

## JOURNAL INFORMATION

### AIM AND SCOPE

The Iranian Journal of Radiology is the official journal of *Tehran University of Medical Sciences* and the *Iranian Society of Radiology*. It is a scientific forum dedicated primarily to the topics relevant to radiology and allied sciences of the developing countries, which have been neglected or have received little attention in the Western medical literature.

This journal particularly welcomes manuscripts which deal with radiology and imaging from geographic regions wherein problems regarding economical, social, ethnic and cultural parameters affecting prevalence and course of the illness are taken into consideration.

The Iranian Journal of Radiology has been launched in order to interchange information in the field of radiology and other related scientific spheres. In accordance with the objective of developing the scientific ability of the radiological population and other related scientific fields, this journal publishes research articles, evidence based review articles and case reports focused on regional tropics.

Iranian Journal of Radiology operates in agreement with the below principles in compliance with continual quality improvement:

1-Increasing the satisfaction of the readers, authors, staff and co-workers.


2-Promotion of the scientific content and appearance of the journal.

3-Advancing the scientific validity of the journal both nationally and internationally.

Such basics are accomplished only by aggregative effort and reciprocity of the radiological population and related sciences, authorities and staff of the journal.

### CONTENT COVERAGE

Iranian Journal of Radiology is an authentic clinical journal with a content devoted to selected compilation of the latest worldwide and interdisciplinary research and reviews in the field of radiology. In addition, consensus evidential reports not only highlight the new observations, original researches and results accompanied by innovative treatments and all the other relevant topics, but also include highlighting disease mechanisms or important clinical observations and letters on articles published in the journal.

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### ***Radiology – domestic and international challenges***

Economic and scientific issues are two domestic and international challenges present in today radiology.

From an economic perspective, soared prices and worldwide inflation have imposed challenges in the import of consumable goods and technical equipments. Furthermore, global sanctions and fluctuations of foreign exchange have caused a dramatic decline in the value of national currency which has made the situation more critical to the extent that investment for establishing new radiology center is nearly impractical.

From a scientific perspective and beauties of new radiology and imaging the emergence of different disciplinaries and fine technologies such as sonography, CT scan and MRI, PET-CT and PET-MR have has made this field quite attractive to other areas.

Today, Diagnostic imaging moves towards benefiting all medical disciplinaries rather than just radiology. However, through relying on clinical sciences, radiologist still remains on top of the list.

The congress at hand ICR2014, is going to be held under domestic and international social, political and economic pressures on the members of the ISR and congress.

Therefore, the young president of the current congress is expected to put more emphasis on scientific and clinical issues and ask for competent researchers to take part in the presentation.

I, hereby, thank faculty member university of medical sciences, Shahid Beheshti, Dr. Haghighatkhah, who has dedicated more than a year to the congress activities in order to mark another success in the history of this committee.

Scientific and executive secretaries of ICR2014, Dr. Marina Pourafkari, Dr.Reza Bakhshandehpour, Dr. Mohammad Reza Movahhedi and Dr. Kourosch Abdollahifard are four of the well-known and recongnized faces of this congress who have provided a comprehensive agenda for the executive and scientific committees which will have its outcomes clear by the end of the ICR2014.

Moreover, lack of sufficient number of radiologists in the public and governmental sector is observable which needs to be addressed through two main approaches; one is putting emphasis on a sense of loyalty for radiologists towards their native region and the second solution is increasing the efforts from the public sector to further motivate the candidates.

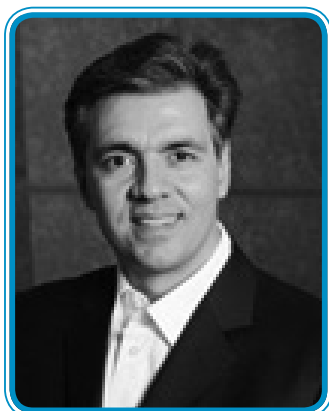
The society can achieve success in this matter by promoting a mutual understanding with the public sector.

Welcome to all our guests from near and far parts of country and world for attending ICR2014 – Tehran.

J. Jalal Shokouhi M.D.  
President, Iranian Society of Radiology

## WELCOME

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**Hamid Reza Haghghat khah M.D.**  
**President of ICR 2014**

**Dear colleagues,**

I am honoured to invite you to participate in the 30th Iranian Congress of Radiology to be held at the Olympic Hotel, Tehran, Iran on May 13-16, 2014. To mark 3 decades of meticulous work in organizing the country's most prestigious scientific gathering for radiologists, This year the congress has been planned around 4 main themes of Oncology imaging, Onco-intervention, Obstetric imaging and Gynecology imaging. However, the event will also include loads of other programs that will cover many areas in medical and diagnostic imaging. For the first time in Iran, the 30th ICR will include a comprehensive module on oncology imaging and onco-intervention which will be attended by a panel of renowned experts from North America, West Europe and Iran. In these sections, we will speak with focus on "what information the clinician needs to gather from the radiologist". As for the theme of oncology, we have tried to observe the important role of radiologists in the current multidisciplinary approach to the diagnosis and treatment of cancer from its detection to staging and evaluation of response to treatment. We guarantee you a treat with hot topics on onco-intervention. In Obs. & Gyn. imaging, we have several simple and yet important topics which we will try to rehash to reduce common errors in practice. The congress will include many high quality and innovative lectures presented by well-respected Iranian and international speakers along with many interactive workshop sessions aims at providing the opportunity to practice skills. We have also worked out some social programs to make the most of your stay in the beautiful metropolis of Tehran by visiting its attractive sites and hopefully having enjoyable moments.

H.R. Haghghatkhah M.D.  
President, 30th Iranian Congress of Radiology

## WELCOME

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### **Welcome Note for ICR2014**

Iranian congress of radiology has been held for over three decades and in my opinion, this year ICR is in one of its turning points by becoming a truly international meeting in the region. After several years of efforts to promote the meeting in the neighbor countries, now we have registrants from abroad who have found the congress beneficial in the past years. And we consider it as one of the most important achievements of Iranian society of radiology.

Oncologic imaging is one of the most interesting fields in diagnostic and interventional radiology which is becoming more and more applicable in clinical situations. It is a multidisciplinary practice area requiring vast knowledge not limited to the imaging modalities and findings but also including tumor staging, radiation oncology, surgical and interventional treatment options and most interestingly hybrid imaging as a new approach to visualize cancer. So, it has been a wise decision by congress program committee to select oncologic imaging as one of the major themes of the meeting enriched by outstanding guest speakers invited from all over the world. The pre-congress course on PET/CT will be an invaluable opportunity for introductory training, fitting both practicing and resident radiologists. We are grateful for the kind support of European society of oncologic imaging for their contribution. Also we are thankful for leading experts in the field of oncologic imaging who accepted for contribute as faculty of 30th ICR.

This year, Iranian society of radiology has the honor of granting the first resident research award. It is a thoughtful foundation based on generous donation of Prof. Bonakdarpour, one of the pioneers of skeletal radiology at international level. This foundation is running by a board of trustees elected by the founder and for the first round, the grant will be awarded to best resident papers of ICR2014.

I am pretty sure this congress will be another step forward in the history of Iranian congresses of radiology.

Mansoor Fatehi, MD, CIIP  
General Secretary, Iranian Society of Radiology

## WELCOME

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Radiology is one of the most evolutionary fields in medical history. Beginning with only x-ray as a physical tool for obtaining simple diagnostic images Radiologist has resorted to other physical phenomena such as ultrasound and radiofrequency waves for producing superb images from deep structures of the body which were unthinkable some years ago. He also has transgressed simple diagnostic images to intervene in some of the therapeutic and invasive procedures. These developments progressing faster than expectation have imposed heavy burden on Radiologists to keep himself or herself abreast with.

These seminars and congresses are powerful means for fulfilling this purpose and it is hoped participants of this congress gain considerable benefit in this regard as well as furthering friendship and understanding among themselves which will serve to improve prestige of the field of Radiology.

Bahman Mohtashemi M.D.  
Honorary President of ICR 2014

## HONORARY MEMBERSHIP RECIPIENTS



**Riccardo Manfredi M.D.**

*Associate Professor of Radiology, Department of Radiology, University of Verona, Italy*



**Heinz-Peter Schlemmer M.D. , Ph.D**

*Professor of Oncologic Radiology, Medical Faculty of Heidelberg University, German Cancer Research Center Director, Department of Radiology, Coordinator Research Topic Imaging and Radiooncology, Germany*



**Luigi Solbiati M.D.**

*Chairman, Department of Oncology, Head, Division of Interventional Onologic Radiology, General Hospital, Busto Arsizio, Italy*

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## GOLD MEDALISTS



**Ali Akbar Ameri M.D.**

*Emeritus Professor of Shahid Beheshti University of Medical Sciences, Tehran, Iran*



**Kavous Firouznia M.D.**

*Associate professor of Radiology, Tehran University of medical Sciences, Tehran, Iran*



**Jafar Golzarian M.D.**

*Department of Radiology, University of Minnesota, Minneapolis, MN, USA*



## GUEST SPEAKERS



**Parisa Aminzadeh M.D.**

*Member of the Royal Australian and New Zealand College of Radiologists (FRANZCR)  
Staff specialist and Senior radiologist Breast Screen Tasmania (Australia)  
Visiting Medical officer Monash Breast Screen Victoria  
National site visitor Breast Screen Australia*



**Bijan Bijan M.D. , M.B.A.**

*Professor of Diagnostic Radiology and Nuclear Medicine, University of California Davis Medical Center (UCDMC), Cross-sectional / MRI/ Nonvascular Interventional Radiology and Nuclear Medicine / PET Divisions, Sacramento, California, USA*



**Florian Dammann M.D.**

*Head of the Department of Radiology and Nuclear Medicine  
Managing Physician of the German Mammography Screening Program*



**Jafar Golzarian M.D.**

*Professor of Radiology & Surgery Director Division of Interventional Radiology and Vascular Imaging, University of Minnesota, Minneapolis, MN, USA*



**Andrea Laghi M.D.**

*Associate Professor of Radiology Departments of Radiological Sciences, Oncology, and Pathology, Sapienza University of Rome, Polo Pontino, Latina, Italy*

## GUEST SPEAKERS

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### **Hamid Reza Mirbagheri M.D.**

*Orthopaedic Surgeon with special interest in foot and ankle surgery  
Newport university hospital, Wales, UK*



### **Kambiz Motamedi M.D.**

*Associate Professor  
University of California, Los Angeles  
Musculoskeletal Imaging,  
Director, Postgraduate Training  
UCLA Radiology*



### **Daniele Regge M.D.**

*Chief of the Radiology Unit, Institute for Cancer Research  
and Treatment, Torino, Italy*



### **Heinz-Peter Schlemmer M.D. , Ph.D**

*German Cancer Research Center Director Department of  
Radiology, Coordinator Research Topic Imaging and Ra-  
diooncology, Professor of Oncologic Radiology, Medical  
Faculty of Heidelberg University*



### **Ali Shirkhoda M.D.**

*Department of Radiology, University of California, Irvine,  
CA, USA*

## GUEST SPEAKERS

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**Luigi Solbiati M.D.**

*Chairman, Department of Oncology, Head, Division of Interventional Onologic Radiology, General Hospital, Busto Arsizio, Italy*



**Muhammad Umar Amin M.D.**

*FCPS (Diagnostic Radiology)  
Consultant Radiologist  
Department Of Radiology, Shifa International Hospital, Islamabad, Pakistan*



**Zeynep Yazici M.D.**

*Uludag University, Faculty of Medicine, Department of Radiology, Bursa, Turkey*

## BOARDS & CHAIRS

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	Mohammad Ali Elahifar M.D.			Masoumeh Salamati M.D.
	Dariush Etemadi M.D.			Kaveh Samimi M.D.
	<b>Planning committee</b>	<b>First name</b>	<b>Last name</b>	<b>Title</b>
Jalal		Jalalshokouhi	<i>M.D., ISR President</i>	
Mansoor		Fatehi	<i>M.D., ISR General Secretary</i>	
Hamid Reza		Haghighatkhah	<i>M.D., President of ICR2014</i>	
Bahman		Mohtashami	<i>M.D., Honorary President of ICR2014</i>	
Marina		Pourafkari	<i>M.D., Chair of Scientific Board of ICR2014, ISR Board Member</i>	
Reza		Bakhshandehpour	<i>M.D., Chair of Scientific Board of ICR2014</i>	
Morteza		Sanei Taheri	<i>M.D., Iran Radiology Website Manager</i>	
Kourosh		Abdollahifard	<i>M.D., Chair of Executive Board of ICR2014</i>	
Mohammad Reza		Movahhedi	<i>M.D., Chair of Executive Board of ICR2014</i>	
Makhtoom		Shahnazi	<i>M.D., ISR Vice-President</i>	
Iraj		Honarbaksh	<i>M.D., ISR Treasurer</i>	
Hassan		Hashemi	<i>M.D., ISR Auditor</i>	
Abdolrasoul		Sedaghat	<i>M.D., ISR Board Member</i>	
Mahyar	Ghafoori	<i>M.D., ISR Board Member</i>		
Abbas	Dargahi	<i>M.D., ISR Board Member</i>		
<b>Organizing committee</b>	<b>First name</b>	<b>Last name</b>	<b>Title</b>	
	Kourosh	Abdollahifard	<i>M.D., Chairman of Executive Committee</i>	
	Mohammad Reza	Movahhedi	<i>M.D., Chairman of Executive Committee</i>	
	Ramin	Pourghorban	<i>M.D., Head of Scientific Papers</i>	
	Farahnaz	Falahati	<i>M.D., International Affairs</i>	
	Fatemeh	Moftakhari	<i>BSC, Head of Executive Group</i>	
	Afshin	Majd	<i>MSC, Informatics Affairs</i>	
	Mehdi	Faraji	<i>Exhibition Management</i>	
	Zahra	Mousavi	<i>ICR 2014 Office</i>	
	Gity	Zarvani	<i>Workshops Affairs</i>	
	Javad	Pouyan	<i>Design and Graphics</i>	
Masoud	Ghasemi	<i>General Services</i>		

## BOARDS & CHAIRS

Scientific Committee	First name	Last name	Group
	Leila	Aghaghazvini	<i>M.D., Director of Workshops and E-Learning, Head &amp; Neck Imaging Committee</i>
	Seyed Morteza	Bagheri	<i>M.D., Emergency Imaging Committee</i>
	Mohammad	Davoudi	<i>M.D., Cardiothoracic Imaging Committee</i>
	Abbas	Arjmand Shabestari	
	Hamid Reza	Pouraliakbar	
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	Ramin	Pourghorban	
	Masoumeh	Raoufi	
	Hooman	Bahrami-Motlagh	
	Elham	Keshavarz	<i>M.D., Oncointervention Committee</i>
	Hossein	Ghanaati	
	Hazhir	Saberi	
	Kavous	Firouznia	
	Mahyar	Mohammadifard	<i>M.D., Pediatric Imaging Committee</i>
	Mohammad Reza	Abedini	
	Ali	Hekmatnia	
	Roxana	Azma	<i>M.D., Chest Imaging Committee</i>
	Maryam	Farghadani	
	Shahram	Kahkouee	
	Farrokh	Seilanian Toosi	
	Payam	Mehrian	<i>M.D., GYN Imaging Committee</i>
	Yasmin	Davoudi	
	Mojgan	Kalantari	
	Maryam	Rahmani	<i>M.D., Uroradiology Committee</i>
	Mehrzad	Lotfi	
	Mahyar	Ghafoori	<i>M.D., Neuroradiology Committee</i>
	Masoud	Pooreisa	
	Reza	Sadeghi	<i>M.D., Musculoskeletal Imaging Committee</i>
	Reza	Saadat	
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Amir Reza	Radmard		
Morteza	Sanei Taheri		
Masoumeh	Salamati	<i>M.D., OB Imaging Committee</i>	
Firouzeh	Ahmadi		
Abdolrasoul	Sedaghat	<i>M.D., Management in Radiology Committee</i>	
Mortaza	Ashrafi		
Alireza	Shakibafard	<i>M.D., Imaging Informatics Committee</i>	
Majid	Shakiba	<i>M.D., Education, Research Committee</i>	

## SCIENTIFIC PROGRAM

### Hall 1 Language: Persian

#### Day 1 Tuesday, May 13, 2014 Hall 1

Board Review (07:30-08:30)

07:30 - 08:15 Pediatric Imaging

Ali Hekmatnia

08:15 - 09:00 Pediatric Imaging

Javad Jannati

#### Day 1 Tuesday, May 13, 2014 Hall 1

Breast (09:00-10:30)

**Chairs: Masoumeh Gity, Nahid Sedighi, Maryam Noori**

09:00 - 09:15 How Do I Report Mammography

Donya Farrokh

09:15 - 09:30 BIRADS 0 and 3

Niousha Minoo

09:30 - 09:45 Tomosynthesis

Khadijeh Bakhtavar

09:45 - 10:00 Breast Complex & Complicated Cyst in Sonography (BIRADS)

Afsaneh Alikhassi

10:00 - 10:15 Axillary Imaging

Masoumeh Salamati

10:15 - 10:30 Question and Answer

10:30 - 11:00 Coffee Break

#### Day 1 Tuesday, May 13, 2014 Hall 1

Obstetric (11:00-13:00)

**Chairs: Mohammad Mahdi Arasteh, Morteza Tahmasebi, Azita Azarian**

11:00 - 11:10 Evaluation of Choroid Plexus Cysts

Korosh Shahsavan

11:10 - 11:25 Short Femur

Korosh Shahsavan

11:25 - 11:45 Neural Tube Defect

Ahmad Reza Tahmasebpour

11:45 - 11:55 CNS Anomalies in 1th Trimester

Elham Keshavarz

11:55 - 12:10 Ventriculomegaly

Ladan Younesi

12:10 - 12:25 Fetal CNS MRI

Sepideh Sefidbakht

12:25 - 12:40 Fetal Chest Anomaly

Morteza Tahmasebi

12:40 - 13:00 GU and Genitalia Anomaly

Masoud Poureisa

13:00 - 14:00 Lunch

#### Day 1 Tuesday, May 13, 2014 Hall 1

Board Reviews (13:00-14:00)

13:00 - 14:00 OB & GYN Imaging

Morteza Tahmasebi

#### Day 1 Tuesday, May 13, 2014 Hall 1

Opening Ceremony (14:00-16:00)

15:45 - 16:00 Coffee Break

#### Day 1 Tuesday, May 13, 2014 Hall 1

GU (16:00-18:00)

**Chairs: Behrouz Davachi, Mahyar Ghafoori, Mehrzad Lotfi**

16:00 - 16:15 Ethical Case Studies in Uroradiology

Majid Reza Khalajzadeh

16:15 - 16:40 TRUS Guided Prostate Biopsy (Methods, Techniques, and Complications)

Mehrzad Lotfi

16:40 - 17:00 MRI & MRU of Urinary System

Mahyar Ghafoori

17:00 - 17:20 Color Doppler Study of Scrotum Including Varicocele Evaluation

Seyed Morteza Bagheri

17:20 - 17:40 Imaging of Transplanted Kidney

Mehrzad Lotfi

17:40 - 18:00 Conventional Imaging of Urinary System

Seyed Ali Golestanha

#### Day 1 Tuesday, May 13, 2014 Hall 1

Board Reviews (18:00-19:00)

18:00 - 19:00 GU Imaging

Mehrzad Lotfi

#### Day 2 Wednesday, May 14, 2014 Hall 1

Board Review (07:30-08:30)

07:30 - 08:30 GI Imaging

Bijan Bijan

#### Day 2 Wednesday, May 14, 2014 Hall 1

Pediatrics (8:30-10:30)

**Chairs: Javad Jannati, Ali Hekmatnia, Mehrzad Mehdizadeh**

08:30 - 08:45 Reporting and Terminology in Radiology (MIR)

Abdolrasoul Sedaghat

08:45 - 09:00 The Role of Cardiac MRI in Congenital and Acquired Heart Disease of Children

Roozbeh Barikbin

09:00 - 09:15 Imaging of a Child with Palpable Abdominal Mass

Shahnaz Ghahremani

09:00 - 09:15 Pitfalls and Normal Variants in Neonatal Brain Ultrasound

Maryam Farghadani

09:15 - 09:30 Pathologic Findings in Neonatal Brain Ultrasound

Karmella Kamali

09:30 - 9:45 Imaging in Congenital Brain Tumors

Ali Hekmatnia

9:45 - 10:00 Brain MRI in Pediatric Convulsion

Reza Basiratnia

10:00 - 10:15 Pitfalls in Neonatal Hip Sonography

Mehrzad Mehdizadeh

## SCIENTIFIC PROGRAM

10:15 - 10:30 Question & Answer

10:30 - 11:00 Coffee Break

### Day 2 Wednesday, May 14, 2014 Hall 1

Chest (11:00-13:00)

**Chairs: Mohammad Davoudi, Shahram Kahkouee, Hadi Majidi**

11:00 - 11:20 Systematic Interpretation of CXR

Soheila Zahirifard

11:20 - 11:40 CT Scan of Pulmonary Nodules

Farrokh Silanian Toosi

11:40 - 12:00 Bronchogenic CA Imaging

Shahram Kahkouee

12:00 - 12:20 Imaging of Mediastinal Masses

Omid Tahbaz

12:20 - 12:40 Imaging of Pleural Malignancies

Payam Mehrian

12:40 - 13:00 PET-CT in Thoracic Malignancies

Mehrdad Bakhshayeshkaram

13:00 - 14:00 Lunch

### Day 2 Wednesday, May 14, 2014 Hall 1

Board Review (13:00-14:00)

13:00 - 14:00 Head & Neck Imaging

Jahanbakhsh Hashemi

### Day 2 Wednesday, May 14, 2014 Hall 1

Emergency Imaging (14:00-16:00)

**Chairs: Ahmad Alizadeh, Minoo Naroueinejad**

14:00 - 14:15 Ethical Case Studies in OB & GYN Radiology

Reza Ommani Samani

14:15 - 14:32 Imaging of Craniofacial & Skull Base Trauma

Seyed Morteza Bagheri

14:32 - 14:50 Imaging of Non-Traumatic Neurologic Emergencies

Seyed Hassan Mostafavi

14:50 - 15:08 Role of Imaging in Non-Cardiac, Non-Traumatic Acute Chest Pain

Minoo Naroueinejad

15:08 - 15:26 Ultrasound of the Non-Traumatic Acute Abdomen

Hassan Jafari

15:26 - 15:44 Ultrasound in Obstetrics and Gynecologic Emergencies

Ladan Younesi

15:44 - 16:00 Imaging of Penile and Scrotal Emergencies

Mohsen Darabi

15:45 - 16:00 Coffee Break

### Day 2 Wednesday, May 14, 2014 Hall 1

GI & Miscellaneous (16:00-18:00)

**Chairs: Ali Akbar Ameri, Kambiz Steadie Seifi, Firooz Tabarrok**

16:00 - 16:15 How to Prepare Tax Return Forms? (MIR)

Reza Dogahe

16:15 - 16:30 MRI in Perianal Fistula

Saeed Naghibi

16:30 - 16:50 Role of Ultrasonography in Bowel Pathologies

Behrooz Davachi

16:50 - 17:05 MR Enterography, a New Experience in Iran

Amir Reza Radmard

17:05 - 17:25 MRI Application in Female Pelvic Tumors

Ahmad Soltani Shirazi

17:25 - 17:35 True 3D Weight Bearing CT Imaging for Foot & Ankle

Hamid Reza Mirbagheri

17:35 - 17:45 Smartest Dose Reduction, Highest Image Quality in Digital Imaging by Pixium Detectors

(Vendor Lecture) Bruno Commere

Argeles (Thales - Payamed Company)

17:45 - 18:00 Quantitative MRI in Cancer

Hamid Reza Salighehrad

### Day 2 Wednesday, May 14, 2014 Hall 1

Board Review (18:00-19:00)

18:00 - 19:00 MSK Imaging

Kambiz Motamedi

### Day 3 Thursday, May 15, 2014 Hall 1

Board Review (07:30-08:30)

07:30 - 08:30 Neuro Imaging (Interactive Presentation)

Morteza Sanei Taheri

### Day 3 Thursday, May 15, 2014 Hall 1

Obstetrics (08:30-10:30)

**Chairs: Ahmad Soltani Shirazi, Maryam Barzin, Mehri Sirous, Narges Afzali**

08:30 - 08:45 Normal Heart

Korosh Shahsavan

08:45 - 09:00 Abnormal 3-Vessel View

Farzaneh Fattahi

09:00 - 09:15 Heart in 1st Trimester

Korosh Shahsavan

09:15 - 09:30 Fetal Arrhythmias

Farzaneh Fattahi

09:30 - 09:45 Doppler in Twin - Twin Transfusion

Violet Adib

09:45 - 10:00 Ultrasound Bioeffect and Safety in Obstetric

Amir Hossein Hashemi Attar

10:00 - 10:15 Placenta Accreta

Mohammad Kazem Tarzamani

10:15 - 10:25 Congenital diaphragmatic hernia

Amir Hossein Hashemi Attar

10:25 - 10:35 Cervical Length

Narges Afzali

10:30 - 11:00 Coffee Break

### Day 3 Thursday, May 15, 2014 Hall 1

GYN (11:00-13:00)

11:00 - 13:00 Panel: Clinical Points in Post-Menopausal Bleeding

## SCIENTIFIC PROGRAM

Moderator : Mojgan Kalantari

Participants: Masoumeh Gity, Farah Farzaneh, Saghar Salehpour, Nadereh Behtash, Hamid Behnia, Morteza Tahmasebi, Firouzeh Ahmadi, Maryam Noori

13:00 - 14:00 Lunch

### Day 3 Thursday, May 15, 2014 Hall 1

Board Review (13:00-14:00)

13:00 - 14:00 Chest Imaging (CXR & Thoracic CT Scan)

Shahram Kahkouee

### Day 3 Thursday, May 15, 2014 Hall 1

GYN (14:00-16:00)

**Chairs: Mojgan Kalantari, Maryam Rahmani**

14:00 - 14:15 Medico-Legal Aspects in OB & GYN Imaging

Roya Rashid Pouraie

14:15 - 16:00 Panel : Adnexal Masses, Focused on Benign Ovarian Disorders Such as PCOD and Endometrioma

Moderator : Maryam Rahmani

Participants: Mitra Modares Gilani, Azamsadat Mousavi, Ensiyeh Tehrani Nezhad, Azamsadat Mahdavi, Mahrooz Malek, Elham Keshavarz, Nasrin Ahmadinezhad

15:45 - 16:00 Coffee Break

### Day 3 Thursday, May 15, 2014 Hall 1

Board Review (16:00-17:30)

16:00 - 16:45 MSK Imaging

Iraj Honarbakhsh

16:45 - 17:30 Intervention

Hossein Ghanaati

### Day 4 Friday, May 16, 2014 Hall 1

Board Review (07:30-08:30)

07:30 - 08:30 GI Imaging

Makhtoom Shahnazi

### Day 4 Friday, May 16, 2014 Hall 1

MIR & Others (08:30-10:30)

**Chairs: Jalal Jalalshokouhi, Abdolrasoul Sedaghat, Mortaza Ashrafi**

08:30 - 08:45 Appropriateness Criteria/Referral Guidelines in Radiology Practice (MIR)

Mansoor Fatehi

08:45 - 09:15 Medical Behavior

Hamid Khoori

09:15 - 10:00 Imaging of Malignant Bone Tumors

Ali Radmehr

10:00 - 10:15 Malpractice Cases in Radiology

Gholamali Jafari

10:15 - 10:30 Rights of Patients, Radiologist & Society

Mortaza Ashrafi

10:30 - 11:00 Coffee Break

### Day 4 Friday, May 16, 2014 Hall 1

Obstetrics (11:00-12:00)

11:00 - 12:00 Panel: Diagnostic Faults of Imaging in Medico Legal Forum and Looking on Issued Legal Articles on it.

Moderator : Marina Pourafkari

Participants: Ali Radmehr, Abdolrasoul Sedaghat, Ali Akbar Ameri, Gholamali Jafari, Ahmad Reza Tahmasebpour, Nahid Sedighi, Masoumeh Gity



## SCIENTIFIC PROGRAM

### Hall 2 Language: English

#### Day 1 Tuesday, May 13, 2014 Hall 2

Oncology Imaging (08:30-10:30)

**Chairs: Ali Akbar Ameri, Kaveh Samimi, Mansoor Fatehi**

08:30 - 09:00 A Multidisciplinary Approach to Cancer, an Oncologist's View

Babak Bahar

09:00 - 09:30 Principles of Oncologic Imaging & Reporting

Heinz-Peter Schlemmer

09:30 - 09:50 Oncologic Pitfalls in Imaging of the Pancreas

Ali Shirkhoda

09:50 - 10:10 Imaging of Pancreatic Adenocarcinoma

Andrea Laghi

10:10 - 10:30 Imaging of Pancreatic Neuroendocrine Tumors

Ali Shirkhoda

10:30 - 11:00 Coffee Break

#### Day 1 Tuesday, May 13, 2014 Hall 2

Oncology Imaging (11:00-13:00)

**Chairs: Ali Shabani, Marina Pourafkari, Shahram Akhlaghpour**

11:00 - 11:20 Effects of New Adjuvant Therapy on Staging of Unresectable Pancreatic Cancer

Shahram Akhlaghpour

11:20 - 11:40 Role of MDCT in Detecting Patterns of Recurrence after Whipples Procedure

Muhammad Umar Amin

11:40 - 12:10 Cystic Pancreatic Neoplasms

Andrea Laghi

12:10 - 12:30 Hybrid Imaging of Pancreatic Cancer

Bijan Bijan

12:30 - 12:50 Protocols for Imaging Studies in Oncologic Patients

Hamid Reza Salighehrad

12:50 - 13:00 Question & Answer

13:00 - 14:00 Lunch

#### Day 1 Tuesday, May 13, 2014 Hall 2

Oncology Imaging (16:00-18:00)

**Chairs: Kaveh Samimi, Hamid Mohammadpour, Babak Salavatipour**

16:00 - 16:20 Role of Endosonography in Staging of Gastrointestinal Tract Cancer

Seyed Amirhossein Jafari Sepehr

16:20 - 16:40 Imaging of Gastrointestinal Stromal Tumors

Andrea Laghi

16:40 - 17:00 CT-Colonography (Colorectal Cancer Diagnosis & Staging)

Daniele Regge

17:00 - 17:30 Initial Staging of Rectal Cancer

Andrea Laghi

17:30 - 17:50 Hybrid Imaging in Colorectal Cancer

Bijan Bijan

17:50 - 18:00 Question & Answer

#### Day 2 Wednesday, May 14, 2014 Hall 2

Oncology Imaging (08:30-10:30)

**Chairs: Minoo Naroueinejad, Mahyar Ghafoori, Kaveh Samimi**

08:30 - 08:50 Basis of DW Imaging of Oncologic Imaging

Andrea Laghi

08:50 - 09:30 Oncologic Pitfalls in Imaging of the GU Tract

Ali Shirkhoda

09:30 - 09:50 Small Renal Masses

Daniele Regge

09:50 - 10:10 Indeterminate Adrenal Mass in Patients with Cancer

Ali Shirkhoda

10:10 - 10:30 Hybrid Imaging of GIST

Bijan Bijan

10:30 - 11:00 Coffee Break

#### Day 2 Wednesday, May 14, 2014 Hall 2

Oncology Imaging (11:00-13:00)

**Chairs: Ali Shirkhoda, Bijan Bijan, Javad Rafiei**

11:00 - 11:30 Assessment of Treatment Response: Current Criteria and their Limitations (Resist & Persist)

Heinz-Peter Schlemmer

11:30 - 11:50 Liver Lesions: Practical, Differential Diagnostic Approach & Pitfalls

Heinz-Peter Schlemmer

11:50 - 12:10 Imaging of Cholangiocarcinoma

Daniele Regge

12:10 - 12:40 Hybrid Imaging Instrumentations

Mohammad Reza Ay

12:40 - 13:00 Hybrid Imaging: Esophageal Cancer Imaging

Bijan Bijan

13:00 - 14:00 Lunch

#### Day 2 Wednesday, May 14, 2014 Hall 2

Oncology Imaging (14:00-16:00)

**Chairs: Shahriyar Shahriaran, Shirin Birang, Dariush Saedi**

14:00 - 14:40 Imaging of the Peritoneum

Ali Shirkhoda

14:40 - 15:00 Imaging of The Prostate Cancer

Daniele Regge

15:00 - 15:20 Imaging Evaluation of Recurrence in Treated Prostate Cancer

Mahyar Ghafoori

15:20 - 15:30 Question & Answer

15:30 - 16:00 Coffee Break

#### Day 2 Wednesday, May 14, 2014 Hall 2

Oncology Imaging (16:00-18:00)

**Chairs: Alireza Rasekhi, Toktam Beheshtian, Hadi Rokni**

16:00 - 16:20 Ovarian Tumors: Diagnosis and Staging

Daniele Regge

16:20 - 16:40 Imaging Strategies in Head & Neck Oncology

Florian Dammann

## SCIENTIFIC PROGRAM

16:40 - 17:00 Imaging Tumor Response to Therapy in the Era of Target Therapy

Heinz-Peter Schlemmer

17:00 - 18:00 Panel: Meeting Professors (Question & Answer)

Moderator: Ali Shirkhoda

Participants: Jafar Golzarian, Bijan Bijan, Andrea Laghi, Heinz-Peter Schlemmer, Daniele Regge

### Day 3 Thursday, May 15, 2014 Hall 2

General Assembly of ISR (16:00-18:00)

### Day 4 Friday, May 16, 2014 Hall 2

Intervention (08:30-10:30)

**Chairs:** *Alireza Raseghi, Masoud Pezeshkirad, Mahyar Mohammadifard*

08:30 - 08:50 Treatment of Hepatocellular Carcinoma: Drug Eluting Vs. Classical Transarterial Chemoembolization (TACE)

Jafar Golzarian

08:50 - 09:10 TACE for HCC: Choice of Embolic Materials

Jafar Golzarian

09:10 - 09:30 Percutaneous Ablation of HCC: Indications, Long Term Results and Complications

Luigi Solbiati

09:30 - 09:50 Thermal Ablation for Liver Metastases from Colorectal Carcinoma: Indications for Inoperable & Operable Patients

Hossein Ghanaati

09:50 - 10:10 Thermal Ablation of Liver Metastases from Colorectal Cancer: 10-yr Follow-up

Luigi Solbiati

10:10 - 10:30 Radioembolization with Y90 for HCC and Colorectal Metastases to the Liver: Results and Complications

Jafar Golzarian

10:30 - 11:00 Coffee Break

### Day 4 Friday, May 16, 2014 Hall 2

Intervention (11:10-12:00)

**Chairs:** *Hossein Ghanaati, Mohammad Reza Abedini, Navid Tofghirad*

11:00 - 11:20 Embolization of Bone Metastases Prior to Surgery

Jafar Golzarian

11:20 - 11:40 Percutaneous Ablation of Kidney Cancer

Luigi Solbiati

11:40 - 12:00 Embolization to Relieve Lower Urinary Tract Symptoms Due to BPH (an Update on the State of the Art Approach)

Jafar Golzarian

## SCIENTIFIC PROGRAM

### Hall 3

#### Language: Persian/ English

##### Day 1 Tuesday, May 13, 2014 Hall 3

Neuroradiology (Spine)

Degenerative spinal diseases

**Chairs: Sirous Nekooei, Abdolrasoul Alaei, Ali Hekmatnia**

08:30 - 08:45 Imaging of Spinal Instability

Hooman Bahrami-Motlagh

08:45 - 09:00 Spinal Dysraphism

Hassan Hashemi

09:00 - 09:15 Spinal Canal Stenosis: Diagnostic Approach and Clinical Correction

Ahmad Alizadeh

09:15 - 09:30 OPLL, DISH, and HPLL: Imaging Presentations

Masoud Poureisa

09:30 - 09:45 How to Describe Disk Abnormalities?

Mohammad Hossein Daghighi

09:45 - 10:00 MR Myelogram: Is There any Role for Diagnosis?

Reza Bakhshandehpour

10:00 - 10:45 Panel: What a Spinal Surgeon Needs to Know in Degenerative Spinal Diseases?

Moderator: Hassan hashemi

Participants: Abolfazl Rahimizadeh, Hesam Abdolhosseinpour, Reza Bakhshandehpour, Mohammad Hossein Daghighi

10:30 - 11:00 Coffee Break

##### Day 1 Tuesday, May 13, 2014 Hall 3

Neuroradiology

Spinal Post-Op Changes and Complications

**Chairs: Dariush Etemadi, Abdolrasoul Sedaghat, Mahmoud Heravi Taheri**

11:00 - 11:15 Common Surgical Techniques and Hardwares in Spinal Surgery

Hesam Abdolhosseinpour (Spine surgeon)

11:15 - 11:30 Post-OP Changes and Complications on MRI: How to Image and Described?

Helen Nayeri

11:30 - 11:45 Imaging Features of Spinal Hardware Complications

Sofia Sabouri

11:45 - 12:00 CT Myelography vs. MRI: Which One is More Helpful?

Sirous Nekooei

12:00 - 12:15 Minimal Invasive Treatments: Technical Aspects and Clinical Indications

Jalal Jalalshokouhi

12:15 - 12:30 Vertebroplasty: Technical Aspects and Clinical Indications

Abbas Dargahi

12:30 - 13:20 Panel: What a Spinal Surgeon Needs to Know about Post-Op Imaging

Moderator: Jalal Jalalshokouhi

Participants: Hesam Abdolhosseinpour, Abolfazl Rahimizadeh, Mirmostafa Sadat, Sofia Sabouri

13:20 - 14:00 Lunch

##### Day 1 Tuesday, May 13, 2014 Hall 3

MSK

**Chairs: Homayoon Hadizadeh, Mehran Mostaan, Babak Sanei**

16:00 - 16:15 Imaging of MSK Infections

Kambiz Motamedi

16:15 - 16:30 2D and 3D Measurements of Lower Extremities

Pooneh Dehghan

16:30 - 16:45 Bone Biopsy

Kambiz Motamedi

16:45 - 17:05 Common Cases of Upper Extremities

Babak Sanei

17:05 - 17:20 Common Mass Like Soft Tissue Lesions

Kambiz Motamedi

17:20 - 17:30 MRI of TFCC Injury

Babak Shekarchi

17:30 - 17:45 Shoulder Ultrasound

Kambiz Motamedi

17:45 - 18:00 RF Ablation of Osteoid Osteoma

Kambiz Motamedi

##### Day 2 Wednesday, May 14, 2014 Hall 3

Head & Neck

**Chairs: Jalal Jalalshokouhi, Jahanbakhsh Hashemi, Seyed Mohammad Hadi Kharazi**

08:30 - 08:55 Pre and post-operative imaging findings in tumoral lesions of temporal bone and base of skull

Hashem Sharifian

08:55 - 09:15 Imaging Modalities of Paranasal Sinuses Tumoral Lesions, Pre and Post OP

Jahanbakhsh Hashemi

09:15 - 09:35 Diagnostic Imaging of Malignant Cervical LAP in Staging and Surgical Planning

Jalal Jalalshokouhi

09:35 - 09:55 Imaging Modalities of Oral Cavity and Base of Tongue Tumoral Lesions, Pre and Post OP

Shervin Sharifkashani

09:55 - 10:15 Imaging Modalities of Laryngeal Tumoral Lesions, Pre and Post OP

Leila Aghaghazvini

10:15 - 10:30 Head and Neck Surgeons Points of View in Head and Neck Tumoral Lesions

Nasrin Yazdani

10:30 - 11:00 Coffee Break

##### Day 2 Wednesday, May 14, 2014 Hall 3

Neuroimaging

Spinal Imaging

**Chairs: Jalal Jalalshokouhi, Maryam Mashayekhi, Mohammad Hadi Kharazi**

11:00 - 11:30 Imaging of Spinal Trauma (Part I)

Ali Radmehr

## SCIENTIFIC PROGRAM

11:30 - 11:45 Lumbar-Sacral-Pelvic Biomechanic

Hossein Sabbagh (Doctor of Chiropractic)

11:45-12:15 Imaging of Spinal Trauma (Part II)

Ali Radmehr

12:15 - 12:30 Scoliosis: How to Image and Interpret Findings on Digital X-Ray?

Iraj Honarbakhsh

12:30 - 12:45 Scoliosis: The Role of Imaging

Abdolrasoul Sedaghat

12:45 - 13:00 What a Spine Surgeon Needs to Know in Spinal Scoliosis Imaging?

Mohammad Reza Golbakhsh

13:00 - 14:00 Lunch

### Day 2 Wednesday, May 14, 2014 Hall 3

MSK

14:00 - 14:15 MRI of Rotator Cuff Tears

Reza Sadeghi

14:15 - 14:30 What the Orthopedic Surgeon Wants to Know in Shoulder MRI?

Morteza Nakhaei

14:30 - 15:30 Panel: Shoulder MRI with Focus on Rotator Cuff Tear, SLAP Lesions and Instabilities

Moderator: Reza Sadeghi

Participants: Homayoon Hadizadeh, Babak Sanei, Morteza Nakhaei, Mohammad Reza Gity, Hamid Reza Aslani

15:30 - 16:00 Coffee Break

### Day 2 Wednesday, May 14, 2014 Hall 3

MSK

**Chairs: Homayoon Hadizadeh, Hassan Mostafavi, Reza Sadeghi**

16:00 - 16:15 What the Orthopedic Surgeon Wants to Know in Knee MRI?

Sohrab Keihani

16:15 - 16:30 MRI of ACL Injury

Homayoon Hadizadeh

16:30 - 16:45 MRI of Menisci

Kambiz Motamedi

16:45 - 17:00 Lateral Supporting Structures and PLS

Seyed Hassan Mostafavi

17:00 - 17:15 The MRI of Extensor Mechanism of the Knee

Mohammad Reza Movahhedi

17:15 - 17:30 Cartilage Imaging

Reza Saadat Mostafavi

17:30 - 17:45 Medical Supporting Structures and the Posteromedial Corner

Armin Noormohammad

17:45 - 18:00 Imaging Pitfalls in Knee MRI

Esmaeel Shokrollahi

### Day 3 Thursday, May 15, 2014 Hall 3

Intervention

**Chairs: Shahram Akhlaghpour, Alireza Rasekhei, Hadi Rokni**

08:30 - 08:50 Drug Eluting Particles for Embolization: What Do You Need to Know?

Jafar Golzarian

08:50 - 09:20 Radio Embolization with Y90: How to Get Started and Technique

Jafar Golzarian

09:20 - 09:30 Does Lung Ablation for Metastatic Disease Improve Survival

Shahram Akhlaghpour

09:30 - 09:50 Comparison of Radiofrequency vs. Microwaves Ablation for Liver Malignancies

Luigi Solbiati

09:50 - 10:00 Intra-Venous Ports for Chemotherapy

Hadi Rokni

10:00 - 10:15 When Aspiration Biopsy of Thyroid Nodules is Really Needed

Luigi Solbiati

10:15 - 10:30 Intervention in Benign Biliary Stricture and Biliary Leak

Mohammad Gharib Salehi

10:30 - 11:00 Coffee Break

### Day 3 Thursday, May 15, 2014 Hall 3

Intervention

**Chairs: Hazhir Saberi, Seyed Ali Golestanha, Alireza Rasekhi**

11:00 - 11:15 Management of Malignant Biliary Tract Obstruction

Hazhir Saberi

11:15 - 11:45 Intervention in Liver Transplantation

Alireza Rasekhi

11:45 - 12:00 Self-Expandable Metal Stents in Malignant Biliary Obstruction

Hojat Ebrahiminik

12:00 - 12:15 Virtual Navigation with Real-Time US/CT/MRI/PET Fusion Systems to Guide and Monitor Ablations

Luigi Solbiati

12:15 - 12:30 Follow-up of Percutaneous Ablative Treatments with US Contrast Agents

Luigi Solbiati

12:30 - 13:00 Panel: Meeting Professors (Question & Answer)

Moderator: Mahyar Mohammadifard

Participants: Luigi Solbiati, Jafar Golzarian

13:00 - 14:00 Lunch

### Day 3 Thursday, May 15, 2014 Hall 3

Intervention

**Chairs: Kavous Firouznia, Sirous Nekooei, Mahyar Mohammadifard**

14:00 - 14:15 Management of Benign Head & Neck Tumors

Mahyar Mohammadifard

14:15 - 14:30 Echo Laser Ablation for Prostate Lesions

Mohammad Reza Abedini

14:30 - 14:45 Chemical Ablation of Desmoids Tumors

Rambod Saluti

## SCIENTIFIC PROGRAM

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14:45 - 15:00 Prostatic Arterial Embolization to Treat Benign Prostatic Hyperplasia (PAE)

Mohammad Reza Babaei

15:00 - 15:15 Uterine Artery Embolization

Kavous Firouznia

15:15 - 15:30 Laser Ablation for Thyroid Nodules

Hossein Chegini

15:30 - 15:45 Inferior Vena Cava Filters in Cancer Patients: Review of Current Concepts and Evidences

Masoud Pezeshkirad

15:45 - 16:00 Pain Management with US-Guided Nerve Block

Dariush Hendsi

## SCIENTIFIC PROGRAM

### Hall 4

#### Language: English / Persian

##### Day 1 Tuesday, May 13, 2014 Hall 4

Scientific Papers I (08:30-10:30)

**Chairs: Ramin Pourghorban, Hooman Bahrami-Motlagh, Taraneh Faghihi Langroudi**

08:30 - 08:40 Comparison of HRCT Features of Pneumocystis Jiroveci Pneumonia in Patients with and without HIV

Mohammad Ali Karimi

08:40 - 08:50 Malignant Mesothelioma versus Metastatic Adenocarcinoma of Pleura: A Comparison CT Study

Ghazaleh Amjad

08:50 - 09:00 Diagnostic Accuracy of HRCT for Differentiation of NSIP, UIP and Chronic Hypersensitivity Pneumonitis

Mohammad Ali Karimi

09:00 - 09:10 HRCT Features of Pulmonary Aspergillosis in Patients with Solid Organ Transplant

Mohammad Ali Karimi

09:10 - 09:20 Evaluation of the Diagnostic Value of Cardiac MRI in Comparison to Trans-Thoracic Echocardiography in Detection and Characterization of Cardiac Masses

Kaveh Shokri

09:20 - 09:30 Stent Stenosis after Percutaneous Coronary Intervention

Marzieh Motevalli

09:30 - 09:40 Systemic Venous Anomalies in Patients with Pulmonary Atresia: A CT angiographic Study

Mohammad Ali Karimi

09:40 - 09:50 Anomalous Retro Aortic Left Brachiocephalic Vein

Ghazaleh Amjad

09:50 - 10:00 How to Find an Isoechoic Lesion with Breast US

Leila Ahmadian Mehrگو

10:00 - 10:10 Mammographic Signs of Systemic Diseases

Elham Tavakol

10:10 - 10:20 Ultrasonographic Evaluation of Renal Transplantation Complications

Mehdi Shahryari

10:20 - 10:30 Role Of Acoustic Value Histogram of Urinary Stone on Ultrasonography as Predictor of Respnase to Extracorporeal Shock Wave Lithotripsy

Reza Esfandiary

10:30 - 11:00 Coffee Break

##### Day 1 Tuesday, May 13, 2014 Hall 4

Scientific Papers II (11:00-13:00)

**Chairs: Ramin Pourghorban, Hooman Bahrami-Motlagh, Taraneh Faghihi Langroudi**

11:00 - 11:10 Comparison of B-mode Ultrasonography and CT-Scan in Diagnosis of Children's Maxillary Sinusitis

Morad Sina

11:10 - 11:20 Imaging of Postoperative Cranium: Normal and Abnormal Appearance

Mohammad Ali Karimi

11:20 - 11:30 Patterns of Brain Injury in Poisoning and Intoxication

Afarin Sadeghian

11:30 - 11:40 Magnetic Resonance Spectroscopy in Neurological Disorders

Sharare Sanei Sistani

11:40 - 11:50 Approach to White Matter Lesions of the Brain

Jaleh Jamshidi

11:50 - 12:00 How Useful is Ultrasound in the Imaging Workup of Malrotation?

Mohammad Ali Karimi

12:00 - 12:10 Sonographic Measurements of the Abdominal Esophageal Length in Premature Neonates with and without Gastro-Esophageal Reflux Disease

Somayeh Zeynizadeh Jeddi

12:10 - 12:20 Differentiation between Groin Hernias with Cross-Sectional Imaging

Afarin Sadeghian

12:20 - 12:30 Spectrum of Central Nervous System Anomalies Detected By Fetal Magnetic Resonance Imaging: A 2 Year Study

Sakineh Dehghani

12:30 - 12:40 Sonoelastography of the Liver

Amirreza Tadayonfar

12:40 - 12:50 The Role of Endoanal Sonography in Treatment of Patients with Anal Diseases Referred to Shiraz Colorectal Surgery (SCRS) Department Since 2011

Ensieh Izadpanah

12:50 - 13:00 Usefulness of Lung Window in Evaluation of Abdominal Computed Tomography of Drug Mules

Fatemeh Vakilian

##### Day 1 Tuesday, May 13, 2014 Hall 4

Informatics (16:00-18:00)

**Chairs: Kourosh Abdollahifard, Mansoor Fatehi, Ali Reza Shakibafard**

16:00 - 16:30 Flat Panel Technology in Digital Radiology

(Vendor Lecture) Bruno Commere

Argeles (Thales \_ Payamed Company)

16:30 - 17:00 Oncologic Imaging Informatics

Mansoor Fatehi

17:00 - 17:30 Digital Imaging Output, Hardcopy CD or Poster?

Alireza Shakibafard

17:30 - 18:00 Cloud PACS

Mansoor Fatehi

##### Day 1 Tuesday, May 13, 2014 Hall 4

Obstetric (18:00-19:00)

18:00-19:00 panel: Strategies and Challenges in Obsteric Sonography

Modrator: Masoumeh Gity

Participats: Mojgan Kalantari, Maryam Rahmani, Ahmad Reza Tahmasebpour, Korosh Shahsavari

##### Day 2 Wednesday, May 14, 2014 Hall 4

Scientific Papers III (08:00-10:30)

**Chairs: Masoumeh Raoufi, Elham Keshavarz, Ramin Pourghorban**

08:00 - 08:10 Approach to Renal Incidentalomas

Elnaz Ghasemi

## SCIENTIFIC PROGRAM

08:10 - 08:20 Radiologic Manifestations of chronic constipation in CT scan

Mehdi Karami

08:20 - 08:30 Diffusion-Weighted Imaging of The Normal Placenta, Correlation of ADC Values with Granuum Classification

Maryam Safari

08:30 - 08:40 Doppler Evaluation of Uterine Anomalies and Masses in Infertility

Mehdi Afrasiabi

08:40 - 08:50 Three Dimensional Transperineal Ultrasonography of the Pelvic Floor

Masoomeh Norouzi

08:50 - 09:00 Efficacy of Radiologic Percutaneous Interventional Treatments for Biliary Complications after Liver Complications after Liver Transplantation: Shiraz Experience

Alireza Rasekhi

09:00 - 09:10 High Frequency and Noncontact Low Frequency Ultrasound for the Treatment of Venous Leg Ulcer, a Randomized Controlled Study

Azadeh Garkaz

09:10 - 09:20 X-Ray Techniques in The Diagnosis of Sacroiliitis in Ankylosing Spondylitis Patients

khaydarova Guuzalya

09:20 - 09:30 Differential X-Ray Diagnosis of Aneurysmal and Simple Bone Cysts

Usmanova Muhlisa Nodirovna

09:30 - 09:40 Value of Sonographic Examination of Left Wrist and Hand in Estimation of Bone Age in 0-6 Years Old Children

Parisa Hajalioghli

09:40 - 09:50 Magnetic Resonance Imaging in the Diagnosis of Osteoarthritis of the Knee

Umidakhon Kasimova Kazimkhanovna

09:50 - 10:00 Quantification of Pulmonary Thromboembolism in CT Angiography Reports and Predicting Right Ventricular Dysfunction and Patient Mortality

Masoomeh Raoufi

10:00 - 10:10 MRI Findings in Children Presenting with Epilepsy

Parisa Hajalioghli

10:10 - 10:20 Comparison of Color Doppler Ultrasound and CT Angiography in Carotid Artery Stenosis: Four Years' Experience from a Single Medical Center

Payam Asadi

10:20 - 10:30 Imaging Workup of Incidentally Discovered Adrenal Masses in Oncologic Patients

Masoomeh Raoufi

10:30 - 11:00 Coffee Break

### Day 2 Wednesday, May 14, 2014 Hall 4

Scientific Papers IV (11:00-13:00)

**Chairs: Taraneh Faghihi Langroudi, Mahyar Mohammadifard, Ali Babaei Jandaghi**

11:00 - 11:10 Sonographic Measurement of the Umbilical Cord and its Vessels and their Relation with Fetal Anthropometric Parameters

Sheida Rostamzadeh

11:10 - 11:20 Safety and Efficacy of Intra-Arterial Chemotherapy in Retinoblastoma

Hossein Ghanaati

11:20 - 11:30 Vascular Anatomy of the Spinal Cord

Kavous Firouznia

11:30 - 11:40 Coil Embolization of Intracranial Aneurysms

Hossein Ghanaati

11:40 - 11:50 Endovenous Laser for the Treatment of Saphenous Reflux and Varicose Veins

Rambod Saluti

11:50 - 12:00 The Role of Interventional Radiology in Diseases of the Hepatobiliary System

Hossein Ghanaati

12:00 - 12:10 Liver Metastases of Pancreatic Cancer: Role of Repetitive Transarterial Chemoembolization (TACE) on Tumor Response and Survival

Alireza Azizi

12:10 - 12:20 Biliary Interventions

Hazhir Saberi

12:20 - 12:30 Endovascular Treatment of Spinal Arteriovenous Malformations

Hossein Ghanaati

12:30 - 12:40 Various Types of Niche Imaging by Sonohysterography

Firouzeh Ahmadi

12:40 - 12:50 Intra-Sheath versus Extra-Sheath Image-Guided Corticosteroid Injection in Patients with Trigger Finger: Results from a Triple-Blind Randomized Control Trial

Ali Babaei Jandaghi

12:50 - 13:00 Classification, Imaging, and Interventional Procedures in Peripheral Congenital Vascular Anomalies

Abolhassan Shakeri Babil

13:00 - 14:00 Lunch

### Day 2 Wednesday, May 14, 2014 Hall 4

Scientific Papers V (14:00-16:00)

**Chairs: Maryam Farghadani, Yasmin Davoudi, Elham Keshavarz**

14:00 - 14:10 CT scan Findings of Aortic Arch Anomalies in Patients Referred to a Private Imaging Center in Tehran from 2008 to 2011

Hussein Soleimantabar

14:10 - 14:20 Neonatal Asphyxia, What a Radiologist Needs to Know

Yasmin Davoudi

14:20 - 14:30 Effectiveness of Semi-Quantitative Multiphase Dynamic Contrast-Enhanced MRI at 3 Tesla as a Predictor of Malignancy in Adnexal Masses

Leila Torbati

14:30 - 14:40 Determination of 1H MRS Efficacy in the Diagnosis of Complex Adnexal Masses by Comparing Results with Sonography and Histopathologic CE

Mitra Bigpourian Behbahani

14:40 - 14:50 Serial High-Resolution Ultrasound Findings of Acute Nasal Fracture: A potential Implication to Predict the Time of Facial Injury

Ali Babaei Jandaghi

14:50 - 15:00 Ultrasound in the Diagnosis of Endometriosis

Maryam Niknejadi

15:00 - 15:10 Pregnancy-Associated Breast Cancer: Significance of Early Detection and Imaging Appearance



## SCIENTIFIC PROGRAM

Donya Farrokh

15:30 - 16:00 Coffee Break

### Day 2 Wednesday, May 14, 2014 Hall 4

Scientific Papers VI (16:00-18:00)

**Chairs: Hamid Reza Salighehrad, Amir Hossein Saveh**

16:00 - 16:10 Pharmacokinetic Model and Arterial Input Function Selection in Dynamic Contrast Enhanced-MRI in Head and Neck Cancers

Sanam Assili

16:10 - 16:20 The Relationship Between Cognitive Function and Brain Lesion Volumes in Multiple Sclerosis Patients

Mehran Arab Ahmadi

16:20 - 16:30 T1 Quantification of the Cortical Bone Employing Short-TE MRI at 1.5 and 3 Tesla

Atena Akbari

16:30 - 16:40 The CT-Based Patient Specific Hip Joint 3D-Modeling; Potential to Create a Virtual Alignment

Amir Hossein Saveh

16:40 - 16:50 Comparison of Pulsed and Continuous Ultrasound Waves in Vacuole Formation at Therapeutic Frequencies

Zahra Tabatabaei

16:50 - 17:00 Development of a Low-Cost Phantom to Assess Absolute Quantification in Multi-Voxel MR Spectroscopy

Ali Parto

17:00 - 17:10 Sparse Quantification of 1H-MRS Based on Metabolites Profiles in Time-Frequency Employing Pursuit Algorithm; A Phantom Study

Hamid Reza Salighehrad

17:10 - 17:20 Automatic Bone Segmentation in Pelvis Area with Bone Marrow Metastases; Applications in Breast Cancer Treatment Monitoring

Faezeh Sanaei Nezhad

17:20 - 17:30 A Review Study on the Efficacy of Quantitative DCE-MRI in Breast Lesion Diagnosis

Sahar Rezaei

17:30 - 17:40 Accurate Quantification of Metabolite Ratio in Osteosarcoma Employing Clinical Magnetic Resonance Spectroscopy at 3T; A Comparative Study with Normal Tissue

Shaghayegh Karimi Alavijeh

17:40 - 17:50 A Review Study on the efficacy of Quantitative DCE-MRI in Adnexal Lesion Diagnosis

Sahar Rezaei

17:50 - 18:00 Improved Quantification of Dynamic Contrast Enhanced MR Imaging (DCE-MRI) in Adnexal Masses by Elastic Registration Method

Elahe Kia

### Day 3 Thursday, May 15, 2014 Hall 4

Board Review (08:30-10:30)

08:30 - 09:30 Neuroimaging

Hadi Rokni

09:30 - 10:30 Cardiovascular Imaging

Abbas Arjmand Shabestari

10:30 - 11:00 Coffee Break

### Day 3 Thursday, May 15, 2014 Hall 4

Chest Imaging (II)

**Chairs: Mehrdad Bakhshayeshkaram, Kamran Azarkhish, Farrokh Seilanian Toosi**

11:00 - 11:30 Acute and Chronic Pulmonary Thromboembolism

Soheila Zahirifard

11:30 - 12:00 Interstitial Lung Disease

Mehrdad Bakhshayeshkaram

12:00 - 12:30 Smoking Related Lung Disease

Payam Mehrian

12:30 - 13:00 Bronchiectasis and Small Airway Disease

Shahram Kahkouee

13:00 - 14:00 Lunch

### Day 3 Thursday, May 15, 2014 Hall 4

Board Review (14:00-16:00)

14:00 - 15:00 GU Imaging

Mahyar Ghafoori

15:00 - 16:00 Neuroimaging

Ali Babaei Jandaghi

### Day 4 Friday, May 16, 2014 Hall 4

Pediatric II (08:30-10:30)

**Chairs: Morteza Bajoghli, Ali Hekmatnia, Maryam Farghadani**

08:30 - 09:30 Case Based Review of Pediatric Abdominal Solid Organ Tumors

Zeynep Yazici

09:30 - 10:30 Radiologic Diagnosis of Pediatric Bone Tumors

Zeynep Yazici

10:30 - 11:00 Coffee Break

### Day 4 Friday, May 16, 2014 Hall 4

Scientific Papers VII (11:00-12:00)

**Chairs: Morteza Bajoghli, Kavous Firouznia, Hooman Bahrami-Motlagh**

11:00 - 11:10 Review on Surgical and Imaging Anatomy of the 7 segments of the Internal Carotid Artery

Behzad Saberi

11:10 - 11:20 Imaging Features of Therapeutic Drug-Induced Disease: Part II

Morteza Bajoghli

11:20 - 11:30 Comparison of Image Quality of Low Voltage 64-slice Multidetector CT Angiography (80 Kilovoltage) with Standard Condition (100 Kilovoltage) in Patients Suspicious of Pulmonary Embolism

Soudabeh Belash abadi

11:30 - 11:40 Classification of Benign and Malignant Ovarian Masses Based on DCE-MRI Quantitative Parameters Employing Hierarchical Clustering Approach

Anahita Fathi Kazerooni

11:40 - 12:00 Question & Answer



## SCIENTIFIC PROGRAM

### Hall 5 Language: Persian

#### Day 2 Wednesday, May 14, 2014 Hall 5

Neuroradiology

Spinal Imaging: Osteoporosis

**Chairs: Firooz Tabarrok, Mansoor Fatehi**

08:30 - 08:45 Pitfalls and Limitations in Interpretation of DXA

Mansoor Fatehi

08:45 - 09:00 QCT and Diagnosis of Osteoporosis

Laleh Ebrahimpour

09:00 - 09:35 Alternative and Modern Methods of Imaging Osteoporosis (MRI, US, Radiogrammetry, and Perfusion)

Reza Bakhshandehpour, Mansoor Fatehi, Dariush Hendsi

09:35 - 09:45 Spine Morphometry Using DXA

Mansoor Fatehi

09:45 - 10:00 Drug & Nutritional Treatment of Osteoporosis

Mohsen Soroush (Rheumatologist)

10:00 - 10:15 Surgical Treatment of Complications of Osteoporosis

Hesam Abdolhosseinpour (Spinal Surgeon)

10:15 - 10:45 Panel: What a Clinician Needs to Know in Imaging Work up and Follow up?

Moderator: Mansoor Fatehi

Participants: Laleh Ebrahimpour, Reza Bakhshandehpour, Mohsen Soroush, Hesam Abdolhosseinpour, Firooz Tabarrok

#### Day 2 Wednesday, May 14, 2014 Hall 5

Obstetrics (11:00-13:00)

11:00 - 13:00 Panel: Clinical and Legal Challenges in Fetal Screening

Moderator: Elham Keshavrz

Participants: Mojgan Kalantari, Ariana Kariminejad, Ameneh Beikmohammadi, Ahmad Reza Tahmasebpour, Sarang Younesi, Solmaz Piri

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Paper Title	Author Names
1 Incidence of Heart Delayed Enhancement in Symptomatic Patients with Tetralogy of Fallot After Total Correction with CMR (Cardiac Magnetic Resonance) and its Correlation with Right Ventricular Function	Farzaneh Akhavan*, Iran Medical Science University; Marziyeh Motevalli , ; Mohammad Hossein Razaghy,
2 Evaluation of Peripheral Pulmonary Artery Stenosis in Tetralogy of Fallot after Total Surgical Correction with Cardiac MRI	Farzaneh Akhavan*, Iran Medical Science University; Marziyeh Motevalli , ; Mohammad Hossein Razaghy,
3 Brain Abscess as the First Manifestation of Pulmonary Arteriovenous Malformation : A Case Report.	Maryam Moradi*, Radiologist; Maryam Adeli,
4 Comparison of MRI with Standing lumbar Plain X Ray	Mohammad Hossein Daghighi*, Radiologist
5 Evaluation of the Effect of Combined 2D/4D Ultrasound on Fetal Heart Rate Changes	Fateme Saafi*, Arak Medical University; Hormoz Haddad Larjani, Arak Medical University ; Bahman Sadeghi , Arak Medical University ; Mehri Jamilian, Arak Medical University
6 Quantification of NAA/Cr, NAA/Cho and Myo/Cr as Diagnostic Biomarkers to Detect Multiple Sclerosis Lesions Employing Proton Magnetic Resonance Spectroscopy at TE = 30msec and 3T	Hamideh Vafaeyan, School of Para-Medicine, Shahid Beheshti University of Medical Science; Seyed Amir Ebrahimzadeh, Department of Radiology, Shahid Beheshti University of Medical Sciences; Nasrin Rahimian, Iranian Center of Neurological Research, TUMS; Shaghayegh Karimi Alavijeh, Institute for Advanced Medical Technologies (IAMT); Alireza Madadi, Tehran University of Medical Sciences (TUMS); Fariborz Faeghi, School of Para-Medicine, Shahid Beheshti University of Medical Science; Mohammad Hossein Harirchian, Iranian Center of Neurological Research, TUMS; Hamidreza Saligheh Rad*, TUMS
7 An Assessment of Patient Maximum Skin Dose Arising From Cardiac Angiography Procedures Based on Measured DAP Values	Mohsen Khosroabadi*, North Khorasan University of Medical Sciences; Mohammad Taghi Bahreyni Toossi, Mashhad University of Medical Sciences; Mohammad Mehrpouyan, Sabzevar University of Medical Sciences; Fatemeh Kavosi, Mashhad University of Medical Sciences
8 Result of 1000 PET-CT Scan on Patients of Masih Daneshvari Hospital	Mehrdad Bakhshayesh Karam, ; Abbas Yousefikoma, ; Leila Mosadegh*, NRITLD; Pardis Ghafarian,
9 New Algorithm for Improving Three-Dimensional Imaging System Through Near-Infrared in Breast cancer Diagnosis	Siamak Hamzeei*, Shiraz University; Yaser Noorishirazi, ; Hamzeh Asgharnezhad,
10 A Monte Carlo Study on Tissue Composition Effect on Dose Distribution in Neutron Capture Therapy	Homa Rezaei Moghadam* , ; Mahdi Ghorbani, ; Mohsen Khosroabadi, North Khorasan University of Medical Sciences; Bagher Farhood, ; Nima Hamzian,
11 Correlation Between Fatty Liver in Ultrasound and Serum Levels of Liver Transaminases	Mohammad Ali Karimi*, Department of Radiology, Shohada-e-Tajrish Hospital, SBMU; Khosro Taheri, Department of Radiology, Shohada-e-Tajrish Hospital, SBMU; Seyed Mohammad Kharrazi, Department of Radiology, Shohada-e-Tajrish Hospital, SBMU
12 Computed Tomography Features of Multidrug-Resistant Tuberculosis (MDR TB) in HIV+ Patients	Shahram Kakhouee, National Research Institute of Tuberculosis and Lung Diseases; Shahram Arvin, Department of Radiology, Masih-e-Daneshvari Hospital, SBMU; Mohammad Ali Karimi*, Department of Radiology, Shohada-e-Tajrish Hospital, SBMU
13 Usual and unusual CT Presentations of Pulmonary Hydatosis	Shahram Kakhouee, National Research Institute of Tuberculosis and Lung Diseases; Saeid Shayan, Department of Radiology, Masih-e-Daneshvari Hospital, SBMU; Mohammad Ali Karimi*, Department of Radiology, Shohada-e-Tajrish Hospital, SBMU
14 Tips to Differentiate Chronic Sarcoidosis from Chronic Hypersensitivity Pneumonitis: An HRCT Analysis of Two Lung Diseases with Upper Lobe Fibrosis	Sandbad Armand*, National Research Institute of Tuberculosis and Lung Diseases; Shahram Kakhouee, National Research Institute of Tuberculosis and Lung Diseases; Makhtoom Shahnazi, Shahid Beheshti University of Medical Sciences; Ramin Pourghorban, Department of Radiology, Shahid Beheshti University of Medical Sciences
15 Role of Elastasonography of Breast for Detection of Breast tumor of Dense Mammogram	Ahmad Soltani Shirazi*, Ahvaz University
16 X Ray ,Ct Scan of Extra Pulmonary Lesion with intra Pulmonary Appearance	Ahmad Soltani Shirazi*, Ahvaz University
17 Pulmonary Alveolar Proteinosis: HRCT Appearance	Mohammad Ali Karimi*, Department of Radiology, Shohada-e-Tajrish Hospital, SBMU; Hamid Jafarzadeh, 2. Department of Radiology, Masih-e-Daneshvari Hospital, SBMU; Payam Mehrian, 1. National Research Institute of Tuberculosis and Lung Disease, SBMU; Nasrin Homayounfar, Department of Nursing & Midwifery, Ardebil Medical University, Ardebil, Iran.
18 Computed Tomography Features of Pulmonary Nocardiosis	Mohammad Ali Karimi*, Department of Radiology, Shohada-e-Tajrish Hospital, SBMU; Payam Mehrian, 1. National Research Institute of Tuberculosis and Lung Disease, SBMU; Ehsan Esfandiari, Department of Radiology, Masih-e-Daneshvari Hospital, SBMU
19 Abdominal Aortic Aneurysm: Morphology and Complications in Multidetector CT/CT Angiography	Ashrafosadat Hosseini, Department of Radiology, Shahid Sadoughi Hospital, SSUMS, Yazd, Iran.; Morteza Sanei Taheri, ; Hamid Reza Haghghatkhah, Iranian Society of Radiology; Mohammad Ali Karimi*, Department of Radiology, Shohada-e-Tajrish Hospital, SBMU; Ramin Pourghorban, Department of Radiology, Shahid Beheshti University of Medical Sciences

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21	Preventive Effect of Vitamin D3 Supplementation on Conversion of Optic Neuritis to Clinically Definite Multiple Sclerosis: a Double Blind, Randomized, Placebo-Controlled Pilot Clinical Trial	Hajar Derakhshandi*, Zahedan University of Medical
22	Skin Dose Measurement During Radiotherapy of Patients with Breast Cancer by TLD Chips	Atefeh Vejdani Noghreian*, Student; Shokohozaman Soleymanifard, ; Seied Amir Aledavood, ; Mahdi Ghorbani,
23	Uterus Body and Cervix Solid Hypoecho Mass with High BHCG Level	Ahmad Soltani Shirazi*, Ahvaz University
24	Ultrasounds for Blunt Abdominal Trauma	Hajar Taheri*, Zahedan University of Medical Science; Mohammad Ali Elahifar, Zahedan University of Medical Science; Amin Bighamian, Zahedan University of Medical Science
25	Assessment of Varicocele Grade Differences, in Two Color Doppler Ultrasonography, Which one of Them was Performed at Morning and other one at the end of Day	Ramezan Jafari*, Assistant professor
26	Imaging Modalities in Laryngeal Tumors	Leila Aghaghazvini*, Tehran University of Medical Science
27	Using Optimal Projections for Reduction of Radiation Risks in Patients Undergoing some Radiographies	Ali Chaparian*, Shahid Sadoughi university of ; Abolfazl Kanani,
28	Glial Coristoma of infra Temporal and Para-Pharyngeal Spaces :(A Rare Case Report)	Leila Aghaghazvini*, Tehran University of Medical Science
29	The Effect of Midazolam on Decreasing the Duration of Intussusception Hydrostatic Reduction in Children	Rahele Mehraeen*, Babol University of Medical Science; isa Alipoor, ; Mohamadreza Esmaili Duki, Babol University of Medical Science
30	Splenic Artery Aneurysm Presenting as Ascites: a Case Report and Review of Literature	Farnood Rajabzadeh*, Islamic Azad University, Mashhad; Hasan Vosoghinia , Mashhad University of Medical Sciences; Ladan Goshayeshi, Mashhad University of Medical Sciences; Mohammad Reza Farzanehfard, Mashhad University of Medical Sciences
31	Automated Texture Analysis of Breast Cancer by Ultrasound Imaging	Ali Abbasian Ardekani*, Student Research Committee, Urmia University of Medical Science; Akbar Gharbali, Department of Medical Physics, Faculty of Medicine, Urmia University of Medical Science.; Afshin Mohammadi, Department of Radiology, Faculty of Medicine, Urmia University of Medical Science, Urmia, Iran.
32	The Role of MRI in Evaluation of Acute MS Attack	Yasmin Davoudi*, MUMS
33	Lecture: Osteoid Osteoma and Osteoblastoma: "an Overview of Imaging Procedures and Variety of its Location"	Morteza Mearadji*, Erasmus MC Rotterdam
34	Sonographic Findings in Liver Transplanted Patients at Taleghani Hospital from 2009 till 2012	Marina Pourafkari, Shahid Beheshti University of Medical Sciences; Reza Pourghorban*, Shahid Beheshti University ; Pooneh Dehghan, Shahid Beheshti University of Medical Sciences
35	Rare Repeated Recurrence of Parosteal Osteosarcoma Adjacent To a Prosthesis After 15 years: A Case Report	Ahmad Rezaee AzandaryanI*, Medical
36	Gasrointestinal Tract Duplication in Infant and Children (GTD).	Morteza Bajoghli*, Isfahan University; Farshad Bajoghli, Isfahan Isfahan University
37	MR Myelogram: Is There Any Role for Diagnosis of Spinal and Extra-Spinal Disorders?	Reza Bakhshandehpour*, PMIC
38	Fetal lung Maturity Assessment in Ultrasonography	Elham keshavarz, Shahid Beheshti Medical University; S. Malek Mesbahi*, Shahid Beheshti Medical University; Mojgan Kalantary, Shahid Beheshti Medical University
39	Diagnostic Accuracy of Coronary Calcium Score Below 100 in Ruling out Coronary Artery Disease	Marzie Motevalli, Department of Radiology, Shahid Rajaee Heart Center; Hossein Ghanaati, Advanced Diagnostic and Interventional Radiology Research Center (ADIR); Reza Hanifehpour, ADIR, TUMS; Mounes Aliyari, Advanced Diagnostic and Interventional Radiology Research Center (ADIR), TUMS ; Mona Shahriari, ; Majid Shakiba*,
40	MRI Findings in Creutzfeldt-Jakob Disease, a Case Report	Farnood Rajabzadeh*, Islamic Azad University, Mashhad; Ashmad Khosravi, Mashhad University of Medical Sciences; Mohsen Foroughipour, ; Ladan Goshayeshi, Mashhad University of Medical Sciences
41	Intracranial Lipoma	Farnood Rajabzadeh*, Islamic Azad University, Mashhad
42	Congenital Bronchial Atresia, A Case Report	Arash Taghavi*, Medical University of Isfahan; Mehri Sirous, Medical University of Isfahan
43	Diagnosis of Ovarian Torsion	Elnaz Ghasemi*, SBUM; Hamidreza Haghhighatkhah, Shohada Hospital
44	Computed Tomography Imaging of Disease Accompanied with Diffuse Bronchiectasis	Rustam Fayzullayev*, Tashkent Medical Academy; Bahtiyor Akhmedov, Tashkent Medical Academy

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45	Simultaneous Hepatic and Gastric Artery Aneurysms: A Case Report	Hedieh Zamini*, Modarres Hospital; Hamid Reza Haghhighatkah, Iranian Society of Radiology; Morteza Sanei Taheri, ; Mohammad Hadi Kharazi, Shohada Hospital, Shahid Beheshti University of Medical Science; Fateme Vakilian,
46	Have You Heard the Alarm of the Inappropriate Use of CT Scan in Children?	Karmella Kamali*, Shiraz University ; Mohmmad Farnoodi, Radiology; Reza Hosseini, Radiology
47	The Complementary Value of Sonography in Early Evaluation of NEC	Karmella Kamali*, Shiraz University ; Reza Hosseini, Radiology; Mohmmad Farnoodi, Radiology
48	CTLM- Laser Breast Imaging without Compression	Parvaneh Darkhor*, Paramed Faculty of Tabriz
49	Amniocentesis and Chorionic Villus Sampling: Stress and Pain Before and Following these Procedures and Predisposing Factors	Amirhossein Hashemi Attar*, Islamic Azad University; Saeed Naghibi, Islamic Azad University; Nazli Parizadeh, Islamic Azad University
50	Using Ultrasound as an Accurate Method of Determining Bone age in Older Children	Mehdi Karami*, Isfahan University of Medical ; Reza Khaleghnejad Tabari, Isfahan University of Medical Sciences; Fatemeh Karami, Isfahan University of Medical Sciences
51	Splenic Incidentalomas	Nima Noori*, Resident; Taraneh Faghihi Langroudi, Shahid Beheshti University of Medical sciences
52	Radiographic Features of Chest in Patients with Pectus Deformity Detected by Posterior-Anterior Radiography	Khasan Giyasov*, Tashkent Medical Academy; Bahtiyor Akhmedov, Tashkent Medical Academy
53	Multifocal Skeletal Tuberculosis Pretending Langerhans cell Histiocytosis in a Child	Afarin Sadeghian*, Resident of Radiology, SBMU; Hamid Reza Haghhighatkah, Iranian Society of Radiology; Morteza Sanei Taheri, ; Sufia Saburi, ; Nooshin Behbudi,
54	Evaluation of Pulmonary Hypertension in Post lung Transplantation Follow Up	Amirreza Tadayonfar*, Sbm; Shahram Kahkouee, National Research Institute of Tuberculosis and Lung Diseases; Hamid Reza Haghhighatkah, Iranian society of radiology
55	Spinal Stenosis	Ahmad Alizadeh*, Guilan University
56	Comparing Ultrasonic Indices in Determining Gestational Age	Behzad Ghasemi*, Shahid Beheshti University ; Hamid Reza Haghhighatkah, Iranian Society of Radiology; Morteza Sanei Taheri, ; Maryam Afrakhteh, ; Ebrahim Ghaderi,
57	HRCT Imaging of Ear Cholesteatoma , What does The Radiologist Should Provide?	Jahanbakhsh Hashemi*, Associate professor of Radiology
58	Interobserver Variability of the Contrast Enhanced Peripheral Vascular MR Angiography of the Lower Leg Arteries, Comparison between Built-in Body Coil and Surface Coil	Hadi Zomorrodian*, KAE
59	Designing of Gamma Camera without Collimator Based on Special Arrangement of the Detectors	Ali Shafiei*, Rafsanjan University of Medical Sciences; Hossein Akbari Lalimi, Mashhad University of Medical Sciences
60	Comparison of Postcontrast Fluid-Attenuated Inversion-Recovery (FLAIR) with Postcontrast T1 Weighted MR Images in Detecting Metastatic Brain Lesions and Leptomeningeal Involvement	Mohammad Sobhan Ardekani *, Shahid Sadoughi University of Medical Sciences; Taghi Roshanbovanlu, Shahid Sadoughi University of Medical Sciences; Reza Nafsimoghdam, Shahid Sadoughi University of Medical Sciences
61	Comparison of Frequency Brainstem Plaques in Migraineurs with Multiple Sclerosis and non-Migraineurs	Mohammad Sobhan Ardekani *, Shahid Sadoughi University of Medical Sciences; Moosa Ostadi, Shahid Sadoughi University of Medical Sciences; Abolghasem Rahimdel, Shahid Sadoughi University of Medical Sciences
62	Evaluation of Agreement Between MRI Findings and Clinical Diagnosis in Lumbar Spine Diseases	Mohammad Sobhan Ardekani *, Shahid Sadoughi University of Medical Sciences; Jalil Abrisham, Shahid Sadoughi University of Medical Sciences; Majid Samiee, Shahid Sadoughi University of Medical Sciences
63	ACL and PCL tearing	Jalal Jalal Shokouhi*, Iranian Society of Radiology
64	Cultural Results From Mommy Imaging "Saltman 1-6	Jalal Jalal Shokouhi*, Iranian Society of Radiology
65	Social, work and Diseases of Wrist, a Radiology and Imaging Approach	Jalal Jalal Shokouhi*, Iranian Society of Radiology
66	Findings in MRCP "15 Years Statistics	Jalal Jalal Shokouhi*, Iranian Society of Radiology
67	Dark or Black Bone Marrow by MRI	Jalal Jalal Shokouhi*, Iranian Society of Radiology
68	Legal Medicine of Vertebral Body Fractures	Jalal Jalal Shokouhi*, Iranian Society of Radiology
69	Dedicated Pituitary Gland Imaging	Jalal Jalal Shokouhi*, Iranian Society of Radiology
70	History of Radiology and Imaging Machines in Iran	Jalal Jalal Shokouhi*, Iranian Society of Radiology
71	Concha Bullosa in Iran	Jalal Jalal Shokouhi*, Iranian Society of Radiology
72	Clinical and Statistical Values of Nasal septal Deviation for Insurance Companies	Jalal Jalal Shokouhi*, Iranian Society of Radiology

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### • 1001

#### LIVER METASTASES OF PANCREATIC CANCER: ROLE OF REPETITIVE TRANSARTERIAL CHEMOEMBOLIZATION (TACE) ON TUMOR RESPONSE AND SURVIVAL

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### • 1002

#### AUTOMATIC BONE SEGMENTATION IN PELVIS AREA WITH BONE MARROW METASTASES; APPLICATIONS IN BREAST CANCER TREATMENT MONITORING

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### • 1003

#### ACCURATE QUANTIFICATION OF METABOLITE RATIO IN OSTEOSARCOMA EMPLOYING CLINICAL MAGNETIC RESONANCE SPECTROSCOPY AT 3T; A COMPARATIVE STUDY WITH NORMAL TISSUE

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### • 1004

#### QUANTIFICATION OF PULMONARY THROMBOEMBOLISM IN CT ANGIOGRAPHY REPORTS AND PREDICTING RIGHT VENTRICULAR DYSFUNCTION AND PATIENT MORTALITY

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### • 1005

#### EFFECTIVENESS OF SEMI-QUANTITATIVE MULTIPHASE DYNAMIC CONTRAST- ENHANCED MRI AT 3 TESLA AS A PREDICTOR OF MALIGNANCY IN ADNEXAL MASSES

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## AWARDED ABSTRACTS

(RESIDENT SUBMISSIONS)

### • 1006

#### DIAGNOSTIC ACCURACY OF HRCT FOR DIFFERENTIATION OF NSIP, UIP AND CHRONIC HYPERSENSITIVITY PNEUMONITIS

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### • 1007

#### SONOGRAPHIC MEASUREMENTS OF THE ABDOMINAL ESOPHAGEAL LENGTH IN PREMATURE NEONATES WITH AND WITHOUT GASTRO-ESOPHAGEAL REFLUX DISEASE

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### • 1008

#### HIGH FREQUENCY AND NONCONTACT LOW FREQUENCY ULTRASOUND THERAPY FOR VENOUS LEG ULCER TREATMENT: A RANDOMIZED CONTROLLED STUDY

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### • 1009

#### SPECTRUM OF CENTRAL NERVOUS SYSTEM ANOMALIES DETECTED BY FETAL MAGNETIC RESONANCE IMAGING; A 2 YEAR STUDY

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• 1010

### IMAGING APPROACH AND MANAGEMENT OF BREAST CYSTS

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In ultrasonography, breast cysts are categorized into simple, complicated, and complex types. A Breast complicated cyst can be defined as any cyst that does not meet the strict criteria for a simple cyst and is less likely to be malignant than in any other organ. Complex breast cysts are common, and owing to the use of higher-resolution equipment, are increasingly detected. Complex breast cysts are defined as cysts with thick walls, thick septa and intracystic masses or other discrete solid components. Many patients have numerous different cysts in each breast. Such lesions are too numerous to be biopsied, aspirated, or even followed. In order to both avoid mischaracterizing malignant complex cysts as benign and minimize the number of biopsies on the far more numerous suspicious-appearing benign complicated cysts, the sonographer must develop a systematic approach for evaluating the risk associated with individual breast cysts. Each breast cyst must be characterized into a Breast Imaging Reporting and Data System (BIRADS) category. We first describe cyst related breast anatomy and then an algorithm for breast cysts approach.

• 1011

### HOW TO FIND AN ISOECHOIC LESION WITH BREAST US

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Isoechoic lesions surrounded by fat can be a challenge for radiologists and can result in false-negative interpretations and a delayed diagnosis of breast cancer. Furthermore, isoechogenicity, including slight hypoechogenicity, as a common finding

in breast lesions, is being reported in up to 84% of benign nodules and 30% of malignant lesions. Thus, about one-third of breast cancers may be described as isoechoic in actual clinical practice. Isoechogenicity can be seen in usual ductal hyperplasia, atypical ductal hyperplasia, papillary apocrine metaplasia, adenosis, debris and floating cells of complex cysts in the fibrocystic and benign proliferative conditions, fibroadenomas, and papillomas, as well as in about one-third of breast carcinomas. It is important to set the ultrasonic parameters, such as the dynamic range, total gain, and time-gain compensation curve, appropriately for comparison. Complementary tools to B-mode ultrasound in the evaluation of isoechoic breast lesions include spatial compound imaging, tissue harmonic imaging, ultrasound elastography, color or power Doppler imaging, power Doppler vocal fremitus imaging, and contrast agent enhancement.

• 1012

### A REVIEW STUDY ON THE EFFICACY OF QUANTITATIVE DCE-MRI IN BREAST LESION DIAGNOSIS

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Breast cancer is the most common cancer among women, for which a successful treatment depends in part, on early diagnosis. Accurate differentiation of lesions may greatly affect the outcome of treatment. In this regard, anatomical along with physiological MR imaging modalities, such as dynamic contrast-enhanced magnetic resonance imaging (DCE-MRI), diffusion weighted imaging (DWI), and magnetic resonance spectroscopy (MRS) which provide accurate, repeatable and noninvasive physiological biomarkers of tumor growth, have been increasingly used as secondary characterizing tools to ultrasonography (US) and mammography. The aim of this study is to present a thorough review on available scholarly works, especially where quantitative DCE-MRI has been employed for diagnostic decisions on breast cancer, concluding if the modality is either necessary for better sensitivity/specificity, or for a reliable surgery/treatment planning.

US and mammography are the conventional screen-

ing modalities for breast cancer diagnosis. The overall sensitivity of mammography is 70%–90%. However, this sensitivity is variable and can range from as high as 80%–98% in women with fatty breast tissue to as low as 30%–48% in women with dense breast tissue. Sonographic classification of benign and malignant tumors has a high sensitivity of as high as 98% but a low specificity of about 32%. The low specificity of mammography and US methods and the need for extracting biomarkers, has led to rising interest in employing physiological MR imaging methods for characterizing breast cancers. DCE-MR images can be analyzed in a semi-quantitative (non-model-based) or quantitative (model-based) approach. The sensitivity and specificity of semi-quantitative DCE-MRI in detecting breast cancer reaches 88.1% and 67.7%, respectively. While it has been proved that DCE-MR imaging features could be useful to noninvasively distinguish highly aggressive breast carcinomas, they are not as useful in discriminating benign from malignant non-mass lesions (such as DCIS). On the other hand, the pharmacokinetic (or model-based) analysis of DCE-MRI can be useful in monitoring and predicting response to therapy, as the changes in tumor vascularization in responder patients precede changes in tumor size, and may better describe tumor response to therapy. Pharmacokinetic model analysis of DCE-MRI data provided a sensitivity and specificity of 100% and 78%, respectively. In comparison with semi-quantitative DCE-MRI, Quantitative DCE-MRI has significantly improved the sensitivity and specificity of breast cancer diagnosis. Other physiological MR imaging alternatives like DW-MRI and MRS, have also been employed for breast cancer diagnosis. In a pooled analysis on clinical breast MRS gathered from five independent centers around the world, the sensitivity and specificity of breast MRS were 83% and 85%, respectively. In a study on 78 patients (110 lesions), the sensitivity and specificity of DWI in detection of malignant and benign lesions was reported at 86%. Although the sensitivity and specificity of imaging could be influenced by the selected values of ADC cut-off, the ADC-values may still be used to characterize breast lesions.

The diagnosis of breast cancer is a very challenging issue, as early detection may allow for conservative surgery as an alternative to mastectomy. Although mammography and US allow earlier detection of cancers and have been shown to improve the survival of women with breast cancer, with a relatively high sensitivity in women older than 50 years, monitoring the breast cancer is limited by low specific-

ity. DCE-MRI is a powerful imaging tool that has shown utility in delineating the extent of disease in patients with known breast cancer and in screening women at high risk for breast cancer. Semi-quantitative DCE-MRI has high sensitivity but only moderate specificity, because of an overlap between benign and malignant lesions, independent of breast density, tumor type, and menopausal status. Quantitative analysis of DCE-MRI is used by many researchers for detecting and evaluating breast diseases and is a means of increasing the specificity of breast MR examination. MRS of the breast has been proposed as an adjunct to the anatomical MRI examination to improve the specificity of distinguishing malignant from benign breast tumors, however, MRS alone is not suitable in lactating women. Nevertheless, many studies have reported that DWI-MRI may help to differentiate between benign and malignant lesions with good specificity. These findings suggest that incorporating MRS and DW-MRI may increase the overall specificity of quantitative analysis of breast DCE-MRI.

• 1013

**PREGNANCY-ASSOCIATED BREAST CANCER: SIGNIFICANCE OF EARLY DETECTION AND IMAGING APPEARANCE**

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**Background/Objectives:** To evaluate the mammographic and sonographic findings of pregnancy associated breast cancer.

**Patients and Methods:** In this study, we selected 25 patients who were diagnosed with pregnancy associated breast cancer during the previous 10 years. The disease was diagnosed during pregnancy (n=5) or lactation (n=20). All patients underwent ultrasonography, the first choice for evaluation of pregnancy associated breast disease. Mammography was performed for 22 patients.

**Results:** The commonest clinical symptom was a breast lump. Ultrasound was abnormal in all cases. The most common ultrasound finding was a solitary hypo echoic mass with irregular shape, irregular margin, and heterogeneous echogenicity.



Architectural distortion was seen in two patients. Some unusual sonographic findings for breast cancer were detected in these patients, including parallel orientation, cystic components, and posterior enhancement. Mammography was performed for 22 patients and revealed positive findings in 80% of cases despite a dense breast. The most common mammographic finding was a breast mass with or without microcalcification (n=10). Microcalcification alone was seen in 2 patients. Lesions, were predominantly invasive ductal carcinoma (96%).

Conclusion: Ultrasonography is recommended for the initial diagnosis of pregnancy associated breast cancer. Mammography is indicated when initial evaluation suggests a malignant lesion or when ultrasound is negative in spite of a palpable breast lesion. When the imaging results are suspicious, a biopsy should be performed to obtain a pathologic diagnosis.

• 1014

**MAMMOGRAPHIC SIGNS OF SYSTEMIC DISEASE**

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Although mammography is primarily used for the detection of breast cancer, it can occasionally reveal breast abnormalities related to extra-mammary disease. Cardiovascular diseases such as congestive heart failure and central venous obstruction may manifest as venous engorgement and breast edema at mammography. Pathologic arterial calcifications seen at mammography can indicate an underlying risk factor for accelerated atherosclerosis such as chronic renal failure. Connective tissue diseases including rheumatoid arthritis, systemic lupus erythematosus, dermatomyositis-polymyositis, and systemic scleroderma typically manifest with bilateral axillary lymphadenopathy, and stromal calcifications are also seen in the latter three disease processes. Some diseases such as neurofibromatosis type 1 and filariasis may manifest with pathognomonic findings at mammography, whereas other systemic diseases such as Wegener granulomatosis, sarcoidosis, and amyloidosis can manifest as nonspecific breast masses that are indistinguish-

able from breast cancer and usually require tissue biopsy for confirmation. Knowledge of the imaging characteristics of various systemic diseases affecting the breast will aid the radiologist in differentiating systemic disease from suspect breast lesions, thereby, helping ensure appropriate follow-up. Furthermore, recognition of systemic diseases such as Cowden syndrome that are associated with an increased risk of breast cancer will allow the radiologist to recommend appropriate surveillance.

• 1015

**STENT STENOSIS AFTER PERCUTANEOUS CORONARY INTERVENTION**

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Background/Objectives: Coronary artery stenosis is the leading cause of mortality worldwide. Most of the patients are treated with percutaneous coronary intervention (PCI). Inserted stents may themselves develop stenosis and result in ischemic cardiac events. In this presentation, we want to assess the frequency of stent stenosis among a large group of patients underwent the PCI using the 64-multidetector CT scan.

Patients and Methods: Over a period of 6 years (2007-2012), a total of 2525 patients were referred to two university affiliated multislice CT scan centers (a GE 64 multislice CT scan machine and a Siemens 256 multislice machine) for cardiac CT angiography. The patients were referred because of some clinical symptoms or signs or due to control imaging after an intervention (CABG or PCI). Among these patients, 243 had at least one stent (in LAD, LCx or RCA) who were enrolled into the study. Standard image reconstruction was performed, and the coronary angiography was done for all patients. Stents were assessed for stenosis in reformatted images. The three above-mentioned vessels were assessed in terms of main anatomical parts such as proximal, middle and distal portions.

Results: Mean age of the patients was 58.2 ± 11.6 years

old. 167 patients were male (68.7%). 166 stents (68.3%) had been placed in the LAD, 73 stents (30%) in the LCx and 74 stents (31.5%) in the RCA. Among 87 stents of the proximal portion of the LAD, distribution of normal, mild stenosis, moderate stenosis, severe stenosis, and complete occlusion were 58 (66.7%), 12 (13.8%), 6 (6.9%), 8 (9.2%) and 3 (3.4%) respectively. Among 61 stents of the middle portion of the LAD, distribution of normal, mild stenosis, moderate stenosis, severe stenosis, and complete occlusion were 53 (86.9%), 4 (6.6%), 1 (1.6%), 2 (3.3%) and 1 (1.6%), respectively. Eight cases of stent in distal portion of LAD were all normal (100%). Among all stents in other parts of the LAD, 1 had mild stenosis and 1 had complete occlusion.

Among 19 stents of the proximal portion of the LCx, distribution of normal, mild stenosis, moderate stenosis and severe stenosis were 16 (84.2%), 1 (5.3%), 1 (5.3%) and 1 (5.3%), respectively. Among 27 stents of the middle portion of the LCx, 22 were normal (81.5%), 4 had moderate stenosis (14.8%), and one had severe stenosis (3.7%). All six stents of distal LCx were normal. Among stents inserted in other parts of the LCx, one had moderate stenosis, 2 had severe stenosis and 3 had complete occlusion. Among 37 stents of the proximal portion of the RCA, distribution of normal, mild stenosis, moderate stenosis and severe stenosis were 27 (73%), 4 (10.8%), 1 (2.7%) and 5 (13.5%) respectively. Among 28 stents of the middle portion of the RCA, distribution of normal, mild stenosis, moderate stenosis, and severe stenosis were 21 (75%), 1 (3.6%), 2 (7.1%) and 4 (14.3%), respectively. All 4 stents in the distal portion of the RCA and 5 stents in other parts of the RCA were normal.

**Conclusion:** The rate of stenosis in stents is considerable and needs special attention when the patients are evaluated clinically.

• 1016

**DIAGNOSTIC VALUE OF CARDIAC MRI IN COMPARISON TO TRANS-THORACIC ECHOCARDIOGRAPHY IN DETECTION AND CHARACTERIZATION OF CARDIAC MASSES**

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**Background/Objectives:** Cardiac masses are uncommon and encompass a spectrum of lesions with different histological features. Despite rarity, serious complications associated with these lesions render the need for a sensitive, specific, and accurate diagnostic tool which may lead to treatment options such as cardiac surgery as a major invasive intervention. The purpose of this study was to compare accuracy and specificity of trans-thoracic echocardiography (TTE) and cardiac MRI (CMRI) as the two non invasive diagnostic methods available.

**Patients and Methods:** Thirty-eight patients who were suspected to have cardiac or pericardiac space occupying lesions on TTE were included in this study. CMRI protocols include steady cine imaging, HASTE and 3D-IR FLASH sequences after contrast (Gd-chelate) administration in first pass and delayed images added to common CMRI sequences (T1 and T2 TSE)

**Results:** Of the 38 subjects, 27 (PPV, 68.4%) had findings in CMRI in favor of SOL (other studies were either normal or suggestive of other disorders such as cardiomyopathies). Of these, 18 were solid masses and 9 were either cystic mass lesions or clots. In view of CMRI findings and clinical indications, 20 patients underwent operation and for all of them the diagnosis of SOL lesions was confirmed (no false positive). On CMRI, 11 cardiac tumors had findings suggestive of malignancy, which was consistent with the histopathology results in 10 operated patients (specificity, 90.9% of tissue diagnosis). CMRI features in 7 patients were in favor of indeterminate or benign lesions with a PPV of 83.3% after histological comparison (6 masses were resected). Five lesions which were suspected of being neoplastic masses on TTE, turned out to be endocardial vegetations or thrombi on CMRI (PPV, 78%). In five patients who underwent CMRI for characterization of cystic lesion detected by TTE, findings of both modalities were almost consistent with each other with a superior precision in CMRI characterization. Invasion to adjacent organs or remote organs involvement was detected in 7 patients, completely compatible with intra-operational observations and/or further investigations (specificity, 100%).

**Conclusion:** CMRI with specific sequences and multiplanar image is by far the most accurate non invasive modality in detection and evaluation of mass lesions in and around heart.

• 1017

**IMAGING FEATURES OF THERAPEUTIC DRUG-INDUCED DISEASE: PART II**Morteza Bajoghli<sup>1,\*</sup>; Farshad Bajoghli<sup>1</sup><sup>1</sup> Isfahan University of Medical Sciences, Isfahan, Iran\*Corresponding author's e-mail: [morteza.bajoghli@yahoo.com](mailto:morteza.bajoghli@yahoo.com)

As survival rate continues to increase for patients with childhood and adult malignancies, it is important to detect disease recurrence and to find the potential complication that occur after treatment with oncologic medication and therapeutic radiation. The most common side effect of the anthracycline drug is its cardiotoxic effect which will give the patient a decline in ejection fraction and may result in dilated cardiomyopathy. The use of isotope scan and FDG-PET exam plays an important role in diagnosis of this subclinical cardiac dysfunction. Other less common cardiotoxic side effect of chemotherapeutic medications include: arrhythmia, myocarditis, coronary artery disease, tamponade, pericarditis, and pericardial effusion. Radiation therapy can also lead to cardiotoxicity when the heart or pericardium is included in the radiation port. Radiation-induced conditions include: pericardial disease, coronary artery disease, valvular disease, and cardiomyopathy. Many of these side effects may remain asymptomatic until late in the course of the disease and may be detected earlier. With the use of appropriate imaging modalities, radiologists should be familiar with the current knowledge and pathophysiology of these cardiac complications.

• 1018

**THE ROLE OF CARDIAC MRI IN CHILDREN'S CONGENITAL AND ACQUIRED HEART DISEASE**Roozbeh Barikbin<sup>1,\*</sup>; Ali Hekmatnia<sup>2</sup>; Maryam Farghdani<sup>2</sup>; Reza Basiratnia<sup>2</sup><sup>1</sup> Sepahan Medical Imaging Center<sup>2</sup> Departments of Radiology, Isfahan University of Medical Sciences, Isfahan, Iran\*Corresponding author's e-mail: [dr\\_rbarikbin86052@yahoo.com](mailto:dr_rbarikbin86052@yahoo.com)

Cardiovascular magnetic resonance (CMR) is a valuable and accurate modality used in the evaluation of both structure and function of the heart. As a re-

sult of significant advances in MR technologies, it is increasingly considered to be a useful non-invasive modality which is instrumental in the management of cardiovascular conditions. Ongoing technological advancements in both data acquisition and data presentation have made integration of CMR into clinical practice possible. Evaluation of congenital heart disease is an important application of cardiac MRI as the morphological details of chambers, septum, defects, and anomalous connections are depicted accurately. Additionally, flow information across valves, chambers, outflow tracts, and shunts are also provided. The combination of exquisite 3D anatomy with physiological data enables CMR to provide a unique perspective for the management of many patients with congenital heart disease (CHD). Its utility is further increased after corrective surgery during the follow up period. Imaging small children with CHD is challenging, and in this manuscript, we will review the technical adjustments, imaging protocols, and application of CMR in the pediatric setting.

• 1019

**PULMONARY NODULES CT SCAN**Farrokh Seilanian Toosi<sup>1,\*</sup><sup>1</sup> Department of Radiology, Mashhad University of Medical Sciences, Mashhad, Iran\*Corresponding author's e-mail: [seilanianf@mums.ac.ir](mailto:seilanianf@mums.ac.ir)

Pulmonary nodules are a common incidental finding on imaging studies, particularly multidetector computed tomography (MDCT). Advances in CT have improved characterization of nodules, helping to differentiate benign from malignant lesions noninvasively. Many nodules, however, remain indeterminate and require either temporal characterization to confirm stability or invasive assessment for a definitive diagnosis. A pulmonary nodule is defined as a "round opacity, at least moderately well marginated and no greater than 3 cm in maximum diameter." Solitary pulmonary nodules (SPNs) may be caused by a variety of benign and malignant disorders. CT is significantly more sensitive than standard radiography for nodule detection, and with the increasing use of MDCT, small nodules of less than 1 cm are detected with increasing frequency. As a result, small benign lesions that would have otherwise been invisible on radiographs are now being detected. Low-dose CT has proved to be 3 times more



sensitive than chest radiography for detection of non-calcified nodules. Of those patients with nodules, 11% were eventually diagnosed with lung cancer, the majority of whom at stage I of the disease. The introduction of MDCT has minimized misregistration artifacts and improved spatial and temporal resolution, thereby, improving nodule detection and characterization. Intravenous contrast administration is not routinely required. However, it may prove useful in cases in which the suspected nodule is located adjacent to the mediastinum or hilum or if there is a suspicion for an arteriovenous malformation. Routine reconstructions typically are composed of 5-mm sections with a non targeted field of view. A targeted field of view with thin sections (1-1.5 mm) through an area of interest, however, greatly improves spatial resolution and hence nodule assessment.

• 1020

#### QUANTIFICATION OF PULMONARY THROMBOEMBOLISM IN CT ANGIOGRAPHY REPORTS AND PREDICTING RIGHT VENTRICULAR DYSFUNCTION AND PATIENT MORTALITY

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Recently, attempts have been made to quantify the clot burden on the basis of CT angiographic findings. The development of clot burden index [pulmonary arterial obstruction index (PAOI)] may have important prognostic and therapeutic implications and may provide a reproducible standard for measuring response to thrombolytic therapy. The presence of right ventricular dysfunction (RVD) is a marker for adverse clinical outcome in patients with acute pulmonary embolism (PE). The ratio of the right ventricle to left ventricle short axis diameters (RV/LV) has been proposed as an accurate sign for the presence of RVD. Other studies suggested that the quantification of a clot at pulmonary computed tomography (CT) angiography is an important predictor of right heart failure and patients' outcome in the setting of PE. In this study, we assess the measurement of PAOI and RV/LV ratio in pulmonary CT angiography and

discuss the significant correlations between them.

**Patients and Methods:** The study population comprised 42 patients (19 women, 23 men; mean age, 52 + 18 years) with the definite diagnosis of PE based on their pulmonary CT angiography. The CT angiography of patients were reviewed, and PAOI and RV/LV ratio were measured. PAOI was calculated from the size of embolus and the location of thrombus on CT images in accordance with another study by Qanadli et al. The index was defined as the product of  $N \times D$ , where N was the value of the proximal clot site, equal to the number of segmental bronchial branches, and D was the degree of obstruction, defined as 1 for partial obstruction and 2 for total obstruction. Furthermore, the scans were evaluated by measuring the minor axes of the right and left ventricles of the heart in the transverse plane at their widest points between the inner surface of the free wall and interventricular septum. By using logistic regression, PAOIs were compared with RV/LV ratio. Correlation between PAOI and RV/LV ratio was evaluated by Spearman correlation test, and receiver operating characteristic (ROC) curve was used to determine an optimal cut-off value for PAOI.

**Results:** In our study group, mean PAOI was 24.3 + 19.2%. Nine cases (21.4%) had a PAOI of more than 40%. The mean RV/LV ratio was 1.03 + 0.25; eighteen patients (43%) had an RV/LV ratio of more than 1; twenty-four patients (57%) had an RV/LV ratio of less than 1. There was a statistically significant correlation between PAOI and RV/LV ratio ( $P = 0.007$ ;  $r = 0.4$ ). The mean PAOI of patients with RV/LV ratio of  $>1$  was significantly higher than that of patients with RV/LV ratio of  $\geq 1$  (32.6% vs. 18.1%;  $P = 0.02$ ). However, based on ROC analysis, an ideal cut-off value for PAOI could not be defined. Also, there was no significant difference in PAOIs between different age ( $P > 0.05$ ) and sex ( $P > 0.05$ ) groups.

**Conclusion:** Our findings were in agreement with those of Wu et al. and suggested that the quantification of a clot at CT pulmonary angiography is an important predictor of right heart failure and determines patients' outcome in the setting of PE. There was a significant correlation between PAOI and RV/LV ratio in PE. However, there was no ideal PAOI cut-off value for the diagnosis of right ventricular dysfunction (RV/LV ratio  $>1$ ). Further studies with a larger study population may be necessary to generalize our findings and to suggest a sensitive and specific cut-off point for ventricular dysfunction in patients with PE. The prognostic role of RV/LV ratio and obstruction index on spiral CT may also warrant further investigation in patients with PE.

• 1021

### COMPARISON OF HRCT FEATURES OF PNEUMOCYSTIS JIROVECI PNEUMONIA IN PATIENTS WITH AND WITHOUT HIV

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**Background/Objectives:** Pneumocystis jirovecii (carinii) pneumonia (PJP) is one of the most common opportunistic infections in immunocompromised patients, especially in patients with human immunodeficiency virus (HIV). High resolution computed tomography (HRCT) is more sensitive for diagnosis of PJP in patients with normal or equivocal chest X-ray. Bilateral ground glass opacities (GGOs) are the most common findings in HRCT. Administration of prophylactic antibiotic against PJP and possibility of co-infections in HIV patients may lead to atypical radiologic presentations of PJP in these patients. Some studies have shown that radiologic manifestations of PJP may be altered in HIV/AIDS patients, and possibility of encountering atypical presentations is higher. Different immune reactions to the parasite *P. jirovecii* in immunocompromised patients with and without HIV may result in a different time lag between symptoms and a correspondingly different radiographic patterns. The aim of this study was to compare the HRCT features of PJP in patients with and without HIV.

**Patients and Methods:** Forty-eight consecutive patients (mean age 38.11 years; 83.7% male) with proven PJP (by lung biopsy or bronchoalveolar lavage) were enrolled to our study. Patients with co-infections (including two cytomegalovirus and three tuberculosis cases) were excluded. Twenty-seven patients (62.8%) were HIV positive and 16 (37.2%) were HIV negative. All but one of HIV negative patients had an immunocompromised condition such as immunoglobulin deficiency (n=2), malignancy (n=3), organ transplant (n=9), or on glucocorticoids (n=2).

All chest HRCT images (Siemens Somatom Emotion, Germany) were reviewed by two expert pulmonary radiologists. The radiologists were not aware of the patients' HIV status. Consequently, HRCT findings were compared between HIV+ and HIV- patients us-

ing the Chi square and Fischer exact tests. P values less than 0.05 were considered significant.

**Results:** There was substantial interobserver agreement between two radiologists (Kappa=0.8). Bilateral GGO was the most common HRCT manifestation of PJP in both HIV+ and HIV- patients; there was no statistically significant difference between the two groups (90% vs. 75%;  $P > 0.05$ ). Most of GGOs in both groups had symmetric diffuse pattern. Centrilobular nodular opacities were the second most common HRCT manifestation of both HIV+ and HIV- patients without significant difference between the two groups (55.6% vs. 37.5%;  $P > 0.05$ ). Reticulation and septal thickening in HIV+ group was significantly higher than HIV- group (44.4% vs. 12.5%;  $P = 0.03$ ). There was no cavitary lesion in the HIV+ group, while 18.8% of the HIV- patients had cavitary lesion ( $P = 0.02$ ).

**Conclusion:** Bilateral diffuse GGO is the most common HRCT manifestation of PJP in both HIV+ and HIV- patients. Septal thickening and reticular opacities are more commonly seen in PJP in HIV+ patients than in HIV- patients. Cavitary lesions as a manifestation of PJP are more common in HIV- patients.

• 1022

### HRCT FEATURES OF PULMONARY ASPERGILLOSIS IN PATIENTS WITH SOLID ORGAN TRANSPLANT

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**Background/Objectives:** Invasive pulmonary aspergillosis (IPA) is a serious infection in immunocompromised patients, especially in patients with organ transplant. By familiarizing with all radiologic features and early diagnosis of pulmonary aspergillosis, radiologists can play an important role in improving the outcome of these patients. The aim of this study was to determine the findings of IPA in HRCT of patients with solid organ transplant.

**Patients and Methods:** HRCT images of 23 patients with histopathologically proven IPA in Masih-e-

Daneshvari hospital of Tehran from 2002 to 2011 were reviewed. All patients had solid organ transplants (18 pulmonary, 4 kidney, and one heart transplants). Mean time interval between transplant to the diagnosis of IPA was 8.10 (1-48) months. Comparison between the subgroups was performed by Chi square and Fischer exact tests.

**Results:** The mean number of radiologic findings was 4. HRCT findings in order of decreasing frequency were: pulmonary nodule(s) (87%), halo sign (61%), ground glass opacities (GGO) (56.5%), consolidation (52.5%), cavity (47.8%), nodular infiltration with or without tree-in-bud (43.5%), hypo dense sign (21.7%), bronchiectasis (17.4%), pleural effusion (13%), interlobular septal thickening (13%), mass (4.3%), and air crescent sign (4.3%). Most of the nodules were multiple (80%) and larger than 10mm (85%), and cavity was seen in 40% of nodules. Forty-six percent of GGOs were diffuse and 56% of them were patchy. Forty-two percent of consolidations were patchy and 58% of them were segmental or lobar. There were no significant differences in frequency of HRCT findings of IPA in terms of age, sex, type of transplant, or interval between organ transplant and IPA diagnosis.

**Conclusion:** The main radiologic manifestations of IPA, as observed in this study, are consistent with previous studies and include a combination of nodule, halo sign, GGO, consolidation and cavity. However, radiologists should also consider IPA with other findings such as nodular infiltration, hypo dense sign, and bronchiectasis, especially in the presence of at least one common feature and in the appropriate clinical setting.

• 1023

**DIAGNOSTIC ACCURACY OF HRCT FOR DIFFERENTIATION OF NSIP, UIP AND CHRONIC HYPERSENSITIVITY PNEUMONITIS**

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Background/Objectives: Diagnosis of chronic pul-

monary fibrosing diseases is dependent on biopsy which is an invasive procedure that cannot be done in some patients. A noninvasive accurate diagnostic tool such as HRCT can obviate the need for biopsy. The aim of this study was to assess the diagnostic accuracy of HRCT for nonspecific interstitial pneumonitis (NSIP), usual interstitial pneumonitis (UIP) and chronic hypersensitivity pneumonitis (HP).

**Patients and Methods:** HRCT images of 57 patients (22 NSIPs, 21UIPs, and 14 chronic HPs) were reviewed by two pulmonary radiologists in a blinded way. The radiologic diagnosis was compared with pathologically proven diagnosis, and sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV), and diagnostic accuracy as well as reliability were determined.

**Results:** Confident diagnosis by HRCT was made in 66% of patients. The diagnosis in 93.1% of cases which were confidently diagnosed by both radiologists was consistent with histopathology. The overall agreement between two radiologists in all three diseases was fair. However, in the cases with confident diagnosis by both radiologists the agreement was excellent, especially for NSIP (Kappa=0.86). The diagnostic accuracy of HRCT for NSIP, UIP and chronic HP was 82%, 73% and 87.5%, respectively. Sensitivity, specificity, PPV, and NPV for all of these diseases were almost acceptable (71-100%).

**Conclusion:** HRCT is a highly accurate method for diagnosis of NSIP, UIP, and chronic HP. Biopsy could be avoided in case of confident agreement between two radiologists in their HRCT based diagnosis of NSIP.

• 1024

**COMPARISON OF IMAGE QUALITY OF LOW VOLTAGE 64-SLICE MULTIDETECTOR CT ANGIOGRAPHY (80 KILOVOLTAGE) WITH STANDARD CONDITION (100 KILOVOLTAGE) IN PATIENTS SUSPECTED OF PULMONARY EMBOLI**

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Background/Objectives: Comparing quality of images at 80 kV versus 100 kV



**Patients and Methods:** In a non-randomized triple blind parallel quasi-experimental study, we evaluated 140 suspicious cases of pulmonary emboli by either 80 or 100 kV CT angiography.

**Results:** Quality of images was better in 80 kV group (OR, 2.08). Vascular enhancement was significantly higher in all main, segmental and subsegmental arteries ( $P < 0.001$  in all) in 80 kV group as well. Mean number of measurable segmental arteries was also significantly higher among 80 voltage group. On the other hand, mean of image noise was higher (68.4 vs. 43.1) among images with 80 kV ( $P < 0.001$ ). Received radiation dosage in the group with 80 kV and the group with 100 kV were 0.94 and 2.43 mSv, respectively ( $P < 0.001$ ).

**Conclusion:** Despite worse image noise, received radiation dosage was lower, and image quality was better in cases with 80 kV in comparison with 100 kV.

• 1025

**MALIGNANT MESOTHELIOMA VERSUS METASTATIC ADENOCARCINOMA OF PLEURA: A COMPARISON CT STUDY**

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**Background/Objectives:** Malignant mesothelioma and metastatic adenocarcinoma are the two most common pleural malignancies. They have similar imaging findings but different prognosis and treatment. CT scan is the modality of choice for their diagnosis. In this study, details of chest CT findings in these two conditions were assessed to find out if there are any imaging clues for early differentiation.

**Patients and Methods:** Chest CT scan of 113 patients [metastatic adenocarcinoma: 58 (52%) and malignant mesothelioma: 55 (48%)] were retrospectively reviewed by two radiologists with consensus at Masih Daneshvari University Hospital Medical Center, Tehran, Iran between 2005 to 2010. Patients were assessed for 35 CT variables and smoking and occupational history.

**Results:** History of asbestos exposure was detected in 96% of cases of malignant mesothelioma. As for

malignant mesothelioma related CT findings, pleural plaques and calcifications were detected in 92% and 89% of cases, respectively. On the other hand, pulmonary mass (23%), nodules (34%), interstitial reticulation, and interlobular septal thickening (lymphangitic carcinomatosis) (15%) were in favor of metastatic adenocarcinoma. Invasion to chest wall and lobar fissure were more common in malignant mesothelioma (23% vs. 15%), while bony metastasis and mediastinal lymphadenopathy were more frequent in metastatic adenocarcinoma (18% vs. 12%). Pleural effusion in malignant mesothelioma was mostly loculated and unilateral (73%), in contrast with metastatic adenocarcinoma in which it was mostly bilateral (65%). There were no significant differences in terms of age, sex, history of smoking, extent of pleural and pericardial effusion, pleural thickening, and involvement of mediastinal pleura between malignant mesothelioma and metastatic adenocarcinoma.

**Conclusion:** Malignant mesothelioma needs to be distinguished from metastatic adenocarcinoma. These pleural tumors have different treatments and prognoses. CT scan is a primary and good imaging technique that can be used in order to differentiate these two entities. Albeit non-identical, CT appearances of malignant mesotheliomas and metastatic adenocarcinomas have similar features. Using a check list containing the mentioned diagnostic CT features can be helpful in differentiation between these two diseases.

• 1026

**ANOMALOUS RETRO AORTIC LEFT BRACHIOCEPHALIC VEIN**

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**Background/Objectives:** Anomalous retro aortic left brachiocephalic vein is a rare and less known vascular anomaly which may associate with complex heart disease and may be mistaken with normal or abnormal mediastinal structures.

**Patients and Methods:** We evaluated retrospectively

all cardiovascular CTAs which were done in 3 referral centers between 2006 to 2010. CTA of 22 patients already diagnosed with anomalous retro aortic brachiocephalic vein were reevaluated by another expert radiologist in order to detect concomitant malformations. Chi square test was used for analysis of the data.

Results: Patients' mean age was 12.9 years (from 2 month to 40 years). There were 12 males and 10 females. Among the 22 new cases, tetralogy of Fallot (TOF) component features (RVOT hypoplasia or atresia, overriding of aorta and RVH) were seen in 14 patients (63.6%). Abnormal aortopulmonary connections were detected in 14 cases (63.6%). Dilation of aortic arc was noted in 13 patients (59%). Right sided aortic arc was reported in 12 cases (54.5%) of which 5 had mirror image (22.7%). PDA was seen in 3 cases (13.6%). Hepatic hemangioma was incidentally detected in 2 patients (9.09%). In 1 patient, no other concomitant cardiovascular anomaly was seen (4.5%).

Conclusion: In our study, most common concomitant cardiovascular anomaly with anomalous retro aortic brachiocephalic vein was TOF. More than half of the patients had right sided aortic arc. In patients with pulmonary hypoplasia or aplasia, some parts of lung's blood supply were provided by aortic collaterals which had led to abnormal aortopulmonary connections. For a radiologist, it is important to differentiate this anomaly in cross-sectional imaging from a persistent left superior vena cava, partial anomalous pulmonary veins return, an elevated right pulmonary artery, and especially an enlarged lymph node. Investigations of this anomaly may lead to probable concomitant malformations and in isolated forms prevent further evaluations.

### • 1027

#### ETHICAL CASE STUDIES IN URORADIOLOGY

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Today, radiologists are more than ever in need of current knowledge and skills to make use of modern technologies. Radiologists need to be considerate of patients' values and wishes in addition to observing technical guidelines. Such conduct is

a sign of respect for patient autonomy and is the basis for informed consent before every medical procedure. Doctors are obligated to inform their patients at a level that they can understand about the procedures, its expected outcomes and its potential harms and benefits of. In the field of uroradiology especially when some sort of interventions are going to be done, disregarding informed consent as a simple but important step can impair the relationship between patient and radiologist. For example, in the cases of ultrasound guided needle biopsy of prostate, misinforming the patient on some important adverse effect of the procedure including infection, pain and injury of adjacent organs may result in serious legal action. Radiologist negligence for taking consent from patient for prostate needle biopsy is a case that will be discussed in this lecture.

### • 1028

#### SERIAL HIGH-RESOLUTION ULTRASOUND FINDINGS OF ACUTE NASAL FRACTURE: A POTENTIAL IMPLICATION TO PREDICT THE TIME OF FACIAL INJURY

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Background/Objectives: Despite the fact that physical examination is the gold standard for diagnosing nasal fractures, high-resolution ultrasonography can also be used as a noninvasive method to evaluate facial injuries especially in legal cases with old nasal trauma and also for medico-legal purposes to determine whether the findings are of recent onset. The aim of this study was to investigate the ultrasound findings of nasal fracture over time.

Patients and Methods: Thirty-six patients with the diagnosis of nasal fracture according to their physical examinations were enrolled in the current study. All patients underwent nasal bone ultrasound, and both longitudinal and transverse views were obtained and evaluated by an expert radiologist using a SonixOP system (Ultrasonix Medical Corporation,

Richmond, Canada). The first ultrasound exam was performed within the first five days of nasal trauma, and the follow-up studies were done 3, 6, 12, and 24 weeks after the trauma. Any abnormality in the nasal bone, including subperiosteal hematoma, nasal bone stepping, and hypoechoic/anechoic fracture lines were searched for on ultrasound investigation. Results: We found that in the first sonographic investigation, the sensitivities of subperiosteal hematoma, lucency in the lateral nasal bone, and nasal bone stepping were 100%, 90.32%, and 77.42%, respectively for the diagnosis of recent fracture. During the first three weeks after nasal trauma, subperiosteal hematoma and lucency in the lateral nasal bone had the highest diagnostic values which were statistically significant ( $P < 0.0001$ ). The predictive values of subperiosteal hematoma and lateral nasal bone lucency in sonographic investigation for estimating the time of nasal trauma were 86.3% and 67.7%, respectively. Furthermore, in the performed serial ultrasound exams, subperiosteal hematoma and lucency in the lateral nasal bone were persistent for 25 and 85 days, respectively.

Conclusion: High-resolution ultrasound can be helpful to diagnose nasal fracture and to estimate the actual time of nasal bone fracture. The latter has potential implications in forensic medicine to predict the time of facial injury, e.g. a patient with a nasal fracture between 25 and 85 days ago may have lucency in the lateral nasal bone with no subperiosteal hematoma.

### • 1029

#### MR ENTEROGRAPHY: A NEW EXPERIENCE IN IRAN

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Magnetic resonance enterography (MRE) is playing an increasingly important role in the evaluation of small bowel disorders particularly in patients with Crohn's disease (CD). Despite advances in endoscopic techniques that can help gastroenterologists directly visualize the colon, the small bowel remains relatively inaccessible. Absence of ionizing radiation, improved soft-tissue contrast, the ability to

provide dynamic information about bowel distention and motility, and a relatively safe intravenous contrast agent are the main advantages of MRE. It can also provide superior diagnostic information about CD especially in differentiating active inflammatory disease from chronic fibrostenotic disease. Although a true epidemiologic profile of CD in Iran is not quite clear, its incidence is widely on the presumably due to gradual adoption of a western lifestyle in Iran. Unlike developed countries, MRE is not well-known by most Iranian radiologists. In this talk, we will aim to discuss the technical aspects of MRE and illustrate the range of imaging findings in patients suspected to have CD who referred to a university hospital in Tehran with a referral gastroenterology center.

### • 1030

#### GASTROINTESTINAL IMAGING

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The aim of this presentation is to provide a brief overview on the broad spectrum of gastrointestinal radiology. The discussion will include disorders of esophagus, diaphragm, stomach, small bowel, and colon. Each organ-focused section is subdivided into parts related to diseases or findings of that organ. For each condition some illustrations will be shown and the key facts will be discussed. The imaging modalities consist of plain films, barium studies, ultrasound, and CT scan. The ultimate goal of this presentation is to provide the essential knowledge that is needed to make an accurate diagnosis with gastrointestinal imaging.

### • 1031

#### THE ROLE OF INTERVENTIONAL RADIOLOGY IN DISEASES OF THE HEPATOBILIARY SYSTEM

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Interventional radiology is a safe, less invasive therapeutic modality as compared with open surgery in the treatment of hepatobiliary diseases with less recovery time and significant side effects or damage to the adjacent normal tissues. Patients who have suffered hepatobiliary problems benefit from interventional radiology (IR) techniques. First-line modern imaging modalities, such as duplex ultrasonography, 3 and 4 phasic CT scan, and high-resolution MRI, have revolutionized the diagnosis and management of hepatobiliary diseases. Pioneers in this field have performed IR procedures, such as transjugular intrahepatic portosystemic shunt (TIPS), transjugular liver biopsy (TJLB), biliary stent, and embolotherapy, for the hepatobiliary system. Recently, interventional radiologists, in cooperation with gastrohepatologists, have even further promoted development of this field of medicine. For management of patients, we need collaboration between internists, gastroenterologists, oncologists, surgeons and interventional radiologists. This multidisciplinary management requires attendance of several health service providers. This review provides an overview of the interventional procedures for patients with hepatobiliary problems.

• 1032

**THE EFFICACY OF ENDOANAL SONOGRAPHY IN TREATMENT OF PATIENTS WITH ANAL DISEASES REFERRED TO SHIRAZ COLORECTAL SURGERY (SCRS) DEPARTMENT SINCE 2011**

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Background/Objectives: Different diagnostic modalities have been used in treatment of patients with anal diseases who have referred to Shiraz colorectal surgery (SCRS) department in the past 7 years. These modalities include anoscopy, manometry, endoanal sonography, MRI and EMG in addition to clinical

evaluation. Among these modalities, endoanal sonography looks like the first choice of SCR surgeons, and with their increasing reliance on ultrasound findings, the rate of using other modalities have declined among in recent years.

Patients and Methods: To evaluate the efficacy of endoanal sonography on treatment planning of patients with anal diseases, we reviewed the notes of patients who had anal sonography prior to treatment by using Medtronic 360 degree endoanal sonography device. We focused on decision making efficacy of this modality and its diagnostic accuracy.

Results: Endoanal sonography was done in 1418 patients from March 2011 to December 2013. In 83% of patients anal canal structure was normal, and in 17% of patients, pathological findings such as anal canal tumor, peri-anal fistula and anal sphincter muscle damage were found. Comparing to other modalities, endoanal sonography had most accuracy in diagnosis of patients with fecal incontinence and was very helpful for colorectal surgeons in decision making for patients with anal canal tumors. In 5 patient with anal canal tumor, primary decision of local excision was changed to AP resection because of detecting T2 or T3 involvements. In 2 patients who insisted on local excision, deep tissue involvement was revealed on histopathology. In patients with incontinence due to sphincter damage, the detected site of damage was accurate in 100% of patients, and colorectal surgeons could confidently rely on sonography findings for approach to the site of sphincter defect. In 15 patients with longstanding anal pain, a small peri-anal cold abscess was detected on endoanal sonography. These abscesses had not been diagnosed prior to ultra sound scanning and were eventually approached and treated under the guide of sonography.

Conclusion: Endoanal sonography can be the best modality in detection of anal canal diseases if there is close cooperation between radiologists and colorectal surgeons.

• 1033

**USEFULNESS OF LUNG WINDOW IN EVALUATING ABDOMINAL COMPUTED TOMOGRAPHY OF DRUG MULES**

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**Background/Objectives:** With increasing rate of drug smuggling, the emerging legal implications and possible need for urgent surgery in drug mules make early and accurate diagnosis important. It has recently been recommended to review the abdominal computed tomography (CT) of suspected drug mules in lung window for better delineation of ingested packets and pellets. We conducted a study to examine the usefulness of adding lung window to conventional abdominal window.

**Patients and Methods:** At a major toxicology referral center, 40 suspects (35 males and 5 females) who had undergone abdominal CT scan were included in the study, and their scans were reviewed by a board-certified radiologist in both abdominal and lung windows. The gold standard was detection of packs in stool examination or surgery which was positive in 25 patients.

**Results:** The sensitivity, specificity, positive predictive value, negative predictive value, and accuracy of abdominal CT scan with conventional abdominal window in detection of drug mules were 50%, 100%, 100%, 46%, and 65% respectively which increased to 53.5%, 100%, 100%, 48%, and 67.5% after adding lung window. Adding lung window, only one body stuffer who was over looked on abdominal window for the hypodense peripheral cover of the pack could be detected additionally. However, more number of packs were detected (mean 7.4 vs. 6.9) and the difference was significant ( $P = 0.04$ ).

**Conclusion:** Reviewing the abdominal CT scan of drug mules in lung window helps to detect more number of ingested packets and pellets, however its usefulness is strongly related to the way ingested packs are fashioned. Small pellets with loose wraps are not well visualized even on lung window and are more prone to leak in the gastrointestinal tract.

#### • 1034

### DIFFERENTIATION BETWEEN GROIN HERNIA WITH CROSS-SECTIONAL IMAGING

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The sectional imaging of groin hernia poses a problem to the inexperienced operator due to intricate anatomy of the region. Inguinal and femoral hernias are the usual defects with a prevalence rate of 5% or more. Inguinal hernias comprise approximately 75% of all hernias, of which two-thirds are indirect and one-third are direct. Femoral hernia represent 3% of hernias. Although both types may be incarcerated and strangulated, the risk is higher for the femoral type (20%-25% vs. 3%). Current surgical information still indicates that indirect inguinal and femoral hernias require surgery as they are at higher risk for complications. As surgical approach differs in inguinal and femoral hernias, the ability to differentiate different hernias is both in the interest of the patient and the clinician. The aim of our study is to propose reliable guidelines for distinguishing three types of groin hernias with combined planes of CT to help radiologists better assist the clinicians in accurate diagnosis. In all articles which we reviewed, identification of pelvic anatomic structures, location of each type of groin hernia in relation to important CT landmarks (such as inferior epigastric artery and pubic tubercle,...), and also key findings in each type of hernia have been investigated. We first explain schematic anatomic structures in axial, coronal and sagittal planes of contrast-enhanced CT and then introduce easy and reliable guidelines to approach the groin hernias.

#### • 1035

### RADIOLOGIC MANIFESTATIONS OF CHRONIC CONSTIPATION IN CT SCAN

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**Background/Objectives:** Constipation is the most common gastrointestinal complaint in the general population. Given the long transit time of fecal material and abnormal aggregation of feces in the colon in chronic constipation, some anatomical changes such as increase in diameter or elongation of the colonic segments may be expected. Sometimes in abdominal radiological examinations, like CT scans that were performed for any clinical

reason, these changes are evident. The question is whether they are normal variations or secondary to chronic constipation. In the literature review, we did not find any clear answer to this question. This problem encouraged us to set up a new study to clarify the answer.

**Patients and Methods:** This was a comparative cross sectional study. We studied 86 patients, in whom abdominopelvic CT scan was performed for any reason with a 64-detector MDCT. According to the Rome-III criteria, the patients were assigned to the constipated (33 patients) and non constipated groups. The colon was surveyed by a radiologist in axial, coronal and sagittal sections, and the maximum diameter of every portion of colon and evidences of colonic elongation were recorded.

**Results:** There was no significant difference between the two groups in terms of age ( $P = 0.105$ ), height ( $P = 0.239$ ), weight ( $P = 0.220$ ), the maximum diameter of ascending ( $P = 0.227$ ), descending ( $P = 0.136$ ) and transverse colon ( $P = 0.613$ ) and rectum ( $P = 0.712$ ).

**Conclusions:** Based on the results of this study, the diagnosis of constipation may not be drawn from anatomic changes of colon in radiologic studies.

• 1036

**SONOELASTOGRAPHY OF THE LIVER**

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In general population, chronic liver disease is a great public health problem. Liver fibrosis, a common pattern in the usual causes of chronic liver disease, involves the gathering of collagen and other macromolecules inside the extracellular matrix. Fibrosis tends to proceed, leading to liver dysfunction, portal hypertension, and eventually cirrhosis. Liver biopsy is the gold standard for the diagnosing of liver fibrosis, and unfortunately it is invasive, expensive, with sampling variability and probable complications (mortality rate is procedure-related: one in 10,000-12,000). For patients with chronic liver disease, it is important to delineate the degree and grading of fibrosis progression. Ultrasonography (US) provides ideal noninvasive assessment for

diffuse liver disease because of its low cost and wide availability. Conventional B-mode US is good for the diagnosis of advanced cirrhosis, but is insensitive for fibrosis. Elastography may be employed as a substitute diagnostic technique for fibrosis. The METAVIR scoring system assigns fibrosis to five stages of F0: no fibrosis, F1: portal and periportal fibrosis with no septum, F2: portal and periportal fibrosis with rare septa, F3: portal and periportal fibrosis with many septa, F4: cirrhosis). In elastography, a mechanical force (compression or vibration) is applied to the soft tissues, and a conventional imaging technique such as US or MR imaging is used to create a map of soft-tissue deformation. There are two types of elastography: static and dynamic elastography. Static elastography is now a more common type of elastographic imaging. In this method, a single and very small compressive force is used by pressing with the ultrasound probe, typically and then the displacement of tissue is calculated. Static elastography has been widely used with superficial organs. It is more difficult to apply in deeper organs, and also the qualitative figures have not been displayed to have value for detection of liver fibrosis by using a vibratory stimulus to produce shear waves (which slowly pass through tissues) to be tracked by ultrasound. The spreading rate of shear waves depends upon the shear modulus of tissues, which is usually proportional to the Young's modulus directly. Hence, quantifying tissue stiffness is possible by using this method. The first ultrasound system to apply this method is the Fibroscan (by Echosens) which can evaluate liver fibrosis. Shear waves are sent into the liver by a piston at the center of the probe, and the shear waves velocity is used to assess the shear modulus. This tool has proved feasible for the noninvasive diagnosis of moderate and severe fibrosis, but mild changes are not detected. Development of other systems to apply acoustic radiation force imaging (ARFI) (such as the Siemens S2000) by pushing on organs with a high-powered ultrasound pulse is under way. Currently, there are three main techniques to evaluate liver stiffness: transient elastography (FibroScan by Echosens), acoustic radiation force impulse (ARFI) imaging, and shear-wave (SW) elastography. Among these methods, transient elastography offers the capacity to estimate mean tissue stiffness noninvasively. Several recent studies have proved that the measurements of liver stiffness with transient elastography are well correlated with the METAVIR stages of fibrosis. In addition, transient elastography is helpful as it can be performed repeatedly. However, it is not a real-time

technique because the sonographic images are not visible during the measurement. In patients with hepatosteatosis and increased body mass index (BMI), the reproducibility of transient elastography is substantially reduced as the modality of ultrasonography itself has restrictions for visualizing the liver clearly in these patients. Real-time sonoelastography is another method for the evaluation of tissue elasticity. It uses a B-mode ultrasound, combining with elastography with the conventional US scanner. This device estimates the relative hardness of the organs and displays this data as real-time color images. It can show tissue elasticity images and conventional B-mode images at the same time. There are many reports and approaches to evaluate liver stiffness without liver biopsy. Among them, the FibroScan appears useful.

• 1037

### USING OPTIMAL PROJECTIONS FOR REDUCTION OF RADIATION RISKS IN SOME RADIOGRAPHIES

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**Background/Objectives:** While modern nonionizing imaging systems such as magnetic resonance imaging offer undeniable advantages including lack of radiation and better image quality, the availability and lower cost of conventional X-ray examinations make them remain a cornerstone of diagnosis. While being highly helpful in the diagnosis of diseases, radiological examinations may involve potential risks. One of the most efficient dose reducing methods requiring no additional cost is the use of optimized projections instead of the traditionally accepted projections. The goals of the present study were the calculation and comparison of the effective doses and the risks of exposure induced cancer in male and female patients for different projections of the abdomen, the pelvis, and the lumbar spine X-ray examinations.

**Patients and Methods:** Radiographies of lumbar spine [in the eight projections of anteroposterior (AP), posteroanterior (PA), right lateral (RLAT), left

lateral (LLAT), right anterior-posterior oblique (RAO), left anterior-posterior oblique (LAO), right posterior-anterior oblique (RPO), and left posterior-anterior oblique (LPO)], abdomen (in the two projections of AP and PA), and pelvis (in the two projections of AP and PA) were investigated. A solid-state dosimeter was used for the measurement of skin exposure. A Monte Carlo program was used for calculation of effective doses and the risks of radiation-induced cancer related to the different projections.

**Results:** Results of this study showed that PA projection of abdomen, lumbar spine, and pelvis radiographies caused 50%-57% lower effective doses than AP projection and a 50%-60% reduction in radiation risks. Also, the use of LAO projection in lumbar spine X-ray examination caused 53% lower effective dose than RPO projection and 56% and 63% reduction in radiation risk for male and female patients respectively. Furthermore, RAO projection caused a 28% lower effective dose than LPO projection and 52% and 39% reduction in radiation risk for male and female patients respectively.

**Conclusion:** Results of this study may introduce preferable projections for reduction of the effective dose and the risk of radiation-induced cancer. Recommended projection, whenever possible, for abdomen and pelvis X-ray examinations should be the PA projection rather than AP projection. Also, suggested projections for lumbar spine radiography should be PA rather than AP, LAO rather than RPO, RAO rather than LPO, and for men, RLAT rather than LLAT.

• 1038

### ACCURATE QUANTIFICATION OF METABOLITE RATIO IN OSTEOSARCOMA EMPLOYING CLINICAL MAGNETIC RESONANCE SPECTROSCOPY AT 3T; A COMPARATIVE STUDY WITH NORMAL TISSUE

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**Background/Objectives:** Proton magnetic resonance spectroscopy imaging (1H-MRSI) has recently attracted attention in musculoskeletal applications



in general, and in osteosarcoma in particular. Acquired spectra in the MRSI procedure are usually corrupted due to low signal-to-noise ratio (SNR), as well as baseline and residual water contaminations, leading to quantification errors and; therefore, misinterpretation of the ratios calculated by the clinical scanner's software. The aim of this study is accurate quantification of Choline-to-Creatine (Cho/Cr) ratio elevating in osteosarcoma.

**Patients and Methods:** Cho/Cr were obtained in 10 patients and 10 healthy volunteers at 3T (Siemens Tim-Trio) by MRSI (PRESS, TR/TE: 2500/135 ms) using a phase-array coil with water-suppression. An extra single voxel spectroscopy (SVS) without water-suppression was acquired to provide phase information for further Eddy-current correction (ECC). Multi-stage preprocessing was applied as follows: ECC, SNR-enhancement and water-removal. Subtract-QUEST-MRSI as a time-domain technique was employed to accurately quantify the metabolite ratios and to estimate the baseline. An optimal database for subtract-QUEST was achieved based on multiple trials evaluated by acceptable peak fitting and Cramer-Rao-Bound (CRB) including Alanine, Cho, Cr, Lactate, Lipid and water. Lipids at frequencies of 0.94 and 1.33 ppm were combined to increase accuracy of the Lipid estimation.

**Results:** The average values of Cho/Cr for 10 patients and 10 volunteers were  $0.448 \pm 0.055$  and  $0.324 \pm 0.030$ , respectively, and the meaningful change of 35% ( $P < 0.0001$ ) between the two groups. Reliability of the quantitative results was estimated by employing CRB which was about 93.6% among the 10 volunteers.

**Conclusion:** In this study, we managed to observe meaningful changes in the Cho/Cr ratio in osteosarcoma lesions versus the control group employing 1H-MRSI. The best database for subtract-QUEST-MRSI was optimized in osteosarcoma. Reliability of the quantitative results was about 93.6% among the 10 volunteers.

• 1039

### IMPROVED QUANTIFICATION OF DYNAMIC CONTRAST ENHANCED MR IMAGING (DCE-MRI) IN ADNEXAL MASSES BY ELASTIC REGISTRATION METHOD

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**Background/Objectives:** Ovarian cancer is the fifth commonest cancer affecting women in the developed world and is the primary indication for gynecological surgery. Quantitative dynamic contrast enhanced MRI (DCE-MRI) has been shown beneficial to differentiate malignant and benign tumors and is increasingly used as the investigational biomarker of response in clinical studies based on the measurement of enhancement characteristics. One of the major assumptions in quantification of DCE-MRI in abdominal organs is spatially-fixed region of interest over the time course of contrast agent passage. However, there are two types of motion occurring in the image series, which could invalidate this assumption and thus the quantification outcome: one of them from complex motion resulting from breathing, pulsation and the natural movement of the organ of interest, and the other one from the motion of the contrast agent. Thus, the accurate quantification of DCE-MR image series highly depends on minimization of motion artifacts. To this end, proper registration of images that have been acquired in different time points is essential for deriving diagnostic information to produce a dataset without motion artifact. Here, we have proposed a registration approach for accurate quantification of DCE-MRI in ovary, employing elastic registration to account for spatially-varying intensity changes within the registration framework.

**Patients and Methods:** Data Acquisition: DCE-MR images of eighteen patients (10 benign and 8 malignant tumors based on histopathology) diagnosed with solid or solid/cystic ovarian masses were acquired on a 3T MR scanner (Siemens MAGNETOM Tim TRIO) using a surface phased-array coil, TE/TR = 1.74/5 ms, flip angle = 60°, image matrix = 156×192, FOV=23×23 cm<sup>2</sup>, slice thickness = 5 mm, number of measurements = 52 at 6 s/volume, number of slices = 16. The acquisition was performed before and immediately after injection of 0.2 mL/kg of Gadolinium (DOTAREM; Guerbet, Aulnay, France), followed by injection of 20 cc normal saline solution with 3 mL/min injection rate.

**Image registration:** The pre-contrast image is taken as the reference and the consequent images are aligned with the reference image. We have employed elastic registration algorithm developed by Periaswamy and Farid. The geometric transforma-

tion is a local affine model with a global smoothness constraint. Intensity variations are modeled with local changes in brightness and contrast. The mean squared error metric was applied to the intensity values to correct the nonlinear distortion. A least-squares technique was used to minimize the error function which is linear in model parameters. An iterative nonlinear minimization scheme is used to minimize the nonlinear error function

**Quantification:** As proposed, time-to-peak (TTP) and wash-in-rate (WIR), defined as  $(SI_{max}-SI_0)/TTP$ , can be used to distinguish between benign and malignant ovarian masses.

**Results:** The impact of the registration methods was shown on the selected regions-of-interest (ROIs) located in solid part of the tumor in malignant forms. As a result, the elastic registration algorithm significantly improves the signal intensity curves, especially in psoas that inhibited much distortion. In addition, the mean and the median of the standard deviation within the ROIs selected on tumor and psoas over the time courses of contrast agent passage were computed, which suggests that the elastic registration (E-Reg) method significantly improves the signal intensity-time courses in contrast to the unregistered (UnReg) images. Similar results are obtained for the other data sets. Also, quantitative parameters were calculated for unregistered and elastic registered images. It can be inferred that the value of mean to standard deviation ratio of the parameters increased after registration, which would improve the characterization of benign from malignant ovarian masses.

**Conclusion:** From the results attained in this work, it can be concluded that the outcome of ovarian cancer characterization could benefit from elastic registration approach and hence this method can be reliably used for quantification of DCE-MR images of adnexal tumors.

• 1040

## PHARMACOKINETIC MODEL AND ARTERIAL INPUT FUNCTION SELECTION IN DYNAMIC CONTRAST ENHANCED-MRI IN HEAD AND NECK CANCERS

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**Introduction:** Head and Neck cancers constitute 6% of all cancers. Dynamic contrast enhanced magnetic resonance imaging (DCE-MRI) has the potential to measure the physiological properties of the tissue, like vascularization, vascular leakage, blood vessel volume fraction and blood flow, all of which play important roles in oncology. DCE-MRI is an effective MR imaging technique suitable for characterizing tumor angiogenesis, which is a critical process in tumor growth and metastasis. DCE-MRI technique is performed by acquiring MR images during the passage of an exogenous contrast agent (CA) in the tissue of interest. When the acquisition time is short, it allows to get valuable information about perfusion, tracer uptake and wash-out rate (WOR). Quantitative measures of tumor vascularity could be computed by investigating the signal intensity change during CA passage with respect to the signal intensity before CA injection in the tissue of interest and a reference artery, representing the arterial input function (AIF). Accurate definition of the behavior of the tissue during CA passage highly depends on selected tracer kinetic parameters, which can be modeled using "pharmacokinetic (PK) modeling" approach, and the AIF selection strategy. Here, we aim to introduce the proper PK model, describing hemodynamic characteristics of head and neck cancer, and AIF selection approach.

**Methods:** Various PK models have been introduced in literature to be used in combination with DCE-MR imaging, each exploiting different subsets of kinetic parameters. In most tissues, CA leaks rapidly into intracellular intravascular space (EES) at a rate determined by the permeability of the micro vessels (K<sub>Trans</sub>), their surface area (PS), and blood flow (F). Two other parameters include V<sub>e</sub>, which shows the EES volume per unit volume of tissue and V<sub>p</sub>, that indicates the blood plasma volume per unit volume of tissue. In order to achieve the optimal tissue-specific model, it is essential to select suitable descriptive parameters of the tissue of interest.

Accurate quantification of kinetic parameters highly rely on accurate characterization of AIF, which could itself be affected by many technical factors such as spatial and temporal resolution accuracy of the T<sub>1</sub> measurements, in-flow effects, B<sub>1</sub>-inhomogeneity and also many patient-related factors such as heart output rate, vascular tone, hematocrit and tracer distribution in the body and kidney. Recently, it has been proposed that measuring the contrast

agent concentration in veins could be preferable in brain perfusion studies, as it could reduce the in-flow effects.

Conclusion: Results show that there are two models, namely Tofts and Brix, which can be used in head and neck cancers. One of the problem of PK modeling would be AIF selection. In order to increase the validation of AIF selection it is possible to use the vein CTCs for Tofts model to measure the reliable pharmacokinetic parameters.

### • 1041 LUMBAR SPINAL STENOSIS

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As we age, our spines change. These normal wear-and-tear effects of aging can lead to narrowing of the spinal canal. This condition is called spinal stenosis. Almost everyone will experience low back pain at some point in their lives. A common cause of low back pain is lumbar spinal stenosis. Your spine is made up of vertebrae, muscles, ligaments, nerves, and intervertebral disks. When stenosis occurs in the lower back, it is called lumbar spinal stenosis. It often results from the normal aging process. As people age, the soft tissues and bones in the spine may harden or become overgrown. These degenerative changes may narrow the space around the spinal cord and result in spinal stenosis. Degenerative changes of the spine are seen in up to 95% of people by the age of 50. Spinal stenosis most often occurs in adults over 60 years old. Pressure on the spinal cord is equally common in men and women, although women are more likely to have symptoms that require treatment. A small number of people are born with back problems that develop into lumbar spinal stenosis. This is known as congenital spinal stenosis. It occurs most often in men. People usually first notice symptoms between the ages of 30 and 50. Arthritis is the most common cause of spinal stenosis. Arthritis is the degeneration of any joint in the body. Since 2002, we have treated spinal stenosis with CT guided epidural injection of steroids.

### • 1042 MR IMAGING OF POSTEROLATERAL CORNER INJURY OF THE KNEE

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Although injuries to lateral knee structures are less common than medial knee structures injuries but are important because they may be more disabling, frequently overlooked at clinical examination and also overlooked in interpretation of knee MRI studies due to association with cruciate ligaments and medial knee structures injuries which are more easily recognizable at MR images. The lateral knee stabilizers are composed of a complex arrangement of ligaments, tendons, and muscles. We can evaluate these structures by routine magnetic resonance (MR) imaging sequences performed in the sagittal, coronal, and axial planes. Anterolateral stabilization is provided by the capsule and iliotibial tract. Posterolateral stabilization is provided by the arcuate ligament complex, which comprises the lateral collateral ligament; biceps femoris tendon; popliteus muscle and tendon; popliteal meniscal and popliteal fibular ligaments; oblique popliteal, arcuate, and fabellofibular ligaments; and the lateral gastrocnemius muscle. Structures of the anterolateral quadrant are most frequently injured; posterolateral instability is considerably less common. Practically all tears of the lateral collateral ligament are associated with damage to posterolateral knee structures. Most injuries of the popliteus muscle and tendon are associated with damage to other knee structures. MR imaging can demonstrate these injuries. Familiarity with the musculotendinous anatomy of the knee will facilitate accurate diagnosis with MR imaging.

### • 1043 IMAGING PRESENTATIONS OF SPINAL INSTABILITY

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Low back pain is a common condition with a lifetime prevalence of up to 84% in the general population. In many cases it remains difficult to determine the exact cause of back pain, but among various other conditions, lumbar instability is important. Spinal instability is defined as an abnormal response to applied loads, characterized by movement in the motion segment beyond normal constraints. The etiologies of spinal instability can be classified as congenital (dysplastic), spondylolytic (isthmic), degenerative, traumatic, pathologic and iatrogenic (i.e., postoperative). The diagnosis of intervertebral instability is based on the direct and indirect radiological findings of an abnormal vertebral motion. A variety of imaging modalities are currently used to assess spinal instability with each having its merits and demerits. Plain radiographs are the baseline investigation but have uncertain diagnostic value as they show only indirect evidences of spinal instability. Functional radiography is promising; however, it has its limitations of inaccurate reproducibility and non-standardized techniques. Computed tomography offers a higher sensitivity than plain radiographs due to its superior contrast resolution and better delineation of bony structures. Functional CT illustrates abnormal motion between the facet joints and objectively establishes spinal instability. MR imaging is highly sensitive in detection of soft tissue abnormalities that contribute to spinal instability. Analysis of the various imaging modalities reveal that no single modality is complete by itself and needs to be complemented by other.

• 1044

**QCT AND DIAGNOSIS OF OSTEOPOROSIS**

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Noninvasive measurement of bone mineral density (BMD) is a technology that benefits both the patient and society through its potential to decrease the morbidity, mortality, and cost of fractures associated with osteoporosis through early detection and treatment. In general, two sites are assessed, the spine and the hip. If one of these sites cannot be as-

essed, the protocol should outline the next site to be used. Quantitative computed tomography (QCT) can identify patients with low BMD compared to the QCT reference database and who are at risk for fracture. QCT cannot be used to diagnose osteoporosis based on the quantitative BMD value obtained, since it has never been validated for WHO criteria. It is, however, the only other technology besides DXA that is approved for treatment follow up. Quantitative computed tomography (CT) is a three-dimensional non-projectional technique to quantify bone mineral density (BMD) in the spine, proximal femur, forearm, and tibia with a number of advantages to other densitometric techniques: cortical and trabecular bone can be separated, trabecular volumes of interest (VOI) are largely independent of degenerative changes in the spine; so, QCT can be used to assess/monitor patients with extensive degenerative disc disease, more sensitively than DXA for density changes in the vertebral body and 3D geometric parameters can be determined. Bone mineral density (BMD), as measured by QCT, is a true density measured in g/cm<sup>3</sup>, in contrast to dual-energy X-ray absorptiometry (DXA), which determines an areal density (BMDa) measured in g/cm<sup>2</sup>. It has also some disadvantages such as higher radiation dose and lack of applicability with WHO diagnostic criteria. Furthermore, diagnosis of low bone mass is made by using the QCT criteria which is technically more difficult than DXA unless spiral technique is used. In modern spiral CT scanners, various techniques are implemented to significantly reduce radiation exposure by optimally adapting the X-ray tube current to the individual subject being scanned. The level of dose reduction depends on anatomical location. However, due to limited medical evidence, definitive advice on its use in all clinical practices cannot be provided until more data emerge.

• 1045

**WHAT THE ORTHOPEDIC SURGEON WANTS TO KNOW IN SHOULDER MRI?**

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High quality MR images and good reports are essential in many shoulder diseases. Common should-



der diseases are rotator cuff pathologies (from impingement to cuff tear arthropathy), instabilities and SLAP lesion. In cuff pathologies, we need to know about type, location and size of the tear, severity of muscles atrophy, fatty degeneration, type of acromion, severity of ACJ degeneration and its undersurface spurs, subchondral cysts in head, and accompanying SLAP lesion. In instabilities, we need to know about type, location and extension of labral tears, presence or absence of glenoid rim fracture or erosion, Hill-Sachs lesion and accompanying cuff pathologies. In this lecture, we discuss some problems that we encountered in the diagnosis of common shoulder diseases where high quality MRI, and good reports are instrumental.

### • 1046

#### OPLL, DISH AND HPLL IMAGING PRESENTATION

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Posterior longitudinal ligament (PLL) originates at the basiocciput, extends along the posterior aspect of the vertebral bodies and intervertebral discs and inserts into the sacrum. When hypertrophied (HPLL) and ossified (OPLL), the ligament encroaches upon the spinal canal. The OPLL is diagnosed when ossification originates within or spans the space between two discs to involve the ligament overlying the centrum of the vertebral body in between. The HPLL is defined by thickening of the PLL that compresses the dural tube. The differential diagnosis should be made based on the existence of ossification either on the X-rays or the histological findings. The relation between HPLL and OPLL is still controversial, and there is no universal consensus as to whether HPLL evolves into OPLL. For diagnosis, plain films may be useful. MRI should be the initial study for a patient with non-traumatic myelopathy. OPLL appears as an area of low signal and CT-myelogram provides better resolution of osseous anatomy and longitudinal retrovertebral opacity. Etiology of OPLL is unknown, but high incidence of diffuse idiopathic skeletal hyperostosis (DISH) among OPLL patients suggests a hereditary diathesis of spinal ligament ossification.

The diagnostic features of DISH are: calcifications and ossifications along the anterolateral aspect of vertebral bodies, osteophytes, preservation of disk height, an absence of excessive disk disease, bony ankylosis, and sacroiliac erosion. Radiography is sufficient for diagnosing DISH. Occasionally, computed tomography (CT) scanning may be performed to evaluate complications. Bone scanning and MRI do not play a significant role.

### • 1047

#### THREE DIMENSIONAL TRANSPERINEAL ULTRASONOGRAPHY OF THE PELVIC FLOOR

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Ultrasound images have replaced conventional radiology as the modality of choice for imaging the female patients with voiding dysfunction and evaluation of pelvic floor function. Transvaginal, introital, and perineal ultrasound can all be performed with 3D and Doppler options. Recommended bladder filling to ensure reliability and reproducibility of obtained data is about 300 ml. Urethral funneling is more pronounced in an appropriately filled bladder. Prolapse is less apparent when pressing with a full bladder than with a partially filled bladder. 3D ultrasound sectional images are replacing MRI because of an equivalent resolution and the added advantage of ease of utility, dynamic display, and vascular display. Once the midsagittal view of the pelvic floor is obtained, the patient can be asked to strain, and a cine loop of the action can be recorded, allowing relative organ position changes to be assessed. The major muscle of the pelvic floor is the levator ani. The muscle complex spans the space between the obturator internus muscle laterally, the pubis symphysis anteriorly and the coccyx posteriorly. Levator ani muscles support the pelvic floor and counteract the pressure by contracting and creating a circular closing of the levator hiatus and an upward movement of the pelvic floor and perineum. The indices for evaluation of anterior compartment are H (distance between the bladder neck and a line through the lower edge of the pubic symphysis) and B (posterior urethrovesical angle). These

indices are determined at rest, during the Valsalva maneuver, and during pelvic floor contraction. Normal range of H is 20.6 mm at rest and 14.0 mm during strain. Normal posterior urethrovesical angle is 96.8° at rest and 108.1° during strain. The posterior compartment elements (internal sphincter, external sphincter, and longitudinal muscles) also can be evaluated with sonography. Four ultrasonographic signs of sphincter damage include thickening of the ES at the 12-o'clock position, thinning of the IS in the area of rupture with thickening opposite the rupture site (the half-moon sign), IS/ES discontinuity and abnormality of the mucous folds.

• 1048

### T1 QUANTIFICATION OF THE CORTICAL BONE EMPLOYING SHORT-TE MRI AT 1.5 AND 3 TESLA

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**Background/Objectives:** Larger pores in human cortical bone (>30 μm) have essential role in its mechanical competence, suggesting to quantify such proton pools as a reliable measure of cortical bone porosity and thus, cortical bone quality. Signal from such pores can be captured using short echo time (STE) pulse sequence with echo-time in the range of 0.5-1 ms. Since T1-relaxation increases with the porosity volume, in the first step we have quantified T1 values as a reliable measure of cortical porosity employing the dual-TR technique. Results show that the T1 values quantified by this method are accurately close to the ones reported in the ultra-short echo time (UTE) literature. Such T1 values can be used in the quantification process of cortical bone porosity to discriminate osteoporotic bone from normal.

**Patients and Methods:** Image Acquisition: Mid-tibia images were acquired using STE pulse sequence with two different TR values (TR1 = 20 ms and TR2 = 60 ms) on both 1.5T (Siemens, Magnetom Avanto 18 channel) and 3T (Siemens Tim Trio, Erlangen, Germany) MR scanners. Volunteers enrolled into our study were 3 males and 5 females (20-57 years with the mean age of 37.4) for 1.5T acquisition, and 2 males and 3 females (26-37 years with the mean age of 29) for 3T acquisition. An 8-channel Tx/Rx knee

coil was used for both acquisitions.

**T1-Quantification:** Steps of quantification are as follows: (1) manual segmentation of the whole cortical bone at each of the two images with different TRs; (2) computation of the ratio value, by dividing the mean signal intensities of the segmented cortical bone acquired from long-TR (TR2) and short-TR (TR1) images, respectively; (3) calculation of cortical bone T1-value at each imaging slice; and (4) calculation of the average T1-values for each subject from ten different slices.

**Evaluation of signal-to-noise ratio (SNR):** To evaluate SNR values, we placed two ROIs on each acquired image. The first ROI was on the segmented cortical bone and the second one on the background noise. Then, we calculated SNR by dividing the mean intensity of the first ROI by the mean intensity of the second one. This evaluation was performed on images with higher intensity (TR = 60). The obtained SNR values were in acceptable range (SNR > 12 at 1.5 T and SNR > 17 at 3 T).

**Results:** Results for quantitative measurement of T1-values were shown in eight and five healthy volunteers using STE pulse sequence at 1.5 and 3 T respectively. Measurements were performed for both genders, resulting in the mean T1-values of about 202.81 ms and 238.56 ms for human cortical pore water at 1.5T and 3 T respectively. Such T1 quantities are in a good agreement with the values reported in the UTE literature (380-775 ms and 200-400 ms at 4.7T and 3T, respectively).

**Conclusion:** Results show that quantifying T1-relaxivity of the cortical bone using STE-MRI is feasible with the similar accuracy of UTE imaging. Such pulse sequences are available on commercial MRI magnets in everyday clinics, save money and time to half of what UTE needs; meaning that STE pulse sequence can be utilized as a proper alternative in quantifying cortical bone parameters in-vivo.

• 1049

### THE CT-BASED PATIENT SPECIFIC HIP JOINT 3D-MODELING; POTENTIAL TO CREATE A VIRTUAL ALIGNMENT

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**Background/Objectives:** The salvage proximal femoral osteotomy is performed in mild to moderate forms of osteoarthritis when the articulating surfaces are normal and relieves the subject's pain. Because of the importance of angular mal-alignment of the femur bone at the hip junction, accurate pre-op planning based on patient specific anatomy is required to prevent any lower misalignment and joint problem.

**Patients and Methods:** In this study, a virtual CT-Based modeling technique was used to a 3D-Model of the patient's pelvis and proximal femur. The registration stage using angio-fluoroscopy was performed to calculate the proximal femur kinematic and input it into a finite element model to achieve the stress distribution pattern of femoroacetabular joint.

**Results:** To assess the biomechanics of the joint contact surface, it is necessary to have the stress distribution in the articulating surfaces of the hip joint. The decision about the salvage surgical approach and the appropriate plan for wedge excision will be made based on the biomechanical results at the joint. FE model also provides additional information on the stress profile of the contact surface when the joint moves from full extension to full flexion.

**Conclusion:** Use of a non-invasive 3D modeling method will remediate the surgical approach in pre-op stage. Here, the in-vivo modeling and assessment of the patient femoroacetabular contact is approved. It has been shown that the accuracy of the proposed model is comparable with the existing surgical pre-op planning.

• 1050

**VALUE OF SONOGRAPHIC EXAMINATION OF LEFT WRIST AND HAND IN ESTIMATION OF BONE AGE IN 0-6 YEARS OLD CHILDREN**

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**Background/Objectives:** Assessments of skeletal age are of great importance for the diagnosis of growth disorders, which are classified into two broad categories of primary and secondary growth defects with different etiologies, prognoses and treatments. Distinction between these categories can be made from clinical findings and skeletal age. "Greulich and Pyle" is the most prevalently employed skeletal age technique, based on the recognition of maturity in hand-wrist radiographs from birth to maturity. On the other hand, sonography is a developing method in examination of soft tissues and has some known advantages such as avoidance of radiation in children. The purpose of this study is evaluation of the value of sonographic examination of wrist and hand in estimating bone age in 0-6 years old children.

**Patients and Methods:** Fifty-one children, referred to Tabriz Children Hospital for determining bone age on the base of left wrist-hand radiograph, were introduced to sonographic examination before radiography. At first, in a sagittal sonogram of distal radius the persistence of distal radius epiphysis is detected. Then, in a transvers sonogram, the size of distal radius metaphysis and epiphysis were examined. After that, sagittal sonographic exam was obtained from first and third metacarpal bones and third finger to determine persistence and size of the osseous epiphysis. Sagittal and transvers exams of the wrist were also obtained, and the number and size of the epiphysis were measured. Based on these findings and comparison with the "Greulich and Pyle" atlas, the bone age was estimated. Then routine hand-wrist radiograph was obtained, and bone age was estimated with another radiologist, using also "Greulich and Pyle" atlas. The results of the sonographic and radiographic exams were listed and compared.

**Results:** Six children were less than 1 year (4 girls and 2 boys), 8 children were 1-2 years old (4 girls, 4 boys), 8 children were 2-3 years old (4 girls, 4 boys), 7 children were 3-4 years old (3 girls, 4 boys), 8 children were 4-5 years old (4 girls, 4 boys) and 14 children were 5-6 years old (9 girls, 5 boys). Diagnostic value of sonography for estimation of bone age in comparison with plain radiograph was somehow equivalent, that is statically significant (P = 0.01).

**Conclusion:** Sonographic examination of wrist is a valuable method for estimating bone age in 0-6 years.



• 1051

### TRUE 3D WEIGHT BEARING CT IMAGING FOR FOOT AND ANKLE

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Foot and ankle surgery is a sub-specialty of orthopedics and podiatry that deals with the treatment, diagnosis and prevention of disorders of the foot and ankle. For the first time, physicians can get three-dimensional, weight bearing images of the foot and ankle with the pedCAT system. The pedCAT uses cone beam volumetric tomography to reconstruct the foot's bony anatomy in its true physiological position within minutes.

The pedCAT is a compact device that requires minimal radiation shielding, which means it could fit in a primary care podiatrist's office as easily as it could in a large imaging center. The pedCAT is manufactured by CurveBeam. CurveBeam was founded in 2009 with the primary mission of adapting cone beam volumetric tomography technology to imaging all body extremities. Over the past decade, CBVT has revolutionized oral and maxillofacial care. Three-dimensional scans of the skull have become an essential tool in diagnosis and treatment planning, especially for orthodontics and dental implants. The pedCAT is expected to transform the fundamentals of diagnostic imaging for the foot and ankle specialty by providing an 'ideal' starting point to evaluate and treat a patient's foot condition. The pedCAT is easy to use for both the doctor and the patient. The patient steps onto a platform and the gantry closes behind him. The physician pushes a single button, and the pedCAT scans one foot in less than 20 s or both feet in less than 40 s in weight bearing or non-weight bearing positioning. The manufacturer estimates the radiation dose delivered to the patient to be slightly higher than a similar plain X-ray. CubeVue, the accompanying software, stitches together the slices to create an exact digitized replica of the foot and ankle in less than three minutes. Using CubeVue, the physician can get an unobstructed view of the foot from any angle, rotate and navigate the 3D data, and make exact measurements. The physician can scroll through the slices, which can be as thin as 3 mm, in any direction. The pedCAT<sup>®</sup>, first in-office TRUE 3D weight

bearing CT for the foot and ankle, helps optimize treatment planning for our patients. Via this low dose radiation option, the pedCAT<sup>®</sup> assesses clinical conditions including, but not limited to, fractures, dislocations, arthritic joints, deformity and for quicker diagnosis, evaluation and treatment planning. The patient experience benefits include: in-office and on-site compact imaging; TRUE weight bearing and non-weight bearing 3D imaging for one or both feet; capture unprecedented diagnostic information not seen in regular x-rays; easy to use visualization software that adds a new dimension to diagnosis and evaluation; fast acquisition of 3D data allows you to start your treatment planning in minutes; If needed, we can confidently plan surgeries with precision and speed.

• 1052

### DIFFERENTIAL X-RAY DIAGNOSTICS OF ANEURYSMAL AND SIMPLE BONE CYST

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**Background/Objectives:** Improving the differential diagnostics of aneurysmal bone cyst using X-ray studies .

**Patients and Methods:** There were 50 patients (28 men, 22 women) aged from 13 to 52 with cystic bone formations in the study group. Radiological diagnoses included 24 patients with aneurysmal bone cyst and 26 with simple bone cyst. X-ray evaluation of following characteristics was done: location, size, texture, contours, bone shape, periosteum reaction, and the presence of pathological fractures. To verify the diagnosis, all the patients were conducted MRI of the affected bones in the T1, T2, STIR conditions in axial, coronary, and sagittal planes. Specific indices were calculated for aneurysmal bone cyst such radiological signs as texture, localization of the tumor, and bone deformity .

**Results:** The affect of long bones in the group is 72.5% (including 28.6% of aneurysmal bone cysts, 81.4% of simple bone cyst), flat bones were affected in 27.5% of cases (including 78.5% of aneurysmal bone cysts, 21.5% of simple bone cysts). In 45.5% of the cases aneurysmal bone cyst was located in the metaphysis of long bones, 38.5% in the pineal

gland, and 17.5% in the shaft. Simple bone cysts in 31.5% of the cases were located in the metaphysis, 28.5% in the epiphysis and 17% in the diaphysis. There was no significant difference between X-rays and MRI data concerning localization of revealed structures. The average diameter of aneurysmal bone cysts was 7.8 cm, and that of simple bone cysts was 6.2 cm. A chamber structure was revealed at 38.2% of patients, including 21.5% of aneurysmal bone cysts, and 78.5% of simple bone cysts. The multi-chamber structure was observed in 61.8% of patients (79.5% of them had aneurysmal bone cyst, and 20.5% had simple bone cyst). In 52.2% of patients (78.6% of them had aneurysmal bone cysts, 21.4% had simple bone cysts) the contents of cysts on MRI was heterogeneous due to the presence of blood. In all patients, the lumen of cysts on radiographs was defined as a homogeneous area of enlightenment. Pathological fracture was detected in 12.4% of patients with aneurysmal bone cyst, and 21.4% of patients with simple bone cyst. The presence of sclerotic loops was revealed in 62.6% of patients (aneurysmal bone cyst, 18.5%; simple bone cyst, 81.5%). Swelling of bone was observed in 78.2% of patients, including aneurysmal bone cyst in 58.5% and simple bone cyst in 41.5% of cases. There was periosteal reaction in the form of linear periostitis in 24.5% of patients with aneurysmal bone cyst. No changes in the periosteum were found in the patients with simple bone cyst. The percentages pertaining to indicators of specific structure, localization of new formation, and changes in the shape of bones for aneurysmal bone cysts were 81.8%, 63.2%, and 42.4%, respectively.

**Conclusion:** According to our data, the structure of formation is the most specific out of all radiographic evidences. MRI is superior to X-ray in evaluation of structure bone cyst formation. It most accurately indicates the nature of their contents. Results of X-ray method and MRI regarding identification of location, size and contour of bone cyst, bone deformation, periosteal reaction, and the presence of pathologic fracture did not show significant difference.

• 1053

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**MAGNETIC RESONANCE IMAGING IN THE DIAGNOSIS OF OSTEOARTHRITIS OF THE KNEE**

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**Background/Objectives:** To define changes of a knee joint of patients with osteoarthritis on the basis of MRI data.

**Patients and Methods:** The study included 40 patients (28 women, 12 men, aged between 40-80 years, 20 persons in the control group). The MRI study of the knee joint comprised coronary, axial and sagittal projections, in T1 and T2 modes. Evaluating the quality and quantity indicators of cartilage: clearness and sharpness of edges of a cartilage, its thickness on medial and lateral condyles and the intercondylar fossa. We studied the contours of the bony structures of the femur and tibia, the condition of the joint space, and the presence of effusion as well. The shape, integrity, contour, and position of the menisci were also evaluated. The type of injury inflicted on the menisci, frequency of internal and external meniscus injury and the location of the tear were also assessed. X-ray of the knee was performed in two standard projections the Kellgren-Lawrence criteria were applied for staging of the osteoarthritis.

**Results:** In 23% of patients, imaging revealed an uneven thinning of the articular cartilage of less than 2 mm. Radiologically degenerative and proliferative changes of bone structures were not found in this group of patients. In 38% of patients, thickness of the hyaline cartilage was observed to have declined to 1 mm. Single sites of destruction of an articular cartilage, synovitis, a meniscus prolapse on 1/3 of its width and injury of a meniscus in 50% of cases were found. In these patients, radiological findings showed unexpressed osteophytes and line osteosclerosis. In 27% of patients with hyaline cartilage thickness of less than 1 mm, expressed destruction of articular cartilage, synovitis, a full prolapse of a meniscus with deformation of its internal part and injury of a meniscus in 70% of cases was observed. The frontal and posterior horns of the menisci were damaged in 40% and 33%, of patients correspondingly. The body of meniscus was damaged in 18.4% of patients. Complex tear with extension to the body or to the other horn was noted in 1.6% of patients. In 76.5% of patients, horizontal tear in menisci was found. Complex and radial fractures occurred in 16.2% of cases and paracapsular rupture was found in 7% of them. In degenerative changes of menisci hetero-

geneity, fragmentation and cysts were noted. The intra-articular effusion led to the emergence of Baker's cysts in 53% of patients. Expressed osteophytes, joint space narrowing and expressed osteosclerosis were revealed. In 12% of patients, on MRI, image of the articular cartilage was absent. Radiological findings in these patients included large marginal osteophytes, significant narrowing of joint space and expressed subchondral osteosclerosis.

Conclusion: Magnetic resonance imaging may reveal specific changes of arthritis in articular cartilage at an early stage and more precisely characterize the features and extent of changes in joint structures in the process of disease development.

• 1054

**X-RAY TECHNIQUES IN THE DIAGNOSIS OF SACROILIITIS IN PATIENTS WITH ANKYLOSING SPONDYLITIS**

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Background/Objectives: The aim of the study was to improve X-ray diagnosis of sacroiliitis in ankylosing spondylitis by using oblique projections.

Patients and Methods: The study included 35 patients (26 males, 9 females, aged 18–40 years; average age 30.0 + 5.3 years; joint functional failure stage I–IV) with bilateral sacroiliitis and 15 control subjects. All the patients had X-ray in the direct and oblique projections. In the direct projection, patient was on his back, and the beam was perpendicular to the surface of the body. In this case, the direction of X-ray beam was at an angle with the joint space. Additionally, we performed X-rays in the oblique projection, for each sacroiliac joint separately, with the patient turning 30° to the horizontal plane. The beam was parallel to the sacroiliac joint space. The width of the joint space, changes of articular surfaces (sclerosis, erosions), and the symmetry of the lesions were analyzed. All findings were verified by CT.

Results: On the direct X-ray, bilateral sacroiliitis was found in 38 patients, of them, 33 cases were true positive and 5 were false positive. Two cases were false negative yielding a diagnostic accuracy of 88%. On the oblique X-ray, sacroiliitis was noted in 35 patients, of them, 33 cases were true positive and 1 was

false positive and three cases were false negative, yielding a diagnostic accuracy of 92%. The sensitivity of the direct projection radiography was 94%, and its specificity was 67%. The sensitivity of the oblique projection was 91% and its specificity was 93%.

Conclusion: The oblique X-ray is more informative for the diagnosis of sacroiliitis and assessment of changes in the sacroiliac joints.

• 1055

**INTRA-SHEATH VERSUS EXTRA-SHEATH IMAGE-GUIDED CORTICOSTEROID INJECTION IN PATIENTS WITH TRIGGER FINGER: RESULTS FROM A TRIPLE-BLIND RANDOMIZED CONTROL TRIAL**

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Background/Objectives: The impingement of flexor tendon sheath in A1 pulley, named as “trigger finger”, leads to pain and difficulty during flexion and extension. Local corticosteroid injection into the affected tendon sheath is the treatment of choice. To the best of the authors' knowledge, no study has been conducted so far to compare intra-sheath and extra-sheath corticosteroid injection in patients with trigger finger. The aim of this study was to determine if injection directly into the tendon sheath will make any difference in the long term outcome of the patients.

Patients and Methods: One hundred-sixty-six patients with the diagnosis of trigger finger were enrolled based on the following clinical criteria: 1, Tenderness in A1 pulley; 2, Pain and discomfort during flexion and extension; 3, Presence of nodule. The Quinnell scale was used to evaluate the severity of the disease before the launch of the treatment. Thereafter, with a random block method, patients were divided into two groups: Group A (n=83), with ultrasound-guided extra-sheath corticosteroid injection and Group B

(n=83), with ultrasound-guided intra-sheath corticosteroid injection directly into the sheath. All patients have been followed up to one year according to the following timeline: 3, 6, 12, 24, and 48 months after the treatment. The Quinnell scale was obtained again during each follow-up session. If patient's score did not change until the third visit, either reinjection or surgery would have been considered as the next proper treatment option, if any.

**Results:** The ethic committee of our center had approved of this survey, and written informed consent was obtained from all patients. The mean age of the enrolled patient was 49.9 years. Right hand was more commonly involved in our patients. No tendon rupture, infection, fat necrosis, finger necrosis, hematoma, nerve rapture, or A1 pulley injury was detected. There was no statistically significant difference between the groups A and B in the frequency of required injections at the follow up sessions, based on their lack of improvement in the Quinnell scale. The follow-up sessions, the patients' group, and the corresponding number of patients in whom reinjection was required were as follows: First follow-up session, 2 cases in group A, 1 case in group B; Second follow-up session, 10 cases in group A, 7 cases in group B; Third follow-up session, no case in group A, 1 case in group B; Fourth follow-up session, 1 case in group A, 1 case in group B. Surgery was required to be done in none of our patients. Overall, the frequency of high Quinnell scales (scales 3 and 4) were reduced in all patients at the end of our study.

**Conclusion:** There is no significant difference between the patients with trigger finger who undergo intra-sheath corticosteroid injection and those with extra-sheath corticosteroid injection in their outcomes; thus, it will be postulated that the injected corticosteroid may sufficiently pass through the tendon sheath even though it is injected in an extra-sheath location. Given the fact that after injection under no ultrasound guidance, the injected corticosteroid may accumulate either in an intra- or extra-sheath location, the findings of our study suggest that blind injection might be as effective as ultrasound-guided intervention; albeit, at a lower cost burden.

### • 1056

#### MINIMAL INVASIVE TREATMENTS: TECHNICAL ASPECT AND CLINICAL INDICATIONS

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These treatments have been done under imaging control or even blindly (by none radiologists) to save money, time and patients comfort. All extravascular interventional or needle procedures and surgery via a narrow tube or by endoscopic ways are in these categories. An old neurosurgeon says: if the patients pain or problem solves by a pill no needle is need and if a needle is useful to relief from pain why we use surgery knife. Microtherapy, nerve blocks and other minimally invasive treatments by me have been done by 22G coaxial needles (10 to 30 centimeter long) and under CT-control.

### • 1057

#### WHAT A SPINAL SURGEON NEEDS TO KNOW ON POST-OP. IMAGING?

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Some says that: please don't take MRI till 2 years after surgery for disc because there are pitfalls to differentiate new or recurrent hernia from scar formation even by GD+MRI.

SURGICAL NEED IS A CLINICAL, NOT AN IMAGING DECISION.

Scar versus treatable entities is a problem, they are: residual or recurrent herniation and spinal canal stenosis.

By non-contrasted CT there is 43% - 60% rate of diagnosis.

By contrasted CT rate is 70% - 83%

By contrasted MRI, diagnostic rate is 96% - 100%

Arachnoiditis occur in 5% of post-op. patients.

### • 1058

#### NON-TRAUMATIC NEUROLOGIC EMERGENCIES



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There are a number of non-traumatic neurologic conditions that are associated with high rates of morbidity and mortality. These conditions often have a subacute clinical presentation, which can lead to delay in performing appropriate imaging studies. Furthermore, some of these disorders may have subtle radiologic findings, which can lead to a delay in diagnosis. Recent improvements in computed tomography (CT) and magnetic resonance (MR) imaging have facilitated the diagnosis of a number of these conditions. In some of these disorders (e.g., dural sinus thrombosis), the radiologist may be the first to suggest the correct diagnosis because the clinical features are often ill-defined and non-specific. It is important for radiologists to be familiar with the various imaging findings associated with these neurologic emergencies to ensure early and correct diagnosis and treatment.

• 1059

**PRE AND POST OPERATIVE IMAGING FINDINGS IN TUMORAL LESIONS OF TEMPORAL BONE AND BASE OF SKULL**

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Complex anatomy of skull base and temporal bone causes the interpretation of tumoral lesions in these regions to become difficult. Post operative changes add to the difficulty, because of swelling, hematoma, tissue reconstruction and so on. Consequently, proper choice of imaging modality, protocol of image acquisition and knowledge about surgical techniques are essential in producing a good imaging report. I have a brief discussion about normal anatomy and pre-operative findings in tumors of skull base and temporal bone, and then, I discuss post operative changes more precisely by showing different cases.

• 1060

**MR MYELOGRAM: IS THERE ANY ROLE FOR DIAGNOSIS OF SPINAL AND EXTRA-SPINAL DISORDERS?**

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**Background/Objectives:** The objective of this presentation is to point out some diagnostic clues and presentations of MR myelograms in routine spinal MRI which may help radiologists and clinicians with better detection or description of spinal and extra-spinal pathologies.

**Patients and Methods:** We collected more than 100 cases of spinal MRI from teaching files of five institutions during the past 10 years. All patients presented with symptoms and signs related to spinal disorders.

**Results:** Imaging evaluation of patients with the possibility of spinal disk disorders can sometimes be very challenging, as low back pain or pain in the thoracic and cervical regions which is usually caused by intervertebral disks abnormalities, could also be triggered by a wide spectrum of pathologies in neighboring structures. In this presentation, with a view to updating the current therapeutic and diagnostic approaches, we have categorized and classified these potential pain sources and other incidental findings in MR myelograms of a number of patients as below: 1) infections 2) kidney, bladder and prostate problems 3) cholelithiasis 4) pleural effusion or chest infections 5) ovarian cysts or cystic masses 6) tumors 7) nondiscogenic lesions such as spinal arachnoid or other developmental cysts 8) miscellaneous (e.g., ascites) 9) trauma

**Conclusion:** In this educational presentation, we will present a large collection of pathologies in MR myelograms of a number of patients presenting with pain in and around spinal region who referred to us to rule out disk abnormalities. Awareness, understanding, and recognition of these presentations may permit the radiologists to play a signifi-

cant role in avoidance of unnecessary medical and surgical interventions or unnecessary diagnostic evaluation procedures.

• 1061

**DEVELOPMENT OF A LOW-COST PHANTOM TO ASSESS ABSOLUTE QUANTIFICATION IN MULTI-VOXEL MR SPECTROSCOPY**

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Background/Objectives: Magnetic resonance spectroscopy (MRS) is a technique to measure chemical shift and can be used to analyze biochemical parameters in a region-of-interest (ROI) of the tissue through a procedure called 'Quantification'. Evaluation of accuracy and robustness of a quantification method is extremely important to help validate it in practice. This is particularly important when the method deals with absolute quantification as there is no consensus regarding absolute values found in different ROIs. Usually, such evaluation procedures are initially tested on simulated signals and then on phantom signals in the next step. Most of MRS phantoms designed so far are not multi-purpose, in that they evaluate either quality assurance and reliability, or absolute quantification results. Here, we designed a low-cost MRS phantom with flexibility to contain one single solution for quality assurance and reliability tests, as well as different combinations of metabolites with known concentrations for evaluation of (absolute) quantification algorithms.

Patients and Methods: Phantom production: Phantom was designed in cylindrical- shape. Phantom can be filled with water or any other liquid. A detachable circular holder plate was designed for the interior of the cylinder of phantom. The holder contained 5×5 holes to hold 25 standard 10 mL vials with 15 mm diameters for holes. Another circular plate at the bottom with holes of 5mm diameter was used in order to fix the vials in their place. The cone-shape vials could be filled with pure metabolites or any combination of metabolites with desired concentrations. The resulting cylindrical phantom body

had an outer diameter of 21 cm, an inner diameter of 14 cm and a height 15 cm. The body of the phantom was made of acrylic glass with removable top that allowed easy access to the interior chamber. An O-ring was used to watertight the lid of the phantom. All materials, laser-cut and production procedure cost less than 100\$.

Data acquisition: Proton MRS imaging experiments were performed on a 1.5T Siemens Avanto MRI/MRS system in the room temperature using Point Resolved Spectroscopy (PRESS) pulse sequence with manufacture's built-in auto-shimming on the volume-of-interest, CHESS water suppression and 3D imaging parameters as follows: TE/TR = 30/1500 ms, voxel size = 8×8×8 mm<sup>3</sup>, NEX = 2, frequency bandwidth = 2000Hz and number of data points = 1024. Each vial was filled with a pure metabolite with known concentration as exists in human normal brain. All solutions of metabolites were calibrated in chemical laboratory with highly sophisticated instruments.

Processing: Signal quantification, residual water peak removal and phase corrections were carried out with the Java-based MRUI quantification package. Receiver coil inhomogeneity was compensated using, 3D T2-weighted images acquired from the pure water phantom.

Results: Position of the voxels on the T1-weighted MR scout image was shown. One sample spectrum of Choline in built-in Siemens Syngo MRS Package was shown. Quantification for all metabolites in different slices of each vial, based on QUEST method in jMRUI software, and after being post-processed with the 3D receive coil inhomogeneity profile was depicted. The result was in linear relationship between volume and concentration.

Conclusion: We developed a versatile and low-cost phantom for evaluation purposes in different MR imaging and spectroscopy studies, with special capabilities to be utilized for multi-voxel spectroscopy experiments with the goal of absolute quantification.

• 1062

**SPARSE QUANTIFICATION OF 1H-MRS BASED ON METABOLITES PROFILES IN TIME-FREQUENCY EMPLOYING PURSUIT ALGORITHM; A PHANTOM STUDY**

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**Background/Objectives:** Performance of quantification methods utilized for proton magnetic resonance spectroscopy (1H-MRS), implemented either in time-domain or in frequency-domain, is limited due to static field ( $B_0$ ) inhomogeneities and the overlapping nature of metabolites in actual low-SNR environments. Sparse representation methods for MRS quantification have suggested robust and high performance algorithms which have been previously implemented based on Gaussian and Lorentzian models, to be selected by some pursuit methods, e.g. parallel basis selection method based on the focal underdetermined system solver (FOCUSS) algorithm. FOCUSS algorithm performs well in correlated environments, however it is computationally more intense compared to the selection methods. Here, we proposed a sparse quantification method for 1H-MRS in time-frequency domain, achieved by continuous wavelet transform (CWT), and employing sparse features of the whole simulated metabolites' spectra existing in frequency, as well as properties of profiles in time. Stability and accuracy of the proposed technique was confirmed by simulated and phantom data, resulting in correct quantification of the metabolites of interest in 1H-MRS signals of brain.

**Patients and Methods:** Phantom preparation- An MRS phantom with 13 vials, filled with solutions containing the most important brain metabolites with known concentration was used to simulate tumorous and normal brain tissues; 5 vials were filled with pure metabolites in order to achieve metabolites' profile, and the other vials contained relevant concentrations of Alanine, Choline Chloride, Creatine, Myo-Inositol and N-Acetyl-L-Aspartic Acid, mimicking the tumorous and normal human brain tissues. Data acquisition- Proton MRS imaging experiments were performed on a 1.5T (Siemens Avanto) MRI/MRS system in the room temperature using Point RESolved Spectroscopy (PRESS) pulse sequence with manufacture's built-in auto-shimming on the volume-of-interest, CHESS water suppression and 3D imaging parameters as follows: TE/TR = 30/1500 ms, voxel size =  $10 \times 10 \times 10$  mm<sup>3</sup>, frequency bandwidth = 1200 Hz and number of data-points = 1024.

**Quantification-** Eq. 1 expresses MRS signal as a function of linear combination of metabolites' profile with added baseline and noise, in which  $K$  is the

number of metabolites in the signal,  $m(k,n)$  represents  $k$ -th metabolite information profile, and  $a(k)$  is amplitude (weight) of each profile in the signal. The term  $B(n)$  is the baseline signal generated by macromolecules and  $e(n)$  is white Gaussian noise. Block diagram of the quantification procedure is shown in, with details as follows: 1) Employed metabolite dictionary can be created either from simulated profile or from phantom (to be adjusted for frequency shift, time shift, receive coil inhomogeneity and unwanted signals); 2) Complex Morlet CWT (Eq. 2) was applied to both signal and metabolites profiles (simulated-based or phantom-based); 3) Noise estimation was performed based on a rough approximation of each metabolite, being applied onto the dictionary and the signal; and 4) Sparse quantification employing FOCUSS Pursuit algorithm estimated the sparse representation of the signal with respect to the constructed dictionary.

**Results:** PRMSE of the quantification for 5 metabolites was shown in three types of signals: 1) Simulated signal with infinite signal-to-noise ratio (SNR), quantified by the simulated dictionary; 2) Simulated signal with SNR=10 dB, quantified by the simulated dictionary; and 3) Signal acquired from 7 different types of solutions in the phantom, quantified by the phantom-based dictionary.

**Conclusion:** Results show that the proposed method can quantify metabolites of 1H-MRS signal with low level of error (< 1% for simulated signal (SNR=infinite), < 3% for simulated signal (SNR=10) and < 9% for phantom signal with the dictionary based on phantom). The proposed procedure finds the sparse representation of the signal after exploiting almost all information of the signal in the linear sparse combination of a number of dictionary profiles after being transformed onto the time-frequency domain. Using metabolites' profile acquired from the phantom also added to the accuracy of metabolites estimation.

## • 1063

### SPECTRUM OF CENTRAL NERVOUS SYSTEM ANOMALIES DETECTED BY FETAL MAGNETIC RESONANCE IMAGING; A 2 YEAR STUDY

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**Background/Objectives:** Magnetic resonance Imaging (MRI) is increasingly used for detailed visualization of the fetus as well as pregnancy structures although ultrasound (US) remains the predominant modality for evaluating disorders related to pregnancy overall. MRI does not have the limitations of US thanks to its multiplanar capability, lack of ionizing radiation, and excellent soft-tissue contrast. The most common indications for fetal MRI are neurological. MRI is commonly used to investigate underlying etiologies of brain abnormalities that are not detected by US. Cortical malformations, heterotopias and anomalies of the corpus callosum are well depicted by MRI. It can confirm the diagnosis of ventriculomegaly or other associated abnormalities not detected by sonography. Posterior fossa abnormalities that can be evaluated by prenatal MRI include Dandy-Walker syndrome, Dandy-Walker variant, mega cisterna magna (>10 mm), arachnoid cyst and Chiari's malformation type II. Evaluation of the spinal column is important to detect abnormalities such as neural tube defects. We intend to investigate the prenatal MRIs performed in our center for frequency of different central nervous system anomalies.

**Patients and Methods:** In a cross sectional retrospective study, from September 2011 to December 2013 pregnant women referring for fetal MRI with suspected anomalies diagnosed in prenatal ultrasound were included in the study. All MRI's were done on a 1.5 T Siemens Avanto Magnet with a 4 channel body coil. Mothers with GA of 20 weeks or above were examined in the right tilt position. Sequences include T2 HASTE, Trufisp images 6 mm thick in axial, coronal and sagittal planes to mother's body. T2 HASTE and Trufisp images were also taken with 4 mm slice thickness relative to specific fetal body part being evaluated. T1 flash images were obtained in at least one plane based on clinical indication. We investigated the available images for any abnormality in central nervous system. Descriptive analysis was done on the collected data to achieve the index of frequency.

**Results:** Most of patients (74%) were referred with primary impression of borderline ventriculomegaly on ultrasound. A total of 11 patients out of 60 (18.3%) were found to have CNS anomalies and others were normal neurologically. Detected anomalies were as follows: 3 fetuses had complete agenesis of corpus callosum (27.2%), 2 had partial agenesis of corpus

callosum (18.18%), 2 had myelomeningocele (18.18%) and 2 had Dandy-Walker variant (18.18%). Chari II malformation, aqueductal stenosis, tethered cord, schizencephaly and enlarged cisterna magna were anomalies presenting each in one patient (9%). 3 of the patients had concomitant findings.

**Conclusion:** MRI is superior to ultrasound in detection of CNS anomalies which seems to over diagnose some brain anomalies and miss some others. Although most of the patients were provisionally diagnosed with ventriculomegaly, the majority of them came as normal. Just 18.3% of fetuses had CNS anomalies with complete agenesis of corpus callosum as the most common finding. Other findings were partial agenesis of corpus callosum, myelomeningocele, Dandy-Walker variant, Chari II malformation, aqueductal stenosis, tethered cord, schizencephaly and enlarged cisterna magna, in order of frequency.

### • 1064

#### VASCULAR ANATOMY OF THE SPINAL CORD

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The vascular anatomy of the spine and spinal cord has been well recognized since the end of the 19th century. However, recent angiographic investigations have significantly added to this body of knowledge. Interest in the vascular anatomy role has increased in recent years; they represent the essential factor of equilibrium in the tissue perfusion of the normal spinal cord. The vascular changes that are associated with most vascular malformations account for the majority of the clinical manifestations of these disorders. In this presentation we aim to review the gross and microscopic vascular anatomy of the spinal cord and their appearance. Special attention will be paid to the angiographic aspects of the spine and spinal cord.

### • 1065

#### IMAGING OF POSTOPERATIVE CRANIUM: NORMAL AND ABNORMAL APPEARANCE

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This presentation aims to describe the imaging patterns of normal postoperative (post-op) cranium and usual and unusual complications of various cranial surgeries. Many radiologists are dealing with imaging of postoperative cranium in their daily practice. They should be familiar with various types of cranial surgeries, including burr holes, craniotomy, craniectomy, and cranioplasty, as well as normal postoperative changes and complications of each cranial surgery. Findings and procedure details: Imaging is of significant importance in the routine postoperative follow-up of neurosurgical cranial procedures. Computed tomography (CT) is the first choice imaging modality. However, magnetic resonance imaging (MRI) may be needed for early or better detection of some complications, especially for ischemia or infections. The most important mainstay of interpreting a post-op cranium is to distinguish normal post-op changes from complications. The first step is familiarity with the normal anatomy. Although the vast majority of post-op CT or MR images are not normal looking, most of their changes are expected (normal) post-op changes which do not adversely affect the patient outcome. Scalp swelling, simple pneumocephalus, small size hemorrhages or edema in surgical site, extradural or subdural fluid collections and dural or surgical site enhancement in early post-op period are examples of normal post-op changes. Some complications are seen only in special procedures (such as plunging of burr holes or extracranial herniation, trephine syndrome, or external brain tamponade in craniectomy) and others are common for all procedures. Skull fractures, infection (extradural abscess, subdural empyema, bone flap infection), hemorrhage (subdural, extradural, parenchymal hematoma) and pneumocephalous are common complications of all neurosurgical procedures. The most important role of radiologists is to recognize the less common, but life threatening, post-op complications such as tension pneumocephalus, external brain tamponade and paradoxical herniation. Early and accurate diagnosis is essential for improving the outcome. Since some findings may be seen in asymptomatic patients (pseudocomplications), one should always consider the patient's clinical status

when interpreting the post-op images. Interpretation of post-op cranium images requires knowledge of the normal anatomy, types of craniotomy, and differentiating normal post-op changes from complications. Reporting a complication, especially a life threatening one, always should be done with clinical correlation.

• 1066

**NEONATAL ASPHYXIA, WHAT A RADIOLOGIST NEEDS TO KNOW**

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The findings of hypoxia in the term neonate are unique. Because neonatal brain imaging findings are different from those of older children and adults, evaluation of brain images in the neonate for signs of hypoxic injury requires attention to a specific set of signs. Furthermore, neonatal hypoxic events may be complex and have the component of hypo perfusion that is not typically present in older children or adults. In this article, we review the important sequential signs of neonatal asphyxia in MRI and their probable impact on patient's outcome. We would review the different findings in severe complete hypoxia and chronic partial hypoxia. We would also emphasize on the role of CT and ultrasound imaging of brain in the evaluation of neonates who have sustained perinatal asphyxia.

• 1067

**THE RELATIONSHIP BETWEEN COGNITIVE FUNCTION AND BRAIN LESION VOLUMES IN MULTIPLE SCLEROSIS PATIENTS**

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**Background/Objectives:** Magnetic resonance imaging (MRI) plays a critical role in diagnosis of multiple sclerosis (MS) and detecting brain changes during the course of the disease, but many aspects of MR Imaging such as its relationship with MS disabilities has remained unrecognized yet. One of the MS disabilities is cognitive impairment (CI), with an incidence of about 45% to 60%. The purpose of this study was to examine the relationship between cognitive function and the volume of the brain lesions by assessing some of the sub-items of cognition.

**Patients and Methods:** We assessed cognition using the Montreal Cognitive Assessment (MoCA) Test and brain changes in 46 MS patients in whom brain changes were detected with 1.5 tesla MR Imaging. Brain lesions were classified in three regions consisting of juxtacortical, periventricular and infratentorial. Lesion volumes were estimated using MIPAV software. We used SPSS 20 for data analysis. Also, we classified patients according to age, gender, and education.

**Results:** There were no significant correlation between total lesion volumes and MoCA score. But significant correlations between total lesion volumes with visuospatial/executive function were found in persons with higher education.

**Conclusion:** White matter lesion volumes have influence on some of the cognition sub-items in MS patients. Furthermore, MRI determinants can be useful for clinicians to evaluate cognition in MS patients.

### • 1068

#### MAGNETIC RESONANCE SPECTROSCOPY IN NEUROLOGICAL DISORDERS

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Magnetic resonance spectroscopy (MRS) is a non-invasive technique that can be used to measure the concentrations of different low-molecular weight chemicals. It differs from conventional magnetic resonance imaging (MRI) in that spectra provide physiological and chemical information instead of anatomy. The high diagnostic specificity of MRS ren-

ders the biochemical changes that accompany various neurological disorders detectable. It may also be useful in disease characterization, sometimes diagnosis, and monitoring. In this paper, we discuss the physical basis, normal spectra, clinical applications, and results interpretation of MRS in the evaluation of neurological disorder.

### • 1069

#### PATTERNS OF BRAIN INJURY IN POISONING AND INTOXICATION

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Drug abuse and poisoning represent remarkable causes of morbidity and mortality in both developed and developing countries. The most common forms of intoxication vary between different populations and generally include ethanol, drug overdose (e.g., methadone and IV abused opiates, benzodiazepines), recreational drugs (e.g., ecstasy and cocaine) and poisons (e.g., carbon monoxide). Another important challenge is that drug abusers are usually unreliable in terms of presenting history, especially if they had been suicide the existence of suicidal thoughts, psychotic problems or altered mental status. Recreational drugs, ethanol and opioids may all cause coma and loss of consciousness. Therefore, in the acute care setting where clinicians often base treatment on patient history and clinical data, the radiologist may play an important role in drawing a prompt diagnosis. Each type of toxins can cause different patterns of brain injury in acute and delayed states. CT and MRI are valuable in determination of disease extent and may be useful for supposing the causative factor. Due to clinical situation of intoxicated patients, CT and MRI are not part of the usual diagnostic work up of these patients and hence, little imaging is available to preview the findings in acute phase of intoxication. This article contains case series of intoxicated patients who were reviewed for variables such as age, gender, substances ingested or inhaled, imaging findings and clinical outcomes. This manuscript reviews the unusual and interesting neuroradiographic features of carbon monoxide poisoning, opioid and ethanol toxicity, and etc.



• 1070

**REVIEW ON SURGICAL AND IMAGING ANATOMY OF 7 SEGMENTS OF THE INTERNAL CAROTID ARTERY**

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Internal carotid artery arises from the common carotid artery and anatomically is divided into seven segments which are: C1 cervical, C2 petrous, C3 lacrum, C4 cavernous, C5 clinoid, C6 ophthalmic, and C7 communicating. In clinical practice both surgically and radiologically, knowing the precise anatomy of each segment has importance in avoiding surgical complications.

Using radiological methods to study the detailed anatomy of the artery enables the surgeons to approach the lesions of the artery or the adjacent structures which involve the artery more precisely, and consequently, such approaches cause less side effects for the patients.

As knowing the surgical and imaging anatomy of this important anatomical structure is very critical in surgical approaches specifically in the setting of skull base surgeries, in this study we reviewed the anatomy of this important structure in more details from both points of views of neurosurgery and neuroradiology and outlined some important anatomical and surgical hints.

In clinical practice, knowing the precise anatomy of each segment of internal carotid artery has importance in avoiding surgical complications.

• 1071

**APPROACH TO WHITE MATTER LESIONS OF BRAIN**

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The differential diagnosis of brain white matter lesions is extensive. The main goal of this paper is to help the radiologists to categorize the findings

under two main white matter patterns. A vascular pattern which represents microvascular involvement and a perivascular pattern which represents the inflammatory demyelinating diseases such as multiple sclerosis. The most common cause of white matter lesions is microvascular disease due to hypertension, diabetes melitus, and other hypoxic ischemic causes. To differentiate the vascular disease from the multiple sclerosis, the distribution and location of lesions are the most important factors.

• 1072

**ROLE OF POSITRON EMISSION TOMOGRAPHY-COMPUTED TOMOGRAPHY IN PULMONARY NEOPLASMS**

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Computed tomography (CT) revolutionized the management of patients with cancer for diagnosis, staging, and assessing disease response to therapy. PET-CT is now a routine body oncology imaging modality, and is particularly well suited for patients with lung cancer. PET-CT can now be considered the standard of practice for staging non-small cell lung cancer, either suspected or histologically proven. As locoregional spread of lung cancer is to hilar and mediastinal lymph nodes, adding FDG-PET to CT increases diagnostic accuracy by detecting metastatic involvement of non-enlarged nodes. Distant metastatic patterns for non-small cell lung cancer chiefly include liver, adrenal glands, and bone, and here FDG-PET provides sensitivity for the small metastases easily overlooked on CT interpretation or occult on the CT images. Lung cancer also has a propensity for soft tissue metastases, especially in the setting of treated disease, and these are often depicted on FDG-PET and only identified on CT as easily overlooked or subtle findings. PET-CT combines the advantages of CT for largely anatomically defined criteria such as the T stage with the added sensitivity of FDG-PET metabolic assessment of small nodal or distant metastatic disease defining the N and M stage. Therapy response assessment can be broadly thought of as both assessing response of malignant disease to therapy during the course of therapy,

usually referred to as therapy monitoring, and re-staging of extent of malignant disease following completion of a therapy regimen. In either case, the imaging examination is performed for the purpose of guiding subsequent treatment, be it systemic or directed. A developing application of FDG-PET imaging is therapy monitoring early in the course of chemotherapy or assessing neoadjuvantive therapy before completion.

• 1073

### IMAGING MODALITIES IN LARYNGEAL TUMORS

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Imaging plays an important role in the diagnostic evaluation of laryngeal cancers. Cross-sectional imaging modalities are important in determination of imaging anatomy, patterns of tumor spread, management in pretreatment staging and post-treatment surveillance. Clinical examination, endoscopy, and imaging are complementary to each other. Endoscopy gives an accurate assessment of mucosal involvement. CT and MRI are excellent modalities to evaluate the submucosal spaces, cartilage and extra laryngeal soft tissues. Thus, the combination of information from clinical examination and imaging provides the most accurate staging of laryngeal malignancy. We introduce the different appearances and key points of laryngeal cancers in imaging.

• 1074

### DIAGNOSTIC IMAGING OF MALIGNANT CERVICAL LYMPHADENOPATHY IN STAGING AND SURGICAL PLANNING

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Disciplines for detecting malignant neck adenopathies are:

Ultrasonography

X-ray CT-scanning

MRI

Dye injection especially in X-ray CT is necessary.

Shape, size, number and adjacent pathology are important in staging.

They are common in lymphoma, NHL, tongue and nasopharynx C.A, SCC, metastatic.

MRI is more sensitive for detection of nodes than CT.

MRI is for better delineation of nodes.

• 1075

### EFFECTIVENESS OF SEMI-QUANTITATIVE MULTIPHASE DYNAMIC CONTRAST-ENHANCED MRI AT 3 TESLA AS A PREDICTOR OF MALIGNANCY IN ADNEXAL MASSES

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Background/Objectives: Ovarian cancer is the second commonest gynecological malignancy, the fifth commonest cancer affecting women in the developed world, and the leading indication for gynecological-oncological surgery. There is a wide range of management options for ovarian cancers from conservative to radical surgery; conservative laparoscopic surgery in young women wishing to preserve their childbearing potential (borderline epithelial tumors) is the preferred method. The current investigation tool for management of ovarian masses consist of a TVS as the screening tool and determining the RMI using US score, menopausal state and CA 125 levels. MRI with Gd is the next preferred method, while it keeps indeterminate masses which are managed intra-operatively using macroscopic and histological frozen section analysis of vegetations or solid tumor components. Several studies have emphasized the diagnostic performance of new imaging modalities such as dynamic contrast enhanced MRI (DCE-MRI) as well as their DWI and MRS findings in the determination of adnexal masses. The aim of this study was to determine diagnostic accuracy of semi-quantitative factors resulted from dynamic curves of enhancement of adnexal

masses at 3 tesla MRI and to determine threshold criteria of malignancy or benignity using them.

**Patients and Methods:** Forty-nine adnexal masses in 40 patients hospitalized in onco-gynecologic ward of Valiasr hospital with surgical plan from 2011 to 2012, were investigated with multiphase dynamic contrast enhanced MRI using 3 tesla MRI. After choosing ROI, semi-quantitative factors of enhancement were drawn from the enhancement curve through home-made MATLAB software. Using histological result of resected adnexal mass as the gold standard, masses were categorized into benign versus malignant group. Myometrium and psoas muscle enhancement patterns were also analyzed as the internal reference.

**Results:** The maximum actual enhancement (SI max), maximum relative enhancement (SI rel) and Wash out rate (WOR) did not show any significant difference in the two groups while the amount of Wash in rate (WIR), Area under curve in 60 s (AUC60), SI peak tumor, SI tumor in 30 s also SI max (tumor)/SI max (psoas), WIR (tumor)/WIR (psoas), SI max (tumor)/SI max (myometrium) and WIR (tumor)/WIR (myometrium) ratios were significantly higher in malignant group in comparison with benign ones (P value less than 0.05). Using area under the ROC curve (AUROC) malignancy and benignity threshold were determined for each of semi-quantitative factors; WIR value of more than 2.45 could be indicative of a malignant adnexal mass (specificity and PPV of 100%) while WIR value of less than 0.38 could be predictive of a benign one (sensitivity and NPV of 100%). Similar to WIR, the SI max (tumor)/SI max (psoas) more than 3.25, SI max (tumor)/SI max (myometrium) more than 2.8 and WIR (tumor)/WIR (psoas) more than 22.5 were more accompanied by malignant adnexal masses while SI max (tumor)/SI max (psoas) less than 0.99, SI max (tumor)/SI max (myometrium) less than 0.61 and WIR (tumor)/WIR (psoas) less than 0.91 were more suggestive of a benign adnexal mass.

**Conclusion:** This study showed that DCE sequences are more effective than simple CE sequences for qualitative assessment of enhancement, and based on this evidence, we assume DCE-MRI should be incorporated into our institution's standard practice to be used routinely during qualitative evaluation of images.

• 1076

## AUTOMATIC BONE SEGMENTATION IN PELVIS AREA WITH BONE MARROW METASTASES; APPLICATIONS IN BREAST CANCER TREATMENT MONITORING

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**Background/Objectives:** In bone marrow metastatic cancers, therapy goals are delay skeletal-related events, reduce symptoms, improve patients' life quality and increase their survival. Correct knowledge about patients' bone state in shortest possible time is the key to achieve therapy goals. Therefore, several quantitative analyses of MR images have been used, in which accurate segmentation of the bone plays a vital role. Due to heterogeneous nature of tumors and presence of cystic or necrotic areas, correct separation of the overall border of bone is difficult, creating source of error for the quantitative analysis results. Diffusion-weighted (DW) MR images are capable of revealing information of bone status, showing applications in skeletal related diseases. The poor anatomy available in these images gears them toward anatomical MR images such as T1-weighted (T1-w) images. However, boundary distortion created by bone metastasis hierarchically affects information extracted from DW-MR images. Commonly used bone segmentation methods are applicable on healthy bone structures, while they partly fail in presence of bone metastasis, especially in advanced situations. In this study, we proposed an automatic method to extract pelvis bone from T1-w images in the presence of bone marrow metastasis. This method eliminates manual segmentation variability, resulting reproducible quantitative analysis independent of human error. We also investigated clinical quantitative analyses variations caused by miss-segmentation of the bone due to the bone marrow metastasis, and how our proposed method eliminates such errors.



**Patients and Methods:** Pelvis images of ten female patients, with metastatic bone marrow breast cancer under treatment, were carried out on 1.5T MR with the following specifications: TR/TE =171/4.76 ms, FOV =430×430, slice thickness=5 mm, spaces between slices=5.5 mm. Whole-body DW images acquired using GE-EPI sequence with the following specifications: TR/TE =5540/102 ms, percent phase FOV =430×430, slice thickness=5 mm, spaces between slices=5.5 mm, at b-value=50, 900 sec/mm<sup>2</sup>. ADC- maps were then calculated from DW images. Image processing and analysis: Image processing consisted of the following steps: 1) automatic non-rigid registration of T1-w MR images with the ADC-maps with SPM8 software; 2) segmentation of bone in each T1-w image using local level-set with prior information algorithm, implemented in MATLAB; 3) using result of step 2 as a mask, for bone extraction from corresponding DW-MR images such as ADC-map. In order to show the applicability of the automatic segmentation-based analysis, its performance in ADC-map analysis was compared to manual-based analysis methods.

**Results:** An example of bone structure was illustrated which was diminished due to bone marrow metastasis. Registration and segmentation procedure leads to bone structure extraction regardless of the disease, providing an efficient and accurate bone study. In order to exhibit the variation of information extracted from DW-MR images based on ROI selection, three common parameters extracted from ADC-map based on manual segmentation (performed by 10 different unbiased observers) against parameters extracted based on proposed automatic segmentation method, suggesting significant differences in analysis results. Automatic segmentation accuracy has been evaluated using boundary-based (Hausdorff parameter, result: 5.55 + 1.4) and volume-based (Dice, result: 83% + 0.06 and sensitivity parameter, result: 81% + 0.08) measures. Performance of proposed method was quantitatively evaluated, comparing its performance with two commonly used different methods, in terms of segmentation accuracy. The proposed method is superior to the other two methods with Dice values of 76% and 67%, respectively.

**Conclusion:** In conclusion, the proposed automatic algorithm has promising results in bone segmentation and in the presence of bone marrow metastasis. This method is accurate and robust, which improves the design of the patient's treatment plan and provides the opportunity for accurate high profile analyses. This segmentation is a significant step

towards accurate information extraction and therefore, applicable usage of DW-MRI images in bone marrow metastatic cancers, bringing consistency and reproducibility to the extracted information.

• 1077

### A REVIEW STUDY ON THE EFFICACY OF QUANTITATIVE DCE-MRI IN ADNEXAL LESION DIAGNOSIS

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Ovarian cancer is a leading indication for gynecological surgery. The conventional and widely-accepted imaging modalities, such as ultrasonography (US), fall short of specificity. Thus, advanced imaging modalities such as anatomical along with physiological magnetic resonance imaging, specifically dynamic contrast enhanced (DCE-) MRI could be used successfully as an adjunct to morphological assessment findings. The specificity of diagnosis could benefit from DCE-MRI analysis approach, either semi- or fully quantitative. The aim of this abstract is to give a review on the available scholarly works, in order to investigate the role of quantitative DCE-MRI in ovarian cancer diagnosis and differentiation.

US is considered as the primary imaging modality for confirmation of the ovarian origin of the mass and characterization of the nature of the mass as benign or malignant. In a study on 72 patients, Sohaib et al. showed that the sensitivity and specificity of US for differentiating malignant from benign lesions are 100% and 39.5%, respectively. MRI has proved to be most predictive of malignancy. The sensitivity and specificity of anatomical MRI in detecting malignancy are 96.6% and 83.7%, respectively. DCE-MRI has been introduced as a beneficial functional MR imaging technique for improving the tumor diagnosis. In Bernardin et al. study, MRI features of 70 complex adnexal masses with enhancing components in 63 patients were reviewed and correlated with histopathology or radiological follow-up results. Their results showed a significant difference in maximum absolute enhancement of signal intensities (SI<sub>max</sub>), maximum relative enhancement (SI<sub>rel</sub>) and wash-in rate (WIR) between benign and borderline/invasive malignant groups. A cut-off of

WIR  $\geq 9.5$  l/s had a specificity of 88% and positive predictive value of 86% for predicting malignancy, which was significantly higher than conventional MRI (62%). On the other hand, the pharmacokinetic (or model-based) analysis of DCE-MRI is a feasible and accurate technique to differentiate malignant from benign adnexal tumors. Thomassin-Naggara et al. managed to obtain diagnostic evaluation in 56 women. Microvascular parameters were extracted from high temporal resolution DCE-MRI series, using a two-compartmental model in the solid tissue of adnexal tumors. Malignant tumors displayed higher blood flow (FT), blood volume fraction (Vb), area under the enhancing curve (rAUC) and lower interstitial volume fraction (Ve) than benign tumors. FT was the most relevant factor for discriminating malignant from benign tumors. A tissue blood flow had a high sensitivity of 88.9% for predicting benignity. Diffusion weighted magnetic resonance imaging (DW-MRI) is an alternative functional MR imaging technique. In their study of DW-MRI, Nakayama et al. reported no significant difference in the ADC-values between the benign and malignant cystic ovarian lesions; however, there was a wide variation within the ADC-values of malignant ovarian tumors, which is related to complex morphology of ovarian cancer. DWI can improve characterization of adnexal lesions, especially benign lesions.

Ovarian cancer is a genetically heterogeneous disease with a poor prognosis. US is less accurate for complex or indeterminate masses, even when combined with color Doppler imaging. Most MRI studies had higher prevalence of complex (solid, solid/cysts) ovarian lesions than that of US. Semi-quantitative parameters extracted from DCE-MRI are shown to produce promising results for differentiating benign, borderline, and invasive ovarian epithelial tumors and found to correlate with tumor antigenic status, as determined with immunohistochemical staining. Although semi-quantitative DCE-MRI analysis shows rather high sensitivity and specificity (88% and 86%), it lacks reproducibility, because they work based on signal intensity and do not take into account the individual variability of the arterial input function. On the other hand, quantitative DCE-MRI is rather accurate for differentiating borderline from primary invasive ovarian tumors (88.9% of sensitivity). It can be concluded that in order to increase sensitivity and specificity of quantitative DCE-MRI, it seems reasonable to use DWI as an adjunct to PW imaging in combination to conventional MRI, to improve the characterization of complex adnexal masses.

• 1078

### IMAGING WORKUP OF INCIDENTALLY DISCOVERED ADRENAL MASSES IN ONCOLOGIC PATIENTS

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As the use of cross-sectional imaging continues to rise, adrenal masses are more frequently detected incidentally in the daily practice of radiology. The goal of adrenal imaging is to characterize and differentiate the benign "leave-alone" lesions from those that require treatment without exhaustive workup. Most of incidentally found masses are benign, with adenoma being the most common pathology. However, the adrenal gland is a common site of metastasis. Also, of clinical concern are primary adrenal neoplasms that may require proper management, e.g., pheochromocytoma, aldosteronoma, cortisol-producing adenoma, and adrenal cortical carcinoma. Prior history of malignancy is one of the most important determinants in the workup of incidental adrenal lesions. Differentiating a benign from metastatic adrenal mass in patients in whom the adrenal gland is the only potential site of metastasis would be of more importance, because the diagnosis may alter not only the prognosis but also the treatment options. For example, in a patient with a potentially resectable lung carcinoma and an isolated adrenal mass, differentiating a benign adenoma from a metastasis is critical for accurate staging and determining the most optimal treatment (curative resection vs. chemotherapy). This presentation discusses contemporary adrenal imaging and the optimal algorithm for the workup of incidentally discovered adrenal masses.

• 1079

### CALSSIFICATION OF BENIGN AND MALIGNANT OVARIAN MASS BASED ON DCE-MRI QUANTITATIVE PARAMETERS EMPLOYING HIERARCHICAL CLUSTERING APPROACH

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**Background/Objectives:** Accurate characterization of benign and malignant ovarian cancers plays a critical role in decision making about the therapeutic strategy, treatment monitoring, and could highly affect the treatment outcome. In this context, dynamic contrast enhanced (DCE-) MRI has evolved into a helpful imaging technique in distinguishing complex adnexal masses by providing noninvasive and quantitative biomarkers of tumor progression. Reliable prediction of malignancy in complex adnexal masses depends on proper selection of quantitative DCE-MRI descriptive parameters and their cutoff points, which the latter is commonly carried out by threshold criteria. In this work, we exploited an unsupervised, non-parametric clustering algorithm, which does not require any prior or expert knowledge about the thresholds to select the optimal predictor parameters, followed by introducing a classification decision-tree for accurate differentiation of malignant from benign ovarian tumors.

**Patients and Methods:** **Data Acquisition:** Twenty-two patients diagnosed with solid or solid/cystic complex ovarian masses (12 benign and 10 malignant as identified with histological assessment) underwent DCE-MR imaging on a 3T MR scanner (Siemens MAGNETOM Tim TRIO) using a surface phased-array coil, TE/TR = 1.74/5 ms, flip angle = 60, image matrix = 156x192, FOV = 23x23 cm<sup>2</sup>, slice thickness = 5 mm, number of measurements = 52 at 6 s/volume, number of slices = 16. The acquisition was performed before and immediately after injection of 0.2mL/kg of Gadolinium (DOTAREM; Guerbet, Aulnay, France), followed by injection of 20 cc normal saline solution with 3mL/min injection rate. **Pre-processing:** All images were corrected for motion artifacts, using an efficient non-rigid image registration approach in a groupwise setting. **Data Quantification:** The regions-of-interest (ROIs) were placed on the solid part of tumors and within the adjacent psoas (as an internal reference). Several semi-quantitative parameters were used for further analysis and clustering of the signal intensity curves: S<sub>max</sub> = maximum signal intensity of tumor to that of psoas, TTP: Time-to-Peak, Wash-in-Rate (WIR) = (S<sub>max</sub>-S<sub>IO</sub>)/TTP, IAUC60 = initial area under the time-intensity curve during the first 60 seconds in tumor to that of psoas. **Clustering:** Clustering was performed for each descriptive parameter, using unsupervised Hierarchical Clustering (HC) with Ward's linkage method,

before and after registration, to both determine the best descriptive parameters for diagnosing malignant from benign tumors and evaluate the effects of registration on the outcome of diagnosis.

**Results:** The box-and-whisker plots for TTP, S<sub>max</sub>, WIR, and IAUC60 for both benign and malignant tumors were shown. TTP and WIR parameters led to none and small overlaps between enhancement characteristics of benign and malignant tumors, respectively, suggesting their reliability in distinguishing cancer types. The sensitivity and specificity of each parameter in diagnosing malignancy in complex ovarian cancers are summarized. As it can be inferred, WIR parameter returns a sensitivity of 100% in distinguishing malignant tumors (both before and after registration), and TTP produces the best specificity in comparison with S<sub>max</sub> and IAUC60 parameters. In several studies, the early enhancement (TTP) is confirmed to be an indication of malignancy, and WIR is shown to be correlated with the expression of vascular endothelial growth factor (VEGF). Also, it can be observed that registration can significantly improve the outcome of tumor characterization, in the sense that the parameters would become more reliable to characterize the cancer malignancy. In view of these results, WIR and TTP were combined to develop a decision tree for classification of malignant from benign tumors, which generated promising results on the data with 95% of accuracy before and 100% after registration.

**Conclusion:** This result recommends that optimizing the decision approach could compensate for misalignment of data, which is essentially important when proper registration software is not available or feasible in a clinical diagnosis setting. In conclusion, we proposed a decision tree classifier developed through an unsupervised clustering approach, which is unbiased to the threshold values of the parameters and provides a more flexible framework for increasing the positive prediction rate for distinguishing malignant from benign complex ovarian tumors.

## • 1080 IMAGING OF CONGENITAL BRAIN TUMORS

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Congenital brain tumors are not common in newborns but have specific signs, symptoms, and presentations. These tumors include specific types that occur in newborns and early detection and demonstration of anatomical extension of them play critical role for surgical and medical treatment of them. CT Scan and MRI play an important role for diagnosis and follow up of these patient. In this presentation, various types of congenital brain tumors, their different and specific imaging signs will be shown and characteristic classifications of them for better diagnosis will be demonstrated.

• 1081

IMAGING OF PEDIATRIC EPILEPSY

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Intractable pediatric epilepsy patients represent a challenging clinical population. Each year, approximately 30,000 new cases of pediatric epilepsy are reported. Approximately 25% of these cases are refractory to medical therapy and patients are often severely debilitated by this disease. In patients with refractory epilepsy, neuroimaging is crucial for precisely identifying epileptogenic foci that are potentially amenable to surgical resection for possible cure. Some, but not all causes of pediatric epilepsy are detectable with conventional MR Imaging. We review structural MR findings in these groups of patients with various pathological entities including focal cortical dysplasia, tuberous sclerosis, mesial temporal sclerosis, neoplasms, etc.

• 1082

COMPARISON OF B-MODE  
ULTRASONOGRAPHY AND CT-SCAN IN

DIAGNOSIS OF CHILDREN'S MAXILLARY  
SINUSITIS

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**Background/Objectives:** Sinusitis is a common medical problem, especially in children. Diagnosis of sinusitis in children is usually based on clinical symptoms and clinicians usually tend to avoid X-ray study especially under 6 years of age. Nowadays, the gold-standard for the diagnosis of sinusitis is CT scan but other modalities including plain X-ray and MRI are also useful. In the literature, there are few studies about the use of ultrasound for diagnosis of sinusitis as a safe, inexpensive and radiation-free method but most of these studies are limited to adults, therefore this study has been designed to show the accuracy of ultrasound in diagnosis and follow up of sinusitis in the pediatric age group.

**Patients and Methods:** All children in the age range of 2-14 years who were clinically suspected for sinusitis and referred to Tabriz children's hospital for CT scan were enrolled in this study and maxillary sinus sonography was performed for all of them before CT. Revonta method was used and sonography was done with Sonix-OP machine (by using linear- L14-5MHz and microconvex-C9-5/10MHz probes). Totally, 58 patients (116 maxillary sinuses) were evaluated over a 6 months period.

**Results:** Based on CT findings, patients were divided into four groups: 1) normal, 2) slight mucosal thickening, 3) considerable mucosal thickening (more than 50% of the surface), 4) fluid retention in association with mucosal thickening.

According to the statistical analysis undertaken in this study, and extracted cut off point, accuracy of ultrasound in group 1 is about 90% with ultrasound quantitative criteria and about 82% with qualitative criteria. In group 3 and 4 the accuracy of ultrasound is above 90% by using qualitative criteria and 75% with quantitative criteria.

**Conclusion:** Ultrasound study of maxillary sinuses in children is easily achievable if operator has enough skills and experience. Since qualitative criteria are more operator dependent, quantitative study is more accurate and more practical. Using these results, the accuracy of ultrasonography in the diagnosis of maxillary sinusitis in children is

considerably high and acceptable, therefore ultrasound can be used not only as a precise diagnostic tool for primary diagnosis of sinusitis but also it can be used as a safe, accurate, practical and repeatable tool for follow up and post treatment monitoring of these patients.

• 1083

**HOW USEFUL IS ULTRASOUND IN THE IMAGING WORKUP OF MALROTATION?**

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**Background/Objectives:** The position of third portion of duodenum (D3) is always intramesenteric in malrotation. Displaying normal retromesenteric-retroperitoneal position of D3 by ultrasound (US) can help to rule out malrotation. The aim of this study was to evaluate the feasibility of US in demonstration of retroperitoneal D3.

**Patients and Methods:** Abdominal US study was performed for various indications in sixty newborns and infants [Mean age: 33 days (range: 4-100 days); 56.7% male] by an expert paediatric radiologist. D3 position and its adjacent structures were evaluated in axial and longitudinal planes by linear and curve transducers.

**Results:** Normal retromesenteric-retroperitoneal D3 between superior mesenteric artery and aorta was seen by US in all patients, including those with severe bowel gas. Mean time for displaying D3 was 47.8 s (10-180 s). Ultrasound was also capable to demonstrate D3 structure, diameter, content, its adjacent structures, relative position of superior mesenteric artery and vein.

**Conclusion:** Ultrasound is a simple, fast and highly accurate modality for confirming retroperitoneal position of D3. Ultrasound can be used as the screening method for malrotation and obviate unnecessary barium studies.

• 1084

**MRI FINDINGS IN CHILDREN PRESENTING WITH EPILEPSY**

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Seizure is a common childhood neurologic disorder. Approximately 4 to 10 percent of children have an unprovoked seizure without recurrence. Each year, about 150,000 children and adolescents have their first seizure and 30,000 of them are found to have epilepsy. The term epilepsy is used, when there are recurrent unprovoked seizures. The epileptic children undergo brain MRI. The purpose of this presentation is to describe radiological findings in commonest causes of epilepsy in children. In patients with a first ever seizure, imaging will mostly show no brain-abnormalities, because the seizure may be provoked by fever, drugs, dehydration, or sleep deprivation. About 60 percent of patients with epilepsy can be controlled with antiepileptic drugs. Most patients with uncontrollable seizures have complex partial seizures. In patients with partial epilepsy of habitual type, the causative lesions are shown by MRI in about 20% of cases. Findings and procedure details: Mesial temporal sclerosis (MTS) is the most common cause of partial complex epilepsy in adults and is also the most common etiology in young adult patients undergoing surgery. Diagnostic clue of MTS are: T2 hyper signal intensity, atrophy and loss of internal architecture of hippocampus. Benign neoplasms are the second cause of epilepsy. They are often benign and circumscribed and usually centered on cerebral cortex, usually in temporal or frontal lobes. The commonest is dysplastic neuroepithelial tumors. Cortical scars are the other cause of epilepsy. They may be small or extensive and result from trauma, infarction or infection, in descending order of frequency. Vascular lesions such as cavernous angiomas are also another cause of epilepsy. Malformations of cortical development may cause intractable epilepsy in young children and young adults. Despite their small size and sometimes almost cryptic appearance on MR, these malformations can have severe clinical consequences. It is important that radiologists be familiar with

these malformations as imaging plays a vital role in presurgical planning. This presentation is a case review of some children, referred to MRI center with epilepsy and then gives a short description of each case. Seizures are a common childhood neurologic disorder and it is important for a radiologist to be aware of radiological appearance of the commonest causes of epilepsy. This case review based presentation describes the radiological findings of common causes.

### • 1085

#### **PROBLEM ORIENTED IMAGING OF GASTROINTESTINAL TRACT (GIT); “NEWS AND VIEWS”**

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The anatomic and functional abnormalities of GI-tract can be divided into congenital disorders to be observed in early life and acquired diseases which manifest themselves later on. The clinical symptoms in both groups are generally; vomiting or gastric retention, abdominal distention, pain, failure to pass meconium or abnormal defecation and others depending on severity and location of such disorders. An imaging approach has to be related to the clinical finding and it should be problem orientated. The available modalities for evaluation of different GIT abnormalities include abdominal plain film, ultrasound, CT, MRI, endoscopy and nuclear scanning. Abdominal plain film and ultrasound can be considered as the first step in most of the emergency cases. The use of GI series with contrast media is a golden standard in a large number of upper and lower GI abnormalities. The technique and the manner of examination are reported differently in literature and textbooks. The diagnostic approach in GI-series needs an appropriate technique depending on the age and condition of the patient to avoid the risk of aspiration and other complications. Endoscopy and MR enteroclysis are the first choice in evaluation of colitis and Crohn's disease. Only in exceptional cases are GI-series with contrast agent indicated. Because of the high radiation dose of the CT, it is to be reserved for complicated cases of intes-

tinal disorders, such as complex intestinal infection with abscesses and detection of sonographic unrecognizable appendicitis, tumors and others. Nuclear scanning is frequently needed for detection and localization in occult gastro-intestinal bleedings especially when there is clinical suspicion of Meckel's diverticula and intestinal duplication; ectopic gastric tissue shows intense uptake of radio nuclide if gastric tissue exists. The aim of this workshop is to show my own experiences and practical new techniques in evaluation of GI abnormalities. Special attention should be paid to diversities of sonographic finding in appendicitis and appropriate techniques in hydrostatic reduction of intussusceptions. Additionally, special methods in the diagnosis of Hirschsprungs disease and anorectal malformation with contrast media will be shown.

### • 1086

#### **EMERGENCY NEONATAL CHEST IMAGING: “CHALLENGES AND PECULIARITIES”**

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The neonatal chest and lung abnormalities can be divided into congenital and acquired or iatrogenic disorders, mostly causing respiratory distress. Congenital lesions include various types of abnormalities such as congenital diaphragmatic hernia, congenital cystic adenoid malformation (CCAM), bronchopulmonary sequestration, lobar emphysema and others. Such conditions are frequently associated with other additional organ malformations. The primary acquired neonatal pulmonary diseases are hyaline membrane disease of premature neonate, meconium aspiration syndrome, transient tachypnea of newborn and neonatal pneumonia. Both congenital and acquired pulmonary disorders in the neonatal period mostly need interventional therapy with the use of mechanical ventilation, oxygen therapy or high frequency ventilation. All these procedures may be complicated by pulmonary air leakage with various intra- and extrapulmonary changes, initially, mostly as interstitial emphysema followed by pneumothorax, pneumomediastinum, pneumopericardium and pneumoretroperitone-



um. Such events are always complicated with recurrent atelectasis, acidosis and hypoxemia resulting mostly in chronic lung disease (bronchopulmonary dysplasia). Together with the pulmonary infection, sepsis and other extrapulmonary problems such as intraventricular hemorrhage and necrotizing enterocolitis they result in a high mortality and morbidity rate in this group of infants. The introduction of surfactant therapy in respiratory distress syndrome contributed largely to the reduction of complications in neonatal pulmonary diseases. The imaging of congenital intrathoracic malformations is now frequently recognized by antenatal sonography or MRI if available. The conventional chest X-ray after birth is the first step in the diagnosis of all congenital and acquired neonatal lung disorders for the detection of intrathoracic complications. The prevention of iatrogenic incidents is especially a challenge to the radiologist in this field. The aim of this workshop will be a systematic interpretation of the typical and atypical neonatal chest films including congenital and acquired diseases. Special attention should be paid to the various pulmonary and extrapulmonary complications demonstrated by different pathological signs. Additionally, the radiological signs of patent ductus Botalli on the chest film and the different types and development of chronic lung disease (bronchopulmonary dysplasia) will be shown.

### • 1087

#### **RADIOLOGICAL APPEARANCES OF FIBROUS DYSPLASIA AND ITS DIFFERENTIAL DIAGNOSIS**

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Fibrous dysplasia (FD) is a non inherited developmental disorder in which normal bone is replaced by fibro-osseous tissue. FD is categorized as mono-ostotic or poly-ostotic (10–20%) affecting skeleton. The triad of poly-ostotic FD combined with abnormal skin pigmentation and various endocrine disturbances is identified as McCune Albright syndrome. Cherubism is an autosomal hereditary fibro-osseous neoplasm involving the mandible and maxilla with some resemblance to FD, but is a separate entity and unrelated to FD. FD is caused by

a gene mutation of a cell surface receptor guanine nucleotide protein (GNAS 1). The gene is located at chromosome location 20q13.2. Mono- and poly-ostotic FD can occur anywhere in the skeleton, but the most common locations are the craniofacial region, femur, tibia and rib and may affect any bone in the body and is found in all age groups, but mostly in the age between 10–30 years, without sex prevalence. The clinical symptoms are pain, fractures, bone deformation and some neurological disorders in cases with craniofacial affection. Asymptomatic cases are incidentally found on radiographs.

Imaging appearances of FD: FD may be assessed by different modalities. In general, conventional films are sufficient for diagnosis and especially in follow up of skeletal changes on axial skeleton. A sharply margined and expansile lesion that is lucent relative to normal bone is seen on radiographs. FD affecting the craniofacial bone tends to be more variable. Radionuclide bone scanning of FD shows increased tracer accumulation on early perfusion and delayed bone imaging. These non-specific findings are only useful to assess the extent of skeletal involvement in poly-ostotic cases. CT imaging of FD reflects the macroscopic and microscopic features of expansile lesion with ground glass density, based on the medullary cavity of the affected bone. MRI is an excellent method for the assessment of complex cases of FD especially when affecting the craniofacial region, to observe the compression of neurological structures. This presentation is based on a retrospective study of 52 cases of FD affecting the extremities (mono-ostotic 16, poly-ostotic 2, craniofacial FD (mono-ostotic 18 and poly-ostotic 9) and 7 cases with McCune Albright syndrome (2 of them without bone affection). Two cases of cherubism and some other bone lesions with macroscopic similarity to FD will also be demonstrated. The different modalities used in evaluation of these presented cases will be shown. The various features of bone changes in FD will be an important subject of discussion in differential diagnosis with other skeletal diseases showing similar changes. The frequent incidence of FD and their MRI appearances will also be discussed.

### • 1088

#### **SONOGRAPHIC MEASUREMENTS OF THE ABDOMINAL ESOPHAGEAL LENGTH IN PREMATURE NEONATES WITH AND WITHOUT GASTRO-ESOPHAGEAL REFLUX DISEASE**



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**Background/Objectives:** Recently, association between the length of abdominal esophagus and increased risk for gastro-esophageal reflux disease has been hypothesized. The aim of the present study was to provide sonographic measurements of the abdominal esophagus length in premature neonates with and without GERD and to investigate its diagnostic value to assess GERD in comparison with clinical diagnosis of disease.

**Patients and Methods:** In a cross-sectional study, 75 consecutive premature neonates aged less than 30 days with birth weights of less than 2000 grams hospitalized in NICU ward of the Mahdiah hospital in Tehran in 2013 were included in the study. The certain diagnosis of GERD was based on clinical manifestations. The presence of GERD and also measurement of the abdominal esophageal length was assessed by portable sonography using SIUI sonography device.

**Results:** Clinically, reflux was diagnosed in 15 neonates (20.0%). It was also diagnosed in 20 cases (26.7%) by sonography assessment yielding a sensitivity of 86.7%, a specificity of 88.3%, a positive predictive value of 65.0%, a negative predictive value of 96.4%, and an accuracy of 88% for this diagnostic device. The mean of the length of abdominal esophagus was 15.19 + 4.10 mm (ranging from 8 to 27 mm). There was a strong positive association of the length of abdominal esophagus with neonatal birth weight ( $r = 0.553$ ,  $P < 0.001$ ), and also with gestational age ( $r = 0.491$ ,  $P < 0.001$ ). Furthermore, those neonates with underlying jaundice and those with sepsis had significantly shorter esophagus than those with RDS. Those with clinical diagnosis of reflux had significantly shorter abdominal esophagus than neonates without reflux (11.47 + 1.36 mm versus 16.12 + 4.03 mm,  $P < 0.001$ ). In a multivariate linear regression model, shorter abdominal esophagus was shown to be related to the presence of reflux ( $\beta = 2.764$ ,  $SE = 1.068$ ,  $P = 0.012$ ).

**Conclusion:** Shorter abdominal esophagus in premature neonates is associated with increased risk for GERD that is more highlighted in those neonates with lower birth weight and lower gestational age. Sonography has a high value for assessment of both GERD and also anatomical state of abdominal esophagus in premature neonates.

• 1089

## PITFALLS AND VARIANTS IN BRAIN SONOGRAPHY OF PEDIATRICS

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The application of modern imaging technology and techniques have enhanced detection of pathologic abnormalities on cranial sonography. With improvements in sonographic equipment, visualization of a variety of anatomic variants has become more common. Awareness of these variations is important to avoid pitfalls of misinterpretation. The successful application of modern sonography requires an understanding of technologic advances such as Doppler sonography, linear imaging, and the use of multiple fontanels, as well as knowledge of normal anatomy, variants, and imaging pitfalls that may simulate pathologic abnormalities. In this review article, we will focus on descriptions of important normal brain variants and pitfalls that may mimic pathologic abnormalities that may require additional imaging or clinical follow-up.

• 1090

## PATHOLOGIC FINDINGS IN NEONATAL BRAIN ULTRASOUND

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Both logistical and clinical factors make the imaging of newborn infants a challenging task.

While many neonatal organ systems are amenable to sonographic evaluation, brain imaging is a particularly attractive application.

Premature neonates are especially at risk for intracranial problems, and it is important for the radiologist to have a thorough knowledge of the normal anatomy and sonographic appearance of the neonatal brain, standard exam, transducers and Dop-

pler evaluation of the brain.

Not only is the neonatal head uniquely configured to facilitate ultrasound scanning through fontanelles, but the most common clinical indications for head imaging, such as hemorrhage, hydrocephaly or congenital anomalies, are readily evaluated.

Thus, cross-sectional modalities such as CT or MRI that require cooperation for optimal image quality are difficult to apply. Even low-dose ionizing radiation is potentially harmful for neonates, particularly when serial exams are required. Transportation of sick newborns to an imaging suite is often very difficult, if not impossible.

Tips For Cranial Ultrasound Examination are: Confirm suspected abnormality in the sagittal plane, symmetric echogenic areas are usually abnormal, evaluate the subarachnoid space and fissures, asymmetry in ventricular size can be normal, occipital flare is a normal finding, slit-like ventricles in the absence of other changes can be normal.

The Purpose of This Lecture Is To Discuss:

The major role of US

Advantages and disadvantages of US

Standard Examination and Transducer

The optimal time of scanning

The normal brain sonography

Reliable measurements

Normal variants including: Cavum septum pellucidum, Cavum vergae, ...

And some common pathologic conditions

### • 1091

#### POSTMENOPAUSAL BLEEDING

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Postmenopausal bleeding (PMB) refers to any bleeding other than the expected bleeding that occurs with sequential hormones in postmenopausal women. It is a common problem that affects 1 in 10 postmenopausal women older than 55 years. Although most abnormal vaginal bleedings are caused by hormone imbalance, they can be indicative of diseases such as polyps, myomas, endome-

trial hyperplasia, and cancers of the cervix and endometrium. Cancer of the endometrium is the most common type of gynecologic cancer in the United States. In 2008, an estimated 40,100 cases of cancer of the endometrium and an estimated 7,470 deaths were expected. Vaginal bleeding is the presenting sign in more than 90% of postmenopausal patients with endometrial carcinoma. The majority of patients with postmenopausal vaginal bleeding experience bleeding secondary to atrophic changes of the vagina or endometrium. However, depending on age and risk factors, 1-14% will have endometrial cancer. Thus, the clinical approach to postmenopausal bleeding requires prompt and efficient evaluation to exclude or diagnose carcinoma. In post-menopausal women, the greatest concern is endometrial cancer, which is now the most common gynecological cancer. More than 90% of the cases of endometrial cancer occur in women over 50 and this disease accounts for approximately 10% of the cases of vaginal bleeding in post-menopausal women. Radiologists are relatively new in their involvement in evaluation of patients with postmenopausal bleeding. Various investigations available for evaluation of the endometrium are TVUS, saline infusion sonohysterography (SIS), D&C, hysteroscopy, and endometrial biopsy. So the question is, which test is to be done first? That depends on the accuracy, safety, comfort, efficiency, and availability of each modality. We will discuss these methods.

### • 1092

#### URINARY TRACT ANOMALIES

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Urinary tract abnormalities account for 14-50% of congenital structural abnormalities detected on antepartal ultrasonography. In view of the close embryological relationship in the development of the urinary and the genital tract, it is not surprising that renal, urethral, bladder, and genital anomalies are frequently associated. Early diagnosis with ultrasound is possible in most cases, but some do remain undetected until late pregnancy. Congenital and hereditary urinary tract abnormalities include

a wide spectrum of defects ranging from gross abnormalities of morphogenesis, to more subtle disorders of renal function (renal agenesis or hypoplasia; polycystic or enlarged kidneys and; obstructive uropathy and abnormalities in adjacent abdominal organs). The fast scanning techniques of magnetic resonance imaging (MRI) have proved to be a useful supplementary imaging method without ionizing radiation in evaluating equivocal sonographic findings. Prenatal identification of genital anomalies (isolated finding: hypospadias, clitoromegaly; in combination with renal anomalies: ambiguous, micropenis, hypospadias and bifid scrotum with micropenis, no penis identified, hypospadias with chordee, clitoromegaly, cystic swelling on labia; or in combination with multiple congenital anomalies: male genitalia with bilateral multicystic ovaries, female genitalia with bowed femora, dolichocephaly, cerebral ventriculomegaly) should stimulate a detailed examination and a planned ultrasound and MRI diagnostic work-up. The urinary tract or genital abnormalities vary from minor abnormalities to severe fatal malformations. Thus, prenatal correct diagnosis is needed to make a successful decision concerning postnatal management of the fetus.

### • 1093

#### **DETERMINATION OF 1H MRS EFFICACY IN THE DIAGNOSIS OF COMPLEX ADNEXAL MASSES BY COMPARING RESULTS WITH SONOGRAPHY AND HISTOPATHOLOGIC CE**

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**Background/Objectives:** Adnexal masses are often diagnosed in the pregnant patients. Ultrasonography is the first line modality for the determination of adnexal mass nature followed by contrast enhanced MRI assessment. However, these methods are not reliable methods for the detection of malignancy of ovarian masses. In vivo proton magnetic resonance spectroscopy is able to distinguish malignant and benign ovarian tumors.

**Patients and Methods:** Sixteen patients with the adnexal masses diagnosed primarily by US were evaluated by in vivo 1H MRS for detection of lipid, lactate a choline peak.

**Results:** Significant correlation between MRS and with histopathology findings was observed. The correlation between US and histopathology findings was not significant. 1H MRS was properly able to detect malignancy in the 80% of the above patients.

**Conclusion:** We concluded that 1H-MRS is a reliable method for preoperative characterization of adnexal lesions.

### • 1094

#### **SONOGRAPHIC MEASUREMENT OF THE UMBILICAL CORD AND ITS VESSELS AND THEIR RELATION WITH FETAL ANTHROPOMETRIC PARAMETERS**

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**Background/Objectives:** It has been established that presence of lean umbilical cord with reduced Wharton's jelly (WJ) in sonographic scans is a marker for delivery of a fetus at risk of being small for gestational age at birth. With improvement of ultrasound techniques, more studies have been investigating the alterations of the umbilical cord on pregnancy outcomes. The aim of the current study was to determine the reference ranges of the umbilical cord area during pregnancy and to find out the association between umbilical cord morphometry and fetal anthropometric parameters.

**Patients and Methods:** A cross sectional study was carried out on a study population of 278 low risk pregnant women between 15–41 weeks of gestational age. Fetal anthropometric parameters including biparietal diameter, abdominal circumference, and femur length were calculated. The measurements of the area and circumference of the umbilical cord, vein and arteries were done on an adjacent plane to the insertion of umbilical cord into fetal abdomen. Mean and standard deviation of the area of the umbilical cord and its 5th, 10th, 50th, 90th, and 95th percentiles for each gestational age were calculated. Pearson correlation coefficient was used to assess the relation between the measures of the cord and

fetal anthropometric parameters. Polynomial regression analysis was performed for curves.

Results: The values of the area of the umbilical cord, umbilical vein and WJ increase consistently until 30 weeks of gestation, after which they reach a plateau. There was a significant relation between anthropometric parameters and umbilical cord measurements especially with the areas of the umbilical cord, umbilical vein and WJ. The regression equation for the umbilical cord area according to gestational age up to 30 weeks was  $y = -0.2159x^2 + 23.828x - 325.59$  and for the WJ area according to gestational age up to 30 weeks was  $y = -0.2124x^2 + 17.613x - 221.66$

Conclusion: Reference ranges for umbilical cord area have been generated. The area of the umbilical cord and other components of it increase as a function of gestational age. These measurements correlate with fetal size.

• 1095

**DOPPLER EVALUATION OF UTERINE ANOMALIES AND MASSES IN INFERTILITY**

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The results of some research indicate that absent diastolic flow in uterine artery might be associated with infertility and poor reproductive performance. Therefore, the uterine artery blood flow can potentially be used to predict a hostile uterine environment. Also high prevalence of increased uterine artery impedance among infertile patients with the diagnosis of endometriosis has been reported. In differentiation between septate uterus from arcuate uterus, septum always shows absent vascularity or high resistance vascularity with an RI of 0.68-1. The muscular septum lacks supporting connective tissue and shows poor preovulatory changes and poor decidualization with consequently poor placentation. Additionally, a vascular septum shows enhanced irritability. Most of the septa show poor vascularization responses in the pregnant state. More muscular and vascularized septae correlate with more complications. Doppler study can help radiologist to differentiate polyps (in which solitary feeding vessel usually shows no branching and ta-

pers as it reaches the center of the lesion) from fibroma (peripheral flow) and adenomyoma (spoke wheel radial pattern).

• 1096

**DIFFUSION-WEIGHTED IMAGING OF THE NORMAL PLACENTA, CORRELATION OF ADC VALUES WITH GRANNUM CLASSIFICATION**

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Background/Objectives: Imaging evaluation of the placenta is of prime importance in evaluation of IUGR. This has conventionally been performed with ultrasound, and more recently with MRI. To our knowledge, however, DWI of the normal placenta has seldom been studied. In this study, we aim to correlate ADC values of the normal placenta with Grannum classification.

Patients and Methods: From December 2010 to December 2011, 66 pregnant mothers with normal ultrasound and MRI (with the exception of borderline ventriculomegaly), and no evidence of IUGR at time of ultrasound were referred for fetal MRI (indications including borderline ventriculomegaly and family history of anomalies). After excluding patients who did not provide consent, technically inadequate images and mothers who gave birth to small for gestational age fetuses, 38 mothers with singleton malignancies were enrolled into the study. In addition to the usual fetal MRI sequences including the HASTE images, two sets of DWI images with b values of 0,1000 and b=50,400,800 were obtained. ADC values were calculated using manual free-hand ROI drawn over the largest visible placenta. ADC values were correlated with Grannum classification using Kruskal-Wallis test. Also the ADC values obtained from the two sets of ADC values (b=0, 1000 and b=50,400,800) correlated with the gestational age using linear regression.

Results: ADC values obtained from b values of 0,1000 show significant correlation with gestational age using linear regression (P = 0.000), however, the ADC values obtained from the b values of 50,400,800, failed to show statistically significant correlation with GA (P = 0.076). Also ADC values obtained from



b values of 0,1000 show significant correlation with Grannum classification using Kruskal-Wallis ( $P = 0.004$ ) while the ADC values obtained from the b values of 50,400,800 failed to show statistically significant correlation with Grannum class ( $P = 0.236$ ). Using linear regression analysis, ADC values obtained from b values of 0,1000 show a better fit correlated with gestational age ( $R^2=0.60$ ) than the ADC values obtained from b values of 50,400,800 ( $R^2=0.087$ ).

Conclusion: Various sets of b values result in ADC values with various degrees of correlation with Granuum classification and gestational age. Comparing the two sets of b value in our study, the set including  $b=0$  resulted in a better fit both with gestational age and with Granuum classification.

• 1097

**VARIOUS TYPES OF NICHE IMAGING BY SONOHYSTEROGRAPHY**

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Cesarean scar defects (CSD) or niche are the myometrial discontinuity at the previous cesarean section scar region. We aimed to depict various types of niche imaging by sonohysterography. Recently, the rate of cesarean section delivery has markedly raised around the world; therefore, women with cesarean scar defects are increased and present in up to 19% of women post cesarean section. The increase of repeat cesarean section has been associated with an increase in complications in subsequent pregnancies such as scar pregnancy with life threatening bleeding, uterus rupture, placenta accreta and its subtypes and prolonged postmenstrual spotting. The deeper the niche (or the thinner the overlying myometrium), the higher the risk for complications in a subsequent pregnancy. Various shapes of uterine cesarean scar defects (niche) in TVS and SHG include: thin linear defect, wedge shape defect, droplet defect, semicircular defect, rectangle defect, inclusion cyst defect, irregular defect, multiple defects. Although the ability of transvaginal ultrasound (TVUS) to detect cesarean scars remains unknown, its higher frequency and proximity to the pelvic organs has been used as a powerful tool for detecting the uterine scar of a previous cesarean section. Recently with the in-

creasing use of sonohysterography (SHG) (transvaginal ultrasound with saline infusion) detection of scar defect has been enhanced frequently.

• 1098

**ULTRASOUND IN THE DIAGNOSIS OF ENDOMETRIOSIS**

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Background/Objectives: To evaluate diagnostic accuracy of transvaginal sonography and laparoscopy in the diagnosis of endometriosis.

Patients and Methods: This was a prospective study of women scheduled for laparoscopy because of infertility assessment. Consecutive patients were assessed prospectively using TVS before laparoscopy and the findings of preoperative TVS were compared with the results obtained by laparoscopy as a gold standard. The sensitivity, specificity, positive (PPV) and negative (NPV) predictive values, and accuracy were calculated for the diagnosis of endometriosis.

Results: In total, 262 women (mean age 31 + 4.47) had preoperative TVS and laparoscopies. Of these, 78 had endometriosis. Diagnostic accuracy was assessed, the sensitivity and specificity of the TVS in the diagnosis of pelvic endometriosis were 53% and 95%, respectively, and the positive and negative predictive value were 63% and 92%, respectively. The diagnostic accuracy was 88%.

Conclusions: TVS is a good test for assessing pelvic endometriosis. Good specificity and sensitivity were obtained in the diagnosis of deep endometriosis. TVS is particularly accurate in detecting deep endometriosis, which could facilitate more effective triaging of women for appropriate surgical care.



• 1099

## IMAGING EVALUATION OF RECURRENCE IN TREATED PROSTATE CANCER

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Prostate cancer is the most common cancer in men and although most prostate cancers are slow growing but aggressive prostate cancers cases are seen too. Prevalence of prostate cancer vary widely across the world, it is more common in the developed countries. It is the second leading cause of cancer-related death in men in the united states and the sixth cause of cancer-related death globally in the world. Many cases of prostate cancer remain subclinical and never have symptoms until late progressive stages of the disease. About 85% of patients diagnosed with prostate cancer have localized disease and could be treated by definitive radiation therapy or radical prostatectomy. In 30-50% of patients who had radical prostatectomy, PSA relapse happens at 5 years. Diagnosis and treatment of patients with PSA relapse are difficult. Detection of local recurrence of prostate cancer is important because it could be treated by local radiation therapy. Local treatment of local recurrence of prostate cancer have higher rate of complications in comparison to treatment of primary prostate cancer, hence, accurate detection of local recurrence and excluding distant metastasis is important. Distant metastasis is treated by hormone therapy. Imaging studies play an important role in detection of local recurrence of prostate cancer and its differentiation with distant metastasis. The main imaging studies that are used for evaluation of patients after radical prostatectomy are transrectal ultrasonography (TRUS) and magnetic resonance imaging (MRI). The patients with local recurrence of prostate cancer could be divided to three groups based on imaging studies. 1- Patients who have a mass lesion in surgical bed that is detectable by both MRI and TRUS. TRUS is useful for obtaining biopsy from these mass lesions. 2- Patients who have residual prostate tissue detectable by both MRI and TRUS. The residual tissue may be tumoral and responsible for local recurrence or may be non-tumoral. MRI functional studies including dynamic contrast study, diffusion weighted imaging (DWI) and MR spectroscopy

(MRS) are able to confirm presence of tumoral tissue within the prostate glands remnant. Differentiation of tumoral and non-tumoral prostate remnant is not possible by means of TRUS but TRUS is useful for doing biopsy from the prostate remnant. 3- There is no mass lesion in surgical bed and anastomotic site and surrounding tissues have normal appearance in both TRUS and conventional MRI but local tumor recurrence is detected by functional MR studies like abnormal early phase enhancement in surgical bed structures, restrictive pattern in DWI or rise in choline to creatine ratio in MRS. There is no role for TRUS in detection and management of this third group of patients. CT scan is not useful for evaluation of prostate gland itself but is beneficial for evaluation of lungs and abdominal organs and can detect skeletal metastasis.

• 1100

## MRI & MRU OF URINARY SYSTEM

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MRI is one of the most useful imaging tools for imaging of the urinary system. MR urography is an advanced imaging technique with the potential to noninvasively provide the most comprehensive and specific imaging test available for many urinary tract abnormalities without the use of ionizing radiation. At the same time, formidable limitations and challenges remain for MR urography, including its relative insensitivity for renal calculi, relatively long imaging times, sensitivity to motion, and lower spatial resolution compared with CT and radiography. Some of the potential clinical applications of MR urography include urolithiasis, urinary tract obstruction unrelated to urolithiasis, hematuria, congenital anomalies, and pre- and postoperative assessments. The most common MR urographic techniques used to display the urinary tract can be divided into two categories: (a) static-fluid MR urography (also known as static MR urography, T2-weighted MR urography, or MR hydrography), and (b) excretory MR urography (also known as T1-weighted MR urography)

• 1101

**CONVENTIONAL IMAGING OF URINARY SYSTEM**

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This speech is mainly focused on lower urinary tract imaging, mostly retrograde urethrography, VCUG, and also some cases of antegrade and retrograde ureteropyelography in situations such as infections, fistula, diverticular disease, strictures (congenital, infectious, traumatic, prostatic, iatrogenic, etc.), and pre- and post-op conditions. Images will be discussed.

• 1102

**ROLE OF ACOUSTIC VALUE HISTOGRAM OF URINARY STONE ON ULTRASONOGRAPHY AS PREDICTOR OF AMENABILITY TO EXTRACORPOREAL SHOCK WAVE LITHOTRIPSY**

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**Background/Objectives:** Extracorporeal shock wave lithotripsy (ESWL) is a primary treatment for renal and ureteral stones. Failure in this treatment may result in extra costs and also unwanted complications such as hemorrhage and renal edema for the patients. Thus, the ability to estimate the possibility of destruction of stone with this method will be useful for satisfactory medical outcome. A body of evidence indicates that with the use of histogram data which is obtained by CT scan, the possibility of destruction of stone by ESWL can be estimated. Given the convenience of US (lower cost, less risk of radiation), efforts to predict the possibility of destruction of stone by applying histogram findings obtained by US, as addressed in this presentation, may be justifiable.

**Patients and Methods:** A total of 76 renal and ureter-

al radiopaque stones scheduled for treatment with extracorporeal shock wave lithotripsy were included in this study. Stones less than 5 mm or greater than 20 mm were excluded. Histograms were graphed from US. This parameter was compared between the treatment success and treatment failure groups.

**Results:** Of 76 stones, 7 were excluded, 55 were in success group, and 14 were in the failure group. The histogram was significantly different between the two groups ( $P \leq 0.05$ ) with an accuracy of 80%. furthermore, the histogram figure was the independent predictor of success or failure of ESWL.

**Conclusion:** Our results have suggested that histogram figure is a good predictor of stone amenability to ESWL. The treatment modality of the stone should be selected according to the histogram figure as a practical, simple and predictive index.

• 1103

**APPROACH TO RENAL INCIDENTALOMA**

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Incidental renal masses are extremely common. As multidetector CT has come to play a more central role in medical care and as CT image quality has improved, there has been an increase in the frequency of detecting "incidental renal findings". Most of these incidentalomas represent benign renal cysts, but some of incidental renal masses are not benign. Most renal cell carcinomas are discovered incidentally when an imaging examination is performed to evaluate a nonrenal complaint. Therefore, differentiating incidental benign renal masses from those that are potentially malignant is important. There are well-established, time-tested, image-based criteria that can be used to diagnose most renal masses definitively. However, some renal masses remain indeterminate even after a thorough evaluation with imaging. The workup of incidentalomas is widely varied by physician and region, and some standardization is desirable in light of the current need to limit costs and reduce risk to patients. Subjecting a patient with an incidentaloma to unnecessary testing and treatment can result in a potentially injurious and expensive cascade of tests and procedures.

This article discusses the evaluation, diagnosis, and treatment options of the incidental renal masses.

• 1104

**ULTRASONOGRAPHIC EVALUATION OF RENAL TRANSPLANTATION COMPLICATIONS**

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The most effective primary treatment of chronic renal failure is renal transplantation. A substantial improvement in lifestyle and family life in conjunction with the fact that renal transplantation is an extremely cost-effective procedure has resulted in intense monitoring and imaging studies to help ensure a successful outcome. Ultrasonography is often the imaging method chosen for transplant evaluation early in the postoperative period, and it can be used for long-term follow-up as well. The purpose of this presentation is to show the ultrasonographic findings of complications of renal transplantation. The ultrasonographic findings of complications of renal transplantation include: urologic complications, fluid collections, graft dysfunction, vascular complications, and neoplasms. Specific ultrasonographic features of complications of renal transplantation have been illustrated. Familiarity with the clinical setting and the appearance of potential renal transplant complications as depicted with the most commonly used modality, ultrasonography, will facilitate prompt and accurate diagnosis and treatment.

• 1105

**PERCUTANEOUS VERTEBROPLASTY AND ITS SHORT TERM CLINICAL OUTCOME**

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Background/Objectives: Percutaneous vertebroplasty was found to be effective in treating osteoporosis-

related compression fractures, it is also useful in treatment of hemangioma, multiple myeloma and metastasis. This study was aimed to evaluate the short term clinical outcome of percutaneous vertebroplasty.

Patients and Methods: Twenty-seven patients were enrolled into this descriptive analytical study after being informed on technical details of procedure and its pre- and post-operative cares. Polymethyl-metacrylate bone cement was injected under continuous CT imaging guidance. The amount of injected cement in each treated vertebral body and any cement leakage was monitored.

Results: The mean volume of injected cement was  $6.22 \pm 2.24$  (2-10) mL. The baseline, immediately after procedure and one week and one month post procedure pain scores were  $8.11 \pm 1.69$ ,  $7.85 \pm 1.59$ ,  $6.30 \pm 1.66$  and  $3.63 \pm 1.50$ , respectively. The pain was significantly reduced gradually after the procedure ( $P < 0.001$ ). The baseline and immediately after procedure and one week and one month post procedure disability scores were  $78.70 \pm 9.05$ ,  $58.52 \pm 13.99$ ,  $47.96 \pm 14.95$ , and  $37.59 \pm 18.87$ , respectively. The disability significantly faded after the procedure ( $P < 0.001$ ).

Conclusion: Percutaneous vertebroplasty is an efficient technique with low complication rates and a significant reduction in pain.

• 1106

**SELF-EXPANDABLE METAL STENTS IN MALIGNANT BILIARY OBSTRUCTION**

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Malignant biliary obstruction can be due to direct tumor infiltration, extrinsic compression, adjacent inflammation, desmoplastic reaction from tumors or, more commonly, a combination of the above factors. Pancreatic cancer is the most common cause of malignant biliary obstruction, and jaundice occurs in 70-90% of the patients during the course of the disease. Compared with the uncovered metal stents, covered metal stents have longer patency and a lower rate of tumor ingrowth, but have a higher rate of stent migration. To combat the occlusion and provide an antitumor effect, drug-eluting stents were

developed. A duodenal stricture complicates biliary stent placement in 10–20% of patients with distal biliary obstruction due to pancreatic cancer. When both strictures are considered, a biliary stent can be placed either preceding or following duodenal stent placement. Complications of self-expandable metal stents include stent occlusion, stent migration, cholecystitis and pancreatitis.

### • 1107

#### PROSTATIC ARTERIAL EMBOLIZATION TO TREAT BENIGN PROSTATIC HYPERPLASIA (PAE)

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Benign prostatic hyperplasia (BPH) has a high prevalence rate in men aged 50–79 years and is ubiquitous with aging. Prostatectomy by open surgery or by transurethral resection of the prostate is still considered the gold standard of treatment. Alternative options include minimally invasive treatments. Urinary tract infection, strictures, postoperative pain, incontinence or urinary retention, sexual dysfunction, and blood loss are complications associated with surgical treatments. Minimally invasive treatments were originally conceived as an attempt to offer equivalent efficacy without the burden and risk of operative morbidity. The introduction of arterial embolization to treat uterine fibroids has led to its use for BPH. Prostatic arterial embolization (PAE) is a technically demanding procedure that blocks the blood supply of the arteries that supply the prostate gland. With CTA we define the male pelvic vascular anatomical pattern and the PA anatomy (number of independent PAs, their origin, trajectory, termination, and anastomoses with surrounding arteries). Each pelvic side should be considered separately. The inferior vesical artery and finally the prostatic vessels were selectively catheterized with a 3-F coaxial microcatheter. For embolization, nonspherical 200 µm PVA particles were used. We conclude that PAE is a feasible procedure, with preliminary results and short-term follow-ups suggesting good symptom control without sexual dysfunction in suitable candidates, associated with a reduction in prostate volume.

### • 1108

#### INTERVENTION IN BENIGN BILIARY STRICTURE AND BILIARY LEAK

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Benign causes of biliary obstruction are often iatrogenic in nature, and most commonly result from inadvertent damage to the biliary tree during surgical procedures, particularly laparoscopy. Benign biliary obstruction may be associated with trauma, inflammatory processes due to stone disease or pancreatitis, surgery with biliary-enteric anastomoses, liver transplantation, sphincter of Oddi dysfunction, and as a late complication of the treatment of other intra-abdominal processes. The percutaneous treatment of benign biliary strictures by dilatation has a success rate ranging from 67 to 90%, which is higher than that of endoscopic treatment. Common complications of percutaneous biliary drainage and intervention include hemorrhage from puncture of the portal vein or hepatic artery, pleural or gallbladder puncture, injury to bowel or kidney, and sepsis. Placement of metallic stents in the BBS has been tried with no long term promising results. Metallic stents should only be considered for failed attempts at surgical repair. Development of self-expandable covered stents specifically designed to be removed at a later date may change current management strategies. Treatment with covered metal stents or bio absorbable stents warrants further evaluation. Endoscopic biliary sphincterotomy (EBS) is a first-line therapy for various pancreaticobiliary diseases. The endoscopic management of benign biliary diseases typically consists of dilation and insertion of one or more plastic stents followed by elective stent exchange every 3 months to avoid cholangitis caused by stent clogging. Sequential placement of multiple, large diameter stents in patients with distal common bile duct stenosis secondary to chronic pancreatitis appears to be superior to single stent placement and may provide good long-term benefits.

### • 1109

#### MANAGEMENT OF THYROID LESIONS



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Percutaneous image-guided thermal ablation is a nonsurgical treatment in benign and malignant thyroid lesions. Laser ablation of thyroid nodules is a minimally invasive procedure to treat benign thyroid lesions including cold nodules or single nodules within a multinodular goiter. The technique consists of the destruction of the tissue by the insertion therein of optical fibers which convey the light energy, causing a complete and irreversible necrosis. In many clinical trials, laser ablation has demonstrated a good efficacy for the shrinkage of benign cold thyroid nodules. Laser ablation has been tested for the palliative treatment of poorly differentiated thyroid carcinomas, local recurrences, or distant metastases. Laser ablation therapy is indicated for the shrinkage of benign cold nodules in patients with local pressure symptoms who are at high surgical risk. The treatment should be performed only by well trained operators and after a careful cytological evaluation. Laser ablation does not seem to be consistently effective in the long-term control of hyperfunctioning thyroid nodules and is not an alternative treatment to <sup>131</sup>I therapy. Laser ablation may be considered for the cytoreduction of tumor tissue prior to external radiation therapy or chemotherapy of local or distant recurrences of thyroid malignancy that are not amenable to surgical or radioiodine treatment.

• 1110

MANAGEMENT OF BENIGN HEAD AND NECK TUMORS

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Endovascular procedures for benign head and neck tumors include embolization, stenting, and balloon test occlusion. A transarterial (or endovascular) approach forms the mainstay of treatment for head and neck bleeding as well as for transarterial chemotherapy for head and neck neoplasms. A combination of percutaneous and transarterial approaches may be needed in the embolization of high-flow craniofacial vascular malformations (VMs) and hypervascular tumors. This is a review of the current clinical applications of a variety of percutaneous and endovascular interventional procedures of the extracranial head and neck. The tumors that require embolization in the head and neck most commonly include glomus tumors, angiofibromas, and meningiomas. Many other types of tumors that may also require preoperative embolization include the following: hypervascular metastases, esthesioneuroblastomas, schwannomas, rhabdomyosarcomas, plasmacytomas, chordomas, and hemangiopericytomas. The goal of tumor embolization is to selectively occlude the external carotid artery (ECA) feeders through intratumoral deposition of embolic material. The embolic agents in common use are polyvinyl alcohol (PVA), Embospheres (BioSphere Medical, Rockland, Mass), liquid embolic agents (glue, ethylvinyl alcohol copolymer [EVOH], or Onyx [ev3, Irvine, Calif]), gelatin sponge (Gelfoam; Phadia, Uppsala, Sweden), and coils. The embolization is ideally performed 24–72 hours before surgical resection to allow maximal thrombosis of the occluded vessels and prevent recanalization of the occluded arteries or formation of collateral arterial channels. Preoperative embolization is cost-effective and tends to shorten operation time by reducing blood loss and the period of recovery.

• 1111

INFERIOR VENA CAVA FILTERS IN CANCER PATIENTS: REVIEW OF CURRENT CONCEPTS AND EVIDENCES

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Venous thromboembolism (VTE), including deep vein thrombosis and pulmonary embolism, are well-recognized complications of cancer and its



treatment. Anticoagulation is the mainstay of both treatment and prophylaxis for VTE. Inferior vena cava (IVC) filters may have a role in the management of cancer patients especially in patients with complications or contraindications to anticoagulant therapy. With availability of retrievable filters, new indications have also been introduced. The aim of this presentation is to review indications, safety, complications, and effectiveness of IVC filters in patients with cancer.

• 1112

**COIL EMBOLIZATION OF INTRACRANIAL ANEURYSMS**

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**Background/Objectives:** Rupture of the intracranial aneurysms is associated with a high risk of bleeding and a high incidence of mortality if left untreated due to its natural history. The aim of this study was to report our experience using coil embolization to manage intracranial aneurysms and to report the 6 months outcomes of this procedure.

**Patients and Methods:** From January 2010 to December 2012, a series of 90 nonrandomized consecutive patients (mean age: 44.6 + 14.9 years) with intracranial aneurysms underwent endovascular coil embolization at our center. We excluded patients with dissecting, blood blister-like, or false aneurysms. All patients were evaluated by four-vessel angiography to determine the shape, size, number and location of the aneurysms. We recommended six month follow up control angiography to all patients, to which only 38 patients agreed. The data were analyzed by chi-square, Fisher exact and t-tests and alpha was set at lower than 5%.

**Results:** Total occlusion was seen in 76 patients (86.4%), subtotal occlusion in 6 subjects (6.8%), and partial occlusion in 6 patients (6.8%) after the procedure. There was no significant correlation between the aneurysm size, aneurysm neck size, location of the aneurysm; with total or subtotal occlusions. Eleven patients (12.5%) experienced some compli-

cation during the procedure including 2 tearing, 3 focal neurological signs, 3 vision disturbances, and 3 bleeding in aneurysm location. Major complications were significantly higher in posterior aneurysms in comparison with anterior ones. (55.6% versus 44.4% of the major complications; P = 0.015). Among patients who underwent control angiography, 34 patients (89.4%) had no change, two patients (5.3%) had new growth and two subjects (5.3%) had widening of the neck after 6 months of follow up. Furthermore, 50% of those aneurysms which had any changes in the 6 months follow up angiography were totally occluded. (P = 0.01).

**Conclusion:** Coil embolization showed successful outcomes in treatment of intracranial aneurysms with a low complication rate.

• 1113

**ENDOVASCULAR TREATMENT OF SPINAL ARTERIOVENOUS MALFORMATIONS**

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**Background/Objectives:** Spinal arteriovenous malformations (AVMs) are a rare and enigmatic disease entity. These lesions can be a significant cause of myelopathy and their initial symptoms mainly include sensory loss and motor weakness. The treatment of spinal AVMs has improved tremendously. However, the choice between surgical treatment and embolization remains a matter of debate. The aim of this study is to investigate the outcome of the endovascular management of these lesions.

**Patients and Methods:** We report on 18 patients with spinal-AVM in whom the diagnosis was confirmed by using spinal-MRI/angiography. Patient age ranged from 19 to 73 years. All patients underwent embolization with glue/onyx. Before and after the operation, patients were followed using Aminoff-Logue scale to measure clinical outcome and spinal-MRI to evaluate the feature of the lesion.

**Results:** There was significant difference between the clinical scores (based on Aminoff-Logue scale) of before and after operations (P < 0.01). This significant change is seen in both short and long-term fol-

low-up. Temporary clinical deterioration was found in one patient. Our data showed that the efficacy of this method in long-term follow-up is about 90%.

**Conclusion:** Endovascular embolization is an effective therapeutic procedure in the treatment of spinal AVMs.

### • 1114

#### ENDOVENOUS LASER FOR THE TREATMENT OF SAPHENOUS REFLUX AND VARICOSE VEINS

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**Background/Objectives:** In this presentation, we aim to report our experience about endovenous laser treatment (EVLT) for lower extremity varices during six months follow-up period.

**Patients and Methods:** Forty-six patients with lower extremities varices who underwent EVLT treatment with the 940-nm diode laser were enrolled into the study. The diagnosis of GSV incompetence with reflux was made by clinical evaluation and duplex Doppler examinations. Clinical outcomes, complications, and duplex ultrasound of the GSV were assessed after 1 week, 1 month, 3 months, and 6 months, after the endovascular laser treatment.

**Results:** The mean age of our patients was 44 + 11 years (24-70) and 23 (50%) were female. Improvement in visible varicosity was seen in 39 (84.8%) patients after six months. ( $P = 0.011$ ) The baseline mean diameter of GSV was 4.9 + 1.6 mm which dropped to 3.5 + 1.3 after six months. ( $P < 0.0001$ ). After Six months, 95.7% of our patients were satisfied and mentioned that recommend this procedure to others.

**Conclusion:** Endovascular laser ablation is a safe and effective method for the treatment of lower limb varices.

### • 1115

#### SAFETY AND EFFICACY OF INTRA-ARTERIAL CHEMOTHERAPY IN RETINOBLASTOMA

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**Background/Objectives:** The most common ocular neoplasm in children is retinoblastoma which can spread to the brain via the optic nerve in untreated patients. The most common treatment is enucleation, but modern eye-preserving therapies may save the globe. In advanced stages, globe-preserving strategies are often insufficient to prevent enucleation and direct infusion of chemotherapeutic agents into the ophthalmic artery may be required to control the tumor. In this presentation, we aim to report our experience about the safety and efficacy of intra-ophthalmic artery melphalan (IAM) injection in the treatment of retinoblastoma.

**Patients and Methods:** Totally 46 patients were enrolled into the study. Mean age was 36.8 + 22.2 months (7-100 months). Using digital subtraction angiography, under roadmap guidance a microcatheter was introduced into the ophthalmic artery, subsequently melphalan was injected over 30-40 minutes. The response of the retinoblastoma tumor(s) and any associated local side effects of the treatment were observed.

**Results:** Twenty-three patients were male (50%). Mean weight was 11.2 + 3.9 Kg (4-20) and mean height was 89.3 + 16.2 cm (65-110). The disease was in the right eye in 19 patients (41.3%), left eye in 23 patients (50%) and bilateral in 3 patients (6.5%). The ophthalmic arteries were successfully cannulated except in one patient. There were not severe systemic side effects in our patients. Vasospasm happened in one patient. Canulization failed in one patient out of 29 (3.4%).

**Conclusion:** Intra arterial melphalan injection into the ophthalmic artery is an effective and safe therapeutic modality for retinoblastoma.

### • 1116

#### SYSTEMIC VENOUS ANOMALIES IN PATIENTS WITH PULMONARY ATRESIA: A CT ANGIOGRAPHIC STUDY

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**Background/Objectives:** Associated anomalies in pulmonary atresia (PA) result in poor prognosis and more complicated surgeries. There is no study about the prevalence of systemic venous anomalies (SVAs) in patients with PA. The aim of this study was to determine the types and prevalence of systemic venous anomalies in patients with PA by CT angiography.

**Patients and Methods:** CT angiography images of 90 patients with PA (mean age: 6.6 years; 60% male) were reviewed by a cardiovascular radiologist and types and frequencies of SVAs were determined.

**Results:** PA was isolated in (2.2%), and associated with VSD in (42.2%), large VSD or single ventricle in (12.2%), or complex cardiac anomalies in (43.3%) of cases. The frequencies of SVC, IVC, innominate vein, Azygos and hepatic veins anomalies were 73.3%, 47.8%, 40%, 17.8%, and 16.7%, respectively. The most common type (34.4%) of SVC anomalies was bilateral SVC with drainage of RSVC to right-sided atrium and LSVC to coronary sinus to right-sided atrium. The most common type (16.7%) of IVC anomalies was left IVC (LIVC) to left atrium, followed by Interrupted RIVC with Azygos continuation to RSVC (9%). Innominate vein was absent in 39% of cases and retroaortic innominate vein was seen in one patient. IVC continuation with Azygos and left Azygos to LSVC were seen in 16.7% and 15.6% of cases, respectively. All 15 cases of anomalous hepatic veins, including separate entry to right (n=11) or left (n=4)-sided atrium, were in association with IVC anomalies. In patients with PA and complex cardiac anomalies, IVC anomalies were significantly higher than other types of PA (P= 0.001).

**Conclusion:** SVAs are common in pulmonary atresia; SVC anomalies are seen in more than two-third and IVC anomalies are seen in about half of these patients. Familiarity with SVAs associated with PA is important for detailed interpretation of CT angiographies of these patients and surgery planning.

• 1117

### CLASSIFICATION, IMAGING, AND INTERVENTIONAL PROCEDURES IN PERIPHERAL CONGENITAL VASCULAR ANOMALIES

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Classification of vascular lesions is often confusing and various systems have been described. Pathologically, they can be classified as capillary, cavernous, venous, arteriovenous, lymphatic, and mixed types. Another pathologic classification describes them in two groups including hemangiomas and vascular malformations. Vascular lesions can also be classified for low and high flow lesions depending of blood flow velocity in the lesion. Although vascular lesions are congenital but they may not be evident until adulthood. Imaging modalities that can be used for evaluation of vascular anomalies include: conventional radiography, ultrasonography, CT Scan, MRI, catheter angiography, CT and MR angiography. MRI is the most valuable modality in the classification and diagnosis of vascular lesions. Other modalities also have important roles in diagnosis of problematic lesions and also in interventional procedures such as percutaneous treatment. Most of vascular lesions can be treated conservatively, but some of them especially high flow lesions need interventional treatment and in such lesions, usually a multidisciplinary approach is necessary. Embolization and sclerotherapy are the most used interventional techniques. The aim of this review is describing not only the multiple classification systems of peripheral vascular anomalies, but also more importantly the diagnostic role of different imaging modalities and also embolization or sclerotherapy planning for control of them.

• 1118

### HIGH FREQUENCY AND NONCONTACT LOW FREQUENCY ULTRASOUND THERAPY FOR VENOUS LEG ULCER TREATMENT: A RANDOMIZED CONTROLLED STUDY

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**Background/Objectives:** Ultrasound therapy can

be utilized to manage chronic wounds including venous leg ulcers (VLUs) A randomized controlled clinical study was conducted to compare the effectiveness of standard treatment and standard treatment plus either high frequency ultrasound (HFU) or noncontact low-frequency ultrasound (NCLFU) on VLU outcomes.

**Patients and Methods:** Ninety outpatients (47 men, 43 women; average age, 38.3 [SD, 11.5] years) were randomly assigned into either of the standard care (n=30), HFU (n=30) or NCLFU groups (n=30). Standard care included multilayered compression bandaging (40 mm Hg of pressure at the ankle graduated to 17 mm Hg to 20 mm Hg below the knee) nonadherent dressing and regular debridement. Standard care dressing changes and ultrasound therapy were provided three times per week for 3 months or until healing. HFU delivers high intensity (0.51 W/cm<sup>2</sup>) high frequency (13 MHz) ultrasound for 5 to 10 minutes and NCLFU delivers low-intensity (0.1-0.8 W/cm<sup>2</sup>) low frequency (40 kHz) ultrasound for 4-10 minutes. patients were followed until healing. Wound size wound pain and lower leg edema were assessed at baseline and after 2 and 4 months. Data were analyzed using Student's t test ANOVA, chi square or Fisher's exact test. P value of less than 0.05 was considered significant.

**Results:** Initial wound measurements were 9.60 cm<sup>2</sup> (SD 5.54) 9.86 cm<sup>2</sup> (SD 3.95) and 10.01 cm<sup>2</sup> (SD 4.58) for the standard treatment HFU and NCLFU groups respectively. After 4 months measurements were reduced to 4.28 cm<sup>2</sup> (SD 2.80) 3.23 cm<sup>2</sup> (SD 2.39) and 2.72 cm<sup>2</sup> (SD 2.16) for the standard treatment HFU and NCLFU groups respectively which was statistically significant (P = 0.04). All wounds were healed after an average of 8.50 (SD 2.17) 6.86 (SD 2.04) and 6.65 (SD 1.59) months in the standard treatment, HFU and NCLFU groups respectively (P = 0.001). Differences in the amount of edema and pain rating scores were also significant at the 4th month follow up visit (P = 0.05).

**Conclusion:** Outcomes of both methods of ultrasound therapy were better than standard care alone, and some differences between the two ultrasound therapy groups were observed, but they were not statistically significant

## PRIVATE IMAGING CENTER IN TEHRAN FROM 2008 TO 2011

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**Background/Objectives:** The objective of this study was to examine the findings of CT angiography in patients with aortic arch anomalies and comparison with echocardiography findings in patients referred to a private imaging center in Tehran during 2008-2011.

**Patients and Methods:** The cases included 203 patients with clinical symptoms or echocardiograms of congenital heart disease who were referred to Tooska Imaging Center to assess the presence of aortic arch anomalies. This study was a retrospective study of CT angiography and chest echocardiography findings of patients with aortic arch anomalies.

**Results:** In this study, 203 patients with congenital anomalies were enrolled. Among those, 107 patients were men (96 female). The most common anomaly of the aortic arch was coarctation (19.7%) and Right sided arch with mirror image branching (19.2%). The most common cardiac anomalies associated with aortic arch anomalies were VSD, PA, and PDA. The sensitivity and specificity of echocardiography compared to CT angiography in the diagnosis of aortic arch anomalies was 59% and 100% respectively. Agreement between the two methods (kappa) in the diagnosis of aortic arch anomalies was 0.72.

**Conclusion:** Although echocardiography is the first diagnostic method for patients with congenital heart disease, in some patients, the ability of this method in detection of coronary artery anomalies and thoracic vessels was limited. As a result, CT is used in morphologic evaluation of congenital heart disease (CHD) and its high temporal and spatial resolution are essential for proper evaluation. MDCT is a useful alternative in depiction of aortic arch disorders, determining anatomic landmarks as well as delineating of associated cardiovascular anomalies.

• 1119

### CT SCAN FINDINGS OF AORTIC ARCH ANOMALIES IN PATIENTS REFERRED TO A

• 1120

### EFFICACY OF RADIOLOGIC PERCUTANEOUS INTERVENTIONAL TREATMENTS FOR



**BILIARY COMPLICATIONS AFTER LIVER COMPLICATIONS AFTER LIVER TRANSPLANTATION: SHIRAZ EXPERIENCE**

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**Background/Objectives:** Biliary complications are significant causes of morbidity and mortality in patients undergoing liver transplantation (LT). Post transplantation biliary strictures (BS) are a serious problem with high risk of graft failure. However, management of these BSs remains controversial and great variability has been reported in results of percutaneous trans hepatic radiologic intervention (PTRI) as a result of broad differences in technical procedures. The aim of this study was to evaluate the efficacy of percutaneous treatments in the management of post-LT BSs in Shiraz center.

**Patients and Methods:** PTRI, including ballooning and internal or internal-external stenting, was done in 34 transplanted patients with BS referring to interventional radiology unit of Shiraz Namazi hospital. Technical success rate, patency rates, and complications were evaluated.

**Results:** Thirty-one strictures were successfully treated which was irrespective of anastomotic and non-anastomotic type of stricture (success rate: 91.2%). Six- and 12-mo patency rates were 93.5% and 90.1%, respectively. The minor complication rate (mild cholangitis) was 5.9%, and no major complication occurred.

**Conclusion:** Based on the results of our experience, PTRI is an effective method for treating anastomotic and non-anastomotic strictures with high success rate and little complications.

**• 1121**  
**LIVER METASTASES OF PANCREATIC CANCER: ROLE OF REPETITIVE TRANSARTERIAL CHEMOEMBOLIZATION (TACE) ON TUMOR RESPONSE AND SURVIVAL**

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**Background/Objectives:** The study was conducted to evaluate the effect of chemoembolization on pancreatic cancer liver metastases.

**Patients and Methods:** Thirty-two patients with pancreatic cancer liver metastases who had underwent chemoembolization (4–8 weeks intervals) were retrospectively enrolled into this study. Size based evaluation (RECIST) and survival indexes were assessed in general and for gender and number of lesions.

**Results:** 71.87% of patients showed stable disease (SD), 9.37% partial response (PR) and 18.75% progressive disease (PD). Survival rate for 1-, 3-, and 5-years from first TACE was 60%, 25%, and 11% respectively. Median survival time was 16 months and for SD group was 20 months. Progression-free survival for 6 month, 1-, 3- and 5-years was 84%, 57.3%, 20%, and 10%, respectively. There was statistically significant difference between male and female patients in their response. Survival rate for 1- and 5-years for males was 80% and 14% and for females was 47% and 0%. There was no significant difference between oligonodular liver lesion (less than 5) and multinodular (more than 5) groups. Survival rate for 1- and 5-years for oligonodular was 84% and 14% and for multinodular was 50% and 0% respectively.

**Conclusion:** Repetitive TACE resulted in a relevant response for the control of liver metastases of pancreatic cancer with considerable median survival time. Interestingly, this study was limited by the low number of subjects to produce significant results.

**• 1122**  
**COMPARISON OF COLOR DOPPLER ULTRASOUND AND CT ANGIOGRAPHY IN CAROTID ARTERY STENOSIS: A FOUR YEARS EXPERIENCE FROM A SINGLE MEDICAL CENTER**

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**Background/Objectives:** Carotid artery stenosis is the main cause of stroke, and evaluating the degree of carotid artery stenosis is of utmost importance in this regard. The objective of this study is to compare

color Doppler ultrasound (CD-US) and CT angiography in diagnosing carotid artery stenosis in patients referred to a medical imaging center.

**Patients and Methods:** A total of 198 carotid arteries were evaluated in 99 patients. Patients older than 40 years of age, who were referred to our medical imaging center for the evaluation of carotid stenoses between 2008 and 2012, were enrolled in this study. All patients were examined by CD-US, and if the plaque were present in CD-US, the patients were also examined by CT angiography. In our study, carotid stenosis location, degree of stenosis, stenosis length, calcification, ulcer, and dissection were evaluated. Sensitivity, specificity, and agreement of the two methods were assessed.

**Results:** Comparison results of CD-US and CT findings showed a specificity of 80.6%, sensitivity of 84.7%, and kappa coefficient of 0.60. The most common stenosis location was in the proximal portion of the internal carotid artery. Moreover, the agreement of the two methods in the 4th (70–99%) and 5th (100%) degrees stenosis was very good.

**Conclusion:** The agreement of the two methods was very good for stenosis degree. CD-US had low sensitivity in comparison with CTA in the evaluation of calcification and ulcer. As a result, CTA is a complementary method for CD-US to show calcified plaques and ulcers.

### • 1123

#### BILIARY INTERVENTIONS

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Biliary strictures have a relatively wide spectrum of benign to malignant causes. Endoscopic interventions, percutaneous interventions, and surgery could be selected by multidisciplinary teams for treatment of these patients. Ultrasound, CT, MRI, ERCP, and PET-CT are used for diagnosing the type of stricture, localization and also staging of malignant causes. In this lecture, we discuss image guided percutaneous methods like external biliary drainage, high pressure balloons, external-internal biliary drainage for benign biliary stenosis and also stenting, external- internal biliary drainage with brachy-

therapy for malignant causes like cholangiocarcinoma (Klatskin tumors) which represents the most common form of malignancy in the biliary tract and is inoperable in the majority of cases. Moreover, other tumors like adenocarcinoma of gallbladder, stomach, etc. can invade extra or intrahepatic bile ducts directly. The same protocols for external-internal biliary drainage and brachytherapy may apply. Sometimes, metastatic lymphadenopathies in hilum of liver cause biliary stenosis due to compression of CBD, in these cases we only do biliary drainage or stenting is performed as a measure to decrease bilirubin level and make chemotherapy possible. In benign causes, the most frequent causes are ligation or traumatization of CBD, CHD, or RHD in open or laparoscopic cholecystectomy. Inevitable hepatojejunostomy or choledochojejunostomy are needed in these patients, and the most common complication of this surgery is narrowing of anastomosis which may lead to raising of bilirubin and LFTs. intervention of choice in these complications is PTC and ballooning. As part of an ongoing study, patients have been treated with high pressure balloon for the past 3 years and more than 90% of these patient have remained asymptomatic so far.

### • 1124

#### MR IMAGING PROTOCOL FOR PELVIC GENITAL ORGANS

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The MR imaging protocol at intermediate or high-field strength includes the use of a pelvic phase array coil, 3–6 h fasting prior to the examination, and an intra-muscular injection of an anti-peristaltic agent, such as 20 mg of Buscopan (butylscopolamine, Schering) at the beginning of the examination. General recommendations include small section thickness of 3–4 mm and a smaller field of view than those used for bone imaging covering the pelvic content and not the hips or the entire abdomen. After the initial localizer, high resolution T2-weighted pelvic images are acquired in a sagittal plane, oblique axial (short uterine body axis), and oblique coronal (long uterine body axis) plane to detail uterine zonal anatomy and help to choose

the most appropriate imaging plane for contrast-enhanced T1-weighted sequences. At T2-weighted fast spin echo images an optimal junctional zone to external myometrium contrast is obtained with a repetition time of about 4000 ms and an echo time of about 90 ms. T1-weighted sequences should be performed at least after intravenous bolus injection of gadolinium. The

signal intensity of endometrial tumors is usually hyperintense to the myometrium and slightly hypointense to the normal endometrium at T2-weighted images. Although MR imaging cannot differentiate benign from malignant intracavitary endometrial neoplasm, benign endometrial polyps can be suspected when a central hypointense fibrous core is identified at T2-weighted images in the enlarged uterine cavity. However, hypointensity within the uterine cavity is not a specific finding and can be related to fresh blood. Benign and malignant endometrial tumors may overstretch the cavity and cause myometrial thinning that should not be mistaken for myometrial invasion. Diagnostic criteria

for myometrial invasion include irregular endometrium-junctional zone interface at T2-weighted and contrast-enhanced T1-weighted images or interruption of the junctional zone. Ovarian tumor shows cystic or solid however mixed pattern mass with thick septation and mural part which are enhanced with contrast.

Dynamic pelvic MRI shows rapid enhancement with up ward or plateau with delay wash out of malignant tumor compare with intermediate or benign tumor.

MRS of cystic fluid part of ovarian malignant tumor shows high peak of lipid compare with benign tumor

these findings are very useful for differentiate malignant adnexal mass from benign type because there is limitation of biopsy due to risk of seeding of malignant tumor

MRI of pelvic cavity has advantage of saving time and expense for staging of cervix tumor compare with clinical staging of FIGO.

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