



## Satellite Symposia

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**Thursday, March 3**

**12:30 - 13:30**

**Room F2**

organised by Siemens

## **SY 1**

### **Breast care goes 3D**

*Moderator:*

*D. Uhlenbrock; Dortmund/DE*

#### **D-01**

##### **Introduction**

*D. Uhlenbrock; Dortmund/DE*

#### **D-02**

##### **Automated 3D US breast volume scanning**

*M. Rutten; 's-Hertogenbosch/NL*

Eliminating subjectivity and operator-dependent bias from ultrasound, automated breast volume scanning (ABVS), or 3D ultrasound (US), opens the door to new applications in mammary diagnostics and beyond. 3D US technique and scan methods as well as the post-processing, reviewing and analysing of the 3D breast US data sets are explained and illustrated. Our preliminary experience with clinical ABVS applications will be shown and the advantages, limitations and future aspects of ABVS will be discussed.

#### **D-03**

##### **Digital 3D breast tomosynthesis and its emerging role in breast cancer diagnosis**

*J. Barkhausen; Lübeck/DE*

Breast cancer is the most common malignant tumour in women and early detection is most crucial for outcome and survival. Mammography is the most important imaging technique for tumour screening and characterisation of focal lesions. However, using plain film techniques the three-dimensional object is reduced to a two-dimensional image, and therefore small lesion may be undetectable due to superimposed glandular tissue. Recently, digital breast tomosynthesis (DBT) emerged as a new imaging modality to overcome this limitation. 25 low-dose mammographic projections using a standard mammography system are performed over a limited angle of 50 degree. Based on these images a stack of cross-sectional images covering the entire breast is reconstructed with an interslice distance of 1 mm. The glandular dose of a tomosynthesis scan is comparable to a standard mammography in two projections. Due to the lack of superimposed tissue tomosynthesis images significantly improve the visualisation of small focal lesions. Therefore, tomosynthesis is especially helpful in young women with mammographic dense breast tissue and in patients with fibrocystic breast disease, whereas the additional information is limited in fatty breast tissue. Furthermore, tomosynthesis allows better evaluation of focal lesions compared to conventional mammography. The detailed analysis of the lesions' border helps differentiating between summation artifacts, benign lesions and carcinomas. In conclusion, tomosynthesis will not replace conventional mammography in the near future, but provides clinically important additional information in difficult cases. Additionally, tomosynthesis has the potential to become the imaging modality of first choice in selected patients, e.g. with dense breast tissue.

*Learning Objectives:*

1. To understand the technical principles of tomosynthesis.
2. To learn how tomosynthesis compares to conventional mammography.
3. To discuss which patients may benefit from tomosynthesis.

#### **D-04**

##### **More than MR-mammography**

*W.A. Kaiser; Jena/DE*

In its third decade of clinical evaluation MRM is backed up by high level of evidence in terms of high sensitivity, exact preoperative staging and accurate differential diagnosis. This is achieved applying standardised protocols including imaging parameters, contrast agent application, reading procedures and reporting. Reliable reading and reporting is based on a standardised assessment of morphologic and dynamic enhancement criteria. Thus, sensitive and specific diagnosis is reached in short time. Prerequisite for this is an optimised imaging protocol. Based on more than 25 years of experience, we have developed a robust and fast imaging protocol including dynamic T1w and T2w sequences with an overall acquisition time of about 12 minutes. Modern MRI systems with multichannel capability enable a combination of several surface coils. Thus, it is possible to increase the field of view beyond the breast. The reasons for doing so are obvious: while exact preoperative T-staging is achieved using breast MRI, conventional lymph node and distant metastasis staging include additional examinations like bone scintigraphy, ultrasound, x-ray or CT. However, multichannel-multicoil technology allows for a local, locoregional and distant staging in one examination. Investing 2-3 minutes additional magnet time enables imaging of thorax and abdomen including the vertebral bodies, resulting in accurate locoregional and distant staging, according to our initial experience. The implications of such an approach are a faster and more cost-effective patient management using modern MRI.

**Panel discussion**

**Friday, March 4**

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12:30 - 13:30

Room C

organised by GE Healthcare

## **SY 2**

**Widening clinical capabilities in MRI:  
latest advances**

### **D-05**

**Contributions to patient centric MR**

J. Coumans; Waukesha, WI/US

MR exams have been undergoing serious changes in the past decades. Reimbursement pressures call for ever shorter exam times, with ever-more problem solving diagnostic sequences. Procedure growth in pediatric and geriatric populations, and the quest for open bore MR systems to appease feelings of claustrophobia require new approaches in MR system design. The lecture will highlight a number of initiatives by GE in the above areas.

### **D-06**

**New 1.5T MR technology in clinical practice**

B. Wirth; Lons-le-Saunier/FR

The lecture aims at demonstrating the clinical value of a new 1.5T wide-bore whole body MR system equipped with the latest MRI pulse sequences and coils in the diagnostic of neurological, abdominal, pelvic, and musculoskeletal diseases. Special emphasis will be placed on the use of novel techniques such as contrast injected volumetric dynamic acquisitions in combination with fat/water separation methods in breast and liver oncology indications, NCE-MRA for the renal arteries, and motion-insensitive pulse sequences in abdomen and joints.

### **D-07**

**In search for molecular imaging: the tri-modality imaging approach**

G.K. von Schulthess; Zurich/CH

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12:30 - 13:30

Room D1

organised by Bayer Schering Pharma

## **SY 3**

**Advances in contrast enhanced MRI: efficacy, safety  
and applications**

*Moderator:*

M. Law; Los Angeles, CA/US

Programme not available by date of print

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12:30 - 13:30

Room E1

organised by Philips Healthcare

## **SY 4**

Programme not available by date of print

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12:30 - 13:30

Room G/H

organised by SuperSonic Imagine

## **SY 5**

**Exploring the breakthroughs against cancer and  
fibrosis**

Programme not available by date of print

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12:30 - 13:30

Room I/K

organised by Philips Healthcare

## **SY 6**

Programme not available by date of print

Saturday, March 5

10:30 - 12:00

Room I/K

organised by Bracco

**SY 7**

Programme not available by date of print

12:30 - 13:45

Room B

jointly organised by Siemens and Bayer Schering Pharma

**SY 8**

**Synergies in CT: for better patient care**

Moderator:

J.E. Wildberger; Maastricht/NL

**D-08**

**Contrast induced nephropathy: does it matter for CT applications**

U.J. Schoepf; Charleston, SC/US

**D-09**

**CT dose optimisation in paediatrics**

M. Siegel; St. Louis, MO/US

**D-10**

**Optimising contrast media application for modern imaging**

A.H. Mahnken; Aachen/DE

**D-11**

**Second generation iterative reconstruction: initial results**

M. Lell; Erlangen/DE

12:30 - 13:30

Room C

organised by GE Healthcare

**SY 9**

**X-ray advanced applications: clinical progress and benefits in routine practice**

Moderator:

L. Katz; Buc/FR

**D-12**

**Imaging metal implants: benefits of digital radiography advanced applications**

A. Blum; Nancy/FR

Flat panel digital radiography (DR) presents significant advantages over CR (high DQE, dose reduction, improved workflow and productivity, better workplace ergonomics). This technique allows also new application tools, such as dual-energy and tomosynthesis, which increase the diagnostic value of radiography in musculoskeletal disorders. Dual Energy techniques produce a high-peak-kilovoltage (kVp) image and a low-peak-kVp image with a less than 200-msec temporal separation. Post-processing of these two images results in the following images: a standard image (high kVp), a subtracted soft-tissues image that removes bone contrast from the underlying soft tissue, and a calcium image that displays bone structure. This technique also allows the differentiation between Titanium from steel or Chrome/cobalt alloy and of these metals from iodine or gadolinium mixtures. Therefore

dual-energy arthrography is a promising tool for the evaluation of painful prostheses. Digital x-ray tomosynthesis is a very low dose technique for producing slice images. The dose reduction is about 1/50 compared to CT-scan and its accuracy is superior to plain films in the diagnostic of subtle fractures. Metal artifacts do not affect it and the bone-metal interface can be well evaluated. The routine use of these techniques may drive significant cost savings in the imaging department.

**D-13**

**Digital breast tomosynthesis: clinical performance and vision**

G. Gennaro; Padua/IT

**Method:** The clinical trial (approved by the competent authorities) enrolled 250 consenting women with at least one doubtful or suspicious breast lesion discovered by mammography and/or ultrasound. Patients underwent bilateral digital mammography in two views (cranio-caudal, CC, and medio-lateral oblique, MLO) and tomosynthesis in one-view (MLO). Truth was established by histology or cytology and/or follow-up, according to the standard of care. A multi-reader study was conducted retrospectively and involved six independent radiologists. The study was performed in two phases, split in time to minimize bias: Phase 1: Patient images were organized in separate reading sessions, each including both FFDM and DBT of different breasts. The readers were asked to localize up to three findings per breast and rate each of them using the BIRADS classification. Phase 2: Reading sessions were designed using similar criteria as for Phase 1 with the difference that after DBT evaluation, FFDM CC-view was added and evaluation refined using both modalities. The objective was to quantify the potential added value of FFDM CC to DBT MLO. Per-breast and per-lesion analyses were performed on the datasets. Per-breast analysis compared mean areas ROC curves (AUCs). Per-lesion analysis took into account multiple lesions per breast and addressed the overall (benign and malignant) lesion detection rate.

**Results:** Phase 1 demonstrated non-inferiority of DBT (MLO) versus FFDM (CC+MLO), within 5% non-inferiority margin (AUC(DBT)=0.851; AUC(FFDM)=0.836; AUC difference=0.014, p=0.645; -95% CL=-0.049). No significant differences were found in sensitivity and specificity. Overall lesion detection rate was significantly improved by tomosynthesis (69% DBT vs. 65% FFDM, p=0.008), especially in dense breasts. Phase 2 confirmed the result regarding non-inferiority. Specificity was significantly higher with DBT compared to FFDM (87% vs. 83%, p=0.025). The adjunction of FFDM(CC) increased sensitivity of DBT alone significantly, allowing detection of 2.1 additional cancers, on average. **Conclusions:** Clinical performance of digital breast tomosynthesis (MLO) and mammography (CC+MLO) are not statistically different. Specificity and overall lesion detection rate of DBT were significantly higher. The addition of mammography CC view to DBT improved sensitivity. Results will be discussed and potential scenari for clinical use of breast tomosynthesis will be shared with the audience.

**Learning Objectives:**

1. To illustrate the results from a clinical performance study comparing digital breast tomosynthesis (DBT) with digital mammography (FFDM).
2. To share the vision of possible clinical use of tomosynthesis, based on these results.

**D-14**

**Routine use of digital tomosynthesis for lung nodule detection: clinical, workflow and economic impacts**

S. Kheddache, M. Boijssen, Å.A. Johnsson, A. Svalkvist, S. Zachrisson, A. Flinck, L.G. Månsson, M. Båth, J. Vikgren; Gothenburg/SE

Since December 2006, two pulmonary nodule detection studies, enrolling 114 consenting patients and more than 4800 chest tomosynthesis examinations (TS) (VolumeRad, GE) have been performed at Sahlgrenska University Hospital, Göteborg, Sweden. The most frequent indications for TS have been suspicion of a nodule, tumour, pneumothorax, cavitation or possible confounding skeletal pathology seen on conventional chest radiography (CXR). CXR suffers from low sensitivity and specificity. Patients are often referred to computed tomography (CT) for further work-up of suspicious findings. CT often solves the problem, but has disadvantages such as high radiation dose and high costs. TS offers an improved chest radiography method, which can be used to select patients who need further investigation with CT, thereby significantly reducing radiation dose to population (at least by a factor of 20), optimising the use of CT resources and reducing operating costs in the department. However, TS showed some limitations, such as the requirement for patients to hold their breath for 10s and limited depth resolution of reconstructed images. In the clinical setting at our institution, TS is now routinely used as an adjunct examination to CXR to decide whether to recommend CT or not, based on the findings of the combination of CXR and TS. TS is also used in selected cases for follow-up of pathology which has been confirmed by CT. TS is currently requested by the referring clinicians in more than 50% of TS cases performed. Being part of routine care in our institution, TS is coded and reimbursed.

## D-15

### Contrast-enhanced spectral mammography: clinical benefits in diagnostic workflow

C. Dromain; Villejuif/FR

**Purpose:** Quantify the additional clinical performance and derive the benefits of contrast enhanced spectral mammography (CESM) as an adjunct to standard of care (digital mammography (MX) and ultrasound (US)) in a diagnostic population of women.

**Materials and Methods:** After ethics committee approval 120 consenting patients recalled for diagnostic work-up were imaged with MX, US and CESM. CESM examinations were performed using a GE Healthcare (Chalfont St-Giles, UK) Senographe DS system, modified for paired dual energy exposures (below and above the K-edge of iodine) as well as image recombination for contrast visualization with texture cancellation. Intra-venous injection of iodinated contrast agent (300mg/ml) followed a standard CT protocol (1.5ml/kg of weight at 3ml/s rate). Truth was checked for 112 patients with histology, cytology or minimum 1-year follow-up. Seven experienced breast radiologists blinded on truth and clinical history performed individual interpretations of MX, US and CESM images. Findings were localized and assessed with BI-RADS scores (0 not allowed). Areas under the ROC curves (Az), sensitivity and false positive fraction were calculated using BIRADS 4 as threshold for positive readings.

**Results:** The dataset included a total of 150 proven lesions (86 malignant and 64 benign). Clinical performance (Az) with CESM increased for each reader and overall: areas under the ROC curves across the readers for MX+US and MX+US+CESM were 0.83 and 0.88 ( $p < 0.05$ ). Per lesion mean sensitivities for malignancies were 65.6% and 71.8% respectively ( $p < 0.05$ ) with a slight increase in the false marker rate per image: 0.49 for MX+US and 0.54 for MX+US+CESM.

**Conclusion:** Addition of CESM to standard mammography and ultrasound significantly increased clinical performance and sensitivity across the readers. CESM should play a significant role as a problem solving and staging tool in the breast lesion diagnostic workflow.

12:30 - 13:30

Room E1

organised by Guerbet

## SY 10

### Patient management in oncology: screening, diagnosis and staging of colorectal cancer

Moderator:

D.-M. Koh; Sutton/UK

## D-16

### How to improve the patient management in oncology with complementary techniques?

D.-M. Koh; Sutton/UK

## D-17

### Patient acceptance improvement with minimal bowel preparation in screening CT colonography

J. Stoker; Amsterdam/NL

CT-colonography is widely used in patients suspected of colorectal cancer. The technique is already used for screening in some countries and is a (potential) candidate for screening in other countries. Extensive bowel preparation is considered as the most burdensome part of the CT-colonography examination and therefore limited bowel preparation has been introduced. This bowel preparation concerns tagging of faecal residue with either iodine or barium, such that full cathartic cleansing is no longer mandatory. This limited bowel preparation is combined with a low fibre diet for homogeneously tagged stool. Colonoscopy cannot be performed at the same day, except when additional cleansing is performed. Studies on limited bowel preparation have shown that the accuracy is comparable to extensive bowel preparation, while the acceptance is better. This is not only important for symptomatic patients but also is crucial for screening. Screening techniques are evaluated for their yield and cost effectiveness. Yield concerns the detection of important lesions multiplied by the attendance. A technique with a good acceptance will lead to a better adherence to a screening program and - with comparable accuracy - higher yield. This might prove crucial for CT-colonography to be widely accepted as a screening technique.

## D-18

### Water-coloCT: an alternative imaging technique for colon cancer diagnosis

P.-J. Valette; Lyon/FR

CT is essential for the diagnosis of colonic diseases. Its contribution now extends to tumour or chronic inflammatory diseases. Two technical approaches are proposed to obtain the colonic distension: - air insufflation (in fact CO<sub>2</sub>), with three-dimensional reconstructions to perform a virtual colonoscopy, - water enema. An IV injection of iodine is then performed with image acquisition at the venous time. The main purpose of the water-coloCT is to reveal the existence of a colonic stenosis and/or parietal lesions with precise description of the extent and aspect in favor of enhancement by iodine. Lymph nodes and metastases are also checked, for staging of the tumour. Various studies have demonstrated the excellent sensitivity (98%) of the water-coloCT for detection of colonic tumours including small lesions. More useful, is its near-perfect negative predictive value (99%). Because of its simplicity, water-coloCT finds its ideal indications in symptomatic patients but at risk for a real colonoscopy with general anesthesia. The addition of a simple water enema during scanners performed for assessment of inaugural liver metastases with unknown primary tumour makes also possible the immediate detection of the colonic origin if so. In practice, water-coloCT is therefore directed to symptomatic patients suspected of having colon cancer, and is a complementary technique of virtual colonoscopy in the screening of adenomatous polyps in non symptomatic patients.

## D-19

### Dynamic MR imaging in liver staging after colon cancer

T.J. Vogl; R. Hammerstingl; Frankfurt a. Main/DE

Liver metastases are the most common cause for liver malignancy. High precision in detecting, localizing, and characterizing lesions in liver staging after colon cancer is important, because further treatment decision may have consequences for the prognosis of the patient. Improvements in imaging modalities have contributed to a better depiction, delineation and classification of tumors. Contrast-enhanced MR imaging has become an essential part of liver examination in a number of circumstances. Extracellular fluid space contrast agents are safe compounds in handling and provide information on vascularization and perfusion of focal liver tumors. A dynamic contrast-enhanced study of the liver is performed during the arterial, portal venous, and delayed phase of enhancement. Fast spoiled GRE allows thin-section imaging of the entire liver during a single breath-hold. New volumetric sequences have enabled three-dimensional dynamic imaging with a very high spatial and temporal resolution. The key issue of contrast agents in hepatic imaging is to discriminate between tissue that cannot be adequately differentiated on unenhanced MR imaging. Different characteristic features of the intravascular and extracellular spaces of the various focal liver lesions are depicted by extracellular gadolinium contrast agents. Dynamic imaging has also been shown to improve not only the distinction of malignant lesions but also to achieve the specific diagnosis for most liver tumors and to identify benign disease precisely. Peripheral rim-enhancement, wash-out effect, triangle and wedge sign are typical characteristics of metastases.

## D-20

### Whole-body staging with contrast-enhanced PET-CT

G. Antoch; Düsseldorf/DE

Diagnostic potentials - as well as limitations - associated with morphological cross-sectional imaging on the one hand, and functional imaging on the other, are increasingly well understood. It has become obvious that in many cases both kinds of imaging complement one another. Therefore, hybrid PET/CT imaging must be considered one of the most important new developments in medical imaging in the past decade. When coupling PET with contrast-enhanced CT data whole-body staging of colorectal tumours may be accomplished in a single session offering both diagnostic CT and diagnostic PET data. However, some questions have to be raised and challenges have to be met to avoid overrating PET/CT when staging colorectal disease. The accuracy of PET using FDG as a radionuclide is only low when assessing the T-stage and N-stage of colorectal tumours. Specified PET/CT protocols, such as PET/CT-colonography, may increase this accuracy. However, the main indication for PET/CT in colorectal disease has been staging for distant metastases. In this setting FDG-PET/CT has been reported of high sensitivity with advantages over other imaging procedures. However, even in tumor staging FDG-PET/CT may have limitations in body regions such as the brain (high physiological FDG uptake) or the liver (breathing motion). This talk summarizes the indications of contrast-enhanced PET/CT in whole-body staging of colorectal tumors. Potential limitations of the imaging procedure will be addressed.

## D-21

### Questions and conclusion

D.-M. Koh; Sutton/UK

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12:30 - 13:30

Room F1

organised by Hitachi

## SY 11

### Hitachi real-time tissue elastography (HI-RTE):

#### from the experts

Moderator:

D. Musset; Clamart/FR

## D-22

### Welcome and introduction

D. Musset; Clamart/FR

## D-23

### State of the art Hitachi real-time tissue elastography: characterisation of focal breast lesions

A. Thomas, T. Fischer; Berlin/DE

In the recent years, advanced techniques have revolutionised breast ultrasound (US). The new possibilities comprise techniques for optimising image quality such as tissue harmonic imaging (THI) and frequency compounding (FC), tools for post-processing US raw data such as strain imaging (elastography), and the use of real-time tissue elastography. Initial data suggest that elastography can improve the specificity of ultrasound in differentiating benign and malignant breast lesions. Calculation of strain ratios contributes to the standardisation of real-time tissue elastography with a high sensitivity and allows significant differentiation of breast lesions with a higher specificity compared to B-mode, subjective evaluation of elastography and mammography. The presentation will focus on characteristic features of malignant and benign breast lesions using state of the art US techniques with a special focus on elastography and calculation of strain ratios.

Learning Objectives:

1. To learn how to use new US techniques with classification of focal lesions according to BI-RADS and Ueno Scores.
2. To learn how to use new US techniques with presentation of examples that demonstrate the benefits of elastography.
3. To learn how to use new US techniques with characteristic features of strain ratio quantification.
4. To learn how to use new US techniques with outlook: new techniques for breast elastography.

## D-24

### New aspects in tendon imaging

A. Klauser; Innsbruck/AT

Real-time tissue elastography in tendons: is there any value? Imaging has been used as a yardstick for diagnosing tendinopathies and in particular achillobodynia, with MRI and US as the most commonly used modalities in clinical routine. However, in the literature, the value of these methods is somewhat controversial when compared with clinical assessment. The etiology of tendon disorders is believed to be multifactorial. Repetitive microtrauma and vascular alteration as well as hypoxic, mucoid, calcifying, and lipid degenerations may lead to microscopic alterations, tendon thickening, partial tearing and subsequent full-thickness ruptures. Clinical differentiation between tendinopathy, partial tears, and even paratendinitis may be difficult, and therefore imaging is used, predominantly MRI and US. In the musculoskeletal field, real-time tissue elastography can help improve estimation of tendon stiffness, which might give additional information in the cycle of tendon degeneration to conventionally used imaging modalities. The usefulness of elastography can be expected to increase rapidly in the musculoskeletal field, as soon as we learn to interpret elastographic artifacts as well as to take advantage of the new information provided by real-time tissue elastography. Preliminary findings of real-time tissue elastography in healthy and pathological Achilles tendons, technical considerations, examination technique and several limitations will be addressed.

## D-25

### Hitachi real-time tissue elastography in radiology

P.S. Sidhu; London/UK

Real-time tissue elastography of the testis - a useful tool? Ultrasound is the 'gold-standard' of imaging of the scrotal sac and is unparalleled in that in almost all instances it out-performs other imaging modalities. The development of high-frequency transducers and exquisitely sensitive colour Doppler methods has revolutionised the assessment of the scrotal contents. Nevertheless, clinical palpation remains the cornerstone of diagnosis particularly in the assessment of the testicular tumour, deciding whether malignancy is present. Newer technology introduced to ultrasound, and in use in other areas of the body, may find an application in the scrotal sac. Real-time tissue elastography may scrutinise the lesion within the testis, particularly the small indeterminate intra-testicular lesion, and characterize the 'hardness' aiding management and perhaps avoiding unnecessary surgery or orchidectomy. Areas of ischaemic change and scarring, demonstrating different elastography patterns from tumour, may be identified with added confidence. Global testicular disease causing fibrosis and infertility may present characteristic patterns on elastography, avoiding testicular biopsy for confirmation. This presentation will demonstrate the various appearances of testicular pathology on real-time tissue elastography, indicating areas where this technique may be useful and suggesting areas for further research and eventual clinical utility.

## D-26

### Non-invasive evaluation of liver fibrosis using Hitachi real-time tissue elastography

K. Fujimoto; Tanabe/JP

Assessment of liver fibrosis stage using the liver fibrosis index (LF Index). Within the long-term scenario of chronic hepatitis C, the relationship between the risk of hepatocellular carcinoma and the stage of liver fibrosis has been reported. Thus histological diagnosis by liver biopsy is important to evaluate the stage of hepatic fibrosis; however, it is an invasive technique. Previously, measurement of platelet count and liver fibrosis markers have been used as non-invasive tests to evaluate liver fibrosis, combined with diagnostic imaging methods such as ultrasonography. Recently, real-time tissue elastography (RTE) has been developed. This technique has implemented the combined autocorrelation method for the high-speed calculation and real-time colour display of relative tissue stiffness derived from tissue strain. We have examined the accuracy of RTE for the evaluation of liver fibrosis in chronic hepatitis C and reported that the liver elasticity score, which was scored visually, significantly increased as fibrosis stage progressed and reflected the degree of liver fibrosis. We performed RTE on 310 patients with chronic hepatitis C (and/or liver cirrhosis) and 15 healthy volunteers. Nine image features were extracted from each RTE image and a multiple regression analysis was performed to derive the regression equation. This equation calculates a liver fibrosis index (LF Index), which in turn predicts the fibrosis (F) stage of the liver. LF Index not only correlates highly with the F stage ( $r=0.68$ ), but also it shows significant differences in LF Index values ( $p<0.001$ ) between each stage of fibrosis. As a result, it was possible to assess liver fibrosis stage non-invasively using elastography. The liver fibrosis index (LF Index) highly correlated with histological assessment of liver fibrosis stage.

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12:30 - 13:30

Room F2

organised by Philips Healthcare

## SY 12

Programme not available by date of print

12:30 - 13:30

Room G/H

organised by Philips Healthcare

## SY 13

### Advances in radiology ultrasound using iU22 xMATRIX technology

Moderator:

E. Danse; Brussels/BE

#### D-27

##### Liver and renal 3D conventional and contrast-enhanced US using the iU22 xMatrix system: technical innovation or clinical revolution

J.-M. Correas; Paris/FR

#### D-28

##### xMatrix ultrasound: the power of CT/MR in your hand

S.T. Elliott; Newcastle upon Tyne/UK

12:30 - 13:30

Room I/K

jointly organised by Bracco and Toshiba

## SY 14

### Contrast enhanced ultrasound (CEUS): the effective imaging solution

Moderator:

M. Claudon; Vandoeuvre-lès-Nancy/FR

#### D-29

##### New clinical data to support DCE-US as the imaging modality for the monitoring of anti-angiogenesis therapies efficacy

N. Lassau; Villejuif/FR

The early functional evaluation of new treatments is a main goal. At present, technical advances in DCE-ultrasonography using bolus contrast agent (SonoVue®, Bracco) and perfusion software allow the detection of micro-vascularisation and perfusion of superficial and deep malignant tumours. Thus, it becomes possible to early evaluate the efficiency of antiangiogenic or anti-vascular molecules. Treatment response can be early predicted according to modifications of this vascularisation before any volume modification. The acquisition of raw linear data affords the precise quantification (peak intensity, time to peak intensity, slope of wash-in, and area under the curve, etc.) of the perfusion after contrast uptake curves modelisation, particularly using time tracking of region of interest. The results obtained in our institution on 117 patients, will be focused on GIST, RCC, HCC, and melanoma treated with different molecules. Reduction in tumour vascularisation can easily be detected in responders after 1 or 2 weeks and is correlated with progression-free survival and overall survival in RCC or HCC. DCE-US is supported by the French National Cancer Institute (INCa), which is currently studying the technique in metastatic breast cancer, melanoma, colon cancer, gastrointestinal stromal tumours and renal cell carcinoma, as well as in primary hepatocellular carcinoma, to establish the optimal perfusion parameters and timing for quantitative anticancer efficacy assessments. Final results: 539 patients evaluated in 19 centers with more than 2000 DCE-US demonstrating that AUC could be a robust parameter to predict response.

#### D-30

##### Evaluation of the clinical impact of CEUS in the treatment of abdominal aneurysm

V. Cantisani; Rome/IT

Endovascular aneurysm repair (EVAR) is an effective alternative treatment to open repair of abdominal aortic aneurysm and the number of EVAR procedures carried out worldwide is continuously growing. Incomplete exclusion of the aneurysm sac from the circulation, defined as endoleak, is the most frequent complication after EVAR occurring in 10% to 45% of cases, and it can be associated with aneurysm enlargement and possibly rupture. Despite its notable advantages, ultrasonography has not yet achieved reference standard status in the EVAR follow-up because of

low diagnostic specificity and sensitivity. Recent studies on ultrasound examinations performed without echo-contrast agents reported sensitivity rates ranging from 43% to 97%, such wide differences suggesting that it does not guarantee the necessary reliability (4,5). Therefore, to date computed tomography angiography (CTA) is the preferred imaging modality to follow-up patients after EVAR. However, CTA surveillance carries the risks associated with radiation and contrast media exposure. Magnetic resonance angiography (MRA) and contrast-enhanced ultrasonography (CEUS) have been shown in some studies a better accuracy than CTA (6, 7-13). However, there is no consensus with regard of optimal work-up with diagnostic imaging modalities in surveillance after EVAR. The accuracy of current imaging modalities in the detection and characterisation of endoleaks in aortic endografts, focusing especially on the accuracy of CEUS with the use of second generation contrast agent have been presented. The advantages, the limitations of CEUS in comparison with CTA and MRA, will be discussed.

#### D-31

##### The role of CEUS in the assessment of renal graft: immediate and long term transplant follow-up

T. Fischer; Berlin/DE

Contrast ultrasound is a promising and new method that is superior to established ultrasound techniques like conventional B-mode scanning for volume measurement, demonstration of hematoma and colour Doppler for the detection of acute rejection or perfusion defects in the diagnostic evaluation of kidney grafts. Moreover, contrast enhanced ultrasound has the potential for tumour characterisation in transplant and normal kidneys. A single examination by contrast ultrasound can answer a variety of questions in the early postoperative phase and long-term follow-up. Initial studies show that efficient and early diagnosis of rejection or acute tubular necrosis (ATN) is possible as these conditions have characteristic bolus kinetics. Surgical complications like perfusion defects secondary to thrombosis of a polar artery or postoperative hematoma are also identified. Perfusion effects of an hematoma can also be assessed in standardised manner.

14:00 - 15:30

Room C

organised by Hologic

## SY 15

### The use of breast tomosynthesis in clinical practice

Moderator:

A. Smith; Bedford, MA/US

Programme not available by date of print

14:00 - 15:30

Room E1

organised by Siemens

## SY 16

### Shaping the future of molecular and magnetic resonance imaging

Moderator:

M. Schwaiger; Munich/DE

#### D-32

##### Reducing CT dose in myocardial perfusion SPECT/CT

E. O'Shaughnessy; Poole/UK

**Aims:** To reduce the CT dose for attenuation correction to SPECT studies as much as possible without adversely affecting its accuracy. **Methods:** Using the Perspex CTDI phantom with the Xi detector to measure dose, CT scans were acquired using the Siemens Symbia T over the range of CareDOSE settings. Using the default setting 'ACEmean' the measured dose at the centre of the phantom was 1.675mGy and the breast dose from the topogram was 0.3mGy. The lowest dose was achieved using the setting 'DOM' where the doses were reduced to 1.205mGy and undetectable respectively. To observe the effect of changing these settings, 30 patients received a stress scan with default CT settings and a rest scan utilising SPECT guided CT and the new settings.

**Results:** The mean dose reduction for 30 patients was 23.5%. The dose reduction was greatest for larger patients. The largest dose reduction for one patient was 2.5mSv for 'ACEmean' settings to 0.7mSv for 'DOM' settings. There was no apparent difference in attenuation correction between the two sets of resultant images.

**Conclusion:** The average CT dose was reduced by 23.5% over the 30 patients studied. These new low-dose settings have now been applied to all clinical studies.

*Learning Objectives:*

1. To appreciate the range of CT doses resulting from the default low-dose CareDOSE settings.
2. To learn how these CT doses have been reduced in nuclear medicine at Poole Hospital NHS Foundation Trust.
3. To appreciate the dose reduction achieved.

## D-33

### Whole-body MR-PET: first experiences

M. Schwaiger; Munich/DE

## D-34

### Clinical relevance and potential of 3 Tesla for musculoskeletal imaging: first experiences using MAGNETOM Skyra

T.C. Mamisch; Berne/CH

**Aims:** Improvement of clinical diagnostic performance and workflow using 3T MRI with dedicated musculo-skeletal imaging coils.

**Methods:** Overview of current approaches in musculo-skeletal imaging at 3T from clinical protocols routinely used to new research work. The presentation will focus on improvements in diagnostic imaging for indication, planning and follow up of therapy. Follow areas will be covered: 1. High Resolution Fast imaging: Enabling better SNR at 3T and using dedicated coils to deliver extremely high resolution within clinically acceptable examination times. Alternative for customers who require increased throughput the scan time can be drastically reduced using 3T. 2. 3D Isotropic Imaging as a means of delivered enhanced workflow and increased quality of diagnosis. 3. Biochemical Imaging for improved diagnostic capability and therapy planning. 4. Orthopedic dedicated coils to fully capitalise on the benefits of 3T and to open up new areas of study not previously possible i.e. biochemical imaging of the cartilage in the wrist or ankle.

**Conclusion:** 3T MRI using dedicated coils advances MR imaging of the musculo-skeletal system. This supports development of new therapy concepts, i.e. drugs, cartilage repair, stem cells and preserving surgery, as the advances in musculo-skeletal imaging are capable of grading and staging of the diseases for precise diagnosis and monitoring of therapy.

*Learning Objectives:*

1. To summarise current literature and own experiences of clinical use and relevance of 3T MRI in musculo-skeletal imaging.
2. To learn about clinical advantages to use 3T MRI.
3. To learn about optimisation of protocols at 3T.
4. To give an overview on new application on 3T, as 3D isotropic - or functional imaging.
5. To learn more initial experiences and potential improvements of musculoskeletal imaging using dedicated 16 channel coils at MAGNETOM Skyra.

14:00 - 15:30

Room F2

organised by GE Healthcare

## SY 17

### Promise of advanced oncology imaging

Moderator:

R.C. Sigal; Velizy/FR

## D-35

### Latest guidance technologies for interventional oncology

F. Deschamps; Villejuif/FR

Interventional radiologists need 3D information to plan and guide percutaneous or vascular procedures. The Innova (=trademark of General Electric Company) Vision, the Innova TrackVision and FlightPlan for Liver applications from GE Healthcare provide great help for real-time guidance. The Innova Vision application is used for better understanding of the 3D anatomy and for real time guidance of the catheter

during vascular procedure by providing a virtual "3D road-map" which superimposes the live fluoroscopic images with Innova 3D reconstruction. 3D models, such as hepatic arteries or portal veins, can be reconstructed from subtracted or non-subtracted Innova 3D rotational angiography, computed tomography or magnetic resonance images. This 3D road-map is automatically adjusted in real time for all changes in C-arm angulations, field of view and table positions. The Innova TrackVision application is used to plan and guide needle trajectories for percutaneous procedures such as biopsy, cementoplasty or radiofrequency ablation. After performing an Innova 3D acquisition, the user defines the entry and target points on the Advantage Workstation Volume Share. The line between these two points is automatically superimposed on the fluoroscopic image as a "virtual needle". The "bull's eye" view, which shows the virtual needle as a single point, increases confidence in the optimal needle position for skin entry and in the right direction for progression. The "progress view", which shows the needle trajectory as a line, monitors the advancement of the needle to the target. The FlightPlan for Liver is the ultimate dedicated oncology guidance tool which automates the selection of the arterial path from the main arterial entry to the selected target in the liver and displays the color coded vessel path to help speed up endovascular liver interventional procedures significantly. This improves the physicians ability to determine tumour feeding vessels. When combining the FlightPlan for Liver with Innova Vision, the 3D path can be directly superimposed on fluoroscopy and can help to perform interventions more quickly and with more confidence.

## D-36

### MR guided focused ultrasound (MRgFUS) for treating oncology patients

C. Catalano, A. Napoli; Rome/IT

MR guided focused ultrasound surgery (ExAblate, InSightec Ltd) is a completely non-invasive method of thermally ablating target tissue, while preserving surrounding tissues and organs. The combination of MR guidance with high intensity ultrasound waves enables planning and continuous real time guidance with a high safety profile, providing personalized treatment which is adjusted to the individual patient. MRgFUS is becoming an established treatment option for uterine fibroids and increasing data is being developed for use in various oncology applications. We report on the results in our center for pain palliation of bone metastases and other bone tumours, pancreas, and other indications.

## D-37

### The role of fusion imaging in complex biopsy and ablative procedures

J.-M. Correas; Paris/FR

The purpose of this presentation is to report our preliminary experience with the LOGIQ E9 V Nav - Fusion Imaging feature for performing complex biopsy and ablative procedures. Fusion Imaging in Ultrasound refers to the possibility to fuse live ultrasound acquisition with pre-acquired DICOM volume dataset obtained from other imaging modalities such as MRI, CT and PET-CT. This technique is taking advantage of the specific value of each imaging modality, as the temporal resolution and easy of use of ultrasound to the higher spatial and contrast resolution of CT and MRI. This leads to additional clinical information that helps to increase his confidence in performing difficult procedures. In addition to Fusion Imaging, additional features of the V Nav Package were evaluated. The GPS markers keep tracking the position of marked anatomical structures or references while scanning, enabling an easier access to difficult to reach lesion or simply helping to mark a poorly visible lesion at Ultrasound while visible in CT/MRI before treatment. The possibility to combine GPS, Contrast Enhanced Ultrasound and Fusion Imaging (US/US), together with the Automatic Ultrasound to Ultrasound registration, increased further the clinical confidence in the pre-interventional and interventional phases performed under Ultrasound guidance. The Needle Tracking, a reusable V Nav sensor embedded in the tip of a needle, enables interventional procedures to be planned using any needle insertion path, including an approach that is out of plane with the ultrasound image. As the needle is inserted, the needle path and trajectory are projected onto the current image. Because the sensor is at the distal tip of the needle, the tip and trajectory graphics are correct even when the needle bends.

14:00 - 15:30

Room N/O

organised by Sectra

## SY 18

Programme not available by date of print



**Sunday, March 6**

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12:30 - 13:30

Room C

organised by GE Healthcare

## **SY 19**

**Redefining the rules of CT imaging:  
new frontiers for patient care and image quality**

Moderator:  
A. Laghi; Latina/IT

### **D-38**

**New insights from contrast media research**  
J.A. Jakobsen; Oslo/NO

### **D-39**

**Gemstone spectral imaging (GSI): a significant advance in the diagnostic performance of CT for emergency imaging?**  
J. de Mey; Brussels/BE

### **D-40**

**Ultra low dose abdominal CT with iterative reconstruction technologies:  
how low can you go?**  
M.M. Maher; Cork/IE

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12:30 - 13:30

Room G/H

organised by Philips Healthcare

## **SY 20**

Programme not available by date of print

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12:30 - 13:30

Room I/K

organised by Bracco

## **SY 21**

Programme not available by date of print

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12:30 - 13:30

Room L/M

organised by Siemens

## **SY 22**

**Pioneering innovations in ultrasound**

### **D-41**

**Acoustic radiation force imaging (ARFI): repeatability of measurements and assessment in relation to immediate targeted liver biopsy**  
P.S. Sidhu; London/UK

Acoustic radiation force imaging (ARFI) is a promising non-invasive technique in the assessment of liver fibrosis with the ultimate aim being to avoid or at least delay liver biopsy in patients with chronic liver disease. With any technique, the ability to reproduce accurate measurements is paramount to the success of the technique in the clinical scenario. Furthermore the measurements should be reproducible between different operators using the technology. Reproducibility studies are essential to the clinical utility of this new technique and recent studies have confirmed the

robustness in clinical imaging. A further limitation of any non-invasive technique is the patchy nature of the distribution of fibrosis in the diseased liver, a problem also encountered with targeted biopsy. If the results of an ARFI measurement are to have credibility, the 'reference' standard has to be the ultimate of histology from the exact site sampled by the ARFI 'region-of-interest' box. To this effect a series of patients being investigated for the possibility of fibrosis underwent ARFI followed immediate biopsy from the same site. Both reproducibility studies and results from targeted biopsy will be presented to give an overview of the robustness of the technique.

### **D-42**

**Strain imaging and automated ultrasound in the breast**  
C.S. Balleyguier; Villejuif/FR

### **D-43**

**Automated image fusion: a new processing approach in clinical use**  
D.-A. Clevert; Munich/DE

