



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University of Braunschweig - Institute of Neurology
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Web and New Information and Communication Technologies

→ dramatic changes
of
business,
live,
learn



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**

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

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

**Medical Informatics
(or Computer Science)**



eLearning

Didactics

**Specialties:
Medicine and Dentistry**

History of eLearning at the MHH

Granted by:



Bundesministerium
für Bildung
und Forschung

Lower Saxony, Germany



Continual training
of content authors

Combination of
Schoolbook and ILIAS

CranioTrainer

Model curriculum "HannibalL" for Medicine

Start of **ILIAS**
at the MHH

Orthodontics
in ILIAS

Chemistry
in ILIAS

Biochemistry
in ILIAS

Schoolbook
Neuroradiology

Schoolbook
Dentistry

Schoolbook
Internal Medicine

Schoolbook
Neuropathology

Schoolbook
Caselibrary

Schoolbook
Long Distance X-Ray

First implementation
of **Schoolbook**

Schoolbook
Trauma Surgery

Schoolbook
Cell Biology

TT-Net

ELAN I

ELAN II

ELAN III (eSIM)

2001

2002

2003

2004

2005

2006

2007

2008

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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

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

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

ILIAS – Organization of Modules for HannibaL



The screenshot shows the ILIAS eLearning interface for 'MH Hannover'. The user is logged in as a 'Student Account'. The main content area is titled 'Magazin' and contains a list of categories under the heading 'Kategorien'. The categories are:

- 1. Studienjahr Medizin
- 2. Studienjahr Medizin
- 3. Studienjahr Medizin
- 4. Studienjahr Medizin
- 5. Studienjahr Medizin
- 6. Praktisches Jahr

The third category, '3. Studienjahr Medizin', is circled in green. To its right, the text '(1st, 2nd, 3rd, ... year)' is written in green. Below the list, there are links for 'Allgemeines' and 'Evaluationsergebnisse Wintersemester 2007/08'. The footer of the page reads 'powered by ILIAS (v3.7.3 2006-10-26)'.

ILIAS – Organization of Modules for HannibaL

The screenshot displays the ILIAS eLearning platform interface for the 3rd year of medicine. The page is titled "3. Studienjahr Medizin" and lists various modules under the "Kategorien" section. The module "MSE_P_306 Diagnostische Methoden II" is circled in green. The interface includes a navigation bar, a search bar, and a forum section.

ILIAS eLearning @ MH Hannover
Angemeldet als Student Account
Abmelden

Persönlicher Schreibtisch Magazin Suchen Mail
Magazin > 3. Studienjahr Medizin

3. Studienjahr Medizin

Kategorien

- C4 Infektiologie, Immunologie [Auf den Schreibtisch](#)
- MSE_P_301 Pharmakologie, Toxikologie [Auf den Schreibtisch](#)
Pharmakologie, Toxikologie (F 17)
- MSE_P_302 Pathologie [Auf den Schreibtisch](#)
Pathologie (F 16)
- MSE_P_303 Mikrobiologie und Infektionskrankheiten [Auf den Schreibtisch](#)
Hygiene, Mikrobiologie, Virologie (F 10), Infektiologie, Immunologie (Q 4)
- MSE_P_304 Epidemiologie, Med. Biometrie, Medizinische Informatik [Auf den Schreibtisch](#)
Epidemiologie, Medizinische Biometrie, Medizinische Informatik (Q 1)
- MSE_P_305 Public Health I [Auf den Schreibtisch](#)
Medizinische Psychologie (S 4), Medizinische Soziologie (S 4), Prävention, Gesundheitsförderung (Q 10)
- MSE_P_306 Diagnostische Methoden II** [Auf den Schreibtisch](#)
Physiologie (S 11), Frauenheilkunde, Geburtshilfe (F 7), Innere Medizin (F 11), Kinderheilkunde (F 12), Neurologie (F 14)
- MSE_P_307 Geschichte, Theorie, Ethik der Medizin [Auf den Schreibtisch](#)
Geschichte, Theorie, Ethik der Medizin (Q 2)
- MSE_P_308 Dermatologie, Venerologie [Auf den Schreibtisch](#)
Dermatologie, Venerologie (F 6)

Foren

Forum des dritten Studienjahres [Auf den Schreibtisch](#)
Alle Fragen zu Medizinischen Informatik etc.
Moderatoren: [koesling](#) Themen: 0 Beiträge (Ungelesen): 0 (0) Neue Beiträge: 0 Besuche: 0
Letzter Beitrag:

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ILIAS – Dentistry / Concepts for Occlusion

The screenshot displays the ILIAS eLearning platform interface. The browser address bar shows 'www.mh-hannover.de/ilias'. The page title is 'ILIAS eLearning MH Hannover'. The user is logged in as 'Jörn Krückeberg'. The main content area is titled '3. Konzepte der Okklusion' and '1.1 Idealtypischer Aspekt'. The current page is 'Optimierung der Kaufunktion'. The text discusses the function of cusps (Höcker) and the role of different types of cusps (Schneidhocker, Stumpföhcker) in food processing. A video player is embedded, showing a close-up of teeth and a side profile of a person chewing. The video player title is 'Unterkieferbewegungen beim Kauen'. The interface includes a navigation menu on the left, a search bar, and a footer with 'Private Notizen' and 'Öffentliche Notizen' sections.

ILIAS – 3. Konzepte der Okklusion

www.mh-hannover.de/ilias

ILIAS eLearning MH Hannover

Angemeldet als Jörn Krückeberg

3. Konzepte der Okklusion

1.1 Idealtypischer Aspekt

Optimierung der Kaufunktion

Bei der Zuordnung von Zähnen sollte unter anderem die Funktion der Höcker (weitere Funktionen) besondere Beachtung finden. Schneidhocker (syn. Nichttragende Höcker) haben bei der Nahrungszerkleinerung schneidende Funktion, Stumpföhcker (syn. Tragende Höcker) übernehmen dabei die Funktion des Zerquetschens und Zermahlens von Nahrung (Video).

Weiterhin sorgt eine individuell angepasste bestmögliche Verzahnungstiefe dafür, dass die Nahrung mit minimaler Muskelkraft bei maximalem Kauereffekt zerkleinert werden kann:

Unterkieferbewegungen beim Kauen

Axiale Belastung der Zähne

Private Notizen

Öffentliche Notizen

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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 bestimmen](#) [Herunterladen](#)

Alle auswählen

(Eintrag 1 - 1 von 1)

[Löschen](#) [Ausführen](#)

[Hinzufügen](#)

ILIAS - 4c. Medizinische Signal & Bildverarbeitung

Open Source eLearning

Angemeldet als Thomas Kupka [Abmelden](#)

Persönlicher Schreibtisch Magazin Suchen Mail Administration

... > Lernmodule > 4c. Medizinische Signal & Bildverarbeitung > Signalverarbeitung > Beispiel: Elektrokardiogramm > EKG - Das Signal

Info Inhalt Druckansicht

EKG - Allgemein EKG - Das Signal (2/3)

EKG - Das Signal (1/3)

Kontraktionszyklus des Herzen:

The figure illustrates the cardiac cycle with a heart diagram and a corresponding graph. The heart diagram labels the ATRIA, VENTRICLE, AORTA, and PULM. ARTERY. The graph shows pressure (mmHg) and volume (ml) over time (seconds). The cycle is divided into SYSTOLE and DIASTOLE. The ECG trace shows P, QRS, and T waves. Heart sounds S1, S2, S3, and S4 are also shown.

Tutorials

- atrial systole
- isovolumetric contraction
- rapid ejection
- reduced ejection
- isovolumetric relaxation
- rapid ventricular diastole
- diastasis

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Blood pressure data transfer via NFC

(Near Field Communication)

Das Blutmessgerät der österreichischen Arc-E-Health-Forscher schickt die Werte drahtlos an ein Handy – das allerdings ist mit einer speziellen Software präpariert. Die Daten gehen daher an ein Monitoring-Zentrum. Ab Januar startet ein Pilotversuch in Oberösterreich.

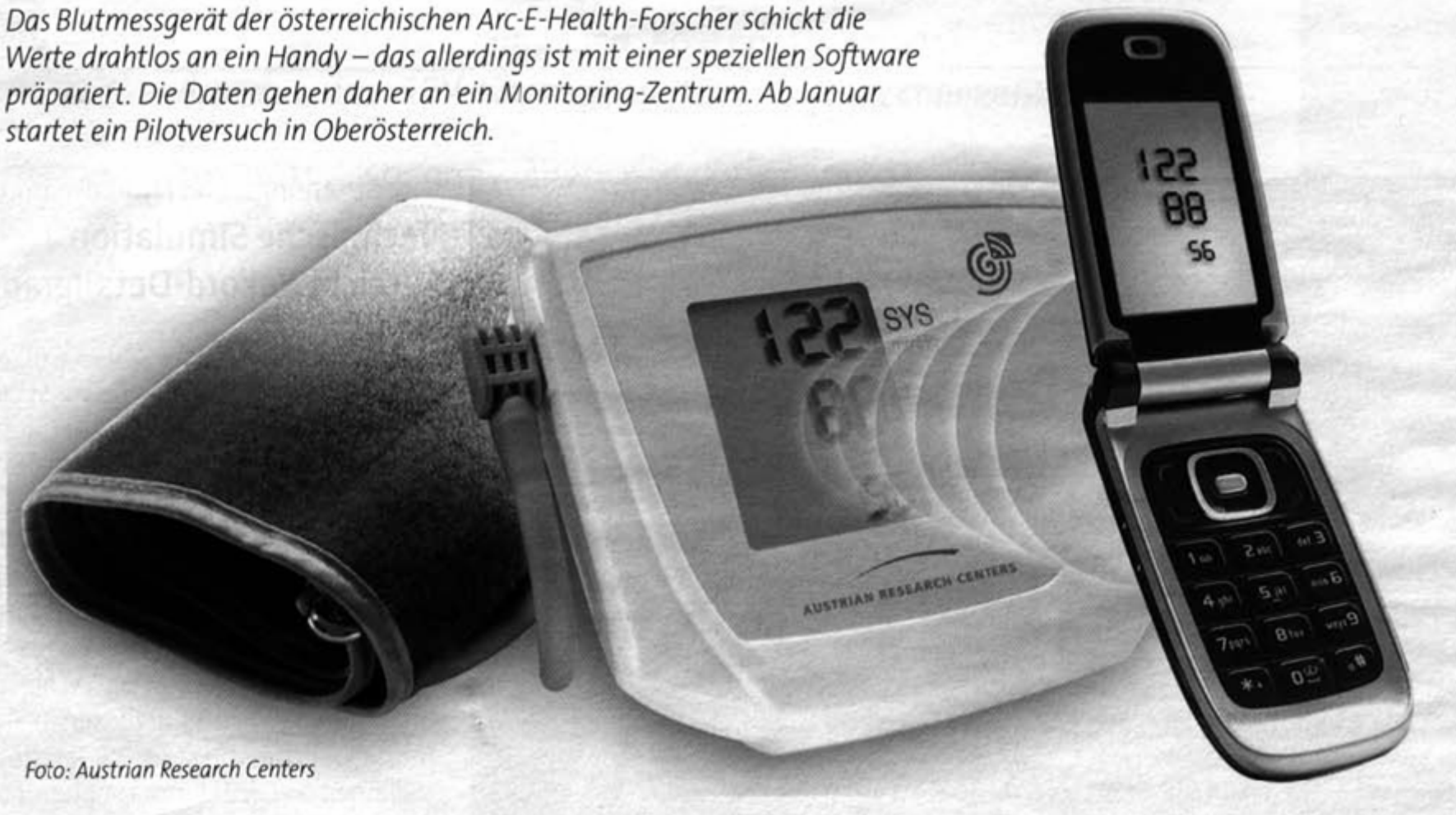


Foto: Austrian Research Centers

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Austrian Research Centers /e-Health
<http://www.arcsmed.at/ehs>



Startseite Desktop **Patientenliste** Logout mhh1

Messwertliste

MHH, Demopatient1 , männlich

Patientendaten Behandlung Untersuchungen **Messwertliste** Grafiken Risikoanalyse

Messwertliste

Neuer Eintrag

Darstellung

Standard | pro Woche | pro Monat

Datum / Uhrzeit	Systolischer Blutdruck	Diastolischer Blutdruck	Herzfrequenz (Puls)	Gewicht
21.12.2008				
16:12	131	88	81	
20.12.2008				
22:11	138	94	79	
19.12.2008				
20:54	141	90	82	
18.12.2008				
20:37	145	100	87	
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	
10.12.2008				
14:49	144	90	83	
09.12.2008				
11:16	162	113	84	

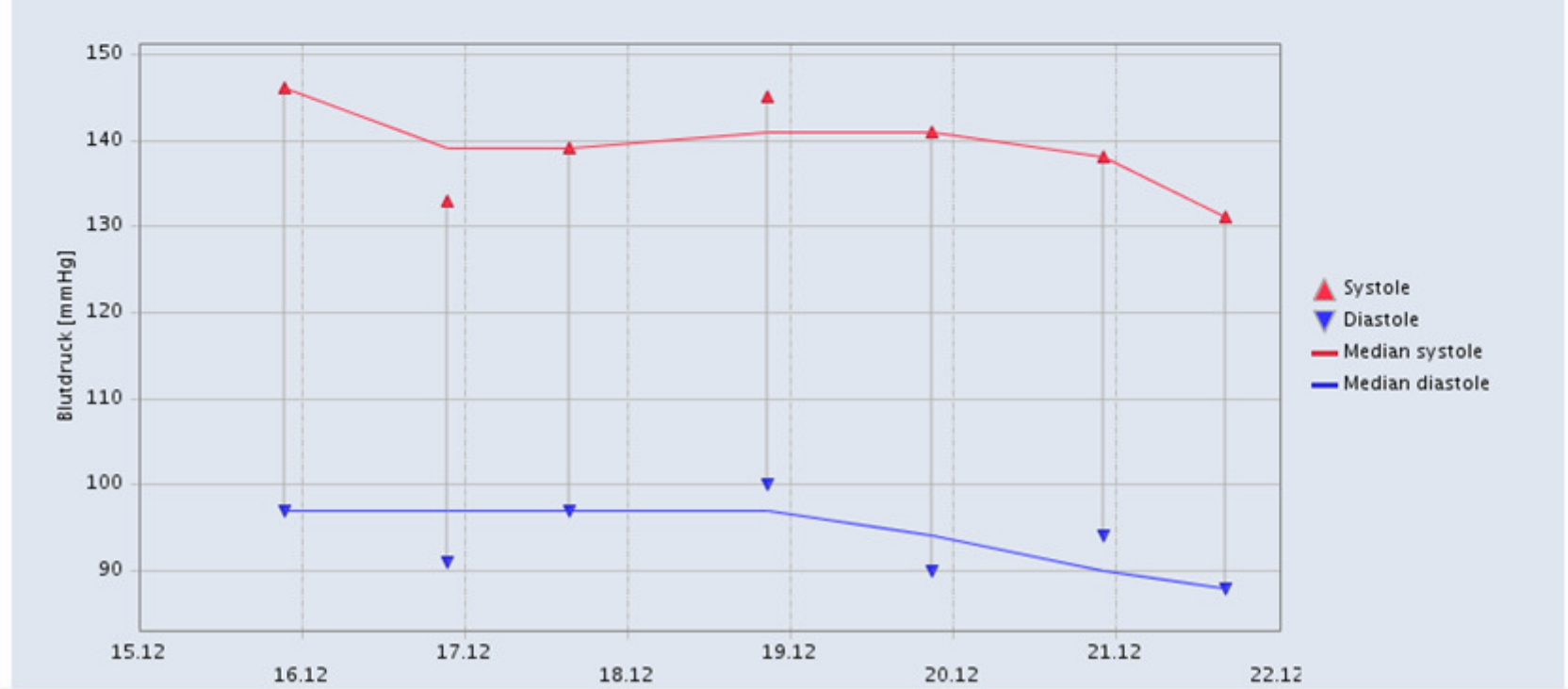
Sie sehen Eintrag 1 bis 10 von 18
1 | 2 | >

Darstellung

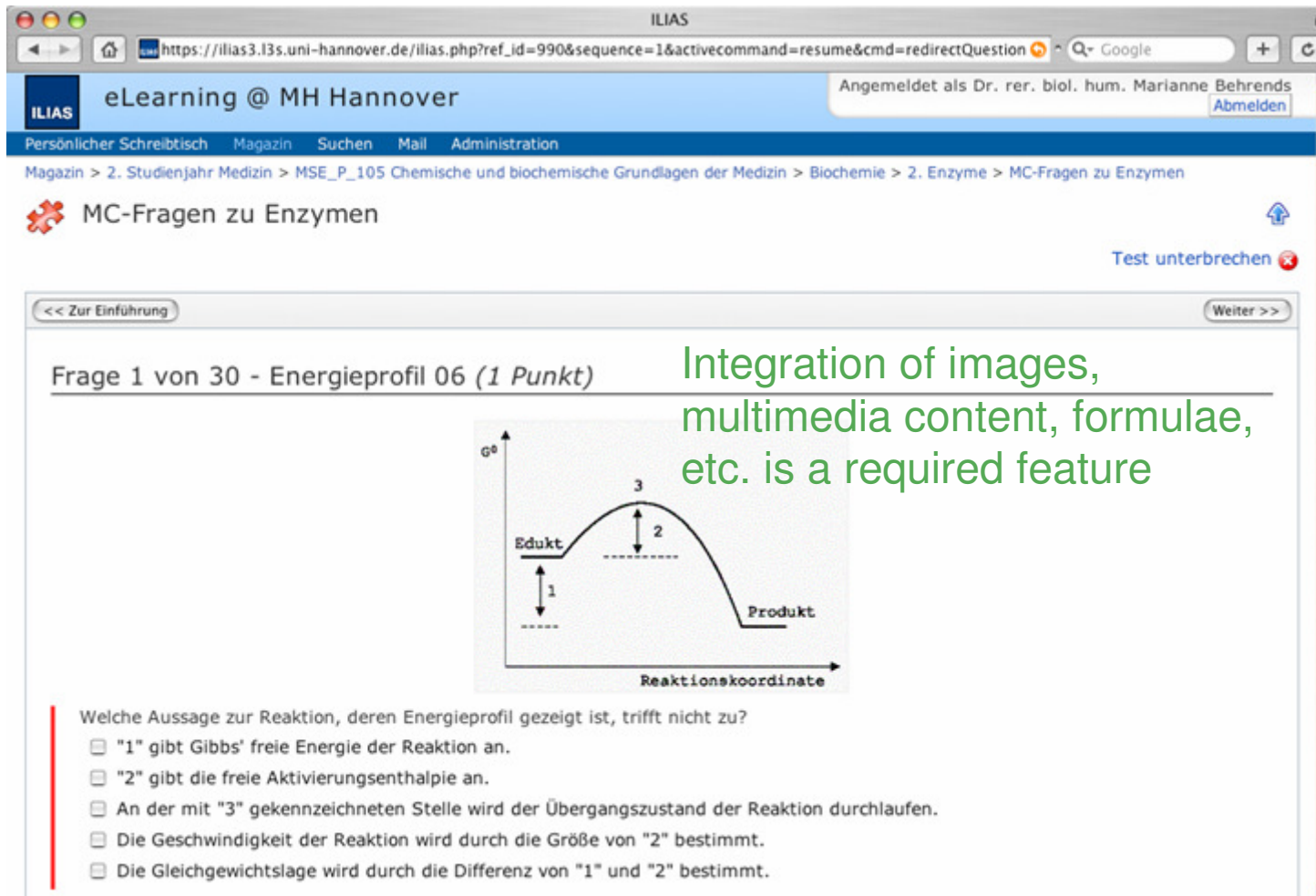
Standard | pro Woche | pro Monat

von Woche 2008 bis Woche 2008

Blutdruckverlauf : Kalenderwoche 51 2008 bis 51 2008 (15.12.2008 - 21.12.2008)



ILIAS – Testing What You've Learned



The screenshot shows the ILIAS eLearning platform interface. The browser address bar displays the URL: https://ilias3.l3s.uni-hannover.de/ilias.php?ref_id=990&sequence=1&activecommand=resume&cmd=redirectQuestion. The user is logged in as Dr. rer. biol. hum. Marianne Behrends. The navigation menu includes: Persönlicher Schreibtisch, Magazin, Suchen, Mail, Administration. The current page is: Magazin > 2. Studienjahr Medizin > MSE_P_105 Chemische und biochemische Grundlagen der Medizin > Biochemie > 2. Enzyme > MC-Fragen zu Enzymen. The main content area displays the question: "Frage 1 von 30 - Energieprofil 06 (1 Punkt)". To the right of the question, a green text annotation reads: "Integration of images, multimedia content, formulae, etc. is a required feature". The question includes an energy profile diagram with the following features:

- Y-axis: G^0
- X-axis: Reaktionskoordinate
- Start point: Edukt
- End point: Produkt
- Point 1: Vertical distance from Edukt to the start of the curve.
- Point 2: Vertical distance from the peak to the end of the curve.
- Point 3: The peak of the curve.

The question asks: "Welche Aussage zur Reaktion, deren Energieprofil gezeigt ist, trifft nicht zu?" (Which statement about the reaction, whose energy profile is shown, is not true?). The options are:

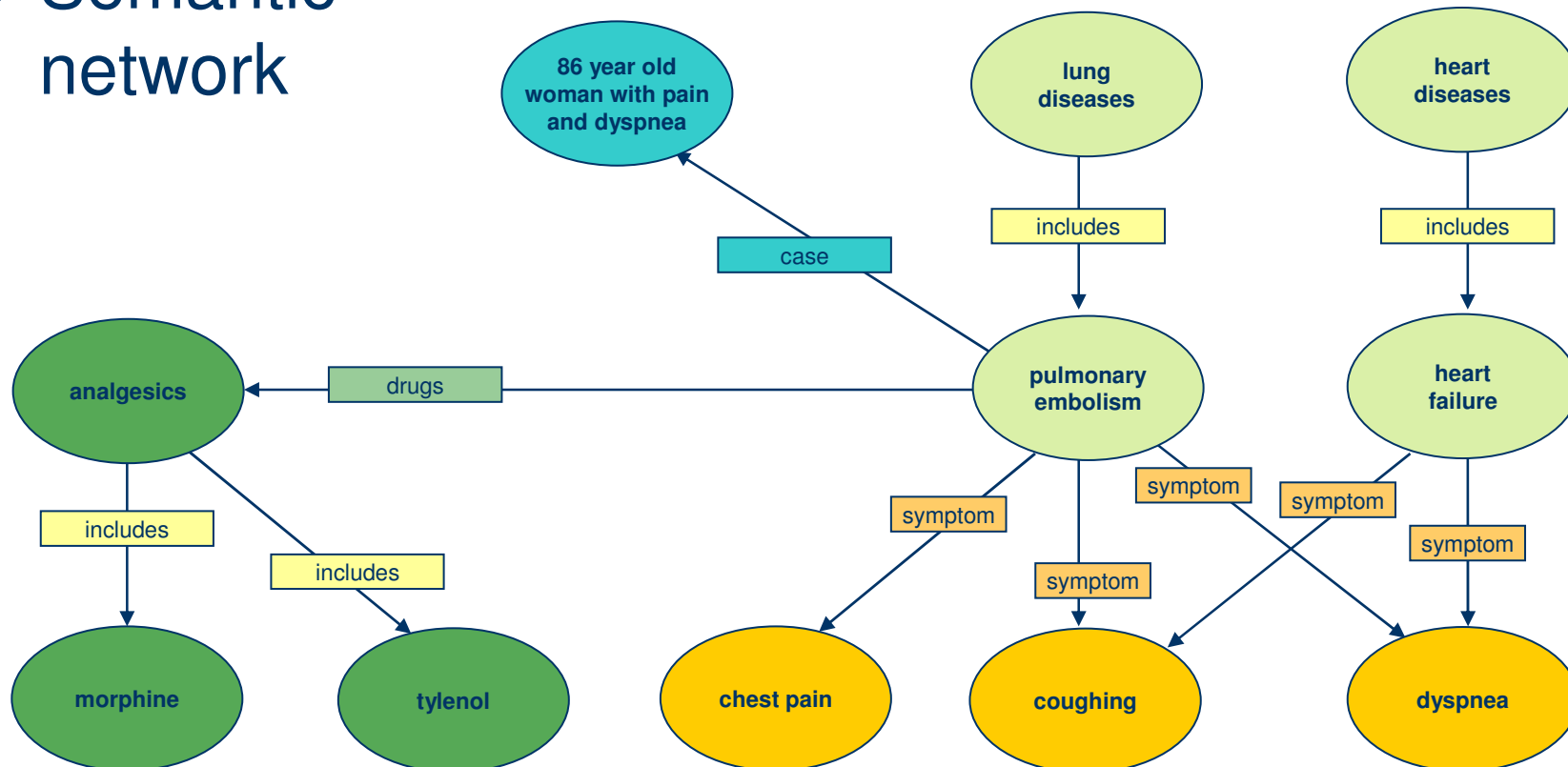
- "1" gibt Gibbs' freie Energie der Reaktion an.
- "2" gibt die freie Aktivierungsenthalpie an.
- An der mit "3" gekennzeichneten Stelle wird der Übergangszustand der Reaktion durchlaufen.
- Die Geschwindigkeit der Reaktion wird durch die Größe von "2" bestimmt.
- Die Gleichgewichtslage wird durch die Differenz von "1" und "2" bestimmt.

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



http://www.medicalschoolbook.de/nephrologie/

Innere Medizin
Nephrologie

orientierung Suche Lehrstoff Fälle Kapitel Editieren


Fallbeispiele
Erkrankung: **Lungenembolie**

86-jährige Frau mit Luftnot und Schmerzen

Anamnese | Diagnostische Überlegungen | Körperliche Untersuchung | Diagnostik | Diagnose | Therapie

<<

Frau L. L., geb. 3.2.1921
Die 86-jährige Rentnerin wird mit dem Notarzt in unsere Notaufnahme eingeliefert.



Über das Schoolbook
Account
Log in Protokoll
Protokoll

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http://www.medicalschoolbook.de/nephrologie2/

Innere Medizin
Nephrologie

orientierung Suche Lehrstoff Fälle Kapitel Editieren

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.

Symptomenkomplex: **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

http://www.medicalschoolbook.de/ - Microsoft Internet Explorer

Daten Bearbeiten Ansicht Favoriten Extras ?

Zurück Suchen Favoriten Medien Links Kostenlose Hotmail Links anpassen

Adresse http://www.medicalschoolbook.de/ Wechseln zu

NEURO RADIO LOGIE

inf: Kapitel Lehrstoff Fälle Übung Suche Info

TT-Net
©Hannover Medical School

E0 SCHOOLBOOK
E1 Adventsseminar 2004
E2 Hirinfarkt - Zerebrale Ischämien
E3 Hypoxischer Hirnschaden
E4
E5
Case AO4_018

Return

About the schoolbook
Account

Hypoxischer Hirnschaden
AO4_018

Klinische Angaben
52-jähriger Patient. Zustand nach Tonsilliten-Ca., Zustand nach massiver Nachblutung, Blutaspiration, Massivtransfusion. Frage: Hypoxischer Hirnschaden.

Flair ax.mov

http://vergil.learninglab.uni-hannover.de/schoolbook1/schoolbook/book/navigator.php?mode=3&addpage=1&edt=0#

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Schoolbook Neuroradiology

The screenshot shows a web browser window displaying the 'Schoolbook Neuroradiology' website. The browser's address bar shows 'http://www.medicalschoolbook.de/'. The website has a yellow background and a navigation menu at the top with icons for 'Orientierung', 'Kapitel', 'Lehrstoff', 'Fälle', 'Übung', 'Suche', and 'Info'. A logo for 'TT-Net Hannover Medical School' is in the top right corner. On the left side, there is a vertical menu with categories: 'E0 SCHOOLBOOK', 'E1 Adventsseminar 2004', 'E2 Hirninfarkt - Zerebrale Ischämien', 'E3 Hypoxischer Hirnschaden', 'E4', 'E5', and 'Case AO4_018'. The main content area is titled 'MRT vom 20.04.' and contains a 'Befundbericht' (Findings Report) and a 'Beurteilung' (Assessment). The 'Befundbericht' describes MRI findings of hypoxic brain damage, including signal changes in the basal ganglia and subdural hygromas. The 'Beurteilung' states that the image shows hypoxic brain damage with manifestations in the basal ganglia and moderate subdural hygromas. On the right side, there is a red header for 'Hypoxischer Hirnschaden AO4_018' and a section for 'Klinische Angaben' (Clinical Information) describing a 52-year-old patient with a history of tonsillitis, massive hemorrhage, and transfusion. Below the text is an axial MRI scan of the brain, labeled 'Flair ax.mov'.

http://www.medicalschoolbook.de/ - Microsoft Internet Explorer

Daten Bearbeiten Ansicht Favoriten Extras ?

Zurück Suchen Favoriten Medien Links Kostenlose Hotmail Links anpassen

Adresse http://www.medicalschoolbook.de/ Wechseln zu

NEURO RADIO LOGIE

info lib: Orientierung Kapitel Lehrstoff Fälle Übung Suche Info

TT-Net
©Hannover
Medical School

E0 SCHOOLBOOK

E1 Adventsseminar 2004

E2 Hirninfarkt - Zerebrale Ischämien

E3 Hypoxischer Hirnschaden

E4

E5

Case AO4_018

Return

About the schoolbook

Account

MRT vom 20.04.

Befundbericht

Zum Vergleich liegen die CT-Voruntersuchungen vom 10. und 13.4.04 vor. In der FLAIR-Sequenz erkennt man eine deutliche path. Signalanhebung der Basalganglien bds., insbesondere beider Caput nucl. caudati sowie des Globus pallidum und Putamens bds. Weitere path. Signalanhebungen erstrecken sich periventrikulär im Marklager. In der Diffusionswichtung weisen die Basalganglien ebenfalls eine geringe Signalanhebung auf, was jedoch als T2-Effekt zu interpretieren ist. Das Mark-Rinden-Band ist gut differenzierbar. Symmetrisches, mittelständiges Ventrikelsystem. Subdurale Flüssigkeitsansammlung bds. frontal im Sinne von Hygromen, im Wesentlichen unverändert im Vergleich zu den Voruntersuchungen.

Beurteilung

Bild eines hypoxischen Hirnschadens mit Manifestation im Bereich der Basalganglien bds. Mäßig ausgeprägte subdurale Hygrome bds.

Hypoxischer Hirnschaden
AO4_018

Klinische Angaben

52-jähriger Patient. Zustand nach Tonsillen-Ca., Zustand nach massiver Nachblutung, Blutaspiration, Massivtransfusion. Frage: Hypoxischer Hirnschaden.

Flair ax.mov

Internet

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Schoolbook Traumasurgery

The screenshot displays a web browser window with the URL <http://www.medicalschoolbook.de/unfallchirurgie/>. The page features a navigation bar with icons for Orientation, Chapters, Lesson, Cases, Examination, Search, and Edit. A logo for ELAN (eLearning Academic Network, Niedersachsen) is visible in the top right corner. The main content area is titled "8. Verletzungen der Muskeln, Sehnen und Bänder" and "8.4 Knie-Bandverletzungen". Below the title, there are links for "Epidemiologie u. Anatomie", "Kreuzbandkinematik", "Seitenband", "Anamnese", "Anteromediale Bandinstabilität", "Posteriore Bandinstabilität", "Diagnostik", "Therapie", "Technik", "Rekonstruktion der Kreuzbänder", and "OP: Arthroskopischer Kreuzbandersatz". A video player shows a surgical procedure on a knee joint. The left sidebar contains a table of contents with links for "Unfallchirurgie", "E0 Hauptvorlesung Unfallchirurgie", "E1 8. Verletzungen der Muskeln, Sehnen und Bänder", "E2 8.4 Knie-Bandverletzungen", "E3", "E4", "Fall", "Return", "About the schoolbook", "Account", "Log in protocol", and "Protocol".

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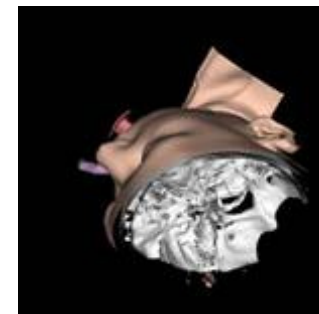
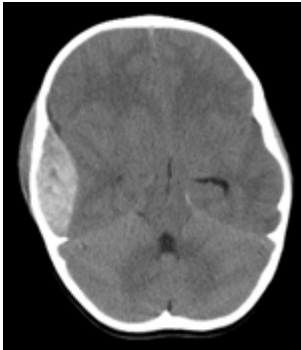
Schoolbook for Oral and Maxillofacial Surgery

The screenshot shows a web browser window with the URL <http://www.medicalschoolbook.de/mkg/>. The interface is in German and features a navigation menu on the left with items: M, K, G; E0 (Mund-, Kiefer- und Gesichtschirurgie); E1 (Zahnärztliches Röntgen); E2 (Lernmodul); E3; E4; E5; and Case. A 'Return' button is also present. Below the menu, there are links for 'About the schoolbook', 'Account', 'Log in protocol', and 'Protocol'. The main content area is titled 'Zahnärztliches Röntgen Lernmodul' and contains four panels: two showing a person with a dental X-ray machine, and two showing 3D models of dental arches. A text box below the panels reads: 'Bitte stellen Sie das Röntgengerät mit Hilfe der Buttons ein. Klicken Sie dann auf den Aufnahme-Button, um zu sehen, wie gut Ihre Einstellungen sind.' At the bottom, a row of eight circular control buttons is circled in red, and an 'Aufnahme' button is located to the right.

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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

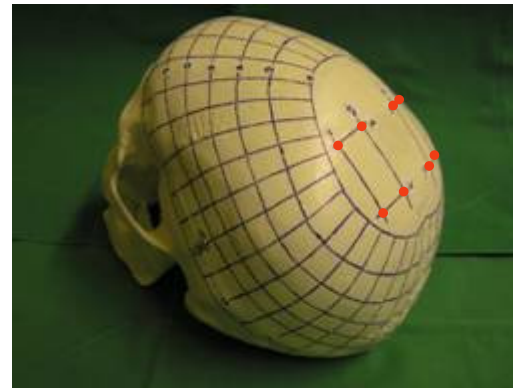
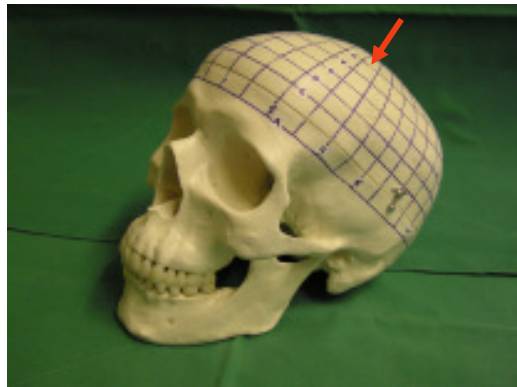


The Aim of CranioTrain

- 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

CranioTrain – Skull Model

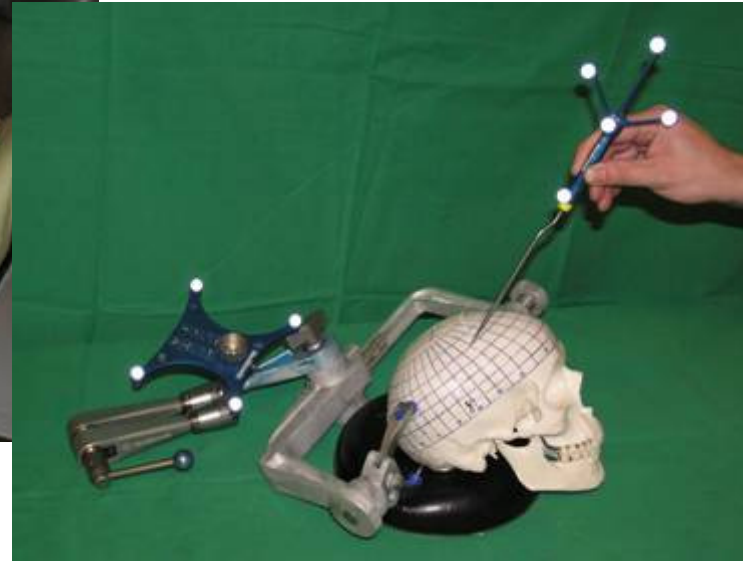
- Standard anatomical skull model A20 (plastic)



- 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

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)

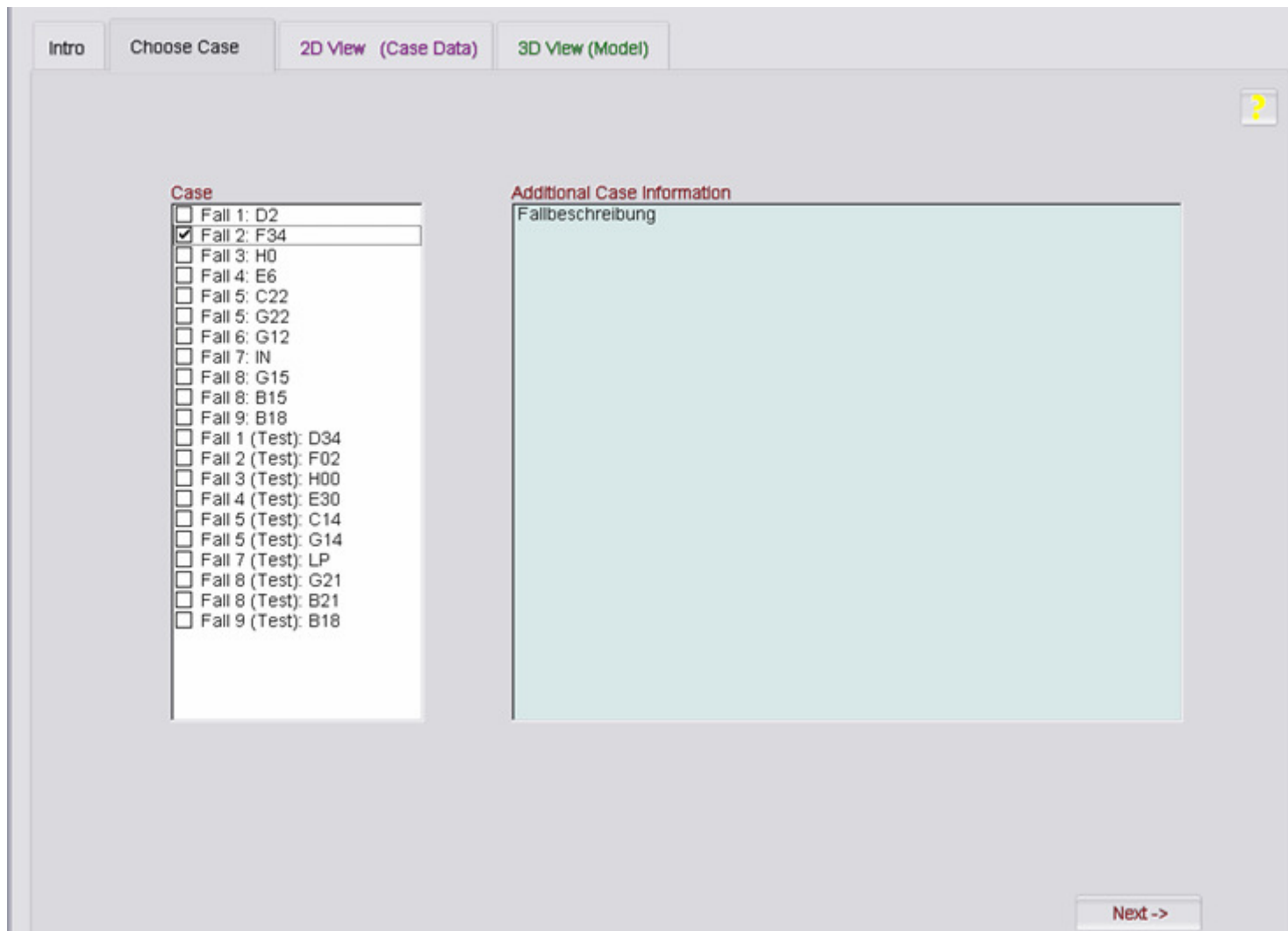
Intro Choose Case 2D View (Case Data) 3D View (Model)

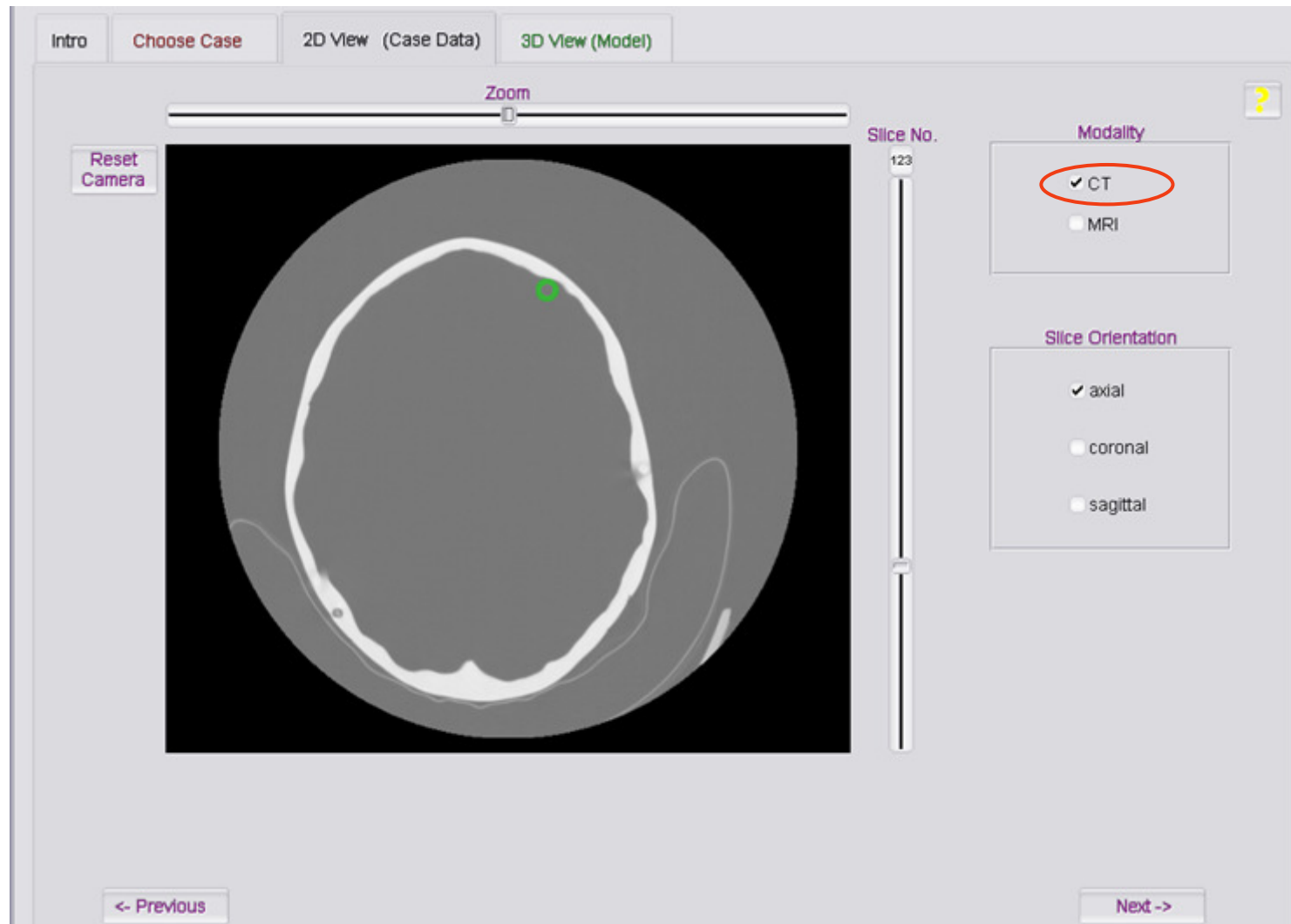
CranioTrainer



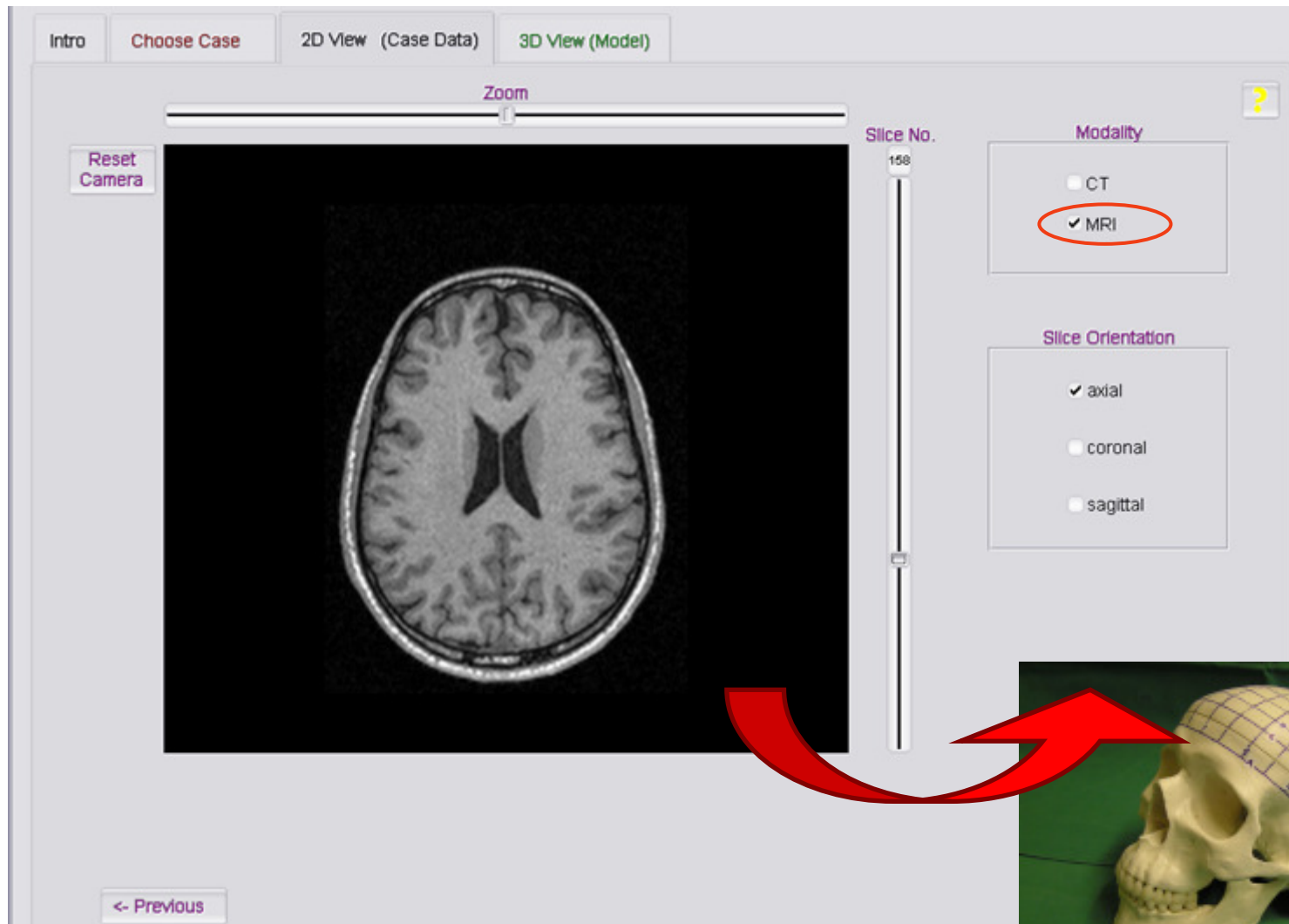
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Department of Neurosurgery
Institute of Medical Informatics

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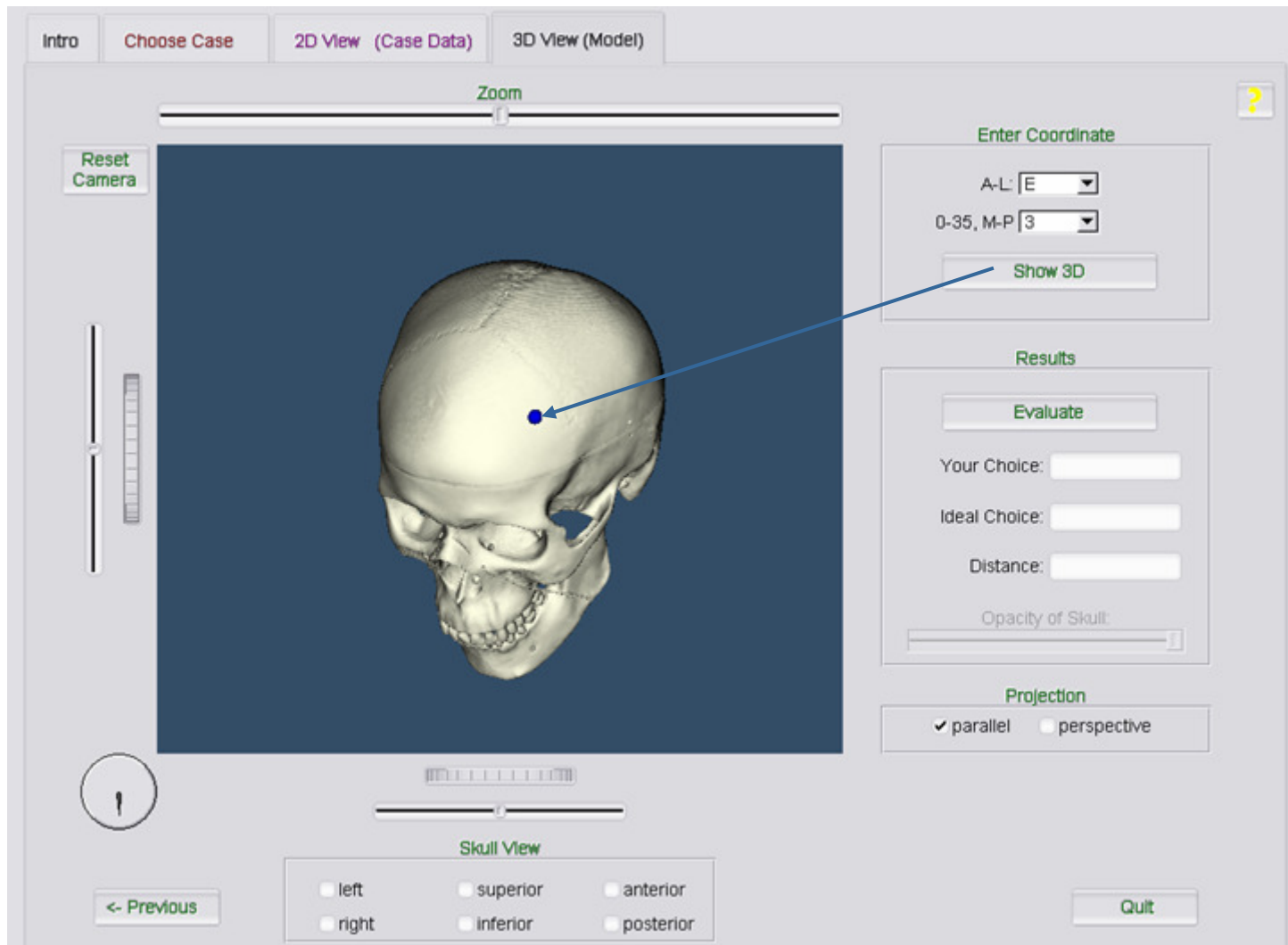




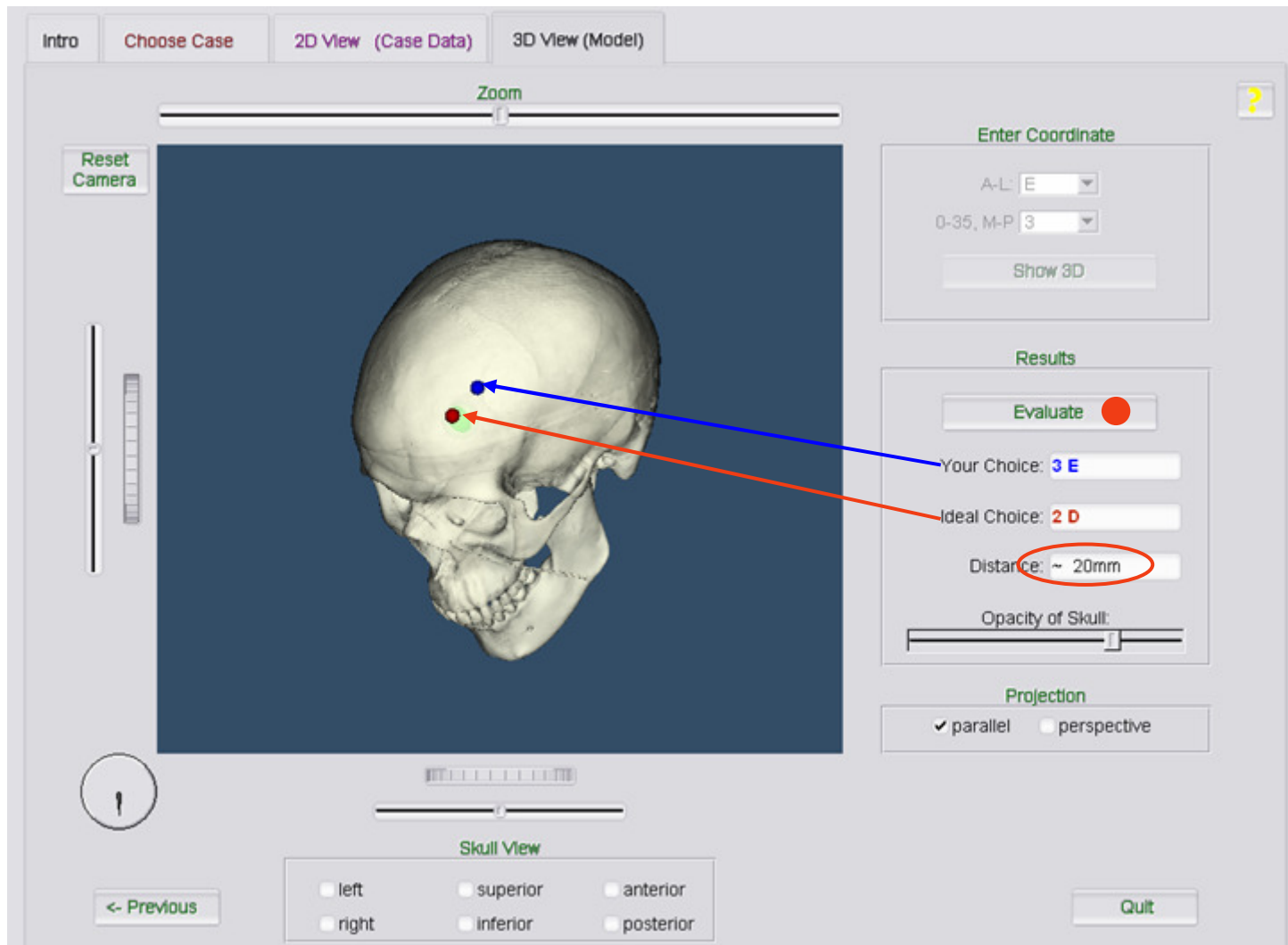
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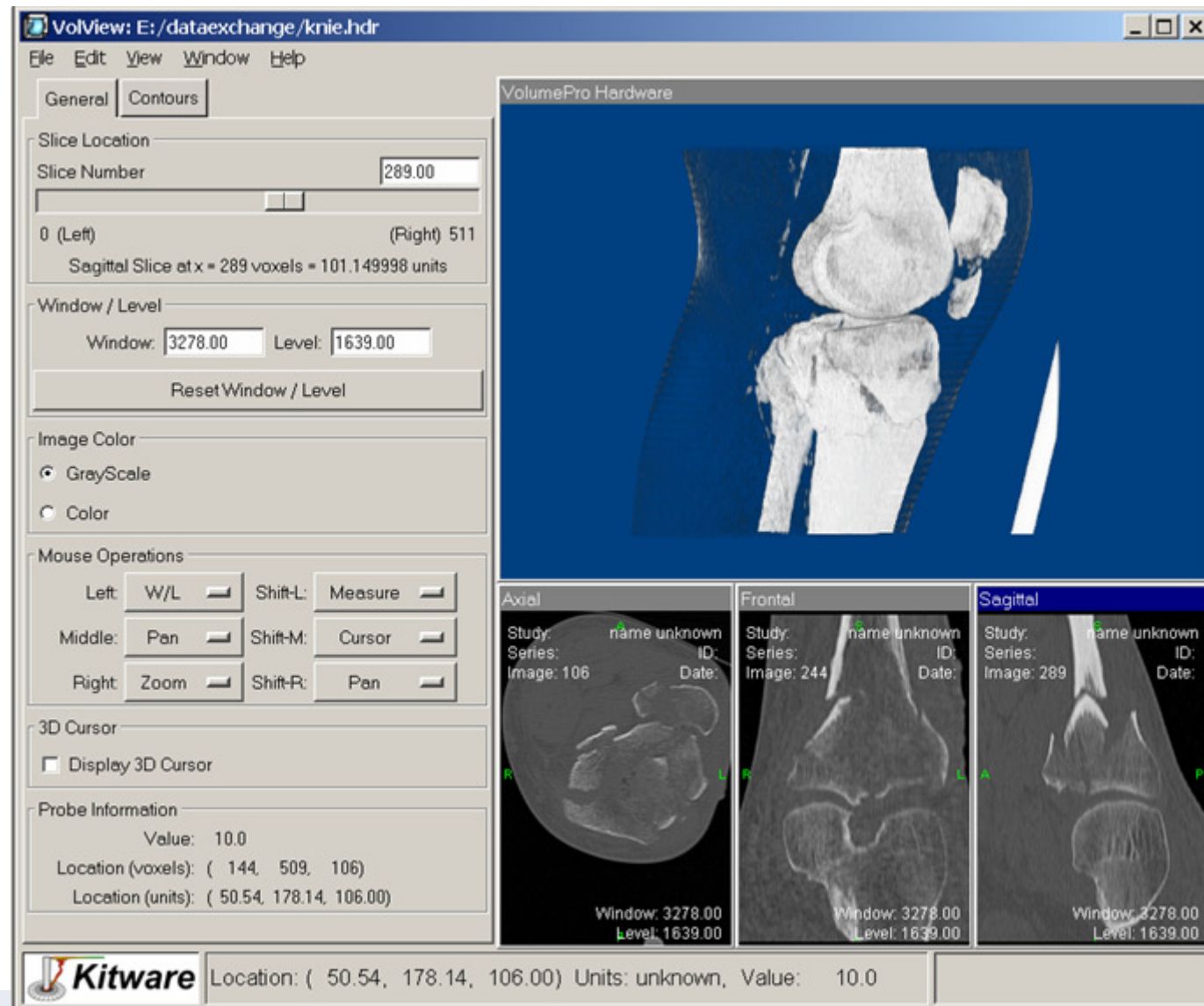
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CranioTrain – Summary



- "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.

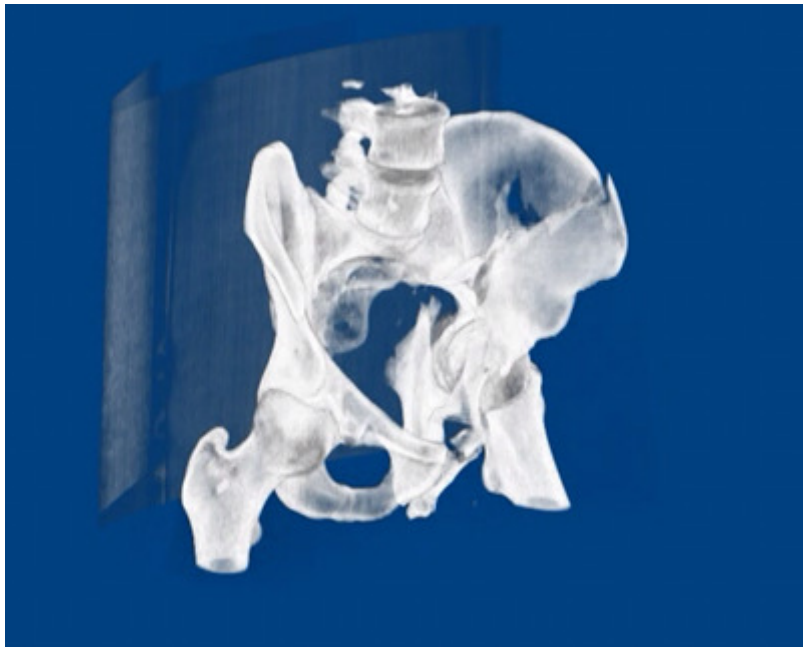
3D Training: Knee (563 kB)



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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. Prakam 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

Sections of fresh rat bones from adult rats were selectively demineralized by timed immersion in 10% ethylenediamine tetraacetic (EDTA). Specimens were removed from the solution after

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