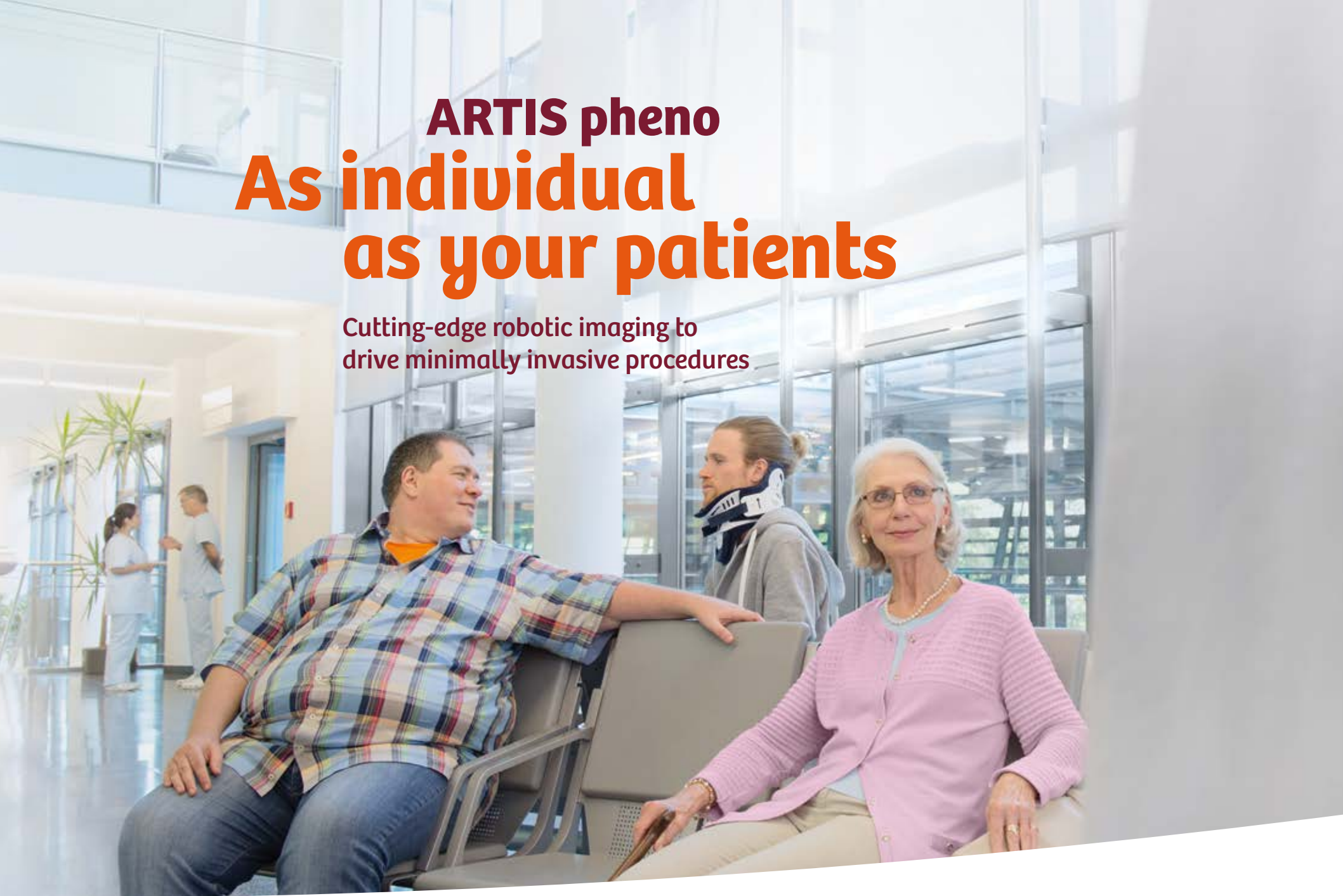


# ARTIS pheno As individual as your patients

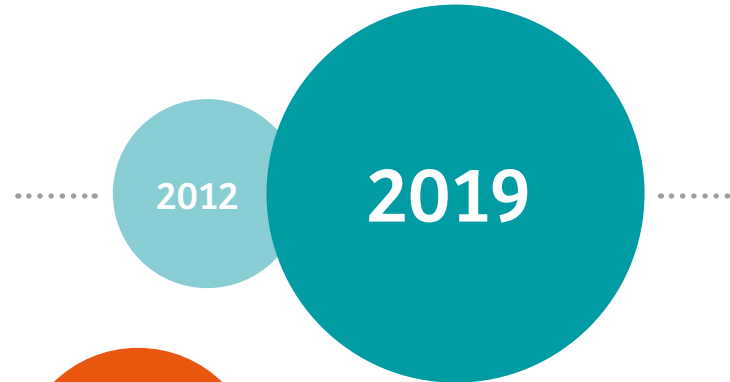
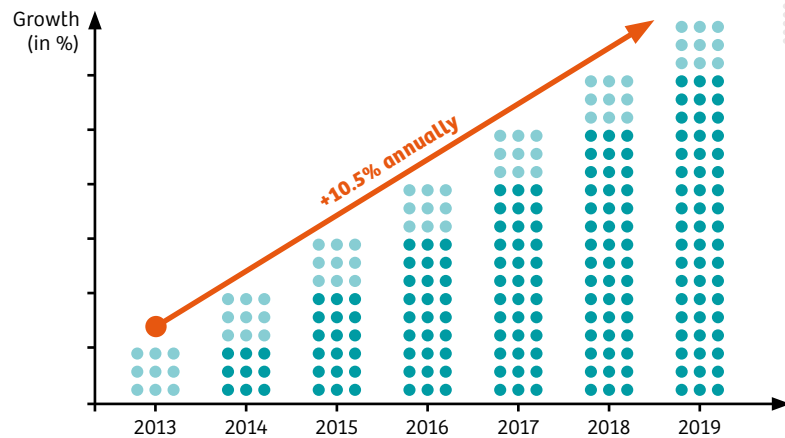
Cutting-edge robotic imaging to  
drive minimally invasive procedures



# The landscape of healthcare is changing

Healthcare providers are facing economic restraints, better-informed patients, and medical and technological advancements. These developments present not only great opportunities, they also make it crucial to keep pace. A way to stay ahead lies in minimally invasive procedures.

Why? Projections show that it is a market which is continually growing and increasing in value.



## Expected growth

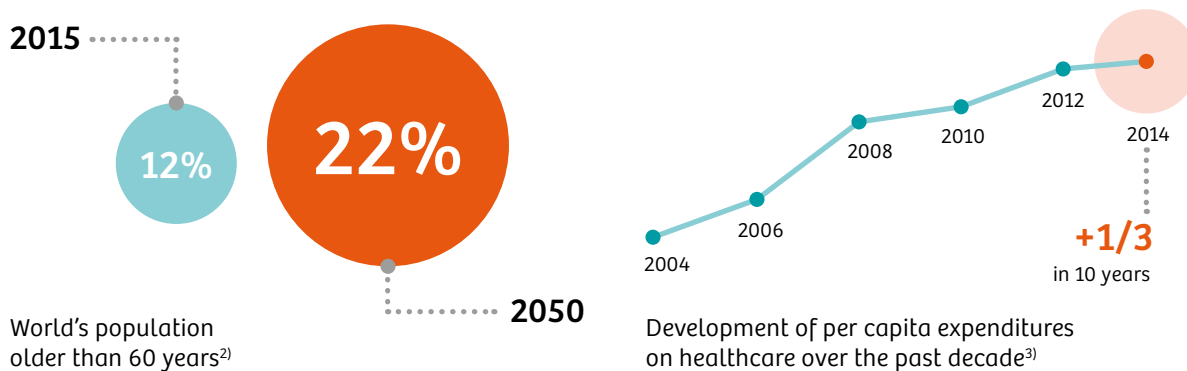
A 2014 study<sup>1)</sup> by Transparency Market Research (TMR) projects an annual growth rate of 10.5% for the global market of minimally invasive procedures.

## Projected value

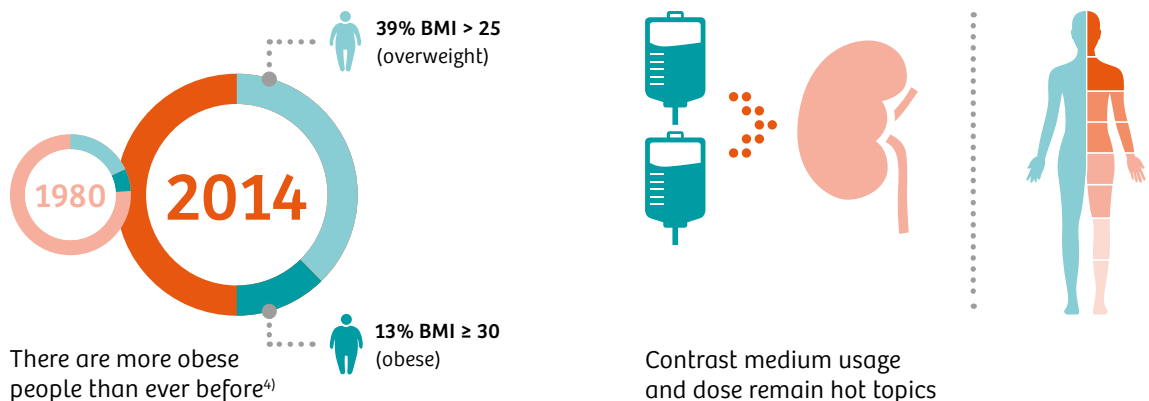
The same study estimates the global market for minimally invasive procedures to double in value between 2012 and 2019.

<sup>1)</sup> Minimally Invasive Surgery Market (Surgical Devices, Monitoring & Visualization Devices, and Endoscopy Devices) – Global Industry Analysis, Size, Share, Growth, Trends and Forecast, 2013 through 2019.

These developments are due to the growing geriatric population, new technology, and reimbursement opportunities, all driving higher per capita expenditures.



So why aren't all providers performing minimally invasive procedures all the time? There are some factors that complicate minimally invasive approaches:



### An aging population

According to the WHO, the number of people older than 60 years will surpass the number of children younger than five years by 2020. The aging population confronts worldwide health systems with significant challenges. A solution lies in minimally invasive procedures. They enable treatment of patients who were previously inoperable. In addition, their low degree of patient trauma, quick recovery time, and shorter duration of hospital stays help to reduce costs.

### Obesity and comorbidities

Obese patients confront imaging systems with a variety of challenges – in terms of patient positioning, permitted table load, or required energy level to penetrate the patient.

A different set of challenges comes with patients with comorbidities. In kidney-impaired patients, for example, lowest iodinated contrast usage is key. Patients with vascular disease, on the other hand, may require long procedures involving more contrast and dose. Contrast and dose therefore remain hot topics that must be addressed by modern imaging systems.

<sup>2)</sup> "Fact sheet no. 404: Ageing and health," September 2015, World Health Organization.

<sup>3)</sup> The World Bank: <http://data.worldbank.org/indicator/SH.XPD.PCAP>.

<sup>4)</sup> "Fact sheet: Obesity and overweight," June 2016, World Health Organization.

**Cutting-edge  
robotic imaging**

to drive minimally  
invasive procedures



# ARTIS pheno

## As individual as your patients

Patients come in all shapes and sizes. Particularly in modern minimally invasive treatment, patient size, condition, or positioning requirements pose significant challenges to imaging systems. In some cases, treatment may even be impossible.

Engineered to be truly patient-oriented, ARTIS pheno® is a unique floor-mounted robotic C-arm system for individualized preprocedural planning, intraoperative guidance, and immediate checkup – regardless of patient condition or procedure complexity. Furthermore, it also helps you maintain a clean work environment.

Embrace heterogeneity: no matter how challenging the patient or how demanding the procedure, ARTIS pheno delivers the right images. Improve clinical outcomes and enhance the standing of your institution – with a versatile and intelligent system that adapts to the reality of all your patients.

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# Patients come in all shapes and sizes

Every single patient deserves optimal treatment – yet some patient groups present serious challenges when it comes to ensuring excellent clinical outcomes.

Obesity is a greater problem than ever before. Approximately 39% of adults 18 years and older are overweight, and 13% are already considered obese. This means that obesity has increased twofold since 1980.<sup>1)</sup>

The number of older patients with multiple morbidities is rising too. The proportion of the world's population over 60 years will nearly double by the year 2050 – from 12% to 22%.<sup>2)</sup>

Fragility due to old age, coupled with an increase in BMI or lifestyle diseases such as diabetes, is producing a patient population that needs access to a wide range of therapies – not all of which are easy to manage.

Imaging of patients with comorbidity is no issue



Imaging of patients up to 280 kg (617 lbs) is no issue



<sup>1)</sup>“Fact sheet: Obesity and overweight,” June 2016, World Health Organization.

<sup>2)</sup>“Fact sheet no. 404: Ageing and health,” September 2015, World Health Organization.

# ARTIS pheno

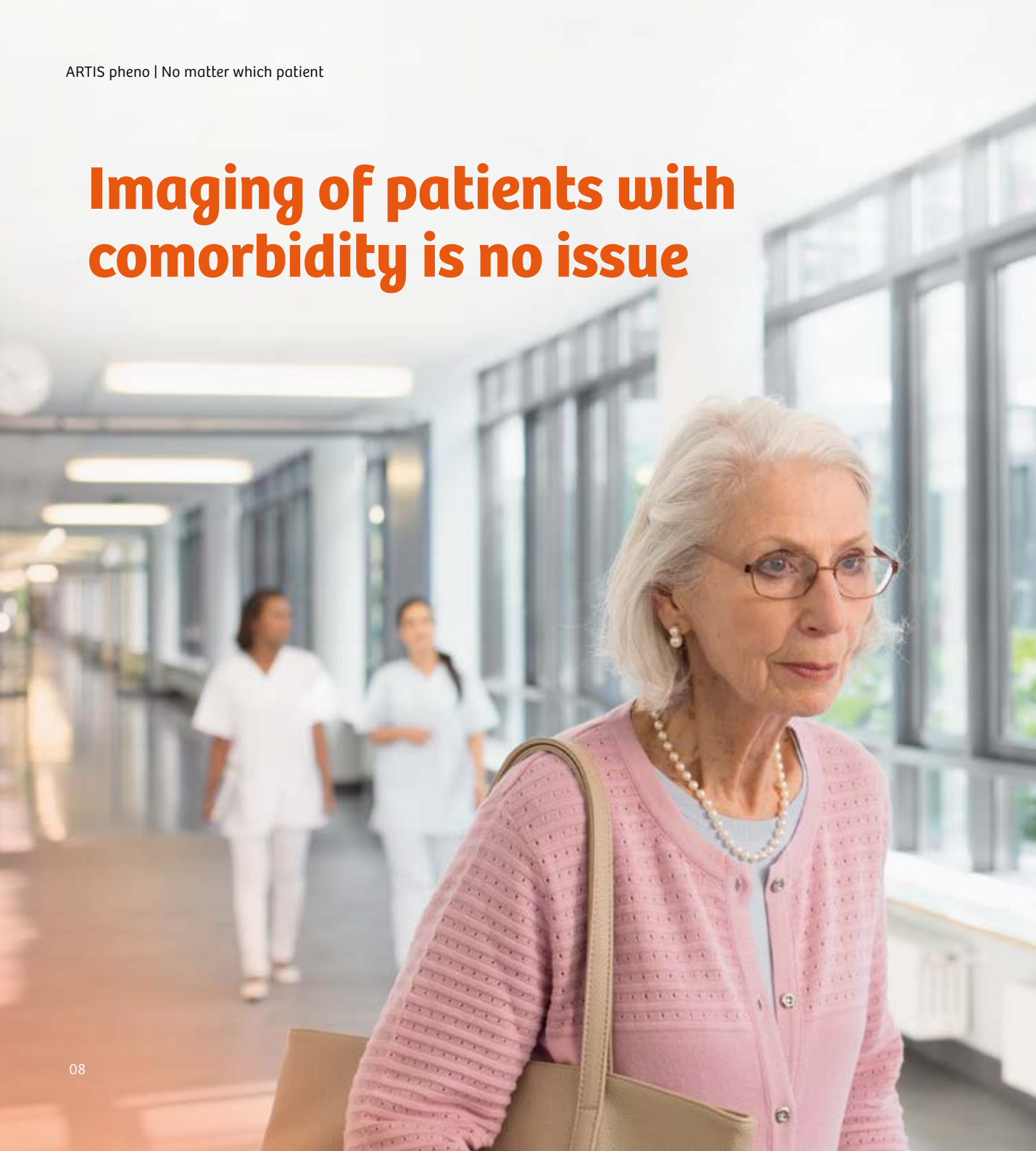
## No matter which patient



Imaging of patients  
requiring large  
instruments and  
devices is no issue

ARTIS pheno® allows you to optimally treat any patient in your interventional suite or hybrid operating room – virtually regardless of patient size, condition, or positioning needs. Optimize intraprocedural quality control and confidently handle each individual patient – thanks to a wide-space C-arm, a flexible isocenter, the short *syngo* DynaCT scan times, and a permitted patient load of 280 kg (617 lbs) on the multi-tilt table.

# Imaging of patients with comorbidity is no issue

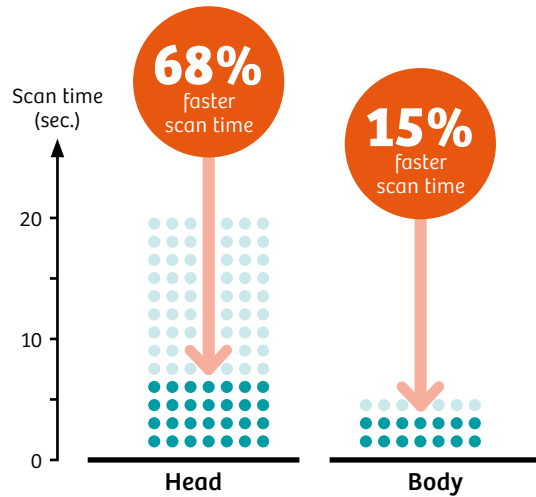


..... **High Performance,  
High Quality**

The zen40HDR detector offers unmatched technology for patients with comorbidity.

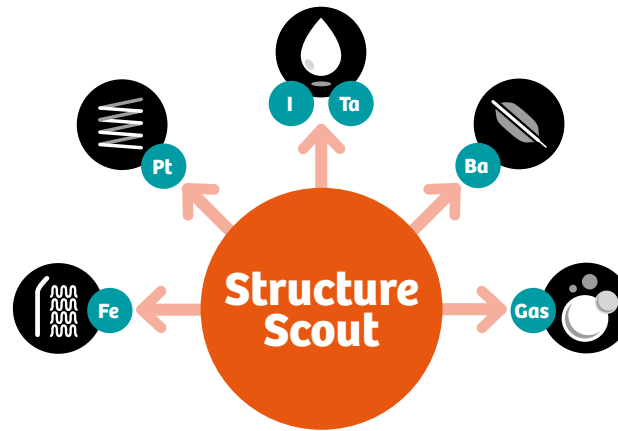


With ARTIS pheno®, you are prepared for the needs of any patient. Fast scans, optimized visibility, and positioning flexibility all await you.



### Reduced contrast media usage by faster scan times

Fast 3D imaging lowers the risk involved in treating patients with impaired kidney function. With *syngo* DynaCT, scanning soft tissue takes less than five seconds for body acquisitions. Large volume acquisitions with *syngo* DynaCT 360 require six seconds for body acquisitions. Sensitive patients benefit from a reduction of required contrast agent. Shorter scan times also mean fewer motion artefacts, and patients do not have to hold their breath for too long.



### Optimized visibility at lowest dose

The new StructureScout adapts imaging parameters to the versatile visualization challenges throughout your procedural workflow. It offers structure-sensitive algorithms that permit an even greater reduction of radiation dose while maintaining optimal image quality for visualizing various important materials. StructureScout optimizes the visibility of materials, gases, devices, vessels, and background structures independent of procedure or material type.



Tilt up to +15°/-20° and cradle up to +/-15°

### Optimal patient positioning for any procedure

With ARTIS pheno, you can also ensure optimal patient positioning regardless of the procedure. For safe CO<sub>2</sub> imaging, patients' feet can be elevated simply by tilting the table. ARTIS pheno automatically follows the tilted table during peripheral runoffs. Intelligent image-processing algorithms ensure exceptionally smooth vessel visualization despite unequal gas distribution in vessels. ARTIS pheno makes treatment of patients with contrast allergies and impaired renal function easy.

# Imaging of patients with up to 280 kg is no issue



..... **All the power you need**

The GIGALIX® tube offers 90 kW power at 125 kV to enable imaging of patients regardless of size and angulation.

Adapt to the size, weight, and angulation needs of any patient. ARTIS pheno® transforms complex space and positioning requirements into almost effortless tasks.



**Maximum patient weight: 280 kg (617 lbs)**

The multi-tilt table accommodates a maximum patient weight of 280 kg (617 lbs). An additional 100 kg (220 lbs) for accessories plus 60 kg (132 lbs) for CPR may be added. This allows you to accommodate even the heaviest patients.



**Position the tabletop with virtually no force**

The multi-tilt table comes with the easy-float tabletop that permits hassle-free positioning of the patient. It is power-assisted, so virtually zero force is required to achieve the desired table position – regardless of desired table angulations and patient weight. Positioning remains easy even the table is tilted.



**More space and positioning flexibility**

ARTIS pheno lets you get close without feeling cramped. The wide-space C-arm's unmatched focal-spot-to-detector distance (SID) of 130 cm (51.2") gives the patient and team a usable clearance of 95.5 cm (37.5"). You are looking at far more freedom during preparation and superior access to all working positions during the procedure – even with the heaviest of patients.

# Imaging of patients requiring large instruments and devices is no issue



..... **All in view**

ARTIS pheno enables intraprocedural 3D imaging of large volumes of the body.

No matter how complex the setup may be, ARTIS pheno® optimally supports treatment of any patient by giving you the space and flexibility you need to work with confidence.



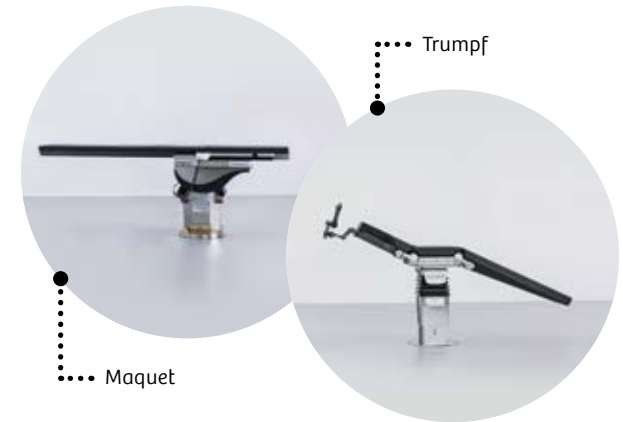
### Sufficient room to navigate complex imaging setups

The wide space C-arm of ARTIS pheno lets you rotate around complex setups with ease, even with accessories such as armboards in place. With a usable clearance of 95.5 cm (37.5"), you can realize steeper angulations and extreme views while still yielding more patient coverage than ever before. Typical procedures become easier, and the scope of the treatments you can offer naturally increases.



### Flexible isocenter for unmatched positioning flexibility

ARTIS pheno's flexible isocenter offers a new way for handling procedural challenges. Position the patient in whatever way is necessary and adjust the working height for your comfort. 2D and 3D imaging are possible in virtually any patient position you choose.



### Full support for third-party surgical tables

For surgical procedures, a variety of patient positions and tabletops are needed to make accurate treatment and comfortable working access for staff possible. ARTIS pheno is fully compatible with surgical tables from market leaders Trumpf and Maquet that serve these specific needs.

# Being able to offer latest procedures is key

Medical capabilities are constantly evolving in today's world, giving you a wide range of possibilities for improving quality of life for your patients. Offering the latest procedures puts you ahead of the competition.

Advances in minimally invasive treatments are helping patients with challenging conditions live better lives. Due to growing clinical excellence, along with advances in device and imaging technology, more and more minimally invasive procedures are possible. This puts less physical stress on the patient, reduces procedural side effects, and lowers healthcare costs on a global scale.

Robotics and cutting-edge software solutions make it easier for medical institutions to add the latest procedures to their treatment portfolio. Image guidance for minimally invasive procedures makes complex treatment safer and more efficient and ensures optimal clinical outcomes. The potential benefits for patients include less dose and contrast, potentially less readmissions, and improved quality of life.

First ARTIS pheno user states:

*"ARTIS pheno offers consistent, excellent DynaCT image quality from head side, left, or right patient side for imaging in thorax, abdomen, and pelvis. This provides important information during technically challenging procedures, helps us avoid major complications, and ensures complete treatment and documents outcomes."*

**Prof. Dr. med. Frank Wacker**

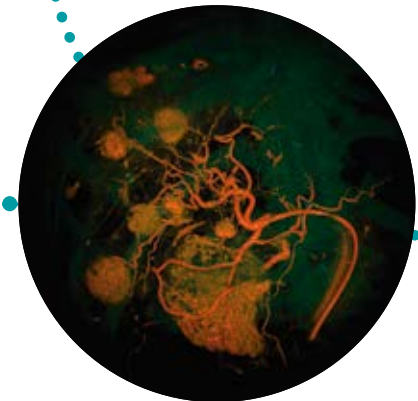
Director Department of Diagnostic and Interventional Radiology,  
Hannover Medical School, Germany



Ready for  
fenestrated EVAR



Ready for  
transarterial  
chemoembolization



# ARTIS pheno No matter which procedure



Ready for  
spinal fusion

ARTIS pheno® helps you take on the most complex procedures, potentially lower complication rates, and improve procedural outcomes. Its excellent imaging capabilities, optimal integration into hybrid operating rooms or interventional suites, and unmatched set of features not only make procedures safer and technically easier – they also increase patient satisfaction and enhance the visibility and reputation of your institution.

ARTIS pheno lets you master the most complex procedures and takes the hassle out of all standard procedures too.



## Ready for fenestrated EVAR



### Certain diagnoses really raise the bar

- Infrarenal aortic aneurysm reaching to the bifurcation of the iliac arteries
- Stenosis of the left external iliac artery



Step up your treatment workflow for fenestrated EVAR with EVAR Guidance Engine, the first assisted workflow for endovascular repair. With support before, during, and after the procedure, you can save your brainpower for stent deployment.

••• Preparation of CT data for fusion imaging

Preparing data for fusion imaging is a breeze. Centerlines are rapidly calculated based on the mesh modeling of the aortic wall. The ostia rings are visualized for all main branch vessels. The software also suggests optimal stent landing zones.

••• 3D guidance during stent deployment

Fusion imaging provides you with continuous support throughout the procedure. Just select the target vessel on the heads-up display and let the C-arm move to the optimal viewing angle. This angle is already calculated during preparation, so no additional radiation is required for C-arm positioning during stent deployment. As you work, ARTIS pheno® shows you the important landmarks you want to see instead of the entire volume.



••• Registration of dataset for fusion imaging

Registration of the dataset can be done right at the table using only two fluoro projections. With assisted registration of anatomical landmarks like the spine or contrast-filled aorta, alignment of the CT data with the angio system is fast and saves dose.

Immediate 3D assessment of results

You can assess the results of stent deployment in astonishing quality with the patient still on the table. Image acquisition in lateral or head side position requires only four seconds. These extra short scan times reduce the amount of contrast required.



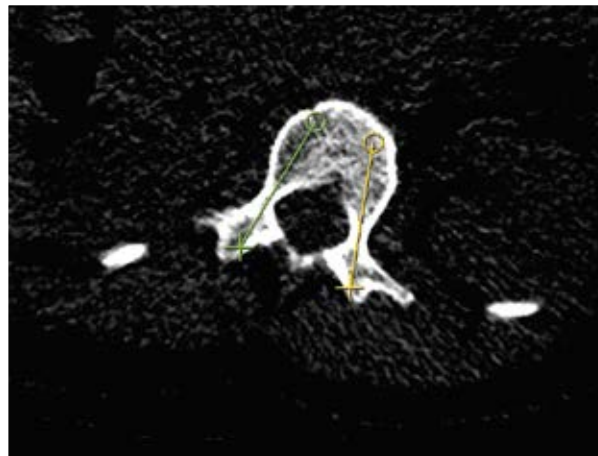
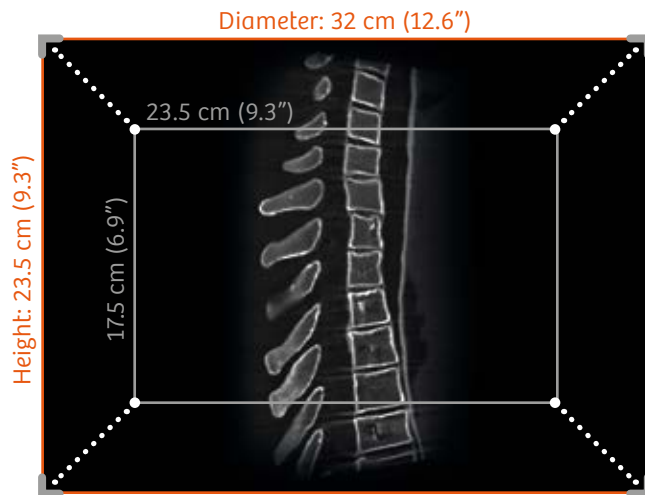
## Ready for spinal fusion



.....  
**Certain diagnoses really raise the bar**

- Congenital scoliosis of the lumbar spine
- Curved spinal deformation in the spinal levels L4 – L5 – S1

Step up your treatment workflow for spinal fusion to achieve faster procedures with less displacement. With automated support during the procedure, ARTIS pheno® helps significantly improve the accuracy of pedicle screw placement\*.



### See up to 10 vertebrae in 3D

ARTIS pheno lets you visualize up to ten vertebrae at the same time. By seamlessly combining two 220-degree rotations into one volume, *syngo* DynaCT Large Volume is able to scan a cylinder of 32 cm (diameter) and 23.5 cm (height) in portrait mode. This way, you can feel confident that you know precisely where you are without having to sacrifice the general overview.

### Always on the right path during spine surgery

Plan your screw paths for spinal fusion with *syngo* Needle Guidance and let the laser cross guide your hand to the desired entry point at the angle you envisioned. The path is shown as a superimposition on the live fluoro image regardless of the perspective you choose.

The C-arm automatically aligns with the screw path – no need to manually drive the table. Intra-operative 3D control scans make post-operative CT obsolete.

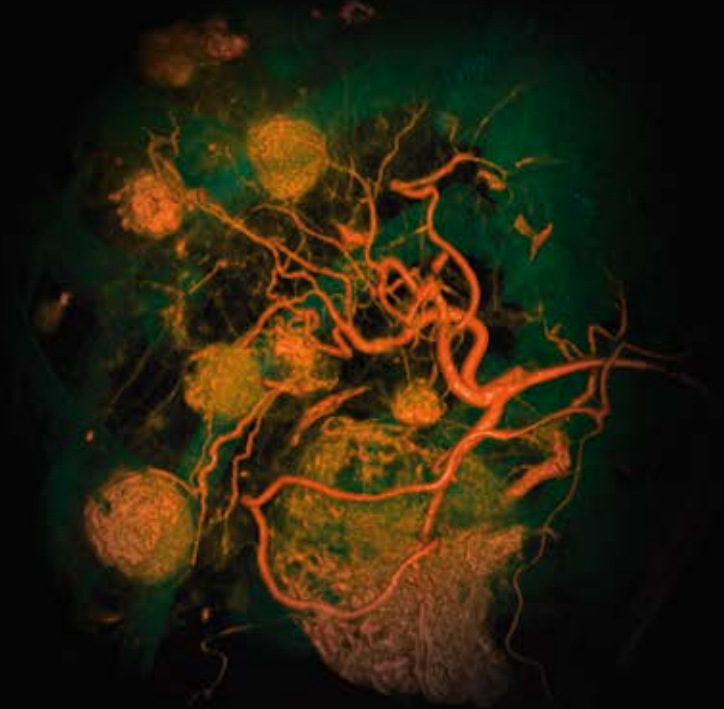
### Support for segmented tables

Segmented tables accommodate the particularly challenging positioning requirements you may encounter during spinal fusion. For these cases, ARTIS pheno provides full integration of surgical tables from Trumpf and Maquet, allowing you to optimally perform any procedure.

\*Compared to screw positioning with conventional image intensifier and screw positioning with optical navigation system.



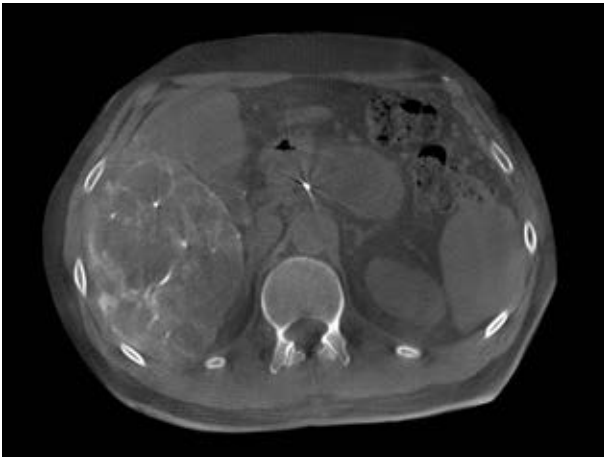
## Ready for trans-arterial chemo-embolization



**Certain diagnoses really raise the bar**

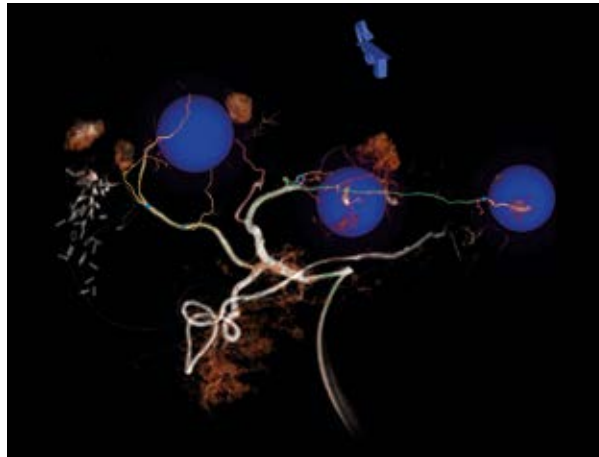
- Intermediate and locally advanced hepatocellular carcinoma
- Liver metastasis

ARTIS pheno® enables you to step up your treatment workflow for complex transarterial chemoembolization. Assessment of full vessel anatomy, automatic feeder detection, and individualized patient selection using imaging biomarkers make truly personalized medicine possible.



#### Assessment of full vessel anatomy

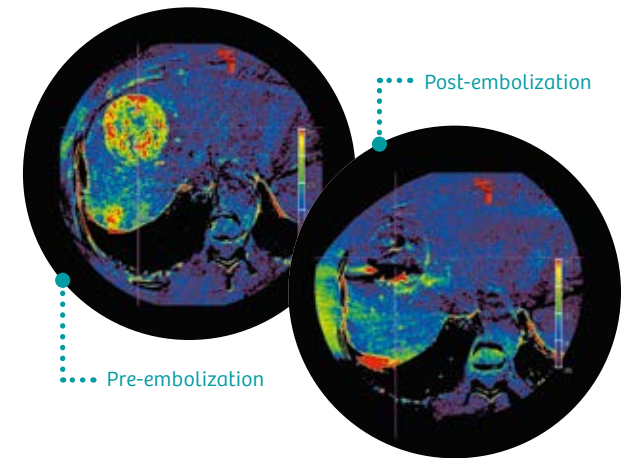
Only ARTIS pheno provides coverage of the entire abdomen to enhance interventional oncology procedures. With a full 360° rotation in only six seconds, *syngo* DynaCT 360 offers a large field of view of 32 cm x 23.5 cm (12.6" x 9.3") that lets you visualize the entire tumor anatomy and all feeding vessels. You get complete liver coverage with excellent image quality and great patient comfort – as fast and easy as conventional cone-beam CT.



#### One-click automatic feeder detection

The simplified navigation path planning of *syngo* Embolization Guidance fosters safe and complete tumor embolization. With our new embolization planning software you are always just a click away from detecting tumor feeders – even right from tableside. Automatic detection of the catheter tip and tumor feeding arteries is possible in case of single and multiple lesions.

You can select treatment positions with confidence and perform faster microcatheter navigation with less dose and contrast.



#### Evaluation of tumor blood volume

ARTIS pheno offers personalized treatment during every step of interventional therapy. You can assess blood volume levels in the tumor before and after embolization using *syngo* DynaPBV Body. This allows for better candidate selection for TACE treatment because you can anticipate treatment response ahead of time. It also helps you confirm the optimal embolization endpoint to ensure complete treatment and reduce the risk of tumor recurrence.

# Keeping hospital environments clean is crucial

Proper infection control is key for the safety of patients and staff in your hospital. It can be hard to keep up with the vast number of pathogens, however.

The level of cleanliness in hospital environments significantly affects health outcomes. 20 % of all healthcare-associated infections are surgical site infections. In the U.S. alone, there are 160,000 to 300,000 surgical site infections per year. Each surgical site infection requires patients to spend up to 11 more days in the hospital in addition to their stay for the initial treatment. This adds up to annual healthcare expenditures in the range of \$3.5 billion to \$10 billion.<sup>1)</sup>

Even if surfaces are cleaned and disinfected according to protocol, medical equipment often contains grooves and hard-to-reach places that may escape even the most rigorous cleaning efforts. Ceiling mounts can pose infection risks during open surgeries, and devices that obstruct proper airflow further impair hospital environments.

Given that there are so many opportunities for micro-organisms to spread, seamless infection control processes are both crucial and extraordinarily challenging to implement and maintain.

**Comprehensive  
cleaning concept**



<sup>1)</sup> Deverick J. Anderson et al., "Strategies to Prevent Surgical Site Infections in Acute Care Hospitals: 2014 Update," *Infection Control and Hospital Epidemiology* 35, no. 6(2014): 605–27.

# ARTIS pheno

## Because infection control matters



Maintain the  
highest infection  
control standards

ARTIS pheno® is the first imaging system designed to support your infection control measures. Seamless covers, anti-microbial surfaces, sealed tableside modules, an uninterrupted air flow due to no ceiling mounted components, and a comprehensive cleaning concept help you maintain the highest standards for infection control – so you can be at the forefront of this important topic.

# Maintain the highest infection control standards

ARTIS pheno



..... **Prepared in no time**

Covering ARTIS pheno with sterile drapes is quick and easy.



ARTIS pheno® ensures easy cleaning.  
Sealed off in every possible way, it is designed to help you fight germs.



#### Smooth and anti-microbial surfaces

ARTIS pheno provides passive infection control that supports regular cleaning and disinfection efforts. Seamless sealed covers with evenly smooth surfaces protect against spills and facilitate easy cleaning. Clean conditions are improved thanks to significant antimicrobial effects on non-sporulating micro-organism.



#### Sealed tableside Pilot Module

The Pilot Module offers intuitive and comfortable operation of the entire system. The illuminated controls and touch display are easy to use – even when covered with sterile drapes. The placement of the module allows for a comfortable posture as you work. Touch2Move technology prevents unintentional system motion.



#### Internal cable guidance

The internal cable guidance improves sterility in the operating room. The cleaning team can simply wipe down the smooth surfaces – no cumbersome cleaning of inaccessible components and wheels. The floor mount simplifies construction requirements and keeps moving parts in the room to a minimum. With no ceiling-mounted rails, you can maintain a sterile airfield above the patient at all times.

# Comprehensive cleaning concept



..... **Make sure it's clean**

ECOLAB's EnCompass™ Monitoring Program enables you to verify the results of your environmental infection control efforts using fluorescent gel markers.

ARTIS pheno® optimally prepares you for infection control. We worked closely with ECOLAB to develop the CleanGuide, a comprehensive cleaning concept for ARTIS pheno that includes cleaning agent recommendations as well as guidance for optimal cleaning procedures.



#### **Cleaning agent recommendations**

ARTIS pheno supports clean working environments every step along the way. CleanGuide contains recommendations for detergents and processing that allow you to achieve optimally clean conditions.



#### **Guidance for optimal cleaning procedures**

Routine cleaning prevents infections – but it needs to be done right. ECOLAB and Siemens developed CleanGuide for optimized routine cleaning and disinfection. This comprehensive process suggests cleaning methods and techniques that ensure validated results.



#### **Improve infection control**

ARTIS pheno means comprehensive infection control in your hospital. Adherence to the CleanGuide cleaning concept yields validated results and improved infection control.

# Additional products & services



ARTIS pheno® provides integration support for additional products.

## Navigation – Brainlab Curve system

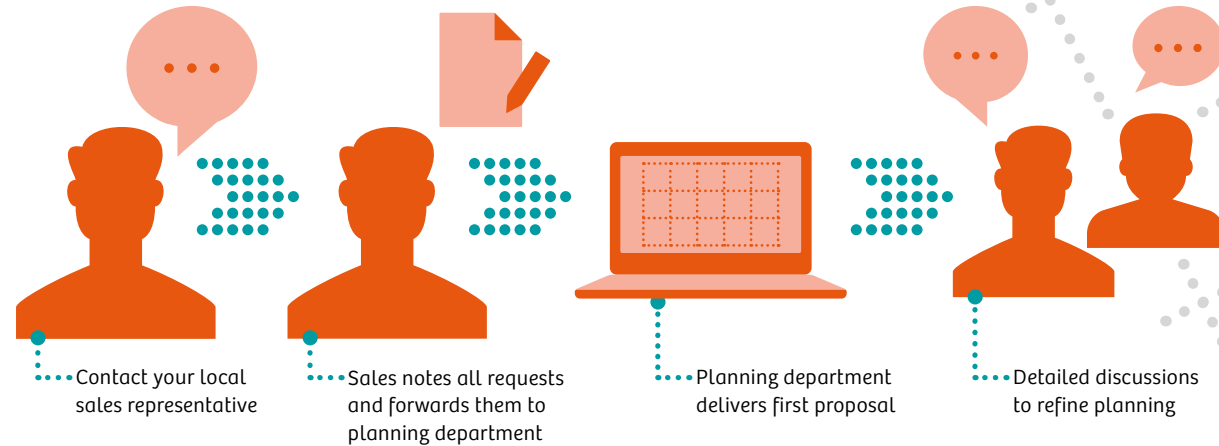
The Brainlab CURVE surgical navigation system improves navigation during procedures where highest precision is needed. Used together with ARTIS pheno, it offers real-time guidance for intraoperative navigation. Automatic registration of the navigation system to the *syngo* DynaCT 3D dataset is quick and easy. The combination of ARTIS pheno and the Brainlab Curve system leads to better decision making and improved patient safety.

## Ultrasound – ACUSON Freestyle

The ACUSON Freestyle™ ultrasound system sets the pace for modern healthcare. Its advanced technologies, including the industry's first wireless ultrasound transducers, are designed to streamline operation and sterile field management. Value-based innovations for improving visualization and cable-free scanning are built to deliver new levels of ease and efficiency at your point of care.

Deliver the quality and safety your patients deserve with value-based technologies designed to reduce complications and improve infection control.

Siemens Healthineers will help you maximize the benefits of hybrid OR technology. Our planning and monitoring services are always tailored to your needs.



.....Contact your local sales representative

.....Sales notes all requests and forwards them to planning department

.....Planning department delivers first proposal

.....Detailed discussions to refine planning

### Advanced system support

Siemens Remote Service (SRS) is a secure data link that connects your medical systems to the service experts in our Customer Care Center. Via SRS, the performance and condition of your equipment can be monitored in real time. SRS makes a broad range of proactive and interactive services available – including fast error identification, remote repair and software updates, preventive maintenance, and collaboration services.

### Hybrid OR planning

Proper planning is key for successful installation. It is essential to involve all stakeholders such as surgeons, anesthesiologists, nurses, architects, medical planners, hospital management, etc. Various opinions and potential conflicts of interests should be taken into account right away.

Siemens Healthineers can answer your questions. We have extensive experience in planning and installing hybrid ORs and hybrid labs for almost all surgical disciplines, interventional radiology, and interventional cardiology.

In helping you prepare for an installation, our experts take into account your hospital's existing infrastructure and design a solution that suits your needs.

# Technical specifications

## Key data

### Installation

- Floor-mounted to keep the ceiling free

### C-arm

- Robotic C-arm with 6 axes for positioning of the C-arm, SID lift, and Detector + Collimator rotation
- Rotation speed up to 90°/s for 3D and *syngo* DynaCT acquisitions
- Wide space C-arm with 130 cm (51") SID and 95.5 cm (37.5") usable clearance for easy patient access and C-arm positioning

### Detector

- 30x40 detector with zen-Technology
- 1,000 micrometer scintillator thickness for high quantum efficiency
- 92 fps readout for 3D and *syngo* DynaCT acquisitions for short scan times

### X-ray tube

- High-performance X-ray tube with flat emitter technology and CLEARpulse
- Providing 90 kW of power at 125 kV
- Flat emitter technology at all focal spot sizes (0.3, 0.4, 0.9)

### Operating modes

- Digital pulsed fluoroscopy, with 0.5, 1, 2, 2.5, 4, 5, 7.5, 10, 15, 30 p/s
- Acquisition at frame rates from 0.5 fps to 7.5 fps (up to 30 fps optional)
- Live 2k imaging at full detector resolution with up to 15 fps during fluoroscopy and acquisition

### Technologies

- CARE+CLEAR for dose reduction and image quality
- PURE for better system performance
- Q-Technology for visionary performance and precision
- zen-Technology for ultra-low dose imaging

### Display

- 55" Large Display with 8 M-Pixel resolution and eight external sources

### 3D acquisition and processing

- Integrated Workstation functionality with workflow integration

### Display suspension

- Siemens fixed-point or rail mount display suspension
- Alternative mount on customer-supplied display suspension

### Tables

- Siemens multi-tilt table with easy-float tabletop for positioning of patients weighing up to 280 kg (617 lbs) in virtually any tilt and cradle – all movements with motor-driven support
- Trumpf TruSystem 7500 surgical table\*
- Maquet Magnus surgical table\*

### CleanGuide

- Guidelines to process system cleaning and sterilization

### CleanSurface

- Anti-microbial coating on C-arm and housing to reduce harboring of bacteria

\*Must be purchased directly from table manufacturer

# Why Siemens Healthineers?

At Siemens Healthineers, we enable healthcare providers to achieve better outcomes at lower cost by expanding precision medicine, transforming care delivery, improving patient experience, and digitalizing healthcare.

Healthcare providers around the world have long relied upon our engineering excellence – leading-edge, high-quality medical technologies across a broad portfolio. Our technologies touch an estimated 5 million patients globally every day.\* At the same time, they help hospital departments to continuously improve their clinical, operational, and financial outcomes.

We now consolidate this unprecedented volume of data and insights and turn them into pioneering enterprise and digital health services. With those, we maximize opportunities and share risks of your entire health system.

Partnerships are built on people. With Siemens Healthineers there is no team more committed and more connected than we are to realize your success together.

\*Siemens AG, "Sustainable healthcare strategy Indicators in fiscal 2014", page 3-4



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The information in this document contains general technical descriptions of specifications and options as well as standard and optional features which do not always have to be present in individual cases.

The statements by Siemens' customers described herein are based on results that were achieved in the customer's unique setting. Since there is no "typical" hospital and many variables exist (e.g., hospital size, case mix, level of IT adoption), there can be no guarantee that other customers will achieve the same results.

The customers cited are employed by an institution that might provide Siemens product reference services, R&D collaboration or other relationship for compensation pursuant to a written agreement.

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Note: Any technical data contained in this document may vary within defined tolerances. Original images always lose a certain amount of detail when reproduced.

Not all features shown in this brochure are necessarily standard and available in all countries. Brainlab, Trumpf, and Maquet products are not sold by Siemens. They have to be ordered, installed, and serviced by way of separate contracts with the vendor in question.

For accessories, go to:  
[siemens.com/medical-accessories](http://siemens.com/medical-accessories)

.....  
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