ESTI European Society of Thoracic Imaging

ESTI 2014

22nd ANNUAL SCIENTIFIC MEETING OF THE EUROPEAN SOCIETY OF THORACIC IMAGING

JUNE 12-14, 2014
AMSTERDAM, NETHERLANDS

FINAL PROGRAMME

ESTI European Society of Thoracic Imaging

ESTI2014

FINAL PROGRAMME

CONTENTS

GENERAL INFORMATION

Congress Venue

NH Grand Hotel Krasnapolsky
Dam, 9.
1012 JS Amsterdam, Netherlands

Certificate of Attendance/CME Accreditation

The Certificate of Attendance/CME Accreditation will be handed out on last congress day at the registration desk.
The ESTI HRCT Hands-On Workshop (June 11, 2014) is designated for a maximum of, or up to 3 European CME credits (ECMEC).
The ESTI Annual Scientific Meeting (June 12-14, 2014) is designated for a maximum of, or up to 17 European CME credits (ECMEC).
Continuing Medical Education (CME) is a programme of educational activities to guarantee the maintenance and upgrading of knowledge, skills and competence following completion of postgraduate training. CME is an ethical and moral obligation for each radiologist throughout his/her professional career, in order to maintain the highest possible professional standards.

Conference Language

The meeting will be held in English. No simultaneous translation will be offered.

Registration Fees

Onsite Registration Fees

Regular Non Member	€ 600.00
Regular Member	€ 450.00
Junior Non Member	€ 380.00
Junior Member	€ 300.00
Technician Non Member	€ 380.00
Technician Member	€ 290.00
Student Non Member	€ 220.00
Student Member	€ 150.00

Registration fee for delegates includes:
- admittance to all scientific sessions
- admittance to the technical exhibition
- congress programme and abstracts
- certificate of attendance
- opening ceremony and welcome cocktail
- coffee breaks

Member Registration
Reduced congress registration fees for ESTI Members are available only if the ESTI 2014 membership fee has been paid.

Junior Registration
Registrations categorised as "Junior" are limited to juniors under the age of 35 (incl. the age of 35). A proof of your junior status has to be shown to the ESTI Office.

Technician Registration
Registrations categorised as "Technician" are limited to technicians without any academic title. A proof of your technician status has to be shown to the ESTI Office.

Student Registration
Registrations categorised as "Student" are limited to students under the age of 30 (incl. the age of 30).
A proof of your student status has to be shown to the ESTI Office.

Registration Opening Hours

Thursday, June 12	08:00 – 18:00
Friday, June 13	08:00 – 18:00
Saturday, June 14	08:00 – 18:00

Onsite Payment

Onsite payment can only be made by credit card (Visa or Euro/Mastercard) or in cash (Euro).
Please understand that no other payment facilities like cheques, etc. will be accepted.

Name Changes

Name changes will be treated like the cancellation of the registration and a new registration of the other participant.

Coffee Breaks

Complimentary coffee, tea and refreshments will be served during the official coffee breaks to all congress delegates.

EPOS™

ESTI 2014 is using EPOS™, the Electronic Presentation Online System, the electronic format of the scientific exhibition developed by the European Congress of Radiology (ECR). Several workstations are available in the EPOS™ Area at which the current electronic exhibits can be viewed by the congress participants during the congress.

Media Centre

The media centre is located near the catering and exhibition area. Trained staff will be available to assist you with the equipment. The media centre should only be used for a test run of the presentations. Please note that the media centre should not be used to prepare your entire presentation and that due to the large number of speakers the workstations are only available for minor editing.

Disclaimer/Liability

Education Congress Research GmbH/ESTI cannot accept any liability for the acts of the suppliers to this meeting or the attendees' safety while travelling to or from the congress. All participants and accompanying persons are strongly advised to carry adequate travel and health insurance, as Education Congress Research GmbH/ESTI cannot accept liability for accidents or injuries that may occur. Education Congress Research GmbH/ESTI is not liable for personal injury and loss or damage of private property.

Lunch Symposium

Each participant of a Lunch Symposium will receive a voucher for lunch, which will be offered after the symposium in the Wintergarden of the NH Krasnapolsky. Access to the buffet lunch is only possible with your lunch voucher. In case you will not attend the Lunch Symposium, vouchers can also be purchased at the registration desk onsite for € 15,00.

SIEMENS	TOSHIBA	BRACCO LIFE FROM INSIDE
Thursday, June 12	Friday, June 13	Saturday, June 14

Future Meeting Desk

This area offers you an overview of future meetings in the field of radiology and related disciplines, from all over the world. Feel free to contribute flyers and posters to promote your own meetings and courses.

ESTI European Society of Thoracic Imaging

ESTI 2014 – June 12-14, Amsterdam/NL

WELCOME RECEPTION

THURSDAY, JUNE 12, 18:00 AT THE WINTERGARDEN OF THE NH GRAND HOTEL KRASNAPOLSKY

The ECR GmbH/ESTI Office may not accept liability for personal injury, loss/damage to property, personal or otherwise belongings of participants and/or accompanying persons, either during or as a result of the evening event.

AMSTERDAM

Amsterdam is the capital and the most populous city of the Netherlands. Amsterdam is an open air museum that in its compactness can be easily discovered by foot, boat or bycicle. With their elightful views, pretty bridges (1703 in total), elegant gabled houses and relaxed waterside cafes, Amsterdam's 75 km of canals are perfect for a leisurely stroll.
In 2010 the 17th century canal ring was added to the UNESCO world heritage list. The Rijksmuseum, the country's largest national museum houses an unrivalled collection of 17th century Dutch art and has been reopened in 2013 after more than 10 years of renovation.
Other famous museums such as the van Gogh museum with its most comprehensive collection of the artist's work, the Anne Frank House or the Stedelijk museum attract thousands of visitors each year. Its exceptionally cosmopolitan and youthful population makes Amsterdam a unique and vibrant place with unlimited shopping options, countless restaurants, its street cafes asking for a break in the sun and its many unusual small shops (winkels).

Further information about Amsterdam is available at the registration desk.

LIST OF SPONSORS

ESTI would like to thank all industry partners for their valuable support.

AGFA HealthCare

BAYER

BRACCO
LIFE FROM INSIDE

Delft Imaging Systems

GE Healthcare

InterMune
Leader in IPF

MeVis

PHILIPS

Riverain TECHNOLOGIES
See the Potential.

SIEMENS

TOSHIBA
Leading Innovation

EXHIBITION

The exhibition area will be located in the Wintergarden, located on the ground floor level of the hotel.

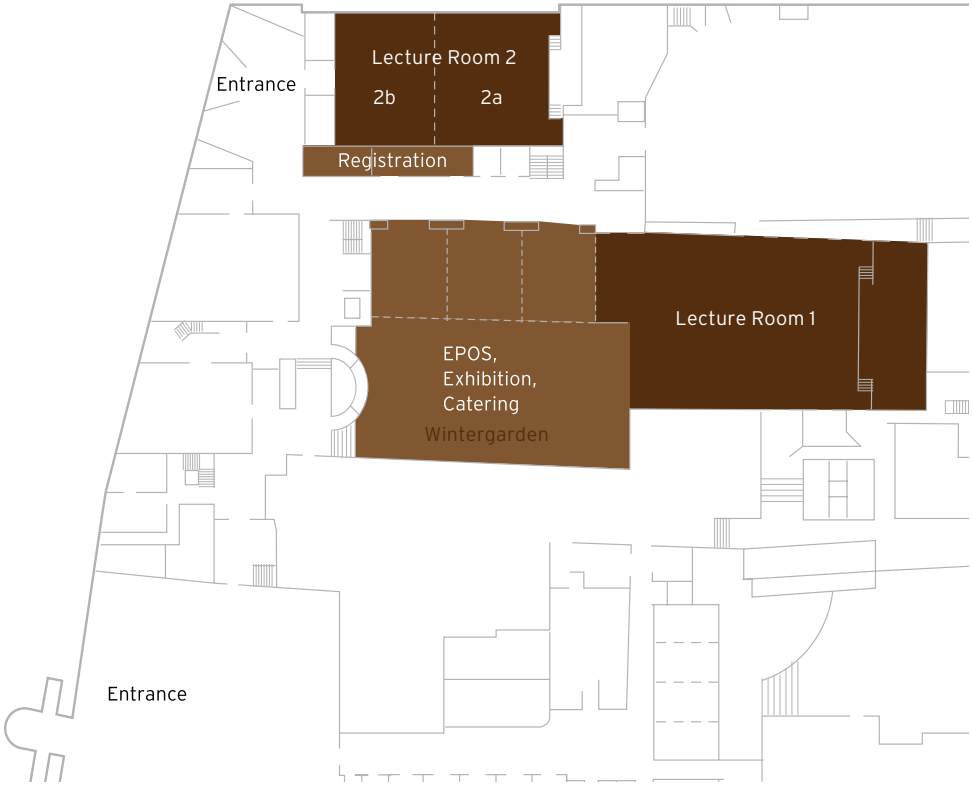
Exhibition Opening Hours

Thursday, June 12	09:00 - 18:00
Friday, June 13	08:30 - 18:00
Saturday, June 14	08:30 - 16:00

List of Exhibitors

- Agfa
- Bayer
- Bracco
- Delft Imaging Systems B.V.
- GE Healthcare
- InterMune International AG
- MeVis
- Philips
- Riverain Technologies
- Toshiba

FLOOR PLAN



GE Healthcare

Strong evidence[1-19]

The only isosmolar X-ray contrast agent for intravascular use at all available iodine concentrations[1]

Cardiac tolerability[2-5]

Renal tolerability[6-11,18,19]

Patient comfort[12-19]

GE imagination at work

ISOSMOLAR
VISIPAQUE™
(IODIXANOL)

PRESCRIBING INFORMATION VISIPAQUE™ Injection (iodixanol)
Please refer to full national Summary of Product Characteristics (SPC) before prescribing. Indications and approvals may vary in different countries. Further information available on request.
PRESENTATION An isotonic, aqueous solution containing iodixanol, a non-ionic, dimeric contrast medium, available in three strengths containing either 270 mg or 320 mg iodine per ml. **INDICATIONS For diagnostic use only** X-ray contrast medium for use in adults in cardioangiography, cerebral angiography (conventional), peripheral arteriography (conventional), abdominal angiography (i.a. DSA), urography, venography, CT enhancement, studies of the upper gastrointestinal tract, arthrography and hysterosalpingography (HSG) Lumbar, thoracic and cervical myelography in adults. In children for cardioangiography, urography, CT enhancement and studies of the upper gastrointestinal tract. **DOSAGE AND ADMINISTRATION** Adults and children: Dosage varies depending on the type of examination, age, weight, cardiac output, general condition of patient and the technique used (see SPC and package leaflet). **CONTRAINDICATIONS** Manifest thyrotoxicosis. Hypersensitivity to the active substance or to any of the excipients.**WARNINGS AND PRECAUTIONS** A positive history of allergy, asthma, or reaction to iodinated contrast media indicates need for special caution. Premedication with corticosteroids or H1 and H2 antagonists might be considered in these cases. Although the risk of serious reactions with VISIPAQUE is regarded as remote, iodinated contrast media may provoke serious hypersensitivity reactions. Therefore the necessary drugs and equipment must be available for immediate treatment. Patients should be observed closely for at least 15 minutes following administration of contrast medium, however delayed reactions may occur. Non-ionic contrast media have less effect on the coagulation system in vitro, compared to ionic contrast media. When performing vascular catheterization procedures one should pay meticulous attention to the angiographic technique and flush the catheter frequently (e.g. with heparinised saline) so as to minimize the risk of procedure-related thrombosis and embolism. Ensure adequate hydration before and after examination especially in patients with renal dysfunction, diabetes mellitus, paraproteinemias, the elderly, children and infants. Particular care is required in patients with severe disturbance of both renal and hepatic function as they may have significantly delayed contrast medium clearance. For haemodialysis patients, correlation of time of contrast media injection with the haemodialysis session is unnecessary. To prevent lactic acidosis in diabetic patients treated with metformin, administration of metformin should be discontinued at the time of administration of contrast medium and withheld for 48 hours and reinstituted only after renal function has been re-evaluated and found to be normal. (Refer to SPC). Special care should also be taken in patients with hyperthyroidism, serious cardiac disease, pulmonary hypertension, patients predisposed to seizures (acute cerebral pathology, tumours, epilepsy, alcoholics and drug addicts), and patients with myasthenia gravis or phaeochromocytoma. One should also be aware of the possibility of inducing transient hypothyroidism in premature infants receiving contrast media. After intrathecal use the patient should rest with head and thorax elevated for one hour and outpatients should not be alone for 24 hours. All iodinated contrast media may interfere with laboratory tests for thyroid function, bilirubin, proteins, or inorganic substances (e.g. iron, copper, calcium, and phosphate). An increased risk of delayed reactions (flu-like or skin reactions) has been associated with patients treated with interleukin-2 up to two weeks previously. **PREGNANCY AND LACTATION** The safety of VISIPAQUE in pregnancy has not been established. Contrast media are poorly excreted in breast milk and minimal amounts are absorbed by the intestine. Breast feeding may be continued normally. **ABILITY TO DRIVE AND USE MACHINES** It is not advisable to drive or use machines for one hour after injection or for 6 hours after intrathecal procedure. **UNDESIRABLE EFFECTS** Undesirable effects are usually mild to moderate, and transient in nature. Serious reactions and fatalities are only seen on very rare occasions. Hypersensitivity may present as respiratory or cutaneous symptoms like dyspnoea, rash, erythema, urticaria, pruritus, skin reactions including severe bullous or pustular reactions, angioneurotic oedema, hypotension, fever, laryngeal oedema, bronchospasm or pulmonary oedema. They may occur immediately after injection or up to a few days later, irrespective of dose, and mild symptoms may be the first signs of serious anaphylactoid reaction/shock. Intravascular use: Uncommon: hypersensitivity, headache, nausea, vomiting, feeling hot. Rare: dizziness, arrhythmia(including bradycardia, tachycardia), myocardial infarction, hypotension, cough, pain, shivering (chills), pyrexia, administration site reactions including extravasation. Very rare: sensory disturbance, amnesia, cardiac arrest, transient blindness, hypertension, ischaemia, dyspnoea, abdominal pain/discomfort, acute renal failure, feeling cold, asthenic conditions (e.g. malaise, fatigue). Frequency unknown: anaphylactoid reaction, anaphylactoid shock, severe pustular or bullous skin reactions, confusional state, motor dysfunction, disturbances in consciousness, convulsion, transient contrast-induced encephalopathy including hallucination and other neurological symptoms, ventricular hypokinesia, myocardial ischaemia, arterial spasm, thrombosis, thrombophlebitis, non-cardiogenic pulmonary oedema, arthralgia, iodism. Intrathecal use: Uncommon: headache (may be severe and lasting), vomiting. Frequency unknown: hypersensitivity, dizziness, transient contrast-induced encephalopathy including amnesia, hallucination, confusional state and other neurological symptoms, nausea, shivering, pain at injection site. Hysterosalpingography: Very common: abdominal pain, vaginal haemorrhage. Common: headache, nausea, pyrexia. Frequency unknown: hypersensitivity, vomiting, shivering, injection site reaction. Arthrography: Common: injection site pain. Frequency unknown: hypersensitivity, shivering. GI tract: Common: diarrhoea, abdominal pain, nausea. Uncommon: vomiting. Frequency unknown: hypersensitivity, shivering. **OVERDOSE** In the event of accidental overdosing, the water and electrolyte losses must be compensated by infusion. Renal function should be monitored for at least the next 3 days. If needed, haemodialysis may be used to remove iodixanol from the patient's system. **PHARMACODYNAMIC PROPERTIES** ATC code: V08A B09. In 64 diabetic patients with serum creatinine levels of 115 - 308 µmol/L, VISIPAQUE use resulted in 3% of patients experiencing a rise in creatinine of ≥ 44.2 µmol/L and 0% of the patients with a rise of ≥ 88.4 µmol/L. The release of enzymes (alkaline phosphatase and N-acetyl-ß-glucosaminidase) from the proximal tubular cells is less than after injections of non-ionic monomeric contrast media and the same trend is seen compared to ionic dimeric contrast media. VISIPAQUE is also well tolerated by the kidney. **INSTRUCTIONS FOR USE AND HANDLING** Do not mix with other medicinal products. Like all parenteral products, VISIPAQUE should be inspected visually for particulate matter, discolouration and the integrity of the container prior to use. The product should be drawn into the syringe immediately before use. Containers are intended for single use only, any unused portions must be discarded. VISIPAQUE may be warmed to body temperature (37°C) before administration. **MARKETING AUTHORISATION HOLDER** GE Healthcare AS, Nycoveien 1-2, Postboks 4220 Nydalen, N-0401 Oslo, Norway. **CLASSIFICATION FOR SUPPLY** Subject to medical prescription (POM). **MARKETING AUTHORISATION NUMBERS** PL 0637/0018-19 (Glass vials/bottles and polypropylene bottles with stopper and screw cap). **DATE OF REVISION OF TEXT** June 2013. **PRICE** 320mgI/ml, 10x50ml: £208.22.

Adverse events should be reported. Reporting forms and information can be found at www.mhra.gov.uk/yellowcard. Adverse events should also be reported to GE Healthcare Limited.

GE Healthcare Limited, Amersham Place, Little Chalfont, Buckinghamshire, England HP7 9NA www.gehealthcare.com

References: 1. Visipaque Summary of Product Characteristics February 2013. **2.** Davidson CJ *et al* Circulation 2000; 101: 2172-7. **3.** Harrison JK. Am Heart J 2004; 147: 613-14. **4.** Nie B *et al*. Catheter Cardiovasc Interv 2008; 72: 958-65. **5.** Svensson A *et al*. Acta Radiol 2010; 51 (7): 722-6. **6.** Mcullough P. Cardiorenal Med 2011; 1: 220-34. **7.** Dong M *et al*. J Nephrol 2012; 25 (3): 290-301. **8.** Aspelin P *et al*. N Engl J Med 2003; 348: 491-9. **9.** Jo SH *et al*. J Am Coll Cardiol 2006; 48: 924-30. **10.** Hernandez F, Mora L *et al*. Rev Esp Cardiol 2009; 62 (12): 1373-80. **11.** Nguyen SA *et al*. Radiology 2008; 248: 97-105. **12.** Mcullough PA *et al*. BMC Med Imag 2011; 11: 12. **13.** Ozbulbul NI *et al*. Coronary Artery Dis 2010; 21:414-9. **14.** Verow P *et al*. Brit J Radiol 1995; 68: 973-8. **15.** Palmers Y *et al*. Eur J Radiol 1993; 17: 203-9. **16.** Justesen P *et al*. Cardiovasc Intervent Radiol 1997; 20: 251-6. **17.** Manke C *et al*. Acta Radiol 2003; 44: 590-6. **18.** Tveit K *et al*. Acta Radiol 1994; 35: 614-8. **19.** Kløw NE *et al*. Acta Radiol 1993; 34: 72-7.

05-2014 JB6099/OS NLD

MEMBERSHIP INFORMATION

Benefits of your ESTI Membership

- Representation of your subspecialty on a European level
- Reduced congress registration fees
- Free subscription to the online version of the Journal of Thoracic Imaging
- iPad App "Journal of Thoracic Imaging"
- Educational material
- EPOS poster in your MyUserArea
- ESOR fellowship programme
- ESOR scholarship programme
- Newsletter
- Certificate of Membership

Membership Types & Fees

Full Member Radiologists (not in training) with special interest and special experience in thoracic imaging, active within Europe or with a European nationality.	EUR 130.00
Corresponding Member Radiologists outside of Europe or with a non European nationality.	EUR 130.00
Associate Member Scientists or physicians active in fields related to thoracic radiology.	EUR 130.00
Junior Member Residents or physicians still in training under the year of 36 (excl. the age of 36) to benefit from a reduced fee for membership.	EUR 50.00
Senior Member Former active members, who wish to maintain their membership after retiring.	EUR 50.00

ESTI European Society of Thoracic Imaging

FLOATING DINNER

FRIDAY
JUNE 13, 2014
18:00

COURSE OF ACTION

18:00
Meeting point NH Grand Hotel Krasnapolsky

19:45
Main course in Restaurant Brasserie Harkema

21:15
Second part of the boat tour with coffee, tea and liquor served and dessert buffet on board

22:45
Arrival at NH Grand Hotel Krasnapolsky

WELCOME FROM THE ESTI 2014 CONGRESS PRESIDENT

Dear Colleagues and Friends,

It is my great pleasure to welcome you all to the **22nd Annual Scientific Meeting of the European Society of Thoracic Imaging** (ESTI) in Amsterdam.

The programme for the 2014 meeting has two parallel tracks, one focusing on current trends and controversies in thoracic imaging, the other is dedicated to education and advances in applied knowledge. I am very thankful to my Programme Committee for putting together such an interesting and stimulating programme. I also encourage you to attend the scientific sessions in which young scientists will present their research results and to actively participate in the film panel for the chance to win a special prize.

It is my pleasure to welcome two other societies – The Society of Thoracic Radiology (STR) from North America and the European Society of Cardiac Radiology (ESCR) – with whom we are running joint sessions. I am very grateful to my international faculty for their contributions to this congress.

The venue is one of the oldest hotels in Amsterdam, located right in the heart of the city. The historical and elegant "winter garden" will serve as our gathering point throughout the conference. It also integrates the industry exhibition and the EPOS workstations and provides an excellent opportunity to meet colleagues and friends, make new contacts and exchange knowledge and ideas.

On behalf of ESTI I thank you for coming to our conference.

Enjoy this meeting!

C. Schaefer-Prokop

Cornelia Schaefer-Prokop
ESTI 2014 Congress President

PROGRAMME OVERVIEW

WEDNESDAY, JUNE 11, 2014 – HRCT HANDS-ON COURSE „READ WITH THE EXPERT“

Room 2a	Room 2b
13:30-15:30 How I start The 4 basic patterns with patho-histological correlation	13:30-15:30 Guided differential diagnosis A case-based discussion of diseases
16:00-18:00 Guided differential diagnosis A case-based discussion of diseases	16:00-18:00 How I start The 4 basic patterns with patho-histological correlation

THURSDAY, JUNE 12, 2014

Room 1	Room 2a	Room 2b
09:00-10:15 Current recommendations: How to	09:00-10:15 Dose issues in chest CT	09:00-10:15 Pulmonary embolism and pulmonary hypertension
10:45-12:15 Obstructive lung disease	10:45-12:15 Lung injury	
12:15-13:15 Industry Symposium		
13:45-14:30 ESTI history and opening lecture	13:45-14:30 Video transfer: ESTI history and opening lecture	
14:30-15:45 Oncology	14:30-15:45 Video transfer: Oncology	
16:15-17:55 New techniques	16:15-17:55 Case-based discussions	

Colour coding

Educational Session	
Scientific Session	
Interactive Session	

FRIDAY, JUNE 13, 2014

Room 1	Room 2a	Room 2b	EPOS Area
08:15-09:45 How I do it ...	08:30-09:45 Interstitial lung disease	08:30-09:45 Cardiovascular imaging and intervention	08:30-09:45 Poster presentations
10:10-11:00 Awarding of research grants and honorary lecture	10:10-11:00 Video transfer: Honorary lecture and research grants		
11:00-12:15 Pulmonary embolism and pulmonary hypertension	11:00-12:15 ESTI meets STR: Systemic diseases		
12:15-13:15 Industry Symposium			
13:45-15:40 Screening: Lessons so far	13:45-15:40 Video transfer: Screening: Lessons so far		
16:10-17:50 Radiology in the real world: Why and how	16:10-17:50 Case-based discussions		

SATURDAY, JUNE 14, 2014

Room 1	Room 2a	Room 2b	EPOS Area
08:30-10:40 ESTI meets ESCR: Heart and lungs	08:30-10:40 Thoracic oncology and screening	08:30-10:40 Quant CT/COPD and (infectious) airways disease	08:30-10:40 Poster presentations
11:10-12:30 Film Panel	11:10-12:30 Video transfer: Film Panel		
12:30-13:30 Industry Symposium			
14:00-15:40 Fibrosis	14:00-15:40 Video transfer: Fibrosis		
15:40-16:00 Awardings and closing lecture			
16:00-17:00 General Assembly			

INVITED FACULTY

Alexander Bankier, Boston/US
Catherine Beigelman-Aubry, Lausanne/CH
Elisabeth Bel, Amsterdam/NL
Jürgen Biederer, Kiel/DE
Emmanuel Coche, Brussels/BE
Susan Copley, London/UK
Marco Das, Maastricht/NL
Pim de Jong, Utrecht/NL
Michael den Bakker, Rotterdam/NL
Walter de Wever, Leuven/BE
Sujal Desai, London/UK
Anand Devaraj, London/UK
Stefan Diederich, Dusseldorf/DE
Adrian Dixon, Cambridge/UK
Robert Dondelinger, Liège/BE
Gilbert Ferretti, Grenoble/FR
John Field, Liverpool/UK
Tomás Franquet, Barcelona/ES
Thomas Frauenfelder, Zurich/CH
Benoit Ghaye, Brussels/BE
Fergus Gleeson, Oxford/UK
Lawrence Goodman, Milwaukee/US
Reginald Greene, Boston/US
Philippe A. Grenier, Paris/FR
Jan Grutters, Utrecht/NL
Dietbert Hahn, Kuernach/DE
David Hansell, London/UK
Ieneke Hartmann, Rotterdam/NL
Christian Herold, Vienna/AT
Nigel Howarth, Chêne-Bougeries/CH
Nevzat Karabulut, Denizli/TR
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Anna Rita Larici, Rome/IT
Francois Laurent, Bordeaux/FR
Sebastian Ley, Toronto/CA
Diana Litmanovich, Boston/US
Christian Loewe, Vienna/AT
Heber MacMahon, Chicago/US
Katharina Malagari, Athens/GR
Katharina Marten-Engelke, Goettingen/DE
Theresa McLoud, Boston/US
Francesco Molinari, Lille Cédex/FR
Anastasia Oikonomou, Toronto/CA
Matthijs Oudkerk, Groningen/NL
Wim Oyen, Nijmegen/NL
Simon Padley, London/UK
Anders Persson, Linköping/SE
Mathias Prokop, Nijmegen/NL
Helmut Prosch, Vienna/AT
Martine Remy-Jardin, Lille/FR
Marie-Pierre Revel, Paris/FR
Santiago Enrique Rossi, Buenos Aires/AR
Cornelia Schaefer-Prokop, Amersfoort/NL
Nicholas Screaton, Cambridge/UK
Valentin Sinitsyn, Moscow/RU
Dirk Jan Slebos, Groningen/NL
Egbert Smit, Amsterdam/NL
Eric Stern, Seattle/US
Nicola Sverzellati, Parma/IT
Denis Tack, Braine-L'Alleud/BE
Igor Tyurin, Moscow/RU
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Marlies Wijsenbeek-Lourens, Rotterdam/NL
Joachim Wildberger, Maastricht/NL

COURSE PROGRAMME WEDNESDAY, JUNE 11, 2014

HRCT HANDS-ON COURSE „READ WITH THE EXPERT"

13:30-15:30 Room 2a

Group A I **How I start – The 4 basic patterns with patho-histological correlation**

Chair: S. Ley, Munich/DE

13:30 ILD: Correlation of HRCT and pathology
M. den Bakker, Rotterdam/NL

13:55 Nodular pattern
Th. Frauenfelder, Zurich/CH

14:20 Reticular pattern
F. Molinari, Lille Cédex/FR

14:45 Increased density
H. Prosch, Vienna/AT

15:10 Decreased density
S. Ley, Munich/DE

13:30-15:30 Room 2b

Group B I **Guided differential diagnosis – A case-based discussion of diseases**

Chair: A. Bankier, Boston/US

13:30 Predominantly nodular pattern
G. Ferretti, Grenoble/FR

14:00 Predominantly reticular pattern
D. Litmanovich, Boston/US

14:30 Predominantly increased density
A. Bankier, Boston/US

15:00 Predominantly decreased density
A. Oikonomou, Toronto/CA

15:30-16:00 Break

16:00-18:00 Room 2a

Group A I **Guided differential diagnosis – A case-based discussion of diseases**

Chair: D. Litmanovich, Boston/US

16:00 Predominantly nodular pattern
G. Ferretti, Grenoble/FR

16:30 Predominantly reticular pattern
D. Litmanovich, Boston/US

17:00 Predominantly increased density
A. Bankier, Boston/US

17:30 Predominantly decreased density
A. Oikonomou, Toronto/CA

16:00-18:00 Room 2b

Group B I **How I start – The 4 basic patterns with patho-histological correlation**

Chair: Th. Frauenfelder, Zurich/CH

16:00 ILD: Correlation of HRCT and pathology
M. den Bakker, Rotterdam/NL

16:25 Nodular pattern
Th. Frauenfelder, Zurich/CH

16:50 Reticular pattern
F. Molinari, Lille Cédex/FR

17:15 Increased density
H. Prosch, Vienna/AT

17:40 Decreased density
S. Ley, Munich/DE

CONGRESS PROGRAMME THURSDAY, JUNE 12, 2014

09:00–10:15 Current recommendations: How to — Room 1

Chair: S. Diederich, Dusseldorf/DE

09:00 **Current recommendations: How to stage lung cancer accurately**
C. Schaefer-Prokop, Amersfoort/NL

09:20 **Diagnose pulmonary embolism**
M.-P. Revel, Paris/FR

09:40 **Diagnose UIP**
N. Sverzellati, Parma/IT

10:00 **Biopsy in the chest**
K. Malagari, Athens/GR

09:00–10:15 Dose issues in chest CT — Room 2a

Chairs: H. Prosch, Vienna/AT; D. Tack, Braine-L'Alleud/BE

09:00 Key note lecture
D. Tack, Braine-L'Alleud/BE

09:10 **Organ based tube current modulation in female chest CT: Impact of relative breast position on possible dose reduction in a 1-year-cohort**
S. Kopp, Basel/CH

09:18 **Organ based tube current modulation in female chest CT: Impact of breast push up on dose reduction**
S. Kopp, Basel/CH

09:26 **Feasibility of an ultra low dose CT for left atrium and pulmonary veins imaging using new model-based iterative reconstruction VEO**
A. Annoni, Milano /IT

09:34 **Standard and low-dose chest CT – Comparing image quality of filtered backprojection and iterative reconstruction**
M. Dadrich, Heidelberg/DE

09:42 **Low kilovoltage and low mAs MDCT chest examinations in adults – Feasibility and effect on image quality & radiation dose**
A. Patil, Cochin/IN

09:50 **Impact of iterative reconstruction on detection of ground-glass opacity in patients with systemic sclerosis undergoing low dose CT**
T.D.L. Nguyen-Kim, Zurich/CH

09:58 **Impact of iterative reconstructions on detection of systemic sclerosis (SSc) – Related interstitial lung disease: Clinical experience in 55 patients**
F. Pontana, Lille/FR

10:06 **Local reference levels for patient radiation doses in bronchial artery embolisation**
A. Khalil, Paris/FR

09:00-10:15 Pulmonary embolism and pulmonary hypertension — Room 2b

Chair: J. Vlahos, London/UK

09:00 Key note lecture
J. Vlahos, London/UK

09:10 **Pulmonary hypertension in IPF: Utility of HRCT**
G. Bettini, Siena/IT

09:18 **Methods of reducing the rate of suboptimal CT Pulmonary Angiogram (CTPA) studies: An audit loop**
S. Karia, Cambridge/UK

09:26 **Diagnosis of acute pulmonary embolism with dual energy CT and iodine maps: Does it help us?**
T. Presa, Madrid/ES

09:34 **Features of infarction after acute pulmonary embolism seen on iodine maps derived from subtraction computed tomography**
A. Verschoor, Nijmegen/NL

09:42 **Impact of scanning conditions in the evaluation of pulmonary blood volume with dual-energy CT: Results in 42 subjects**
F. Molinari, Lille/FR

09:50 **Dual-energy CT with reduced iodine load: A new option for standard chest CTA in patients with superior vena cava syndrome**
M. Remy-Jardin, Lille/FR

09:58 **Impact of perfusion imaging on the assessment of peripheral chronic pulmonary thromboembolism (CPTE): Clinical experience in 62 patients**
F. Molinari, Lille/FR

10:06 **Catheter-directed thrombolysis for the management of submassive pulmonary embolism: Single institutional experience over 6 years**
S. Genshaft, Los Angeles/US

10:15-10:45 Coffee Break

10:45-12:15 Obstructive lung disease — Room 1

Chairs: A. Bankier, Boston/US; P. de Jong, Utrecht/NL

10:45 **What does the clinician expect from imaging?**
E. Bel, Amsterdam/NL

11:10 **Imaging for phenotyping**
P.A. Grenier, Paris/FR

11:35 **Bronchoscopic lung volume reduction for the treatment of patients with severe emphysema**
D.J. Slebos, Groningen/NL

11:55 **Computer-assisted analysis of obstructive lung disease**
E.M. van Rikxoort, Nijmegen/NL

10:45-12:15 Lung injury — Room 2a

Chair: J. Vilar, Valencia/ES

10:45 **The intensive care patient**
L. Goodman, Milwaukee/US

11:10 **Drug induced lung disease**
C. Beigelman-Aubry, Lausanne/CH

11:35 **Pneumoconiosis**
K. Marten-Engelke, Goettingen/DE

11:55 **Smoking related disease**
N. Screaton, Cambridge/UK

12:15-13:15 Industry Symposium

12:15 **Latest technical innovations in lung imaging with computed tomography**
S. Ulzheimer, Forchheim/DE

12:45 **First clinical results in lung imaging using a 3rd generation dual-source CT**
H. Haubenreisser, Mannheim/DE

13:15-13:45 Buffet Lunch

13:45-14:30 ESTI history and opening lecture — Room 1

13:45 **Welcome**
C. Schaefer-Prokop, Amersfoort/NL

13:50 **Early days of thoracic radiology (first 30 years)**
R. Dondelinger, Liége/BE

14:05 **All things visible and invisible: The radiologist within modern healthcare**
A. Dixon, Cambridge/UK

Video transfer in Room 2a

14:30-15:45 Oncology — Room 1

Chairs: Th. McLoud, Boston/US; J. Verschakelen, Leuven/BE

Video transfer in Room 2a

14:30 **Personalised treatment for lung tumors**
E. Smit, Amsterdam/NL

14:55 **Assessment of early tumor response**
W. de Wever, Leuven/BE

15:20 **Minimally invasive treatment**
F. Gleeson, Oxford/UK

15:45-16:15 Coffee Break

16:15-17:55 New techniques — Room 1

Chairs: J. Biederer, Kiel/DE; B. van Ginneken, Nijmegen/NL

16:15 **Computer assisted chest radiography**
H. MacMahon, Chicago/US

16:35 **Functional lung analysis with CT**
F. Laurent, Bordeaux/FR

16:55 **Multi nuclear MRI of lung ventilation**
J. Wild, Sheffield/UK

17:15 **MR: Diffusion and perfusion**
E. van Beek, Edinburgh/UK

17:35 **PET imaging of the lung: What's new?**
W. Oyen, Nijmegen/NL

16:15-17:55 Case-based discussions — Room 2a

Chair: F. Molinari, Lille Cédex/FR

16:15 **An incidental nodule: What now?**
S. Diederich, Dusseldorf/DE

16:40 **Missed lung cancers**
N. Howarth, Chêne-Bougeries/CH

17:05 **Tumor staging: Borderline cases**
A.R. Larici, Rome/IT

17:30 **Is this infection?**
I. Hartmann, Rotterdam/NL

CONGRESS PROGRAMME FRIDAY, JUNE 13, 2014

08:15-09:45 Are my protocols up to date? — Room 1

Chairs: E. van Beek, Edinburgh/UK; J. Wildberger, Maastricht/NL

08:15 **MR: How I do it – A practical guide**
J. Biederer, Kiel/DE

08:40 **Spectral CT Imaging: Applications in the chest**
J.I. Vlahos, London/UK

09:10 **CT: Optimisation of protocols – kindly sponsored by Bayer**
M. Das, Maastricht/NL

08:30-09:45 Interstitial lung disease — Room 2a

Chairs: S. Desai, London/UK; T. Franquet, Barcelona/ES

08:30 Key note lecture
S. Desai, London/UK

08:40 **Thoracic imaging findings of collagen vascular diseases: A CT study**
M. Bakhshayesh Karam, Tehran/IR

08:48 **Familial pulmonary fibrosis: Imaging and pathologic correlations**
N. Cioffi Squitieri, Siena/IT

08:56 **IPF: How to classify honeycombing/reticular abnormalities without basal predominance in absence of features of inconsistent UIP following ATS 2011 guidelines?**
A. Fusco, Rome/IT

09:04 **HRCT-scan of lung parenchyma in young adults smoking cannabis with a spontaneous pneumothorax**
A. Khalil, Paris/FR

09:12 **A multicentre evaluation of observer agreement for HRCT patterns of fibrosis**
S. Walsh, London/UK

09:20 **A multicentre evaluation of observer agreement for the ATS/ERS/JRS/ALAT HRCT criteria for a UIP pattern**
S. Walsh, London/UK

09:28 **T2 Relaxation of different CT patterns in interstitial lung disease**
M. Buzan, Cluj-Napoca/RO

09:36 **T1 signal characteristics of lung parenchyma in interstitial pulmonary fibrosis – Can it be used as a predictor of early interstitial change?**
N. Schembri, Dundee/UK

08:30-09:45 Cardiovascular imaging and intervention — Room 2b

Chairs: N. Karabulut, Denizli/TR; A. Persson, Linköping/SE

08:30 Key note lecture
A. Persson, Linköping/SE

08:40 **Triage – CT (TRO) for comprehensive analysis of complexe thoracic syndromes**
G. Bodendoerfer, Echarlens/CH

08:48 **Bicuspid Aortic Valves: Diagnostic Accuracy of Standard Axial 64-Slice Chest CT Compared to Reformatted Aortic Valve Image Plane ECG-Gated Cardiac CT**
D. Murphy, Dublin/IE

08:56 **Left atrio-thoracic ratio: A new possible indicator of left atrial dilatation on thoracic MDCT**
M. Baque-Juston, Nice/FR

09:04 **High flow contrast media injection protocol in comprehensive pre-TAVI assessment. Initial results**
J. Turek, Maastricht/NL

09:12 **Diagnostic performance of diffusion weighted magnetic resonance imaging for pericardial effusion**
B. Özkul, Kocaeli/TR

09:20 **Influence of emphysema on the risk of pneumothorax in percutaneous transthoracic CT- guided needle biopsy**
W.-L. Mok, Weert/NL

09:28 **Image-guided, small-bore percutaneous catheter drainage of traumatic hemothorax**
Y. Lee, Guri/KR

09:36 **Bronchial artery embolization in cystic fibrosis patients: Effectiveness in achieving symptom control and reducing mortality**
S.M. Mak, London/UK

08:30-09:45 Poster presentations — EPOS Area

Chair: I. Hartmann, Rotterdam/NL

08:30 **Accessory left lower lobar artery: First description**
Y.-J. Lee, Seoul/KR

08:37 **Tuberculous bronchonodal fistula in adult patients**
K.N. Jeon, Jinju/KR

08:44 **Primary squamous cell carcinoma of the lung presenting as long-segmental bronchial wall thickening**
Y.W. Choi, Seoul/KR

08:51 **Pulmonary CT angiography using iterative image reconstruction technique: Assessment of signal-to-noise ratio and image quality**
Y. Lee, Guri/KR

08:58 **Safety margins in supine thoracentesis via posterolateral and posterior approach: Comparison with conventional lateral approach**
J.M. Ko, Suwon/KR

09:05 **Prognostic factors for improved survival after pulmonary metastasectomy from osteosarcoma**
J.H. Park, Seoul/KR

09:12 **Inhalation lung Injury by hydrogen chloride: Radiologic spectrum with serial follow-up study**
K.Y. Lee, Ansan/KR

09:19 **Multidetector CT findings regarding differential diagnosis of malignant pleural mesothelioma and metastatic pleural disease**
Y.K. Kim, Incheon/KR

09:26 **A experimental study of airway changes on Micro-CT in a Mouse Asthma Model: Comparison with histopathological findings**
J.S. Park, Bucheon/KR

09:33 **Quantitative measurement of diaphragm using volumetric CT and correlation with emphysema index and pulmonary function tests in patients with COPD**
S.M. Lee, Seoul/KR

09:45-10:10 Coffee Break

10:10–11:00 Awarding of research grants and honorary lecture **Room 1**

Awarding of research grants
C. Schaefer-Prokop, Amersfoort/NL

Honorary lecture: CT imaging of pulmonary microcirculation
M. Remy-Jardin, Lille/FR

Video transfer in Room 2a

11:00–12:15 Pulmonary embolism and pulmonary hypertension **Room 1**

Chairs: K.F. Kreitner, Mainz/DE; M.P. Revel, Paris/FR

11:00 **PE and PH: The clinical challenges**
A. Vonk Noordegraaf, Amsterdam/NL

11:25 **Imaging: CTEPH or PAH?**
N. Screaton, Cambridge/UK

11:50 **PE Risk stratification based on imaging**
B. Ghaye, Brussels/BE

11:00–12:15 ESTI meets STR: Systemic diseases **Room 2a**

Chair: S. Padley, London/UK

11:00 **Sarcoidosis: An inquisitive journalistic approach who, what, where, when, why and how**
E. Stern, Seattle/US

11:25 **Collagen-vascular disease?**
S.E. Rossi, Buenos Aires/AR

11:50 **Vasculitis?**
J. Vilar, Valencia/ES

12:15–13:15 Industry Symposium – State of the art of lung imaging

12:15 **Ultra low dose chest CT**
O. Buckley, Dublin/IE

12:35 **Lung Subtraction vs Dual Energy**
M. Prokop, Nijmegen/NL

12:55 **Lung perfusion – Clinical update**
E. van Beek, Edinburgh/UK

13:15–13:45 Buffet Lunch

13:45-15:40 Screening: Lessons so far — Room 1

Chairs: M. Oudkerk, Groningen/NL; M. Prokop, Nijmegen/NL

Video transfer in Room 2a

13:45	**Lung cancer screening: The current evidence** A. Devaraij, London/UK
14:10	**Lung cancer screening: What next** J. Field, London/UK
14:35	**Chest screening: More than cancer** P. de Jong, Houten/NL
15:00	**Implementation: Make it cheap, keep it effective** B. van Ginneken, Nijmegen/NL
15:25	**Discussion**

15:40-16:10 Coffee Break

16:10-17:50 Radiology in the real world: Why and how — Room 1

Chair: L. Goodman, Milwaukee/US; Ch. Herold, Vienna/AT

16:10	**Standardised reports** Th. McLoud, Boston/US
16:35	**Multidisciplinary conferences** J. Verschakelen, Leuven/BE
17:00	**Publishing in radiology** A. Bankier, Boston/US
17:25	**Turf battles in thoracic radiology** H.-U. Kauczor, Heidelberg/DE

16:10-17:50 Case-based discussions — Room 2a

Chair: E. Stern, Seattle/US

16:10	**Variations of aspergillus infection** E. Coche, Brussels/BE
16:35	**Viral infections** T. Franquet, Barcelona/ES
17:00	**Tuberculosis** I. Turyin, Moscow/RU
17:25	**Complications of pulmonary infections** R. Greene, Boston/US

CONGRESS PROGRAMME SATURDAY, JUNE 14, 2014

08:30–10:40 ESTI meets ESCR: Heart and lungs — Room 1

Chairs: D. Hahn, Kuernach/DE; J. Wildberger, Maastricht/NL

08:30 **Triple rule-out: Still relevant?**
V. Sinitsyn, Moscow/RU

09:00 **The heart in patients with diffuse lung disease**
S. Padley, London/UK

09:30 **Assessment of the heart before major lung surgery**
Ch. Loewe, Vienna/AT

10:00 **Functional cardiac CT: New techniques**
A. Persson, Linköping/SE

08:30–10:40 Thoracic oncology and screening — Room 2a

Chairs: A. Devaraj, London/UK; G. Feretti, Grenoble/FR

08:30 Key note lecture
A. Devaraj, London/UK

08:40 **Clinicoradiologic and molecular study of 125 surgical cases in lung cancer with ALK, ROS1, RET rearrangement**
H.J. Yoon, Seoul /KR

08:48 **Clinicopathologic and radiologic characteristics of completely resected mucinous adenocarcinomas in the lung: Implications for prognosis**
H.Y. Lee, Seoul/KR

08:56 **Utility of curved planar reformatted „rib unfolding" views in rib lesion evaluation**
B. Niederhauser, Rochester, MN/US

09:04 **Digital bone suppression improves the detection of pulmonary nodules on chest radiographs: Preliminary results**
A. Hidalgo, Barcelona/ES

09:12 **What is the prognostic value by the combination of morphological and metabolic data in lung cancer patients? A complementary study of CT and PET/CT**
A. Panunzio, Padova/IT

09:20 **Multimodality multiparametric imaging in non-small cell lung cancer: Metabolic-perfusion assessment using 18F-FDG PET/CT and perfusion-CT**
L. Calandriello, Rome/IT

09:28 **Should CT and FDG PET data have a prognostic value in mesothelioma pulmonary malignat (MPM) patients?**
A. Panunzio, Padova/IT

09:36 **Whole-Body MRI with diffusion weighted imaging and 18F-FDG-PET/CT in Patients with NSCLC: Correlation between apparent diffusion coefficient (ADC) and standardized uptake value (SUV)**
L. Calandriello, Rome/IT

09:44 **CT characteristic of early local recurrence after resection of the squamous cell carcinoma: Comparison with CT characteristics of granulation tissue at stump site**
H.J. Hwang, Gyeonggi-do /KR

09:52 **Four years results of low dose CT screening and nodule management in the ITALUNG trial**
G. Picozzi, Firenze/IT

10:00 **Can modern CT replace the intraoperative palpation as surgical „gold standard" in patients with malignant lung lesions and justify a minimally invasive treatment?**
S. Dettmer, Hannover/DE

10:08 **Initial appearance of LDCT screen-detected lung cancers in the ITALUNG trial**
G. Picozzi, Firenze/IT

10:16 **Epidermal growth factor receptor mutation in lung adenocarcinomas: Comparing CT characteristics of positive and negative EGFR**
J. Zhao, Heidelberg/DE

08:30-10:40 Quant CT/COPD and (infectious) airways disease — Room 2b

Chair: B. van Ginneken, Nijmegen/NL

08:30 Key note lecture
B. van Ginneken, Nijmegen/NL

08:40 **Multislice CT in the diagnosis of bullous lung emphysema**
M. Pervak, Donetsk/UA

08:48 **CT measurement of small vessels as a tool to phenotype COPD subjects with severe pulmonary hypertension**
G. Dournes, Bordeaux/FR

08:56 **Lung mass calculation as a respiration independent parameter for quantitative computed tomography of the lung**
B. Hensen, Hannover/DE

09:04 **Quantitative analysis of bone density, lung and airways with chest CT in subjects with the COPD Candidate Gene**
K.Y. Lee, Ansan/KR

09:12 **Motion artefact is the major source of variability in the quantification of dynamic CT perfusion of the lung in patients with Idiopathic Pulmonary Fibrosis (IPF)**
S. Mirsadraee, Edinburgh/UK

09:20 **Role of MDCT-virtual lobectomy in the prediction of post-operative lung function in patients undergoing surgical lobectomy**
P. Franchi, Rome/IT

09:28 **Quantitative dual-energy computed tomography imaging: Evaluation of system performance regarding iodine quantification accuracy**
J. Hansen, Heidelberg/DE

09:36 **Dynamic CT scans during forced expirium in the diagnosis of tracheobronchomalacia. Feasibility study**
E. Kocova, Hradec Kralove/CZ

09:44 **Is bronchial imaging affected by temporal resolution? Comparative evaluation at 140 and 75 ms in 90 patients**
N. Tacelli, Lille/FR

09:52 **Increased IL-8 and IL-10 in large or medium sized airway remodeling CT phenotype in non-smoker severe Asthmatics**
Ch. Lee, Seoul/KR

10:00 **Regional quantitative analysis of ventilation and elasticity in the lung parenchyma using temporally resolved MRI images**
Ch. Kolb, Heidelberg/DE

10:08 **Micro-CT analysis of in- and expiratory pulmonary densities in genetic mouse models of hereditary pulmonary alveolar proteinosis**
T. Rodt, Hannover/DE

10:16 **Invasive pulmonary aspergillosis in neutropenic patients: Spectrum of CT patterns**
I. van den Berg, Amsterdam/NL

10:24 **A comparison of HRCT signs in drug-resistant and drug-sensitive tuberculosis**
Ch. Sayer, London/UK

08:30–10:40 Poster Presentations **EPOS Area**

Chair: E. Coche, Brussels/BE

08:30 **Ultra low-dose CT of the thorax using iterative reconstruction: Evaluation of image quality and radiation dose reduction**
Y. Kim, Seoul/KR

08:37 **Lung cancer screening low-dose chest CT using breast shield and organ-based tube-current modulation: Comparison of image quality and diagnostic performance**
Y.K. Kim, Incheon/KR

08:44 **Radiologic features of thoracic manifestations of systemic syndromes and disorders in children**
J.S. Lee, Seoul/KR

08:51 **MDCT findings of acute aortic dissection with diastolic prolapse of the intimal flap into the left ventricle**
I. Song, Seoul/KR

08:58 **Computed tomographic and ultrasonographic findings of pediatric chest wall tumors with pathologic correlation**
J.S. Lee, Seoul/KR

09:05 **Pulmonary primary lymphoma, arising from longstanding, unclarified diffuse lymphoproliferative diseases on chest CT: Long term follow up of three cases**
S.W. Song, Uijeongbu Gyenggi-do/KR

09:12 **Idiopathic dilatation of the pulmonary artery: Radiographic and MDCT features in 6 cases**
J.J. Woo, Seoul /KR

09:19 **Imaging features of non-neoplastic chest wall disorders**
Y.W. Choi, Seoul/KR

09:26 **CT evaluation of anomalous systemic to pulmonary vascular connections in the thorax**
Y.-W. Oh, Seoul/KR

09:33 **Infective endocarditis: What you should know and what you can see in non-gated CT-correlation with echocardiography**
Y. Lee, Guri/KR

10:40–11:10 Coffee Break

11:10-12:30 Film Panel **Room 1**

Moderators: S. Copley, London/UK; A. Oikonomou, Toronto/CA

Video transfer in Room 2a

Team 1:
N. Karabulut, P. de Jong, F. Gleeson, S. Rossi

Team 2:
D. Tack, F. Molinari, N. Sverzellati, N. Howarth

12:30-13:30 Industry Symposium - Optimising procedure, diagnosis and patient management in thoracic imaging

Chair: Ch. Herold, Vienna/AT

12:30 **Tailoring protocols for chest CT applications: When and how?**
R. Lezzi, Rome/IT

13:00 **Utility of MRI in thoracic imaging**
G. Schneider, Hamburg/DE

13:30-14:00 Buffet Lunch

14:00-15:40 Fibrosis **Room 1**

Chairs: M. Remy-Jardin, Lille/FR; M. Wijsenbeek-Lourens, Rotterdam/NL

Video transfer in Room 2a

14:00 **What does a pulmonologist expect from imaging in ILD?**
C. Grutters, Utrecht/NL

14:25 **ATS/ERS IIP update: Implications for radiologists**
S. Desai, London/UK

14:50 **The emerging role of HRCT in clinical drug trials**
D. Hansell, London/UK

15:15 **Classifiable and unclassifiable interstitial lung disease**
A. Wells, London/UK

15:40-16:00 Awardings & closing lecture **Room 1**

C. Schaefer-Prokop, Amersfoort/NL

16:00-17:00 General Assembly **Room 1**

INVITED ABSTRACTS

Current recommendations: How to stage lung cancer accurately

C. Schaefer-Prokop; Amersfoort/NL

Body

Based on differences in survival rates changes with respect to the T and M descriptor were made in the 7th, still valid TNM staging system.
The T-descriptor provides details regarding tumor size, local invasion, endobronchial location and presence of separate tumor nodules.
Most challenging is the differentiation between T3 and T4: T3 is present when there is endobronchial involvement < 2cm distal to the carina, local invasion of the chestwall, diaphragm, mediastinal pleura or parietal pericardium. Superior sulcus tumors and tumors with atelectasis and obstruction pneumonitis affecting the whole lung are still considered T3.
Stage T4 tumors demonstrate invasion of the carina, trachea, heart (inner visceral pericardiac surface), the intrapericardial part of the pulmonary artery and pulmonary veins, the aorta, superior vena cava and the vertebral bodies. Separate nodules in the tumor lobe represent T3, while satellite nodules in the same lung but not tumor lobe represent T4.
For the N descriptor the definition between the right and left sided level is set to the left lateral wall of the trachea due to lymphatic drainage patterns.
The M category is subcategorized into intrathoracic (M1a) and extrathoracic metastasis (M1b) with the former having a better prognosis. M1a includes malignant pleural effusion, pleural dissemination, pericardial disease and pulmonary nodules in the contralateral lung.

Take Home Points

The presentation will
- rehearse the most important changes made for the 7th edition of TNM staging,
- discuss details and difficulties regarding the lung cancer staging system
- illustrate options and limitations of CT versus PET CT,
- list the indications and methods for histological verification of N-staging and last not least
- discuss the importance of interdisciplinary oncology meetings.

Diagnose pulmonary embolism

M.-P. Revel; Paris/FR

Keywords

Lung, Arteries / Aorta, Cardiovascular system, CT-Angiography, Ultrasound, MR-Angiography, Diagnostic procedure, Embolism / Thrombosis

Body

CT angiography (CTA) is the first-line diagnostic procedure in patients with pulmonary embolism (PE) suspicion. If the clinical probability is not high, a normal D-dimer result safely excludes PE, with no need to perform additional tests. If this approach is not used, PE prevalence is low, below 10%. Patients with high clinical probability or positive D-dimers require CTA. When CTA is contraindicated or inconclusive, compression ultrasound demonstrating proximal deep venous thrombosis (DVT) allows starting anticoagulation. This occurs in 15% of patients overall, whereas in patients with leg symptoms suggesting DVT, this proportion reaches 50%. To be conclusive, CTA requires a high level of enhancement of the pulmonary arteries, after injection of iodinated contrast medium at a rate of 4mL/s. The reconstruction slice thickness must not exceed 1mm. Inspiration can have deleterious effects on the quality of pulmonary artery enhancement by favoring inferior vena cava flow. To avoid this phenomenon, CT acquisition should not start immediately after a deep inspiration. During pregnancy, lung scintigraphy is recommended to minimize breast dose, and is diagnostic in 80% of pregnant women who have a normal chest X-ray, the reason why chest X-ray must be systematically performed to help further triage between CTA or lung scintigraphy. MRI has high specificity but limited sensitivity for diagnosing distal PE. Combining different sequences such as unenhanced steady-state-free precession sequences, bolus-triggered and recirculation phase gadolinium-enhanced sequences, increases MR sensitivity and reduces the rate of technically inadequate studies.

Take Home Points

1. PE can be excluded by a normal D-dimer result in patients with low or intermediate clinical probability
2. A positive compression ultrasound at the popliteal level or above validates PE diagnosis in patients with thoracic symptoms
3. CTA requires a high level of pulmonary artery enhancement to be conclusive, which can be compromised if CT acquisition starts immediately after a deep inspiration
4. MRI has high specificity but still limited sensitivity for distal PE diagnosis. Combining different sequences reduces the rate of technical inadequacy

How to diagnose UIP

N. Sverzellati; Parma/IT

Keywords

Thorax, CT, CAD, Decision analysis, Computer Applications-General, CAD, Inflammation, Chronic obstructive airways disease, Cancer

Body

Usual interstitial pneumonia (UIP) is the most common and progressive fibrotic lung disease. UIP is characterized by specific morphologic features that can be evaluated on histology and computed tomography (CT). When idiopathic, UIP is termed idiopathic pulmonary fibrosis (IPF). Its prognosis is poor, with a median survival of less than five years. In more than 50% of cases suspected to be UIP/IPF, the presence of typical clinical and CT features of UIP, when identified by expert clinicians and radiologists, is sufficiently characteristic to allow a confident diagnosis and eliminate the need for surgical lung biopsy. A confident diagnosis of UIP on CT is correct in more than 90% of cases (Fig. 1). However, in patients whose CT does not demonstrate the typical UIP pattern, the surgical lung biopsy may still demonstrate UIP pattern on histopathology (Fig. 2). Indeed, in the latest IPF classification, the combined histologic-radiologic criteria for the diagnosis of IPF has been clearly defined. Therefore, the intepretation of chronic fibrotic lung disease is often challenging. A systematic approach to CT of the chest in suspected UIP/IPF entails evaluation of image quality, precise description of specific disease features using standard terminology, and determination of distribution of disease in the axial and cranio-caudal planes.

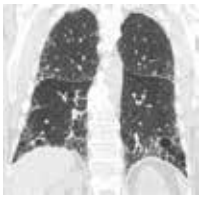


Fig. 1

Coronal image of definite UIP pattern. Note the subpleural and basal-predominant reticular abnormality and definitive honeycomb cyst formation.

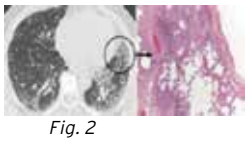


Fig. 2

Non definite UIP pattern. The lack of honeycombing and the presence of ground glass make this CT pattern more suggestive of NSIP. However, there are „definite UIP" histologic features.

Take Home Points

Both optimal CT quality and systematic approach are pivotal for evaluation of suspected UIP. The CT pattern of IPF can be indistinguishable from that found in UIP due to other conditions such as chronic hypersensitivity pneumonitis, asbestosis and collagen vascular disease. Identification of ancillary features such as cysts, nodules, mosaic attenuation or air trapping may increase suspicion of specific non-idiopathic entities.It is important for radiologists to understand the longitudinal behavior of UIP on CT.

Biopsy in the chest

K. Malagari; Athens/GR

Keywords
Interventional non-vascular, CT, Biopsy, Cancer

Body
Biopsy is a common minimaly invasive procedure in the chest. Indications include evaluation of pulmonary nodules (solid, partly solid or ground glass)in the absence of criteria for beningnancy, evaluation of PET positive nodules, evaluation of certain pulmonary infections, evaluation of pleural or mediastinal masses and lymphadenopathy and lytic bony cage lesions.
Contraindications include a uncooperative patient, uncorrectable bleeding diathesis (INR>1.3 and platelet count less than 50.000/↔L, contralateral pneumonectomy, severe bullous emphysema, suspected hydatid cyst, arteriovenous malformation, vascular aneurysm, or pulmonary sequestration (because of the systemic blood supply).
It is a highly accurate procedure with accuracy in malignant nodules of 95% while the accuracy for benign lesions is lower at 88%. The accuracy for nodules less than 1.5cm in diameter drops to 74% to 85%. False positives are less than 2%. More importantly a negative examination may represent a false negative.
The commonest complication is pneumothorax ranging from 5% to 60% in the literature. However the average rate is 20% to 25% while pneumothorax that requires draining is only 2% to 15%. Hemorrhage is more common in patients with bleeding diathesis and presents with hemoptysis with an incidence of 5%. Infrequent complications include vasovagal reaction, air embolism, massive hemoptysis, tumor seeding, lung torsion and fatal hemorrhage.

Take Home Points
- A negative biopsy does not preclude malignancy.
- Patient's collaboration is a prerequisite for an uneventful procedure.
- Pneumothorax is the most common complication but in less than one third require drainage.
- Pneumothorax can be treated by the physician performing the biopsy using small bore catheters with the assistance of a Heimlich valve.

What does the clinician expect from imaging

E. Bel; Amsterdam/NL

Keywords
Lung, CT, Education, Inflammation

Body
Asthma and chronic obstructive pulmonary disease (COPD) are prevalent obstructive lung diseases, both of which are characterized by airflow limitation. Although both represent distinct pathogenic entities, there can be significant clinical and physiologic overlap between the 2 disorders, creating potential management difficulties for clinicians. Although practice guidelines for both conditions outline diagnostic and management strategies, asthma and COPD are highly heterogeneous, and the symptoms of many patients remain poorly controlled despite adherence to current guidelines. Recent advances in phenotyping studies have elucidated heterogeneity in these airway diseases and might represent the best opportunity to enhance diagnosis, predict outcomes, and personalize treatments in patients with asthma and those with COPD. This presentation will focus on the current role of imaging in the differentiation between different phenotypes of asthma and COPD. It will focus on chest radiography and CT for the evaluation of morphological abnormalities and on the potential role of CT for the evaluation of functional abnormalities.

Take Home Points
1. Asthma and COPd are common conditions with significant phenotypic heterogeneity
2. CT-scanning are a useful tool for identifying subgroups of patients with COPD at greatest risk for acute axacerbations and poor prognosis.

3. New imaging modalities of the lungs in asthmatic patients are able to demonstrate significant changes in bronchial morphometry, associated with structural and functional abnormalities, which might be used as targets for intervention

Imaging for phenotyping

P.A. Grenier; Paris/FR

Keywords
Lung, CT, Computer Applications-3D, Chronic obstructive airways disease

Body
The objective of this presentation is to review the phenotypic abnormalities that can be recognized on a visual and quantitative evaluation of CT images in subjects with COPD. Although these abnormalities often overlap, identification and quantification of the predominant morphologic findings and their grouping into defined subtypes of COPD may improve diagnostic accuracy, help optimize treatment, and provide a framework for clinical trials.
The visually defined phenotypes of emphysematous destruction include centrilobular, panlobular and paraseptal patterns. The centrilobular pattern may be scored as trace, mild, moderate, confluent and advanced destructive emphysema. Panlobular emphysema is lower lobe predominant involving generalised destruction of all acini more or less equally, associated with alpha-1-antitrypsine deficiency. Paraseptal emphysema may be scored as mild with small (<1 cm) juxtapleural lucencies or substantial with large (> 1 cm diameter) juxtapleural cystic-like lucencies or bullae, involving more than the lung apices.
Airway disease is a common component of all forms of emphysema but also commonly occurs in the absence of emphysema as a predominant expression of COPD. Inflammatory small airway disease (SAD) can be directly identified by the presence of peripheral micronodular opacities. Obstructive SAD is identified by gas trapping on expiratory CT in the absence of significant emphysema. Bronchial disease is manifested as thickening of walls of segmental and subsegmental airways.
Other associated features may be present. Large airway diseases include moderate tubular bronchiectasis, mostly in the lower lobes, bronchial diverticulas, tracheobronchomalacia and saber sheath trachea. Smoking-related interstitial lung disease is seen as patchy ground-glass opacities and/or mild subpleural reticular abnormality. Pulmonary arterial enlargement suggesting pulmonary hypertension occurs in advanced COPD, and a ratio of the pulmonary artery diameter to the aorta diameter > 1 has been associated with increased risk of COPD exacerbation.
The goals of quantitative CT in providing subtypes amongst the COPD patients are to quantify the presence and amount of emphysema-like lung, the lobar and zonal distribution of the low density regions, the presence and severity of airway wall thickening, and the severity of gas trapping on expiratory CT. By using lung densitometry, volumetric thin-collimation MDCT allows 2D and 3D mapping of emphysema distribution and quantitative evaluation of lung destruction (emphysema %) as a whole or at lung or lobar level. Specific metrics used for quantification of emphysema include the percentage of lung voxels with CT attenuation below a threshold level of -950 to -970 HU, and the attenuation at the first or 15th percentile of the CT attenuation histogram.
On expiratory CT, the percent of lung with CT attenuation less than -850 HU has been widely used to assess the severity of gas trapping. Other potential measures include change in relative lung volume with attenuation values from -860 HU to -950 HU between paired inspiratory and expiratory examinations, and expiratory to inspiratory ratio of mean lung density. More recently, non-rigid registration of inspiratory and expiratory scans has allowed for an assessment of voxel-by-voxel density change and directional strain patterns. Bronchial wall thickness as well as emphysema %, both assessed by CT, have proved to be the strongest determinants of airflow limitation in COPD patients, and to be associated with COPD exacerbation frequency.
Using specific softwares, bronchial wall area may be measured on airway cross-sections reformatted strictly perpendicular to the central axis of the airways. A commonly used summary measure of bronchial wall area is the square root of wall area of a hypothetical bronchus of internal perimeter 10mm, calculated from linear regression of all measured bronchi.

Take Home Points

- Use of CT in the evaluation of patients with COPD has made it clear that individuals with identical GOLD stages may have different morphologic appearances.
- Morphologic changes of emphysema and airway disease are found in a substantial proportion of subjects who do not meet spirometric criteria for COPD.
- Visual characterization of emphysema and airway abnormality associated with quantitative CT assessment permits categorization of COPD into distinct defined subtypes.
- The subjectivity of visual determination of emphysema severity and gas trapping suggests that the combination of visual scoring and quantitative analysis is essential to define these structure/function based COPD subtypes.

Bronchoscopic lung volume reduction for the treatment of patients with severe emphysema

D.J. Slebos; Groningen/NL

Keywords

Lung, Thorax, Interventional non-vascular, CT, CT-High Resolution, Endoscopy, Experimental investigations, Chronic obstructive airways disease

Body

For patients with emphysema, there is no cure, and the goal of medical treatment is primarily to relieve symptoms and reduce exacerbations. Only for a very small subset of patients with emphysema, invasive surgical procedures like lung volume reduction surgery and lung transplantation are available.
Over the past decade, several non-surgical, bronchoscopic lung volume reduction (BLVR) techniques have been developed and studied for the treatment of patients with severe emphysema. BLVR has the potential of being significantly efficacious, suitable for a large group of patients, with a good safety profile and at reasonable costs.
BLVR using one-way endobronchial valves is currently the most advanced technique, with the possibility to indentify a best responder phenotype, by using chest CT-scan analysis and measurement of collateral flow. Patients with a heterogeneous emphysema distribution, with complete interlobar fissures and without functional interlobar collateral ventilation show promising results. Also for patients with collateral ventilation, who are no candidates for valve treatment, as well as for patients with homogeneous emphysema the lung volume reduction coil treatment shows promise. Other treatment modalities using a sealant, thermal energy or airway bypass techniques, have been studied or currently under development. Patient selection for BLVR treatment is crucial for success, and both imaging and pulmonary function measurements play a major role in this process. BLVR is an innovative and exciting new field in pulmonary medicine, with the potential of becoming an important treatment modality for patients with severe emphysema.

Take Home Points

Bronchoscopic lung volume reduction is a new, innovative treatment option for patients with severe emphysema.
Proper emphysema phenotyope selection for bronchoscopic lung volume reduction is crucial for treatment effect.
Dedicated chest CT-scan analysis, with focus on 1) emphysema type, 2) emphysema distribution, and 3) interlobar fissure status is the first step in the evaluation of potential treatment candidates.

Computer-assisted analysis of obstructive lung disease

E.M. van Rikxoort; Nijmegen/NL

Keywords
Lung, CT, Computer Applications-Detection, diagnosis, Chronic obstructive airways disease

Body
Obstructive lung diseases are highly prevalent and disabling. CT imaging is the most sensitive way to analyze obstructive lung diseases in vivo. However, visually assessing the (changes in) disease severity is time-consuming and challenging. Computer-assisted analysis has the potential to allow fast and precise analysis of obstructive lung diseases. In this presentation I will review the literature on quantitative analysis of obstructive lung diseases from chest CT scans and illustrate the use of these quantitative techniques for determining the severity, phenotyping, monitoring, and treatment planning of Chronic Obstructive Pulmonary Disease.

Take Home Points
Visual analysis of chest CT scans of patients with obstructive lung diseases is time-consuming and challenging. Computer-assisted analysis allows fast and precise quantification of disease severity, monitoring of disease development, and treatment planning.

The intensive care patient

L.R. Goodman; Milwaukee, WI/US

Keywords
Lung, Conventional radiography, Computer Applications-Detection, diagnosis, Infection, Acute

Body
Imaging in the ICU presents many technical challenges as well as diagnostic challenges. The ICU patient is the sickest patient in the hospital but gets the least sophisticated imaging. This lecture will cover technical problems and diagnostic problems. Technical problems include such pros and cons of routine daily radiographs versus targeted situation specific radiographs and the pros and cons of digital plate imaging.
Adult respiratory distress syndrome (ARDS) is a vexing problem for both the clinician and the radiologist. The "Berlin Criteria" is a new attempt by pulmonologists and physiologists at classifying ARDS. This will be discussed as it impacts image interpretation of the patient with ARDS and new data on determining ARDS from other forms of edema. Additional topics will include infection and pulmonary embolism in the ICU.

Take Home Points
1. Situation specific portable radiography saves radiation and money without sacrificing important diagnostic information.
2. Digital imaging provides better images, diminishes repeats ,flexible viewing, but is expensive in the short run.
3. Proper evaluation of the ICU patient require a detailed understanding of the various illnesses seen in the ICU, their imaging appearance, and their time course, as the patient progresses through the illness.

Drug induced lung disease

C. Beigelman-Aubry; Lausanne/CH

Keywords
Lung, CT, Treatment effects, Drugs / Reactions

Body
This course will be focused on CT aspects of parenchymal disorders related to drug toxicity. Numerous agents may be responsible of acute and chronic lung disease. Among them, antineoplastic agents are frequently involved and their pathogenesis of induced lung injury remains poorly understood. Some antineoplastic agent-induced adverse drug reactions are potentially preventable, especially those that are related to the cumulative dose, but many are idiosyncratic and unpredictable. Most toxic effects are thought to result from direct cytotoxicity. They usually occurs within weeks to a few months after initiation of therapy except for rare cases of delayed fibrosis as seen with nitrosoureas and bleomycin. Because most antineoplastic therapy protocols consist of multiple drugs, the specific agent that is responsible for the current findings may be difficult to identify. In addition, a synergic effect of radiation-induced lung injury may occur on antineoplastic agent-induced lung toxicity in patients receiving concurrent or sequential chemotherapy plus radiation.
Several underlying histopathologic processes may be observed. Diffuse alveolar damage is frequently caused by cytotoxic drugs, especially cyclophosphamide, bleomycin, and carmustine. CT findings consist of scattered or diffuse areas of ground glass opacity in the mid and lower lungs. Nonspecific interstitial pneumonia may be related to carmustine toxicity or from non cytotoxic drugs such as amidarone. Diffuse ground-glass opacity leading to fibrosis in a basal distribution may be observed. Organizing pneumonia may be caused by bleomycin, cyclophosphamide, gold salts, methotrexate or amiodarone. It appears as bilateral areas of consolidation and ground glass opacities, often with a peripheral location, that may be localized or migratory. Other manifestations ofbleomycin-induced lung injury include subpleural basal reticulations, ground glass opacification and fine nodular densities with volume loss that develop into progressive consolidation and honeycombing. Eosinophilic pneumonia, obliterative bronchiolitis, pulmonary hemorrhage, edema, hypertension, veno-occlusive disease may also be seen. Other drug-induced reactions include pulmonary sarcoidosis following treatment with interferon-Ð and -Ð, multiple nodules that may be related to amiodarone treatment, and TNF targeted therapies-induced granulomatous inflammation with nodule formation that raises suspicion of mycobacterial or fungal infection, sarcoidosis, hypersensitivity pneumonitis or rheumatoid nodules in patients with rheumatoid arthritis. Exacerbations of underlying lung disease have also been described with the later drugs.
Illicit drug may also be associated with various lung complications depending on the specific drug used and the route of administration. Cardiogenic and non cardiogenic pulmonary edema, acute lung injury, pulmonary hemorrhage, interstitial fibrosis, pulmonary hypertension, acute bronchopasm, hilar adenopathy, aspiration pneumonia as infectious disorders may be seen. Iller agents such as talc may also result in panacinar or bullous emphysema, foreign body granulomatosis, or high-attenuation upper-lobe conglomerate masses. Although occuring in clearly different clinical situations, radiologists should be familiar with all these potential complications.The diagnosis is usually made on the basis the combination of the presence of a compatible clinical pattern, a drug that is a known or suspected culprit, and the exclusion of any alternative diagnosis. This may include pulmonary infection, findings suggestive of pulmonary edema that may be related to cardiotoxic side effect as seen with anthracycline drug class or pulmonary involvement from the underlying disease. Because establishing the diagnosis of drug toxicity has significant implications for clinical care, a multidisciplinary approach with additional tests including BAL appears highly recommended. This will ensure the best outcome for the patient, taking into account the frequent coexistence of several disorders.

Take Home Points
- Radiologists should be familiar with the potential complications related to all kinds of drug-induced lung disease
- TNF targeted therapies-induced granulomatous inflammation must be remembered as well as their differential diagnosis
- The need to exclude any alternative diagnosis and the frequency of coexistence of multiple disorders requires a multidisciplinary approach in order to ensure the best outcome for the patient

Pneumoconiosis

K. Marten-Engelke; Göttingen/DE

Keywords

Lung, CT-High Resolution, Computer Applications-Detection, diagnosis, Epidemiology

Body

Occupational lung disease constitutes one of the most common work-related injuries, with the development of disease depending on the intensity and duration of the exposure, the toxic effects of the agent, and the susceptibility of the host. The most common of the pneumoconioses are silicosis, coal-worker´s pneumoconiosis, and asbestosis. In silicosis, multiple small nodules in a predominantly centrilobular distribution are characteristic. Calcified hilar or mediastinal lymph nodes are a frequent finding; confluence of nodular lesions may lead to progressive massive fibrosis. In coal worker´s pneumoconiosis, similar findings may occur, although the nodules tend to be smaller and less well defined. Asbestos-related disease encompasses pleural effusions, diffuse pleural thickening, pleural plaques and interstitial fibrosis (asbestosis). Hypersensitivity pneumonitis is increasingly recognized as an occupational lung disease, resulting from a response to inhalation of antigens present in the workplace. Key HRCT findings include patchy or diffuse ground-glass opacification, centrilobular ground glass nodules and air trapping. Siderosis and berylliosis are uncommon occupational lung diseases. In siderosis HRCT reveals widespread centrilobular nodules, ground glass opacification and emphysema, whereas in berylliosis, HRCT findings closely resemble sarcoidosis and consist of a perilymphatic nodular pattern, interlobular septal thickening and ground glass opacification.

Take Home Points

Radiologists play a key role in the diagnostic work-up of pneumoconioses. Characteristic HRCT findings, clinical information and occupational history improve the diagnostic accuracy of these disorders.

Smoking related disease

N. Screaton; Cambridge/UK

Body

Together with COPD and lung cancer cigarette smoking is associated with a heterogeneous group of interstitial manifestations in the lung. These include the spectrum of macrophage associated diseases (respiratory bronchiolitis, respiratory bronchiolitis associated interstitial lung disease (RBILD) and desquamative interstitial lung disease (DIP)), pulmonary Langerhans' cell histiocytosis, and acute eosinophilic pneumonia. Whilst described as discrete entities there is often overlap in the clinical, pathological, and imaging features as well as coexistence of more than one smoking related manifestations in the same patient. Smoking may also be associated with the development of interstitial fibrosis (both of NSIP and UIP pattern).

Take Home Points

The objectives of this presentation are to:

- Describe the spectrum of smoking related lung disease and their imaging manifestations
- Discuss the concepts of overlap and co-existence
- Discuss the association between smoking and interstitial fibrosis

The early days of thoracic radiology (first 30 years)

R. Dondelinger; Liege/BE

Body

Shortly after the spread of the discovery of X-rays, during the first two weeks of January 1896, physicists repeated Roentgen's experiment successfully in many places. Illumination of a fluorescent screen and observation of the shadow of an interposed object was easy to reproduce. On January 25, BATELLI and GARBASSO presented at the Institute of Physics of Pisa a photo-fluoroscope, capable of photographing a fluorescent screen. MOUNT BLEYER presented similar work in Naples, on April 7 and published impressive snapshots of tracheal foreign bodies. Later during the year, McINTYRE in Glasgow made the technique of cinemato-radiography widely known, but practical photofluorography became real only in the nineteen-thirties. A simple device, called « cryptoscope », made of a cardboard tube coated with calcium sulfide was introduced by SALVIONI in Perugia on February 6 and allowed fluorescent observation in daylight. On the same day, MAGIE in Princeton, presented the same type of device using a platinum bari-cyanide coated screen , which he called « skiascope ». The next day, PUPIN in New-York discovered that placing a fluorescent screen in contact with a radiographic plate increased contrast intensity and reduced exposure time of radiographs. Between January and March, EDISON in his laboratories of Orange, had tried a large number of compounds, to select the one with the most powerful fluorescent properties. On March 17, EDISON cabled to Lord KELVIN in London, claiming calcium tungstate was efficient to the point « rendering radiographs unneccessary ». EDISON called the resulting handhold observation device « vitascope », and later « fluoroscope ». He presented his invention to the public at the National Electrical Exhibition in New-York in May, attracting to his booth two tousand visitors per day. By increasing the size of the fluorescent screen, examination of almost the entire chest became possible, in supine or upright position, either in a darkroom or in daylight, the head of the observer and the screen being wrapped with dark clothes. Vertical excursion of the diaphragm during respiration came as a first surprise to the observers, as phrenic contractions were believed so far to be directed horizontally towards the phrenic center. Acute crises of asthma and hiccup were studied on the screen in amazement. Seeing for the first time the heart beat in the living was an overwhelming experience to the pioneers. Many basic fluoroscopic observations of abnormal pulmonary and pleural conditions were made already during 1896. Each « first » was an occasion to give a presentation at medical-surgical societies or scientific academies in Europe and overseas. Many prominent physicians showed interest for a while in the new technique, others such as OSLER remained sceptical ; a few internists persisted in their endeavour and commitment to the study of the use of the « new light ». WILLIAMS from Boston, BÉCLÈRE from Paris and HOLZKNECHT from Vienna are considered the fathers of medical Roentgenology and in particular the promotors of investigation of chest diseases. They argued that X-ray laboratories should be installed inside the hospital ; sometimes in those days, the Roentgen rays entered the hospital before installation of electrical current. In Europe, BÉCLÈRE, HOLZKNECHT and KIENBÖCK among others, who devoted their time exclusively to the use of X-rays, organized formal teaching of the new diagnostic techniques and fought for the recognition of « Radiology » as a new clinical sub-specialty by the faculty of medicine. Thoracic fluoroscopy remained the preferred diagnostic technique, at least for the first ten years. Producing radiographic glass plates was expensive and cumbersome, as exposure times of 30 to 60 minutes were required, using the cold cathode Crookes' X-ray tube. However, chest radiographs started to be published during mid 1896. Contrast remained week and limits unsharp, no detail of lung structure was recognizable. Despite slow technical radiographic progress, BÉCLÈRE was able in 1899 to issue a small book devoted to the contribution of X-rays to the diagnosis of lung tuberculosis, emphasizing that « latent tuberculosis » could be revealed prior to clinical findings. WILLIAMS was ahead of European researchers, as he benefited from the technical support of the Massachusetts Institute of Technology, which provided him with the most powerful X-ray equipment of the time. WILLIAMS was a systematic researcher, fully aware of the danger of exposure to X-rays, unlike HOLZKNECHT, a passionate fluoroscopist, who underwent 64 interventions in twelve years time for palliation of radiation induced cancer, and BÉCLÈRE, who experienced limited radiation induced skin necrosis of the left hand. In 1901, WILLIAMS published a 658 pages book on « Roentgen rays in medicine and surgery », 256 pages were devoted to the thorax. The basis for fluoroscopic recognition of most thoracic pathologies was laid down in his book, including sophisticated diagnoses, such as infraclinical tuberculosis, air trapping, pneumonia containing an « air bronchogram », mediastinal and cardiac shift by pleural and pulmonary conditions, pulmonary oedema consecutive to cardiac insufficiency, cardiac valvulopathies, and the need for serial chest

examinations in acute disease. During the same year, HOLZKNECHT had published his post-doctoral thesis on « Roentgenological diagnosis of diseases of thoracic viscera», which met considerable interest in the German speaking part of Europe. In 1899, RIEDER in Munich (he described the Bismuth meal for opacification of the gastro-intestinal tract) advocated « instantaneous » radiography of the chest, reducing exposure time to a fraction of a second. Despite the resulting hazard to available X-ray tubes, the method gained ground progressively, as quality of breathhold chest X-rays was significantly increased. Since the start of chest fluoroscopy, observation of the heart had risen great enthusiasm. WILLIAMS had conceived a combination of a stethoscope and fluoroscopic screen, called the « Sea-Hear » instrument. The outline of the enlarged heart or thoracic aneurysm was drawn on the patient's skin under fluoroscopic vision and the result was compared to physical examination. In 1900, MORITZ in Munich, described a method of orthodiagraphic delineation of the cardiac contour. LEVY-DORN in Berlin, refined further the technical equipment, although these methods had no future. In 1905, KÖHLER in Wiesbaden, described orthodiagraphic Roentgenograms of the chest, without magnification, the tube being placed at a distance of 2 meters from the plate. In 1910, he published an atlas on normal variants of radiographic appearances, which has been augmented and re-edited ever since. In 1912, LILIENFELD in Leipzig, described the principle of the hot cathode tube, but the real breakthrough came the following year by COOLIDGE (General Electric Company, New-York), who patented the same, slightly modified invention, in the USA. Soon, the tube with the electron emitting tungsten filament became the standard and CROOKES' tube was abandoned. Despite technical progress by powerful X-ray tubes and short exposure times, the radiographic image remained blurred, due to secondary radiation. PASCHE in Switzerland, had suggested in 1903 the use of two movable grids to get rid of undesired radiation. In 1913 BUCKY in Berlin, reported the use of a honeycombed stationary grid. In 1917, POTTER in Chicago, replaced the grid by parallel strips, resulting in the POTTER-BUCKY diaphragm. During all these years, interpretation of fluoroscopic and radiographic patterns was based on an empirical and analogical reasoning, in close combination with clinical findings. Since 1916, MILLER described in several publications detailed anatomy of the lung, which still today serves as a basis for reading high resolution pulmonary CT examinations. For more than 20 years, the debate continued on the nature of the radiographic lung pattern : is it the bronchial tree or the vascular structures that we see? After World War I, the great tradition of radiological-pathological correlation started basically in American publications, for a rational understanding of the X-ray shadows produced. The implication of the lymphatics in somme radiographic patterns was recognized. The need for classification became urgent for some pathological conditions, such as pulmonary tuberculosis and pneumoconiosis. In 1918, JACKSON in Philadelphia described bronchography, insufflating bismuth powder in the bronchi, that was replaced in 1922 by lipiodol, the eldest still existing radiographic contrast medium, made popular by SICARD and FORESTIER from Paris. GOLDEN described right upper lobe atelectasis caused by proximal bronchial tumour in 1925 : the « inverted S » or « GOLDEN » sign became the first eponym in thoracic diagnostic radiography. Thirty years after the discovery of the Roentgen rays, Radiology had grown up : the first International Congress of Radiology was inaugurated in London in the same year.

Take Home Points

- Progress in Roentgenology was chaotic for the first ten years.
- Fluoroscopy remained for a long time the modality of choice for chest imaging, exposing to hazards of radiation.
- Technical breakthroughs were the discovery of the intensifying screen, the hot cathode tube and antiscatter grid.
- Diagnostic reasoning remained based on analogical comparison of radiographic observation with clinical findings during the first 30 years.

All things visible and invisible: The radiologist within modern healthcare

A. Dixon; Cambridge/UK

Keywords
Thorax, CT, Comparative studies, Multidisciplinary cancer care

Body
With objective radiological images (CXR and thoracic CT) and the demise of the clinical examination, the role of the radiologist within modern healthcare has never been more exciting. Of course we must be conscientious in providing a timely and high quality service to our patients and our clinical colleagues. Some argue that modern PACS systems and electronic communications might render the radiologist invisible. Far from it: such tools enable us to divert appropriate patients from primary care practitioners to the appropriate specialist colleagues; we must be proactive in arranging the necessary next steps (CT, biopsy, etc); we can bring these interesting patients to the all-important clinico-radiological meetings where we can introduce the 'worked up' patient for appropriate treatment. Indeed the radiologist has taken away from the clinician much of the fascinating diagnostic challenge. However it is incumbent upon radiologists to offer the highest quality service and to keep up-to-date with technological advances. The whole point of introducing two years of subspecialty training was to allow radiologists to be able to offer added value to their clinical colleagues. Should this aspect ever be eroded, radiological services may well become under threat. Hence the importance of continuing medical education at subspecialty meetings such as this.

Take Home Points
- Radiology is correctly replacing the clinical examination of the patient.
- Radiologists must prvide a timely high quality service.
- They should be procactive in arranging further investigations.
- They must become involved in clinico-radiological meetings.
- They must keep their subspecialty skills up to date.
- The radiologist should be at the centre of modern healthcare

Assessment of early tumor response

W. de Wever; Leuven/BE

Keywords
Lung, Oncology, CT, PET-CT, MR-Diffusion/Perfusion, Diagnostic procedure, Neoplasia

Body
Improvement of clinical symptoms and survival are considered the ultimate proof of the effectiveness of anticancer drugs. However, to evaluate early therapy response, surrogate endpoints based on imaging are used to assess therapeutic effects.
Conventional systemic antineoplastic therapies in cancer patients are most of all cytotoxic therapies, aimed at destruction of tumor cells. The World Health Organization (WHO) criteria, Response Evaluation Criteria in Solid Tumors (RECIST, version 1.0) and their modified criteria (RECIST, version 1.1) are the traditional response criteria used to evaluate tumor response. These criteria are based on change in tumor size depicted on imaging studies. A decrease in size suggests response and an increase in size suggests progression to therapy. Modern molecular therapies, targeted or personalized therapies, however, are mostly not cytotoxic but aim to reduce tumor perfusion or metabolism by blocking specific cell functions without causing cell death. These therapies cause often intra-tumoral hemorrhage, necrosis, or cavitation which usually represents a good therapy response. Therefore, assessment of tumor size alone may not be appropriate in this setting and can even lead to false conclusions. New functional and metabolic imaging techniques have the capability to integrate pathological, physiological and morphological changes and can serve as early predictors of therapeutic response. Positron Emission Tomography (PET) appears a valuable technique in such cases. PET has the ability to assess tissue metabolism by using radiolabelled molecules. F-FDG PET is most commonly used to measure glucose metabolism or tumor growth in oncology. Additional imaging biomarker devices

such as dual energy computed tomography (CT) and magnetic resonance imaging (MRI) including diffusion weighted imaging (DWI) can also be used to evaluate non-anatomical changes and shall become more frequently used for tumor response evaluation.

Take Home Points

- Conventional antineoplastic therapies are most of all cytotoxic therapies, aimed at destruction of tumor cells. Modern molecular therapies aim to reduce tumor perfusion or metabolism by blocking specific cell functions without causing cell death.
- Traditional tumor response criteria (WHO and RECIST 1.0 and 1.1) are based on change in tumor size depicted on imaging studies.
- New functional and metabolic imaging techniques can integrate pathological, physiological and morphological changes and can serve as early predictors of therapeutic response.

Minimally invasive treatment

F. Gleeson; Oxford/UK

Keywords

Thorax, CT, Ablation procedures, Cancer

Body

Percutaneous thermal ablation is of proven value in treating primary and secondary thoracic malignancies. It should be considered as a treatment option in patients unsuitable for resection. Microwave ablation using high energy probes appears as effective as stereotactic ablative radiotherapy, SABR, with > 85% recurrence free survival at 2 months in carefully selected patients. As with radiofrequency ablation and SABR, microwave ablation appears less effective in pulmonary masses > 3 cm in diameter. Unlike SABR, microwave ablation is equally effective in both primary and secondary thoracic malignancies. It has an acceptable morbidity and mortality. Careful technique, including detailed analysis of whether there has been complete treatment is important, and the use of jet-vent anaesthesia has been shown to reduce treatment times and aid probe placement.

Take Home Points

1. Microwave thermal ablation is as effective as SABR in the treatment of primary and secondary thoracic malignancies
2. Careful patient selection and treatment techniques are critical
3. Jet-vent anaesthesia decreases treatment times and aids probe placement
4. Detailed analysis of adequate treatment at the time of the procedure is critical
5. Microwave thermal ablation has an acceptable morbidity and mortality

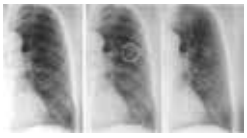
Computer assisted chest radiography

H. MacMahon; Chicago/US

Keywords
Thorax, Plain radiographic studies, Computer Applications-Detection, diagnosis, Cancer

Body
Although CT has largely replaced chest radiography in many specific thoracic imaging applications, including staging and monitoring of primary and metastatic lung cancer, chest radiographs continue to fulfill an important function in initial detection of disease, and in monitoring non-neoplastic disease. However, due to the complex nature of the image with extensive superimposition of anatomy, chest radiographs are challenging to interpret, and oversight errors are common.
Over the past two decades, there have been several advances in image acquisition technology, as well as in sophisticated processing techniques, that have proven potential to improve radiologists' performance, and to reduce oversight errors. While the term "Computer Assisted Radiography" is mainly associated with computer aided detection, it is important to consider the complete imaging system when considering diagnostic accuracy.
Therefore, this presentation will review briefly advances in image acquisition, advanced image processing such as dual energy, bone suppression, temporal subtraction, tomosynthesis and dynamic radiography, in addition to computer-aided nodule detection. The benefits and limitations of each approach will be discussed, and recent improvements in the technology will be emphasized. Finally, clinical examples of subtle or difficult to characterize abnormalities will be shown to illustrate the potential utility of these techniques in routine practice.

Take Home Points
1. Advanced image processing for chest radiography has proven potential to improve detection accuracy for both lung cancer and more common benign diseases such as oneumonia.
2. Computer assisted nodule detection software has vastly improved since its initial introduction, and the number of false positive detections has been markedly reduced.
3. When properly integrated, use of these techniques need not substantially increase interpretation time.



Computer Assisted Nodule Detection with Rib Suppression

Multi nuclear MRI of lung ventilation

J.M. Wild; Sheffield/UK

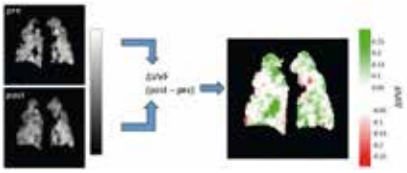
Keywords
Lung, MR, Diagnostic procedure, Image verification

Body
A brief overview of methods for multi-nuclear lung MRI will be highlighted and the different physical properties of the respective nuclei will be discussed in respect of their sensititivity to different aspects of disease and physiology.
The role of lung ventilation MRI as a diagnostic marker of regional lung disease in asthma, CF, COPD, IPF and developmental lung diseases will then be highlighted with clinical examples from the Sheffield group.
Functional lung imaging with hyperpolarised gas and proton MRI has the sensitivity to regional changes in response to intervention and medical treatment. The sensitivity and repeatability of this imaging technique make it an ideal tool for testing therapy response in clinical trials of new therapies and example applications will be highlighted.

Coregistered 1H, 3He and 129Xe MR images acquired in the same breath

Take Home Points

The combination of 1H MRI of lung anatomy with hyperpolarised (HP) gas MRI of lung function allows complementary functional and structural information to be acquired from the lungs. In this talk, recent developments in methods for imaging lung ventilation and function with multi-nuclear lung MRI will be demonstrated.



Images of lung ventilation before and after treatment with a treatment response map

MR: Diffusion and perfusion

E. van Beek, S. Mirsadraee; Edinburgh/UK

Keywords

Thorax, Lung, Oncology, MR-Diffusion/Perfusion, Imaging sequences, Diagnostic procedure, Experimental investigations, Cancer, Embolism / Thrombosis, Tissue characterisation

Body

Outline

This presentation will give a review of the development of MRI techniques to give additional information on the diagnosis of various pulmonary diseases, including lung cancer, emphysema, pulmonary fibrosis and pulmonary vascular diseases.

MR perfusion

MR perfusion is gradually becoming the technique of choice where diagnosis of pulmonary vascular disease is concerned. Although CT pulmonary angiography remains the primary test in acute pulmonary embolism, many other disorders, such as pulmonary hypertension as well as lung parenchymal diseases, will be increasingly evaluated for perfusion changes using MRI. Comparisons with CT techniques will be shown.

MR diffusion

MR diffusion methods are only gradually making their inroads into the pulmonary MR imaging domain. This is largely due to the nature of pulmonary imaging. A review of the literature will be part of this presentation.

Take Home Points

1. To understand the role of MR perfusion in pulmonary vascular and parenchymal diseases.
2. To appreciate the new development of MR diffusion imaging in the lungs.
3. Gain understanding of the place of MRI in the chest.

PET imaging of the lung: What's new?

W. Oyen; Nijmegen/NL

Keywords
Lung, PET-CT, Surgery, Radiation therapy / Oncology, Chemotherapy, Cancer, Metastasesn

Body
FDG-PET/CT imaging has gained a pivotal role in the staging of patients with suspected or proven non small cell lung cancer with a major impact on patient management. Main indications are assessement of solitary pulmonary nodules, and N/M staging, thus stratifying the diagnostic work-up and guiding clinical decision making.
More recently, the use of FDG-PET/CT for radiation treatment planning is receiving considerable attention as incorporation of molecular imaging information leads to improvement of the treatment plan. The logical next step is additional FDG-PET/CT imaging early during the course of radiotherapy to allow adaptation of ongoing treatment rather than to evaluate patients after completion of treatment when modification is no longer an option. Similarly, FDG-PET/CT can be used as a predictive imaging biomarker in patients treated with systemic therapy to identify those patients who do not benefit from treatment. This may result in earlier switch to more effective treatment and limit the exposure to ultimately ineffective treatment with its inherent side effects and costs.
Besides FDG, there is wide variety of other radiopharmaceuticals available to depict molecular features of tumors, such as FLT for imaging proliferation and a number of agents for imaging of hypoxia. These may prove to be useful when specific characteristics of tumors need to be assessed.
Of particular interest are those imaging agents that can be used to evaluate the receptor status of tumor cells, including the accessibility of the tumor by certain drugs and the intra and intertumoral heterogeneity of receptor expression. Imaging not only allows to visualize receptor expression, but also provides insight if drugs reach the tumors and accumulate there.

Take Home Points
Molecular imaging of lung cancer is evolving beyond FDG-PET/CT staging of primary NSCLC. Especially its role in radiation oncology is rapidly evolving. The exact positioning of PET/CT for new indications and the use of radiopharmaceuticals beyond FDG are subject to ongoing research.

An incidental nodule: What now?

S. Diederich; Dusseldorf/DE

Keywords
Thorax, CT, Conventional radiography, CAD, Contrast agent-intravenous, Structured reporting, Biopsy, Cancer

Body
Incidental pulmonary nodules are detected in patients undergoing chest radiography, MRI or CT for unrelated reasons.
More than 95% of these nodules are small (< 10 mm) and are often only detected at CT. Nodules detected at chest radiography are mostly larger.
The aetiology of pulmonary nodules is variable and includes a vast number of benign and malignant tumors and pseudotumors.
For the clinical management of the affected individual the most important question is the differentiation between benign and malignant nodules.
There are morphologic features, best demonstrated at CT, which can suggest the benign nature of a nodule, i.e. the presence of fat or benign patterns of calcification in the nodule.
Non-lipid containing nodules with no benign pattern of calcification are potentially malignant. Solid (soft-tissue attenuation) and non-solid (ground-glass attenuation) nodules, if malignant may represent different biological variants of lung cancer and require, therefore, different management strategies.
The vast majority of incidental pulmonary nodules detected at CT are small (< 10 mm) and of these more than

95% are benign. Thus, non-invasive diagnostic algorithms are required to detect the few malignant lesions in the huge number of benign nodules.
This is usually done with unenhanced low-radiation dose CT follow-up with follow-up intervals guided by nodule size and the patient´s risk profile.
In the few nodules > 10 mm the probability of malignancy is much higher, usually prompting immediate further diagnostic procedures such as PET-CT, contrast-enhanced CT, biopsy or resection.

Take Home Points

1. Morphologic features that confirm the benign nature of a pulmonary nodule include the presence of fat and benign patterns of calcification within the nodule.
2. Most incidental pulmonary nodules < 10 mm are benign and should not undergo invasive procedures
3. Follow-up with unenhanced low-radiation dose CT should be performed in most incidental pulmonary nodules < 10 mm
4. Follow-up intervalls depend on nodule size and patient`s risk of malignancy
5. Biological behaviour is different between solid and non-solid nodules requiring different management strategies
6. Many incidental pulmonary nodules > 10 mm are malignant and a definite diagnoses should be made without delay

Missed lung cancers

N. Howarth; Chêne-Bougeries/CH

Keywords

Lung, Digital radiography, CT, Observer performance, Perception image, Cancer

Body

The presentation will cover the common and uncommon reasons for errors of interpretation of plain film and CT imaging of lung cancer. Although the clinical value of the chest X-ray remains undiminished, missed lung cancers are one of the most frequent causes of malpractice issues. The skills required for accurate interpretation of plain film and CT imaging of the chest will be explored by a detailed interactive review of a wide variety of missed cancers. The objective is to help you to improve your performance in plain film and CT imaging of the chest.

Take Home Points

1. To learn about the common and uncommon reasons for errors of interpretation of plain film and CT imaging of lung cancer.
2. To understand how a side-by-side comparison of the chest x-ray and MDCT of missed lesions can help reduce the busy radiologist‘s error rate.
3. To improve the skills required for accurate interpretation of plain film and CT imaging of the chest.

Tumor staging: Borderline cases

A.R. Larici; Rome/IT

Keywords
Lung, CT, MR, PET-CT, Staging, Cancer

Body
The TNM staging system is helpful for selecting proper treatment options and for predicting the prognosis of patients with lung cancer. The latest review of the TNM system, published in 2009, has made several changes, in particular regarding the T stage in non-small cell lung cancer, to better correlate disease with patient prognosis and treatment . However, several definition of tumor extension still remains ambiguous, such as tumors involving adjacent lobe across the fissures (interlobar invasion) and lymphangitic spread. Multidetector CT technology has certainly resulted in an improvement in the diagnostic confidence of the radiologist in the staging of lung cancer, thanks to the possibility to use thin slice thickness and to get high quality axial and multiplanar reconstructions, and optimize the contrast medium injection. However, issues regarding the presence of neoplastic tissue contiguous to the mediastinum or chest wall, in the absence of certain signs of infiltration, still pose the dilemma of whether it is a T3 or T4 tumor. Similar problems may occurr in the staging of Pancoast's tumor, for which Magnetic Resonance plays a role in the distinction between T3 and T4 stage. As regards the N descriptor, it may be hard to define the exact anatomic borders between hilar lymph nodes (N1) and unilateral mediastinal lymph nodes (N2), especially at the level of tracheobronchial angle, or to distinguish hilar neoplasic tissue from hilar and/or mediastinal lymph nodes. In this context, also PET-CT scans, commonly used in the assessment of N involvement and distant metastases, cannot be of help. High quality images should be routinely obtained to reduce the risk of inaccurate staging of lung cancer, with consequences on patient treatment.

Take Home Points
The revised TNM staging system yet has some limitations in the context of lung cancer. Multimodality imaging plays a relevant role in the pre-treatment staging of lung cancer even if it is not accurate as desiderable. Radiologists should very carefully analyze images to avoid overstaging of lung cancer, in particular in cases potentially eligible for surgery.

Is this infection?

I. Hartmann; Zwijndrecht/NL

Keywords
Thorax, CT, Conventional radiography, Diagnostic procedure, Infection

Body
Radiological signs of an infection such as alveolar consolidation, ground glass opacities, and centrilobular nodules are non-specific as they can also occur with other lung diseases. The focus of the presentation will therefore lie on the differential diagnosis of the radiological findings *(see table on page 47)*.
Special emphasis will be placed on associated findings that are helpful to reduce the differential diagnosis, the value of clinical information and the overlap of radiological findings representing diagnostic challenges.

Take Home Points
Radiological findings of an infection are non-specific and other pathologies should be considered.
Associated findings and clinical information are helpful to reduce the differential diagnosis.

	Alveolar consolidations	**Consolidations *and* ground glass**	**Ground glass**	**Crazy paving**	**Centrilobular nodules/tree-in bud**
Infection	bacterial fungal	bacterial viral	Pneumocystis viral	Pneumocystis viral bacterial (esp. under therapy)	Bacterial Viral Fungal
Differential Diagnosis	organising pneumonia radiation lipod pneumonia adenocarcinoma lymphoma edema atelectasis hemorrhage	DAD alveolar proteinosis adenocarcinoma organising pneumonia	edema acute eosinophilic pneumonia NSIP (drug-induced) hemorrhage hypersensitivity pneumonitis organising pneumonia	edema DAD acute IP ARDS alveolar proteinosis adenocarcinoma sarcoidosis NSIP organising pneumonia lipoid pneumonia hemorrhage	*well-defined, small, random* pneumoconiosis sarcoidosis miliary metastases *Centrilobular* amyloidosis rheumatoid arthritis Wegener granulomatosis metastasis *unsharp ground glass attenuation.* hypersensitivity pneumonitis RB-ILD follicular or panbronchiolitis LCH vasculitis

MR: How I do it – A practical guide

J. Biederer; Kiel/DE

Keywords

Thorax, MR, Diagnostic procedure, Cancer, Inflammation

Body

MRI is the most recently introduced modality for lung imaging. Its value to replace x-ray and CT, when radiation exposure or iodinated contrast material are contra-indicated, is well acknowledged: i.e. for pediatric patients and pregnant women, or for scientific use. MRI serves in difficult clinical problems, such as assessment of the mediastinum and chest wall. In a single examination it combines morphologic and functional imaging aspects. Undeservedly, lung MRI is still considered a complex procedure and thoracic radiologists may feel uncomfortable with the different contrast, lower spatial resolution and image artefacts. This lecture is intended to encourage interested users to get started with practical protocol suggestions. The protocol suggestions comprise (1) T2-weighted fast spin echo sequences (FSE, aiming at infiltrates and soft parenchymal lesions) (2) T2-weighted fast spin echo sequences (FSE) with inversion recovery pulse or spectral fat suppression (aiming at lymph nodes and bone lesions) (3) Steady state free precession (SSFP) images (aiming at respiratory motion and lung vasculature) and (4) T1-weighted 3D gradient echo sequences (3D-GRE) with volumetric interpolation (aiming at nodules and masses). Optional sequences comprise dynamic contrast enhanced imaging (DCE, aiming at lung or tumor perfusion) and diffusion weighted imaging (DWI, aiming at lymph nodes and for lesion characterization). Access to lung MRI is facilitated by customized push-button protocols for different clinical questions. Depending on the use of optional sequences, the whole procedure takes less than 15-25 minutes room time. With this, lung MRI is ready to go for routine use.

Take Home Points

Access to lung MRI is easy customized protocols for different clinical questions are available the procedure takes less than 15-25 minutes room time.

CT: Optimisation of protocols, kindly sponsored by Bayer

M. Das; Maastricht/NL

Body

CT imaging in thoracic radiology requires careful design of CT scanning parameters as well as contrast media (CM) injection protocol. Most important CT scan parameters that influence scan quality are the dose settings (consisting of kV and tube current settings), scan duration and scan start delay as well as image reconstruction. For CT angiography studies the kV plays the most important role, as lower kV settings will result in higher contrast enhancement. The ultimate goal is to design an individual protocol for the individual patient for the specific clinical question. E.g. pulmonary nodule follow up can be low dose without CM enhancement, while exact tumor staging requires CM application with a normal dose setting. Individualizing protocols to the patient requires adaptation of kV and tube current settings to the patient characteristics. Ideally length, weight, BMI and cardiac output are taken into account, but as a pragmatic solution weight functions as the easiest to assess parameter in daily routine practice. Finally the CM has to be adapted to the clinical indication (organ study or CT angiography). In organ studies the total amount of Iodine is the most important factor (usually 0.5gI/kg), while in CT angiography the amount of Iodine which is injected per second (Iodine delivery rate gI/s) is crucial. E.g. for pulmonary embolism studies higher IDR's between 1.6-2.1 gI/s are desirable. Furthermore, the viscosity of CM is important as viscosity is directly related to injection pressure, which increases with higher viscosity. In general lower concentrated CM have lower viscosities and warming up CM to body temperature decreases viscosity substantially. An optimal bolus shape, tailored to the needs of the individual protocol and scanner technique will lead to the optimal image quality needed for the clinical question.

Take Home Points

- Learn about the most important scanner related factors which are needed for optimal protocol
- The most important patient factor is weight
- Learn about the concept of the Iodine delivery rate (IDR)

PE and PH: The clinical challenges

A. Vonk Noordegraaf; Amsterdam/NL

Body

Progress in thoracic imaging made it possible to diagnose small subsegmental pulmonary embolism (PE). A major, but not yet answered clinical question is whether these findings warrants treatment. On the opposite, massive PE might require thrombolysis, but how do we identify those patients?. Whereas overdiagnosis is a possible danger in PE, pulmonary hypertension is certainly underdiagnosed in the general population. The condition is characterized by a mean pulmonary artery pressure of more than 25 mmHg. More than 40 underlying conditions are currently identified as possible causes for the presence of pulmonary hypertension. A correct diagnosis is a clinical challenge and of importance for the choice of treatment. Thoracic imaging play an important role in the diagnostic work up and follow up of treatment of patients with pulmonary hypertension.
This lecture wll focus on the clinical challenges faced in both PE and PH

Take Home Points

- The clinical consequence of subsegmental PE
- The clinical challenges of risk stratification in PE
- The basics of the differential diagnosis of pulmonary hypertension
- Clinical challenges in the differential diagnosis of pulmonary hypertension

Imaging: CTEPH or PAH?

N. Screaton; Cambridge/UK

Body

Pulmonary hypertension is a diagnosis with high morbidity and significant prognostic implications independent of its cause. Whilst the diagnostic reference standard in establishing a diagnosis is invasive right heart catheterising non-invasive imaging investigations play a fundamental role is suggesting the diagnosis and in many cases identifying the cause.
Pulmonary hypertension is classified using a clinical classification which attempts to group together diseases with similar patho-physiological mechanism and treatment option. The most recent revision of this classification followed the 5th World Symposium in Nice in 2013. The classification consists of five groups: Group 1 consists of diseases affecting the small vessels of the lung with the main group being 'pulmonary arterial hypertension' - diseases with predominantly arteriolar involvement. While the underlying aetiology within this group is diverse the management options are similar and focus on targeted pharmacological therapy. Groups 2 and 3 consist of pulmonary hypertension due to chronic left heart disease and chronic lung disease (or chronic hypoxia) respectively. These are both very common causes of pulmonary hypertension. Group 4 represents chronic thromboembolic pulmonary hypertension resulting from organised thrombi occluding or stenosing vascular beds. CTEPH is common and often diagnosed late. The final group (group 5) consists of disease with unclear or multifactorial mechanisms.
This presentation will focus on pulmonary arterial hypertension and chronic thromboembolic pulmonary hypertension. Whilst treatment of the former is pharmacological with targeted agents to molecular pathways with the vascular endothelium treatment of CTEPH may be either surgical or pharmacological. CTEPH may be considered 'proximal' or 'distal' although the most important questions directing treatment are whether the distribution of disease is surgically amenable, and whether the patient is likely to benefit from surgery which consists of bilateral endarterectomy performed under deep hypothermic circulatory arrest. Some centres are now using balloon angioplasty in a subset of patients.
Imaging plays a fundamental role in establishing a specific diagnosis in PH (differentiating IPAH from CTEPH as well as other causes of PH) as well as in characterising CTEPH and its distribution. Imaging also enables detailed cardiac assessment enabling assessment of haemodynamics at baseline and follow-up

Take Home Points

The objectives of this presentation are to:
1. Summarise the current clinical classification of pulmonary hypertension
2. Describe imaging features of PAH and CTEPH highlighting their differences
3. Discuss the role of imaging in CTEPH and IPAH and its impact on therapeutic options

PE Risk stratification based on imaging

B. Ghaye; Brussels/BE

Keywords

Thorax, Cardiovascular system, Arteries / Aorta, CT-Angiography, CT, Computer Applications-Detection, diagnosis, Embolism / Thrombosis, Dilatation

Body

CT pulmonary angiography (CTPA) has been established as a first-line diagnostic technique in patients suspected of pulmonary embolism (PE).Risk stratification of patients with PE is important because optimal management, monitoring and therapeutic strategies depend on prognosis. Risk stratification is based on clinical, biological and imaging features. Although, echocardiography has been the most widely used imaging technique, CTPA offers findings that can help in patient stratification. Acute right heart failure is known to be responsible of circulatory collapse and death in patients with severe PE. Right heart dysfunction can be assessed on CTPA by measuring heart dimensions or upstream venous vascular structures, or by assessing qualitative parameters including leftward septal bowing and IVC reflux of contrast medium. Measurements of the cardiac cavities can be performed using diameters (axial or four-chamber), surfaces or volumes (Figure). The advent of CTPA obtained under ECG-gating may offer a new advance in acute right heart failure assessment, such as measurement of the ventricular ejection-fraction. The magnitude of pulmonary embolism (PE) can be also calculated by applying

angiographic scores adapted to CT (Miller, Walsh) or dedicated CT scores (Qanadli, Mastora). Although such findings may be useful for assessment of treatment effectiveness, their impact on prognosis of patients with severe PE remains debated in the literature. This lecture reviews CT findings that are not controversial and controversial, and presents future or research items for predicting PE severity on CT.

Take Home Points

- CTPA offers findings that can help in patient risk stratification
- RV/LV dimension ratios have high negative but low positive predictive values for PE mortality or adverse events
- Accuracy may be increased by combining CTPA findings with other tests, i.e. biomarkers

Sarcoidosis: An inquisitive journalistic approach who, what, where, when, why and how

E. Stern; Seattle, WA/US

Keywords

Thorax, PET-CT, CT, Conventional radiography, Education, Pathology

Body

Who first discovered sarcoid?

First described in 1877 by Dr. Jonathan Hutchinson, a dermatologist as a condition causing red, raised rashes on the face, arms and hands
1899 Dr. Caesar Boeck in Norway coined term Sarcoidosis from Greek „sark" and „oid" meaning flesh-like, osis, „diseased or abnormal condition
Lung involvement first described in 1915
1941 Löfgren syndrome was first described
Sven Löfgren described combination of erythema nodosum, polyarthritis, fever, and bilateral hilar lymphadenopathy
1941 Boeck's compatriot, Ansgar Kveim described reaction for diagnostic use

Who gets the disease and when do they get it?

Most commonly affects young adults of both sexes, studies have reported more cases in females.
Incidence is highest for individuals <40, peaks in 20 to 29 years, second peak is observed for women over 50
Occurs throughout the world in all races. Most common in Northern European countries
average incidence of 16.5 per 100,000 in men and 19 per 100,000 in women
highest annual incidence of 60 per 100,000 is found in Sweden and Iceland
In US, more common in people of African descent than Caucasians, Severity varies between different ethnicities
Disease in people of African origin may be more severe and disseminated than for Caucasians, who are more likely to have asymptomatic disease

What is Sarcoidosis and where does it occur?

- Pathology
- Abnormal collections of inflammatory cells (granulomas) that can form as nodules in multiple organs.
- Granulomas most often located in lungs or its associated lymph nodes. Any organ can be affected
- Exact cause is unknown
- In genetically susceptible individuals, alteration of immune response after exposure to an environmental, occupational, or infectious agent. Continues even after initial infection or other antigen is cleared

What is the clinical course?

In most cases clears by itself without any medical intervention. Some cases are chronic or become life-threatening and require medical intervention. Average mortality rate of <5% in untreated cases
Can affect any organ. Incidental discovery in about 5%
Common symptoms are non-specific and include:

- Fatigue
- weight loss, arthralgias in ~70%
- arthritis (14–38% of persons)

- dry eyes
- swelling of knees
- blurry vision
- Dyspnea
- dry cough
- skin lesions

Less Common Symptoms
- Hemoptysis
- Erythema nodosum, granuloma annulare or lupus pernio.
- Löfgren syndrome: combination of erythema nodosum, bilateral hilar lymphadenopathy, and arthralgias

Why is this an important disease to understand and recognize?
Can progress to pulmonary fibrosis and death. About half of cases resolve without treatment or can be cured within 12–36 months, and most within five years. Some cases, however, may persist several decades. Two-thirds of people with the condition achieve a remission within 10 years of the diagnosis. When the heart is involved, the prognosis is generally less favorable, although, corticosteroids appear effective in improving AV conduction. Prognosis less favorable in African Americans, compared to white Americans. Increased risk for malignancy, in particular lung cancer, lymphomas

What are the imaging findings?
CXR
Divided into four stages:
Stage 1: bilateral hilar lymphadenopathy
Stage 2: bilateral hilar lymphadenopathy and "reticulonodular" infiltrates
Stage 3: bilateral "reticulonodular" infiltrates only
Stage 4: fibrocystic sarcoidosis typically with upper lobe predominant hilar retraction, cystic and bullous changes
CT
The most common finding is multiple, 1- to 5-mm nodules, usually with irregular margins, in a lymphatic distribution (bronchovascular margins, along interlobular septa, subpleurally, and in the center of secondary pulmonary lobules). Septal thickening from sarcoidosis has a beaded appearance, a feature that helps distinguish it from pulmonary edema where the septal thickening is smooth. Patchy ground-glass opacities are seen in about 50% of patients with sarcoidosis and may be the only HRCT abnormality. Fibrosis is better characterized on HRCT than on chest radiography. HRCT can show findings of sarcoidosis when the chest radiograph is normal, and patients can have sarcoidosis proved by lung biopsy with a normal HRCT study.
Unusual thoracic manifestations in sarcoidosis include airways disease, pleural disease, and cavitary lung masses. True cavitation in sarcoid is rare and is thought to occur when ischemic necrosis from granulomatous vasculitis of the pulmonary arteries leads to necrosis and liquefaction of confluent sarcoid granuloms.
Atypical nodal locations may be evident on CT including the anterior mediastinum, axilla, internal mammary chains, and retrocrural regions. Nodal calcification ultimately occurs in as many as 20% of patients

What is DDX?
In developing countries often misdiagnosed as TB. symptoms often similar
- Metastatic disease
- Lymphoma
- Septic emboli
- Rheumatoid nodules
- (GPA)Wegener's granulomatosis
- Varicella infection
- Tuberculosis
- Atypical infections, such as Mycobacterium avium complex, cytomegalovirus and cryptococcus

How to Diagnosis?
CXR, CT of chest, PET scan, CT-guided biopsy, mediastinoscopy, open lung biopsy, bronchoscopy with biopsy, endobronchial ultrasound and endoscopic ultrasound with FNA of mediastinal lymph nodes (EBUS FNA)

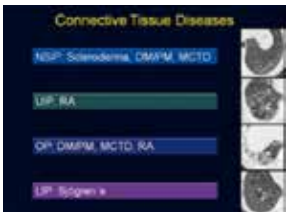
Take Home Points
Thank you.

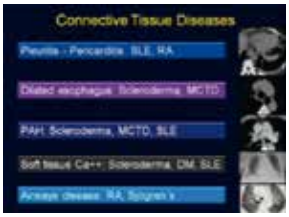
Collagen-vascular disease

S.E. Rossi; Buenos Aires/AR

Keywords
Thorax, CT-High Resolution, Education, Connective tissue disorders

Body
Collagen-vascular disorders represent a heterogeneous group of diseases characterized by damage to components of connective tissue at a variety of sites in the body, including scleroderma, rheumatoid arthritis (RA), systemic lupus erythematosus (lupus); Sjögren syndrome, dermatomyositis/ polymyositis (DM/PM), mixed conective tissue disease (MCTD) and antisynthetase syndrome.





Collagen vascular diseases may affect each portion of the lung: pleura, alveoli, interstitium, vasculature, lymphatic tissue and large and small airways.
Parenchymal involvement of collagen vascular disorders include UIP (RA), NSIP (scleroderma, DM/PM and MCTD), OP (DM/PM, RA) and LIP (Sjogren). Pleural thickening and effusions (lupus and RA). Airways manisfestations include bronchiectasis, obliterative bronchiolitis and follicular bronchiolitis (RA and Sjogren).
Vascular findings seen in CVD include pulmonary hypertension (PH) (scleroderma and lupus), pulmonary embolism (lupus), aortic aneeurysms (RA) and aortic dissections (lupus).We will review common Chest CT findings in Connective Tissue Disease (CTD), patterns of pulmonary involvement in CTD and recognize diagnostic clues that may suggest diagnosis of CTD.

Take Home Points
We will review common chest CT findings in connective tissue disease (CTD), patterns of pulmonary involvement in CTD and recognize diagnostic clues that may suggest diagnosis of CTD.

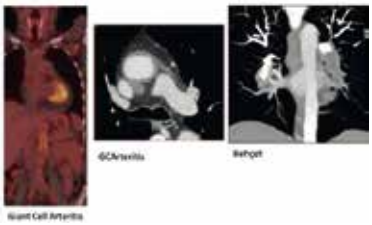
Imaging of pulmonary vasculitis

J. Vilar, M.L. Domingo, S. Isarria; Valencia/ES

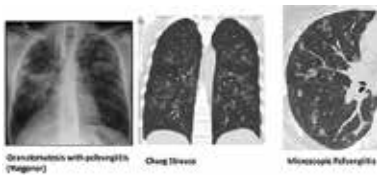
Keywords
Thorax, Lung, Plain radiographic studies, PET-CT, CT, Angioplasty, Inflammation

Body
Pulmonary vasculitis are a challenge for radiologists for two reasons: vasculitis are rare diseases and the pathologic and radiological manifestations are very diverse. Primary vasculitis present with different clinical scenarios and often confusisng situations that mimic other diseases.
Vascutitis are defined as disorders affecting the blood vessels, being primary or secondary.
From the imaging point of view it´s wise to classify vasculitis involving the torax according to the size of the vessels involved. Thus we talk about: large vessels (Takayasu, Giant Cell) combined large and small vessel (Behçet), and small vessel vasculitis (Wegener, Churg Strauss and microscopic polyangiitis).
Radiology plays an important role in vasculitis because often there is a close correlation between pathologic and imaging changes. Chest radiographs are especially usefull in small vessel vasculitis and should be allways a starting diagostic procedure. Contrast CT and MRI further detect and characterise the disease and are especially usefull in large vessel vasculitis along with Doppler Ultrasound. PET/CT is recomended in imaging and follow up of large vessel wall inflamation.
The radiologist must combine the imaging findings with clinical and laboratory data to suspect vasculitis.

PET/CT showing multiple areas of increased metabolism in aorta and major branches.Contrast enhanced CT shows thickenning and enhancement of the wall of the aorta. CT image showing thrombosis and aneurysms of the pulmonary arteries (C. E. Castañer)



Chest radiograph shows large necrotic pulmonary consolidations. Two cases of small vessel vasculitis show patchy pulmonary ground glass areas due to infiltration and hemorrhage.



Take Home Points

- Vasculitis are infrequent diseases with vague systemic symptoms
- Large vessel vasculitis can be distinguished by age and associated clinical symptoms.
- Small vessel vasculitis affect the lung with infiltration, hemorrhage and necrosis, giving rise to ground glass and consolidations and cavitations. Chest radiographs and CT are apropiate techniques.
- Large vessel vasculitis are studied by contrast CT, MRI, Ultrasound and PET/CT.

Lung cancer screening: The current evidence

A. Devaraj; London/UK

Keywords

Lung, CT, Diagnostic procedure, Cancer

Body

Following the publication of the NLST results in 2011, the US Preventive Services Task Force and a number of American professional bodies have recently recommended the implementation of lung cancer screening with CT in the US, in high risk individuals. Smaller European trials have not individually confirmed these results. To date, recommendations in Europe regarding the implementation of screening have been more circumspect, as results from the NELSON and other trials are awaited. Regardless, work is ongoing into how the implementation of lung cancer screening can be optimized, and in this regard a number of recent publications from lung cancer screening trials worldwide provide valuable information. This presentation will review some of the recent data that has emerged from screening trials, focussing on practical issues of implementation such as lung nodule management, the minimization of invasive procedures for benign disease, and the role of volumetry software.

Take Home Points

The successful implementation of lung cancer screening with CT will depend on a number of practical radiological issues.
Nodule management protocols and screening intervals that maximize early stage lung cancer detection, but minimize invasive and other repeat investigations in benign disease will be required.
Evidence gathered from completed and ongoing screening trials will play a crucial role in determining how screening is implemented.

Lung cancer screening: What next

J. Field; London/UK

Keywords

Lung, CT, Screening, Cancer

Body

Where does Europe stand post the recommendations by the US Preventive Services Task Force (USPSTF) to implementation of Lung Cancer CT Screening, which is mainly based on the NLST trial data?
The International Association for the Study of Lung Cancer (IASLC) CT Screening Workshop 2011 developed a consensus statement delineating important issues in screening that require further research, including effective risk assessment and selection of the appropriate risk population, diagnostic algorithm development and appropriate integration with tobacco control measures[1]. The IASLC Strategic Screening Advisory Committee prepared a response to the USPSTF recommendations[2].
The workshop participants from across the globe made six recommendations for future priorities: (i) identification of high-risk individuals for lung cancer CT screening programmes; (ii) develop radiological guidelines for use in developing national screening programmes; (iii) develop guidelines for the clinical work-up of "indeterminate nodules" resulting from CT screening programmes; (iv) guidelines for pathology reporting of nodules from lung cancer CT screening programmes; (v) recommendations for surgical and therapeutic interventions of suspicious nodules identified through lung cancer CT screening programmes; (vi) integration of smoking cessation practices into future national lung cancer CT screening programmes. These issues remain to be resolved in order to establish the most efficient lung cancer screening programmes in the future within national health care systems.
The presentation will focus on the selection of high-risk individuals for future lung cancer screening programmes and possible recruitment strategies[3, 4] which are pertinent to Europe, as well as other outstanding issues[5]. Currently our knowledge on the cost effectiveness is only based on modelling but this will be the major issue for all European Health care systems, considering undertaking lung cancer CT screening in the future. However, we need to focus on the benefits from Lung cancer screening and how we overcome the remaining obstacles[6].

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Take Home Points

- Current evidence for Lung Cancer CT screening, from RCT trial(s).
- CT Screening recommendations from the USA and IASLC.
- Outstanding issues.
- Benefits of CT screening, if implemented in Europe

Chest screening: More than cancer

P. de Jong; Utrecht/NL

Keywords

Respiratory system, Cardiovascular system, Musculoskeletal spine, CT, Computer Applications-General, Arteriosclerosis, Cancer, Chronic obstructive airways disease

Body

Current and former smokers are not only at increased risk for lung cancer, but also for a variety of other common major diseases. Lung cancer mortality in a smoking population is similar to cardiovascular disease mortality. Other major causes of morbidity and mortality are chronic obstructive pulmonary disease (COPD) and osteoporotic fractures. Therefore it is fortunate that a highly promising test to screen for lung cancer, a low dose unenhanced ungated chest CT, enables quantification of a plethora of abnormalities. Observers and computers can detect and quantify pulmonary nodules, pulmonary emphysema, bronchitis, interstitial lung disease and air trapping. Beyond the respiratory system, this single chest CT can additionally quantify coronary artery, aortic and cardiac valve calcifications, vertebral fractures and bone density. Although this information is currently ignored and cost-effective multi-disease treatment needs to be established, this route is highly promising to be further investigated. In the course the current state-of-the-art of the prognostic implications of several CT measures will be presented. Potential therapy and future research directions will be discussed. Also for those who prefer screening for a single disease above screening humans, novel insight into optimization of lung cancer prediction will be presented.

Take Home Points

A baseline screening chest CT allowsDetection and quantification of volume and mass of pulmonary nodulesQuantification of cardiovascular calcifications and prediction of cardiovascular eventsQuantification of bone density and fractures and prediction of osteoporotic fracturesQuantification of airway and pulmonary disease and diagnosis of COPDRefinement of the prediction of individual lung cancer risk.

Implementation: Make it cheap, keep it effective

B. van Ginneken; Utrecht/NL

Keywords

Computer applications, Lung, CT, CAD, Computer Applications-Detection, diagnosis, Screening, Cancer

Body

Widespread implementation of chest CT screening among individuals at high risk for lung cancer would have a significant impact on the resources available for radiological image interpretation. The main culprit is the fact that the time required for reading a lung screening CT scan is in the order of minutes, 10 to 50 times higher than what is needed to read a screening mammography data set. In this presentation I will review literature on how to read lung screening CT data, including the recently published LungRADS standard and its alternatives, and how to integrate evidence based models to estimate the individual's risk for lung cancer, COPD and cardiovascular disease in a screening process. I will show how automated computer algorithms can support reading chest CT scans in an efficient and effective manner.

Take Home Points

Implementation of lung CT screening would require a large amount of radiological expertise.Standards are emerging on how to read lung CT screening scans.Integrated computer support can make the reading process for such scans much more efficient.

Standardised reports

Th. McLoud; Boston, MA/US

Keywords
Thorax, CT, Technical aspects, Workforce

Body
The objectives of this lecture are to allow the audience to understand the motivations for templated and structured reporting, review the evidence in favor of structured reporting, access tools to build consistent structured reports in your practice, and present possible applications of structured reporting in thoracic radiology particularly reporting of lung cancer screening chest CT.
A structured report is a pre-defined report organization used repeatedly. It may also include preferred common language to describe findings and diagnoses. Such an approach has certain advantages which limit inconsistency, confusion and ambiguity. Preferred terms and definitions are used consistently for teaching, research and enhance clinical practice for referring physicians. Structured reporting also reduces the chance of missing content by providing check lists. Vendor systems and voice recognition dictation create an environment that is template friendly and the RSNA is in the process of developing template libraries.
We all resist change but incentives to adopt structured reporting include group involvement in the creation and design of the reports and group financial incentives for adherence to structured reporting. Guidelines for management such as the Fleischner recommendations for follow-up of pulmonary nodules can be imported into structured reports. LU/RADS is a structured reporting system produced by the ACR which provides a standardized language similar to BI-RADS for reporting findings in lung cancer screening chest CT's. Guidelines and recommendations for follow-up of pulmonary nodules can be easily incorporated into a structured reporting system.

Take Home Points
Structured reporting is in your future!!
Helpful for screening studies

Multidisciplinary conferences

J. Verschakelen, W. de Wever, J. Coolen; Leuven/BE

Keywords
Lung, CT, Conventional radiography, Diagnostic procedure, Cancer

Body
A multidisciplinary conference (MDC) can be defined as a conference where a group of people of different health-care disciplines (the multidisciplinary team (MDT)) meets together at a given time (in one place or by teleconferencing) to discuss a given patient in order to contribute independently to the diagnostic and treatment decisions about this patient (adapted from a definition by the UK Department of Health). While team composition very much depends on the disease of the patient and on the diagnostic and therapeutic decisions that need to be made, it is generally accepted that the radiologist is an important member of such an MDT. Nowadays MDC's form part of the daily work in most hospitals caring for cancer patients and many potential advantages of this multidisciplinary work have been recognized and published also in the field of lung cancer. Although introduced later, a multidisciplinary approach is also central to the diagnosis and even the treatment planning of patients with diffuse lung disease and compels the installation of a multidisciplinary team, especially when dealing with patients suspected of having an idiopathic interstitial lung disease.
In this presentation the advantages but also the potential pitfalls of such a multidisciplinary conference together with the requirements for effective MDT working will be discussed.

Take Home Points

1. Multidisciplinary Conferences have become increasingly important:
   - They are an important decision making forum in oncology in general and are necessary to generate an optimal care plan for patients with lung cancer.
   - The multidisciplinary approach is now considered the "gold standard" for diagnosing diffuse lung disease.
2. Radiologists are recognized to be important members of the multidisciplinary team.
3. Care should be taken to develop the necessary clinical, radiological and histopathological skills and to optimally organize these multidisciplinary conferences.

Publishing in radiology: What you always wanted to know and never asked

A. Bankier; Boston, MA/US

Body

This presentation will describe the workflow that manuscripts take when submitted to RADIOLOGY. It will detail the acceptance and revision process. It will also highlight which features manuscripts should have to increase the chances for acceptance. Finally, it will provide authors will examples on how to improve their submissions.

Take Home Points

n/a

Turf battles in thoracic radiology

H.-U. Kauczor; Heidelberg/DE

Keywords

Thorax, Lung, Cardiac, Plain radiographic studies, MR, CT, Diagnostic procedure, Cancer, Inflammation, Infection

Body

The rapid development of imaging technologies is constantly opening novel opportunities leading to new and additional implementations in clinical routine. Beyond the advances in healthcare and technologies the expanding field of imaging is driven further by demographics, the increasing expectations of patients and referring physicians as well as economics in the arena of personalized medicine. As such radiology is an appealing medical discipline attracting students and physicians as well as the stakeholders of other disciplines.
In former times chest radiology was focused on the chest x-ray with its – as we know now – very limited sensitivity and specificity. In those days, the chest x-ray took a central role in the diagnosis of pulmonary and cardiac disease almost like the blood cell count. Subsequently the chest x-ray is widely used as a symbol of a competent physician leading to the credo that every physician can read and report a "simple" chest x-ray. As chest radiologists, we know that this is not true, but in contrast we are aware that the excellent interpretation of the chest x-ray is an art.
Nevertheless, the formation of the subspecialty of chest radiology is closely linked to the introduction of CT, in particular high-resolution CT, of the lung parenchyma and its diseases. In the following, chest radiology substantially contributed to multiple breakthroughs in radiology and generated the required evidence on the way to our current state-of-the-art of how to diagnose and treat the broad spectrum of lung diseases, such as the CT diagnosis of acute pulmonary embolism; CT screening for lung cancer; CT, MRI and PET/CT staging of lung cancer; CT and MRI assessment of pulmonary arterial hypertension; CT diagnosis of diffuse interstitial lung disease – even prevailing pathology – as well as MRI of CF and CT phenotyping of COPD.
Overall, these prominent developments have raised the interest of many to participate in this successful endeavour of image-based diagnosis of lung disease. Although some of the clinical applications of CT, MRI, PET/CT and PET/MRI seem to be straightforward, the implementation and reporting are far from being trivial. This also remains to be true for the chest x-ray which should not be neglected by the young generation of chest radiologists in order to prevent intensive care physicians and cardiologists from becoming the experts for the its interpretation. As such radiology of the chest is no longer something that even the

general radiologist knows to perform on the required high level of expertise without dedicated training, e.g. fellowships. To cope with this need, European chest radiologists led by ESTI should engage even more in level 3 training activities and implement a curriculum for a certification in chest radiology. Such a curriculum also includes hybrid imaging to ensure comprehensive staging and therapy response imaging, in particular for lung cancer but also lymphoma and others. The certification is important to assure quality in the field, e.g. with regard to teleradiology services which just consider radiology, and in particular chest radiology, a commodity. We are also aware that chest radiology covers the chest as a whole and not only the lung. Chest radiologists should have an advanced knowledge of cardiac imaging and also deepen the collaboration with cardiac radiologist. Both are pivotal for the future success of radiology as a whole with regard to the claims from cardiology. Fortunately, our respiratory medicine colleagues have not really engaged in performing and reporting imaging of the lung beyond chest x-ray and ultrasound. Close collaboration as well as our excellence and innovation will preserve our role to the benefit of our patients, the health care system and our discipline.

Take Home Points

- Thoracic radiology is a well recognized radiological subspecialty
- Thoracic radiology comprises projection radiography, CT, MRI, PET/CT and PET/MRI of lung, mediastinum, heart and great vessels with regard to imaging diagnosis, imaging biomarkers and image-guided intervention
- Dedicated curriculum-led training programmes (level 1-3), scholar- and fellowships as well as certificaton have to be implemented with ESTI being a major stakeholder
- Fruitful collaboration with other disciplines and sustained innovation are key to the future of thoracic radiology

Variations of aspergillus infection

E. Coche; Brussels/BE

Keywords

Thorax, Plain radiographic studies, CT, Diagnostic procedure, Infection

Body

Pulmonary involvement with aspergillus is varied and dependent on the patient's immune status and underlying pulmonary conditions. During this presentation, we will review on an interactive fashion the different modes of presentations of the disease including angioinvasive aspergillosis, acute bronchopneumonia, acute tracheobronchitis, allergic bronchopulmonary aspergillosis (ABPA) and chronic forms presenting as a fungus ball (mycetomas, aspergilloma) or pseudotumoral aspect.
The radiological and CT appearance will depend of the type of aspergillosis. The main patterns are the following

Angioinvasive aspergillosis and acute bronchopneumonia

The findings on chest X-ray vary from normal in early disease to focal or widespread peripheral opacities.The „halo" sign seen on CT in relationship with perilesionnal hemorrhage is suggestive of invasive aspergillosis but can be encountered in other mycoses and miscellaneous diseases. With healing the central necrotic tissue collapse and retracts from the peripheral viable tissue and create an air-crescent. This „crescent" sign may occur when neutropenia has resolved, usually after 2 or 3 weeks of treatment. Vascular infiltration by the fungus can result in several complications and can be detected at an early stage by enhanced CT. Hemoptysis is the most frequent and tends to occur during cavity formation. In situ thrombosis, pseudoaneurism can be precisely depicted using dedicated CT protocols.

Acute tracheobronchitis

This form is relatively uncommon. During the early stages of the disease, the chest X-ray is usually normal, but lung nodules frequently appear with clinical progression, reflecting its parenchymal invasive trend. Only a few cases have shown peribronchial thickening or tracheobronchial narrowing. In some cases, centrilobular nodules are present with a „tree-in-bud" appearance at CT.

Allergic bronchopulmonary aspergillosis

The radiographic pattern of ABPA is identical to that of mucoid impaction involving usually the upper lobes and almost always in the more central segmental bronchi rather than the peripheral branches. In some conditions, isolated lobar or segmental collapse also occurs. At CT, mucoid impaction of high attenuation, presumably related to the presence of calcium and segmental and subsegmental bronchiectasis are better depicted than on plain film.

Fungus ball

On chest X-ray, a fungus ball consists of a solid, round or ovoïd mass of soft tissue density lying within a cavity located usually in the upper lobes. Typically, the mass is separated from the wall of the cavity by an air space, creating an „air-crescent" sign. An air fluid level is sometimes present within the cavity. The fungus ball is usually mobile and moves whan the patient change position.CT may show areas of increased attenuation probably related to calcium deposition. A sponge-like appearance may also be present before the developpment of the mature fungus ball in relationship with fungal fronds situated on the cavity wall.

Example of clinical vignette

Figure 1: Middle aged man with previous history of asthma. Non enhanced CT scanner of the chest
Question 1: What are the main abnormalities on the different images?
Question 2: Which findings are consistent with the diagnosis of ABPA?
The answers with clinical backround and some pathologic correlations will be given during the course

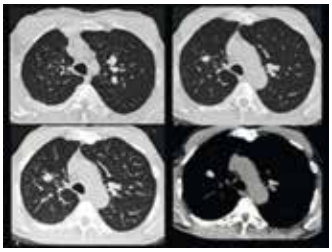


Figure 1: Non enhanced CT of the chest displayed at the level of the upper lobes

Take Home Points

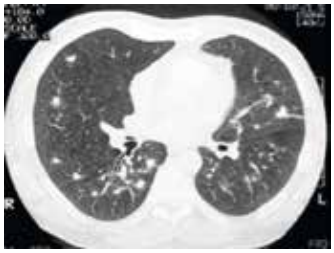
1. Pulmonary involvement with aspergillus is varied
2. Radiological and CT pattern is related to the patient's immune status and underlying pulmonary conditions
3. Vascular involvement in invasive aspergillosis can be dramatic and has to be recognized at an early stage
4. Central bronchiectasis with high attenuation plugs can sugggest the diagnosis of ABPA
5. A fungus ball with „crescent sign" is highy suggestive of chronic aspergillosis but sometimes pseudotumoral appearance may exist.

Viral infections

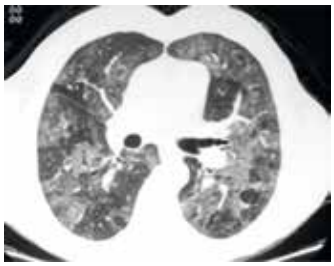
T. Franquet; Barcelona/ES

Keywords
Lung, CT, Diagnostic procedure, Infection

Body
Pulmonary viral infection is relatively common and a major cause of morbidity and mortality particularly in immunocompromised patients. The most important pathogen in immunocompromised patients is Cytomegalovirus. Other pulmonary viral infections include herpes simplex virus, varicella-zoster, adenovirus, syncytial-respiratory virus,and Epstein-Barr virus. Emergent new viral agents have been recently documented (pandemic H1N1 influenza, H5N1 influenza viruses, coronavirus and human metapneumovirus).
The differential diagnosis is based on the clinical history and the pattern and distribution of findings on high resolution CT.CT manifestations are protean and include ground-glass opacities, air-space consolidation, nodular opacities, bronchial wall thickening, tree-in-bud appearance and small pleural effusions. High-resolution CT can be helpful in the detection, differential diagnosis, and management of immunocompromised patients with pulmonary complications. Althoughaccurate clinical information is essential to narrow the differential diagnosis, it is often still imposible to determine the cause of parenchymal abnormalities in this group of patients. Combination of pattern recognition with knowledge of the clinical setting is the best approach to pulmonary infectious processes. A specific pattern of involvement can help suggest a likely diagnosis in many instances.



CMV infection in a HSCT patient. HRCT (lung window) shows multiple bilateral nodular opacities, some of them, surrounded by a halo of GGO



HIV positive patient with severe respiratory insufficiency due to PCP infection. HRCT shows a diffuse bilateral lung disease presenting with multiple patchy areas of GGO (mosaic pattern).

Take Home Points
Viral infections are extremely important causes of disease of the respiratory tract, which are associated with considerable morbidity and, at times, mortality.Disease from human metapneumovirus is generally more severe in adults with chronic lung disease or immunosuppression.Combination of pattern recognition with knowledge of the clinical setting is the best approach to pulmonary infectious processes.

Tuberculosis

I. Tyurin; Moscow/RU

Keywords
Thorax, Lymph nodes, Lung, CT, CT-Angiography, CT-High Resolution, Contrast agent-intravenous, Education, Infection

Body
Approximately 2 billion people worldwide are infected with Mycobacterium tuberculosis, of which 20 million are active cases. The reasons for resurgence of TB infection include the HIV epidemic, a rise in reactivation disease in the elderly, a growing migrant population and spread of drug resistant strains.The pathologic form of the pulmonary infection depends on the sensitivity of the infected host. Patient's immune status is an important factor in determining imaging findings.
Primary TB pattern represents infection resulting from recent contact with the pathogen in the absence or significant decrease of specific immunity. Postprimary TB pattern results from reactivation of a dormant focus within the lungs or exogenous infection in patients with normal/subnormal immunity. Thoracic tuberculosis produces a broad spectrum of radiographic abnormalities. The radiological patterns had been described as parenchymal, airway, vascular, mediastinal, pleural, and chest wall lesions. Common causes of a missed

diagnosis of thoracic tuberculosis are failure to recognize that dissemination, an upper-lobe or superior segment of lower lobe mass might be tuberculosis, as well as that hilar and mediastinal lymphadenopathy may present an active disease in adults. In AIDS patients the imaging features depend on the degree of immune suppression. A pattern of postprimary TB is also usually seen among patients with decreased immunity due to alcoholism, renal failure, diabetes mellitus, ageing, malignancy, renal and cardiac transplantation.

Take Home Points

- Thoracic TB is relatively common infection especially in a specific group of patients
- Patient's immune status is an important factor in determining imaging findings
- TB produces a broad spectrum of radiographic abnormalities that can mimic a common pulmonary pathology
- CT pattern of thoracic TB closely related to pathological changes

Complications of pulmonary infections

R. Greene; Boston/US

Body

Acute pneumonias in otherwise normal persons in the industrialized world are in the vast majority of instances self-limited resulting in recovery without complications. Among the almost half billion pneumonias that occur worldwide each year, complicated pneumonias account disproportionately for pneumonia-associated deaths and serious morbidity. Mortality rates from pneumonia are related to complications of pneumonia and are much higher in impoverished regions of the world, e.g., sub-Saharan Africa. Worldwide, pneumonia is the single largest cause of death in children under five years of age numbering over one million per year, more than from AIDS, malaria and tuberculosis combined. But the problem is not limited to Africa. In the USA pneumonia accounts for more than one million hospitalizations per annum, an indication of the large number of complicated or serious pneumonias in all age groups in an industrialized nation. The incidence of pneumonia and the resulting deaths from pneumonia tend to be higher at the extremes of young and old age, as well as in those with altered host defense, underlying chronic disease, and exposure to highly virulent pathogens or to overwhelming numbers of organisms. Complications of pneumonia fall into two large categories, those that are attributable to the infection, and those that are caused by non-infectious epiphenomena.
Complications attributable to serious infections include tissue necrosis within the infected lung (e.g., lung abscess) and extension of the infection into other parts of the lung, or other anatomic compartments, e.g., the pleura, chest wall, bronchovasculature, lymph nodes and mediastinum. Seeding into local vasculature and lymphatics may lead to the serious complication of bacteremia and to subsequent metastatic spread of infection to other organs, such as, the meninges, bones and cardiac valves. These infectious complications often initiate cascades of additional complications, such as when bacteremia leads to metastatic spread of infection to right-sided cardiac valves that in turn cause multiple septic pulmonary emboli and septic infarcts.
Complications due to non-infectious epiphenomena may in some cases be more life threatening than those attributable to the infection itself. These include systemic hyper-inflammatory and other reactions to infectious agents and their toxins resulting in diffuse lung injury and ARDS. In addition, serious toxic and immunological effects can be incited by antibiotic treatment of these pneumonias. Systemic inflammatory response syndrome (SIRS) is an intractable distinctive life-threatening whole body inflammatory syndrome that can be initiated by severe infection and may persist long after all signs of infection have cleared. It consists of persistent hyperthermia, hypotension, tachycardia, and altered mental status that may presage potentially fatal multi-organ failure.
This session will deal with imaging aspects of common and serious complications of pulmonary infection.

Take Home Points

1. The majority of acute pneumonias are self-limited illnesses with no complications.
2. Complicated pneumonias are a small fraction of all pneumonias but they account for a substantial number of deaths world-wide, more than a million annual deaths in children under the age of five.
3. Complicated pneumonias tend to occur in patients at the extremes of age, and in those with diminished host defense, exposure to virulent pathogens and challenge from overwhelming numbers of organisms.
4. Necrotizing pneumonias tend to be associated with bacteremia and empyemas.
5. Necrotizing pneumonias and bacteremia carry with them a higher risk of second order infectious and non-infectious complications, and carry a higher risk of mortality.
6. Imaging documentation of necrosis and pleural fluid help to identify patients at high risk of complications.
7. Overwhelming pneumonias can lead to life-threatening non-infectious complications due to hyper-inflammatory, immunological, and toxic syndromes. These include the acute respiratory distress syndrome (ARDS), and Systemic inflammatory response syndrome (SIRS) that can result in multi-organ failure.

Triple rule-out: Still relevant?

V.E. Sinitsyn; Moscow/RU

Keywords

Cardiovascular system, Cardiac, Pulmonary vessels, CT-Angiography, CT, Diagnostic procedure, Contrast agent-intravenous, Radiation safety, Acute, Ischemia / Infarction, Embolism / Thrombosis

Body

For a long time CT and CT-angiography (CTA) play an important role in assessment of chest pain patients presenting to the emergency department. So far coronary CTA has not been accepted as a standard diagnostic tool for the patients with proven acute coronary syndrome (ACS). But is has been shown that in patients with intermediate/low risk of ACS or in cases when a chest pain is caused by some other pathologies, different form ACS, CTA can reveal quite a range of vascular and non-vascular chest diseases. Modern scanners systems (starting with 64-row systems) can simultaneously evaluate the coronary arteries, thoracic aorta, and pulmonary arteries during a single breath hold and timely detect such life-threatening conditions as acute aortic diseases (dissection, rupture), pulmonary thromboembolism and coronary lesions leading to ACS. Such protocol has been labeled as a „triple rule out" (TRO) CT. Nevertheless clear indications for its use in patients with acute chest pain are still lacking. Multiple single studies have shown that TRO protocol can be highly diagnostic and even cost effective in patients with acute chest pain caused by both vascular and non-vascular pathologies. Nevertheless there are concerns about relatively low diagnostic yield of TRO protocol applied to large groups of patients with non-specific chest pain accompanied with higher radiation exposure and iodine load to a patient. Meta-analysis have not shown that there are insufficient data to recommend use of TRO CT in majority of patients presenting with acute chest pain. More reasonable approach is to select the appropriate MDCT protocol depending on the clinical presentations of the acute chest pain. It is advisable to restrict the TRO CT to patients with uncertain (intermediate) probability of acute aortic, pulmonary or coronary diseases or combination of them. Current developments in scanner technology have led to dramatic decreases in the radiation doses and scan times necessary to perform TRO CT. It means that clinical indications to TRO should be re-evaluated for new generations of CT systems. The new large-scale clinical trials are needed to ascertain the precise role of TRO CT in the evaluation of patients with acute chest pain of vascular/cardiac origin.

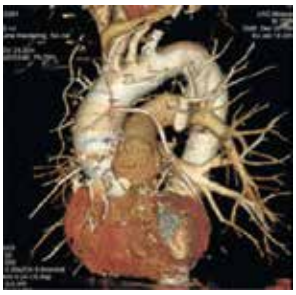


Fig. 1: Low-dose TRO CT simultaneously depicts thoracic aorta, pulmonary arteries and coronary vessels without loss of image quality.

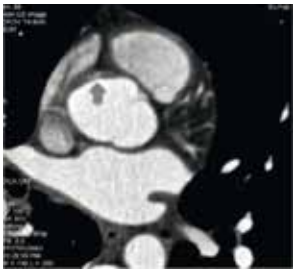


Fig. 2: TRO CTA. Acute aortic ulcer and intramural heamatoma (arrow) in patient with acute chest pain and normal coronarues

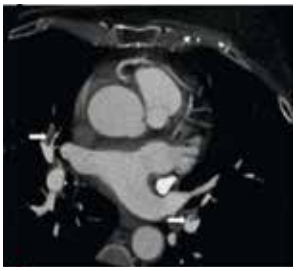


Fig.3: TRO CTA. Acute bilateral PE in patient with coronary atherosclerosis and anomalous RCA.

Take Home Points

- Whole-chest gated CTA (labelled as TRO CT) performed with modern scanners gives opportunity to obtain in one study the high-quality images of coronaries, thoracic aorta and pulmonary arteries.
- TRO CT is highly accurate for detecting or ruling out significant coronary artery disease, pulmonary thromboembolism and acute aortic diseases.
- Current evidence does not support wide use of TRO CT in patients presenting with acute chest pain. In most of such cases CTA protocols tailored to a clinical situation are more preferable. TRO CT should be limited to selected subgroups of patients.
- New developments in scanning technology could expand indications to TRO CT in the nearest future.

The heart in patients with diffuse lung disease

S. Padley; London/UK

Keywords

Thorax, Respiratory system, Cardiac, CT, Education, Biological effects

Body

Cardiac assessment with CT has become an important part of cardiothoracic imaging in the past 10 years. In the majority of cases of CT coronary angiography or cardiac assessment, the lungs are reviewed for incidental pathology. However in certain conditions, both the heart and the lungs are involved by the same disease process.

This talk will concentrate on those conditions where there may be significant myocardial, valvular, pericardial or coronary disease as the result of, or in conjunction with pulmonary disease. Conditions discussed will include systemic sclerosis, sarcoidosis, ankylosing spondylitis and amyloidosis. Smoking related lung disease will also be mentioned briefly with particular regard to the association between COPD and coronary artery disease.

Take Home Points

- Cardiac assessment is relevant in a number of DILD processes.
- Cardiac assessement with CT may form part of a comprehensive cardiopulmonary assessment.

Assessment of the heart before major lung surgery

Ch. Loewe; Vienna/AT

Keywords

Cardiac, Cardiovascular system, Thorax, CT-Angiography, MR, Diagnostic procedure, Arteriosclerosis

Body

Due to the close functional and anatomical relationship between the heart and the lung assessment of the heart plays an important role before major lung surgery including lobectomy/pneumectomy and lung transplantation. The area of interest in that field include assessment of coronary arteries to rule out/diagnose coronary artery disease (CAD), the assessment of the function of both the right and left heart, and the assessment of the myocardial viability.

Given the shared main risk factors of lung cancer and CAD, the coincidence of CAD is high in lung cancer patients. It has been shown that CAD is one of the most important factors for early morbidity and mortality after pneumonectomy. Post-operative cardiovascular events have a relevant, negative impact on the prognosis of the patients, whereas the rule out of relevant CAD in patients suitable for lung surgery from an oncological point of view is an important issue. Another common problem after lung surgery is the high incidence of paroxysmal atrial fibrillation (PAF), which is reported to be between 4% and 37%. Although this postoperative PAF is uncomplicated and transient, postoperative PAF is cause if prolonged hospitalisation and needs intervention in about 30% of the cases. Since it has been shown that CAD is beside age one of the most important risk factors for postoperative PAF, prevention of this complication is another indication for ruling out CAD prior to lung surgery.

During the last years ECG-triggered multidetector CT angiography of the heart has shown a very high negative predictive value (NPV) in the rule out of CAD. Using state-of-the-art scanners providing high spatial and temporal resolution, NPV's between 99% and 100% have been reported so far. Thus non-invasive rule out of CAD by means of CT angiography is possible with really high diagnostic accuracy and could be obtained in patients scheduled for pneumonectomy or lobectomy. Due to exciting technical innovations during the very few last years, radiation exposure of such CT angiography dedicated to the coronary arteries could be significantly reduced down to 1 – 4 mSv.

In patients with diagnosis of CAD prior to surgery further assessment of ventricular function and myocardial viability is mandatory to decide if treatment of CAD prior to lung surgery is indicated or not. The method of first choice to answer these questions is cardiac MR providing different important information's. First it has been shown by numbers of papers that myocardial viability and myocardial scar can be visualized and detected with a really higher diagnostic accuracy. Thus need for revascularization can be assessed by using cardiac MR, and success of such revascularization can be predicted. Ventricular function can be calculated from cardiac MR series independent from acustic window like using echocardiography.

Finally signs of pulmonary hypertension could be detected on CT angiographies and on cardiac MR studies including right heart enlargement, increased diameter of pulmonary trunk, and abnormal right ventricular function.

In this presentation, state-of-the-art non-invasive cardiac imaging techniques including EC-triggered CT angiography and cardiac MR will be introduced. Value of both methods in the management of patients scheduled for major lung surgery will be discussed, and possible advantages and disadvantages will be addressed together with still existing limitations of these modern techniques.

Take Home Points

- CAD has shown to be a relevant risk factor for early morbidity and mortality after lung surgery
- PAF is a relatively common complication after lung surgery, mainly related to CAD
- Non-invasive coronary CT angiography has a high negative predictive value of 99% to rule out CAD
- Cardiac MR is the method of choice to assess myocardial viability and function prior to lung surgery

Functional cardiac CT: New techniques

A. Persson; Linköping/SE

Keywords

Cardiovascular system, CT-Angiography, CT, Computer Applications-3D, Arteriosclerosis, Calcifications / Calculi, Obstruction / Occlusion

Body

Cardiac computed tomography (CT) is emerging as powerful noninvasive imaging tool for the evaluation of atherosclerosis in patients with known or suspected coronary artery disease (CAD). Unlike invasive coronary angiography, CT coronary angiography (CTA) not only assesses disease within the coronary lumen but can also provide direct qualitative and quantitative information about nonobstructive atherosclerotic plaque burden within the vessel wall. New technology has the potential for a comprehensive noninvasive cardiac evaluation of anatomy and also cardiac function. This lecture will discuss current and potential future applications of cardiovascular CT with a particular focus on functional technologies.

Take Home Points

New functional cardiac CT techniques such as CT fractional flow reserve imaging (ctFFR), CT perfusion and spectral CT have the potential to play an important role in the future healthcare.CT imaging to assess the hemodynamic significance of coronary lesions is „promising" but needs more research before it displaces current technologies such as invasive fractional flow reserve (FFR).

ATS/ERS IIP update: Implications for radiologists

S. Desai; London/UK

Keywords

Lung, CT-High Resolution, CT, Diagnostic procedure, Inflammation

Body

The idiopathic interstitial pneumonias (IIPs) are an interesting but challenging group of diseases. Advances in many fields, including imaging, pathology, immunology and genetics, continue to provide insights into these disorders. Our understanding of the IIPs has evolved since the earliest attempts to classify these disorders. Thus, in an important paper in 2002, the American Thoracic and European Respiratory Societies published a consensus statement on the IIPs: an important message of this position statement was the move away from the view of a single – usually meaning biopsy – diagnostic 'gold' standard. In 2013, the original consensus statement was updated, with the aim of adding further precision to the diagnosis/management of the IIPs. It seems likely that further iterations will be published as new data are published in years to come. Investigations in related fields have also provided other insights: thus, the independent importance of age per se in the diagnosis of idiopathic pulmonary fibrosis has been recognized. The potential aetiological contribution of genetics is being explored and, all the while, 'new' conditions (e.g. pleuroparenchymal fibroelastosis) appear to be coming to light. Taken together, these developments have significant implications for the radiologist.

Take Home Points

Radiologists (and radiology) are central to the evaluation of patients with idiopathic interstitial pneumoniasThe recent updated classification of the idiopathic interstitial pneumonias re-inforces the principle that multidisciplinary diagnosis is key

The emerging role of HRCT in clinical drug trials

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Keywords
Lung, CT-High Resolution, Diagnostic procedure, Outcomes

Body
The role of high resolution CT (HRCT) for patients entering drug trials has expanded dramatically in the past few years as the pharmaceutical industry has increasingly focused its efforts on developing drugs for interstitial lung diseases and, in particular, idiopathic pulmonary fibrosis.
Apart from the key diagnostic role of HRCT in the appropriate selection of patients, HRCT is now being used to further refine patient cohorts for drug trials, to ensure that potential responders are well represented in study groups. To facilitate this "cohort enrichment" HRCT is being used to identify subgroups of patients who are stable (and thus unlikely to show a response to a novel treatment) or who are end-stage (such patients are also unlikely to respond). The methods of identifying these subgroups using visual and objective methods of disease quantification will be discussed.
Although not yet mainstream, there is interest in the potential for HRCT to be used as an endpoint, in conjunction with other markers, in drug trials. In several diseases mortality is not a suitable endpoint (largely because separating out disease-specific mortality is difficult, and because mortality is an unsatisfactory endpoint in patients with relatively indolent diseases). Many markers have been explored ranging from lung function decline to biomarkers; none is entirely reliable and combinations of endpoints (including HRCT) are now being investigated. A further role for HRCT is in selected early phase trials as part of safety monitoring to identify adverse reactions to new agents.

Take Home Points
- HRCT is a key part of the diagnostic inclusion criteria for patients entering drug trials
- A new role for the HRCT is "cohort enrichment" of study populations in drug trials
- Work-in-progress explorations of HRCT in drug trials include its use as an endpoint and in safety monitoring

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P-0002 **Right intrathoracic stomach ; case report**
R. Sade[1], A. G. Calis[1], T. PinarbaÐili[2], M. Beyhan[3]; [1]Agri/TR, [2]Tokat/TR, [3]Turkey/TR

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C. Lai; Kowloon/HK

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P-0013 **Radiological spectrum of Thoracic Sequelae and Complications of Tuberculosis**
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P-0015 **Automated rib unfolding software: perks, pearls, and pitfalls.**
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P-0021 **Coronary artery fistula manifesting with steal phenomenon**
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P-0023 **Imaging of thorax in acute non cardiovascular conditions.**
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P-0024 **Massive Bilateral Pulmonary Embolus of Acrylic Cement**
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P-0026 **Review areas of chest on frontal radiograph**
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P-0032 **Nontuberculous Mycobacterial Pulmonary Disease: An Imaging Review**
A. Wallis[1], C. Ball[2], K. Jayawardhana[1], P. McParland[1], R. Dickens[3]; [1]Portsmouth/UK, [2]Brighton/UK, [3]Ha/UK

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P-0054 **Imaging features of non-neoplastic chest wall disorders.**
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P-0055 **A Quick and Non-invasive Way to Diffentiate Transudative versus Exudative Pleural Effusions; Diffusion-weighted MR imaging with EPI sequences**
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P-0056 **Infective endocarditis: what you should know and what you can see in non-gated CT—correlation with echocardiography**
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P-0068 **A systematic approach to managing incidental congenital findings and variants during imaging of thorax**
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P-0070 **A pictorial review of complications following lung transplantation for cystic fibrosis.**
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P-0098 **Radiologic Spectrum of Appearance of the Postsurgical Lung**
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P-0099 **Chest wall varicose veins: did you see that?**
E. Guedes Pinto[1], D. Penha[2], A. M. D. Costa[3]; [1]Quinta do Conde/PT, [2]Lisbon/PT, [3]Amadora/PT

P-0100 **The gamut of cystic lung disease: a practical approach to differential diagnosis**
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P-0009 **Diagnostic confidence and image quality of CT pulmonary angiography at 100 kVp in patients with high body weights**
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P-0039 **ARDS in miners after mining accidents. MDCT with perfusion and angiography, and MRI with DWI, STAGE and STIR**
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P-0040 **Swyer-James-Macleod syndrome after influenza presented by MDCT and MRI**
A. Ivkovic, T. Milosavljevic, S. Ivkovic; NIS/RS

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P-0043 **Differences between child and adult pulmonary haemosiderosis.**
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K. Stefanidis, O. Romanos, F. McCaughan, G. Garwick, C. Lewis, S.R. Desai; London/UK

P-0053 **Safety Margins in Supine Thoracentesis via Posterolateral and Posterior Approach: Comparison with conventional Lateral Approach**
J.M. Ko[1], J. Kim[2], S.-A. Park[3], K.N. Jin[4], M.I. Ahn[4], S.-C. Kim[4], D.H. Han[4]; [1]Suwon/KR, [2]Chicago/US, [3]Uijeongbu/KR, [4]Seoul/KR

P-0060 **Scintigraphic imaging of PE in Pregnancy -10 year review of Practice**
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P-0069 **Outcomes following CT pulmonary angiograms performed during pregnancy over a five year period**
D. Oswal, H. Adamson; Wakefield/UK

P-0072 **CT-angiography protocol with low dose radiation and contrast medium for non-cardiac chest pain**
E. Çakmakcı[1], S. Tokgöz Özal[2], B. Ucan[1], A. Akça[3], E. Özal[2]; [1]Ankara/TR, [2]Istanbul/TR, [3]Kocaeli/TR

P-0080 **Primary squamous cell carcinoma of the lung presenting as long-segmental bronchial wall thickening**
Y. Song, D.H. Han, Y.W. Choi; Seoul/KR

P-0081 **Pulmonary CT angiography using iterative image reconstruction technique: assessment of signal-to-noise ratio and image quality**
Y. Lee[1], K.N. Jin[2], J.Y. Wi[2]; [1]Guri/KR, [2]Seoul/KR

P-0082 **MRI whole-lung perfusion – a feasible alternative to scintigraphy?**
B. Abels, J. Dinkel, M. Puderbach, M. Eichinger, M.-K. Ganten, F.J. Herth, H. Hoffmann, J. Biederer, H.U. Kauczor, C.P. Heussel; Heidelberg/DE

P-0084 **Sweet's syndrome: Pulmonary involvement**
B. Özkul, S. Gümüştaş, Ö. Özkul, I. Çam, A. Akça, A. Demirci; Kocaeli/TR

P-0086 **Indications for Chest Radiographs on an 11 bed Intensive Care Unit**
C.E.S. Lewis, S. Lam, A. Blake, M. Vizcaychipi; London/UK

P-0089 **Accessory left lower lobar artery: First description**
Y.-J. Lee, D. Han; Seoul/KR

P-0090 **Low-dose CT-thorax in exacerbations of COPD, the CATCH study**
G. Kramer[1], E.J. Boerhout[2], H.J. Prins[1], L.J. Bos[1], W.G. Boersma[1]; [1]Alkmaar/NL, [2]Amsterdam/NL

P-0093 **Onset and progression pattern of CT findings in patients with RAS after lung transplantation**
A. Dubbeldam, C. Barthels, J. Coolen, J.A. Verschakelen, S. Verleden, R. Vos, G. Verleden, W.F.M. De Wever; Leuven/BE

P-0116 **Pulmonary complications after hematopoietic stem cell transplantation**
C. Barthels, A. Dubbeldam, J. Coolen, J.A. Verschakelen, W.F.M. De Wever; Leuven/BE

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The congress president, Prof.Dr. Cornelia Schaefer-Prokop, did not disclose any relationships.

NOTES

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