Multidetector-row computed tomography (MDCT) has dramatically changed abdominal CT applications. The potential of MDCT lies in its striking improvement of spatial (thinner slice thickness) and temporal (faster scan time) resolution. Thin slice images improve z-axis (cranio-caudal direction) resolution, which enables acquisition of high quality three dimensional (3D) or multiplanar reformation images. In the MDCT era, it is not too much to say that CT is a modality that not only demonstrates the transverse (axial) plane, but also demonstrates multiple planes.

CT angiography (CTA): To obtain optimal arterial phase CTA images, a higher IV contrast injection rate (5 cc/sec) is desirable, requiring at least a 20 G IV catheter. Bolus tracking (real-time monitoring for contrast arrival while obtaining a density curve of the target organ [e.g. abdominal aorta]) is useful to ensure appropriate scan timing. Theoretically, injection duration (contrast volume/injection rate) should be longer than the scan time for the arterial phase of CTA. The volume of contrast can be reduced if the scan time is shortened, which is another advantage of MDCT. In addition, a saline chase (e.g. 50 ml of saline flush following 100 ml of contrast injection instead of using 150 ml of IV contrast) may also be useful in administering IV contrast more efficiently, which may potentially reduce the total volume of IV contrast used.

CTA provides an accurate and reliable roadmap for vascular anatomy of the abdomen to evaluate the arterial and venous systems. The accuracy of CTA in evaluating
Notes from the Chair

Update on Research in the Department of Radiology

This month the Department celebrated the opening of a new research laboratory, the Iowa Comprehensive Lung Imaging Center (I-CLIC). The laboratory, directed by Eric Hoffman, Ph.D., is equipped with a state-of-the-art 16-slice CT scanner and a micro-CT system. The event was commemorated with a 2-day scientific forum featuring researchers from across the United States and Germany. Dr. Hoffman has been a member of the Department of Radiology since 1992.

Over the last 18 months, the Department has experienced considerable growth in its research enterprise, owing to the success of several faculty in the department and to the recruitment of new researchers. Three new MR Scientists were recruited to work within 2 broad areas: (1) Neuro-imaging sciences (both neurological and psychiatry-based research) – Jinhu Xiong, PhD and Vincent Magnotta, PhD and (2) Cardiovascular imaging – Daniel Thedens, PhD. In addition, a new CT Scientist Researcher has recently joined the faculty – Shiyi Zhao, PhD. Commensurate with these new recruits, the department has entered into a strategic research alliance with Siemens Medical to leverage and advance several mutual research interests.

Further support for the department’s research enterprise will be enabled by the acquisition of several dedicated research imaging systems. This year the installation of two MR research systems (a 1.5 Tesla and a 3 Tesla) into the MR Imaging Clinic is planned. The clinic is currently undergoing extensive remodeling and expansion. In addition, two 16-slice research CT scanners will support research in computed tomography. The first 16-slice CT scanner has been installed in the Iowa Comprehensive Lung Imaging Center. The second CT scanner will reside in the department and will be dedicated to supporting clinical CT research. Renovations for the new PET Center are well underway; the center will include two PET-CT systems, as well as a PET system dedicated to research.

Aside from the “human” imaging systems for research, the department has been enormously successful in garnering support for several animal imaging systems, including two micro CT systems, a bioluminescence CT system, a micro PET system, and several other nuclear medicine instruments (gamma camera, 3 headed SPECT system and a PET system for larger animals). These instruments form the basis for a complete small animal imaging facility now being planned by the College of Medicine. The current design locates the imaging systems in a contiguous 3,000 sq. ft. area, within the Medical Education Research Facility (MERF) building. The close proximity to the animal support facilities, the I-CLIC and the other COM imaging facilities makes it an ideal support center for the Holden Comprehensive Cancer Center and researchers throughout the university.

The Department of Radiology has had a steady increase in successfully funded research grants over the past few years. Last year, the Department ranked 13th among departments of radiology nationwide in NIH grant funding.

<table>
<thead>
<tr>
<th>Grants</th>
<th>Value</th>
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<td>FY2000</td>
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<td>FY2004-Projected</td>
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This year, several research grants have been renewed or newly awarded:

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<th>Primary Investigator</th>
<th>Title of Project</th>
<th>Current YTD Total Award Amount</th>
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<tr>
<td>Kenneth Beck, Ph.D.</td>
<td>Pulmonary Limitations in Chronic Heart Failure</td>
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<td>Kevin Berbaum, Ph.D.</td>
<td>Satisfaction of Search in Diagnostic Radiology</td>
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<td>Improved DBM ROC Methods for Diagnostic Radiology</td>
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<td>Michael D’Alessandro, M.D.</td>
<td>Biodefense: Analysis of Human Lung-Host-Pathogen Interactions</td>
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<td>The Virtual Naval Hospital</td>
<td>$302,067</td>
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<td>Laurie Fajardo, M.D.</td>
<td>ACRIN Committee or Subcommittee Chair Agreement</td>
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<td>LORAD Image Collection Trial Agreement</td>
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<td>Development of an Innovative Field-emission X-ray Source to Facilitate Phase-contrast Digital X-ray Imaging</td>
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<td>Automatic Exposure Control Device for Digital Mammography</td>
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<td>Clinical Evaluation of Digital Mammography</td>
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<td>Thomas Grabowski, M.D.</td>
<td>Time-Aware Data Acquisition, Real-Time Processing for fMRI</td>
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<td>Richard Hichwa, Ph.D.</td>
<td>Innovative Neuroimaging Technologies Training Program</td>
<td>$116,670</td>
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<td>Eric Hoffman, Ph.D.</td>
<td>Inflammatory Parenchymal Lung Disease: Structure/Function</td>
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<td>CT Scan Image Storage and Analysis Center for the National Emphysema Treatment Trial (NETT)</td>
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<td>Myofibroblasts and Loss of Elastic Recoil in Severe Asthma</td>
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<td>Use of Exogenous Surfactant to Mitigate Acute Lung Injury</td>
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<td>Synergistic CT-Bronchoscopy for Lung-Cancer Assessment</td>
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<td>Image and Model Based Analysis of Lung Disease</td>
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<td>Malik Juweid, M.D.</td>
<td>Field Modifiable Micro CT Scanner for Variable Spatial/Temporal Resolution Imaging</td>
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<td>Michael Vannier, M.D.</td>
<td>SPORE: Project 3 - Functional Imaging of Anti-Lymphoma Therapy</td>
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<td>Ge Wang, Ph.D.</td>
<td>ACR Imaging Network Modalities Subcommittee</td>
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<td>Jinhu Xiong, Ph.D.</td>
<td>Cone-Beam Methods for Dynamic Volumetric X-Ray CT</td>
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<td>CT Perfusion at Significantly Reduced Dose</td>
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<td>TOTAL</td>
<td>Influence of Processing Tools on fMRI Metanalyses</td>
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<td>$6,372,765</td>
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Sectional Update
Pulmonary Radiology Division

by Brad H. Thompson, MD, Associate Professor, Director of Diagnostic Imaging & Chief of Cardiovascular & Pulmonary Radiology

The Chest Imaging section that has traditionally been composed of 2.5 faculty members has a new faculty member from Japan. Dr. Koji Takahashi, who currently holds a faculty position as Associate Professor from Asahikawa Medical College, Asahikawa Japan, joined The University of Iowa Radiology Department last summer as a visiting professor. His primary interests are in chest imaging with special concentrations on mediastinal imaging and lung cancer staging. Additionally, Dr. Takahashi’s expertise also extends to vascular and interventional radiology, particularly related to cases involving the cardiovascular system. Koji will be an active member of the section until 2005. The section is very pleased to have Koji here, and we certainly appreciate his valuable contributions to the section and to the department.

The section continues to be involved in several funded research projects. Several faculty members continue to participate with faculty from Pediatric Cardiology in the “Muscatine Study” which is a federally funded longitudinal study looking at long term risk factors for cardiovascular disease. The section provides expertise and interpretations (continued on next page)

MDCT Applications, continued from page 1

vascular anatomy in the abdomen is nearly 100%. CTA has been utilized in attempting to evaluate various vascular pathologies. In the near future, CTA will replace many conventional diagnostic angiographic exams. Diagnostic value of CTA is comparable to contrast enhanced 3D magnetic resonance angiography (MRA). However, it should be stressed that CTA is faster and cheaper than MRA, and better at evaluating small vessels. In addition, MRA can be operator dependent and requires patient cooperation (e.g. holding breath).

With the advent of MDCT, diagnostic radiologists should become familiar with a workstation, since the image data have significantly increased, and hard copy reading is becoming impractical. In abdominal imaging, the act of creating 3D images should be paired with interpretation. Although axial images may be sufficient for diagnosis in most cases, it is best to make the most of high quality multiplanar reformation capabilities (as well as source images), which will ultimately increase the confidence level of interpretation.

The abdominal imaging applications of MDCT are not only used for CTA. For example, CT urography (CTU) is a valuable and simple modality for the workup of a patient with hematuria, producing clearer images of renal tumor, stone, and lesions outside of the GU system. CTU can be a single and complete modality of choice, and the total cost and radiation dose of CTU should be compared to those of other diagnostic modalities, since multiple studies are occasionally needed for diagnosis.

Venous phase of CTA (MDCT portography, Targeted MIP Image) of a patient with portal venous occlusion demonstrates gastrojejunal varices (arrow). CTA is also useful to evaluate portal venous system and portosystemic shunt less invasively.

CTU (Targeted MIP image) shows normal collecting systems and ureters. Bladder stones are present.
Research

Iowa-Comprehensive Lung Imaging Center

by Eric A. Hoffman, Ph.D., Professor of Radiology, Physiology and Biomedical Engineering

Dr. Hoffman arrived at The University of Iowa’s Department of Radiology in 1992. As a cardio-pulmonary physiologist, he has studied the basic principles of heart and lung physiology through the novel use of imaging technologies. At the University of Iowa, Dr. Hoffman, along with his colleague, Dr. Geoffrey McLennan of the Pulmonary Division in the Department of Medicine, have pulled together a group of collaborators from the Departments of Radiology, Medicine (Pulmonary Division), Anesthesiology, Surgery, Pathology, Speech Pathology, Otolaryngology, Biomedical Engineering, Computer and Electrical Engineering, Computer Sciences along with collaborators from the University of Washington, The Johns Hopkins University, The Mayo Clinic, Purdue University, Marquette University, the University of Texas – Houston, and the University of Auckland to form what has become known as the Iowa-Comprehensive Lung Imaging Center or I-Clic. The combined funding of Dr. Hoffman and other key members of I-Clic exceed 30 million dollars over a 5-year period. The group, with Hoffman as PI, attracted one of the first Biomedical Engineering Partnership grants awarded by the NIH, and one of the few that came out of the National Heart, Lung and Blood Institute. The goal was to develop a set of scanning and image analysis methods to allow for the comprehensive assessment of the lung by use of multidetector row CT (MDCT) in order to establish an atlas / model of the normal male and female human lung for 3 decades of age range with the notion that, through an understanding of “normal,” early pathology can be detected, quantitated and followed. The I-Clic is currently in partnership with Siemens Medical who has agreed to keep a newly renovated CT imaging research suite instrumented with state-of-the-art CT equipment for the next 6 years. The facility currently houses a Sensation 16 with a rotation speed of 0.375

(continued on page 6)
seconds per revolution and a Stratton x-ray tube that has enhanced heat loading capacity. This system will be upgraded to a 64-slice scanner within the next six to eight weeks. The research scanning facility also houses a Skyscan 1076 Micro CT scanner which provides in vivo mouse imaging capabilities with an isotropic voxel dimension of between 9 and 35 microns. This scanner was provided to the center through collaboration with Aventis. The pharmaceutical company’s interest is in using in vivo and ex vivo imaging of the mouse lung as a means of drug discovery. The facility also includes both an animal surgical suite and a human preparation area, and video conferencing equipment is set up throughout the facility to allow for up to 10 sites to simultaneously conference together during an experiment in such a way that the remote sites are able to observe any area within the facility, along with images and physiological signals.

In addition to basic research into lung physiology and pathophysiology, Dr. Hoffman serves as the PI of the image archive and analysis centers for the NIH sponsored National Emphysema Treatment Trial (NETT), the Severe Asthma Research Program (SARP), and the recently funded pulmonary arm of the Multi-ethnic Study of Atherosclerosis (MESA) study (MESA-Lung). Drs. McLennan and Mullan (Pulmonary Medicine and Radiology respectively) serve as the PI and co-PI of the Iowa component of the National Lung Screening Trial, and Drs. McLennan and Hoffman are part of the Lung Image Database Consortium (LIDC), a five center consortium funded by the National Cancer Institute to establish a public image database of lung nodules with associated ground truth which can be used by developers of computer aided detection.

(continued on page 9)
**Welcome New Faculty!**

**Tae Il Han, MD**, joined the Department of Radiology as a Visiting Assistant Professor in the Pediatric Radiology section. Dr. Han received his M.D. from Kyunghee University College of Medicine in Seoul, Korea where he completed his residency in Radiology as well. Prior to his appointment at UIHC, he was an Assistant Professor of Radiology at the Eulji University School of Medicine in Taejon, Korea.

**Toshio Moritani, MD, PhD**, joined the Department of Radiology as a Visiting Associate. He received his medical and radiology residency training at Showa University in Tokyo, Japan, and most recently was an Assistant Professor at the University of Rochester Medical Center in New York. Dr. Moritani’s subspecialty area is Neuroradiology.

**Daniel R. Thedens, PhD**, Assistant Professor, received his Ph.D. in Electrical Engineering from Stanford University, and prior to his appointment in Radiology, was an Assistant Professor in the Department of Electrical and Computer Engineering at The University of Iowa. Dr. Thedens joins the MRI Physics section of the Diagnostic Radiology division.

**Jinhu Xiong, PhD**, Associate Professor of MRI Physics, received his Ph.D. in Medical Physics, as well as completed a postdoctoral fellowship in Imaging Neuroscience, at The University of Texas Health Science Center at San Antonio. Prior to his appointment in Radiology, Dr. Xiong was an Assistant Professor at The University of Texas Health Center.

**Shiying Zhao, PhD**, joined the Department of Radiology as an Associate Professor of CT Physics. He received his Ph.D. in Mathematics at the University of South Carolina. Prior to his appointment at UIHC, Dr. Zhao was an Adjunct Associate Professor at the Malinckrodt Institute of Radiology, Washington University School of Medicine, as well as an Associate Professor of Mathematics at the University of Missouri, St. Louis.

In addition to our new faculty appointments, we would also like to welcome the following fellows:

**Body Imaging**

Joel Brake, MD, Fellow-Associate  
Jeffrey Peterson, MD, Fellow-Associate  
Anne Schreiber, MD, Fellow-Associate

**Neurointerventional**

Robert Taylor, MD, Fellow

**Nuclear Medicine**

Twyla Bartel, MD, Fellow

**Musculoskeletal**

Jeff Boyd, MD, Fellow-Associate  
Gerald Decker, MD, Fellow-Associate  
Scott Preusen, MD, Fellow-Associate  
David Van Roekel, MD, Fellow-Associate

**Neuroradiology**

Mahmoud Elkaissi, MD, Fellow  
Sangam Kanekar, MD, Fellow
**Honors & Awards**

**Monzer M. Abu-Yousef, MD**
- Invited to be an examiner for the American Board of Radiology oral examination in Louisville, Kentucky, June 5-9, 2004.

**George Y. El-Khoury, MD**
- Recognition Award from the American Society of Emergency Radiology (ASER) for Outstanding Devotion to Emergency Radiology at the Founders Lecturer at its 14th Annual Scientific Meeting, Las Vegas, NV, October 22-25, 2003.

**Stephanie Ellingson, RT(R)**
- Received the “Aunt Minnie” award as the most effective Radiologic Technology Program Director. Stephanie is the Diagnostic Medical Sonography Director.

**Fiorenza Ianzini, PhD**
- Red Ribbon and Diploma Award and Honorary Mention in the SPIE Medical Imaging, Image Processing Conference, for the paper: “Segmentation and Quantitative Analysis of the Living Tumor Cells Using Large Scale Digital Cell Analysis System” by F. Yang, G. Gallardo, M. A. Mackey, F. Ianzini, M. Sonka.
- Appointed to the Review Board of the Journal of the American College of Radiology.
- Appointed as a Member the Radiation Research Society’s Membership Committee.

**Malik Juweid, MD**
- Selected to be a member of the International Reviewers Panel for the Medical Science Monitor, a scientific journal.

**Simon C. Kao, MD**
- Inducted as a Fellow of the American College of Radiology on May 9, 2004, in Washington, DC.

**Mark T. Madsen, PhD**

**Laurie L. Ponto, PhD**

**Yutaka Sato, MD**
- Invited to be an examiner for the American Board of Radiology oral examination in Louisville, Kentucky, June 5-9, 2004.

**Wendy R.K. Smoker, MD**
- Appointed Chair of the Neuroradiology Section of the ABR Diagnostic Radiology Written Board Examination.

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**Radiology Faculty Recipients of 2004 Collegiate and State Awards**

Two faculty from the Department of Radiology were recent recipients of top honors from the Iowa State Board of Regents and the Roy J. and Lucille A. Carver College of Medicine.

**George Y. El-Khoury, MD**, Professor, received the **Regents Award for Faculty Excellence**. This award is presented by the State Board of Regents to tenured faculty who have distinguished records of achievement across the spectrum of faculty endeavors in teaching, scholarship and service.

**Brian Mullan, MD**, Associate Professor (Clinical), received the **Lewis D. Holloway Award for Research in Health Sciences Education**. This award recognizes faculty for extraordinary achievement in research conducted under the auspices of the College of Medicine Educational Development Fund. Dr. Mullan received the award for his project entitled, “Understanding the Heart: Cardiac Anatomy Through Magnetic Resonance Imaging.” Dr. Mullan was also one of four university faculty who received the **University of Iowa Collegiate Teaching Award**. Recipients of this award have a record of excellence in teaching, contributions to students’ development, analysis of teaching materials and class activities, creative achievements in the enhancement of the quality of their teaching, and students’ evaluation of the recipient’s teaching.

Photos courtesy of Tom Jorgensen
• Magna Cum Laude Award from the American Society of Neuroradiology Annual Meeting, Washington, DC, April/May, 2003, for the Scientific Exhibit, “Horner’s Syndrome – How to Tailor the Radiographic Evaluation based on Clinical Findings.” Garcon E, Reed DL, Smoker WRK.
• Silver Medal Award from the American Society of Head and Neck Radiology Annual Meeting, Palm Springs, CA, October, 2003, for the Scientific Exhibit, “Horner’s Syndrome – How to Tailor the Radiographic Evaluation Based on Clinical Findings.” Garcon E, Reed DL, Smoker WRK.
• Magna Cum Laude Award from Radiological Society of North America 88th Annual Meeting, Chicago, IL, November, 2003, for the Scientific Exhibit “Doctor! What is This Thing in My Nose? Imaging Characteristics of Nasal Masses.” Godelman A, Reed DL, Smoker WRK, Gentry LR.
• Magna Cum Laude Award from XVI International Congress of Head and Neck Radiology, Frankfurt, Germany, September 2003, for the Scientific Exhibit “Intrasphenoidal Development of the Pituitary Gland.” Marsot-Dupuch K, Smoker WRK.

Iowa-Comprehensive, continued from page 6
(diagnosis) systems to aid in the evaluating of lung cancer screening studies. The group is soon to be joined by Dr. Edwin VanBeek who will bring expertise in the use of hyperpolarized gases, allowing for complimentary MRI methods of lung imaging.

An overview of the lung imaging methodologies being developed by members of the I-Clic can be found in [1]. For two years in a row now, members of the group have won the Herbert M. Stauffer Award (2002 and 2003) for “Outstanding Basic-Science Paper” presented by the Association of University Radiologists. [2,3]


William Stanford, MD
• Listed on the Best Doctors in America for 2004.
• Chaired a Scientific session on CT Cardiac Imaging at the 2003 RSNA.
• Member of a delegation that appeared before the FDA on evaluation of the “Image Checker” device proposal from R2 Technology. The “Image Checker” is a device to identify lung nodules that may be missed with routine CT imaging.
• Recipient of the 2003 Radiology Editor’s Recognition award for reviewing with “Special Distinction.”

Judy A. Beckler, RTR, Chief Diagnostic Radiology Technologist, was nominated Employee of the Year for 2003.

Congratulations, Judy!

Judy Beckler, RTR

SERVICE AWARDS 2003

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<th>Years</th>
<th>Name</th>
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<td>George Wm. Russell, Jr.</td>
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<td>Mary Burr</td>
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Publications

Books/Book Chapters


Articles


**ABSTRACTS**


**Scientific Presentations**


Scientific Presentations, continued from previous page


Invited Speakers


## Visiting Professors

El-Khoury GY. Imaging of Muscle Injuries (Radiology Grand Rounds). Yale University School of Medicine, New Haven, CT, April 15, 2004.


El-Khoury GY. Resident Case Conference. Saint Raphael's Hospital, New Haven, CT, April 15, 2004.

El-Khoury GY. Resident Case Conference. Yale University School of Medicine, New Haven, CT, April 16, 2004.

## Invited Course Faculty


## Special Presentations


Ianzini F. Adriamycin-Induced Mitotic Catastrophe in PC-3 Human Prostate Cancer Cells. NIH PPG “Oxidative Events in Cancer Therapy Seminar Series.” Free Radical and Radiation Biology Program, Department of Radiation Oncology, University of Iowa. March 2004.

Ruprecht A. The production of x-rays I & II. Outreach, Iowa Communications Network (ICN), The University of Iowa, Iowa City, February 6, 2004.
Panelists


Exhibits


Scientific Posters


Patents