

# AXIOM Innovations

The Magazine for Interventional Radiology and Cardiology,  
Radiography and Fluoroscopy

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**SIEMENS**

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Where Value Meets Performance



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# Dear Reader,



**Dr.-Ing. Norbert Gaus**  
President AX Division

In recent years, cost pressures in healthcare have been growing and investing in the right imaging systems has become more important than ever for hospitals and other healthcare providers. Especially smaller facilities are facing these challenges and need to invest in technology that is reliable and efficient. We at Siemens Healthcare are well aware of the market situation and want to provide systems with our customers' needs in mind – systems that are affordable and, thus reliable work horses that also fit into smaller budgets. Our goal is to reduce costs but maintain or even increase quality at the same time.

In fluoroscopy and radiography, patient throughput and smooth workflow are equally important. Especially in these clinical fields, a reliable system with features that lighten the daily workload is key for efficiency. Our new Luminos RF Classic\* fluoroscopy system is a prime example of affordable technology with good performance. Its broad applications spectrum and well-thought-out features make it ideal for smaller hospitals or practices. And on the radiography side, MULTIX Swing mFD\* enables customers to enter the world of digital radiography with a small but powerful system with a digital flat detector. This entry solution with its

affordable price lets you easily switch from analog technology to digital and provides you with the many benefits of fully digital workflow.

Interested? Just turn the page and find out more about our cost-efficient system in this special edition of AXIOM Innovations.

Enjoy reading AXIOM Innovations

A handwritten signature in black ink, appearing to read 'N. Gaus'.

Dr. Norbert Gaus

\* Not commercially available in the U.S.

\*\* Pending 510(k)

The information about this product is being provided for planning purposes.

The product is pending 510(k) review, and is not yet commercially available in the U.S.

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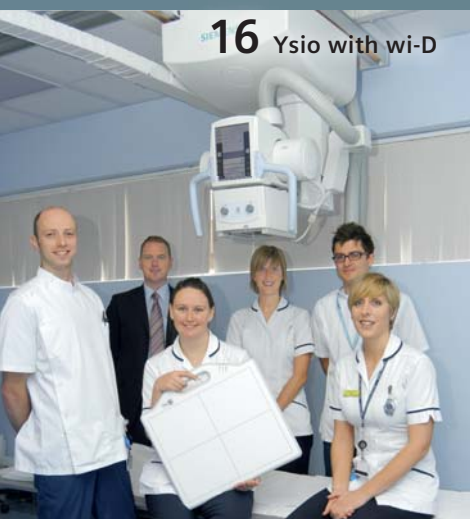
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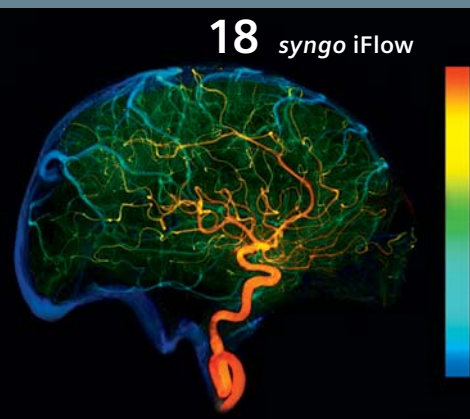
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# Luminos RF Classic – Where Value Meets Performance

With Luminos RF Classic\*, Siemens Healthcare is launching a new affordable but powerful fluoroscopy system that was developed as a cost-effective, reliable solution to support clinical needs as well as to honor the budgets of cost-conscious customers.



\* Luminos RF Classic is not commercially available in the U.S.





Projection flexibility with Luminos RF Classic: Table examinations, free bedside exposures with cassettes, upright examinations with Bucky wall stand or with the patient table.

Cost pressures are growing in healthcare. One of the challenges healthcare providers face is making the right investment. Which technology is the most effective for our clinic? What imaging system should we choose? Will our investment really pay off? What's good value in medical imaging? These and many other questions are on the minds of physicians, administrators and users when investing in new equipment. Siemens Healthcare is answering customers' needs by providing affordable systems for budget-conscious customers. Luminos RF Classic\*, the new remote-controlled fluoroscopy system, is one of them: an analog fluoroscopy system providing all-round great value.

### Good value in fluoroscopy

Siemens Healthcare is continuously investing in the development of innovative but economically priced equipment to offer a solution for their customer

groups. Luminos RF Classic stands for innovative features and proven technology at an excellent price-performance. The system helps to quickly recoup the initial investment by providing efficient user-friendly workflow, excellent diagnostic capabilities and great reliability.

### Suited for a broad range of applications

Flexibility is key for hospitals, imaging centers and private practices since their patients require a broad spectrum of applications and exams, from gastrointestinal and urogenital studies, ERCP, IVP, venography, arthrography, myelography, general X-rays, to name a few. Luminos RF Classic can easily handle the various imaging needs for fluoroscopy and radiography in the imaging department. And flexibility means not only covering a broad range of applications, it also means flexibility in configuring the system. Luminos RF Classic

can be tailored to meet different clinical needs and individual working preferences. The choices include different sizes of image intensifiers, a compression device, tomography, different monitor configurations and various accessories for patient positioning. Furthermore, an optional Bucky wall stand increases versatility of the system. With this addition to Luminos RF Classic, upright examinations such as chest, spine or legs can be done with ease using conventional film or CR cassettes in the wall stand.

### Intuitive and fast workflow

Keeping it simple and user-friendly is what customers ask for most when it comes to medical imaging devices. An intuitive user interface is important to provide quick system operation and a short learning curve. Luminos RF Classic comes with a touch user interface to control and adjust examination param-



A real time saver: the newly designed intuitive and user-friendly remote control console with touch user interface.

eters conveniently. A dedicated organ program editor can create up to 400 individual organ programs for all types of examinations. When tableside operation is called for, Luminos RF Classic also makes a tangible difference. Comprehensive control elements located directly at the spotfilm device enable easy operation of all crucial functions right at the patient's side.

Moreover many highly appreciated functionalities from the Siemens line of successful fluoroscopy solutions are available with Luminos RF Classic. This includes the fully automatic cassette spotfilm device which enables convenient and fast single-handed cassette operation, convenience in patient positioning and excellent coverage delivered by the 8-way tabletop movement and large travel range of image receptor. Easy access to patients from rear of the system allows excellent patient support. In addition, the table features AutoRetrac for automatic anti-collision protection. The tabletop automatically

retracts during table tilt, preventing contact with the floor. In sum, such benefits substantially speed up workflow and enables excellent patient care.

### No compromise in image quality

Luminos RF Classic also makes a visible difference, particularly in terms of its imaging and dose-saving capabilities. High-contrast 1k x 1k real-time imaging with high-quality components such as the image intensifier with excellent quantum absorption are the basis for accurate diagnoses. The system minimizes dose level without compromising image quality. This includes copper prefiltration to reduce the entrance dose, a last-image-hold function, as well as the motorized removable grid, which is an essential requirement for pediatric exams. SUPERVISION can additionally reduce radiation up to 50%, which is especially

suitable during real-time imaging of slow moving organs.

### The best way to be economical: Invest in saving

Luminos RF Classic offers great value for the money. Whether for its handling convenience, outstanding image quality, versatility or reliability, Luminos RF Classic is a solid investment for any imaging facility. It combines quality components and proven technology to offer excellent performance for the complete range of applications. Luminos RF Classic: where value meets performance.

\* Luminos RF Classic is not commercially available in the U.S.  
Some features mentioned are optional.

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# Diagnostic and Therapeutic Value of Lymphography in Persistent Postoperative Chylothorax Supported by AXIOM Luminos dRF

Courtesy of Prof. Alexander C. Langheinrich, MD  
Center for Radiology, University Hospital Giessen and Marburg, Germany



In the past, conventional lymphography (LAG) has been the gold standard for imaging the lymphatic system. With the introduction of cross-sectional imaging techniques, especially computed tomography (CT) and magnetic resonance imaging (MRI), the number of lymphographic investigations has declined markedly. However, conventional lymphography demonstrates an important role in the diagnosis and management of lym-

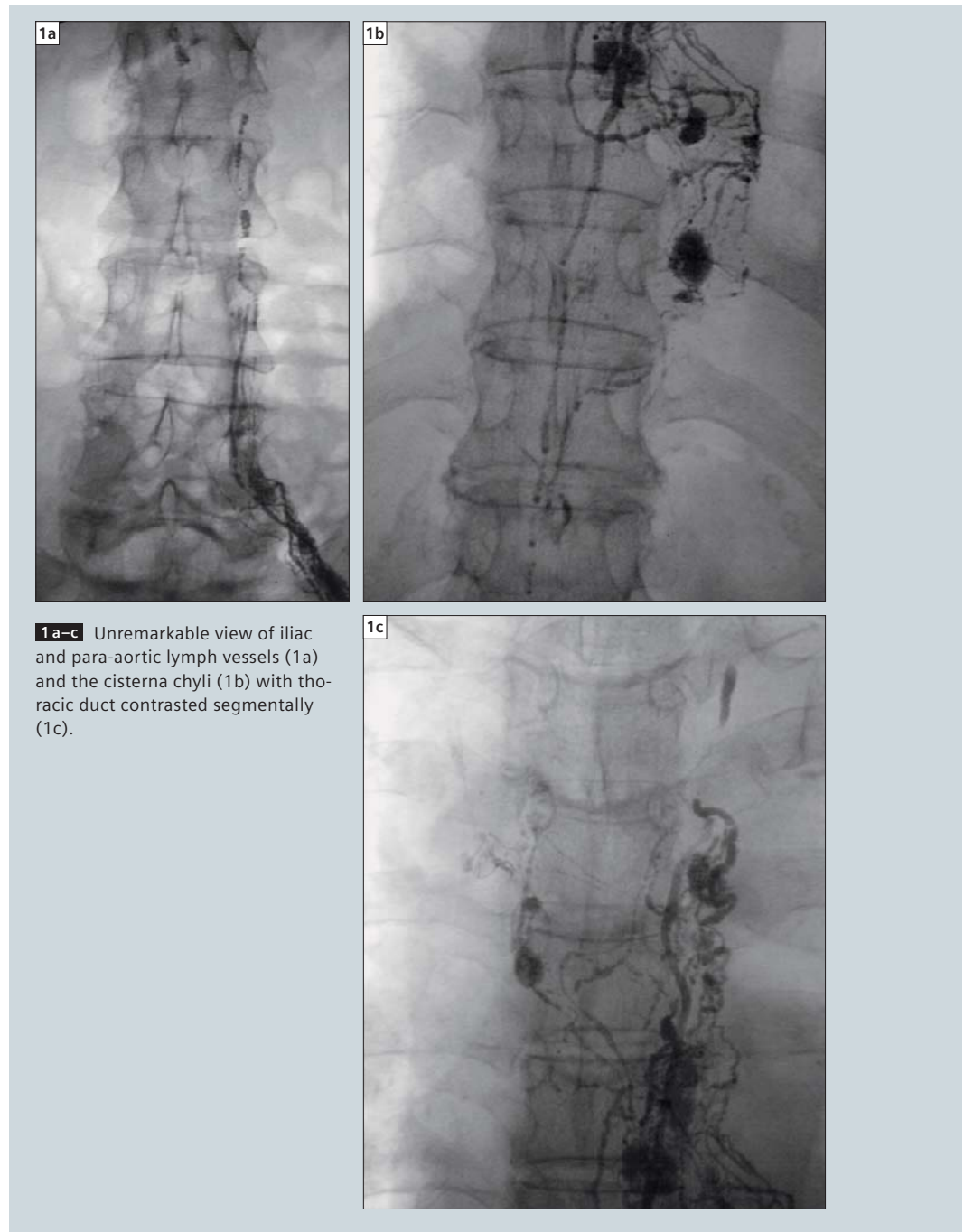
phatic circulatory disorders, especially in the exact anatomical visualization of lymphatic leakage. What's more, conventional lymphography has a valuable place in its therapeutic use, as the applied contrast agent lipiodol (48% iodinated glycerol ester) can suspend the egression of chyle by inducing an inflammation at the site of outflow which leads to a saponification of the surrounding fat tissue.

At the Center of Radiology at the University Hospital Giessen, lymphography is a routine procedure. The center performs about 40 to 50 lymphography examinations per year.

Prof Dr. Langheinrich, Center for Radiology, University Giessen and Marburg, Germany







### Patient History

58-year-old male initially presented with persistent cough. The man has been a smoker for 30 years. His cigarette consumption is estimated at 20 pack years\*.

### Procedure

Status was assessed using X-ray imaging of the thorax. This confirmed suspicion

of a central mass. Computed tomography of the thorax was recommended for further clarification.

The CT exam of the thorax showed suspect lymph node enlargements in the mediastinal region with indication for thorascopic lymph node removal.

Two days postoperative of lymph node removal, X-ray check of the thorax revealed bilateral pleural effusion.

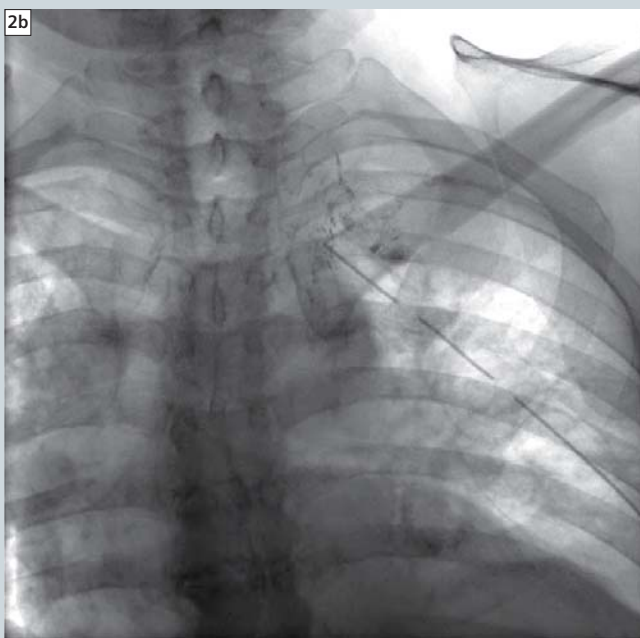
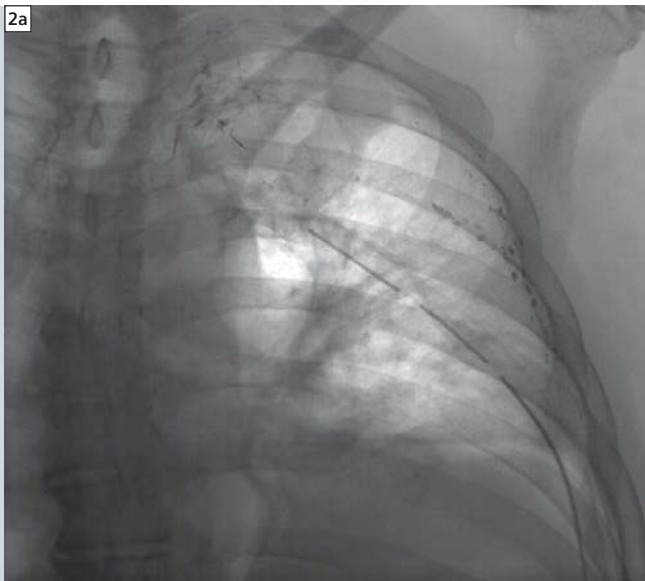
After puncture of the effusion, the patient was diagnosed with a chylothorax.

### Diagnosis

Chylothorax with indication for therapeutic lymphography.

### Lymphography procedure

After local cutaneous disinfection, a mixture of 5 ml of 1% Lidocaine and



“We are using the AXIOM Luminos dRF for the whole spectrum of fluoroscopy examinations including diagnostic angiography studies. The system is very intuitive to use – from system handling to post-processing. And the image quality is outstanding.”

Prof. Alexander C. Langheinrich, MD,  
Center of Radiology, University Giessen  
and Marburg, Germany

**2a–b** Contrast agent containing lipiodol exits into the pleural cavity (2a, 2b). A flow of contrast agent into the venous angle is not detectable under fluoroscopy (2b).

5 ml of methylene blue dye was injected into the cutaneous and subcutaneous tissues of the first and second interdigital space.

The subcutaneous lymphatic vessels are identified through the skin after almost 10 minutes. “Via a longitudinal cutaneous incision, a vessel lateral to the base of the first metatarsal is exposed.

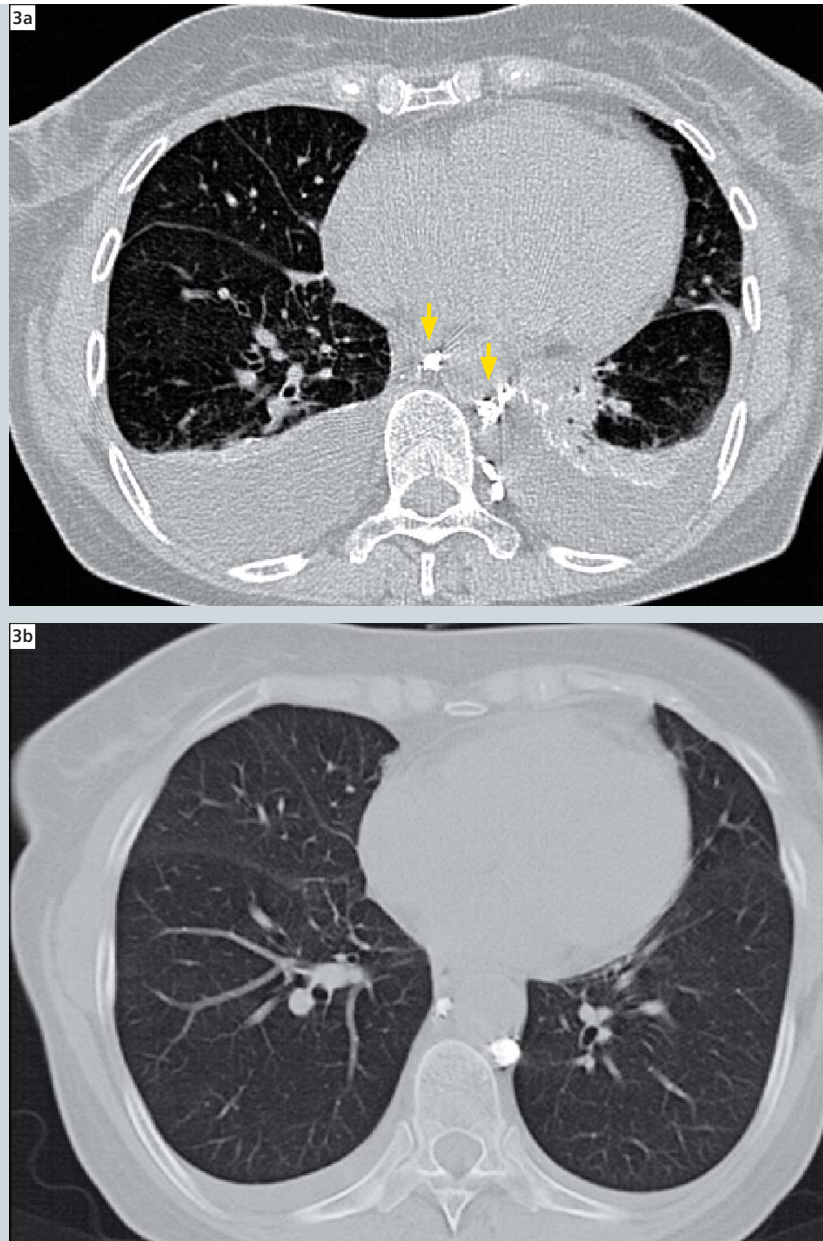
The surrounding tissues are stripped, thereby giving good access to the lymphatic vessel, which is then cannulated. Needle and infusion line are secured

with adhesive strips. Once having secured access to the vessel, up to 1 ml/10 kg body weight per foot, not exceeding a total volume of 14 ml of lipiodol (48% iodinated glycerol ester) is applied, using an injector with an injection speed of 4–7 ml/h. After the injection is completed, the materials are removed and the wound is cleansed, sutured, and covered with adhesive bands. Sutures may be removed at 7–10 days post-intervention.”(1)

### Results

Under fluoroscopy control unremarkable presentation of the lymph vessels of the left leg, the lymph channels, as well as the iliac and para-aortic lumbar lymph nodes. The cisterna chyli is displayed normally at L1/L2. At T4, contrast agent exits into the mediastinum and the pleural cavity. A flow of contrast into the venous angle was not detectable.

The flow rate of the Bülau drain at the time of the examination was approxi-



**3 a–b** Initial post-lymphography CT check shows bilateral pleural effusions (chylothorax). The arrows indicate lipiodol in the mediastinal, para-aortic lymph nodes (3a). Significant reduction of the chylothorax ten days after lymphography; the contrast agent with lipiodol is still detectable in the mediastinal lymph nodes (3b).

mately 400 ml lymph per day. On the second day after the lymphography there was already a significant reduction in the flow rate to approx. 200 ml. The Bülau drain was removed 10 days after the lymphography. Subsequent CT scan showed a significant reduction in volume of the chylothorax.

**\* Pack years:**

A way to measure the amount a person has smoked over a long period of time. It is calculated by multiplying the number of cigarettes smoked per day by the number of years the person has smoked.

Number of pack years:  
 $(\text{Number of cigarettes smoked per day} \times \text{number of years smoked})/20$

**References:**

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# A Portal to Digital Radiography

In recent years, technology has switched from analog to digital. "Digitization" has brought various advantages and conveniences to many areas of radiographic imaging. This paradigm shift is also taking place in the healthcare sector, as evidenced by the numerous digital X-ray imaging technologies introduced into the market.



Although customers clearly see the potential of flat detector technology and its benefits over conventional X-ray systems that use film or imaging plates, the seemingly high investment costs can discourage immediate conversion to digital radiography. MULTIX Swing with mFD\* from Siemens Healthcare now offers a digital radiography solution, developed especially for institutions with budgetary constraints and moderate patient volume.

## **Mobile flat detector technology - combining flexibility with operational efficiency**

MULTIX Swing with mFD covers the full spectrum of radiographic applications for chest, general or trauma imaging. The mobile flat detector (mFD) extends the flexibility of the system to accommodate different patient conditions. It can be removed completely to be positioned next to patients on stretchers or wheelchairs, which ensures minimal discomfort for patients during difficult radiographic examinations. Additionally, in the examinations, many manual work steps like identification

## A single detector system designed to cover the full spectrum of radiographic applications

### Chest Imaging



Screening chest in an upright position.



Sitting chest for wheelchair patients.

### General Imaging



Supine exams with mFD in Bucky, e.g., spine.



Extremity work with mFD out of Bucky, e.g., sunrise patella.

### Trauma Imaging



Trolley positioning capabilities with mFD for immobile patients.



Flexible tube and mFD positioning for cross-table exposures.

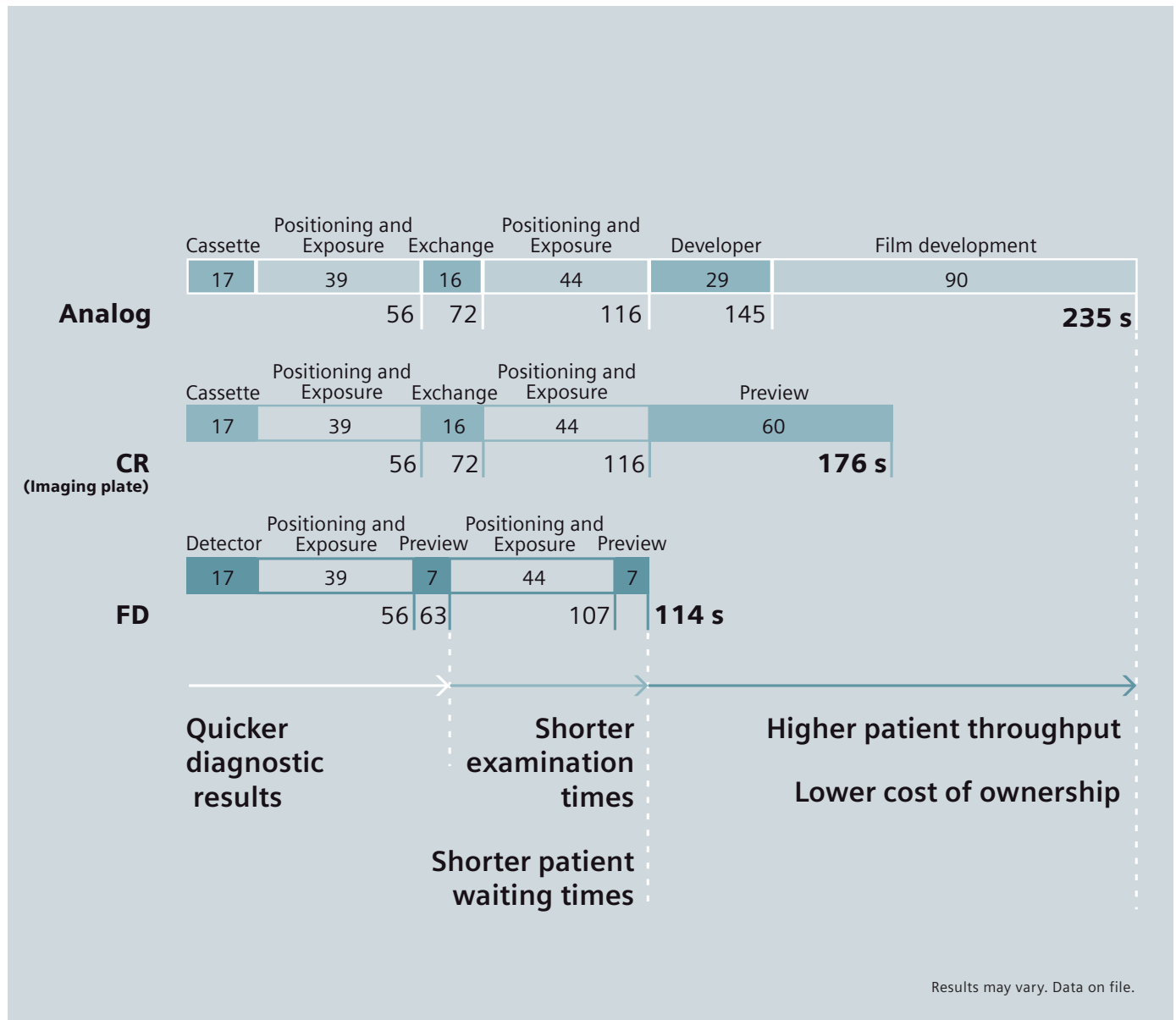


and processing of cassettes are eliminated, making the workflow with the mFD faster and more convenient for the user. Examination times are reduced due to availability of preview images within seconds, thus allowing for fast patient management. Thanks to the wide dynamic range of the flat detector, under- or overexposed images

can be compensated while advanced image post-processing allows for greater contrast detail and good soft tissue visibility. These workflow improvements translate into more convenience for the users and a decidedly more positive imaging service experienced by patients.

#### **Single detector system - Affordability with high reliability**

Using flat detector technology, MULTIX Swing with mFD yields considerable advantages in operational costs. The table shows a comparison between conventional film-screen cassettes, CR cassettes and flat detector technology.



Examination times with FD systems can be reduced by up to 50% compared to analog systems. These shorter examination times and shorter patient waiting times allow for an overall increase in patient throughput, leading to lower cost of ownership. When a film-screen system is used, costs for X-ray films and processing chemicals can total up to a

considerable amount over the years. However, these costs are never incurred using MULTIX Swing with mFD. Especially for those facilities that want to own digital flat detector radiography systems and still expect affordability, MULTIX Swing with mFD makes for a confident investment with its high quality, robust design and flexibility

to accommodate a broad range of examinations.

\* MULTIX Swing with mFD is not commercially available in the U.S.

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# Making Trauma Imaging Easier and Faster with Ysio and wi-D

Advanced Radiographer and Team Manager, Susie Dick, of the Trauma and Orthopedic X-ray department at York Hospital, comments on their first experiences using Ysio.

Ysio, the new digital radiography (DR) system, is unique in offering a wireless portable detector (wi-D) that can be used in Bucky, in the table and wall stand, or removed completely to be placed underneath or next to the patient.

York Hospital, part of the York Hospitals NHS Foundation Trust, has equipped two rooms of its Emergency X-ray (A&E) Department with a fully automated, dual detector Ysio for front line trauma and orthopedic examinations. They have been examining patients with Ysio for approximately 5 months.

Susie, the two Ysio systems were installed in October last year. What are the first impressions of working with Ysio? After initially being a little skeptical of the automated movements and discovering a need for some changes in our working practice, we found it very simple to use; images are superb when compared to that of CR and conventional film and work throughput is quicker. More people now routinely use the automated movements and thus have reduced the complaints about work related musculoskeletal aches and pains.

What features on the Ysio do the radiographers like?

The wireless detector is fantastic; it enables us to obtain difficult images easily, quickly and without putting the patient in severe discomfort.

The ceiling-suspended tube of Ysio can be moved into over 500 customized po-

sitions according to the set we have programmed, and the system will even hold small angulations.

During system movement, it is much more convenient, as the movements of the tube and detector replicate each other to provide accurate tube centering or vice versa. For accurate fine-tuning, we have to adjust the tube manually, but the servo-assisted technology makes it light, flexible and ergonomic.

Which of the features are very commonly used and when are they used?

For a fast system setup, we now use the automated movements for nearly every examination. We also adopted the use of the wireless detector as opposed to CR cassettes, even for difficult, specialized projections.

If we have to reject an unwanted image, it's carried out easily with only one mouse click. By using these features routinely we are able to cut the exam time significantly.

How is the handling of the wireless detector (wi-D)? Is the weight of 4.8 kg an issue?

With more than 100 examinations a day, detector weight was a major concern, but due to the slim and handy design the detector handling is definitely adequate.

Sometimes, if the patient cannot fully co-operate and the wi-D has to be placed behind a patient, detector handling can be a little awkward.

Is the wi-D used frequently for non-Bucky exposures?

There is a wide range of uses for the wireless detector. We use it for our entire extremity work like hands, wrists, feet, ankles or tib/fibs (lower leg). Also, for specialized projections like axial shoulders, we prefer using the wi-D instead of CR cassettes.

Especially for our trolley trauma work, the wi-D offers great flexibility, making exams that were previously rather challenging a little easier.

What comments do your colleagues have about MaxTouch? What difference does it make to the daily work routine?

We appreciate the ability to change menus and alter exposure directly from the tube head. It cuts down on walking back and forth to the control panel especially when people decide to change the projections they want to undertake. It's easy to adjust exposure factors or AEC chambers at this point, and even to change your detector workplace, i.e., wi-D as opposed to fixed detector for chest X-ray, for example.

What about the image quality of Ysio?

As a reporting radiographer, I've noticed that it shows much finer detail that may have previously been missed on other conventional imaging mediums.

Due to this image quality improvement, we don't necessarily use a secondary grid – which naturally results in dose reduction for the patients.



“The wireless detector is fantastic; it enables us to obtain difficult images easily, quickly and without putting the patient in severe discomfort.”

Susie Dick, Department of Radiography, York Hospitals, York, United Kingdom



In general after working for 5 months with Ysio, is there a difference in the way the users are working? Initially, we left the patients waiting outside while we checked the images. Now we send the patients straight from the imaging room back to their original destination as we've become more confident.

An A&E department requires that X-rays are carried out rapidly for accurate diagnosis, thus improving patient throughput, and alleviating pressure on clinical staff is important.

#### Background information on York Hospital and the Trauma and Orthopedic Radiology department

York Hospital, part of the York Hospitals NHS Foundation Trust; is a district general hospital with around 750 beds. The main scope of the emergency X-ray workload is trauma and orthopedic imaging. The two rooms operate 24 hours a day with 4 different shifts and an average of 2 to 3 staff members per Ysio during each shift.

The staff also covers an additional workload of approximately 4,000 ward imaging exams outside normal working hours.

With these two radiographic rooms, approx. 34,000 emergency / trauma examinations and 17,500 orthopedic examinations are performed per year. Emergency work is expected to increase by approximately 6% over the next years.

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# Digital Subtraction Angiography Becomes More Colorful

syngo iFlow\* will change the way DSA images are evaluated. This new application allows dynamic information to be displayed in a single static image, making flow visualization easier. syngo iFlow illustrates the history of the contrast media through the vessels, in full color, at the click of a button.

This dynamic flow evaluation provides a greater understanding of the contrast flow within pathologies, greater ease in visualizing the success of a procedure and assists the clinician in image review by showing a complete Digital Subtraction Angiography (DSA) run in a single image.

- A complete DSA series in one color image
- Easily visualize vascular structures
- Demonstrate the early vascularization of tumors
- Clearly demonstrate post-procedural results

## Arteriovenous Malformation (AVM) Supported by syngo iFlow

Courtesy of Charles M. Strother, MD  
University of Wisconsin School of Medicine and Public Health, Madison, WI, USA

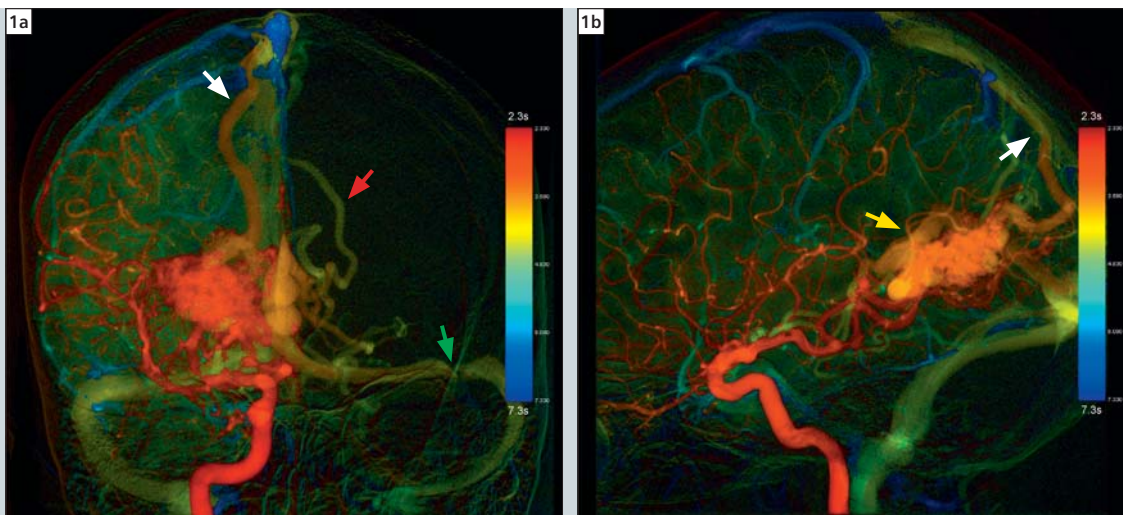
**History**  
40-year-old female with a history of an incidentally found right occipital arteriovenous malformation (AVM).

**Diagnosis**  
Cerebral angiogram demonstrated a 3 cm right occipital AVM fed from P2 and P3 branches of the right posterior cerebral artery. Venous drainage was into the Galenic system as well as into a cor-

tical vein running parallel with the superior sagittal sinus.

**Comments**  
syngo iFlow provides an excellent composite picture of the entire AVM nidus, the feeding arteries and the venous drainage from both the AVM and normal brain on one single image. It is easy to visualize the AVM nidus with primary arterial supply from the posterior cerebral artery, the

shunting into multiple cortical veins of the right hemisphere (white arrow), the deep venous system (yellow arrow) and cortical veins of the left hemisphere (red arrow). A stenosis in the distal portion of the left transverse sinus is also seen (green arrow). Because of the composite nature of the color-coded image, it is easier to see the relationship between arteries and veins that are filling and emptying at different time points.



1 AP (a) and lateral projection (b).

\* Pending 510(k)  
The information about this product is being provided for planning purposes. The product is pending 510(k) review, and is not yet commercially available in the U.S.

# In-Stent Stenosis

## Supported by syngo iFlow

Courtesy of Charles M. Strother, MD

University of Wisconsin School of Medicine and Public Health, Madison, WI, USA

### History

74-year-old woman with a history of recurrent left-hemisphere transient ischemic attacks (TIAs) following previous angioplasty and stenting of a left middle cerebral artery stenosis.

### Diagnosis

A CT perfusion study demonstrated increased transit times and decreased cerebral blood flow of the left cerebral hemisphere. CTA showed evidence of in-stent restenosis. Cerebral angiogram revealed an approximately  $\geq 90\%$  in-stent stenosis of the left M1 extending into the inferior division (M2 segment).

### Treatment

Percutaneous transluminal balloon angioplasty resulted in a reduction of the

stenosis by about 50%. There was markedly improved flow into the middle cerebral distribution. The patient did not experience any further TIAs.

### Comments

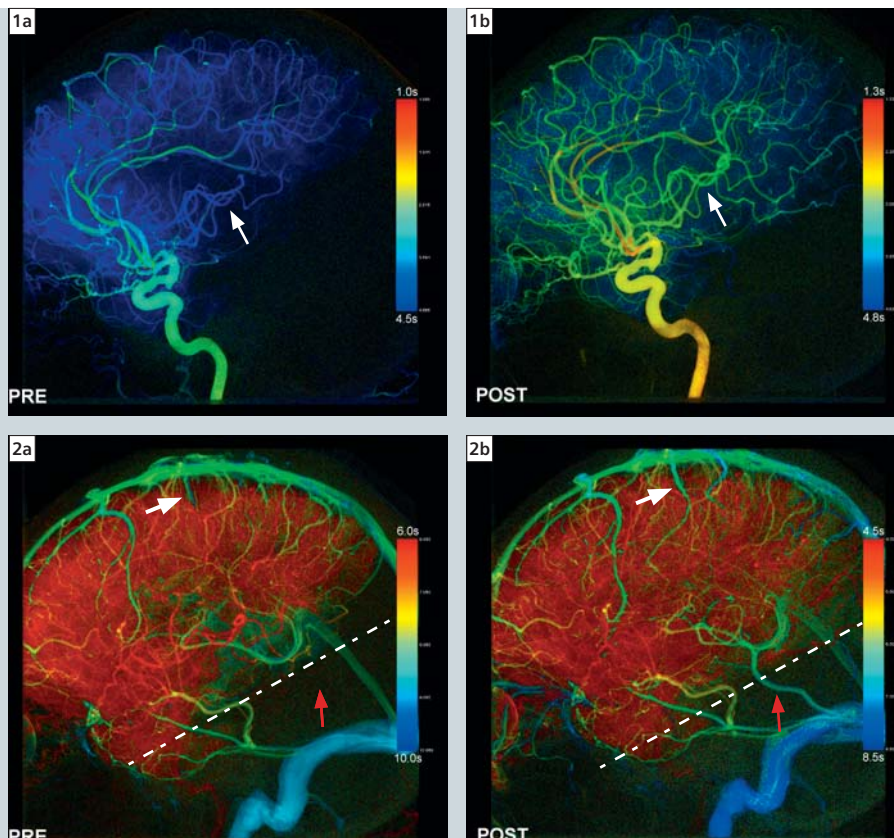
**Arterial Phase:** The lateral projection of the pre-angioplasty angiogram shows slow flow in middle cerebral branches, more in the inferior division than in the superior division (white arrow). After angioplasty flow is much faster in these branches. These changes are easier to visualize on the color-coded image than on the DSA.

**Parenchymal Phase:** The lateral projection of the pre-angioplasty angiogram shows slow flow in the inferior division of the middle cerebral artery. There is

also incomplete opacification of the middle cerebral territory (white dotted line shows expected limit of MCA territory). The vein of Labbe (red arrows) is not filled and cortical veins from the middle cerebral territory (white arrows) fill more slowly than do veins from the anterior cerebral territory. After angioplasty there is much faster flow in the middle cerebral cortical branches with good opacification of the entire middle cerebral territory. The vein of Labbe and other cortical veins from the middle cerebral territory now fill normally. These changes are much easier seen on the color-coded image than on the DSA.

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**1** Lateral projection of arterial phase pre- (a) and post-treatment (b).

## Navigating the Body without Radiation iGuide CAPPa takes Needle Guidance one Step further

iGuide CAPPa is comparable to a GPS for the human body; the new solution supports interventional radiologists during minimally invasive needle procedures. By combining an Artis **zee** angiographic C-arm system with the iGuide CAPPa electromagnetic navigation system, a new method was developed that enables needle navigation without applying radiation. The method uses electromagnetic tracking and facilitates complex percutaneous interventions such as vertebroplasties, radiofrequency ablations or drainages.



For a number of years Siemens has been working together with physicians on navigation solutions that support interventional radiologists during minimally invasive needle procedures as well as improve patient treatment. The innovation iGuide CAPPa is part of the comprehensive needle guidance solution by Siemens. For more than one year, the system has been used successfully by several hospitals. "iGuide CAPPa allows for precise placement of electrodes or biopsy devices even in regions that are difficult to evaluate with conventional

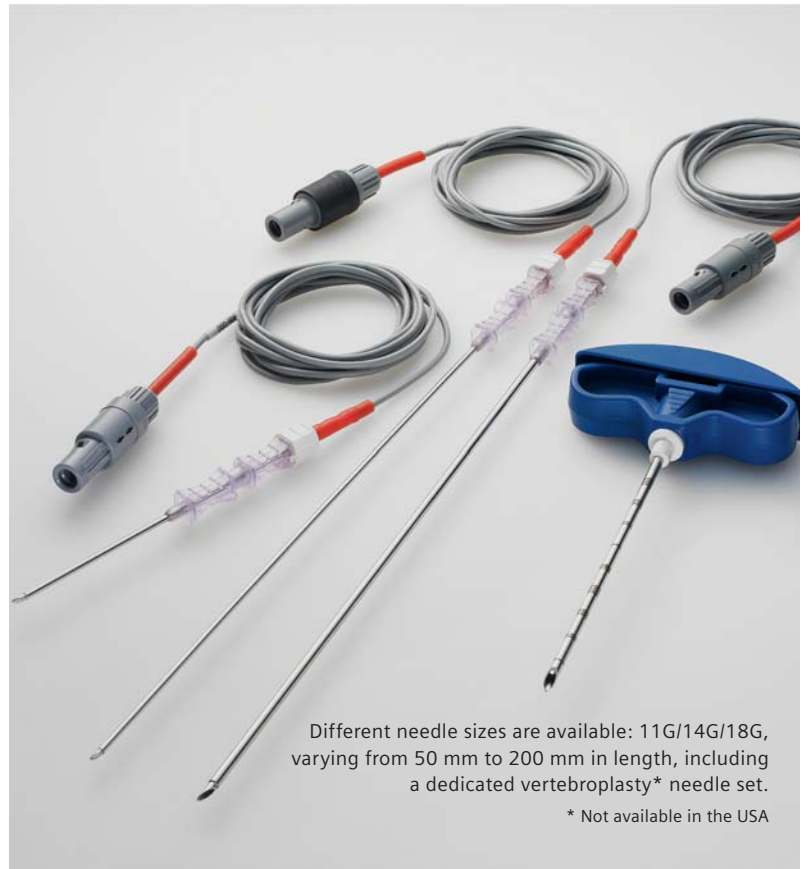
fluoroscopy," explains Dr. Martin Skalej, neuroradiologist at the University Hospital in Magdeburg, Germany. He uses the system primarily for different spinal interventions, e.g., for spinal radiofrequency ablations and for discographies or kyphoplasties. "No further imaging is necessary during the intervention. This greatly reduces the X-ray exposure compared to previous interventions performed in the CT." Dr. Meyer of the Charité Hospital in Berlin, who uses the system for abdominal needle procedures such as drainages

"The combination of syngo DynaCT MPR views and a schematic ring figure makes hand-eye coordination very intuitive".

Dr. Meyer, Charité - Universitätsmedizin Berlin, Germany

“iGuide CAPPa allows for precise placement of electrodes or biopsy devices even in regions that are difficult to evaluate with conventional fluoroscopy.”

Prof. Dr. Martin Skalej, neuroradiologist at the University Hospital in Magdeburg, Germany



Different needle sizes are available: 11G/14G/18G, varying from 50 mm to 200 mm in length, including a dedicated vertebroplasty\* needle set.

\* Not available in the USA

and biopsies, is convinced about iGuide CAPPa.

The principle is a simple one: prior to inserting the needle, the Artis **zee** C-arm with *syngo* DynaCT generates a 3D soft tissue image of the anatomy to be treated, which is used for orientation by the physician. A sensor in the tip of the needle is tracked in an electromagnetic field created via a field generator. This information is transferred in real time to the iGuide CAPPa system which shows the position of the needle tip on a monitor and superposes it with the

previously generated three-dimensional data set of the anatomy. This provides the physician with both the necessary anatomical information as well as the exact position of the needle, so he can confidently perform the needle procedures. This method is especially suitable for lengthy and complex interventions by providing improved spatial orientation and hence faster and safer navigation to the actual target. Additionally, the required radiation dose is greatly reduced.

Minimally invasive needle procedures

are increasingly performed in interventional radiology for the spine (vertebroplasties, kyphoplasties), the liver (radio-frequency ablations, biopsies, drainage) or the thorax. With iGuide CAPPa different sets of needles are available for the various interventional needle procedures. iGuide CAPPa is approved in the US and Europe\* and available on the market, effective immediately.

\* Not available in France

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# Puncture of a Pleural Empyema Using iGuide CAPP Electromagnetic Needle Guidance

Bernhard C. Meyer, MD, Frank K. Wacker, MD

Charité – Universitätsmedizin Berlin, Benjamin Franklin Campus, Department of Radiology, Germany  
Johns Hopkins University, School of Medicine, Russell H. Morgan Department of Radiology and Radiological Science, Baltimore, MD, USA

## Patient history

54-year-old male presented with a pleural fluid collection after partial lung resection of the right upper lobe with worsening under calculated intravenous antibiotic therapy.

## Pre-treatment Imaging

MDCT of the chest showed a right apical fluid collection (arrows in Fig. 1 and Fig. 2). As the patient was in poor general condition presenting with increasing infection parameters, we decided to puncture the potential empyema to allow for drainage and specific antibiotic therapy.

## Treatment

The patient was placed on a vacuum mattress on his right side. For puncture planning, imaging with *syngo* DynaCT was performed (Fig. 3). A dorsal paravertebral approach with a slightly double-angulated puncture to avoid the intercostal vessels path was chosen. The iGuide CAPP electromagnetic tracking system superimposes the puncture path as well as the needle and a virtual needle extension on the *syngo* DynaCT data set to enable a precise needle placement (Fig. 4). After needle placement, the final position achieved according to the electromagnetic tracking system was confirmed by another *syngo* DynaCT run (Fig. 5 and 6). A sample was collected and a drainage catheter was placed over the wire. The duration of the intervention was 14 minutes from the first *syngo* DynaCT data acquisition to the confirmatory



Dr. Bernhard Meyer, interventional radiologist at Charité Hospital, University of Berlin is convinced about iGuide CAPP; he has used the system for more than one year.

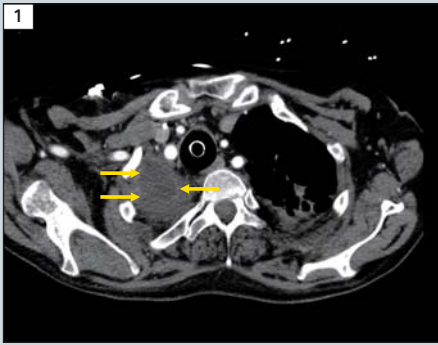
post-procedural *syngo* DynaCT after needle placement including image reconstruction, data transfer to the navigation device, puncture planning, local anesthesia and puncture. The navigated needle propagation alone took 35 sec.

## Comments

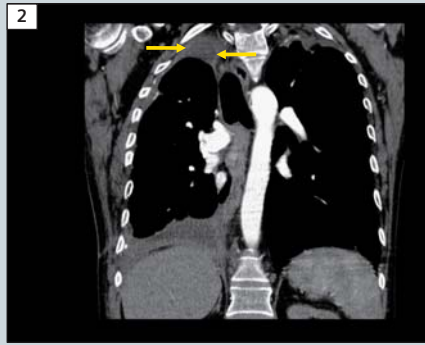
The electromagnetic tracking system in combination with *syngo* DynaCT facilitates needle placement for biopsies and drainages. The combination of the MPR views and a schematic ring figure makes hand-eye coordination very intuitive. By matching two small rings (Fig. 4), the entry point can easily be located. Correct angulation of the needle is obtained by matching the two big rings (Fig. 4). This allows for double-angulated punctures to be performed without any additional effort when compared to in-plane puncture paths.

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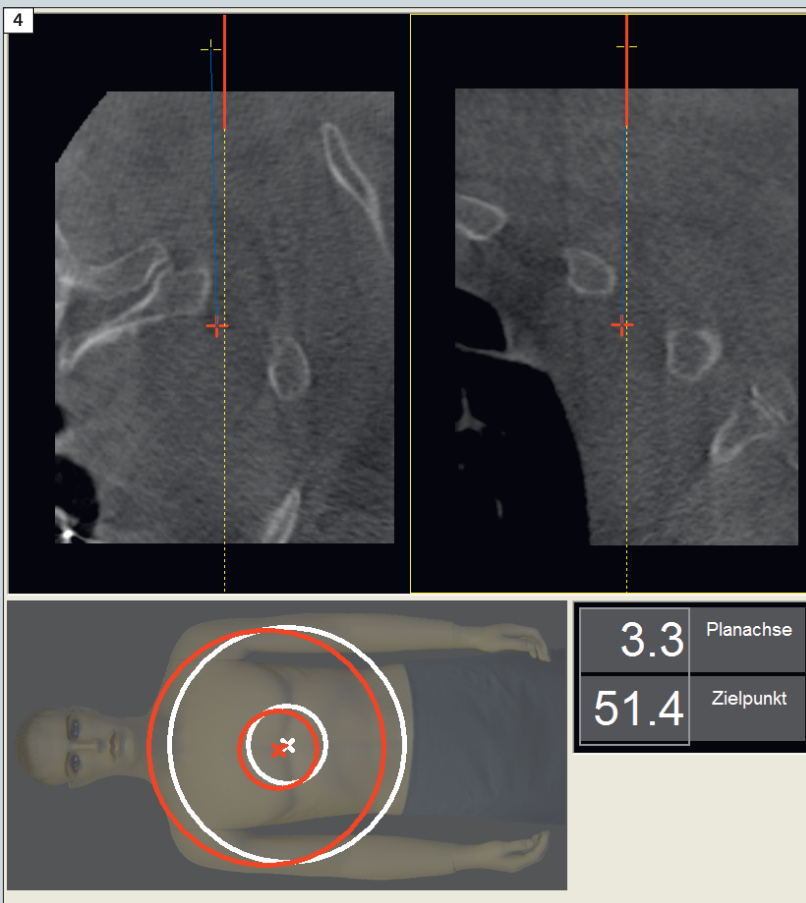
**1** Axial MDCT of the chest.



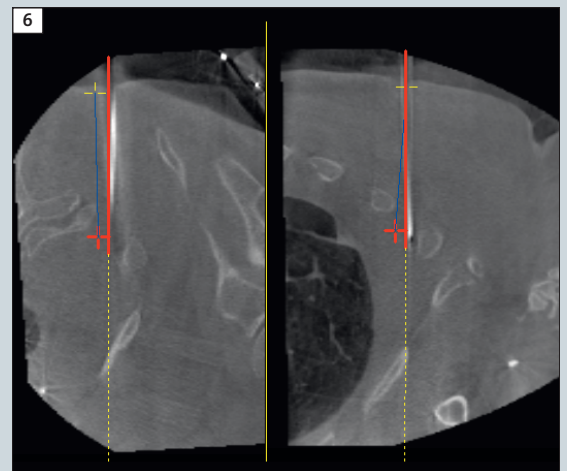
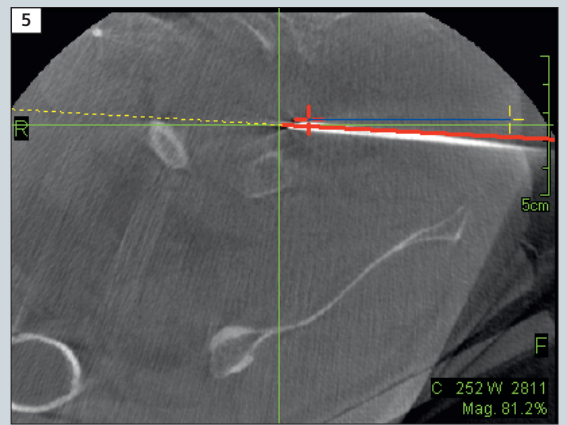
**2** Sagittal MDCT of the chest.



**3** *syngo* DynaCT acquired for puncture planning.



**4** iGuide CAPP superimposes the planned puncture path (blue line) as well as the needle (red line) and a virtual needle extension (yellow dotted line) on the *syngo* DynaCT data set to enable a precise needle placement. By matching two small rings the entry point can easily be located. Correct angulation of the needle is obtained by matching the two big rings. This way needle navigation becomes very intuitive.



**5+6** The successful needle placement was confirmed by a second *syngo* DynaCT acquisition.

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Title	Location	Short Description	Date	Contact
ITEM	Yokohama, Japan	International Technical Exhibition of Medical Imaging	April 16 – 19, 2009	<a href="http://www.j-rc.org/">http://www.j-rc.org/</a>
Charing Cross	London, Great Britain	30th International Symposium	April 4 – 7, 2009	<a href="http://www.cxsymposium.com">www.cxsymposium.com</a>
GEST	Barcelona, Spain	Global Embolization Symposium and Technologies	April 15 – 18, 2009	<a href="http://www.gest2009.eu">www.gest2009.eu</a>
DGK	Mannheim, Germany	Deutsche Gesellschaft für Herz- und Kreislaufforschung	April 16 – 18, 2009	<a href="http://www.dgk.org">www.dgk.org</a>
JRS	Yokohama, Japan	Japan Radiological Society	April 17 – 19, 2009	<a href="http://www.radiology.jp">www.radiology.jp</a>
CMEF	Shenzhen, China	China Medical Equipment Fair	April 18 – 21, 2009	<a href="http://en.cmef.com.cn/">http://en.cmef.com.cn/</a>
HRS	Boston, MA, USA	Heart Rhythm Society	May 13 – 16, 2009	<a href="http://www.hrsonline.org/Sessions/">http://www.hrsonline.org/Sessions/</a>
ASNR	Vancouver, Canada	47th Annual Meeting of the American Society of Neuroradiology	May 16 – 21, 2009	<a href="http://www.asnr.org/2009/">www.asnr.org/2009/</a>
PCR	Barcelona, Spain	Paris Course of Revascularization	May 19 – 22, 2009	<a href="http://www.europcr.com">www.europcr.com</a>
DRK	Berlin, Germany	90. Deutscher Röntgenkongress	May 20 – 23, 2009	<a href="http://www.roentgenkongress.de">www.roentgenkongress.de</a>
UKRC	Manchester, UK	UK Radiological Congress	June 8 – 10, 2009	<a href="http://www.ukrc.org.uk">www.ukrc.org.uk</a>
Europace	Berlin, Germany	European Heart Rhythm Association	June 21 – 24, 2009	
ESC	Barcelona, Spain	European Congress of Cardiology	August 29 – September 2, 2009	<a href="http://www.escardio.org">www.escardio.org</a>
CIRSE	Lisbon, Portugal	Cardiovascular and Interventional Radiological Society of Europe	September 19 – 23, 2009	<a href="http://www.cirse.org">www.cirse.org</a>
ESNR	Athens, Greece	European Society of Neuroradiology	September 2009	<a href="http://www.esnr.org">www.esnr.org</a>
EACTS	Vienna, Austria	23rd Annual Meeting of the European Association for Cardio-Thoracic Surgery	October 17 – 21, 2009	<a href="http://www.eacts.org">www.eacts.org</a>



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