ESTI 2010 18th Annual Meeting of the European

Society of Thoracic Imaging

May 28–30 Bern, Switzerland

FINAL Programme

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ESTIX European Society of Thoracic Imaging

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IMPRESS

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Conference Venue

Inselspital – University Hospital CH-3010 Bern

Speaker Preview Room

Speakers are requested to test their presentations on the computers in the Speaker Preview Room no later than 90 minutes before the beginning of their session. For sessions taking place in the early morning please hand in your presentation on the previous day.

Presentations have to be in PowerPoint format. PC presentations must be provided on CD-ROM, DVD-ROM or USB stick. Presentations using MacIntosh file formats, Zip disk or speakers' private laptops are not possible! If there are video sequences included, please make sure to save the video files on your CD-ROM in addition.

The Preview room is open during the following hours:

Thursday, May 27	17:00-19:00
Friday, May 28	07:30-18:00
Saturday, May 29	07:30-18:00
Sunday, May 30	07:30-10:30



ESTI Executive Committee 2009 - 2010

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Meeting president Prof. Peter Vock

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MS

Dear participants of the ESTI Congress,

On the last weekend of May, Bern is offering you an attractive combination of:

- > the unique yearly European event in scientific chest imaging
- a compact educational course to enhance your knowledge in thoracic radiology
- > a meeting with your ESTI friends
- its charming downtown included in the UNESCO world heritage list
- a starting base for one-day excursions to the Swiss alps
- > its bear park, tower clock, Klee and Einstein museums and other cultural highlights.

It is my pleasure to offer you a warm welcome to the city in the heart of Switzerland!

Iche lock

Peter Vock ESTI President 2010

The need is GREAT. The time is NOW. The goals are ACHIEVABLE... **healthymagination**

Visit us at ESTI

ESTI 2010 • Satellite Symposium



Moderator: Luc Katz, Manager, Clinical Research, Diagnostic X-Ray, GE Healthcare, Buc, France

Lung nodule detection using Digital Tomosynthesis: clinical and organizational impacts

Dr Jenny VIKGREN, Sahlgrenska University Hospital, Sweden

Latest clinical trends for thoracic imaging in computed tomography

François ROCHE, Europe and Middle East Africa CT Marketing Director, GE Healthcare, Buc, France

Friday, May 28th • 12:35–13:25 • Auditorium Rossi



GE imagination at work



WELCOME RECEPTION

Evening Reception, Friday, May 28, 19:00 University platform (Grosse Schanze)

CME

The European Society of Thoracic Imaging, ESTI, is accredited by the European Accreditation Council for Continuing Medical Education (EACCME). The EACCME is an institution of the European Union of Medical Specialists (UEMS), www.uems.be.

ESTI 2010 is designated for a maximum of, or up to 15 European CME credits (ECMEC).

A confirmation of attendance will be handed out at the congress.

COFFEE BREAKS

Coffee, during the official coffee break times, is included in the registration fee.

May 28:	09:30 - 10:00
	15:30 - 16:00
May 29:	10:00 - 10:30
	15:30 - 16:00
May 30:	10:30 - 11:00

EDUCATIONAL AND SCIENTIFIC PROGRAMME FEATURES

Abbreviations in the programme as follows SS = Scientific Session SY = Lunch Symposium ES = Educational Session FP = Film Panel Interpretation

REGISTRATION

OPENING HOURS	
Thursday, May 27	17:00 - 19:00
Friday, May 28	07:30 - 18:00
Saturday, May 29	07:30 - 18:00
Sunday, May 30	08:00 - 10:30
ONSITE FEES	
ESTI Member	EUR 325
Non Member	EUR 410
Radiologist in training	EUR 180
One-day registration	EUR 210
Accompanying person	EUR 120





ESTI wishes to gratefully acknowledge the following companies for supporting the meeting:

PLATINUM SPONSORSHIP



FRIDAY, MAY 28, 2010

SY 01 12:35 – 13:25 GE Symposium "A new dimension in X-Ray"

SATURDAY, MAY 29, 2010

SY 02 12:30 - 13:30 Bracco Symposium "How to reduce radiation dose to the patient"





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PROGRAMME OVERVIEW

>

	Friday May 28	Saturday May 29	Sunday May 30
08:30 - 08:45 08:45 - 09:00 09:00 - 09:15 09:15 - 09:30	Scientific Sessions 1+2	Scientific Sessions 3+4	
09:30 - 09:45 09:45 - 10:00	Coffee Break		Film Panel
10:00 - 10:15 10:15 - 10:30	Opening Ceremony Honorary Lecture	Coffee Break	
10:30 - 10:45 10:45 - 11:00 11:00 - 11:15 11:15 - 11:30 11:30 - 11:45 11:45 - 12:00 12:00 - 12:15 12:15 - 12:30	Educational Session 1 "Pneumonia"	Educational Session 4a Oncology Educational Session 4b HRCT Basis Course	Coffee Break Educational Session 7 The chest emergency
12:30 - 12:45 12:45 - 13:00 13:00 - 13:15 13:15 - 13:30	GE Symposium	Bracco Symposium	Closing remarks
13:30 - 13:45 13:45 - 14:00 14:00 - 14:15 14:15 - 14:30 14:30 - 14:45 14:45 - 15:00 15:00 - 15:15 15:15 - 15:30	Educational Session 2 From diagnosis to therapy: an inter- disciplinary approach	Educational Session 5 HRCT Advanced Course	
15:30 - 15:45 15:45 - 16:00	Coffee Break	Coffee Break	
16:00 - 16:15 16:15 - 16:30 16:30 - 16:45 16:45 - 17:00	Educational Session 3 The borders of the lung	Educational Session Ga The heart between the lungs	
17:00 - 17:15 17:15 - 17:30		and	
17:30 - 17:45 17:45 - 18:00 18:00 - 18:15 18:15 - 18:30	General Assembly	Workshop 6b typical HRCT cases	
Evening	Welcome Reception	Faculty Dinner	Free

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SS 01	08:30 - 09:30	Scientific Session: Oncology Room: Auditorium Rossi Moderator: K. Marten, Goettingen/DE; F. Gleeson, Oxford/UK
The respectiv	ve abstracts can be fo	bund on pages 30-32
SS 01.1	08:30	Performance of CT and PET-CT in nodal restaging of locally advanced non small cell lung cancer after neoadjuvant therapy: Comparison with histopathology <u>A. Caulo</u> , F. Maggi, R. Inchingolo, A.R. Larici, T. Pirronti, L. Bonomo; Rome/IT
SS 01.2	08:38	Guantification of anti-angiogenic effect of epidermal growth factor receptor (EGFR) tyrosine kinase inhibitors (TKIs) with dynamic contrast-enhanced MR Imaging (DCE-MRI) in patients with non-small cell lung cancer (NSCLC): Feasibility study <u>C.A. Y</u> i, J.W. Lee, JH. Kim, K. Park, MJ. Ahn, S. Kim, K.S. Lee, H.Y. Lee; Seoul/KR
SS 01.3	08:46	Lung Cancer Perfusion with 64-rows Computed Tomography: A Reproducibility Study. L. Calandriello, A.R. Larici, A. del Ciello, F. Maggi, M.L. Vita, M. Congedo, P. Granone, L. Bonomo; Rome/IT
SS 01.4	08:54	Chemoembolization with DC Beads microspheres loaded with irinotecan in non operative lung cancer patients (ongoing study) M. Angelopoulos, <u>K. Malagari</u> , M. Pomoni, A. Pomoni, E. Emmanouil, S. Stefaniotou, D. Kelekis; Athens/GR
SS 01.5	09:02	Pre-Surgical Methylene-Blue "Targeting" Of Small Intrapulmonary Nodules In Patients With Haematological Malignancy: Preliminary Experience O.S. Jaffer, P.F. Lung, M. Ceesay, M. Marrinan, R. Deshpande, N. Mulholland, G. Mufti, S. Desai; London/UK
SS 01.6	09:10	Evaluation of the efficacy and safety of Percutaneous Core Biopsy of Lung S. McSweeney, <u>O.J. Flanagan</u> , P. McLaughlin, K. O Regan, L. Burke, M.M. Maher; Cork/IE
SS 01.7	09:18	Extrapleural and cardio-phrenic lymph nodes: Prevalence, clinical significance and diagnostic value B. Feragalli, <u>C. Mantini</u> , E. Di Nicola, F. De Filippis, R.L. Patea, M.L. Storto; Chieti/IT



SCIENTIFIC PROGRAMME: Friday, May 28, 2010

SS 02	08:30 - 09:30	Scientific Session: COPD, New CT Techniques Room: Course room 1 Moderator: N. Howarth, Chêne-Bougeries; E. van Beek, Edinburgh/UK
The respect	ive abstracts can be	e found on pages 32-34.
SS 02.1	08:30	 Improvement in the reproducibility of MDCT quantification of lobar pulmonary volumes using an automatic segmentation technique. <u>F. Molinari¹</u>, M. Amato¹, N. Sverzellati², G. Parapatt¹, F. D'Argento¹, G. Paolantonio¹, J.M. Kuhnigk³, T. Pirronti¹, L. Bonomo¹; ¹Rome/IT, ²Parma/IT, ³Bremen/DE
SS 02.2	08:38	The effect of inspiratory lung volume on lung densitometry in participants of two lung cancer screening trials <u>N. Sverzellati</u> ¹ , S. Diciotti ² , U. Pastorino ³ , JM. Kuhnigk ⁴ , S. Lombardo ² , G. Favilli ² , L. Macconi ² , E. Calabrò ³ , M. Zompatori ⁵ , M. Mascalchi ² ; 'Parma/IT, ² Florence/IT, ³ Milan/IT, ⁴ Bremen/DE, ⁵ Bologna/IT
SS 02.3	08:46	MDCT evaluation of central airways- Comparison of Virtual bronchoscopy, Minimal intensity projection and Multiplanar reformatted images. D.K. Sundarakumar, A.S. Bhalla, R. Sharma; New Delhi/IN,
SS 02.4	08:54	Potential influential factors for subjective and objective image quality in pediatric chest CT-scans <u>E. Stranzinger</u> , S.T. Schindera, SF. Hsu Schmitz, R. Herrmann, R. Wolf; Bern/CH
SS 02.5	09:02	CT screening and follow up of lung nodules: Effect of CT-tube current, nodule size and density on detectability of lung nodules and impact of CT-tube current on the nodule size. <u>A. Christe¹</u> , C. Torrente ¹ , M. Lin ² , R. Hallett ² , A. Yen ² , K. Roychoudhury ³ , P. Vock ¹ , J.E. Roos ² ; ¹ Bern/CH, ² Stanford/US, ³ Cork/IE
SS 02.6	09:10	Dual energy GSI (gemstone spectral imaging) in comparison to conventional dynamic CT in pulmonary nodule assessment: Initial observations J.F. Gruden, P. Panse; Phoenix, AZ/US
	10:00 - 10:30	OPENING CEREMONY/HONORARY LECTURE Room: Auditorium Rossi P. Vock, Bern/CH, J. Vilar, Valencia/ES

SCIENTIFIC PROGRAMME: Friday, May 28, 2010

ES 01	10:30 - 12:30	Pneumonia Room: Auditorium Rossi Moderator: G. Ferretti, Grenoble/FR
ES 01.1	10:30	In the immuno-competent patient
		J. Neuwirth, Prague/CZ
ES 01.2	11:00	In the immuno-incompetent patient
		J. Verschakelen, Leuven/BE
ES 01.3	11:30	In the ICU patient
FO 01 1	10.00	I. Hartmann, Rotterdam/NL
ES 01.4	12:00	M.L. Storto, Chieti/IT
SY 01	12:35 - 13:25	GE Symposium - A new dimension in X-Ray
		Room: Auditorium Rossi
		Moderator: L. Katz, Buc/FR
SY 01.1	12:35	Lung nodule detection using Digital Tomosynthesis: Clinical and organizational impacts J. Vikgren, Gothenburg/SE
SY 01.2	13:00	Latest clinical trends for thoracic imaging in computed
		tomography
		F. Roche, Buc/FR
ES 02	13:30 - 15:30	From Diagnosis to Therapy: An Interdisciplinary Approach Room: Auditorium Rossi Moderator: H.U. Kauczor, Heidelberg/DE
ES 021	13:30	COPD (clinical aspects - CT phenotyping)
		P. Grenier, Paris/FR; E. Russi, Zurich/CH
ES 02.2	14:10	Collagen vascular diseases
		S. Desai, London/UK; T. Geiser, Bern/CH
ES 02.3	14:50	Pulmonary hypertension
		K. Kreitner, Mainz/DE; L. Nicod, Lausanne/CH
ES 03	16:00 - 17:30	The Borders of the Lung
		Room: Auditorium Rossi
		Moderator: D. Tack, Baudour/BE
ES 03.1	16:00	Mediastinum - Tips and tricks
		J. Biederer, Kiel/DE
ES 03.2	16:30	Pleura: The forgotten structure
		F. Gleeson, Oxford/UK
ES 03.3	17:00	Diaphragm: No strict border
		B. Ghaye, Liège/BE
	17.70 10.00	CENEDAL ASSEMBLY
	17.50 - 18:00	





SS 03	08:30 - 10:00	Scientific Session: Pulmonary Embolism, Cardiovascular CT, Biopsy Room: Auditorium Rossi Moderator: S. Diederich, Duesseldorf/DE; J. Vilar, Valencia/ES
The respectiv	ve abstracts can be f	ound on pages 34-37
SS 03.1	08:30	Incidental Asymptomatic Pulmonary Embolism on MDCT: A Prospective Study of Prevalence in Oncology Inpatients <u>A. del Ciello</u> , A.R. Larici, F. Maggi, L. Calandriello, A. Contegiacomo, M. Occhipinti, R. Silvestri, L. Bonomo; Rome/IT
SS 03.2	08:38	Dose reduction in patients with acute chest pain by means of low kilovoltage triple-rule-out dual-source CT angiography - initial results <u>R. Krissak</u> , T. Henzler, A. Prechel, M. Reichert, J. Grüttner, T. Süselbeck, S.O. Schönberg, C. Fink; Mannheim/DE
SS 03.3	08:46	Sensitivity of CT pulmonary angiography at 120 kVp and 80 kVp: Intraindividual comparison in an experimental study <u>Z. Szucs-Farkas</u> ¹ , F. Schibler ¹ , H. Hoppe ¹ , M.A. Patak ¹ , S. Raible ² , P. Vock ¹ , S.T. Schindera ¹ ; ¹ Bern/CH, ² Biel/CH
SS 03.4	08:54	CT assessment of patients with chest pain: Feasibility of a two-step approach <u>J.F. Gruden</u> , P. Panse; Phoenix, AZ/US
SS 03.5	09:02	Radiation Dose and Diagnostic Accuracy of ECG-Gated Coronary CT Angiography in Pediatric Patients <u>T. Henzler</u> ¹ , U.J. Schoepf ² , W. Huda ² , S.O. Schoenberg ¹ , P. Costello ² , C. Fink ¹ , H. Anthony ² ; ¹ Mannheim/DE, ² Charleston/US
SS 03.6	09:10	Cardiovascular Risk stratification in the settings of Lung Cancer screening by means of CT: Insights from the MILD trial <u>N. Sverzellati</u> ¹ , F. Cademartiri ¹ , C. Martini ¹ , F. Bravi ² , A. Gira ¹ , E. Maffei ¹ , M. De Filippo ¹ , C. Rossi ¹ , A. Marchianò ² , E. Calabrò ² , U. Pastorino ² ; ¹ Parma/IT, ² Milan/IT,
SS 03.7	09:18	The Role of Multidetector Computed Tomography in Transcatheter Aortic Valve Implantation (TAVI) <u>A. Balan</u> , S.P.G. Padley, London/UK
SS 03.8	09:26	Aortoiliac CTA performed for the planning of percutaneous transfemoral aortic valve replacement: Frequency of clinically significant incidental findings <u>P. Apfaltrer</u> ¹ , P. Reimer ² , R. Krissak ¹ , T. Henzler ¹ , M. Reichert ¹ , K.A. Buesing ¹ , T. Süselbeck ¹ , S.O. Schoenberg ¹ , C. Fink ¹ ; ¹ Mannheim/DE, ² Karlsruhe/DE

SCIENTIFIC PROGRAMME: Saturday, May 29, 2010

SS 03.9	09:34	Dynamic Telecytologic Evaluation of Imprint Cytology Samples from CT Guided Lung Biopsies- A Feasibility Study
		H. Prosch, E. Hoffmann, J. Schalleschak, K. Bernhardt, E. Schober,
		M. Rowhani, G. Mostbeck; Vienna/AT
SS 04	08:30 - 10:00	Scientific Session: Infection, Interstitial Lung Disease Room: Course room 1
		Moderator: C. Schaefer-Prokop, Amersfoort/NL, C. Engelke, Goettingen/DE
The respec	tive abstracts can be	e found on pages 37-40
SS 04.1	08:30	The outcome of pandemic H1N1 pneumonia: Clinical and radiologic findings for severity assessment
		<u>K.I. Kim</u> ¹ , W.H. Cho ¹ , Y.S. Kim ¹ , D.S. Jeon ¹ , M.K. Lee ² , Y.J. Jeong ² , ¹ Yangsan/KR, ² Busan/KR
SS 04.2	08:38	Imaging Findings in Patients with the New Swine Flu Influenza A (H1N1) infection.
		<u>B. Saidi</u> , M. Bakhshayesh-Karam, P. Tabarsi, S. Zahirifard Tehran/IR
SS 04.3	08:46	Tesla MRI for the diagnosis of pneumonia in neutropenic
		comparison to HRCT
		M. Reichert, T. Henzler, R. Krissak, K.A. Buesing, D. Buchheidt,
		C. Fink; Mannheim/DE
SS 04.4	08:54	Comparison of initial high resolution computed tomography features in viral pneumonia between metapneumovirus
		infection and severe acute respiratory syndrome
		<u>C.K.K. Wong</u> , V. Lai, Y.C. Wong; Hong Kong/HK
SS 04.5	09:02	Extensively drug - resistant tuberculosis: Radiographic and multislice- Computertomography (MSCT) findings in four
		adult patients
		<u>D. Kienzi</u> , M. Kaufmann, M. Rownani, R. Rumetshofer, G. Mostbeck, C.J. Herold, H. Prosch; Vienna/AT
SS 04.6	09:10	CT evaluation of azithromycin therapy in non-cystic fibrosis
		bronchiectatic patients.
		<u>J. Soens</u> , P. Goeminne, F. De Keyzer, L. Dupont, W. De Wever, Leuven/BE
SS 04.7	09:18	Fibrotic idiopathic interstitial pneumonia:
		Predicting patient mortality using HRCT
		<u>A. Edey</u> , A. Devaraj, R. Barker, A.U. Wells, D.M. Hansell;
		London/UK



SCIENTIFIC PROGRAMME: Saturday, May 29, 2010

SS 04.8	09:26	Development of ultra-low-dose protocols for High Resolution CT in pediatric cystic fibrosis patients.
		<u>O.J. Flanagan</u> , O.J. Oʻ Connor, AM. McGarrigle, M. Vandaleur, N. Moore, S. McWilliams, M. Ni Chroinin, S. McSweeney,
		M. OʻNeill, M.M. Maher; Cork/IE
SS 04.9	09:34	Re-evaluation of air trapping (AT), inspiratory HRCT findings and pulmonary function tests (PFT) in pulmonary sarcoidosis P.I. Matalliotaki, <u>E. Detorakis</u> , E. Magkanas, M. Daskalogiannaki, V. Stylianaki, K. Antoniou, N. Gourtsoyiannis; Heraklion Crete/GR
SS 04.10	09:42	Can HRCT distinguish between sarcoidosis and
		pneumoconiosis presenting with hilar/perihilar masses?
		<u>M. Mereu</u> , E. Di Nicola, F. De Filippis, C. Mantini, R.L. Patea,
		M.L. Storto; Chieti/IT
ES 04.1	10:30 - 12:30	Oncology
		Room: Auditorium Rossi
		Moderator: J. Gruden, Phoenix, AZ/US
ES 04.11	10:30	What does the surgeon need to know?
		R. Schmid, Bern/CH
ES 04.12	11:00	Staging of lung cancer: TNM update and PET-CT
50 0 4 17	11 7 0	W. de Wever, Leuven/BE
ES 04.13	11:30	The solitary nodule: Detection and characterization
	12.00	S. Diederich, Dusseldon/DE
23 04.14	12.00	I. Tyurin, Moscow/RU
ES 04.2	10:30 - 12:30	HRCT Basic Course
		Room: Course room 1
		Moderator: M.L. Storto, Chieti/IT
ES 04.21	10:30	Reticular pattern
		K. Marten, Munich/DE
ES 04.22	11:00	Nodular pattern
		K. Malagari, Athens/GR
ES 04.23	11:30	Increased density
		A.R. Larici, Rome/IT
ES 04.24	12:00	Decreased density
		C. Beigelman, Paris/FR

SCIENTIFIC PROGRAMME: Saturday, May 29, 2010

SY 02	12:30 - 13:30	Bracco Symposium - How to reduce radiation dose to the patient
		Room: Auditorium Rossi
		Moderator: P. Vock, Bern/CH
SY 02.1	12:30	How to keep CNR constant while reducing patient dose
		F. Verdun, Lausanne/CH
SY 02.2	12:50	CT pulmonary angiography at low tube voltage
		Z. Szücs-Farkas, Bern/CH
SY 02.3	13:10	Low dose CT angiography: Coronary arteries and beyond
		F. Cademartiri, Parma/IT
ES 05	13:30 - 15:30	HRCT Advanced Course
		Room: Auditorium Rossi
		Moderator: S. Desai, London/UK
ES 05.1	13:30	Diffuse lung diseases: When do radiologists get it right?
		S. Ley, Dossenheim/DE
ES 05.2	14:00	Diffuse lung diseases: When do radiologists come unstuck?
		C. Schaefer-Prokop, Amersfoort/NL
ES 05.3	14:30	NSIP: Still non-specific?
		D. Hansell, London/UK
ES 05.4	15:00	CT of the lungs: The hinterlands of normality
		S. Copley, London/UK
ES 06.1	16:00 - 18:00	The Heart between the Lungs
		Room: Auditorium Rossi
		Moderator: P. Grenier, Paris/FR
ES 06.11	16:00	Heart and vessels: What to see on a CXR?
		J. Caceres, Barcelona/ES
ES 06.12	16:25	ECG-triggered chest CT: When and when not?
		M. Rémy-Jardin, Lille/FR
ES 06.13	16:50	The 1 mSv coronary CTA exam: New standard or wishful
		thinking?
		S. Leschka, St. Gallen/CH
ES 06.14	17:20	How to assess ventricular and valvular function
		J. Bremerich, Basle/CH
ES 06.15	17:40	3T cardiovascular MRI
		H. Hoppe, Bern/CH
ES 06.2	16:00 - 17:00	Workshop typical HRCT cases
		Room: Course room 1

HRCT cases: Discussion, differential diagnosis N. Howarth, Chêne-Bougeries/CH; C. Beigelman, Paris/FR



SCIENTIFIC PROGRAMME: Sunday, May 30, 2010

FP 01	09:00 - 10:30	Film Panel Room: Auditorium Rossi Moderator: G. Ferretti, Grenoble/FR; M. Prokop, Nijmegen/NL F. Gleeson, Oxford/UK H.U. Kauczor, Heidelberg/DE A. Oikonomou, Alexandroupolis/GR M. Revel, Paris/FR C. Engelke, Goettingen/DE E. Van Beek, Edinburgh/UK
ES 07	11:00 - 12:30	The Chest Emergency Room: Auditorium Rossi Moderator: P. Vock, Bern/CH
ES 07.1	11:00	Acute chest pain: Role of imaging
ES 07.2	11:30	PE: What is new? E. Coche. Brussels/BE
ES 07.3	12:00	Blunt chest trauma E. Stern, Seattle/US
	12:30 - 13:00	Closing Remarks Room: Auditorium Rossi



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electronic presentation online system

All scientific exhibits are displayed in electronic poster format and Computer terminals are available for viewing the presentations.

The electronic poster area is located in Course room 3 during the following opening hours:

Thursday, May 27	17:00 - 19:00
Friday, May 28	07:30 - 18:00
Saturday, May 29	07:30 - 18:00
Sunday, May 30	07:30 - 10:30

For detailed abstracts, please refer to page 41-55.

> Electronic Posters

COPD

P 01

Volumetric CT Emphysema Quantification for Predicting Pulmonary Hypertension in Patients with Stable Chronic Obstructive Pulmonary Disease (COPD)

J.S. Park¹, S.-H. PAIK²; ¹Bucheon/KR, ²Bucehon-si/KR

P 02

Reproducibility of airway wall thickness measurements

<u>M. Schmidt</u>¹, J.-M. Kuhnigk¹, S. Krass¹, B. Hoop, de², M. Owsijewitsch³, H.-O. Peitgen¹; ¹Bremen/DE, ²Utrecht/NL, ³Heidelberg/DE

INTERSTITIAL LUNG DISEASES

P 03

Reversed Halo: No longer a pathognomonic sign

<u>G. Meirelles</u>¹, D. Jasinowodolinski¹, J. Capobianco¹, C. Araujo Neto², E. Marchiori³, G. Szarf¹, A. Soares Souza Jr⁴, V. Antunes¹; ¹São Paulo/BR, ²Salvador/BR, ³Rio De Janeiro/BR, ⁴Sao Jose Do Rio Preto/BR

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Y. Ando¹, F. Okada², K. Honda², T. Nakayama², H. Mori²; ¹Beppu/JP, ²Yufu/JP

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Clinical and Pulmonary Thin-Section CT Findings in Acute Klebsiella Pneumoniae Pneumonia

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<u>S.W. Song</u>¹, B.C. Jun¹, S. Lee¹, K.J. Cho¹, Y.J. Kim¹, S.H. Park²; ¹Uijeongbu-City, Gyeonggi-Do/KR, ²Seoul/KR

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J. Capobianco¹, P.P.T.E.S. Torres¹, G. Meirelles²; ¹Sao Paulo/BR, ²São Paulo/BR

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L. Kolilekas, T. Spyridopoulos, E. Manali, E. Mainta, D. Markoulaki, C. Kontopoulou, S. Argentos, C. Sotiropoulou, N. Kelekis, S. Papiris; Athens/GR

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abstracts scientific sessions





Scientific Session 01 - Oncology

SS 01.1

Performance of CT and PET-CT in nodal restaging of locally advanced non small cell lung cancer after neoadjuvant therapy: comparison with histopathology <u>A. Caulo</u>, F. Maggi, R. Inchingolo, A.R. Larici, T. Pirronti, L. Bonomo; Rome/IT

Purpose: To compare performance of CT and PET-CT in evaluating the nodal response to neoadjuvant therapy in N2 non small cell lung cancer patients. Material and methods: 30 patients (24 M, 6 F; mean age 61 years) affected by N2 non small cell lung cancer were retrospectively enrolled. Tumor diagnosis was performed by fine-needle techniques; basal N staging was defined by imaging in 18 patients and by cytology in 12 patients. All patients underwent chemo-radiotherapy and were surgically resected after neoadjuvant treatment. Restaging CT exams were performed in thirteen patients; seventeen patients underwent both CT and PET-CT. Dimensional criterion (short axis > 1 cm) was used to evaluate nodes in restaging CT; in restaging PET-CT a qualitative evaluation was performed. Restaging results were then compared to histopathological results after surgery. Results: Compared to histopathological results (gold standard) CT correctly predicted N stage in 20/30 patients, while PET-CT predicted correct N stage in 12/17 patients. While both exams showed low sensitivity (40% and 67% respectively) and specificity (66,67% and 71,44% respectively), PET-CT showed a high specificity in diagnosing N2 nodes (90,91%), and both exams showed high negative predicting values (88,90% and 90,91% respectively). An interesting topic is the performance of both exams in predicting nodal downstaging, with a better performance of PET CT (94,1%) than CT (83,3%). Conclusion: While CT and PET-CT showed low sensitivity and specificity in predicting N stage after neoadjuvant therapy, their role in predicting nodal downstaging and feasibility of surgery is relevant.

SS 01.2

Quantification of anti-angiogenic effect of epidermal growth factor receptor (EGFR) tyrosine kinase inhibitors (TKIs) with dynamic contrast-enhanced MR Imaging (DCE-MRI) in patients with non-small cell lung cancer (NSCLC): feasibility study <u>C.A. Yi</u>, J.W. Lee, J.-H. Kim, K. Park, M.-J. Ahn, S. Kim, K.S. Lee, H.Y. Lee; Seoul/KR

Purpose: We quantified anti-angiogenic effect of EGFR TKIs using pharmacokinetic parameters from DCE-MRI in patients with NSCLC. Material and methods: Five patients were prospectively enrolled in this study, who can satisfy the following criteria; 1) patients with pathologically-proven recurrent or metastatic NSCLC, 2) patients with primary mass more than 3 cm in longest diameter, and 3) patients with EGFR activating mutation or at least 2 or more factors among adenocarcinoma, female, or never smokers. Patients were treated with gefitinib or erlotinib. DCE-MRI was performed at D-1, D+7, and D+ 28. D0 is the date of starting chemotherapy. Pharmacokinetic parameters were calculated for each pixel of whole primary mass using two-compartment model and time-concentration curve from DCE-MRI (volume transfer constant[Ktrans], volume of extravascular

extracellular space (EES) per unit volume of tissue[ve], flux rate constant between EES and plasma $[k_{ep}]$, enhancement amplitude [EA], time of half rising $[T_{2max}]$, and maximal slope [MS]). Longitudinal changes of antiangiogenic effect were quantified using pharmacokinetic parameters and these parameters were compared with the Response Evaluation Criteria in Solid Tumors (RECIST) results at each follow-up time point. Results: The average of pharmacokinetic parameters were decreased after EGFR TKI treatment in K^{trans} (4/5 pts.), v_e (5/5 pts.), and kep (4/5 pts.), suggesting anti-angiogenic effect with decreased permeability and EES volume in lung cancer. The enhancement amplitude was decreased in all five patients after EGFR treatment, alleviating strong enhancement pattern of malignant tumor. On 7th day of follow-up after EGFR TKI treatment, 4 out of 5 patients showed more than 30% change of pharmacokinetic parameters at least 2 out of six parameters. The most prominent change was observed in K^{trans} (3/5 pts.). But, no patients showed complete remission or partial response with more than 30% change in the longest based RECIST. Conclusion: diameter on Pharmacokinetic parameters from DCE-MRI can be successfully obtained for NSCLC. These parameters are quantitative biomarkers for tumor angiogenesis and may play a role as objective parameters and early indicators for response evaluation of target agent treatment in NSCLC.

SS 01.3

Lung Cancer Perfusion with 64-rows Computed Tomography: A Reproducibility Study.

L. Calandriello, A.R. Larici, A. del Ciello, F. Maggi, M.L. Vita, M. Congedo, P. Granone, L. Bonomo; Rome/IT

Perfusion with MDCT (Multidetector Purpose[.] Computed Tomography) is a dynamic imaging technique to evaluate tumors vascularization in vivo. The aim of our study was to prospectively assess the reproducibility of perfusion technique with 64-rows CT in patients with NSCLC (Non-small Cell Lung Cancer). Material and methods: 10 Patients (4 male, 6 female; age range: 57-86 years), with histologically proven NSCLC, underwent perfusion CT of the tumor by using a 64-rows scanner (Lightspeed VCT, GE Healthcare). Perfusion was performed with the following parameters: 100 kV, 500 mA, rotation time 0.4 sec, slice thickness 5 mm, start delay 5 sec, 50 mL of contrast medium @ 5 mL/s. Two different techniques were used according to the maximum diameter of tumor, respectively a cine mode (8 images/rotation; total coverage 40 mm) or sequential mode (8 images/ rotation/40 mm table movement; total coverage 80 mm). After 24 hours each study was repeated using the same parameters to assess the reproducibility of technique. A chest radiologist reviewed all datasets on a post-processing workstation and perfusion parameters were calculated by using a commercial software (CT Perfusion 4, GE Healthcare). One circular ROI was placed within the aorta to obtain the arterial input and a second ROI was manually drawn within the tumor. Four parameters were measured: BV (Blood Volume), Perfusion, PEI (Peak Enhancement Intensity) and TTP (Time To Peak). Bland-Altman statistic was applied to determine reproducibility. Results were expressed as mean values of differences (Δ) and standard deviations (SD). Results: The mean values \pm SD% for each pair of exam showed high reproducibility

for BV $(2,6\pm3,4\%)$ and Perfusion $(-4,4\pm8,5\%)$ and moderate to good reproducibility for TTP $(20\pm15,4\%)$ and PEI $(-4,3\pm23,6\%)$. **Conclusion**: Perfusion technique performed with 64-rows CT showed high reproducibility in terms of BV and Perfusion measurement. It has the potential of being routinely used in the assessment of tumor vascularity.

SS 01.4

Chemoembolization with DC Beads microspheres loaded with irinotecan in non operative lung cancer patients (ongoing study)

M. Angelopoulos, <u>K. Malagari</u>, M. Pomoni, A. Pomoni, E. Emmanouil, S. Stefaniotou, D. Kelekis; Athens/GR

Purpose: The aim of this trial is to evaluate the feasibility, efficacy and safety of transarterial embolization of bronchial and /or pulmonary arteries with DC Bead microspheres loaded with irinotecan(TACE) in the treatment of primary non operative lung carcinoma. This study is the first in the literature for primary lung cancer and follows animal studies that showed satisfactory pharmacokinetics in the sheep. Material and methods: In an ongoing study of 5 patients 3 sessions of TACE/patient were performed every 6 weeks. In every session 20mg/m² of irinotecan was loaded in a 2 ml vial of DC bead microspheres (300-500 µm and 500-700µm). Post-TACE monitoring included physical examination, vital signs, Lung CT, spirometry, complete blood counts, biochemical profile and adverse events. Results: In 5 angiography patients the pattern at showed hypervascularity from the bronchials and the rest were oligemic. A correlation with angiogenic factors in the blood was feasible only in 4 cases. According to RECIST criteria there was partial local tumor response in 3 patients, and the rest had no response (stable disease). The extent of tumor necrosis was $\sim 20\%$. We observed no procedure-related serious adverse events (SAE) in our patients. There were no significant complications with the exception of a persistent cough that occurred in 2 patients. None of the patients experienced toxicity due to irinotecan administration (20mg/m²) according to Southwest Oncology Group(SWOG) toxicity criteria. In addition, there was no significant difference in terms of quality of life under therapy (EORTC) Conclusion: We conclude that 20mg/m² of irinotecan is a safe dosage and we assume to increase the dose of irinotecan from 20mg/m^2 to 30mg/m^2 and to 40mg/m^2 in order to achieve better tumor response according to RECIST criteria.

SS 01.5

Pre-Surgical Methylene-Blue "Targeting" Of Small Intrapulmonary Nodules In Patients With Haematological Malignancy: Preliminary Experience O.S. Jaffer, P.F. Lung, M. Ceesay, M. Marrinan, R. Deshpande, N. Mulholland, G. Mufti, S. Desai; London/UK

Purpose: The diagnosis of intrapulmonary nodules in patients with haematological malignancies is problematic; such lesions are often small and impalpable and "non-targeted" surgical biopsy is difficult. The aim was to evaluate the utility of image-guided "targeting" of small pulmonary nodules with methylene-blue before video-assisted thoracoscopic (VATS) biopsy.

Material and methods: Eight patients (M:F= 6:2); mean age = 41 yearsï, ± 11.7) with haematological malignancy (lymphoma, n=5, AML, n=1, ALL, n=1, Castleman's disease, n=1) were referred for VATS biopsy. Using computed tomographic (CT) guidance, 0.8-2.0mls of methylene-blue (with an equal volume of iodinated contrast) was injected in the vicinity of the target lesion and along a track (including the pleural surface and the overlying chest wall), using a 20G needle. The platelet count, diameter of targeted nodules, "perpendicular" distance from the pleural surface and complications were recorded. Patients were transferred to surgery from the CT suite. Results: The mean platelet count was 304x10⁹/L. The mean diameter of targeted nodules was 12.5±7.2mm and these were at a mean distance of 14.0±9.4mm from the pleural surface. Minor complications occurred in 4/8 (50%) patients (pneumothorax, n=3, pain, n=1). A definitive histopathological / microbiological diagnosis was achieved in 7/8 (87%) patients and included: organising pneumonia (n=2), respiratory bronchiolitis (n=2), Kaposi's sarcoma (n=1), mycobacterium fortuitum infection (n=1) and chronic graft-versus-host disease (n=1). There were no instances of angioinvasive aspergillosis. Conclusion: The preliminary data suggest that pre-biopsy methylene-blue targeting of intrapulmonary lesions is a safe and promising technique for the diagnosis of indeterminate lung nodules in patients with haematological malignancy.

SS 01.6

Evaluation of the efficacy and safety of Percutaneous Core Biopsy of Lung

S. McSweeney, O.J. Flanagan, P. McLaughlin,

K. O Regan, L. Burke, M.M. Maher; Cork/IE

Purpose: To determine the efficacy and safety of Computed Tomography (CT) guided percutaneous core biopsy without fine needle aspiration (FNA) in focal thoracic disease. Material and methods: A retrospective analysis was performed in 75 consecutive procedures over a two year period involving a common single operator in all. Patient details, risk factors, biopsy technical factors (including CT attenuation of lung parenchyma) and outcome (complications and biopsy pathology) was recorded for all cases. Results: 75 biopsies were performed in 72 patients (38 Male/ 34 Female). The mean age of a patient undergoing the procedure was 63.6 years, 84.7% having a smoking history (41.7% Current smoker, 31.9% Ex-smokers > 1 year, and 11.1% Ex-smokers for < 1 year). The mean size and depth of lesion was 3.1 cm (range 0.7 - 10.7) and 6.9cm (range 2.8-12.6) respectively. 19/75 (25%) had CT lung parenchyma attenuation values < -900. The rate of pneumothorax was 20% (15 pneumothoraces/75 procedures) with majority small with the rate of chest drain insertion 5.3% (4 chest drain insertions/75 procedures), of the patients with pneumothorax 7/15 (47%) had CT lung parenchyma attenuation values < -900. There was CT evidence of perilesional haemorrhage in 12/75 (16%) but here was no significant hemoptysis or haemothorax. Definitive diagnosis was made in 95% (71/75) of procedures with malignancy in 64% (48/75



procedures) and benign in 30.7% (23/75 procedures). Cross-tabulation and Chi-square analysis was also done to see if there was any correlation between risk factors and pneumothorax post biopsy, with increased risk of pneumothorax in patients with CT Lung attenuation <-900. **Conclusion**: CT guided coaxial core biopsy of focal thoracic lesions without FNA is diagnostic in the majority of patients and is safe to perform with acceptable complication rates, with increased risk of pneumothorax in patients with CT Lung attenuation values suggestive of emphysema.

SS 01.7

Extrapleural and cardio-phrenic lymph nodes: prevalence, clinical significance and diagnostic value B. Feragalli, <u>C. Mantini</u>, E. Di Nicola, F. De Filippis, R.L. Patea, M.L. Storto; Chieti/IT

Purpose: To evaluate the prevalence and the clinical significance of extrapleural and cardio-phrenic lymph nodes occasionally observed on CT scans of the chest. Material and methods: 750 consecutive patients who had undergone MDCT scan of the chest for different clinical purposes (370 with non-neoplastic disease, 250 with extrathoracic neoplasms, 100 with intrathoracic neoplasms, 30 with pleural metastasis) and 91 patients with histologically proven Malignant Pleural Mesothelioma (MPM) were included in the study. CT images of each patient were independently evaluated by two chest radiologists and assessed for the presence, number (single or multiple) and size (≤ 5 mm; 6-10 mm; > 10 mm) of extrapleural and cardio-phrenic lymph nodes. The prevalence of these nodes in each group of patients was calculated. Results: The prevalence of extrapleural lymph nodes of any size was less than 1% in all groups of patients, except for patients with MPM (62/91 - 68%; p < 0.01). The prevalence of cardio-phrenic lymph nodes > 5mm in size was 66% (60/91) in patients with MPM, 53% (16/30) in patients with pleural metastasis, and less than 2% in all other groups of patients (p < 0.01). Cardiophrenic lymph nodes \leq 5 mm were observed in 5-7% of cases, without significant differences in terms of prevalence among the different groups of patients (p >0.05). Conclusion: Extrapleural lymph nodes of any size (even $\leq 5 \text{ mm}$) and cardio-phrenic lymph nodes > 5 mmare frequently observed in patients with malignant pleural disease, either primary or secondary, whereas they are almost rare in patients with other intrathoracic and extrathoracic neoplasms.

Scientific Session 02 – COPD, New CT Techniques

SS 02.1

Improvement in the reproducibility of MDCT quantification of lobar pulmonary volumes using an automatic segmentation technique. <u>F. Molinari</u>¹, M. Amato¹, N. Sverzellati², G. Parapatt¹,

F. D'Argento¹, G. Paolantonio¹, J.M. Kuhnigk³, T. Pirronti¹, L. Bonomo¹; ¹Rome/IT, ²Parma/IT, ³Bremen/DE

Purpose: Density-based MDCT quantification (q-MDCT) of lung volumes is relevant in patients with severe emphysema or lung cancer. The inter- and intraoperator variability of q-MDCT obtained by two different segmentation techniques was compared. Material and methods: Forty-seven chest MDCT examinations of patients with lung emphysema (men/women=34/13, age range: 48-85) were selected from our database. All patients had been studied with lung function tests and a standardized chest imaging protocol on a 16-MDCT scanner (thickness/interval=1.25mm; pitch=1.5). The MDCT datasets were analyzed independently by two operators using a manual procedure for delimitation of pulmonary lobes (A), and a full-automatic approach that allowed for manual refinement of lobar separation (B). Lung (V) and emphysema volumes (VE) were obtained from both lungs and each lobe. The inter- and intraoperator differences were expressed as percentages over means. Mean differences (Δ -tot) and standard deviations (SD-tot) calculated from the two approaches were compared. Results: The analysis conducted for both lungs showed minimal variability using A and no variability using B. From the lobar analysis, inter- and intra-operator variability ranges (min/max) obtained from B were lower than those from A: for V (B vs. A: Aintertot \pm SD Δ inter-tot = -3.7/1.6 \pm 4/17% vs. -3.9/3.5 \pm 4.5/22.6%; Δ intra-tot \pm SD Δ intra-tot $= 0.6/0.4 \pm 1.3/8.1\%$ vs. $-1.5/0.9 \pm 2.5/10.6\%$; for VE (B vs. A: Δ inter-tot \pm $SD\Delta inter-tot = -3/2.9 \pm 5/18.9\% \text{ vs. } -3/2.9 \pm 8.5/23.3\%;$ Δ intra-tot \pm SD Δ intra-tot $= -0.5/0.5 \pm 3.2/9.8\%$ vs. -1.1/1 \pm 5.6/13.7%). Conclusion: The reproducibility of q-MDCT lobar volumetry is improved by using an automatic segmentation technique.

SS 02.2

The effect of inspiratory lung volume on lung densitometry in participants of two lung cancer screening trials

<u>N. Sverzellati</u>¹, S. Diciotti², U. Pastorino³, J.-M. Kuhnigk⁴, S. Lombardo², G. Favilli², L. Macconi², E. Calabrò³, M. Zompatori⁵, M. Mascalchi²; ¹Parma/IT, ²Florence/IT, ³Milan/IT, ⁴Bremen/DE, ⁵Bologna/IT

Purpose: To explore the reliability of densitometric measurements for the assessment of the emphysema progression in a lung cancer screening context. Material and methods: Baseline low-dose thin-section CT examinations of 99 and 33 subjects respectively recruited by the Multicentric Italian Lung Detection (MILD) and ITALUNG trials were compared with their corresponding repeat CTs obtained after three months. The CT images of the two groups of subjects were respectively analyzed by two different softwares for the quantification of lung densitometric parameters. A Bland and Altman test was applied to assess the levels of agreement of either the lung volume and the 15° percentile (Perc15) of lung density between the baseline and the repeat CT examinations. Perc15 values were corrected for different lung volumes between CT examinations by a linear regression analysis. Results: 95% Bland and Altman limits of agreement (LoA) of lung volume were about + 1 litres in both groups of subjects. The width of 95% LoA interval of Perc15 was narrowed of 32% (MILD cohort) and 25% (ITALUNG cohort) when lung volumes correction was applied. Conclusion: The differences in lung volumes among serial CT examinations of the same subject have a relevant effect on changes of Perc15 over time. Lung volume correction is feasible in a lung cancer screening context and should be applied to optimize the assessment of the evolution of emphysema.

SS 02.3

MDCT evaluation of central airways- Comparison of Virtual bronchoscopy, Minimal intensity projection and Multiplanar reformatted images.

<u>D.K. Sundarakumar</u>, A.S. Bhalla, R. Sharma; New Delhi/IN

Purpose: To evaluate the role of MDCT in airway imaging and to assess the diagnostic utility of three dimensional post processing techniques including virtual bronchoscopy, multiplanar reformatted images and minimal intensity projection. Material and methods: It was a prospective study involving hundred and fifty patients with symptoms of major airway disease. Fifty six patients were selected for analysis based on detection of major airway lesions in fiberoptic bronchoscopy(FB) or routine axial images. Comparisons were made between axial images, Virtual bronchoscopy (VB), minimal intensity projection (MinIP) and multiplanar reformatted images (MPR) using fiberoptic bronchoscopy as gold standard. Lesions were evaluated in terms of degree of airway narrowing, distance from carina, length of the narrowed segment and visualization of airway distal to the lesion. Results: MPR had the highest degree of agreement with the FB (K=0.76) in the depiction of degree of narrowing. minIP had least degree of agreement with FB (k=0.51) in this regard. The distal visualization was best on MPR (84.2%) followed by axial images (80.7%) while FB could visualize in 45.4% cases. VB had the best agreement with FB in assessing the segment length (k=0.62). There was no overall statistically significant difference in measurements from carina on in axial, minIP and MPR. MPR had the highest overall degree of confidence 70.17% (n=40). Conclusion: Three dimension reconstruction techniques improved the lesion evaluation compared axial images alone. MPR was the most useful technique for lesion characterization. With respect to the above three parameters, VB did not have a distinct diagnostic utility. minIP was useful in the depiction of complex congenital airway lesions.

SS 02.4

Potential influential factors for subjective and objective image quality in pediatric chest CT-scans <u>E. Stranzinger</u>, S.T. Schindera, S.-F. Hsu Schmitz, R. Herrmann, R. Wolf; Bern/CH

Purpose: To assess effects of different factors on subjective and objective image quality in pediatric chest CT scans. Material and methods: Retrospective evaluation of 82 chest-CT scans (64 rows Somatom Sensation Cardiac, Siemens) in 49 children. Two pediatric radiologists evaluated in consensus the subjective image quality using a 4-point scale (1= very good, 2= good, 3= moderate 4= barely diagnostic). The effects of the following factors on image quality were evaluated: tube energy (80kV in 3, 100kV in 68 and 120kV in 11 CT scans), average image noise (HU) in three muscle regions, Rogalla Formula (RF, in 52 CT scans (mAs=kg+5 (±5)), weight group (<15kg (n=12) and \geq 15kg (n=70)), indication (oncology or not), DLP (dose length product), endotracheal tube, ECG-electrodes, slice thickness, prior MR to CT-scan, and chest diameter.

Results: The odds of having a better image quality increases with patient's lateral chest diameter, oncology indication, no prior MRI and slice thickness (P <0.05). There was no difference between RF and no RF. In infants (< 15kg) subjective image quality was good in 1(8%), moderate in 8(67%) and barely diagnostic in 3 (25%) scans. In childhood and adolescence (15 - 90kg) 25(36%) scans were very good, 28(40%) good, 15(21%) moderate and 2(3%) barely diagnostic. Conclusion: Increasing dose parameters may not increase necessarily image quality, rather than good ventilation, avoiding artifacts and timing of the study before MR-scan. The alveolar stage in infants up to two years has a high specific lung-volume per kg and a low total lung volume with a low alveolar surface. This may cause a low subjective image quality in younger children.

SS 02.5

CT screening and follow up of lung nodules: effect of CT-tube current, nodule size and density on detectability of lung nodules and impact of CT-tube current on the nodule size.

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Purpose: The purpose of the study was to quantify and compare the effect of CT-tube current, size and density of nodules on detectability of lung nodules and to quantify the influence of CT-tube current on the size of lung nodules. Material and methods: From 50 patients a total of 125 cuboidal regions of interest (3x3x1.5cm volumes) showing a single nodule (£8mm) and 27 normal cuboids were selected. Image sets were reconstructed from raw data simulating different dose levels with the software Somatom Noise+ V5.Obeta. Each cuboid was available at tube current 300 (original), of а 220,180,140,100,80,60,50,40,30,20,10 and 5 reference mAs. Data were dichotomized for calculating odds-ratios: size \geq 3mm vs. <3mm, density \geq -300 vs. <-300 HU (ground glass opacity) and standard (300 mAs) vs. low dose (5 mAs). Results: The mean sensitivities of three readers for all nodules at tube current level of 300, 100, 40, 30, 20, 10, 5 mAs were 91.5%±8% (SD), 90.4%±8.4%, 91.2%±9.2%, 92.0%±7.6%, 91.2%±8.4%, 88.3%±9.4%, 88%±9.8%. Only sensitivity at 5 mAs was significantly lower than at 300 mAs (p-value = 0.0012). The negative influence on sensitivity are according to the odds-ratios strongest for low nodule density (p-value <0.0001), followed by small nodule size (p-value = 0.01) and low CT-tube current (p-value = 0.12). The mean nodule volume measurement error (VME) of two readers combined between 5 and 300 mAs tube current was 2.2%±22.8% (SD) and much lower than the interobserver VME of 37.8%±44.7% at the standard tube current. Conclusion: Nodule characteristics showed the most important negative effect on the detectability of small pulmonary nodules, while the technical parameter tube current had less influence. Also, volume measurement was much less influenced by tube current than by interobserver variability. The results show a feasibility of a low dose CT-protocol with 10 mAs for follow up of lung nodules.





SS 02.6

Dual energy GSI (gemstone spectral imaging) in comparison to conventional dynamic CT in pulmonary nodule assessment: initial observations J.F. Gruden, P. Panse; Phoenix, AZ/US

Purpose: We wish to report the use of dual energy CT in the analysis of the enhancement characteristics of pulmonary nodules and compare the technique with results obtained with conventional dynamic contrast enhanced CT. Material and methods: We performed dual energy contrast enhanced CT using GSI (gemstone spectral imaging) in 15 patients with pulmonary nodules. Conventional low-dose noncontrast examinations followed by dynamic enhanced CT images through nodules were performed in all patients as per standard protocol. The GSI data set was transferred to a special viewer allowing creation of images utilizing the individual spectral properties of iodine and water. Iodinewater basis pair images display enhancing nodules; water-iodine basis pair images serve as a proxy for noncontrast images. The results were compared with manual Hounsfield number measurement of nodule density before and 1, 2, 3, and 4 minutes after contrast administration as per standard protocol. Results: All nodules with perceptible enhancement (n=9) on conventional CT were visible on the dual energy GSI iodine-water basis pair images. This indicates the presence of iodine in the nodule. The water-iodine basis pair image did not show the nodule in these cases and can serve as a virtual noncontrast image. Nodules that did not enhance (n=6) using conventional density analysis were not visible on either the iodine-water or water-iodine basis pair images indicating the absence of iodine content. Conclusion: Dual energy CT with GSI allows rapid assessment of the presence or absence of iodine (and therefore enhancement) in pulmonary nodules. This preliminary analysis suggests that a single contrast enhanced CT with dual energy GSI may replace the conventional multiphasic pre and post contrast nodule enhancement protocol for the solitary nodule. Dual energy GSI also enables analysis of enhancement of all nodules in the chest with a single acquisition rather than a focus on a single lesion. Further analysis of the technique is warranted.

Scientific Session 03 – Pulmonary Embolism, Cardiovascular CT, Biopsy

SS 03.1

Incidental Asymptomatic Pulmonary Embolism on MDCT: A Prospective Study of Prevalence in Oncology Inpatients

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Purpose: To assess the prevalence of Pulmonary Embolism (PE) incidentally detected on routine MDCT exams in oncology inpatients without and with symptoms suggestive of PE. **Material and methods**: 954

consecutive neoplastic inpatients who had undergone routine contrast-enhanced 16- and 64-row CT scans of the chest for indication other than PE, were prospectively enrolled. Demographics, clinical information (dyspnea, chest pain, limb pain/swelling) and risk factors for thromboembolism other than neoplasm were prospectively obtained from charts at the time of CT exam. All images were reviewed by two chest radiologists in consensus to look for the presence and distribution of PE. Prevalence of incidental PE in asymptomatic and symptomatic patients was calculated. Differences in age and risk factors distribution between PE patients and patients without PE were tested. Results: Incidental PE was observed in 44/954 oncology inpatients (overall PE rate of 4.6%). The majority of patients (76%, 725/954) were asymptomatic and the remaining 24% (229/954) had symptoms like dyspnea (100%) and chest pain (4%). Prevalence of incidental PE in asymptomatic oncology inpatients was 2.7% (20/725). Symptomatic patients had a significantly higher rate of incidental PE (10.6%, 24/229) (p<0.05). In both groups of patients incidental PE was peripherally located. The mean age of patients without PE (59 years) resulted significantly lower than that of PE patients (64 years) (p<0.05). Most of PE patients (38/44, 86%) had more than one coexisting risk factor for thromboembolism besides neoplasm (metastases, chemotherapy and venous catheter). The rate of patients without PE with multiple risk factors was significantly lower (607/910, 66.7%) (p<0.05). Conclusion: Prevalence of incidental PE on routine chest MDCT exams in oncology inpatients without any evidence of symptoms is low. A considerable rate of neoplastic inpatients with incidental PE may have symptoms overlooked by referring clinicians. Radiologists should carefully analyze pulmonary arteries on routine chest CT exams in patients with advanced neoplasm.

SS 03.2

Dose reduction in patients with acute chest pain by means of low kilovoltage triple-rule-out dual-source CT angiography - initial results

<u>R. Krissak</u>, T. Henzler, A. Prechel, M. Reichert, J. Grüttner, T. Süselbeck, S.O. Schönberg, C. Fink; Mannheim/DE

Purpose: To investigate the dose reduction potential of kilovoltage triple-rule-out dual-source CT low angiography (TRO-CTA) in non-obese (BMI ≤ 25 kg/m²) patients with acute chest pain. Material and methods: In an ongoing study TRO-CTA was performed in 16 patients (9 female) with a low-kilovoltage protocol (100 kV/320 mAs) and compared to 18 patients (10 female) examined with a standard protocol (120 kV/320 mAs). Subjective image quality was assessed on a 5 point scale (1: excellent, 5: non-diagnostic) by two blinded observers. Quantitative image analysis assessed vascular attenuation (ascending aorta (AA), pulmonary trunk (PA), left coronary artery (LCA)) and signal-to-noise ratio (SNR) in the AA. The effective dose was calculated from the dose length product (DLP) using a conversion coefficient of 0.017 mSv mGy⁻¹cm⁻¹. Results: There was no significant difference of age, BMI or scan length between both patient groups. Subjective image quality

was rated similar in both groups (100 kV: average score=1.2; 120 kV: 1.1). Vessel attenuation was significantly higher in the 100 kV group (AA: 472 \pm 90 HU vs. 380 \pm 91 HU, p=0.01; PA: 499 \pm 104 HU vs. 419 \pm 81 HU, p=0.02; LCA: 460 \pm 85 HU vs. 363 \pm 102 HU, p=0.01), however, there was no significant difference in SNR (12.2 \pm 9.1 vs. 12.7 \pm 6.2, p=0.84). The effective radiation dose of the 100 kV protocol was significantly lower (8.3 \pm 3.1 mSv vs. 16.4 \pm 7.4 mSv, p<0.01). **Conclusion**: TRO CTA with 100 kV is feasible in nonobese patients and results in a diagnostic image quality and significantly reduced radiation dose.

SS 03.3

Sensitivity of CT pulmonary angiography at 120 kVp and 80 kVp: intraindividual comparison in an experimental study

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Purpose: To intraindividually analyze the sensitivity of CT pulmonary angiography (CTPA) for the detection of pulmonary emboli (PE) with a standard 120 kVp protocol and a 80 kVp protocol using reduced radiation and contrast material (CM) dose under experimental conditions. Material and methods: Normal-dose CTPAs at 120 kVp with 100 mL CM in 10 patients with no PE were randomly selected. The image characteristics of a 80 kVp low-dose protocol (patientexposure reduction, 57%) with 75 mL CM were simulated by increasing the vessel signal by 37% and the image noise by 57%, respectively. Emboli were visually simulated in different locations of the lobar, segmental and subsegmental pulmonary arteries by using an image post-processing software tool specifically developed for the study. The same PE-shapes were used in the 10 normal-dose and in the 10 corresponding low-dose series. The 20 CTPA studies were randomized and assessed by 2 blinded readers for image quality and PE localization. Results were analyzed by the Wilcoxon test. Results: There was no significant difference in the number of correctly identified emboli at all levels of the pulmonary arterial tree (p > 0.21). The subjective image quality showed a trend to be rated higher at 120 kVp compared to 80 kVp, however, the difference was not significant (4.15 vs 3.85 on a 5-point-scale; p= 0.059). Conclusion: This intraindividual comparison revealed no difference in the sensitivity of normal-dose and low-dose CTPA protocols using reduced patient exposure and iodine load. The experiment should be extended, involving more cases and readers, to confirm these preliminary results.

SS 03.4

CT assessment of patients with chest pain: feasibility of a two-step approach

J.F. Gruden, P. Panse; Phoenix, AZ/US

Purpose: CT can be used to assess patients presenting with chest pain and can be performed to simultaneously

exclude pulmonary embolism (PE), aortic dissection, or significant coronary artery stenosis (as a potential cause of unstable angina). However, this approach has significant limitations with regard to patient preparation and scan quality, and is often difficult to perform at all hours every day. We demonstrate the feasibility of a two step CT approach: an initial low dose scan to immediately exclude PE or dissection followed by a dedicated coronary artery CT at a later time. Material and methods: Our standard chest pain protocol in the ED consists of an immediate low dose CT (80-100kVp, 100mAs, 60-80 ml intravenous contrast) in patients suspected of PE or dissection. This allows rapid exclusion of these entities. If coronary artery disease is clinically suspected, patients are prepared for coronary CT if the ECG is normal and if the first set of cardiac enzymes is negative. Beta blockade (50-100 mg Metoprolol) is begun at this time. Coronary CT is performed only between 8 AM and 6 PM daily with dedicated physician and technical staff. All exams are performed with 100-120 kVp and prospective ECG triggering with no padding and a small field of view. Results: Scans are of diagnostic quality and superior to the single helical retrospectively gated studies of the entire chest in terms of image quality and speed of diagnosis of PE or dissection. The radiation dose of the two studies in the two step approach in actually less than that of a single retrospectively gated helical exam. Conclusion: The two step CT approach to the patient with chest pain is feasible and actually superior to the single helical retrospectively gated scan at a lower radiation dose.

SS 03.5

Radiation Dose and Diagnostic Accuracy of ECG-Gated Coronary CT Angiography in Pediatric Patients

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Purpose: Over the past years pediatric ECG-gated coronary-CT-angiography (cCTA) has become feasible. We aimed to assess diagnostic accuracy of pediatric ECG-gated cCTA, to calculate the effective radiation dose (ED) and to identify the main determinants of radiation exposure. Material and methods: Between 01/2006 and 02/2010, 73 pediatric cCTA were performed to evaluate patients with known or suspected coronary abnormalities (48 male, 24 female, mean age 10.3±5.8). Weight, height, CT dose index (CDTI), dose-length product (DLP), tube voltage (kV) and effective tube current (eff mAs) were recorded and the ED was calculated. To determine the diagnostic accuracy of cCTA, findings were compared with other diagnostic studies or with surgery. Results: CCTA findings were confirmed by other diagnostic studies or by surgery in all patients. The overall ED was $9.3 \text{ mSv} \pm 6.0 \text{ mSv}$. Patients scanned with 80kV had lower ED than patients scanned with 100-120kV (5.6mSv±2.7mSv vs. 14.9mSv±5.4mSv (p<0.0001)). Patients between 0-5 years were exposed to lower ED compared to patients of age 5-10 years (4.0mSv±1.9mSv vs. 7.4mSv±2.9mSv (p≤0.005)) and



age 10-18 years (4.0 mSv±2.9mSv vs. 11.9mSv±6.4mSv ($p \le 0.0002$)). Patients who underwent cCTA later than 12/2007 were exposed to lower ED than those who underwent cCTA before 12/2007 (8.0±5.2vs. 13.7±6.6 ($p \le 0.002$)). KV and eff mAS independently predict a higher ED, whereas age, weight and BMI are not predictive. **Conclusion**: CCTA is highly accurate for the evaluation of coronary arteries in pediatric patients. By using dedicated pediatric cCTA protocols the ED can be significantly reduced.

SS 03.6

Cardiovascular Risk stratification in the settings of Lung Cancer screening by means of CT: insights from the MILD trial

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Purpose: To assess the prevalence and severity of coronary artery calcification (CAC) in a cohort of smokers undergoing computed tomography (CT) screening for lung cancer. Material and methods: 1184 consecutive hard smokers (807 men, women 377, 49-77 years, > 20 pack-years of smoking) without history of major adverse cardiac events, undergoing low-dose (30 mAs) ungated CT examination as part of the Multicentric Italian Lung Detection (MILD) trial, were selected for review. Agatston score on 5mm soft-tissue kernel (B30) CT images was calculated by one observer with 5 years of experience in cardiac imaging. Frequency distribution by genders, age and pack-years of smoking were determined. Results: CAC increased with age for both men and women. High Agatston score values (>400) were reported in 28/556 (5.4%) men aged 49-60 yearsold and in 44/246 (18%) men older than 60 years-old; eight (9%) women older than 60 years-old showed Agatston scores of 401-1000. Overall, the severity of CAC increased with increasing pack-years of smoking. Conclusion: Severe CAC has been observed in subjects more at risk of cardiac disease. This information can contribute to risk stratification and management of coronary artery disease in the context of lung cancer screening.

SS 03.7

The Role of Multidetector Computed Tomography in Transcatheter Aortic Valve Implantation(TAVI) A. Balan, S.P.G. Padley; London/UK

Purpose: Catheter based valve replacement has emerged as a potential alternative to surgery for patients with calcific aortic stenosis. The selection of candidates and pre-procedural planning for TAVI involves a multidisciplinary including team, interventional cardiologists, cardiac surgeons, cardiac anaesthetists and cardiac imaging specialists. We have reviewed our experience of the applications of Multi-Detector Computed Tomography (MDCT) in guiding anatomical assessment and pre-procedure planning, and management of procedure related complications. Material and methods: MDCT examinations on 123 patients was performed, using a 64-slice scanner where a standard aortic protocol was applied; an unenhanced scan was initially obtained for calcification assessment, with subsequent contrast enhanced acquisition. Images of aortic root, left ventricular outflow tract, descending aorta and iliofemoral anatomy, were then analysed. Post procedure imaging was also assessed in 25 patients who were imaged for potential TAVI related complications. Results: We illustrate preprocedural calculations of aortic root geometry required to guide optimal choice and positioning of device, and how to assess peripheral access routes. In our experience of 123 patients who underwent TAVI, the procedural mortality rate was 3/123, with 29 (in 25 patients) complications in total. We illustrate examples of vascular complications demonstrated on MDCT which have included injuries to damaged femoral and iliac vessels (10/29), aortic dissection (1/29), CVA (3/29), ventricular perforation (4/29), aortic perforation (1/29), cardiac failure (2/29), valve migration (1/29) and brachial plexus injury (1/29). Conclusion: Transcatheter techniques have the potential to revolutionise the treatment of aortic valve stenosis. The success of TAVI depends on a careful multidisciplinary approach. In combination with other imaging modalities, MDCT has an important role in identifying appropriate patients, selecting the correct prosthesis size and type, and diagnosing procedure-related complications. Radiologists must be aware of the different implantation procedures, and the anatomical requirements of each, in order to usefully contribute to pre and post procedural assessment.

SS 03.8

Aortoiliac CTA performed for the planning of percutaneous transfemoral aortic valve replacement: Frequency of clinically significant incidental findings <u>P. Apfaltrer</u>¹, P. Reimer², R. Krissak¹, T. Henzler¹, M. Reichert¹, K.A. Buesing¹, T. Süselbeck¹, S.O. Schoenberg¹, C. Fink¹; ¹Mannheim/DE, ²Karlsruhe/DE

Purpose: Aortoiliac CTA has been proposed as an alternative to conventional catheter angiography for the assessment of the aortoiliac arteries in the planning of percutaneous transfemoral aortic valve replacement (PAVI). The purpose of this study was to assess the frequency of clinically significant incidental findings of aortoiliac CTA performed for planning of percutaneous transfemoral aortic valve replacement (PAVI). Material and methods: In a retrospective analysis CTA of 40 patients (mean age: 83 ± 4 years) scheduled for PAVI were evaluated in consensus by 2 radiologists regarding the presence of clinically significant incidental findings. These incidental findings included e.g. lesions suspicious for malignancy (e.g. non-calcified pulmonary nodules > 8mm) or significant vascular findings (e.g. aortic aneurysm). CTA was performed either on a dual source CT or 64-section CT (Somatom Definition or Sensation, Siemens). Results: 29 patients showed clinically significant incidental findings of: e.g. non-calcified pulmonary nodules >8mm (n=2 patients), pancreatic tumor with liver metastasis (n=1), aortic aneurysm (n=3), retroperitoneal haematoma (n=1), or pseudoaneurysm (n=3). Conclusion: Aortoiliac CTA reveals clinically significant incidental findings in the majority of patients considered for PAVI. Thus, CT contributes to the preinterventional workup of these patients and adds additional information to a stepwise approach including conventional aortoiliac catheter angiography.



SS 03.9

Dynamic Telecytologic Evaluation of Imprint Cytology Samples from CT Guided Lung Biopsies – A Feasibility Study

<u>H. Prosch</u>, E. Hoffmann, J. Schalleschak, K. Bernhardt, E. Schober, M. Rowhani, G. Mostbeck; Vienna/AT

Purpose: On-site cytologic evaluation has been reported to increase the sensitivity of CT and ultrasound guided biopsies. Despite its advantages, on-site cytologic evaluation is only available in few centers. It was the aim of this study to evaluate the feasibility of a telecytologic evaluation of samples from CT guided lung biopsies using a dynamic telecytologic system operated by personnel from the department of radiology. Material and methods: Two sets of 20 and 25 imprint samples from 45 CT guided biopsies of lung lesions were retrospectively reviewed by two experienced cytologists using a telecytologic microscopic system (Olympus BX51, Tokyo, Japan). The telecytologic microscope was operated by one board certified radiologist and one radiologic technician (RT) in four diagnostic session. The cytologic samples were classified in four categories: benign, malignant, atypical cells of undetermined significance, and not diagnostic. The results were compared to the results of a consensus reading of two independent cytologists. Results: When the radiologist was operating the microscope, the observed diagnostic accuracy was 100% (45 /45; CI [1.0; 1.0]) as both cytologists were able to establish the correct diagnosis in all samples. When the RT operated the microscope, the diagnoses of cyotologist 1 differed in two cases from the gold standard. Therefore the accuracy for the RT was 95.56% (43 /45; CI [0.89; 1.0]). Conclusion: Telecytologic evaluation of imprint samples from CT guided lung biopsies with the microscope operated by radiologic personnel (radiologist, RT) has a high diagnostic accuracy. Accordingly, telecytologic services could be implemented where on-site cytology is not available.

Scientific Session 04 – Infection, Interstitial Lung Disease

SS 04.1

The outcome of pandemic H1N1 pneumonia: Clinical and radiologic findings for severity assessment <u>K.I. Kim¹</u>, W.H. Cho¹, Y.S. Kim¹, D.S. Jeon¹, M.K. Lee², Y.J. Jeong²; E.S. Lee³, ¹Yangsan/KR, ²Busan/KR, ³Seoul/KR

Purpose: Pandemic influenza A (H1N1) virus infection presents with variable severity. We studied the clinical predictors of severe pandemic H1N1 pneumonia and their correlation with chest high-resolution CT (HRCT) findings. Material and methods: We reviewed medical charts and radiologic and laboratory records of 37 adults with pandemic H1N1 pneumonia. Demographic data, pneumonia severity index (PSI), CURB65, risk factors, time to first dose of antiviral delivery, routine laboratory data, clinical outcome, and radiologic characteristics were evaluated. HRCT scans were performed on study patients. Patients were classified into severe and nonsevere groups according to disease severity. Results: Of 37 patients with pandemic H1N1 pneumonia, 12 and 25 were assigned to the severe and non-severe groups, respectively. PSI score and serum AST, ALT, and LDH

levels were higher in the severe group than in the nonsevere group (P = 0.035, 0.0003, 0.0023, and 0.0002, respectively). AST, ALT, and LDH levels were positively correlated with the extent involvement of radiologic findings (P = <0.0001, 0.0003, and <0.0001, respectively) and with the number of involved lobes (P = 0.663, 0.0134, and 0.0019, respectively). The most common finding on HRCT scans was patchy areas of ground glass attenuation surrounding areas of consolidation (n = 22, 60%). **Conclusion**: We demonstrated a positive correlation between clinical findings such as serum AST, ALT and LDH levels and radiological findings. A combination of clinical and HRCT findings would be useful in predicting the clinical course and outcome of pandemic H1N1 pneumonia.

SS 04.2

Imaging Findings in Patients with the New Swine Flu Influenza A (H1N1) infection.

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Purpose: The aim of this study was to evaluate the chest X-ray and CT scan of patients with documented influenza A (H1N1) virus (S-OVI) infection referred to our center. Material and methods: 31 patients (16 men and 15 women), with documented H1N1infection confirmed by RT-PCR from November to December 2009 were included in our study. 31 patients had available chest Xrays and of these 10 had CT scans. The initial radiography obtained from the patients was reviewed regarding pattern (consolidation, ground glass, nodules and reticulation), the distribution (focal, multifocal, and diffuse) and the lung zones involved. CT scans were also reviewed for the same abnormalities. The patient files were studied for their possible underlying disease. LDH and CPK level was available for 22 and 24 patients respectively. **Results**: The mean age was 37.97 ± 13.9 years. 17 (54.8%) patients had Co-existing condition (8 Respiratory, 5 cardiovascular, 2 Immunodeficiency, 2 Cancer, 4 others). 12 (38.7%) patients required ICU admission. 5 (16.1%) patients died. 8 (25.8%) had normal initial radiographs. The most common radiographic abnormality was consolidation (12/31; 38.7%) in the peripheral region (11/31; 35.5%) followed by peribronchovascular (10/31; 32.3%) which was most commonly observed in the lower zone (left 61.3%; right 45.2%). The patients admitted to the ICU were more likely to have more than one zones involved (p=0.005).11 (35.5%) patients had pleural thickening or effusion. 6(19.4%) patients had hilar or mediastinal adenopathy.CPK was high in 9/24 (37.5%), LDH in 14/22 (63.6%). Conclusion: In patients with the novel swine flu infection the most common radiographic abnormality observed in our center was multifocal consolidation in the lower lung zones. Patients admitted to ICU were more likely to have more than one lung zone involved.





SS 04.3

3 Tesla MRI for the diagnosis of pneumonia in neutropenic patients with acute myeloid leukemia: First results in comparison to HRCT <u>M. Reichert</u>, T. Henzler, R. Krissak, K.A. Buesing,

D. Buchheidt, C. Fink; Mannheim/DE

Purpose: Evaluation of 3 Tesla MRI for the assessment of pneumonia in neutropenic patients with acute myeloid leukemia. Material and methods: In an ongoing prospective study 3 Tesla MRI was performed in 10 neutropenic febrile patients (1 woman, 9 men; mean age 62 years ± 10; range 42-76 years). All patients had undergone high-resolution CT within 24 hours prior to MRI. The MRI protocol (Magnetom Tim Trio, Siemens) included T2-weighted HASTE sequence (TE/TR: 33ms/¥, slice thickness 6mm) and an high resolution 3D VIBE sequence with short echo time (TE/TR 1,4/3,7 ms, slice thickness 3mm). VIBE sequence was examined before and after the intravenous injection of 0.1 mmol/kg i.v. Gadoterate meglumine (Dotarem, Guerbet). The presence of pulmonary infiltrations, their segmental location, and distribution pattern (localized/diffuse), and lesion characteristics (e.g. ground-glass, nodular) were independently analyzed by two readers. The results were compared to the findings of HRCT, which was evaluated by a third independent radiologist. Results: Infiltrates were seen on MRI in 9 of 10 patients by both readers. In 5 patients with diffuse infiltrates in HRCT the same distribution pattern was also identified in MRI by both readers. In those cases with localized infiltrates a correct localisation within the lungs was possible. There was no false negative finding. In one case MRI showed a central cavitation which was not visualized by CT. A positive halo sign was visible at MRI in all 5 cases. For the assessment of infiltrates HASTE was rated superior to VIBE. Conclusion: Pneumonia can be assessed by 3 Tesla MRI in neutropenic patients with acute myeloid leukemia, as there is a high agreement with HRCT. Due to the improved soft tissue contrast of MRI a characterization of the infiltrates (e.g. the detection of cavitation) might be detected earlier than with HRCT

SS 04.4

Comparison of initial high resolution computed tomography features in viral pneumonia between metapneumovirus infection and severe acute respiratory syndrome

C.K.K. Wong, V. Lai, Y.C. Wong; Hong Kong/HK

Purpose: To review and compare initial high resolution computed tomography (HRCT) findings in patients with metapneumovirus pneumonia and severe acute respiratory syndrome (SARS-Coronovirus). **Material and methods**: 4 cases of metapneumovirus pneumonia (mean age of 52.3years) in an institutional outbreak (Castle Peak Hospital) in 2008 and 38 cases of SARScoronovirus (mean age of 39.6years) admitted to Tuen Mun hospital during an epidemic outbreak in 2003 were included. HRCT findings of the lungs for all patients were retrospectively reviewed by two independent radiologists. Statistical analyses were then performed and differences with a P value of < 0.05 were considered to statistically significant. **Results**: In be the metapneumovirus group, common HRCT features were ground glass opacities (100%), consolidation (100%), parenchymal band (100%), bronchiectasis (75%). Crazy paving pattern was absent. They were predominantly subpleural and basal in location and bilateral involvement was observed in 50% of patients. In the SARS group, common HRCT features were ground glass opacities (92.1%), interlobular septal thickening (86.8%), crazy paving pattern (73.7%) and consolidation (68%). Bronchiectasis was not seen. Majority of patient demonstrated segmental or lobar in distribution and bilateral involvement was observed in 44.7% of patients. Pleural effusion and lymphadenopathy were of consistent rare features in both groups. Conclusion: Ground glass opacities, interlobular septal thickening and consolidations were consistent HRCT manifestations in both metapneumovirus infection and SARS. Presence of bronchiectasis may point towards metapneumovirus (p<0.01) while crazy paving pattern is more suggestive of SARS (p<0.01).

SS 04.5

Extensively drug - resistant tuberculosis: radiographic and multislice- Computertomography (MSCT) findings in four adult patients

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Purpose: Extensively drug-resistant tuberculosis (XDR-TB) is caused by mycobacteria that are resistant to standard TB treatment and to at least one intravenously applied second-line antituberculosis-drug. Radiographic and CT findings in XDR-TB patients have only been described in a limited number of reports. Material and methods: In our retrospective study, four proven XDR-TB patients (M: F = 3:1) were included. All patients were immigrants and had a history of multidrug-resistant tuberculosis (MDR-TBC). Chest radiographs and MSCT were performed in all patients as a baseline examination. Follow-up radiographs were obtained over a period of one year, and follow-up CT scans were obtained at least twice. All examinations were reviewed by two experienced chest radiologists, in consensus. Results: At admission, the most frequently seen abnormalities, with either modality, were cavitations (4 of 4), consolidations (4 of 4), granulomas (3 of 4), the tree-in-bud sign (3 of 4), traction-bronchiectasis (4 of 4), restiform scars (4 of 4), and apical pleural caps (4 of 4). Except for the tree-inbud sign, all changes were depicted in both modalities. The abnormalities involved mainly the upper and middle lung zones, and were primarily bilateral. None of the patients showed ground-glass-opacities, pleural effusion, or enlarged mediastinal lymph nodes. In one patient, the left main trunk of the pulmonary artery was occluded. Upon implementation of extended antibiotic treatment, a remarkable improvement was observed on chest

radiographs and CT after three months in all patients. The consolidations decreased in size and the wall of the cavities narrowed and the tree-in-bud sign diminished. These changes were paralleled by progression of parenchymal scarring with consequent volume reduction of the affected lung –lobes and increasing traction-bronchiectasis. **Conclusion**: XDT-TBC presented as post-primary tuberculosis in all four patients. Treatment response was observed in all patients on chest radiographs and CT after three months of treatment.

SS 04.6

CT evaluation of azithromycin therapy in non-cystic fibrosis bronchiectatic patients.

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Purpose: The effect of azithromycin therapy (AziT) in non-cystic fibrosis patients with bronchiectasis (NCFB) is not proven as in cystic Fibrosis (CF) patients. Evaluation of therapy-response is often related to functional outcomes rather than structural changes. Purpose of this study is to evaluate CT-scoring before and after AziT in NCFB patients, to correlate these findings with lung function tests, to evaluate the inter-observer variability of the CT-scoring-system. Material and methods: 63 patients with NCFB received AziT. 17 Patients underwent a CT-scan before and after AziT and were included in this retrospective study. The CT-scans were evaluated by two readers using a modified Brody-score system. Bronchiectasis, mucus plugging, wall thickness and lung parenchyma were evaluated on 4 slices using a 4 point scale. The results were compared with lung function test. Inter-observer-variability was evaluated. Mann-Whitney test, Bland-Altman difference plots and Intraclass Correlation Coefficient (ICC) were performed. Results: Analysis of the modified Brody-score showed that wall thickness score (p= 0.04) and total CT-score (p= 0.04) improved significantly with AziT. Bronchiectasis (p=0.14), mucus plugging (p=0.06) and lung parenchyma score (p=0.15) did not change significantly. There was a significant correlation between change in mucus plugging score and change in FEV1(r=0.71; p=0.006) and FVC (r=0.56; p=0.04). There was a very good correlation between the two readers in the evaluation of the parenchyma score (ICC = 0.863) and a good correlation for the evaluation of the wall thickness (ICC=0.667) and bronchiectasis (ICC=0.591). Conclusion: The adapted Brody CT scoring system is a good tool to evaluate the effect of empirical treatment with AziT in NCFB patients. There is a good inter-observer reading correlation using this scoring system.

SS 04.7

Fibrotic idiopathic interstitial pneumonia: predicting patient mortality using HRCT

<u>A. Edey</u>, A. Devaraj, R. Barker, A.U. Wells, D.M. Hansell; London/UK Purpose: Fibrotic idiopathic interstitial pneumonia is associated with wide variation in patient survival but differentiating between idiopathic pulmonary fibrosis (IPF) and non-specific interstitial pneumonia (NSIP) at presentation is often not possible based on clinicoradiologic features. The aim of this study was to identify CT features which predict patient outcome in fibrotic idiopathic interstitial pneumonia regardless of underlying diagnosis. Material and methods: CTs of 146 consecutive patients (M=86; mean age=60 years ± 11.5) with pulmonary fibrosis of unknown cause or association were evaluated at six anatomical levels by two independent observers. The overall extent of interstitial abnormality at each level was scored to the nearest 5%. An estimate was made of the proportion of specific patterns (ground glass opacification; fine reticulation; coarse reticulation; microcystic (cysts <4mm) and macrocystic honeycombing). For each individual pattern the severity of associated traction bronchiectasis within the abnormal pattern was scored. Using death as the primary outcome measure, variables were analyzed to determine indicators of poor outcome using Cox proportional hazards model. Results: CT features of coarse fibrosis (coarse reticulation and honeycombing) and increasing extent of abnormal lung were predictive of a poorer outcome (p<0.001). In bivariate analysis microcystic honeycombing was a more powerful determinant of a bad prognosis (HR=1.02, CI=1.01-1.03, p<0.005) than macrocystic honeycombing (HR=1.02, CI=0.99-1.04, p=0.2). Increasing severity of traction bronchiectasis was indictative of rapidly progressive disease regardless of the background pattern of abnormal lung (HR=1.4, CI=1.23-1.61, p<0.001). Conclusion: The key HRCT predictors of a poor outcome are coarse fibrosis and severity of traction bronchiectasis. More extensive microcystic honeycombing, previously considered a feature of relatively benign disease, was shown to be more predictive of a poor prognosis than macrocystic honeycomb lung destruction.

SS 04.8

Development of ultra-low-dose protocols for High Resolution CT in pediatric cystic fibrosis patients. O.J. Flanagan, O.J. O' Connor, A.-M. McGarrigle, M. Vandaleur, N. Moore, S. McWilliams, M. Ni Chroinin, S. McSweeney, M. O' Neill, M.M. Maher; Cork/IE

Purpose: HRCT enjoys many advantages over chest radiography (CR) for the assessment of cystic fibrosis (CF), but has much higher radiation exposure. The development and clinical utility of ultra-low-dose HRCT protocols instead of CR in CF with suspected bronchiectasis is examined. **Material and methods**: Following ethical approval, 14 CF patients and 11 non-CF patients (16 male, 9 female; mean age 12.6 years+/-5.4 [standard deviation]; age range 3.5-25 years) underwent ultra-low-dose HRCT. 1mm thick slices (protocol A) were acquired in 10 patients and 0.5mm



thick slices (protocol B) in 15 patients at 6 levels at 120kVp and 30-50mA. Image quality and diagnostic acceptability were scored qualitatively and quantitatively by two radiologists who also quantified disease severity on HRCT and CR. Effective doses were calculated using the Imaging performance and assessment in CT dosimetry calculator. Results: Ultra-low-dose HRCT was performed with mean effective doses of 0.19mSv+/-0.03 for protocol A and 0.14mSv+/-0.04 for protocol B (P=0.0045). Diagnostic acceptability and depiction of bronchovascular structures on lung windows were graded as almost excellent for both protocols but protocol B was inferior to protocol A for mediastinal assessment (P<0.02). Patients with CF had moderate lung disease with an average Bhalla score of 9.2+/-5.4[standard deviation], range 0-19), compared with that of non-CF patients (1.1+/-1.4[standard deviation], P<0.001). There was excellent correlation between HRCT and CR (r= 0.88-0.92, P< 0.001). Conclusion: Ultra-low-dose HRCT can detect important lung abnormalities at much lower effective doses than standard CT, approaching that of CR. Ultra-low-dose HRCT definitively may detect bronchiectasis in CF and selected subgroups of non-CF patients with suspected airways disease.

SS 04.9

Re-evaluation of air trapping (AT), inspiratory HRCT findings and pulmonary function tests (PFT) in pulmonary sarcoidosis

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Purpose: To evaluate changes on inspiratory lesion extent and AT extent on HRCT scans as well as PFT in pulmonary sarcoidosis patients, examine these parameters individually and correlate the differences of inspiratory lesion extent and PFT to AT extent changes. Material and methods: The study included thirty patients (3 men, 27 women) with proven sarcoidosis who were reevaluated prospectively with inspiratory/expiratory HRCT and PFT one year after the initial examination. Initial & follow-up HRCT images were evaluated by two experienced chest radiologist (by consensus) for the presence and extent of AT and inspiratory lesions. HRCT findings and PFT were studied independently and the differences of AT extent between two controls were correlated with inspiratory lesion extent and PFT changes. Statistical evaluation was performed using paired-sample t-test, chi-square, Mann-Whitney and Spearman's tests (SPSS 16.0). P<0.05 was considered as statistically significant. Results: AT was depicted in 25/30 (83.3%) at first control and in 27/30 (90%) at reevaluation (p=NS). AT extent (8.9±7.0 vs.10.6±7.5%, p=0.084), inspiratory lesion extent (8.6±10.3 vs.6.9±7.6%, p=0.257) and PFT did not differ significantly between the first control and the reevaluation. As regards PFT, there was significant correlation only between AT extent and residual volume/total lung capacity (RV/TLC), both in first

(rho=0.512, p=0.015) and second control (rho=0.540, p=0.009). No correlation was found between AT extent changes and all PFT changes. Significant correlation (rho=0.374, p=0.042) was recorded between AT extent differences and inspiratory lesion extent differences. **Conclusion**: Although no statistically significant changes in AT and inspiratory lesion extent were recorded in one year follow-up, patients who improved or worsened their inspiratory lesion extent, respectively. Since PFT changes failed to be correlated to AT extent changes, we may assume that minor AT extent changes might not be detected by PFT in patients with pulmonary sarcoidosis.

SS 04.10

Can HRCT distinguish between sarcoidosis and pneumoconiosis presenting with hilar/perihilar masses?

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Purpose: To retrospectively evaluate the accuracy of HRCT distinguishing sarcoidosis in from pneumoconiosis in presence of hilar/perihilar nodules or masses ("mass-like" sarcoidosis or pneumoconiosis). Material and methods: Thirty-six patients (20M, 16F; mean age: 67±8 years) with hilar/perihilar nodules or masses and a diagnosis of sarcoidosis (n=15) or pneumoconiosis (n=21) were included in the study. Two chest radiologists, blinded to the diagnosis and without knowledge of cases included, independently evaluated HRCT scans for lesion site (apical/mediobasal;anterior/posterior) and distribution (peribronchovascular/peripheral/mixed), displacement of hila (absence/posterior/cranial), and paracicatritial emphysema (absent/present). In each patient a CT likely diagnosis (sarcoidosis/pneumoconiosis/indeterminate) was made and the level of diagnostic confidence (high/low) was recorded. Results: A high level of confidence was observed in 58/72 (80.6%) readings and in 53/58 (91.4%) readings the diagnosis was correct. The diagnosis was indeterminate for both readers in only 2 cases. Interobserver agreement was very good (k=0.85). A peribronchovascular distribution of lesions and an apical/posterior displacement of hila were more frequently present in "mass-like" sarcoidosis than in silicosis (p<0.5), whereas a peripheral distribution of lesions associated with paracicatritial emphysema was more suitable of "mass-like" pneumoconiosis. Conclusion: HRCT findings allow distinguishing "masslike" sarcoidosis from pneumoconiosis with a good level of diagnostic confidence in 80% of cases.

abstracts electronic poster presentations



P 01

Volumetric CT Emphysema Quantification for Predicting Pulmonary Hypertension in Patients with Stable Chronic Obstructive Pulmonary Disease (COPD)

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Purpose: Which factors would be associated with pulmonary hypertension in stable COPD? Is there predictor (marker) of pulmonary hypertension in stable COPD? Material and methods: 89 of COPD patients who underwent MDCT were recruited and measured peak & mean pulmonary arterial pressure (PAP) by using echocardiogram. The proportion of lung volumes with attenuation values below the -900 and -950 HU threshold during inspiratory and expiratory scans were measured using the CT densitovolumetry. The main pulmonary artery diameter was also measured on the MDCT. We compared with volume CT parameters with clinical parameters of PAP, PFT and ABGA. Results: The peak PAP was correlated with the proportion of lung volumes with attenuation values below -950 HU during inspiratory scan (r=0.326, P<0.005) and below -900 HU threshold during expiratory scan (r=0.373, P<0.005). Pulmonary artery diameter was correlated with peak PAP(r=0.558, p<0.005), mean PAP (r=0.334, p<0.05) of echocardiogram and ABGA {PaO2 (r=-0.312, p<0.05) and O2 saturation (r=-0.556, p<0.05)}. On PFT, FEV1 and FEV1/FVC were correlated with the proportion of lung volumes below -950 HU during expiratory scan (r=-0.491, P<0.005, r=-0.538, P<0.005, respectively). Conclusion: In COPD patients, volumetric CT emphysema quantification and diameter of main pulmonary artery on MDCT reflect the parameters of pulmonary artery pressure, PFT and ABGA.

P 02

Reproducibility of airway wall thickness measurements

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Purpose: To assess clinical applicability of state-of-theart airway wall thickness measurement software by evaluation of in vivo inter-reconstruction and inter-scan reproducibility. Material and methods: For the assessment of airway wall thickness in CT-scans of the lungs, a prototypical software (MEVIS Airway Examiner) featuring state-of-the-art methods for subvoxel accurate wall thickness quantification is used. It includes fully automated measurements of average WA% (ratio of airway wall and lumen areas) per lobe and additionally allows for local measurements at arbitrary positions in the airway tree. Measurement reproducibility is investigated with respect to two of the main challenges in a clinical environment: Influences of different reconstruction kernels are assessed based on a set of 25 CT acquisitions with two reconstructions each. Variations in repeated acquisitions are investigated based on repeated low-dose acquisitions of 14 patients. Results: Comparison of lobar WA% measurements in different reconstructions showed a Pearson correlation of r=0.99 and an average difference of 3.54 +/- 1.38 WA%-points (mean +/- std.dev.). Correlation of measurements on repeated acquisition was 0.88 with a mean difference of 1.11 +/- 3.9 WA%-points. Local measurements of WA%

showed a Pearson correlation of r = 0.96 and r = 0.95, respectively, in the two experiments. **Conclusion**: The presented study addresses two of the main factors currently impairing clinical applicability of airway wall thickness measurements. Firstly, the experiments show that variability for repeated acquisitions is well below 10% of the observed range of measurements. Moreover, it is shown that the reconstruction kernel dependence of the WA% assessment known from standard measurement methods (e.g. FWHM) can be largely avoided by using the advanced quantification software.

P 03

Reversed Halo: No longer a pathognomonic sign

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Purpose: The purpose of this exhibit is: To review the reversed halo sign as initially described To present the differential diagnosis, including cases of paracoccidioidomycosis, pulmonary infarct, eosynophilic pneumonia, schistossomiasis and other diseases To discuss the current significance of the reversed halo sign Material and methods: We analyze selected cases of patients with the reversed halo sign on CT images, with emphasis on the differential diagnosis, imaging findings and significance of the reversed halo sign. Correlations with histological aspects and clinical findings are also performed, with a brief literature review on the subject. Results: We have encountered the reversed halo sign in a wide variety of clinical conditions, such as: Infectious diseases: Paracoccidioidomicosis, Schistossomiasis, Iatrogenic diseases: Radiation pneumonitis vascular diseases: Pulmonary infarct Idiopathic diseases: Chronic eosinophilic pneumonia. The significance of the reversed halo sign is described for each disease, with a critical analysis of this finding in comparison with data available in the literature. Conclusion: The major teaching points of this exhibit are: 1. The reversed halo sign is not a pathognomonic sign. 2. The differential diagnosis includes infectious, inflammatory and vascular diseases. 3. The reversed halo sign, although commonly associated with the diagnosis of C.O.P, is not pathognomonic and should be investigated properly according to the clinical scenario.

P 04

Can infliximab influence chest HRCT findings and pulmonary function tests in patients with rheumatoid arthritis? A preliminary study

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Purpose: To compare and correlate the inspiratory and expiratory chest HRCT findings and pulmonary function test (PFT) before and after one year of treatment with infliximab in patients with rheumatoid arthritis. **Material and methods**: 21 patients (10 men, 11 women) fulfilling



the revised criteria for rheumatoid arthritis were consecutively included in a prospective study underwent inspiratory and expiratory chest HRCT and PFT's before and after one year of treatment with infliximab combined with a low dose methotrexate. Their mean age was 54.2 years (range: 23-86) (mean duration of the disease was 6,5 years, range: 1-12). Inspiratory findings and air trapping were re-evaluated by two chest radiologists and final decision was reached by consensus. A statistical evaluation was performed using paired-sample t-test, chiquare, Mann-Whitney test and Spearman's correlation (SPSS 16.0) to correlate inspiratory and expiratory lesion extent and PFT changes and differences. A p<0.005 was considered as statistically significant. Results: The most frequent HRCT findings were: reticular pattern in 11/21(52%) and bronchiectasis/bronchiolectasis in 10/21 (47%) in both controls and air trapping on expiration in 10 and 9/21 (47% and 42%) patients in the first and second control, respectively. 4 (19%) patients with no inspiratory lesions had AT as the only HRCT finding. No statistically significant difference was recorded in the extent of inspiratory lesions between the two control (13.1±13.1vs.13.6±15.7,p=0.693). AT extent was significantly reduced (12.9±13.4 vs. 11.9±12.9, p=0.042) between the first control and re-evaluation. Inspiratory lesion extent & AT extent failed to be statistically correlated with any PFT parameters. The extent difference of inspiratory lesions was negatively correlated with FVC difference (rho=-0.632, p=0.002). Between two controls, FEV1 was significantly reduced (86.1 vs. 78.8, p=0.045) as well as FEV1/FVC ratio. Conclusion: Although this study regards a small group of patients with RA we may assume that infliximab does not influence significantly the inspiratory lesion extent (positively or negatively) but may be statistically related to air trapping extent improvement.

P 05

Acute Klebsiella pneumoniae pneumonia alone and with concurrent infection: comparison of clinical and thin-section CT findings

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Purpose: Recently, we have reported that in 764 of 962 patients (79.4%) with acute Klebsiella pneumoniae, one or more additional pathogens, predominantly methicillinresistant Staphylococcus aureus (MRSA) (36.7%) and Pseudomonas aeruginosa (23.3%), were found. The aim of this study was to compare the clinical and thin-section CT findings in patients with acute K. pneumoniae pneumonia alone and with concurrent infection. Material and methods: We retrospectively identified 160 patients with acute K. pneumoniae pneumonia, who underwent chest thin-section CT examinations between August 1998 and August 2008. The study group comprised 80 patients (54 male, 26 female; age range 18-97 years, mean age 61.5) with acute K. pneumoniae pneumonia alone, 55 (43 male, 12 female; age range 46-92 years, mean age 76.0) with K. pneumoniae pneumonia combined with MRSA,

and 25 (23 male, 2 female; age range 56-91 years, mean age 72.7) with K. pneumoniae pneumonia combined with Pseudomonas aeruginosa. Underlying diseases in patients with each type of pneumonia were assessed. Parenchymal abnormalities were evaluated along with enlarged lymph nodes and pleural effusion. Results: In patients with concurrent pneumonia, underlying conditions such as cardiac diseases, diabetic mellitus, and malignancy were significantly more frequent than in patients with K. pneumoniae pneumonia alone. In concurrent K. pneumoniae pneumonia, CT findings of centrilobular nodules, bronchial wall thickening, cavity, bronchiectasis, nodules, and pleural effusion were significantly more frequent with concurrent pneumonia than those with K. pneumoniae pneumonia alone (p< 0.005, each). Conclusion: The CT findings are useful for differentiation between K. pneumoniae pneumonia alone or with concurrent infections.

P 06

Clinical and Pulmonary Thin-Section CT Findings in Acute Klebsiella Pneumoniae Pneumonia

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Purpose: The aim of this study was to assess the clinical and pulmonary thin-section CT findings in patients with acute Klebsiella pneumoniae pneumonia. Material and methods: We retrospectively evaluated thin-section CT examinations performed between January 1991 and December 2007 from 962 patients with acute Klebsiella pneumoniae pneumonia. 764 cases with concurrent infectious diseases were excluded. Thus, our study group comprised 198 patients (118 male, 80 female; age range 18-97 years, mean age 61.5). Underlying diseases and clinical findings were assessed. Parenchymal abnormalities were evaluated along with the presence of enlarged lymph nodes and pleural effusion. Results: The CT findings in patients with acute Klebsiella pneumoniae pneumonia consisted mainly of ground-glass attenuation (100%), consolidation (91.4%), and intralobular reticular opacity (85.9%), which were found in the periphery (96%) of both sides of the lungs (72.2%) and were often associated with pleural effusion (53%). Cavitary lesions were found in only one patient (0.5%). The underlying conditions in patients with Klebsiella pneumoniae pneumonia were mainly alcoholism and smoking habit. Conclusion: Thin-section CT findings in patients with acute Klebsiella pneumoniae pneumonia consisted mainly of ground-glass attenuation, consolidation, and intralobular reticular opacity, and were found in the peripheral and lower lung with pleural effusion. In patients with underlying diseases such as alcoholic smoking habit, these abnormal thin-section CT findings can be considered as suggestive of acute Klebsiella pneumoniae pneumonia.

P 07 Withdrawn by author



P 08

Pulmonary thin-section CT findings in acute Moraxella catarrhalis pulmonary infection <u>F. Okada¹</u>, Y. Ando², T. Nakayama¹, A. Ono¹, H. Mori¹; ¹Yufu/JP, ²Beppu/JP

Purpose: Moraxella catarrhalis is a pathogen that is well known to exacerbate chronic obstructive pulmonary disease. The aim of this study was to assess the clinical and pulmonary thin-section computed tomography (CT) findings in patients with acute Moraxella catarrhalis pulmonary infection. Material and methods: Thinsection CT scans obtained between January 2004 and March 2009 from 292 patients with acute Moraxella catarrhalis pulmonary infection were retrospectively evaluated. Patients with concurrent infection diseases, Streptococcus including pneumoniae (n=72), Haemophilus influenzae (n=61), Staphylococcus aureus (n=37), methicillin-resistant Staphylococcus aureus (n=25), Pseudomonas aeruginosa (n=20), or multiple pathogens were excluded from this study. Thus, our study group comprised 109 patients (66 male, 43 female; age range, 28-102 years, mean, 74.9 years). Clinical findings in the patients were assessed. Parenchymal abnormalities, lymph node enlargement and pleural effusion were assessed by thin-section CT. Results: Underlying diseases included pulmonary emphysema (n=74), cardiovascular disease (n=44), or malignant disease (n=41). Abnormal findings were seen on CT scans in all patients and included ground-glass opacity (n=99), bronchial wall thickening (n=85) and centrilobular nodules (n=79). These abnormalities were predominantly seen in the peripheral lung parenchyma (n=99) or the lower lung (n=60). Pleural effusion was found in eight patients. No patients had mediastinal and/or hilar lymph node enlargement. Conclusion: Moraxella catarrhalis pulmonary infection was observed in elderly patients, often in combination with pulmonary emphysema. The CT findings in patients with Moraxella catarrhalis mainly consisted of ground-glass opacity, bronchial wall thickening and centrilobular nodules in the periphery.

P 09

Bronchiectasis and Feeding Bronchus Sign in Active Tuberculosis

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Purpose: To describe bronchial dilatation and feeding bronchus sign in active tuberculosis **Material and methods**: Total 246 patients were included in analysis, who were diagnosed as active tuberculosis and underwent CT scans at the time of diagnosis. We reviewed CT scans focusing on dilatation of segmental or distal bronchi within TB consolidations and nodules. We analyzed incidence and appearance of bronchial dilatation and then checked its changes with time during follow-up. **Results**: In 72 patients (29%), bronchial dilatation was present within consolidations or nodules in CT scans. Dilated airways appeared tubular in all patients. In 35 patients

(49%), dilated airways communicated with cystic cavitary spaces showing feeding bronchus sign. Followup CT was available in 12 patients. Bronchiectasis was progressed in 7 (7/12, 58%), regressed (3/12, 25%) and stable (1/12, 8%). Due to marked architectural distortion, evaluation couldn't be done in one patient. **Conclusion**: Bronchial dilatation is relatively common in active tuberculosis and can be changeable, which means that it can be caused by active bronchial inflammation, not only by fibrotic traction. Feeding bronchus sign is also present in active tuberculosis, which is known to be a frequent CT finding of non-tuberculous mycobacterium.

P 10

Tropical and subtropical parasitic infections of the chest: spectrum of imaging findings

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Purpose: The purpose of this exhibit is: 1. Describe the main tropical and subtropical parasitic diseases in terms of their geographic distribution, with emphasis on South American infections. 2. Demonstrate their most common imaging, clinical and pathological findings. Material and methods: We analyse the main clinical, imaging and pathological findings of tropical and subtropical parasitic infections of the chest, with sample cases. The geographic distribution and imaging aspects of tropical and subtropical parasitic diseases are reviewed and illustrated, along with their life cycles and treatment aspects. Results: The following diseases are described and illustrated in this essay, with emphasis on their radiographic, US, CT and MR aspects: 2.1 Amebiasis, 2.2 Schistosomiasis , 2.3 Hydatid lung disease , 2.4 Malaria, 2.5 Trypanosomiasis, 2.6 Strongyloidiasis, 2.7 Dirofilariasis , 2.8 Paragonimiasis 2.9 Cisticercosis Conclusion: The major teaching points of this exhibit are: 1. Parasitic infections are common in tropical and subtropical regions, but their chest imaging findings are unknown to the majority of radiologists. 2. Familiarity with their geographic distribution, besides their clinical and imaging features, may help in the differential diagnosis.

P 11

Air Trapping Is Critical Determinant of Fixed Air Flow Obstruction in Moderate to Severe Asthmatics: Follow-up Study Using MDCT

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Purpose: To investigate which changes in airway morphology could clarify the characteristics of the fixed airway obstruction following the treatment. **Material and methods**: 22 moderate to severe asthmatics were recruited. Pulmonary function test (PFT)s and multidetector row computed tomography (MDCT) were done simultaneously twice at first visit and at follow-up time



when FEV1 reached at the constant level after prolonged treatment over 12 months. Bronchial wall area% (BWA%), Air trapping (AT, the proportion of lung volumes with attenuation values below -910 and -950HU), and centrilobular nodules (CN) were measured. Results: During the follow-up period, the FEV1 was recovered over 75% of predicted value (Recovered group) in 18 asthmatics and less than 75% (fixed group) in 14 ones. There were no significant differences between the two groups in terms of age, sex, atopy, smoking status at the initial visit and follow up check of MDCT. The follow-up duration and combination steroid inhaler dosage were comparable in the two groups. 1) At the first visit, PFTs, Expiratory air trapping (AT), BWA%, and CN showed no differences between the two groups. 2) In the recovered group, follow-up CN, and Expiratory AT were markedly decreased compared to those of first visit (p= 0.001 and P= 0.026 respectively), although BWA/R did not changed significantly (P=0.082). 3) In the fixed group, follow-up BWA%, expiratory AT, and CN were not significantly different compare to that of first visit. 4) At the follow-up time, Expiratory AT was signicantly greater in the fixed group than that in the recovered (P= 0.008). 5) Regression analysis demonstrated a good association of expiratory AT with FEV1(%) at the follow-up check (P= 0.002). Conclusion: Air trapping could be one of main risk factor for the fixed airflow obstruction observed in unrecovered asthmatics even after prolonged and intensive inhaled combination steroid

P 12

Combined Fluoroscopy and CT Guided Transthoracic Needle Biopsy Using C-arm Cone-Beam CT System: Comparison with Fluoroscopy Guided Biopsy Y. Kim, S.M.Lim, J.K. Lee; Seoul/KR

Purpose: To evaluate the feasibility of combined fluoroscopy and cone beam CT guided transthoracic needle biopsy (FC-TNB) using a c-arm cone beam CT system. Material and methods: This study included 74 FC-TNB cases (group A) and 97 F-TNB cases (group B). Only for the pulmonary lesions, which were visible on fluoroscopy, F-TNB or FC-TNB was performed. FC-TNB was used in the cases of pulmonary lesions which were small (less than 30 mm), deeply located from the chest wall (more than 5 cm in length), located posterior to the heart, attached to the mediastinum or hilum, or necrotic masses which need specific target areas for biopsy. A 20-gauge automated cutting needle without coaxial technique was used in all patients. We evaluate the diagnostic accuracy according to the size and depth of lesions, incidence of major complications, procedure time, and radiation dose. Results: For pulmonary lesions < 30 mm in size, the sensitivity for malignancy and overall diagnostic accuracy were 90.5% and 94.3% in group A, and 72.7% and 80.6% in group B. Those for pulmonary lesions \geq 30 mm in size were 90.6% and 92.3% in group A, and 90.2% and 92.4% in group B. With respect to the depth of lesion, the sensitivity and diagnostic accuracy for those < 50 mm were 80.0% and

87.0% in group A, and 86.1% and 89.6% in group B, while values for those ≥ 50 mm were 92.3% and 94.1% in group A, and 83.8% and 87.8% in group B. Pneumothorax requiring chest tube placement was noted in 1 case (1.4%) from group A, and 4 cases (4.1%) from group B. The mean procedure time and patient skin dose were 13.6 ± 4.0 minutes and 157.1 ± 76.5 mGy in group A, and 9.0 ± 3.5 minutes and 21.9 ± 15.2 mGy in group B. **Conclusion**: FC-TNB allows biopsy of small (< 30 mm) and deep (\geq 50 mm) lesions with high diagnostic accuracy and short procedure time. F-TNB provides high diagnostic accuracy similar to FC-TNB for larger and more superficial lesions with low radiation dose.

P 13

CT evaluation of vocal cord paralysis due to chest diseases: A 10-year retrospective study

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Purpose: Vocal cord paralysis (VCP) is sometimes the only sign of the underlying disease. Many fatal diseases in chest are included among the primary diseases and CT evaluation is necessary for the etiology of VCP, especially chest diseases. Material and methods: Among cases with VCP over the past 10 years at our hospital, 115 cases with CT evaluation were retrospectively reviewed. Records of a total of 38 patients (25 M, 13 F) with VCP due to chest diseases were analyzed for patient identification as follows: sex, age distribution, side of paralysis, duration of symptom, diagnostic imaging studies, and primary disease. The etiology of paralysis was determined using historical information and the diagnostic imaging procedures including chest radiograph, CT of the neck or chest, and esophagography. Results: 34 of 38 patients with chest diseases had unilateral VCP (21 left, 13 right). Of the primary chest diseases, malignancy was the most common (20, 52.6 %). 18 of 20 malignancies had unilateral paralysis. Chest radiograph failed to detect 9 of 20 primary malignancies detected on CT. We also had various etiologies of VCP including 2 cardiovascular disease (1 brachiocephalic artery aneurysm, 1 aortic aneurysm), 4 iatrogenic (2 cancer surgery, 2 tracheostomy), 7 inflammation (6 Tb, 1 mediastinitis), 1 neurofibromatosis, 3 benign nodes and 1 collapse. The largest category in VCP was lung cancer. The detected malignancies in the chest were 13 lung cancer, 3 esophageal cancer, 2 metastasis, 1 mediastinal tumor, and 1 thyroid cancer. 4 of 9 lung cancers were diagnosed as recurrence (n=1) or aggravation of primary malignancy (n=3) after CT evaluation in VCP patients. Conclusion: CT is helpful for early detection of a malignancy or recognition of a recurrence or aggravation or metastasis between follow ups. This is why CT evaluation is necessary in a patient with VCP. CT also differentiates various non-malignant causes of VCP.





P 14

Direct Lipiodol Injection Used for a Radio-opaque Lung Marker: Stability and Histopathologic Effects <u>Y.J. Jeong¹</u>, W.J. Kwon², J.W. Song³, I.S. Lee³, Y.D. Kim³; ¹Busan/KR, ²Ulsan/KR, ³Pusan/KR

Purpose: This study was conducted to evaluate the effects on the histopathologic findings of directly injected lipiodol into normal lung parenchyma and to identify the existence of remaining lipiodol in the lung according to the follow-up time. Material and methods: A total of 40 rats were randomly assigned to one of four groups: Group I (n=10) served as the control group and received 0.2 mL of normal saline; groups II (n=10), III (n=10), and IV (n=10) served as experimental groups and received 0.1-0.2 mL of lipiodol under fluoroscopy. Radiographs were obtained initially and at follow-up in all 40 rats. At three hours (groups I and II), 24 hours (group III), and one week (group IV) after injection of normal saline or lipiodol, the rats were euthanized. The radiographic presence of lipiodol and the histopathologic findings of each group were then evaluated. Results: A minimal acute lung injuries developed and the radio-opaque lipiodol pulmonary nodule remained in group II. In group III, the acute lung injuries were the most serious among all the experimental groups without significant lipiodol elimination. However, the acute injuries disappeared and foamy macrophages accumulated within the alveolar space in group IV. In this group, remaining lipiodol was also identified on the follow-up radiograph. Conclusion: Directly injected lipiodol caused acute lung injury. The degree of acute injury differed according to the follow-up time and was most severe 24 hours following injection. However, the majority of histopathologic findings caused by acute lung injuries disappeared at a week along with the resolving process. On serial radiographs, directly injected lipiodol remained after a week. These results suggested that lipiodol could be used as a safe and stable biomaterial for marking small GGO pulmonary nodules in the practice.

P 15

Non-cardiac causes of chest pain: pictorial review of radiological findings

N. Ramesh; Portlaoise/IE

Purpose: The purpose of this study is to present the imaging features of non-cardiac causes of chest pain. **Material and methods**: Chest radiographs, ultrasound examination, CT and barium studies are often performed to determine the causes of non-cardiac pain. Acute chest pain is one of the commonest presentation at Emergencies department, while cardiac cause is the commonest in the elderly, it is essentially non- cardiac in most other group of patients **Results**: Pulmonary and pleural cause of chest pain is the commonest in our experience including acute pulmonary infection and pleuritic pain, other causes include musculoskeletal, gastrointestinal and infra-diaphragmatic. **Conclusion**:

Imaging plays an important role in the assessment of noncardiac chest pain

P 16

Localization of Pulmonary Nodules with Lipiodol Prior to Thoracoscopic Surgery

<u>Y.J. Jeong</u>¹, K.N. Lee¹, Y.D. Kim², W.J. Kwon³, J.W. Song², I.S. Lee²; ¹Busan/KR, ²Pusan/KR, ³Ulsan/KR

Purpose: This study was designed to evaluate the performance and complication rates of localization of pulmonary nodules with lipiodol prior to video-assisted thoracoscopic surgery with regard to the CT appearance of nodules. Material and methods: After institutional review board approval and informed consent were obtained, lipiodol marking was performed under CT guidance in 67 patients (33 men and 34 women; mean age, 58 years) with 68 nodules. All nodules were marked with 0.4 to 0.5 mL lipiodol under CT guidance on the day of surgery. The size of the targeted nodule and the distance to the closet pleural surface were measured. The composition of nodules (pure ground glass attenuation-GGA, partly solid, and solid) and the presence of emphysema on CT images were also evaluated. Lipiodol accumulation of a targeted nodule was scored by use of a four-point scale (0: none, 1: within 1 cm around a nodule, 2: partial accumulation within a nodule, 3: total accumulation within a nodule). Any complications after localization of nodules were noted. We analyzed the score of lipiodol accumulation and the presence of complications for the CT appearance of pulmonary nodules using the Mann Whitney U test, Fisher's exact test and the Kruskall Walis test. Results: The average nodule size was 11.4 mm (range, 3.0-28.3 mm) and the average distance to the pleural surface was 13.7 mm (range, 0-51.4 mm). Of 68 nodules, 49 (72%) lesions were solid nodules, 18 (26%) lesions were partly solid nodules and the remaining one (2%) lesion was a pure GGO nodule. Lipiodol accumulation scores of nodules were as follows: score 3 (n=19, 28%), score 2 (n=37, 54%), score 1 (n=11, 16%), and score 0 (n=1, 2%). Lipiodol accumulation scores of nodules were different according to the size of nodules (Kruskal Wallis test, p = 0.023). Pneumothorax after localization occurred in 20 (29%) patients and the incidence was higher in nodules located in the subpleural area (Mann Whitney U test, p = 0.048). Pulmonary hemorrhage along the needle tract occurred in five (7%) patients and was more frequent in patients with deep nodules as compared to shallow nodules (Mann Whitney U test, p < 0.001). Conclusion: Lipiodol marking under CT guidance is a useful and safe procedure for the intraoperative localization of pulmonary nodules.



P 17

Accuracy of chest CT to predict the origin of nonbronchial systemic artery: Correlation with angiographic finding

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Purpose: To investigate whether the nonbronchial systemic arterial origin of the bleeding causing hemoptysis is dependent on anatomic location of involved pleura or not. Material and methods: Our study group consisted of 33 patients (60 cases) who presented with hemoptysis was examined with chest CT and conventional angiography. Patients who showed only single pleural involvement in CT or single nonbronchial systemic artery in angiography were included in this analysis. Pleural thickening of more than 3 mm and enhanced vascular structures within hypertrophic extrapleural fat consider as nonbronchial systemic arteries causing hemoptysis. The involved pleura were divided into anteromedial, superolateral and posterior group according to anatomic location. By using potential systemic arterial supplying regions which are dependent on angiographic vascular trajectory as reference, diagnostic accuracy of CT finding was calculated. Results: The most common supplied systemic artery is internal mammary artery in anteromedial group (9/13), subclavian artery in superolateral group (13/26) and intercostal artery in posterior group (13/21), respectively. The accuracy of anteromedial group was 83.3% (sensitivity 69.2%, specificity 87.2%) in anteromedial group, superolateral group was 68.3% (sensitivity 50%, specificity 82.4%), and posterior group was 66.0% (sensitivity 61.9%, specificity 66.7%). The accuracy, specificity and sensitivity of CT in superolateral and posterior group were lower than those in anteromedial group. Conclusion: To predict the origin of nonbronchial systemic artery based on CT image was more difficult in superolateral and posterior group than in anteromedial group. Therefore, when theses pleural regions are involved, the interventionists always keep the possibility of variable systemic arterial supply in mind during embolotheraphy.

P 18

How to set up dynamic contrast-enhanced MR imaging (DCE-MRI) for estimating pharmacokinetic parameters using diffusible tracer in patients with non-small cell lung cancer

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Purpose: Tumor angiogenesis is one of the most important biomarkers of cancer. It can be visualized with dynamic contrast-enhanced MR imaging (DCE-MRI) with pharmacokinetic parameters using diffusible tracer. Although DCE-MRI is a promising surrogate biomarker for tumor angiogenesis, it is not widely performed in many institutions. The purpose is to demonstrate how to optimize the protocol of DCE-MRI and how to estimate pharmacokinetic parameters from DCE-MRI. Material and methods: This review will discuss 1) brief history of DCE-MRI for tumor angiogenesis, 2) essential sequences for DCE-MRI and T1-mapping, 3) models for estimating pharmacokinetic parameters from DCE-MRI using diffusible agent, 4) definition and clinical significance of pharmacokinetic (volume parameters transfer constant[K^{trans}], volume of extravascular extracellular space (EES) per unit volume of tissue[ve], flux rate constant between EES and plasma [kep], enhancement amplitude [EA], time of half rising $[T_{2max}]$, and maximal slope [MS]), and 5) representative cases of DCE-MRI in patients with non-small cell lung cancer (NSCLC). Results: Coronal 3D fast spoiled gradient recalled (SPGR) sequence was used for DCE-MRI of the thorax with less than 3 sec temporal resolution per each phase. Motion artifacts can be minimized with shallow breathing during dynamic phases and large voxel size is advantageous for consistent results of pharmacokinetic parameters. T1 mapping were feasible using variable flip angle gradient refocused imaging. Two-compartment model estimated pharmacokinetic parameters of diffusible tracer in NSCLC. Time-concentration curve was fitted to sigmoid equation for calculation of reproducible dynamic parameters. Conclusion: Pharmacokinetic parameters can be successfully estimated from DCE-MRI in patients with non-small cell lung cancer. These parameters are quantitative biomarkers for tumor angiogenesis and may be used as prognostic factors of NSCLC or as indicators of target agent treatment.

P 19

CT guided fiducial placement in lung lesions

- E. Sotiropoulou, K. Stathopoulos, V. Georgiadou,
- P. Tsagouli, O. Konstantinopoulos, N. Salvaras,
- L. Thanos; Athens/GR

Purpose: CyberKnife Frameless Image-Guided Radiosurgery is being used for stereotactic radiotherapy of parenchymal extracranial lesions. Gold radiomarkers called fiducials are required for the treatment planning and aiming of CyberKnife therapy. We report our experience regarding percutaneous CT guided placement of fiducials in lung malignancies. Material and methods: From March 2007 until now, 72 patients with primary or metastatic lung lesions (lesion diameter range: 0.5-10.8 cm) underwent percutaneous fiducial placement via CT guidance, in order to have CyberKnife Stereotactic Radiosurgery. The procedure was performed under local anesthesia. At the desired location, a 18G Chiba needle was placed under CT guidance, through which the fiducials were advanced and implanted inside or near the tumor. Placement of fiducials in neighboring locations was achieved by withdrawing and readjusting the tip of the needle. Results: Seventy -two patients underwent CT guided fiducial placement; a total number of 156 gold seeds were implanted; namely 118 single, 35 double, 1 spiral and 2 triple fiducials. We experienced one episode of pneumothorax that required drainage, two



mild pneumothoraces which were treated conservatively and three episodes of perifocal pulmonary hemorrhage. Migration of the fiducials was observed in 2 patients ; the cases regarded one out of three gold markers positioned in one of the lung lesions, located in the left lower lobe, and three out of three fiducials in another lesion in the right upper lobe; in the last case we had to re-implant new fiducials. **Conclusion**: Fiducial implantation under CT guidance, appears to be a safe and efficient procedure, as long as it is performed by an experienced interventional radiologist.

P 20

Percutaneous MICROWAVE ABLATION under CTguidance in the treatment of Pulmonary Malignancies in 45 patients.

<u>K. Stathopoulos</u>, E. Sotiropoulou, V. Georgiadis, M. Kelogrigoris, P. Tsagouli, I. Volioti, L. Thanos; Athens/GR

Purpose: To retrospectively evaluate the effectiveness, safety and follow up imaging features of microwave ablation in 45 patients with pulmonary malignancies. Material and methods: From February 2008 to March 2010, 45 patients (29 men, 16 women; 18-85 years old) were submitted for percutaneous microwave ablation sessions. All tumors were larger than 3cm. Seventy two (72) procedures were performed by a specially trained interventional radiologist in an interventional radiology suite. The procedure was performed under local anesthesia with injection of 2% Lidocaine. Optimal approach was determined based on the location of the tumor, and tumors were targeted under CT-guidance. A thin (14, 5 G) microwave antenna was placed directly into the tumor. Duration of each session ranged between 3-12 minutes. Follow-up contrast material-enhanced CT scans were obtained at 1, 3, 6 months, 1 year and 18 months. Results: Follow up contrast media-enhanced CT scans revealed lack of contrast media enhancement (71.1%) in 32 patients, whereas partially decreased enhancement was seen in 11 patients (28,9 %), who all underwent a second session. No major complications, such as acute pulmonary bleeding, large pneumothorax, pulmonary embolism, excessive necrosis or death, occurred. No significant worsening in pulmonary function has occurred. Post-ablation syndrome was reported in 9 patients (20%). Minor complications occurred in a minority of patients; productive cough occurred in 5 patients (11,1%), small pleural effusions in 3 patients (6,6%) Small pneumothorax occurred in 4 patients (8,8%) and was self limited. Conclusion: Our preliminary results and those reported in literature support the use of microwave ablation for the treatment of different type of tumors. Further studies are necessary to confirm short- and long-term effectiveness of the methods and to compare it with other ablative techniques.

P 21

Inadequate clinical history on requests for chest radiographs: Audit of local experience <u>N. Ramesh;</u> Portlaoise/IE

Purpose: The purpose of this audit was to highlight to the referring clinicians the importance of adequate clinical history for Chest radiograph requests. Material and methods: Despite advances in Radiology Chest radiographs remain the most request radiological investigation in any radiology department particularly referrals from the emergency departments 250 requests for Chest radiographs were reviewed and audited for the adequacy of clinical details. Also, audited were the number of illegible forms, the absence of previous clinical and radiological investigations, and the accuracy of patient details. Results: 95% of the requests lacked adequate history, 90% of these forms were filled by junior doctors and general practitioners and consultants were responsible for 5%. 80% of the forms only indicated chest pain as the clinical history, without any other clinical details. 98 % of the request forms lacked at least one detail. The findings of the audit were discussed with the referring clinicians; modified systems were adopted with an aim to re-audit in six months. Conclusion: Adequate clinical history and patient details are necessary for accurate Radiological interpretation of chest radiographs.

P 22

MDCT of the chest- not just heart and lungs: alternate musculoskeletal findings <u>N. Ramesh;</u> Portlaoise/IE

Purpose: The purpose of this poster presentation is to highlight the importance to identify and report musculoskeletal findings on MDCT of the chest. Material and methods: MDCT of the Chest is one of the commonest Radiological investigations performed in the Radiology department. Retrospective review of 100 examinations was undertaken with aim to review only the musculoskeletal findings. Results: Nearly 90% of the cases reviewed showed at least one abnormality of the skeletal system, though only 35 % were of any clinical significance. Amongst the clinically significant majority were osteoporotic fractures, 10 cases showed metastatic lesions involving the ribs and scapula, which were better demonstrated on 3 D images and one case showed diastasis of the sternal sutures following recent cardiac surgery. Other findings included humeral cyst, lipoma of the soft tissues. While the radiologists reported majority of the findings, two radiologists did not deem it necessary to report degenerative changes involving the dorsal spine. Conclusion: Not unlike the skeletal review on a chest radiographs, it is important to review the musculoskeletal system particularly the multiplanar views and 3 D reconstructions.



P 23

Tuberculous cold abscesses located paravertebral in the thoracic area, not imaged in chest radiograph: diagnostic and therapeutic management using computed tomography.

<u>P. Tsagouli</u>, V. Georgiadi, K. Stathopoulos, E. Sotiropoulou, I. Volioti, L. Thanos; Athens/GR

Purpose: To determine the accuracy of imaging paravertebral tuberculous cold abscesses with CT scan in patients with negative chest radiographs and the efficiency of treating them by means of aspiration and drainage under CT guidance. Material and methods: We present 33 cases of 28 patients, treated in our hospital during the last two years. 19 of them were men and 14 were women (age range: 22-65 years). They all suffered from tuberculous infection complicated with cold abscesses in the paravartebral thoracic area that were not imaged with chest radiographs, but were clearly revealed in chest CT scans. The diameters of the abscesses ranged from 3,2cm to 5,1cm. All these patients underwent percutaneous aspiration and drainage under CT imaging, following the trocar puncture technique. The catheter remained in place for about a week. A follow up CT scan was performed in all cases before the catheter removal. They were all under antituberculosis pharmaceutical treatment. Results: All the patients had a successful recovery from the abscesses. There were no major or minor complications observed. No recurrence occurred until today. Conclusion: CT scan is a sensitive and accurate method of imaging paravertebral cold abscesses. Percutaneous aspiration and drainage of them, under CT guidance, adjunctive to specific antituberculosis therapy, leads to a satisfactory conclusion.

P 24

Complicated bronchial artery aneurysm in patient without known lung disease - a case report <u>F. Morais</u>, P. Campos, I. Távora; Lisboa/PT

Purpose: The authors present a case of an asymptomatic 74 years-old male that was found to have ruptured bronchial artery aneurysm without apparent parenchimal lung disease in computed tomography (CT). Material and methods: The patient underwent chest X-ray, CT and surgery that confirmed CT results. Results: An old man without any relevant background of lung disease, was admitted to hospital with hemoptysis and chest X-ray showed right pulmonary parenchymal and signs of pleural effusion. A CT scan (after contrast injection) was performed revealing enlargement of the right intercostobronchial artery and its right branch and rupture volumous (2, 4 cm) aneurysm of its intrapulmonary branch, associated with a large intrapulmonary hematoma of the right lower lung and hemothorax besides of enlargement of the heart. Surgery was performed and confirmed CT findings. Conclusion: Sistemic arterialization of the lung is usually congenital. In with chronic pulmonary inflamation, patients anastomoses can develop between sistemic and pulmonary arteries. Enlargement of the bronchial arteries is more prominent in bronchial disease (bronchiectasis due to postprimary pulmonary tuberculosis for example), than in chronic parenchimal lung disease. Bleeding is most commonly from enlarged bronchial arteries due to bronchietasis, ongoing chronic bronchial inflamation or intracavitary mycetomas, than in patients with active

cavitary disease or vasculitis. Surgery or thranscatheter embolization may me required for massive bleeding; therefore CT plays an important pre-interventional role in demonstrating bronchial arteries anatomy, localizing the site of bleeding and selecting bronchial arteries for interventional approach. This case reports a complication of bronchial artery aneurysm and was consistent to the few reports of aneurysmal dilatation of bronchial arteries in patients without obvious bronchial disease, which is the most common cause of enlargement of bronchial arteries.

P 25

Importance of some CT criteria for differentiation between mediastinal lymphoma from lung cancer mediastinal type

I. Tatishvili, I. Andronikashvili; Tbilisi/GE

Purpose: To analyze and select different CT criteria assisting in differentiation of lung cancer mediastinal type from mediastinal lymphoma. Material and methods: CT examinations of 34 patients having mediastinal lymphoma or lung cancer (mediastinal type) where analyzed retrospectively and prospectively. Diagnosis of lymphoma or cancer was established by CT guided biopsy, bronchoscopy (with cytology) or surgery. Patients having extramediastinal spread of disease (metastasis to peripheric lymph nodes, adrenals, lung, liver and so on) or having other etiology mediastinal tumor where not included in study. All patients included in study had main tumor mass in middle mediastinum. All patients had multislice (4-slice) CT examinations of thorax without and with contrast injection. Where analyzed axial images and MPR and 3D reconstructions. Were analyzed following CT criteria: mediastinal mass size, shape, density and contrast enhancement, mediastinal lymph node number and location, invasion to tracheo-bronchial tree, esophagus and pericardium. Where analyzed diagnostic importance of each above mentioned factors separately. Results: The highest diagnostic value criteria assisting in differentiation where invasion to tracheo-bronchial tree and blood vessels (aorta, pulmonary trunk and pulmonary arteries). Invasion to these structures was significantly more often in lung cancer. Other criteria had no statistically important value. Conclusion: Differentiation of mediastinal lymphoma from lung cancer mediastinal type is often challenging and less reliable by CT. Due to this, it's important to define most reliable CT criteria assisting in diagnosis. This is most important for patients in which confirmatory studies (with morphology) for different reasons are unavailable. According to our results, the most assisting criteria are invasion to main arteries and bronchi, but further (larger and more refined) studies are needed.

P 26

Lung ultrasonography as a bedside tool in the diagnosis of pneumothorax in the ICU. <u>K. Stefanidis</u>, K. Vitzilaios, S. Dimopoulos, S. Nanas, P. Piperopoulos; Athens/GR

Purpose: Pneumothorax is a frequent diagnostic problem in the Intensive Care Unit (ICU). The purpose of this study is to evaluate the efficacy of bedside ultrasonography (US) in the detection of pneumothorax in critically ill patients, compared to the results of the





gold standard Computed Tomography (CT). Material and methods: A total of 84 critically ill patients (age= 51, range= 17-75, male/female= 39/45,) admitted in the ICU with mechanical ventilation, were prospectively enrolled in this study. All patients underwent CT and lung US. Ultrasound scanning of the anterior and the lateral chest was obtained on the right and left hemithorax, from the second to the fourth-fifth intercostal space from parasternal to midaxillary line. The presence of lung sliding and comet-tail artifacts were evaluated for the sonographic depiction of pneumothorax. Results: Eleven pneumothorax were depicted with CT, the gold standard examination. In 9 cases, both lung sliding and comet-tail artifacts were absent, leading to the diagnosis of pneumothorax. In two cases pneumothorax was not sonographically recognized. According to these results, US demonstrated sensitivity of 82% and specificity of 100% in the diagnosis of pneumothorax. Conclusion: Lung ultrasonography is a bedside, non-invasive technique that can be considered as an attractive and promising alternative to CT in the diagnosis of pneumothorax in the ICU.

P 27

Misplaced Tubes and Lines on chest radiographs <u>N. Gupta;</u> Philadelphia/US

Purpose: Chest radiographs are done quite frequently in inpatients especially in the setting of intensive care units. The principal role of chest radiographs in the hospital setting is predominantly to monitor the various supporting devices including central lines, Swan Ganz catheters, and dialysis catheters, chemotherapy PORTS, chest tubes, feeding tubes and endotracheal tube. A pictorial review of misplaced tubes, lines will be presented to the audience to make them familiar with various misplaced tubes and lines and their associated complications. Helpful hints will be provided to diagnose normal and abnormal placements. Material and methods: Chest radiographs will be presented illustrating the normal and abnormal course of various tubes and lines. Chest radiographs have been collected from patients with cardiopulmanary symptoms, after cardiac, general or thoracic trauma; from patients with monitoring tube and lines and other life support hardware. These have been retrospectively analyzed for misplaced tubes and lines. Results: Malpositioned tubes and lines are everyday occurrence in radiologist's work. There were variety of misplaced tubes and lines and some of which were ugly and caused adverse outcome for the patients. This case will be highlighted for the radiologists and other audiences. Not only the central lines but nasogastric tubes, chest tubes and intra-aortic balloon pumps misplacement will be illustrated. Various kinds of LVAD will also be depicted to make audience cognizant of these devices. Conclusion: It is very important for the radiologists and other physicians involved in the care of critically patients to evaluate chest radiographs carefully for the evaluation of normal and abnormal placement of tubes and lines. Misplaced tubes can result in adverse outcome for the patients and timely communication with the staff taking care of patients can avert the adverse outcomes.

P 28 Withdrawn by Author

Can MRI measure Oxygenation of Lung Tumours in Humans? A Feasibility Study.

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Purpose: Blood oxygenation and vascular function in malignant tumours might be useful as predictors of response upon radiation or systemic therapy as well as a parameter in tumour grading. BOLD MRI is regularly performed in brain-research with signal changes reflecting brain activation. However, due to motion and susceptibility artifacts, BOLD-MRI has rarely been tried in bronchial carcinoma. To evaluate its potatial role, a BOLD sequence was implemented in a standard thoracic MRI protocol. Material and methods: 30 patients (19 male, median age 65 ± 5 yrs) with suspicion of bronchial carcinoma (median size 4 ± 2 cm) with clinically indicated MRI prior to treatment were included. MRI was performed on a clinical 1.5T scanner (Avanto, Siemens). The BOLD sequence was performed without a navigator run and acquired 150 continuous 3D data-sets of the whole lung (4 mm, isovoxel). The patient inspired either ambient air or 151/min pure oxygen via a face mask ("block-design", 5 phases on/off oxygen). Evaluation was performed with SPM8 (Wellcome Department, London; standard procedures). Realignment in 3 planes, noncanonical hemodynamic response function (hrf). Results: In tumours of 2 cm and above (n= 27) a significant (p<0.05) variation in the BOLD signal was detected in 25 of the patients. Further significant signal changes were detected in the heart (n=23) as well as in muscles of the chest-wall (n=19). This is plausible as their activity is correlated to the frequency of breathing. There was no relevant difference in the activations modeling data with either a Fourier set or a rectangle hrf. The amplitudes within the lung tumours did not resemble the oxygen dependent changes in brain activation. Conclusion: BOLD MRI has the ability to reflect oxygen-induced changes in larger human lung tumours. The determination of typical response patterns of the BOLD signal in lung tumours might improve the specificity of oxygen related signal changes detected.

P 30

Magnetic Resonance Imaging in pumonary nodules: usefulness of diffusion-weighted images. Preliminary results.

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Purpose: To preliminary evaluate diffusion-weighted (DW) magnetic resonance (MR) imaging for differentiation of benign and malignant pulmonary nodules/masses by using apparent diffusion coefficient (ADC). **Material and methods**: An institutional review board approved this study; informed consent was obtained from patients. DWI was carried out prospectively in 20 patients with 22 pulmonary nodules/masses before surgery for suspected lung carcinoma. Diffusion of water molecule in each lesion was quantitatively measured by a minimum ADC. ADC values were statistically compared in order to determine differences between benign and malignant entities.

Results: 20 nodules/masses were visible in DWI; two of them were benign lesions. Malignant nodules/masses showed lower ADC than benign ones (the mean ADC was 1.39×10^{-3} mm²/s vs 2.57×10^{-3} mm²/s), although the difference was not significant (p=0.081). The receiver operating characteristics (ROC) curve showed cutoff values of the minimum ADC for benign/malignant discrimination to be 1.84×10^{-3} mm²/s, with sensitivity of 0.80 and specificity of 1.0 for this cutoff point. **Conclusion**: DWI may be able to distinguish malignant from benign pulmonary nodules/masses.

P 31

CT Findings of Small Cell Lung Carcinoma

J.Y. Rho¹, Š.M. Yoo¹, Y.M. Kwon²; ¹Seongnam-si/KR, ²Jeonju-si/KR

Purpose: The aim of this study was to demonstrate the CT findings of small cell lung carcinoma (SCLC) and to recognize the usual pattern of SCLC on CT including multidetector row CT (MDCT). Material and methods: CT findings were retrospectively reviewed in 29 patients (25 men, 4 women; age ranges of 52~82 years) with pathologically proven SCLC from March 2005 to April 2009. All CT examinations were reviewed for the following findings by one chest radiologist: (1) mass location (tumors were regarded as central when located within or proximal to the segmental bronchial lumen. Otherwise, tumors were considered to be peripherally located.); (2) mediastinal extension of mass or lymphadenopathy (when primary tumor was located central hilum with only hilar lymph node enlargement, we defined as a central hilar mass only. other than that, we discriminated as mediastinal extension. when combination of bilateral central hilar tumor with large amount of undistinguishable lymphadenopathy is recognized, we defined as diffuse bilateral mediastinal mass.); (3) airway involvement (bronchial stenosis and obstruction); and (4) concomitant findings (lymphangitic /pleural metastasis, consolidation, and nodule/mass) **Results**: Central hilar mass with contralateral mediastinal extension (n=11) was the most common manifestation of chest CT. The central hilar mass with ipsilateral mediastinal extension (n=10), central hilar mass (n=3), diffuse bilateral mediastinal mass (n=3), and peripheral mass with mediastinal lymphadenopathy (n=2) were frequently observed. Almost primary tumors including central hilar mass, diffuse bilateral mediastinal mass could not be distinguished reliably from enlarged lymph nodes. Lymph node metastasis were observed in all of the 29 SCLC patients, usually in contiguous. 27 patients had evidence of airway stenosis with wall thickening or obstruction. 17 patients had narrowing of a single bronchus and 10 had narrowing of two or more bronchi. Concomitant extension and spreading patterns were lymphangitic spread (n=8), pleural metastasis (n=8), contiguous consolidation (n=3), and peripheral mass (n=3). Conclusion: Usual pattern of SCLC is a central hilar mass contiguous to enlarged ipsilateral or contralateral lymph nodes. Most of the patients with central tumors show bronchial narrowing or obstruction by hilar mass as well as bronchial wall thickening.

P 32

Malignant Pulmonary Ground-Glass Opacity Nodules: Prognostic Implications J.H. Park, D.H. Choe; Seoul/KR

Purpose: To evaluate follow-up results in terms of patient prognosis in malignant pulmonary pure groundglass opacity (GGO) nodules observed at high-resolution CT (HRCT). Material and methods: Surgical removal for malignant GGO nodule(s) was accomplished in 58 patients (26 men, 32 women; mean age, 57 years; range, 29-78 years). Patient prognoses were assessed by using patients' clinical status and the presence of changes in nodule size at follow-up HRCT. And then differences in patient prognoses were compared in terms of nodule number, size, surgical methods, change in size before surgical removal, and histopathologic diagnoses by using the Fisher exact test and the Pearson Chi-Square. Results: Of 58 patients, 40 (69%) proved to have bronchioloalveolar carcinoma (BAC) and 18 (31%) adenocarcinoma with predominant BAC component. Neither local recurrence nor metastasis occurred in any of these patients at follow-up period of 24 months (range; 12 - 65 months). Of 14 patients with multiple GGO nodules, all were resected without recurrence in 6 patients. In the remaining 8 patients, the remaining nodules showed no change in size in 7 and decrease in size in one at follow-up CT. There was no significant difference in recurrence rates in terms of nodule size, surgical methods, change in size before surgical removal, and histopathologic diagnoses between patients with single GGO nodule (44, 76%) and multiple GGO nodules (14, 24%) (all P > 0.05). Conclusion: Prognoses in patient with malignant pulmonary pure GGO nodules are excellent, and not significantly different in terms of nodule number, size, surgical methods, presence of size change before their surgical removal, and histopathologic diagnoses.

P 33

FDG PET/CT Staging of Lung Cancers. A Pictorial Essay.

<u>A. Tan Eik Hock</u>, A. Ng, C.Y. Lim, H.Y. Loi, S. Zaheer, T.Y. Kok, D. Ng CE; Singapore/SG

Purpose: Since US FDA approval for the use of F-18 Fluorodeoxyglucose (FDG) as a radiopharmaceutical was granted in 1997, there has been widespread and rapid clinical adoption. This is particularly evident in the field of oncology, as malignant neoplasms as a rule, show significantly higher metabolic activity and as such demonstrate avid uptake of FDG. Lung cancers are one of the leading causes of malignancy related death worldwide, and accurate staging allows for more precise prognostication and management stratification. FDG PET/CT has the potential to improve such staging accuracy with possible impact on clinical management and outcomes. Material and methods: Staging in NSCLC can be performed using the International Stating System, which in turn in based on classical TNM classifications. The International Staging System for lung cancer was developed in response to the need for a classification scheme to unify variations in staging definitions and provide a consistent interpretation. In general, the TNM staging is used to define 7 clinical stages of disease, with prognostication and management differences between the stages. Results: We present a pictorial essay on the use of FDG PET/CT in the pretherapy staging of Non-Small Cell Lung Carcinomas (NSCLC), illustrating the various clinical stages and several teaching points in FDG PET/CT interpretation. Conclusion: The primary aim of pre-therapy staging is to determine the extent of disease for purposes of



prognostication and management stratification. FDG PET/CT has potential as a "one-stop" imaging modality and could plausible replace other investigations in this aspect.

P 34

Detection and Response Evaluation of Bone Metastases Using Various Imaging Modalities in Non-Small Cell Lung Cancer: The Untrod Road <u>H.J. Kim</u>, H.Y. Lee, K.S. Lee, B.-T. Kim, C.A. Yi, M.J. Chung, T.S. Kim; Seoul/KR

Purpose: To review the current issues on the evaluation of bone metastases detected on the initial staging work-up or their changes during treatment. Material and methods: We reviewed the detection rates for bone metastases of various imaging modalities. We also had the spectrum of bone imaging findings and sequential changes acquired from 340 NSCLC patients treated with epidermal growth factor receptor-tyrosine kinase inhibitors (EGFR TKIs). Newly devised tumor response criteria for bone metastases and the results of their application to our patients are discussed. Results: MRI and 18F-FDG PET can help detect malignant marrow involvement early in the course of the disease before identifiable bone changes occur and, thus, may be superior to CT and scintigraphy in identifying bone metastases. During the treatment of bone metastases, we can experience "osteoblastic flare". This action, occurring when treating patients with cytostatic agents such as EGFR TKIs, may be either due to direct therapeutic effect or stimuli to osteoblasts and osteoclasts. We demonstrate the spectrum of radiologic findings and changes over time of osteoblastic response, while discussing the differential points of osteoblastic response disease progression. Bone may remain from morphologically abnormal even when cancer cells are "sterilized". The RECIST guidelines do not take osteoblastic changes into account when treatment response is assessed. We apply new tumor response criteria for bone metastasis to our patients and analyze the data with respect to patient's survival and clinical response. Conclusion: The imaging findings of bone metastases are diverse. The radiologic interpretation of metastatic bone disease and its response evaluation to targeted agents should be started with the full consideration of clinical feature for fear of erroneous discontinuation of an actually effective treatment. Moreover, we should keep in mind an important phenomenon such as "osteoblastic flare" in the next revision of currently used RECIST.

P 35

Bronchioloalveolar Carcinoma and Mixed Adenocarcinoma with Bronchioloalveolar Component: CT and PET/CT aspects J. Capobianco, P.P.T.E.S. Torres, G. Meirelles, São Paulo/BR

Purpose: Bronchioloalveolar carcinoma (BAC) is a unique subtype of pulmonary adenocarcinoma that is characterized by intra-alveolar tumoral dissemination in intact intersticial substract, with no vascular, stromal or pleural invasion. They can be found in the pure form (pure BAC) or in adenocarcinoma tumors with mixed histological subtypes, and each form has different prognostic values. **Material and methods**: In this work

we describe and illustrate the most characteristic imaging findings on computed tomography (CT) and PET/CT of pure BAC and mixed adenocarcinomas with a bronchioloalveolar component. We also include a brief and relevant literature review about the subject. Results: Pulmonary solitary nodule is reported as its most frequent manifestation, typically a ground glass opacity (GGO) in pure BAC and subsolid nodules in mixed adenocarcinomas with a bronchioloalveolar component. Pure BAC tumors are usually hypocaptating in FDG PET/CT exams. Consolidation occurs in about 30% of cases, when there is difficult differentiating from infectious pneumonia. Centrolobular pulmonary nodules, GGO, aerobronchograms, peripheral distribution and lower lobe predominance are the most prominent findings in the diffuse form. Conclusion: BAC and mixed adenocarcinomas with a bronchioloalveolar component have a diverse spectrum of CT and PET/CT manifestations and recognizing its patterns can be definitive for early diagnosis and increasing survival possibilities.

P 36

Primary pulmonary lymphoma as we know it

<u>C. Leal</u>, N. Costa, H. Marques, O. Fernandes, E. Pinto, L. Figueiredo; Lisboa/PT

Purpose: To review and illustrate the spectrum of presentation of primary pulmonary lymphoma. Material and methods: Primary pulmonary lymphoma develops in subepithelial lymphoid follicles distributed along distal bronchi and bronchioles in the form of mucosa-associated lymphoid tissue (MALT) lymphoma (MALToma), sometimes also referred to as bronchus-associated lymphoid tissue (BALT) lymphoma (BALToma). It is a low-grade small B-cell lymphoma usually non-Hodgkin's type, estimated to be less than 1% of all lymphomas. This tumor has a nondestructive growth with preservation of the lung architecture. After a retrospective review of pathology proven cases of primary pulmonary lymphoma, we selected the most illustrative imaging findings. Results: Pulmonary MALT lymphomas can manifest as solitary, well-delineated soft-tissue masses. Other imaging features include multiple unilateral or bilateral nodules, diffuse infiltrates along the bronchovascular bundles and interlobular septa and extensive lobar infiltrates mimicking pneumonia. CT demonstrates airspace consolidation, nodules with air bronchograms or adjacent areas of ground-glass attenuation and bubble-like areas of consolidation. Hilar and mediastinal lymphadenopathy is not a prominent radiologic finding, but nodal involvement has been documented in about 30% of cases. The main imaging differential diagnosis includes lymphocytic interstitial lymphomatoid pneumonia, granulomatosis, bronchioloalveloar carcinoma, metastasis, indolent granulomatous infection, Wegener's granulomatosis and cryptogenic organizing pneumonia. Conclusion: The imaging appearance of pulmonary MALT lymphoma can be quite variable, but many imaging similarities exist with bronchioloalveloar carcinoma, including air bronchograms within the lesions and the CT angiogram sign. The recognition of these presenting features is of great importance for a correct diagnosis and management of these patients.



P 37 Revised TNM staging for Lung cancer – what radiologist need to know? N. Gupta, E. Barbosa, T. Mickus; Philadelphia/US

Purpose: Main changes in revised TNM classification for lung cancer will be summarized pictorially to make radiologists familiar with the revised system. Material and methods: Multicenteric data from 80000 patients of lung cancer was collected by The International Association for the Study of Lung Cancer (IASLC) between 1990 and 2000. T (tumor), N (node) and M (metastasis) descriptors were statistically analyzed for 5 year survival rates in these patients and modifications in TNM classification made for more accurate prognostic classification. Results: Revised TNM staging includes T1 sub-classification into new T1a (≤ 2 cm) and T1b (> 2 cm) but \leq 3 cm); T2 sub-classified into new T2a (> 3 cm but \leq 5 cm) and T2b (> 5 cm but \leq 7 cm); T2 reclassified to new T3 (if > 7 cm); cancer with other nodules in the same lobe changed to T3 from T4; previous M1 stage with other nodules in the same lung revised to T4; T4 with malignant pleural effusion becomes M1a; M1 is subclassified into M1a (intra-thoracic metastasis) and M1b (distant metastasis). No changes are made to the N descriptor though there are revised nodal map changes. These changes will upstage T2bN0M0 from IB to IIA; downstage T2aN1M0 from IIB to IIA and T4N0-N1M0 from IIIB to IIIA. The remainder stage groups remain unchanged. Conclusion: It is of utmost importance for the radiologists to be familiar with the changes in the TNM system for lung cancer staging, which emphasizes prognostic relevance of tumor size, and also reconciling the classification of pleural dissemination and ipsilateral additional pulmonary nodules with clinically observed prognostic value. Radiologists in frontline for staging the lung cancer, will play an even more central role in the decision making and care of patients.

P 38

Lung cancer in elderly never-smoker women: a case series

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Purpose: Lung cancer among nonsmokers has emerged as a distinct clinicopathologic entity for which the etiology is still poorly understood, but which accounts for a significant proportion of the lung cancers among women. The aim of this study is to analyze and report the imaging findings and pathology of lung cancer in a case series of elderly never smoker female patients. Material and methods: The study comprised 8 elderly neversmoker female patients (age range 70-89 yrs, mean 75.25) without history of exposure to involuntary smoking. Presenting symptoms included cough, face flashing, chest pain and mild dyspnea. Patients underwent chest CT scan and transthoracic CT-guided needle biopsy. Results: The lesion size ranged from 2.7cm to 6.6cm, bearing lobulated margins (n=3) and spiculations (n=5). One of the lesions presented air-bronchogram and was initially considered as pneumonia. No cavitation was present. Lesions were located in the upper lobes (n=5) or lower lobes (n=3) and were predominantly positioned peripherally (n=6) rather than centrally (n=2). Pulmonary metastases were present in two patients at the time of

while two patients had mediastinal diagnosis lymphadenopathy. No distant metastases were present. Histology revealed lung adenocarcinoma - of high differentiation in two patients (n=2), intermediate in three (n=3) and of low differentiation in two (n=2). Bronchoalveolar cell type carcinoma was disclosed in one patient. Conclusion: Lung cancer not associated with history of smoking tends to develop in elderly women with histology being consistent with lung adenocarcinoma. In contrast to literature data, the upper lobes were mostly affected in the cases presented. Imaging findings of lung adenocarcinoma presenting in elderly never-smoker women do not differ from those described in lung adenocarcinoma presenting in smokers.

P 39

Visual simulation of reduced tube voltage and pulmonary emboli at CT angiography <u>S. Raible¹</u>, R. Cattin¹, Z. Szucs-Farkas²; ¹Biel/CH, ²Bern/CH

Purpose: Contrary to reduced CT tube current, simulation of image characteristics at reduced CT tube voltage is very challenging. In this study both the increased vessel signal and image noise at low tube energy with CT pulmonary angiography (CTPA) were simulated and an algorithm was developed to mimic intravascular filling defects as in pulmonary embolism (PE). Material and methods: The image characteristics of a 80 kVp low-dose CTPA protocol with reduced patient exposure and iodine load were simulated in 10 normal-dose CTPAs at 120 kVp with no PE. Contrasted vessels in the transverse CT images were selected semiautomatically based on an attenuation threshold and their signal was increased by 37%. Increased image noise was simulated by adding 57% Gaussian noise to the entire image. Filling defects at various levels of the pulmonary arteries were mimicked by first segmenting the pulmonary arterial tree with a semi-automatic segmentation algorithm. In a second step several key forms were manually modeled and the PE volume was automatically interpolated. In a third step the filling defects were created by adding fill textures to the 2D slices of the modeled PE volume. Vessel signal and noise in the post-processed images were compared to those in a collective of 120 patients. Subjective image quality was interpreted by an expert radiologist. Results: Vessel attenuation, image noise and subjective image quality in the simulated and the genuine 80 kVp series were very similar. Both the form and texture of emboli from the lobar to the first subsegmental pulmonary arteries could be convincingly simulated. Conclusion: Pulmonary emboli and characteristics of a low-voltage CTPA both in terms of increased vessel attenuation and image noise can be simulated. The post-processed images can be used in reader studies.





P 40

The Location and Size of Pulmonary Embolism in Anti-neoplastic Chemotherapy Patients W. Kwon, Y. Park; Wonju/KR

Purpose: To retrospectively evaluate the prevalent location and size of pulmonary embolism (PE) in antineoplastic chemotherapy patients by multidetector row CT (MDCT). Material and methods: This study was conducted in 101 patients with a positive diagnosis of PE by CT. Among these patients, 23 patients had received or were undergoing chemotherapy. The location and the mean size of the largest PE was compared between antineoplastic chemotherapy patients and non-cancer patients by using Chi-square test and paired t-test, respectively. We used multiple linear regression analysis to assess the risk posed by the other risk factors of PE. Results: The most prevalent location of PE in patients on antineoplastic chemotherapy was in the lobar or segmental pulmonary arteries and was not significantly different from non-cancer patients. The size of the PE was smaller in patients on anti-neoplastic chemotherapy (1.14 mL [standard error=0.29]) compared to non-cancer patients. (2.14 mL [standard error=0.40]) (p < 0.05). Conclusion: The size of PE is smaller in anti-neoplastic chemotherapy patients than non-cancer patients.

P 41

Computed Tomography Pulmonary Angiography in the setting of a pulmonary emergency department: An audit of its use in the assessment of patients with suspected pulmonary embolism

L. Kolilekas, T. Spyridopoulos, E. Manali, E. Mainta, D. Markoulaki, C. Kontopoulou, S. Argentos, C. Sotiropoulou, N. Kelekis, S. Papiris; Athens/GR

Purpose: To make an audit of the use and role of computed tomography pulmonary angiography (CTPA) alone or in combination with perfusion scanning (Q scan) and lower limb venous ultrasonography (LLVUS) in the assessment of patients with suspected pulmonary embolism (PE) in association with clinical and laboratory findings. Material and methods: Patients examined at the Emergency Department (ED) of a University Hospital and suspected for PE were eligible. Patients underwent clinical test probability assessment by Wells score. Ddimers, Troponin and BNP tests and CTPA were performed. Q scan, LLVUS and cardiac ultrasound were selectively performed in the first 24 hours. Results: One hundred forty eight patients with a mean age $(\pm SD)$ of 65.86 (± 14.20) years were included. An intermediate Wells score had 73% and a high score 26.4% of patients. CTPA was performed in 98.6% of patients with 12.8% positive for PE. Twelve Q scans (2.7% positive) and 96 LLVUS (16.2% positive) were performed. Based on CTPA, Q scan and LLVUS, 33 patients (22.3%) were diagnosed with PE and treated. Three patients died. One patient (0.7%) presented recurrent PE at 3-months follow-up. Wells score had a PPV of 71.8 and NPV of 95.4. Pleural effusion or dilatation of the PA presented no differences between the PE and non-PE group. D-dimers had an area under curve of 0.857 (95% CI=0.79-0.92), p<0.001. At 840 (<240 normal), D-dimers had a PPV of 62.2% and a NPV of 90.9% for PE. When combining a high Wells score with either, BNP, Troponin or Ddimers, the latter combination bears the best PPV (81.8%). Conclusion: In patients suspected for PE at the ED, the combination on high clinical probability and positive D-dimers better predicts but does not safely exclude PE. CTPA alone or in combination with Q scan/ LLVUS is the radiologic evaluation of choice to diagnose PE at the ED.

P 42

Mean pulmonary arterial pressure and vascular CT signs of pulmonary hypertension

A. Marin, I. Pozek, R. Cesar, I. Drinovec; Golnik/SI

Purpose: The aim of the study was to determine whether the ratio of the diameters of the main pulmonary artery (PA) and of the ascending aorta (AA) and the ratio of the diameters of main pulmonary artery branches [left main PA (LPA), right main PA (RPA), segmental pulmonary arteries] and of their homologous bronchi as assessed on CT correlate with the degree of pulmonary arterial hypertension (PAH). Material and methods: We undertook a retrospective review of 18 patients that had undergone right heart catheterization. We collected MPAP (mean pulmonary artery pressure) of all 18 patients. We measured AA, main PA, LPA, RPA and all of the segmental arteries (upper lobe apical segment and lower lobe postero-basal segment on both sides) diameters and the diameters of their homologous bronchi on all 18 CT scans. We calculated PA/AA, and all peripheral pulmonary arteries/homologous bronchus ratios and tested their relationship with MPAP using Spearman's rank correlation coefficient. Results: Average age was 62.4 (22-79) and average MPAP was 43.1 mmHg. Four patients were male. Six patients had pulmonary hypertension due to Systemic Sclerosis and lung fibrosis, four had chronic thromboembolic pulmonary hypertension, three patients had cirrhosis and portal hypertension, two idiopathic PAH, two PAH associated with connective tissue disease and one patient had Betaferon induced PAH. The ratio of the diameter of the main PA to the diameter of the AA correlated with MPAP. The segmental artery-to-bronchus ratio did not correlate to MPAP. Conclusion: The most specific CT finding in PAH that correlates with MPAP is PA/AA ratio. Artery-to-bronchus ratio and other vascular CT signs of PAH need further diagnosis based evaluation.

P 43

Chronic expanding hematoma of the thorax: CT findings in eight patients.

Y.W. Choi, S.C. Jeon, J.N. Heo, C.K. Park; Seoul/KR

Purpose: Chronic expanding hematoma (CEH) of the thorax is a rare pleural lesion presenting as an expanding pleural mass in patients with a history of thoracotomy, tuberculous pleurisy, or thoracic trauma. We analyzed radiological features of CEH. Material and methods: We evaluated four men and four women ranging between 52 and 82 years of age with CEH in the right (n=4), or left (n=4) side. The diagnosis was made when chest radiographs and/or CT scans showed an expanding pleural mass during 19-112 month (mean, 60 months) follow-up and needle aspiration or surgery did not reveal tumor or infection but old blood derivatives in the pleural space. They all had a history of pleuropulmonary tuberculosis 25-47 years ago. Their chest CT scans (n=8) and prior CT (n=6) taken 8 to 100 months before were evaluated for calcification around the pleural mass, break



down of the calcification, inversion or compression of ipsilateral diaphragm, mediastinal compression, attenuation, volume of the mass, focal protrusion into the chest wall or lung, and other associated findings. Results: Pleural masses showed calcification in the wall (n=7), break of a calcific rind (n=1), protrusion into the lung (n=2) or chest wall (n=1), indentation or inversion of the ipsilateral diaphragm (n=7), or mediastinal compression (n=2). Pleural mass occupied <10% to 90% (mean 23%) of the affected hemithorax volume. The masses were lower than the muscles and homogeneous (n=5) or heterogeneous (n=3) in attenuation. In addition CT showed pulmonary ground glass opacity due to pulmonary hemorrhage, leakage of contrast material within the mass, or erosion of an adjacent rib in one each. Conclusion: Chronic expanding hematoma may extend or rupture into the lung or chest wall clinically presenting as pulmonary hemorrhage or chest wall protrusion, and may show mass effect to the adjacent mediastinum, diaphragm, or the rib. The pleural mass doesn't have to occupy the entire hemithorax. CEH should be included in the differential diagnosis of a chronic expanding pleural mass.





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