

**Get two steps ahead
with Dual Source CT**
SOMATOM Force



Expanding precision medicine

Healthcare institutions need to keep pace with global trends and their impact on care delivery. Societies are aging fast and demanding care that's geared to older and older patients. Obesity is creating new challenges for diagnostics and therapy. At the same time, the growing prevalence and cost of chronic diseases calls for innovative answers.

Radiology can play a key role in managing these issues. SOMATOM® Force, Siemens Healthineers' leading Dual Source CT system, keeps you at the forefront when it comes to acquiring more precise data and a deeper understanding of human health. It helps you increase accuracy, advance therapy results, and support new diagnostic methods associated with lower risks and costs than conventional procedures. Precise tissue characterization and material quantification with dose-neutral Dual Energy enable enhanced insights beyond morphology, even in clinical routine. Eventually, automated workflow technologies have the potential to significantly reduce the source of unwarranted variations throughout CT imaging.



André Hartung,
Head of Business Line
Computed Tomography,
Siemens Healthineers,
Forchheim, Germany

“More than 220 scientific publications clearly demonstrate what is possible with SOMATOM Force. Defining the leading edge in CT imaging, it helps you move forward to precision medicine.”

Improving accuracy, advancing therapy results – and how CT can make a difference

Aging societies and their impact on healthcare costs

Demographic change

People are living longer worldwide. However, health in the later years hasn't significantly improved. Because the number of people aged 60 years and older is expected to increase by 1.1 billion from 2015 to 2050,¹ the impact on healthcare costs will be substantial.



Globally, people aged 60 and older will outnumber children younger than five in 2020.¹

In per capita health spending, there's a sixfold difference between people over 85 and those between 55 and 59.²

Diagnostic quality with no dose penalty

Image quality and dose – the right balance

In high-risk, asymptomatic cohorts, early detection of potential diseases can make sense. With conventional CT, however, this might imply a dilemma between high doses and uncertain results.



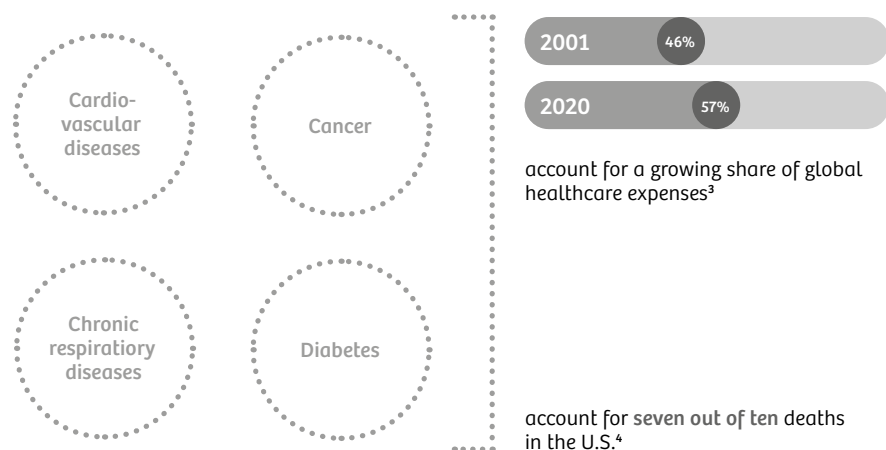
Sustainable results might come with too high dose...

...or dose reduction might compromise image quality

Four key diseases with a high toll

Chronic disease burden

Chronic, non-communicable diseases account for an ever-increasing share of healthcare costs in developed societies. How can CT imaging contribute to earlier detection and lesion evaluation, especially when it comes to cancer and cardiovascular diseases?



A small number of chronic disease types has a disproportional impact on both healthcare costs and death rates.

The goal: precision medicine

Precision medicine

How can CT imaging support the transition to a more precise and outcome-oriented healthcare delivery?

“As radiologists, we now have the possibility to create value-based medicine by targeting the clinical end point of medical procedures: The recovery of the patient.”

Prof. Stefan Schönberg, MD,
University Medical Center Mannheim, Mannheim, Germany



**SOMATOM
Force**

Get two steps ahead with Dual Source CT – SOMATOM Force

Get two steps ahead in clinical excellence

At the top of our Dual Source CT portfolio, SOMATOM Force enables new levels of image quality, clinical outcomes, and ultimately precision medicine. Examine patients without beta-blockers, with no need for them to hold their breath, and with the lowest possible amount of contrast media. Make clearly quantified therapy evaluations with dose-neutral Dual Energy.

Get two steps ahead in workflow performance

Automated technologies support safe, standardized, and highly performant workflows – allowing for appropriate dose and reproducible precision from the smallest to the tallest patients.

Get two steps ahead in expert leadership

Thinking beyond today, you're connected to the future with an ever-growing expert community and exclusive access to our advanced research environment.

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SIEMENS
Healthineers



SOMATOM Force

Get two steps ahead ...

... in clinical excellence

Achieve exceptional clinical and patient outcomes. Based on its industry-leading imaging chain, SOMATOM Force supports high-precision diagnoses, reliable therapy response evaluation, and improved patient care for every individual.

... in workflow performance

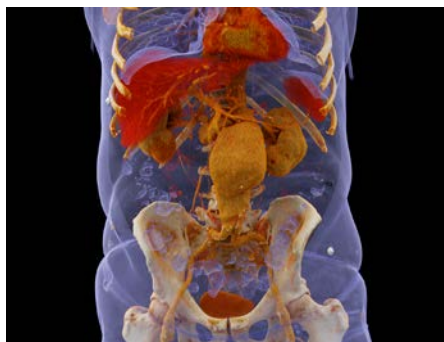
Get exceptional, consistent images faster. The automated FAST Integrated Workflow supports reproducible image quality. High power, speed, and automated dose management help precisely adapt scanning parameters to any patient.

... in expert leadership

Increase your reputation by spearheading medical innovation. As a member of the global SOMATOM Force community, you have access to the *syngo.via* Frontier research environment and can share advanced clinical knowledge in a network of peer experts.

Three of the many things you can only do with SOMATOM Force

There's a broad range of clinical capabilities you can achieve exclusively with SOMATOM Force. Here are just three examples – enabling you to get two steps ahead.



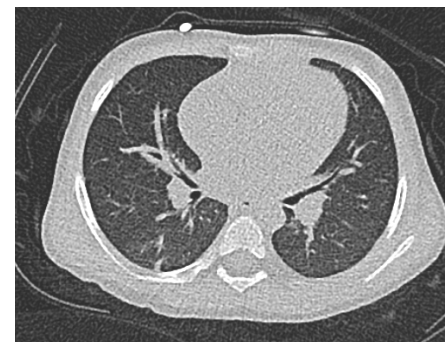
Uncompromised Dual Energy imaging

Cinematic VRT¹⁷ derived from a whole-body Dual Energy (DE) scan in the case of an occult ruptured aneurysm. Dual Energy can improve detection of bleeding and extent of rupture. This is based on the better contrast-to-noise ratio of a low-keV contrast-media-enhanced scan.



4D CTA up to 80 cm for therapy planning

With scan coverage of up to 80 cm in dynamic angio, SOMATOM Force can display challenging vascular situations like the one above, a case of peripheral vascular disease. Cinematic VRT from one phase is shown.



Free-breathing and ultra-low-dose imaging

Due to their higher vulnerability to radiation, high-quality ultra-low-dose imaging of the lung in noncompliant children can be achieved using the unique Tin Filter and the industry's fastest scan speed (up to 737 mm/s) of SOMATOM Force for virtually motion-free images.

Uncompromised Dual Energy imaging

With energy pairings and the unique Tin Filter, SOMATOM Force enables new levels of energy separation in Dual Energy scanning and therefore significantly increases precision and clinical impact.

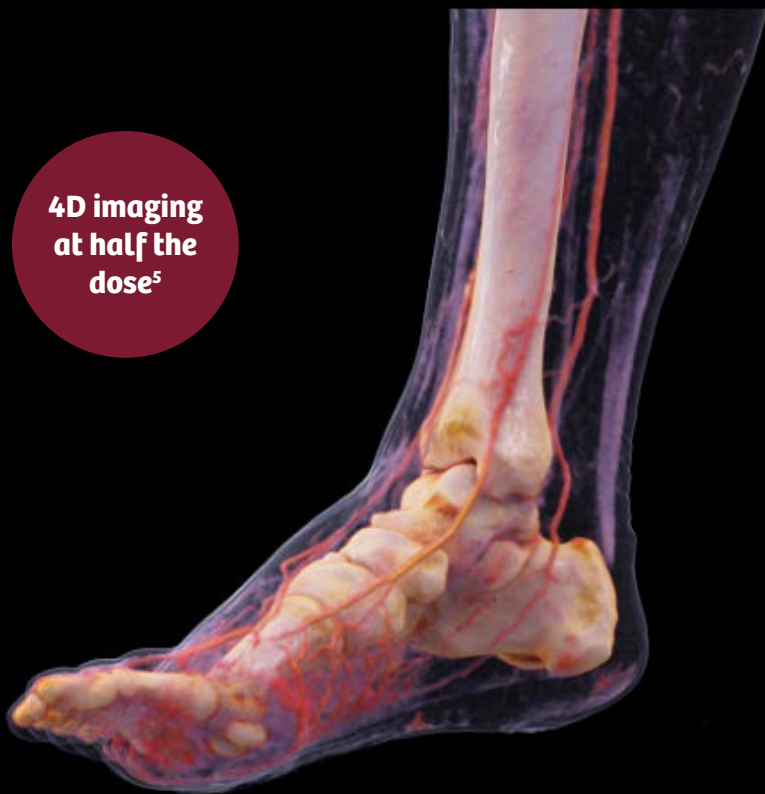
SOMATOM Force utilizes multiple pairings, from the “standard” 80-/140-kV to new 80-, 90-, and 100-/150-kV modes with tin (Sn) filtration using the Tin Filter: for example, for obese patients. 30 percent better energy separation means similar tissues can be differentiated more precisely, leading to increased diagnostic power in Dual Energy.



**Precise and
dose-neutral
Dual Energy**

Courtesy of University of Tuebingen, Tuebingen, Germany

**4D imaging
at half the
dose⁵**



Extended dynamic CTA up to 80 cm

The applied dose has been the critical threshold for broadening the application of functional imaging, especially to body perfusion.

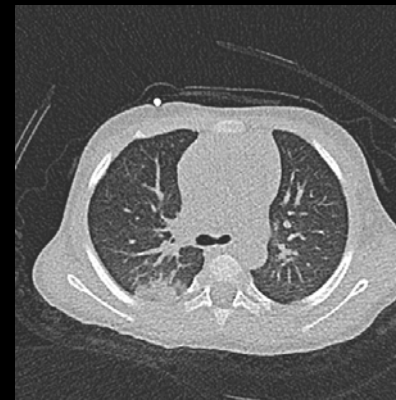
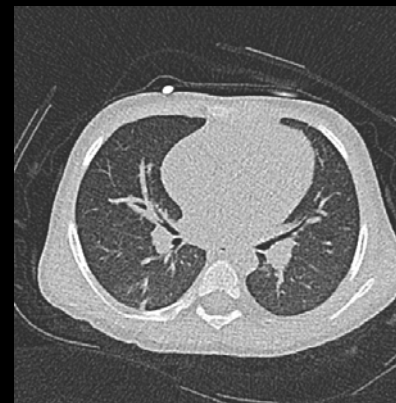
SOMATOM Force significantly lowers this hurdle, extending the coverage to up to 22 cm for perfusion of the brain and organs (for example, the liver) while significantly reducing the applied dose. The system also allows ultra-long-range dynamic CT angiographies of up to 80 cm.

Courtesy of University Medical Center Mannheim, Mannheim, Germany

Free-breathing and ultra-low-dose imaging

A significant number of patients are unable to hold their breath or to hold still due to their age or their progressed disease state – for example, in COPD, trauma imaging, or, as shown to the right, with a child who can't follow your instructions.

SOMATOM Force minimizes motion artifacts with its outstanding combination of pitch 3.2 and native temporal resolution of 66 ms, allowing patients to “breathe freely” during thoracic and abdominal examinations. The excellent image quality helps minimize motion artifacts that otherwise impair image quality. In pediatric imaging, it may help you reduce the number of sedations required.

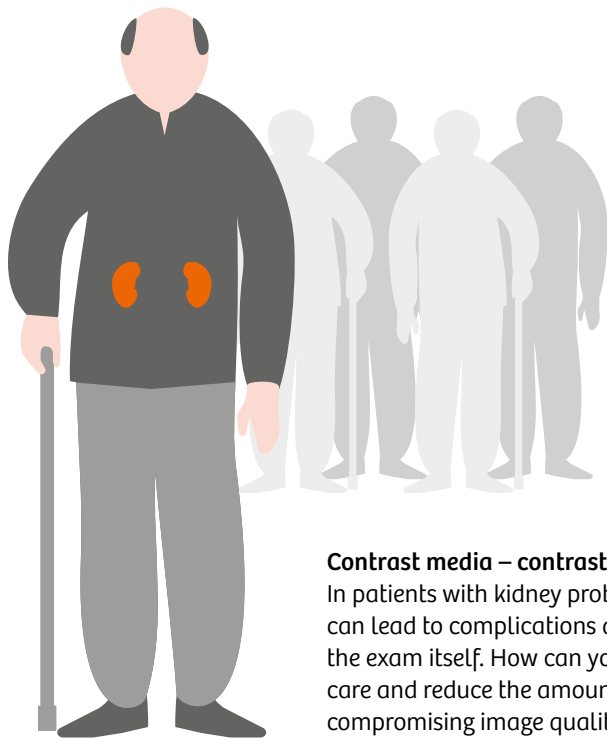


**Eff. dose
0.08 mSv**

Courtesy of University of Tuebingen, Tuebingen Germany

How can you increase certainty and reduce risks?

New risks due to aging, multimorbidities, kidney problems, or other factors are typical in societies undergoing demographic shifts. This can pose new challenges to CT scanning in terms of image quality, patient care, and decision-making.



20% have renal insufficiencies⁶

Contrast media – contrasting their own benefit

In patients with kidney problems, contrast media exams can lead to complications and push costs far higher than the exam itself. How can you safeguard excellent patient care and reduce the amount of contrast media without compromising image quality?



FFR_{CT} requires exquisite image quality

Going for non-invasive alternatives

One way to reduce risks in cardiology is to choose non-invasive alternatives like CT-derived FFR⁷. However, its application is absolutely dependent on very high CT image quality. How can you maximize this quality?



Achieve exceptional clinical and patient outcomes. Based on its industry-leading imaging chain, SOMATOM Force supports high-precision diagnose, reliable therapy response evaluation, and improved patient care for every individual.

**Get two steps ahead
in clinical excellence**

Bring image quality to the next level – with free-breathing and powerful imaging

Free-breathing imaging

Motion blur and unwanted artifacts can obscure diagnostic image quality. With SOMATOM Force, you can significantly improve image quality, helping prevent rescans and uncertain diagnoses.



More patients, less motion

The purpose of breathing commands is simple: to avoid as much movement as possible to reduce motion artifacts. Unfortunately, a significant number of patients simply can't hold their breath even for a few seconds. Obese, elderly, unconscious, or uncooperative patients are either excluded, need to be sedated, or are scanned with results that are ultimately unusable for diagnosis. By providing the industry's highest native temporal resolution and fastest speed, SOMATOM Force helps to minimize motion artifacts even in these challenging cases.

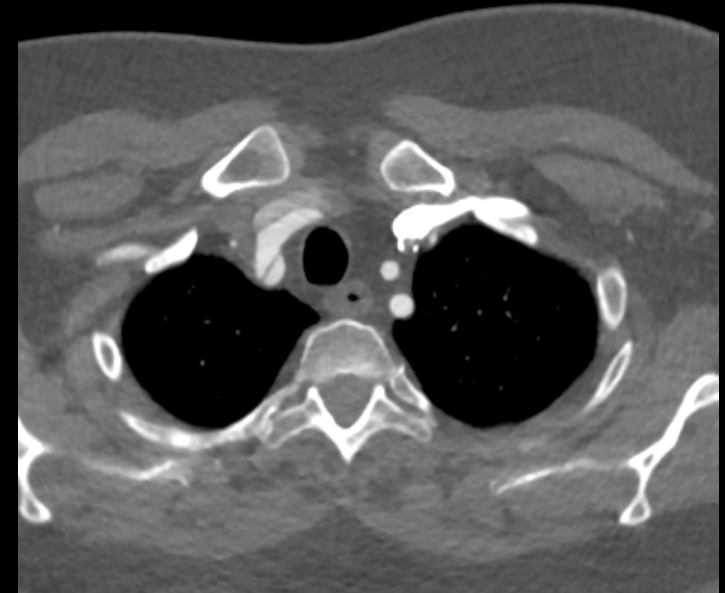
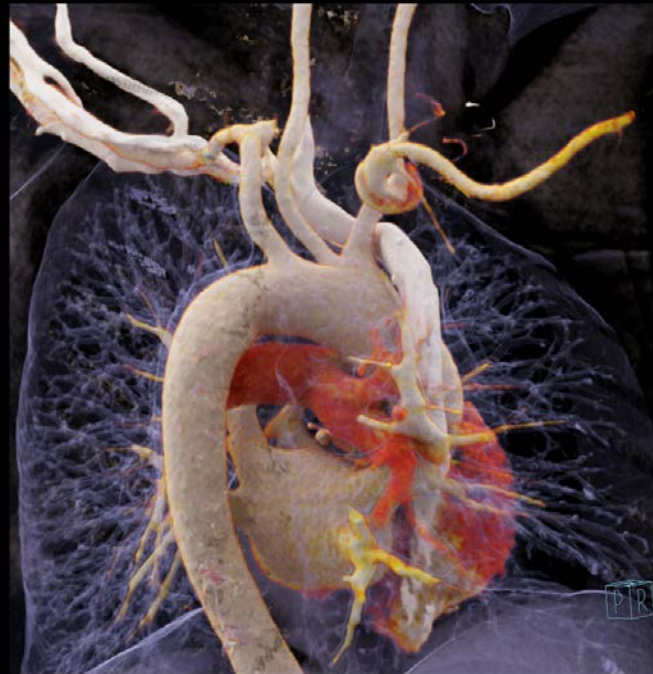
Better preparation, reduced complications

Scanning with a native temporal resolution high enough for patients to breathe freely provides significant clinical benefits. Thanks to SOMATOM Force's extended coverage, you can scan an entire heart in approximately 150 ms. Combining an acquisition speed of up to 737 mm/s and a generator power of up to 2 × 120 kW, SOMATOM Force facilitates freezing motion at outstanding image quality.

Turbo Flash scan catching the details in CTA – right subclavian artery dissection

Collimation: $2 \times 192 \times 0.6$ mm
Pitch: 3
Scan time: 0.53 s
Scan length: 366 mm
Rotation time: 0.25 s
Tube settings: 80/80 kV, 150 mAs
CTDI_{vol}: 2.20 mGy
DLP: 94.6 mGy cm
Eff. dose: 1.32 mSv

Turbo Flash mode at up to 737 mm/s prevents breathing and motion artifacts. When combined with the Vectron™ tubes, dose levels can be reduced to a minimum.



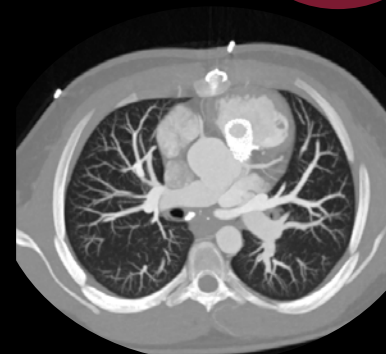
**Speed
733 mm/s**

Cardiac imaging – 14-year-old adolescent

Collimation: $2 \times 192 \times 0.6$ mm
Pitch: 3.2
Scan time: 0.41 s
Scan length: 303 mm
Rotation time: 0.25 s
Tube settings: 80 kV, 424 mAs
CTDI_{vol}: 1.95 mGy
DLP: 67.1 mGy cm
Eff. dose: 0.94 mSv
HR: 65 bpm



**Native
temporal
resolution
66 ms**



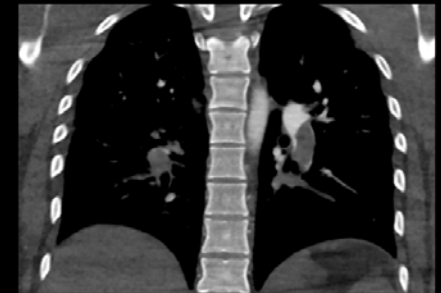
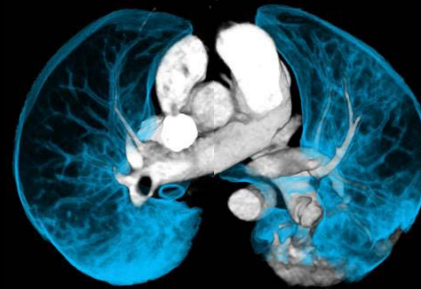
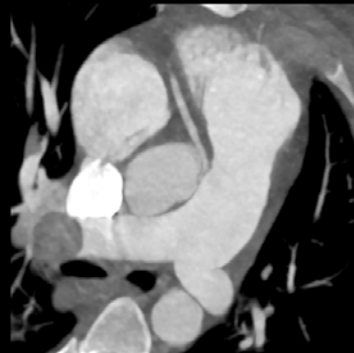
Courtesy of University Hospital Calmette, Lille, France

Turbo Flash scan at 142 bpm – pulmonary embolism and RCA of abnormal origin

Collimation: $2 \times 192 \times 0.6$ mm
 Pitch: 3.2
 Scan time: 0.31 s
 Scan length: 236 mm
 Rotation time: 0.25 s
 Tube settings: 90 kV, 617 mAs
 DLP: 120 mGy cm
 CTDI_{vol}: 4.31 mGy
 Eff. dose: 1.6 mSv
 HR: 142 bpm
 CM: 80 mL

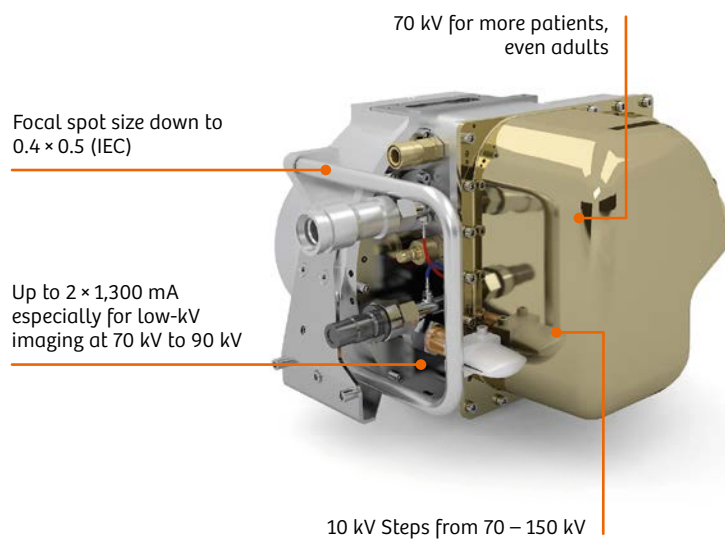
Vectron tubes combined with Stellar^{Infinity} detectors offer steps of 10 kV from 70–150 kV. In this case, a contrast-media-enhanced CT to diagnose the emboli and abnormalities of the coronaries in one scan was performed with 90 kV. Image quality shows perfect details with excellent contrast media enhancement.

Scan time
0.31 s



Powerful imaging

When the smallest details count – like in the inner-ear and bone imaging, or stent visualization – the quality of the entire imaging chain is essential. With its powerful Vectron™ X-ray tubes and the highly sensitive Stellar^{Infinity} detectors, SOMATOM Force is the ideal scanner for high-speed, large-volume coverage at outstanding image quality.



Unique power, gentle scans

SOMATOM Force significantly improves spatial resolution in clinical routine thanks to a fine-tuned combination of solutions: Data acquisition uses the small focal spot of the Vectron™ X-ray tube with a power-independent focal spot size; the small detector apertures of the Stellar^{Infinity} detector combined with the in-plane and z-axis flying focal spot enable excellent in-plane and through-plane sampling. With ADMIRE[®], clinical images will also benefit from higher resolution at organ borders and improved edge delineation at up to 60 percent less dose.⁹ Increased spatial resolution may be beneficial in inner-ear and bone imaging and CT angiographic studies, particularly for the visualization of very small vessels like the coronary arteries.

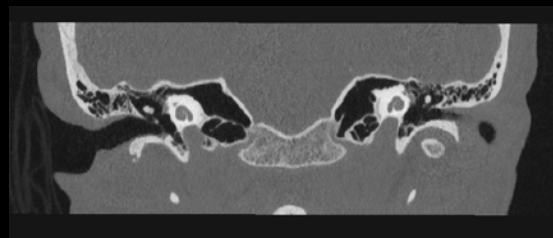
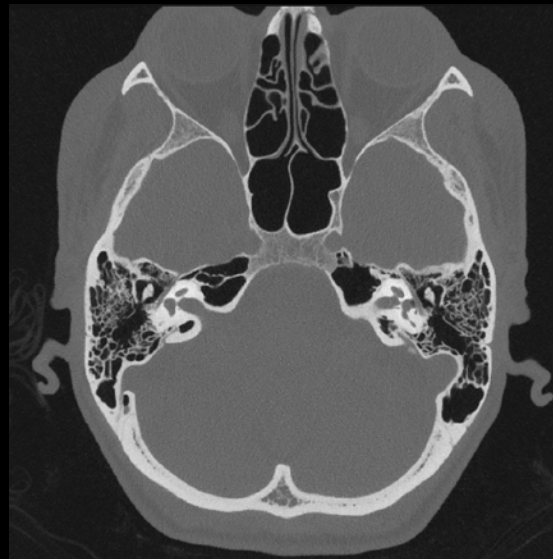
Unique performance parameters

The Vectron™ X-ray tube and the corresponding high-power generator offer unique performance parameters. Thanks to the efficient electron catcher, the tube's focal spot is very small, achieving a size of a mere 0.4×0.5 (IEC). The focal spot typically spreads at a high X-ray tube power, which negatively impacts the spatial resolution and image contrasts. SOMATOM Force overcomes this challenge by maintaining its focal spot size – and accordingly, the spatial resolution – practically independent of the kV setting, even at very high tube power.

Ultra-high-resolution (UHR) mode – mid and inner ear with detailed bony structures and the ossicles

Collimation: 44×0.6 mm
Scan time: 3.51 s
Scan length: 57.2 mm
Rotation time: 1 s
Tube settings: 90 kV, 132 mAs
CTDI_{vol}: 8.69 mGy
DLP: 109.9 mGy cm
Eff. dose: 0.2 mSv

Outstanding image detail: The very small focal spot enabled by the Vectron™ X-ray tube, in conjunction with UHR mode, made it possible to display very fine bone structures.



**Small
focal spot
size
 0.4×0.5
(IEC)**



Courtesy of Carolinas Medical Center, Charlotte, North Carolina, USA

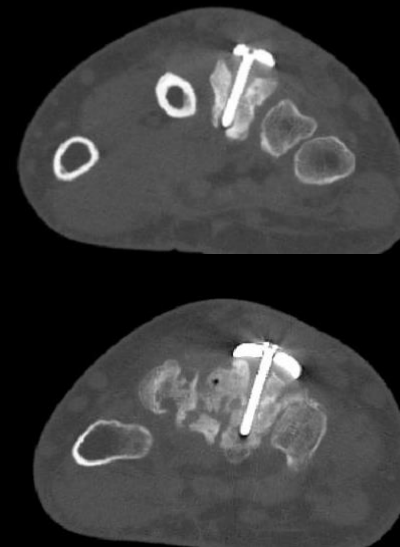
Ultra-high-resolution (UHR) mode – complex wrist fracture with fixation

Collimation: 64×0.6 mm
Scan time: 9.6 s
Scan length: 185 mm
Rotation time: 1.0 s
Tube settings: 120 kV, 82 mAs
CTDI_{vol}: 4.75 mGy
DLP: 95 mGy cm
Eff. dose: 0.08 mSv

High-resolution bone imaging: Ultra-high-resolution mode achieves 0.4 mm resolution to enable the fine depiction of small bone structures at dose levels of conventional X-ray.



Precise
metal artifact
reduction



Courtesy of University Hospital Zurich, Zurich, Switzerland

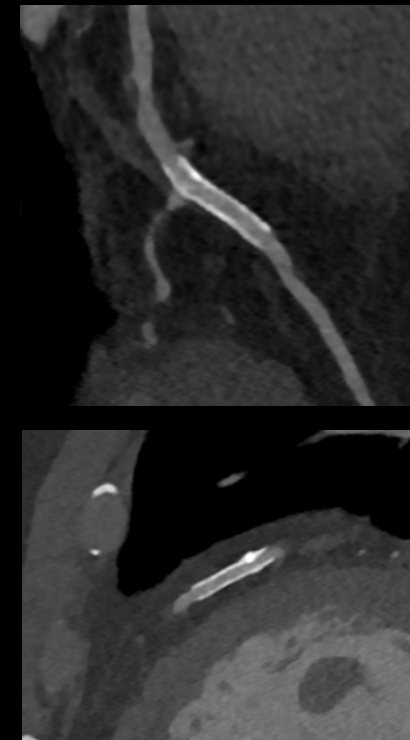
Follow-up of a 57-year-old male patient who had suffered from a left coronary artery stenosis

Collimation: $2 \times 192 \times 0.6$ mm
Scan time: 0.18 s
Scan length: 129.3 mm
Rotation time: 0.25 s
Tube settings: 100 kV, 500 mAs
CTDI_{vol}: 4.95 mGy
DLP: 84.2 mGy cm
Eff. dose: 1.2 mSv
HR: 57 bpm

Thanks to a temporal resolution of 66 ms and an isotropic resolution of 0.3 mm, SOMATOM Force allows excellent visualization of coronaries and stents.



Scan time
0.18 s



Courtesy of Department of Radiology, Lishui Central Hospital, The No. 5 Affiliated Hospital of Wenzhou Medical College, Lishui, PR China

Improve patient care – with kidney-friendly and ultra-low-dose scanning

Kidney-friendly scanning

With an aging population, chronic kidney diseases are on the rise, creating a need for better care and more effective treatments. A smaller dose of contrast media especially benefits patients with renal insufficiency.



Prof. Gabriele Krombach, M(H)BA,
Head of Diagnostic and
Interventional Radiology,
University Giessen-Marburg,
Germany

"In our first week using SOMATOM Force, we not only saved about 40 percent of contrast media in CT angiographies and 50 percent in thorax/abdomen CT – we also scanned three peds without sedation."



Lower kV, more protection

SOMATOM Force allows you to routinely perform exams at 70–90 kV, even with adults. This may reduce the quantity of contrast media required. As a result, residual renal function can be maintained and the kidneys are less likely to be harmed by nephrotoxic effects.

Less risk, more savings

In some cases, patients must be hospitalized in order to undergo prescan care or aftercare following a contrast scan. These procedures can be time-consuming and have the potential to cost much more than the CT examination itself. Reducing the quantity of contrast media can lead to significant improvements in clinical results and patient well-being.

Kidney-friendly scanning with Turbo Flash mode – aortic dissection with renal insufficiency

**20 mL
contrast
media**

Collimation: $2 \times 192 \times 0.6$ mm
Pitch: 3.2
Scan time: 1.07 s
Scan length: 740 mm
Rotation time: 0.25 s
Tube settings: 80/80 kV, 140 mAs
CTDI_{vol}: 2.09 mGy
DLP: 154.6 mGy cm
Eff. dose: 2.32 mSv
CM: 20 mL

Low-kV imaging with VECTRON™ tube:
The innovative tube design with small focal spots and high power reserves allows contrast media to be reduced to extremely small amounts while improving image contrast-to-noise ratio.



Courtesy of University Medical Center Mannheim,
Mannheim, Germany

Ultra-low-dose scanning

With conventional CT, doses can be too high and results too uncertain for successful early detection – for example, of occult lesions in the lung. SOMATOM Force provides significantly optimized dose efficiency, which enables ultra-low-dose imaging of a growing number of high-risk, asymptomatic individuals.



Michel Nemery,
Head of the Radiology Department,
Herlev and Gentofte Hospital,
Denmark

***"SOMATOM Force is accurate,
fast, and gentle."***



Lower dose, earlier diagnoses

SOMATOM Force comes with the unique Tin Filter technology, which shields your patients from clinically irrelevant low-energy radiation. The result: You can deliver excellent results at dose levels comparable to conventional X-ray – for example, in non-contrast studies like lung screening as well as orthopedic and sinus scanning. The Tin Filters can also be used for other types of exams, including topograms and calcium scoring, that you can now perform at previously unknown low dose levels.

Clear advantages, clinically approved

A recent clinical study confirms the advances in low-dose scanning with SOMATOM Force, stating that the visualization of pulmonary nodules "... can be performed with third-generation Dual Source CT producing high image quality, sensitivity, and diagnostic confidence at a very low effective radiation dose of 0.06 mSv when using a single-energy protocol at 100 kVp with spectral shaping and when using advanced iterative reconstruction technique."¹⁰

Ultra-low-dose scan with Tin Filter and Turbo Flash mode – bilateral pneumonia

**Eff. dose
0.04 mSv**

Collimation: $2 \times 192 \times 0.6$ mm
Pitch: 3.2
Scan time: 0.45 s
Scan length: 311 mm
Rotation time: 0.25 s
Tube settings: Sn100 kV, 24 mAs
CTDI_{vol}: 0.09 mGy
DLP: 2.8 mGy cm
Eff. dose: 0.04 mSv
Slice width: 1.5 mm

Detailed images: High spatial resolution enables perfect visualization of pneumonia even at extremely low dose levels. Tin Filters allow for lung scans at extremely low dose levels.



Make sound decisions – with 4D imaging at half the dose and dose-neutral Dual Energy

4D imaging

With diagnoses often stuck in a compromise between dose and data, the option to deliver high-quality yet dose-efficient 4D imaging can help make decisions more quickly and sustainably.



Proper diagnoses, precise decisions

4D imaging adds functional information to morphology. With its Stellar^{Infinity} detectors, SOMATOM Force enables body perfusion suitable for use in clinical practice. The increased coverage allows for a perfusion range of up to 22 cm, which easily covers entire organs. The key to bringing this breakthrough into everyday use is the full electronic integration of the Stellar^{Infinity} detectors and the Adaptive Dose Shield. Together they enable up to 50 percent dose reduction in 4D imaging compared with other state-of-the-art CTs.

Accurate results, appropriate therapies

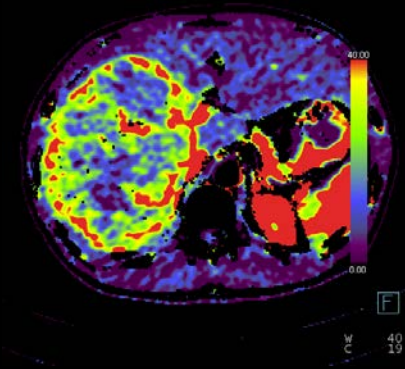
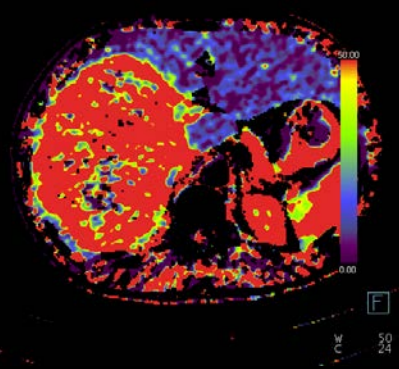
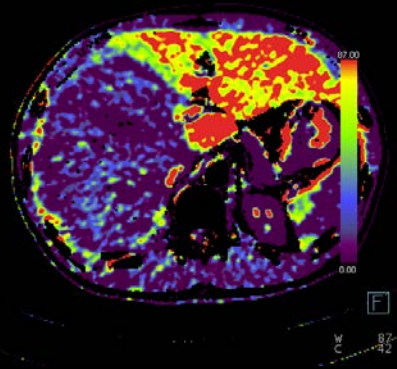
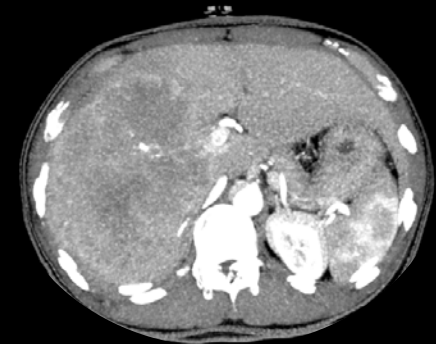
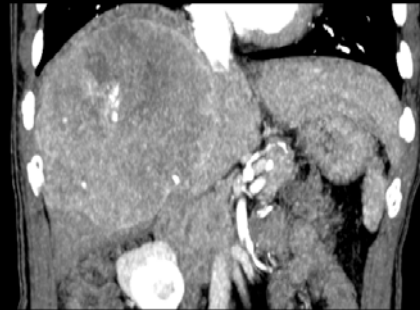
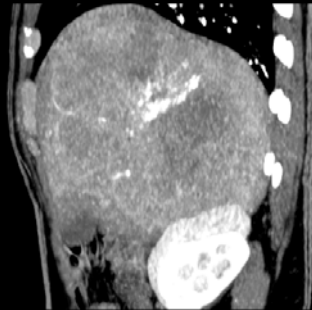
Another question with multi-phase exams is how to optimize contrast bolus timing and execution. With SOMATOM Force, you can switch to easier-to-perform 4D studies. Besides being more cost-effective, the functional information allows increased precision in disease assessment and supports appropriate decisions. More patients can benefit from a highly precise assessment of lesions and the associated therapies. This can help reduce overall healthcare spending and enable individual institutions to free up resources.

Volume perfusion of the liver at 70 kV

Collimation: 48×1.2 mm
 Scan time: 28.5 s
 Scan length: 294 mm
 Rotation time: 0.25 s
 Tube settings: 70 kV, 189 mAs
 CTDI_{vol}: 48.17 mGy
 DLP: 1015.7 mGy cm
 Eff. dose: 15.24 mSv

Whole liver volume perfusion enabled by SOMATOM Force at 70 kV results in superior contrast-to-noise ratio and lower radiation dose compared with conventional perfusions exams.

**Coverage
294 mm**

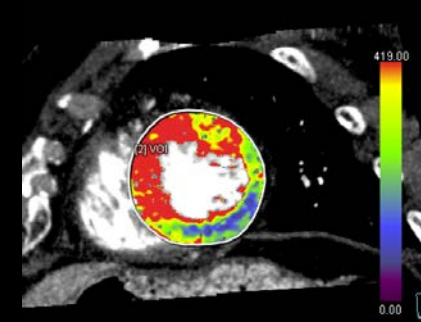
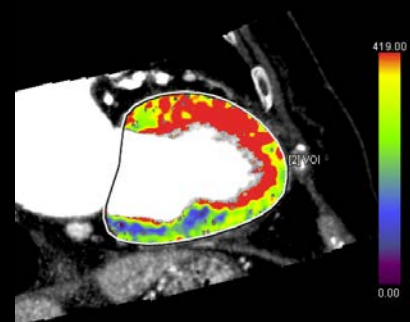
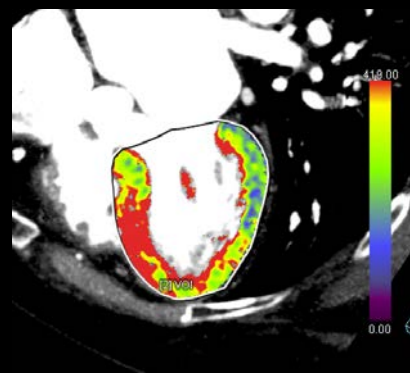
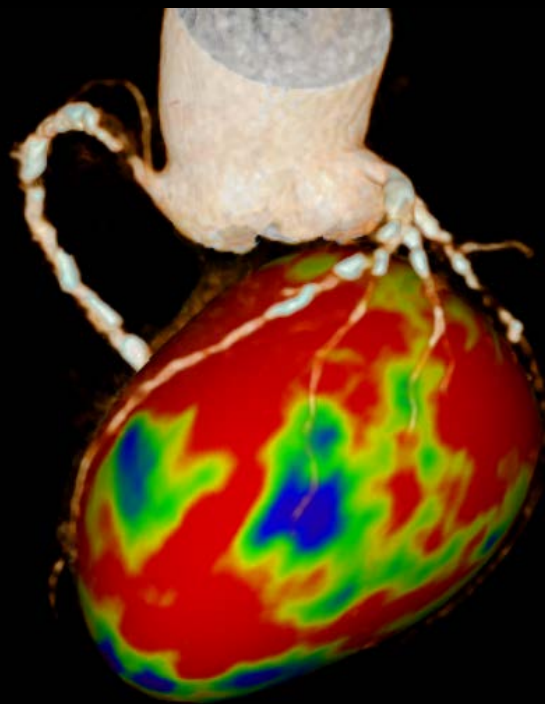


Courtesy of Peking University Medical College, Beijing, PR China

Dynamic myocardial stress perfusion – combining diagnostic and functional imaging at low dose

Collimation: 192 × 0.6 mm
Scan time: 33.41 s
Scan length: 104.3 mm
Rotation time: 0.61 s
Tube settings: 70 kV, 275 mAs
CTDI_{vol}: 43.08 mGy
DLP: 455.0 mGy cm
Eff. dose: 6.37 mSv
HR: 85–92 bpm

Assessment of myocardial perfusion requires the most efficient possible use of radiation dose and high temporal resolution to cover broad range of heart rates.

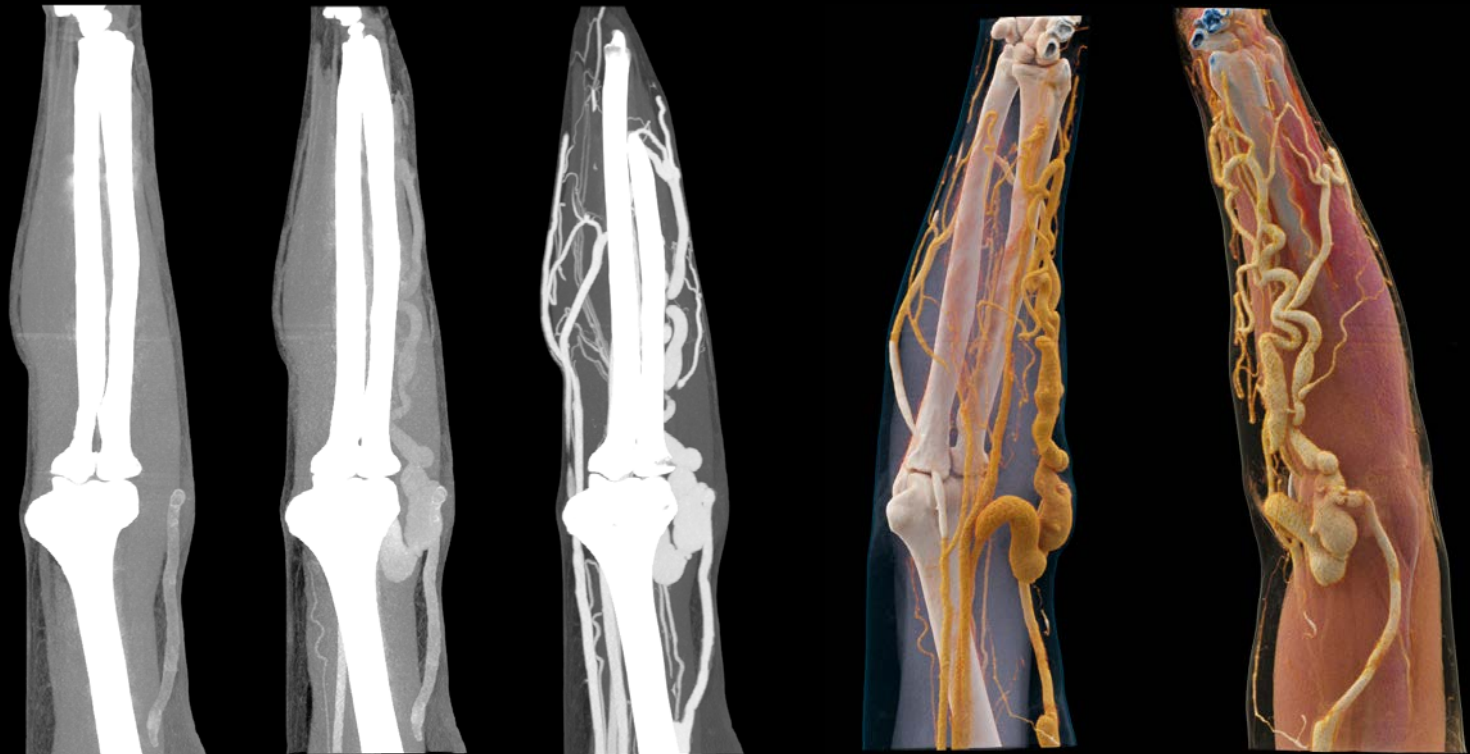


70 kV

Extended dynamic imaging of peripheral vessels

Collimation: 192 × 0.6 mm
 Scan time: 47.1 s
 Scan length: 433.2 mm
 Rotation time: 0.25 s
 Tube settings: 70 kV, 80 mAs
 CTDI_{vol}: 23.57 mGy
 DLP: 1404 mGy cm
 Eff. dose: 1.12 mSv

Complex vascular pathology requires dynamic information to reveal the entire complexity, as shown here. 4D CTA imaging was applied to visualize the consequences of the occlusion of a shunt.



Coverage
433.2 mm

Courtesy of University Medical Center Mannheim, Mannheim, Germany

Precise and dose-neutral Dual Energy (DE)

The reliable evaluation of patient-specific therapies can significantly improve patient outcomes and prevent costly, ineffective treatment. Precise and dose-neutral quantification helps you generate high-quality diagnostic results.



More information, better outcomes

In recent years, Dual Energy CT has found its way into clinical routine, adding tissue and material information to morphology. Various studies have shown the potential for reducing the need for follow-up imaging. By further increasing sensitivity and specificity, SOMATOM Force pushes Dual Source Dual Energy to a new level. Improved DE acquisition speeds of up to 258 mm/s and a much broader range of applications, for example, for obese patients, permit a more precise differentiation of tissue types in oncology, cardiovascular, and acute-care cases.

Saved time, increased usage

Waiting to see whether a chosen therapy is appropriate can be complex, costly, and time-consuming. It also implies the risk of wasting resources on unnecessary treatments. Reliable information about tissue and material decomposition may enable a faster evaluation of therapy response. By making DE quantification more precise and accessible, SOMATOM Force takes CT two steps ahead as a decision support tool – in line with the goals of value-based healthcare.

Precise Dual Energy tissue differentiation – cardiac PBV – coronary stenosis and bypasses

**Dual Energy
pairing
90/Sn150 kV**

Collimation: $2 \times 128 \times 0.6$ mm

Scan time: 10.9 s

Scan length: 208.4 mm

Rotation time: 0.25 s

Tube settings: 90/Sn150 kV, 128/108 mAs

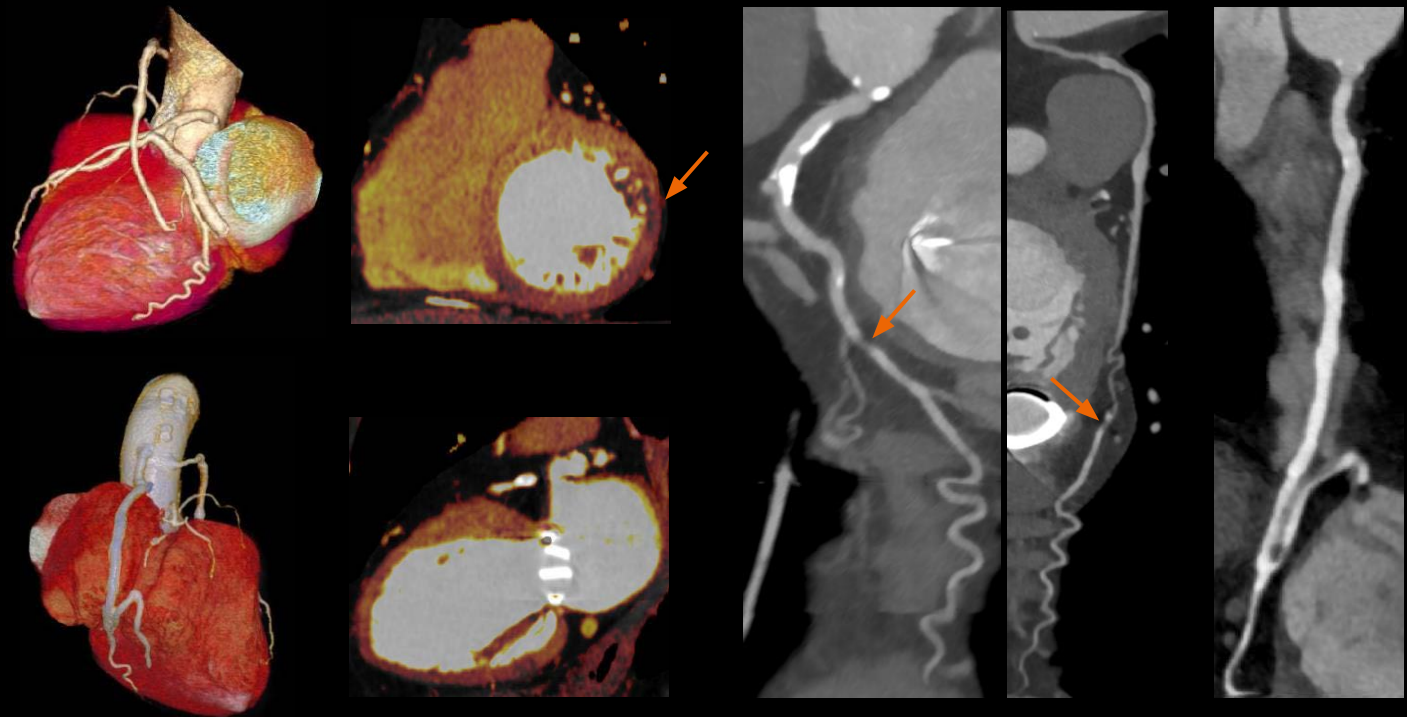
CTDI_{vol}: 10.99 mGy

DLP: 230.9 mGy cm

Eff. dose: 3.23 mSv

HR: 53–58 bpm

Advanced diagnostic information with DE:
With a single scan, both CTA and myocardium
PBV information are acquired with no dose
penalty for DE acquisition.

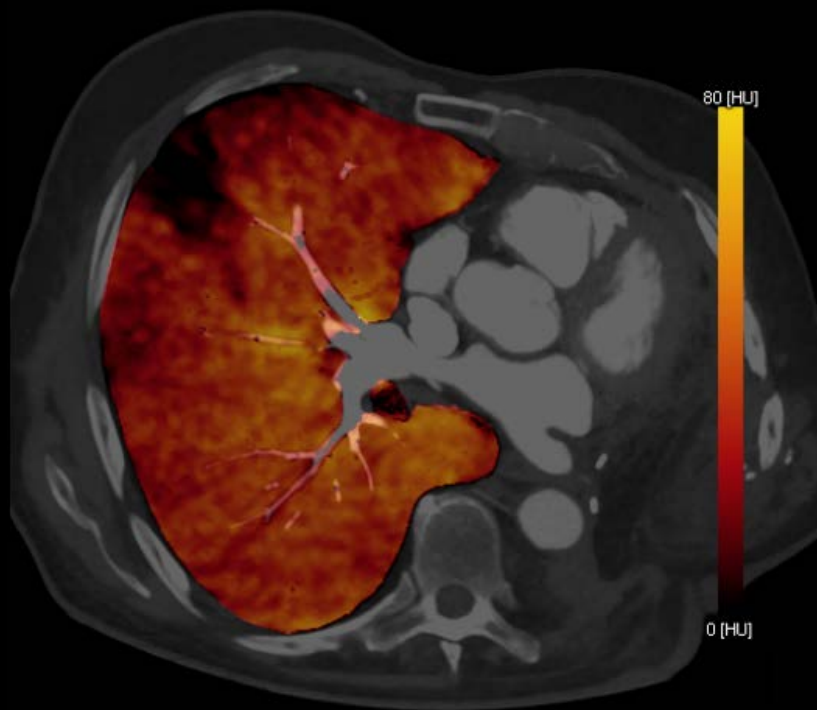


Courtesy of MUSC Medical Center, Charleston, USA

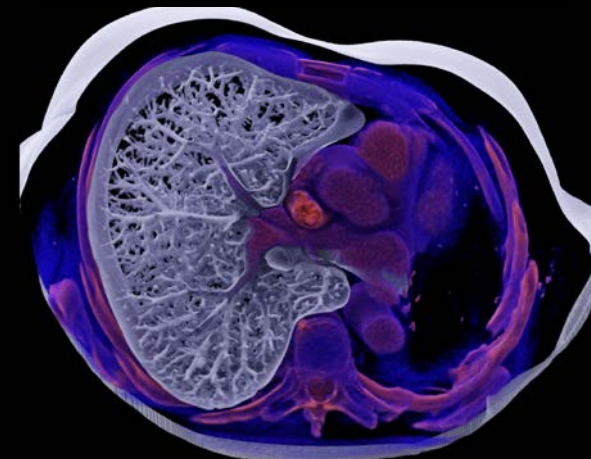
Precise Dual Energy tissue differentiation – lung perfusion

Collimation: $2 \times 128 \times 0.6$ mm
Scan time: 4.12 s
Scan length: 355 mm
Rotation time: 0.25 s
Tube settings: 80 kV/Sn 150kV,
115/70 mAs
CTDI_{vol}: 7.78 mGy
DLP: 298.7 mGy cm
Eff. dose: 4.18 mSv

Understanding lung function is essential, and not just in cases of pulmonary embolism. In the case shown, the high speed of the Dual Source technology was used to visualize the degree of perfusion defects after resection of the left lung for tumor treatment. The combination of high in-plane and best spectral separation of the DE scan result in artifact-free and reliable perfusion mapping, even when imaging is a challenge.



**Dual Energy
pairing
80/Sn150 kV**



Courtesy of University Hospital Calmette, Lille, France

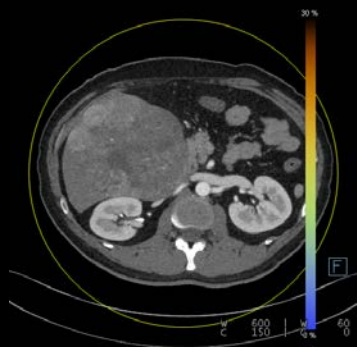
Precise Dual Energy tissue differentiation – liver tumor

Collimation: $2 \times 128 \times 0.6$ mm
 Pitch: 0.6
 Scan time: 6.85 s
 Scan length: 315 mm
 Rotation time: 0.5 s
 Tube settings: 80/Sn150 kV, 124/65 mAs
 CTDI_{vol}: 4.58 mGy
 DLP: 130.23 mGy cm
 Eff. dose: 1.95 mSv

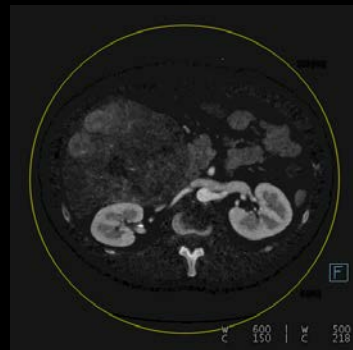
Cinematic VRT derived from information of the iodine map showing the vascularization of the tumor.



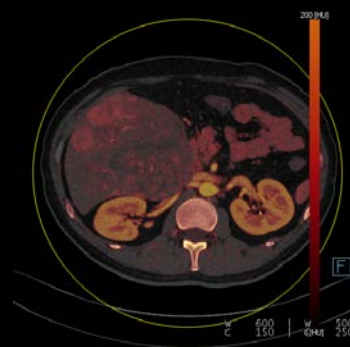
**Eff. dose
1.95 mSv**



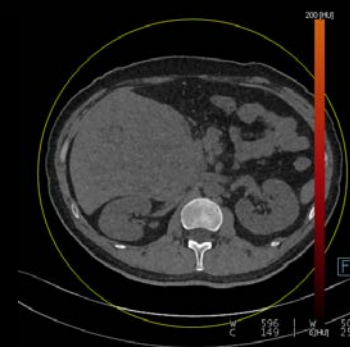
Contrast-enhanced
120-kV-equivalent image



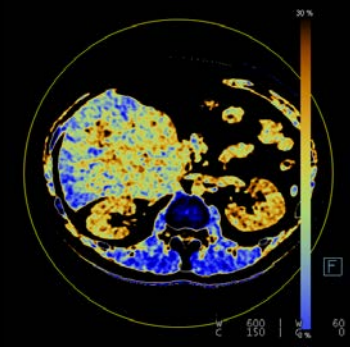
Iodine map



Overlay iodine map/
virtual non contrast-
enhanced image



Virtual non-contrast-
enhanced image

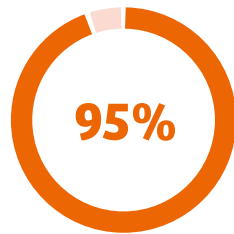


FAT map

Courtesy of Peking University Medical College, Beijing, PR China

How can you reduce unwarranted variations?

In daily practice, radiology workflows are often challenged by staff changes, unequal degrees of experience, and insufficient tools. This can affect consistency, efficiency, and staff satisfaction.



of patients aren't positioned correctly in the CT isocenter.¹¹



The same study revealed a 2.6-cm mean deviation. A 3.0-cm deviation would lead to ...

6%
more
image noise

18%
higher
peripheral dose

Get two steps ahead in workflow performance



Get exceptional, consistent images faster. The automated FAST¹² Integrated Workflow supports reproducible image quality. High power, speed, and automated dose management help precisely adapt scanning parameters to any patient.

Position patients precisely – with FAST Integrated Workflow

Accurate patient positioning is essential for safe, error-free CT imaging with no rescans and time loss. However, users are as individual as patients, and so the quality of results can differ enormously. With its game-changing FAST Integrated Workflow, SOMATOM Force helps technologists acquire the right body region at the right dose – in a reproducible way.



Precise position – precise quality and dose

The world's first FAST 3D Camera in conjunction with FAST applications helps your team provide first-time-right scans, manage tight schedules, and potentially examine more patients.

Get closer to your patients

At the same time, with the Touch Panels, technologists can provide instruction and assistance much closer to patients. Considering the growing pressures on healthcare providers, this could enhance patient cooperation, staff satisfaction, and even your institution's reputation.

"Special attention must be paid to correct patient centering in order to optimize organ doses and image quality of the respective CT examination."¹³

Saltybaeva N, Alkadhi H;
Vertical Off-Centering Affects Organ Dose in Chest CT



Make precise positioning your standard

FAST Integrated Workflow

With SOMATOM Force and its FAST Integrated Workflow, you can push workflow automation and standardization to a new level – and, with no contradiction, care for patients more individually.



Starting with 3D measurement

“You can only improve what you can measure” – SOMATOM Force gives truth to the old saying:

- FAST 3D Camera captures the patient's shape, position, and height in three dimensions
- Using infrared measurement, it even recognizes body contours; this is particularly useful when, for example, patients are wearing thicker clothes



Calculating with accuracy

Algorithms use the measured data to calculate:

- The body regions in z-direction
- The patient's direction – “head-first versus feet-first” as well as “prone or supine”
- The table height and patient thickness



Automating precision

Specialized applications support accurate and reproducible positioning:

- FAST Isocentering, at the push of a button, provides the correct isocenter position, enabling the right dose modulation and consistent images
- FAST Range supports scanning the correct body region with no truncation by aligning the automatically identified anatomical position with the protocol
- FAST Direction helps safeguard the right scan direction, which is crucial when moving the table with infused patients
- FAST Topo enables faster scan speeds in topograms, which prevents breath-hold artifacts. It also has the potential to decrease the topogram dose



Want to dive deeper?
Scan the QR code to watch
the FAST Integrated Workflow
video!



Staying in control – closer to your patients

Technologists can improve patient interaction with two front-side and two optional back-side Touch Panels:

- This allows setting and controlling all parameters while staying in touch with the patient
- Protocol selection and patient positioning become simpler and more precise
- With FAST ECG Check, patient variabilities with ECG impedance and electrode contact are ruled out, allowing for the most accurate ECG signal for each patient



Accommodate the smallest to the tallest – with personalized scanning

No two patients are the same, and some aren't easy to scan – but referring physicians and ordering clinicians always expect precise results. With its outstanding speed, power reserves, and sensitivity, SOMATOM Force adapts to every need. At the same time, intelligent automation adjusts scan parameters to each patient size and shape.



Prof. Konstantin Nikolaou, MD,
Director of the Department of Diagnostic
and Interventional Radiology,
University Hospital Tuebingen, Germany



“Every patient now gets a personalized scan. Depending on age, body weight, and clinical indication, we can achieve dose levels far below the standard values.”



Catherine M. Owens, MD,
Consultant Radiologist,
Great Ormond Street Hospital (GOSH)
London, United Kingdom

“Children really are the ultimate test of a good CT machine. They are small – many of the hearts operated on are about the size of a walnut – and the rapid heart rates and faster breathing in children cause motion artifacts; and older children may be uncooperative.”

High attention for the young

When examining children, everyone on the team knows that developing organs and tissues must be maximally safeguarded from high doses. At the same time, the youngest ones are often unable to hold still. In the past, this only let you choose between motion-blurred images and sedation.

SOMATOM Force can end the need for sedation and help you scan children and young adults with utmost care – enabled by fast, powerful, and at the same time sensitive technology. One example is Turbo Flash scanning at an industry-leading maximum scan speed of 737 mm/s, combined with 0.25 s rotation

speed and an outstanding pitch of up to 3.2. High power at 70 kV and 80 kV enables low kV values. In combination with the integrated CARE Child technology, you are perfectly prepared for low-dose pediatric scanning.

Staging of a Wilms tumor –
2-year-old child

Arterial

Collimation: 96×0.6 mm

Scan time: 2.03 s

Scan length: 246 mm

Rotation time: 0.28 s

Tube settings: 80 kV, 552 mAs

CTDI_{vol}: 8.13 mGy

DLP: 174.25 mGy cm

Venous

Collimation: 96×0.6 mm

Scan time: 2.24 s

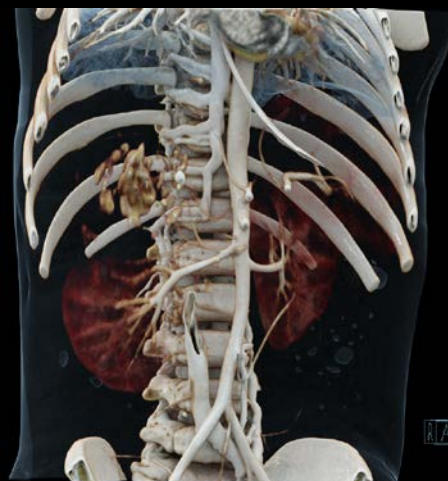
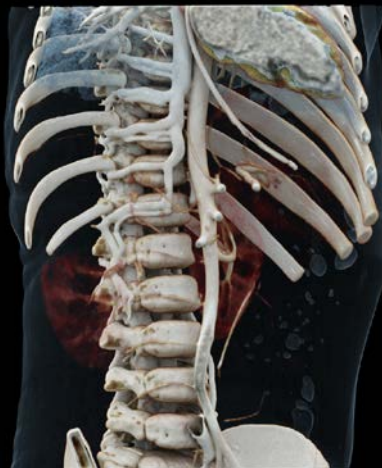
Scan length: 361 mm

Rotation time: 0.5 s

80 kV, 129 mAs

CTDI_{vol}: 1.9 mGy

DLP: 59.17 mGy cm

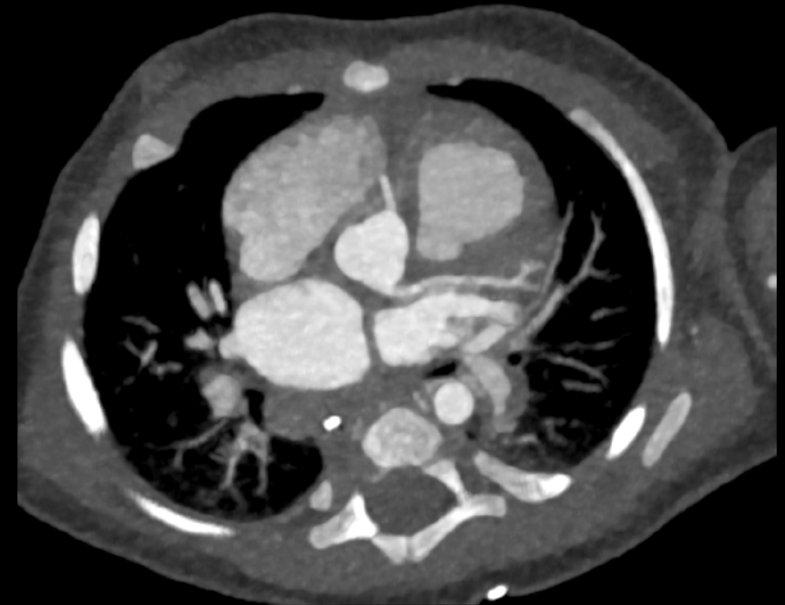


Excellent
visualization
of tumor and
vessels

Pediatric cardiac CT at 70 kV

Scan time: 0.61 s
Scan length: 79 mm
Rotation time: 0.28 s
Tube settings: 70 kV, 115 mAs
CTDI_{vol}: 1.16 mGy
DLP: 9.13 mGy cm
Eff. dose: 0.96 mSv
HR: 130 bpm

Visualization of coronaries
in a 2-month-old free-breathing
baby.



70 kV

Courtesy of University of Karolinska, Solna, Sweden



"3rd generation DSCT enables one to perform coronary CTA at 70–80 kV in obese patients without compromising CNR and thus reduces radiation dose."¹⁴

High quality at every weight

Obesity is a growing problem with global relevance. Getting high-quality images from these patients while keeping dose as low as possible can be challenging. You not only have to consider enormous X-ray attenuation: Obesity often comes with co-morbidities like asthma, making even short breath-holds impossible.

SOMATOM Force combines its Vectron™ X-ray tubes with high power reserves at every kV value (up to 1,300 mA at 70 kV) and the Stellar^{Infinity} detectors that are able to detect even very low signals. This unique imaging chain enables sharp and rich-in-contrast images of obese patients at high speed and low dose.

Additionally combining CARE kV and 10 kV Steps, SOMATOM Force offers for previously unknown automated personalization. With its large bore of 78 cm and a patient load capacity of up to 307 kg (676 lbs), SOMATOM Force helps you examine even the heaviest patients with ease.

Cardiac imaging for obese patients – Turbo Flash mode even for patients with a BMI of 47

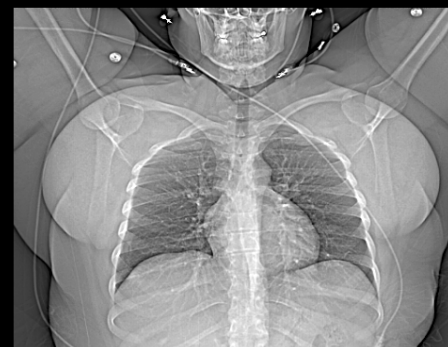
Collimation: $2 \times 192 \times 0.6$ mm
Scan time: 0.15 s
Scan length: 111 mm
Rotation time: 0.25 s
Tube settings: 100 kV, 600 mAs
CTDI_{vol}: 5.93 mGy
DLP: 91.5 mGy cm
Eff. dose: 1.28 mSv
HR: 56 bpm
BMI: 47

Vectron™ X-ray tubes enable 100 kV scans even in severely obese (BMI 47) patients within 0.15 s and at excellent image quality.



**Scan time
0.15 s**

CX



LAD



RCA



Courtesy of MUSC Medical Center, Charleston, USA



High speed for saving lives

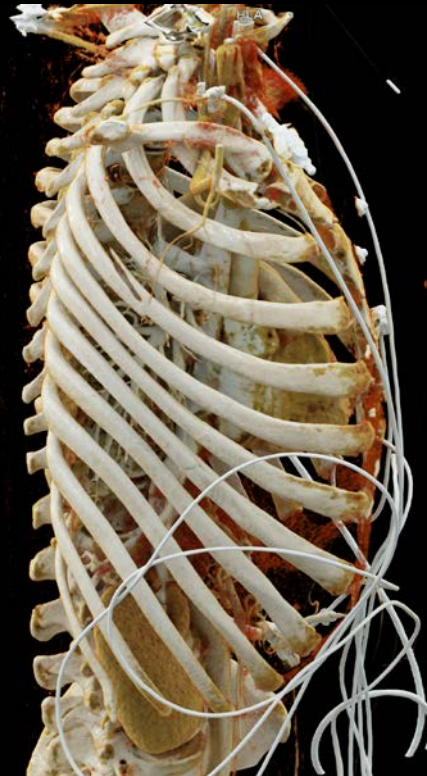
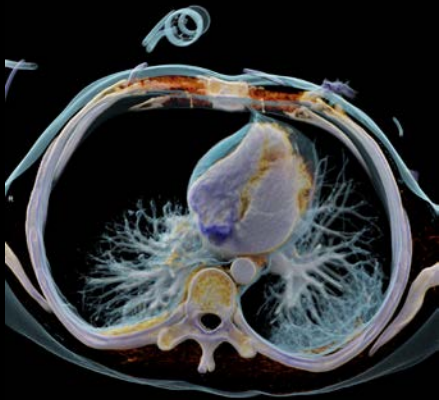
In emergency cases, every second counts. But patients often are unable to follow commands. In the past, this resulted in motion artifacts – which is especially unacceptable when images are urgently needed for life-saving procedures.

Better you freeze motion when your patient can't. SOMATOM Force combines high power reserves that enable fast rotation at 0.25 s with fast Dual Energy acquisition in clinical routine, resulting in motion-artifact-free images even when people and organs move. This comes

with exceptionally fast reconstruction and postprocessing speed. Integrated workflow algorithms help you accelerate the emergency workflow: for example, by unfolding ribs and letting you accurately prepare spine recons with a single click.

Dual Energy – thorax and spine trauma

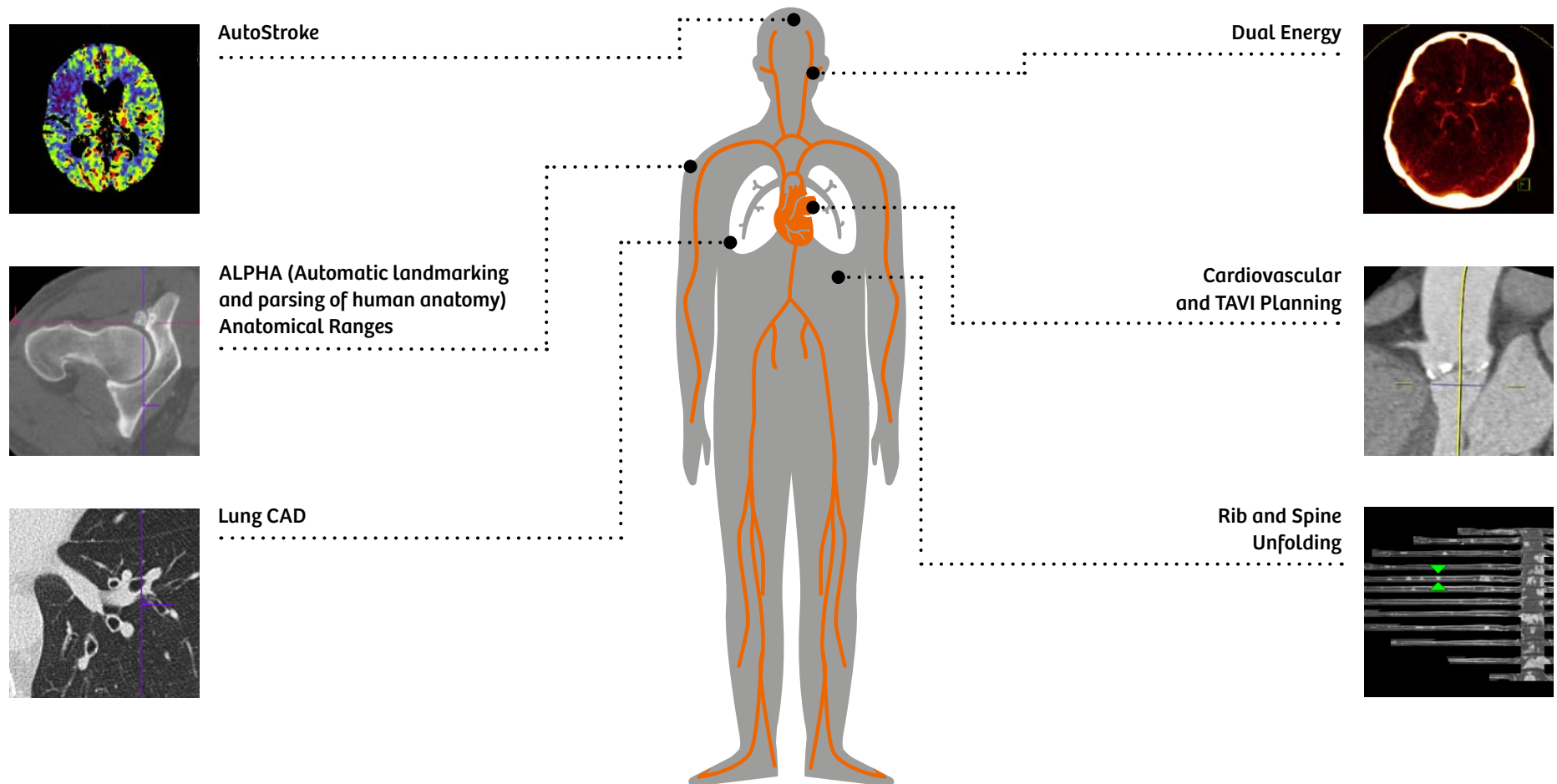
Collimation: $2 \times 128 \times 0.6$ mm
Pitch: 0.6
Scan time: 12.08 s
Scan length: 555 mm
Rotation time: 0.5 s
Tube settings: 100 kV/Sn 150 kV,
89/47 mAs
CTDI_{vol}: 5.28 mGy
DLP: 276.5 mGy cm
Eff. dose: 4.15 mSv

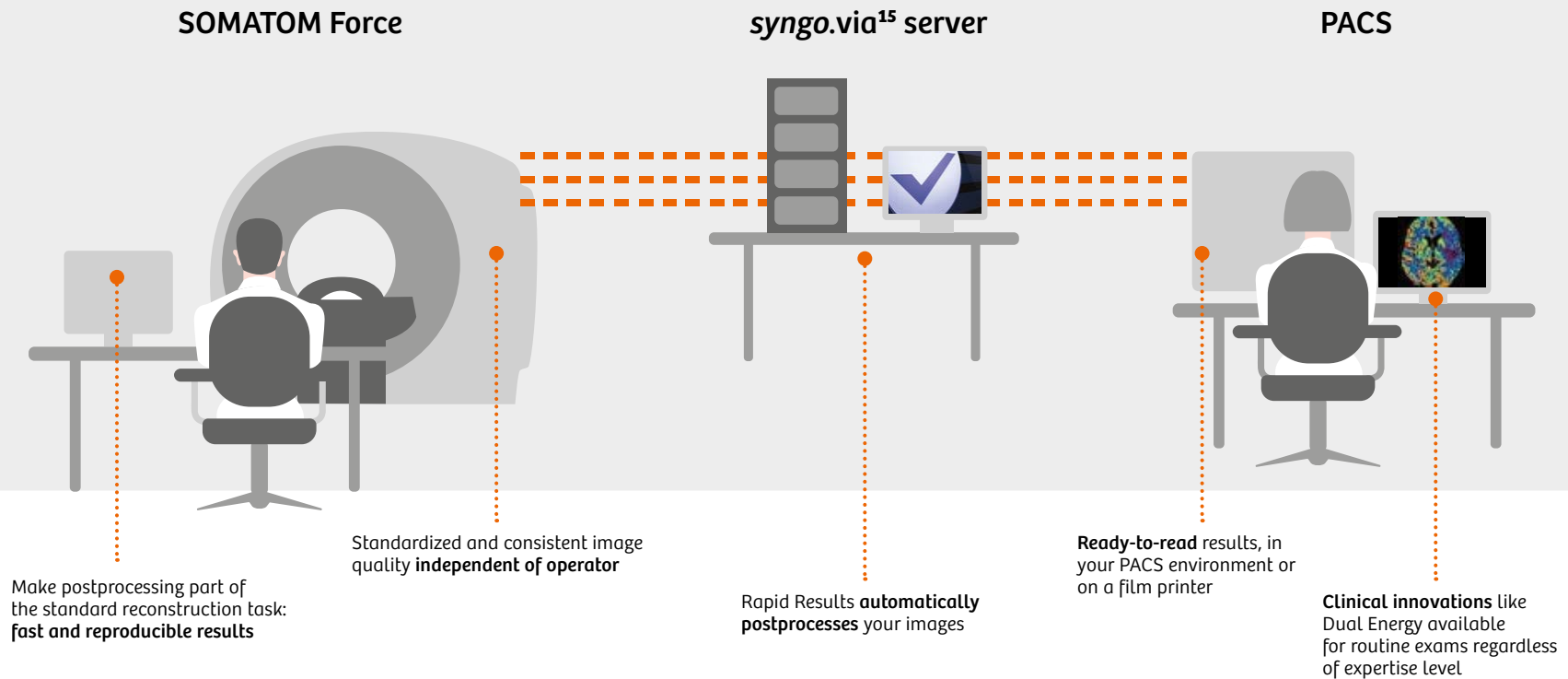


**Ultra-high
resolution
imaging**

Courtesy of University of Tuebingen, Tuebingen, Germany

Rapid Results applications available with SOMATOM Force and *syngo.via*





Rapid Results – zero-click postprocessing

Rapid Results enables direct communication between syngo.via and SOMATOM Force, enabling zero-click postprocessing within the selected scan protocol. This is how syngo.via automatically creates and sends ready-to-read results from wherever you are to your PACS or a film printer. Rapid Results knows what you need, right when you need it. This is reading as simple as it should be. With Rapid Results, you can automatically generate neuro perfusion maps, standard visualizations of general

vessels and different anatomies in various types and orientations, and visualizations of the rib cage in an easy-to-report format.

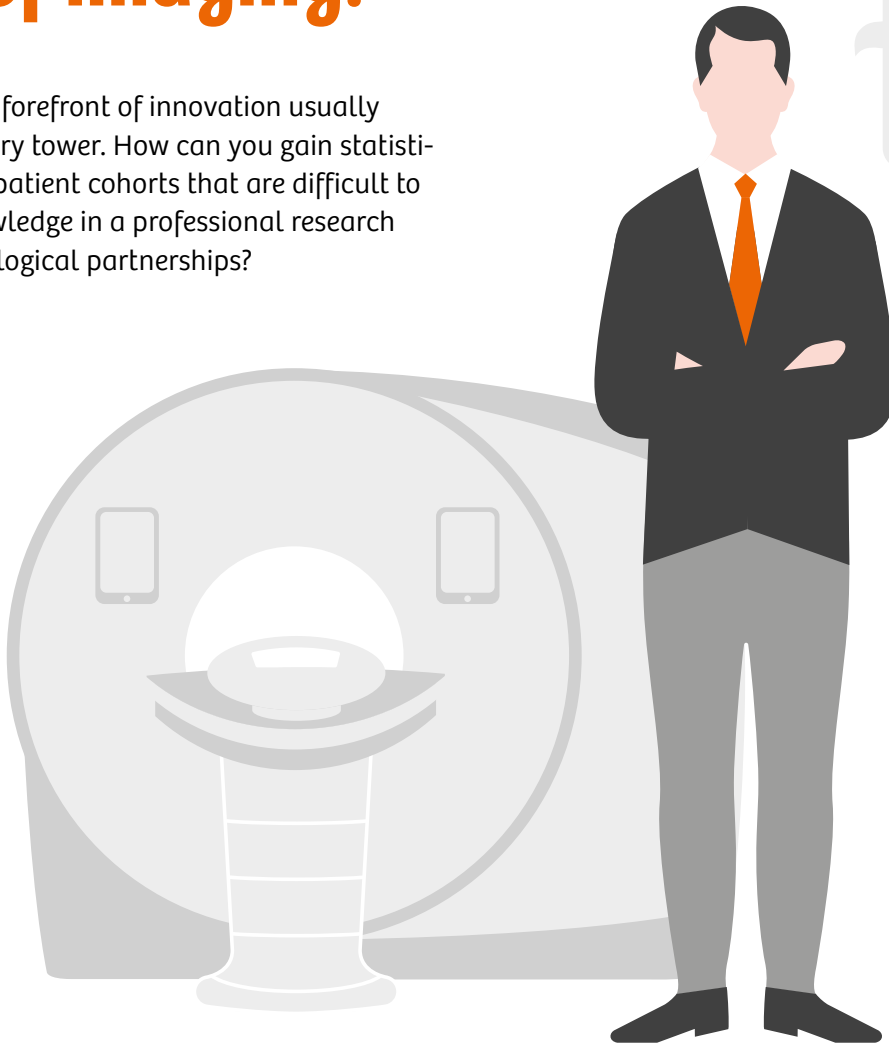
What's more, you can get your Dual Energy scans PACS-ready with all your preferred reconstructions with no need for further interaction in syngo.via. Define your workflow once, and let Rapid Results produce the basis for your decisions.

Your benefits with Rapid Results

- 1 Clinical innovations like CT Bone Reading and Dual Energy for routine exams regardless of expertise level
- 2 Standardized and consistent image quality independent of operator skills
- 3 Postprocessing as part of the standard reconstruction task
- 4 Ready-to-read results wherever you want them

How can you shape the future of imaging?

Keeping your institution at the forefront of innovation usually involves more than just the ivory tower. How can you gain statistically reliable data, even from patient cohorts that are difficult to scan? How can you share knowledge in a professional research environment and build technological partnerships?



"Innovation is equally important to our success as operational effectiveness." ...



... according to **74%** of decision-makers¹⁶



SIEMENS
Healthineers

**Get two steps ahead
in expert
leadership**

SOMATOM Force

Increase your reputation by spearheading medical innovation. As a member of the global SOMATOM Force community, you have access to the *syngo.via* Frontier research environment and can share advanced clinical knowledge in a network of peer experts.

Advance your research – with professional tools

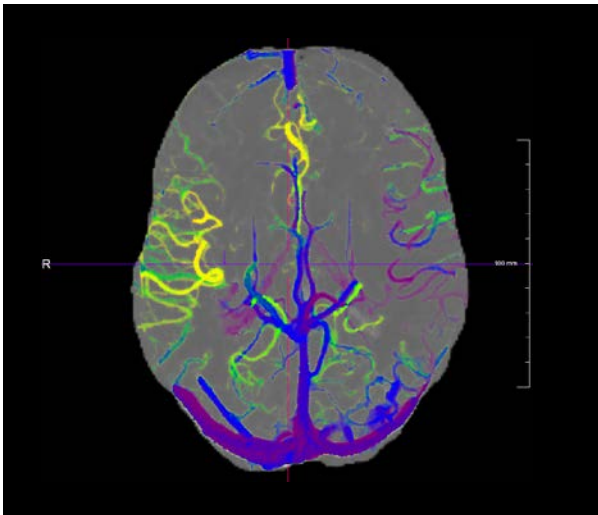
As a SOMATOM Force user, you have access to the unique *syngo.via* Frontier research environment. You can develop your own algorithms and share them in an international network of experts, test prototypes in routine reading, and explore new trends.



From ideas to prototypes

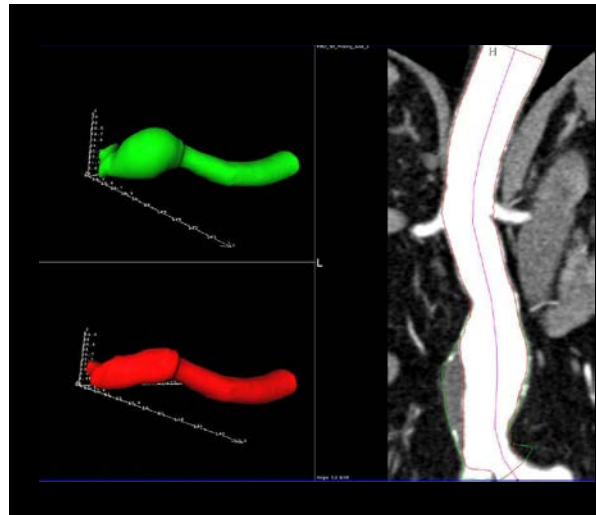
An ideal research environment gives you access to the latest applications, provides tools that translate your ideas into tangible prototypes, and supports your exchange with other experts around the world. With *syngo.via* Frontier,¹⁸ you can explore the potential of advanced postprocessing prototypes that are seamlessly integrated with your routine *syngo.via* system.

syngo.via Frontier also enables you to easily implement your own algorithms and connects you directly with other key opinion leaders and the Siemens Healthineers predevelopment teams. Save time and reduce costs with an integrated research solution. Boost your reputation and attract talents as well as patients. Bridge the gap in postprocessing translational research with *syngo.via* Frontier.



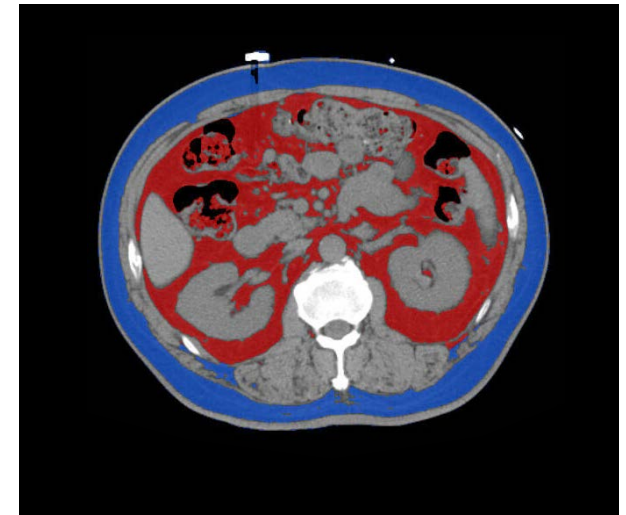
CT Flow Visualization

Whereas perfusion techniques evaluate the patient's brain parenchyma, the main goal of this prototype is to provide insight into the dynamics of the vascular structures.



CT 3D Printing for AAA

3D printing of an abdominal aortic aneurysm (AAA) can be used to facilitate decision-making and device selection for endovascular repair.



CT Cardiac Risk Assessment

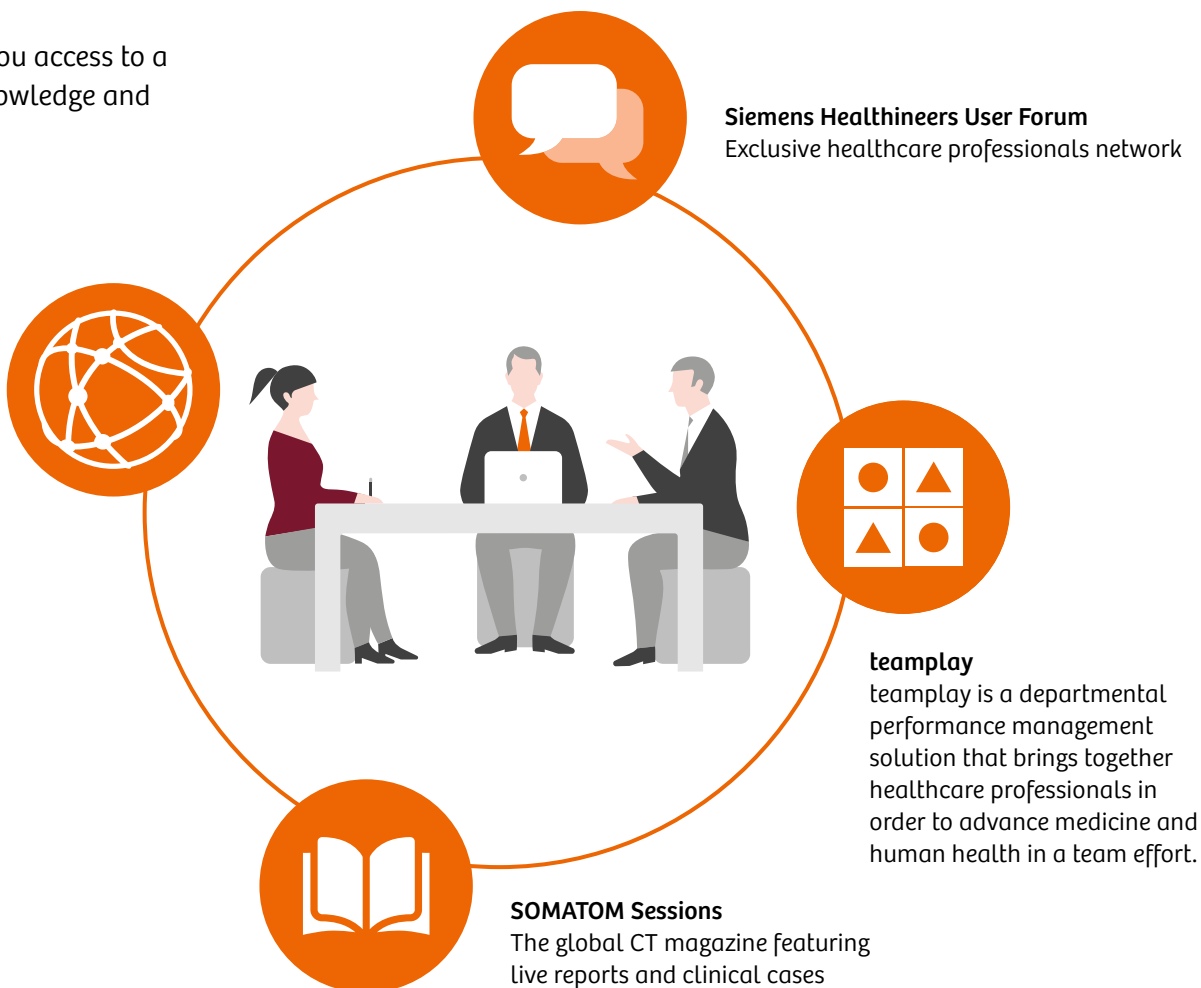
This prototype uses non-contrast CT data to provide an analysis of visceral fat.

Connect with peers and lead a global community

SOMATOM Force is more than a CT scanner. It grants you access to a community of clinical experts that regularly shares knowledge and the latest medical developments peer-to-peer.

SOMATOM World Summit
Our CT innovation conference for advanced users

Connect with peers at the Siemens Healthineers' regular SOMATOM World Summit attended by almost 500 radiologists and executives from around the world. You can also get the most recent user stories from our SOMATOM Sessions online and printed magazine. Last but not least, SOMATOM Force has been the subject of more than 220 scientific studies and publications.





> 220 peer-reviewed publications

"... FORCE CT scanner and third generation iterative reconstruction enable large reductions in radiation ..."
 "... pulmonary disease. ... effective dose of 0.14 mSv ..." "... equivalent to a standard posterior to anterior and lateral chest radiograph."

Newell, Hoffman, et al.

"... peak tube current of 1,300 mA ... at a tube voltage of 70 kV ... enables lowering radiation dose and contrast media volumes (45 mL vs. 80 mL)."

Meyer, Henzler, et al.

"The high-pitch data acquisition of the heart is fast, taking less than 0.2 s, and is associated with a low radiation dose of 0.4 mSv."

Gordic, Alkadhi, et al.

"... DE performance is best for 80/150 Sn kV – irrespective of the phantom size." "For all patient diameters, image noise in the VNC images is lowest at 80/150 Sn kV."

Krauss, Flohr, et al.

Expand your capabilities and rethink your way of working

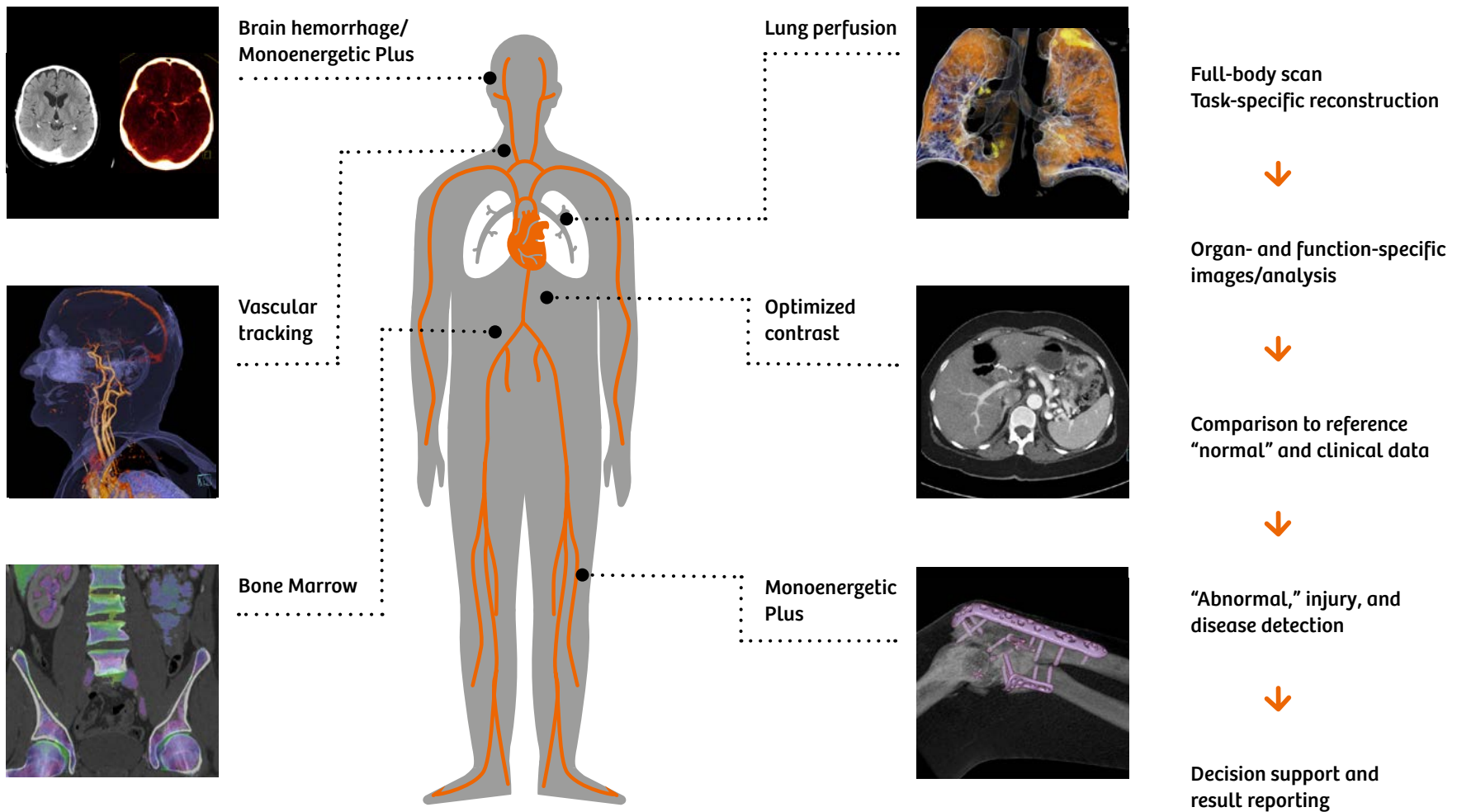
With Dual Source imaging, CT has become mature enough to take on a new role and redefine traditional ways of treating patients. One of the most prominent examples is trauma imaging.



A unique combination for fast decision-making

To take complete advantage of additional information in trauma full-body scans, workflow changes and even higher speeds are necessary. SOMATOM Force combines a unique range of Dual Energy technologies like fast Dual Energy acquisition, Virtual Monoenergetic, virtual non-contrast (VNC), Iodine Maps, and Bone Marrow images that enable fast, high-quality decision-making for diverse patients and exams.

Exploration of the role of quantitative imaging in trauma



SOMATOM Force

Detectors:	2 × Stellar ^{Infinity} detectors with anti-scatter 3D collimator grid
X-ray tubes:	2 × Vectron™ X-ray tubes
Number of acquired slices:	384 (2 × 192) slices
Rotation time:	up to 0.25 s ¹⁹
Temporal resolution:	up to 66 ms ¹⁹
Generator power:	240 kW (2 × 120 kW)
kV settings:	70–150 kV in steps of 10 kV
Spatial resolution:	0.24 mm ¹⁹
Max. scan speed:	737 mm/s ¹⁹ with Turbo Flash
Table load:	up to 307 kg/676 lbs ¹⁹
Gantry opening:	78 cm

Dual Source technology

- Precise and dose-neutral Dual Source Dual Energy
- Turbo Flash scanning (up to 737 mm/s)
- 66 ms native temporal resolution

Tin Filters

- Low-dose early detection
- Tin-filtered topogram

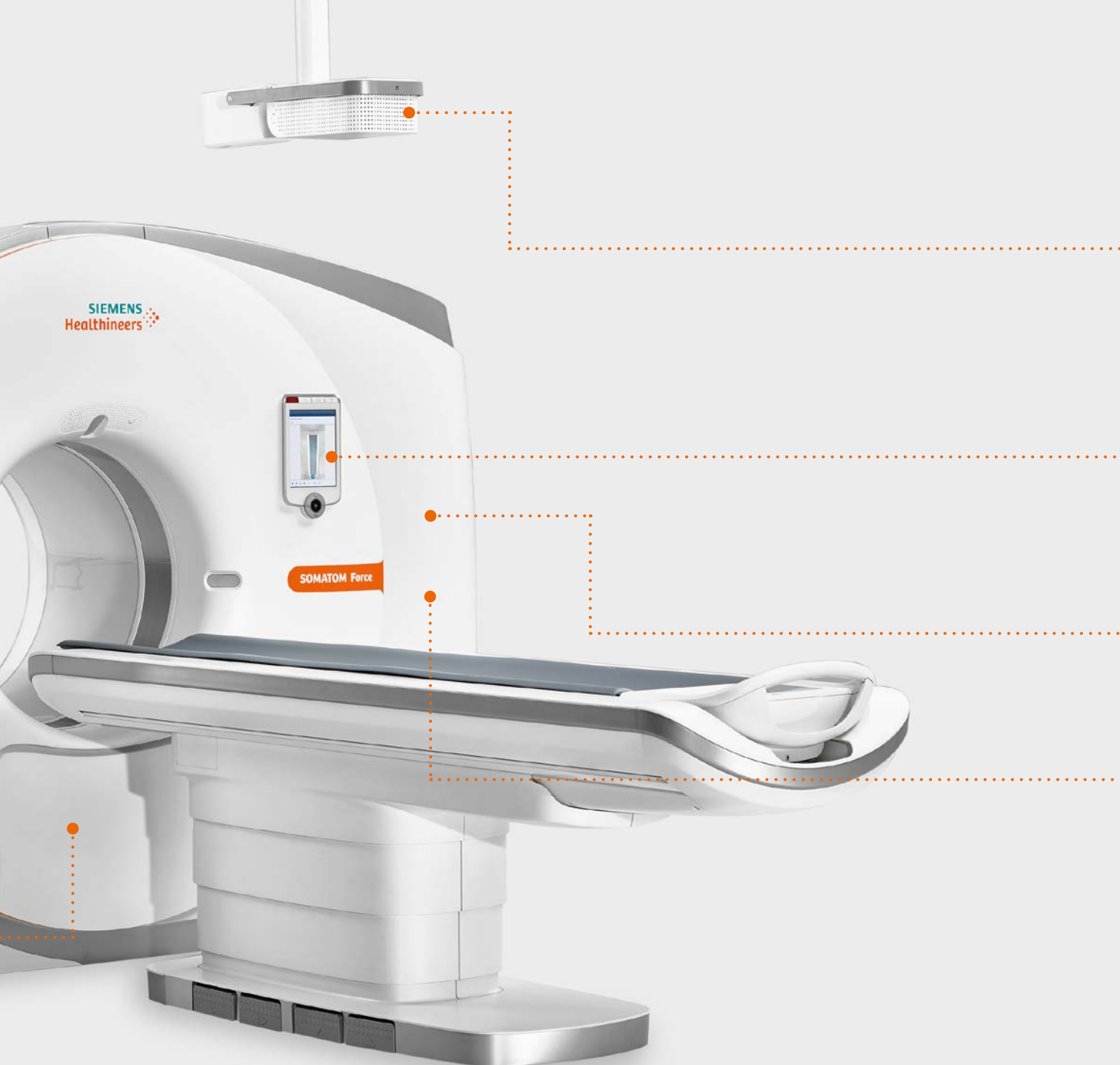
Vectron™ X-ray tube

- 1,300 mA @ 70, 80, 90 kV
- 0.4 × 0.5 (IEC) focal spot
- 70–150 kV in steps of 10 kV

Generator power

- 2 × 120 kW



**FAST 3D Camera –
part of FAST Integrated Workflow**

- Precise isocentering
- Correct patient positioning
- Exact topogram

Touch Panels

- Enhanced patient care plus real-time ECG control
- Facilitates patient interaction

Adaptive 4D Spiral

- Advanced CT perfusion up to 22 cm
- Extended dynamic angio up to 80 cm
- Adaptive Dose Shield

Stellar^{Infinity} detectors

- With anti-scatter 3D collimator grid
- TrueSignal technology with full electronic integration
- Edge technology enabling the generation of 0.5 mm slices

Additional products and services

***syngo.via* –**

Reading as it should be: simple and cinematic

Reading should be simple. If you like to read and report with ease, you'll love the new *syngo.via*. All your favorite tools are centralized in one place, from basic distance measurement to CT vascular tools. This saves you clicks and mouse movement. With the new Findings Assistant, you can organize your findings and make sure you focus on what's relevant.

Reading should be cinematic. Make your communication with referrers and patients clear and convincing. With the new Cinematic VRT¹⁷ in *syngo.via*, you can make your case look like something from an anatomy textbook. It only takes one click to create stunning, easy-to-understand clinical images. Use this photorealistic material for education, publication, and communication.

[siemens.com/syngo.via](https://www.siemens.com/syngo.via)

Cyber security –

Protecting data, systems, and patients

With ongoing digitalization in healthcare systems, the role of cyber security is ever increasing throughout the entire imaging chain. *syngo* System Security protects your imaging modalities and data from unauthorized access and manipulation. Custom-made activities range from fast and regular delivery of security fixes to incident support and vulnerability management. All of this is based on a comprehensive cyber security partnership that keeps you apprised of the latest developments in software and hardware as well as current innovations in the security field.

Customer Services – Providing users with expertise and efficiency over the long term

We're constantly focusing on high-quality services. Our extensive service portfolio for CT offers comprehensive service contracts including a variety of training modules. This makes Siemens Healthineers well positioned to address diverse customer needs in the healthcare market.

[siemens.com/user-services](https://www.siemens.com/user-services)

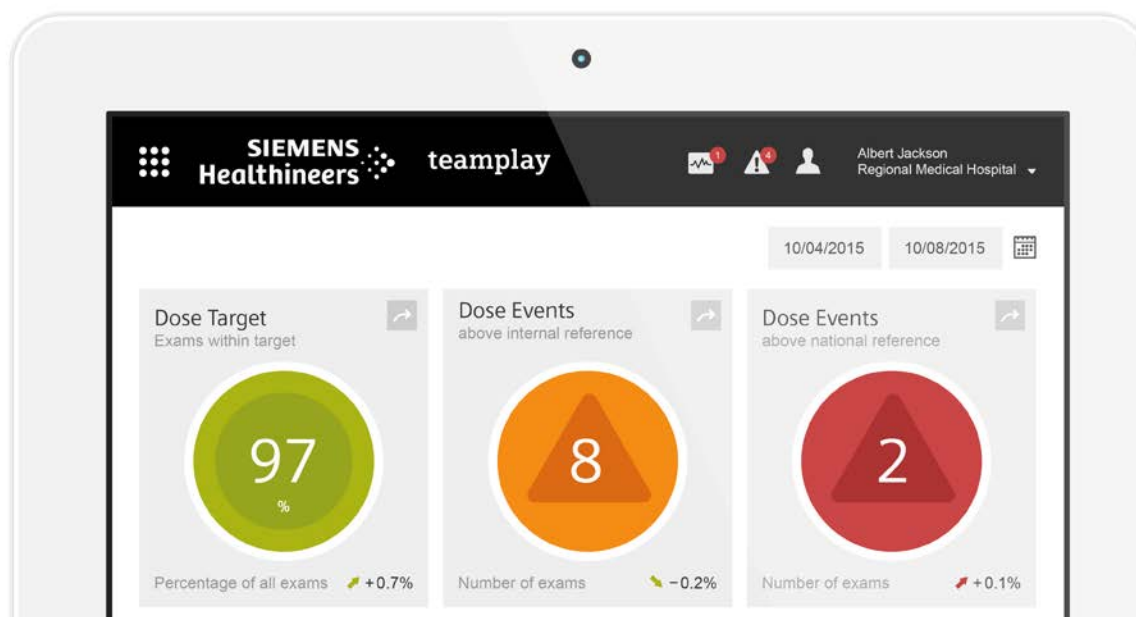
Guardian Program™ including TubeGuard

Predicting your tube's lifecycle:

- Continuous real-time monitoring
- Focus on the X-ray tube
- Failure prediction

siemens.com/system-services**teamplay**

teamplay²⁰ helps you to securely connect, compare, and collaborate. Connecting to the teamwork cloud gives you instant²⁰ access to your data for faster decision-making based on reliable, well-structured, and up-to-date key metrics. Comparing performance data to peer institutions^{20, 21} helps you maintain competitive standards.

siemens.com/teamplay**Follow us in these media**facebook.com/siemens-healthineerslinkedin.com/company/siemens-healthineerssiemens.com/somatom-sessionshealthcare.siemens.com/news

Why Siemens Healthineers?

At Siemens Healthineers, our focus is to help healthcare providers succeed in today's dynamic environment.

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.²³ 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 for the success 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.



SOMATOM Force is not commercially available in all countries. Due to regulatory reasons, its future availability cannot be guaranteed. Please contact your local Siemens Healthineers organization for further details.

On account of certain regional limitations of sales rights and service availability, we cannot guarantee that all products/services/features included in this brochure are available through the Siemens Healthineers sales organization worldwide. Availability and packaging may vary by country and are subject to change without prior notice.

The information in this document contains general descriptions of the technical options available and may not always apply in individual cases.

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- ⁵ Compared with other state-of-the-art CT systems
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- ⁷ Fractional Flow Reserve
- ⁸ Advanced Modeled Iterative Reconstruction
- ⁹ In clinical practice, the use of ADMIRE may reduce CT patient dose depending on the clinical task, patient size, anatomical location, and clinical practice. A consultation with a radiologist and a physicist should be made to determine the appropriate dose to obtain diagnostic image quality for the particular clinical task. The following test method was used to determine a 54 to 60% dose reduction when using the ADMIRE reconstruction software. Noise, CT numbers, homogeneity, low-contrast resolution and high contrast resolution were assessed in a Gammex 438 phantom. Low dose data reconstructed with ADMIRE showed the same image quality compared to full dose data based on this test. Data on file.
- ¹⁰ Gordic S, Morsbach F, Schmidt B, Allmendinger T, et al. Ultralow-dose chest computed tomography for pulmonary nodule detection: first performance evaluation of single energy scanning with spectral shaping. Invest Radiol Jul. 2014. 49(7):465–473.
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- ¹² Fully Assisting Scanner Technologies
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- ¹⁴ Meinel et al., Eur Radiol. 2014 Jul;24(7):1643-50 Image quality and radiation dose of low tube voltage 3rd generation dual-source coronary CT angiography in obese patients: a phantom study.
- ¹⁵ syngo.via can be used as a standalone device or together with a variety of syngo.via-based software options, which are medical devices in their own right. syngo.via and the syngo.via-based software options are not commercially available in all countries. Due to regulatory reasons their future availability cannot be guaranteed. Please contact your local Siemens Healthineers organization for further details.
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- ¹⁷ Requires the license syngo.via Cinematic VRT. Cinematic VRT is recommended for communication, education, and publication purposes and is not intended for diagnostic reading.
- ¹⁸ For research use only. Not for clinical use.
- ¹⁹ Option
- ²⁰ Prerequisites include: wireless connection to clinical network, meeting recommended minimum hardware requirements, and adherence to local privacy and security regulations.
- ²¹ Information about this product is preliminary. It is under development, not commercially available, and its future availability cannot be guaranteed.
- ²² Availability of benchmarking option depends on a minimum number of considered subscribers to guarantee customer anonymity and data protection.
- ²³ Siemens AG., "Sustainable healthcare strategy Indicators in fiscal 2014": page 3.4.