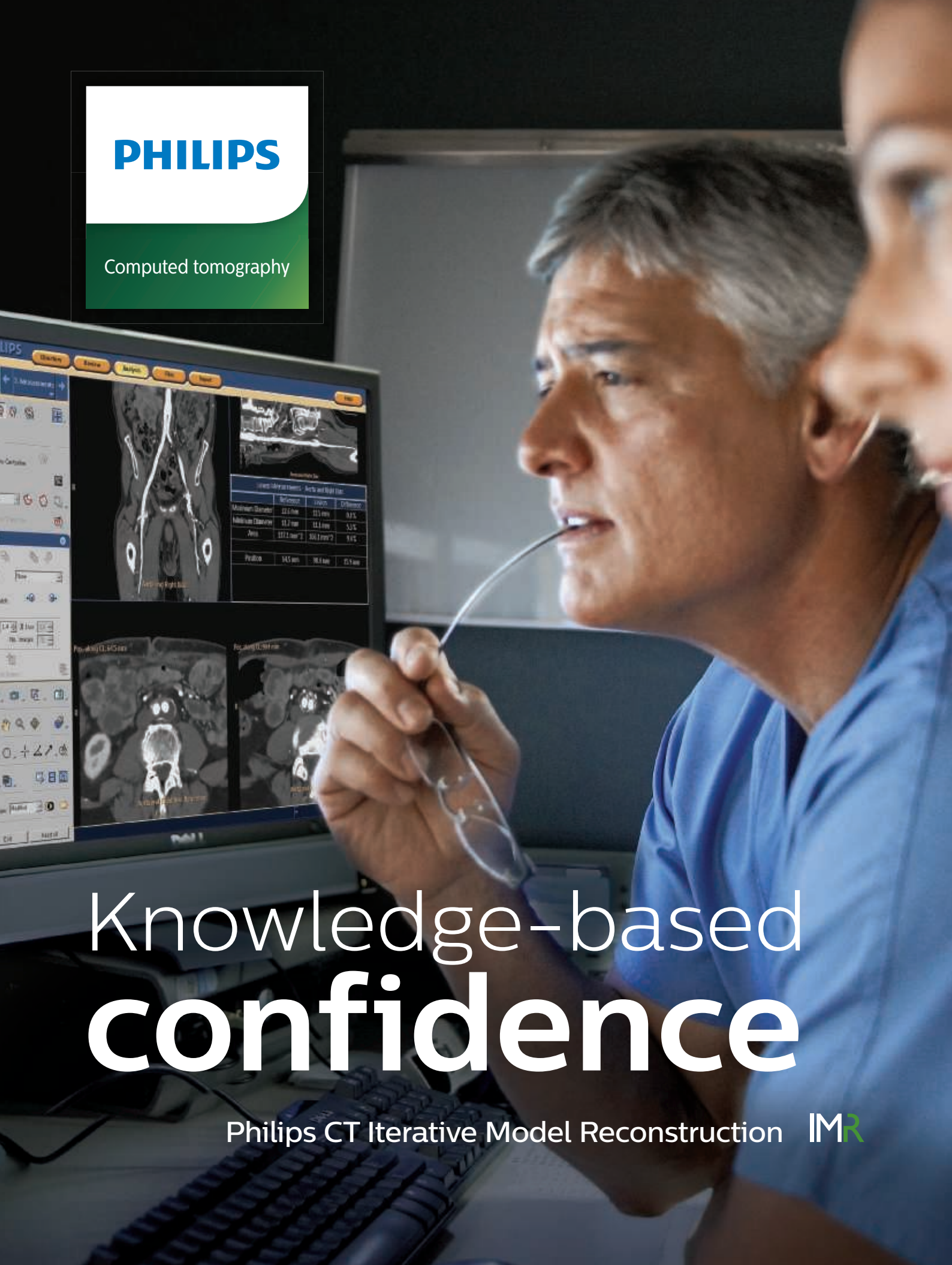
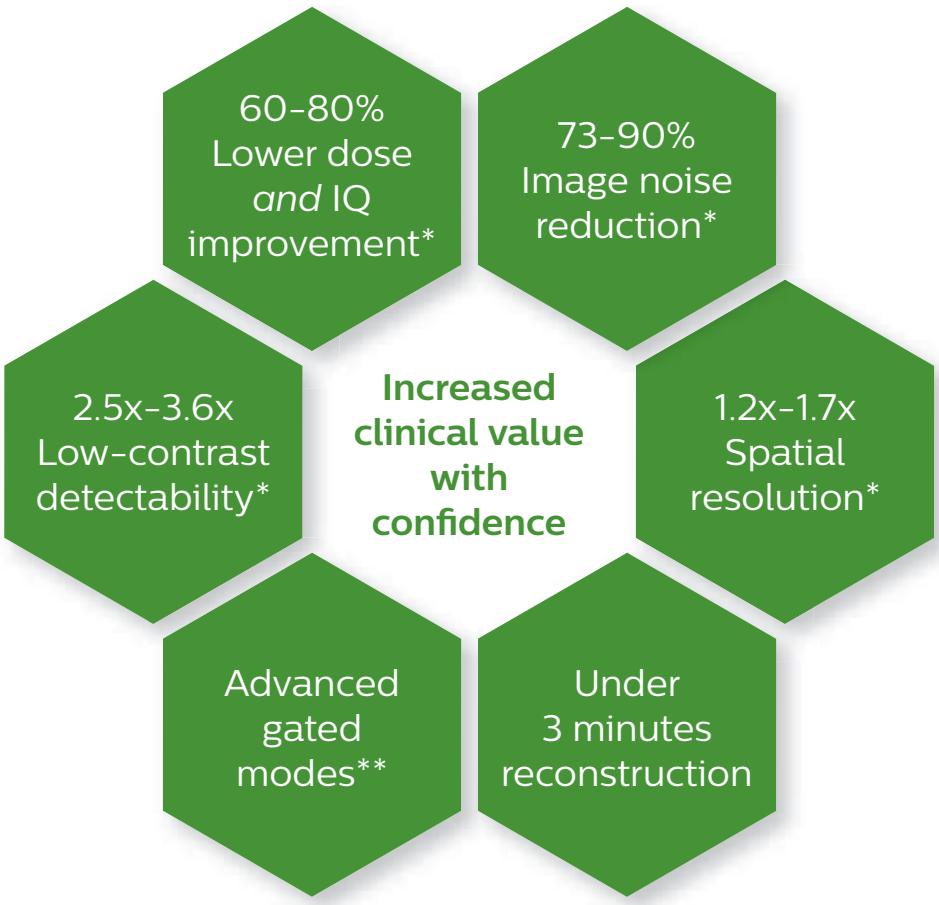

PHILIPS
Computed tomography
Knowledge-based
confidence
Philips CT Iterative Model Reconstruction
IMR

A new direction in CT image quality

For the first time, physicians are able to combine virtually noise-free images and industry-leading low-contrast resolution with significantly lower doses.* This breakthrough is made possible through the first iterative reconstruction built on knowledge-based models.



* In clinical practice, the use of IMR 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. Lower image noise, improved spatial resolution, improved low-contrast detectability, and/or dose reduction, were tested using reference body protocols. All metrics were tested on phantoms. Dose reduction assessments were performed using 0.8 mm slices, and tested on the MITA CT IQ Phantom (CCT183, The Phantom Laboratory), using human observers. Data on file.

** Requires IMR Platinum.

IMR meets the demands of a new imaging era

Key benefits

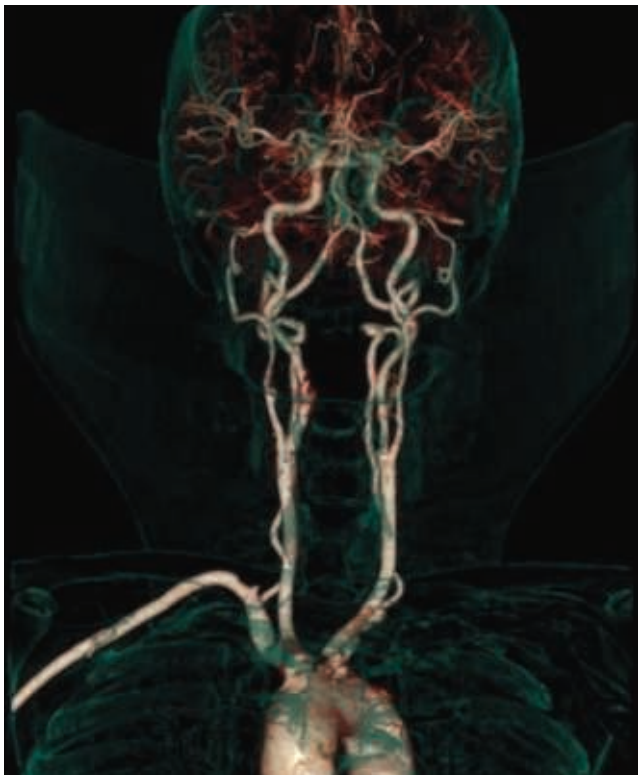
- Industry-leading low-contrast resolution
- Significantly lower dose while simultaneously improving image quality*
- Significantly improved image quality (lower noise, improved low contrast, improved resolution)**
- First knowledge-based iterative reconstruction for gated acquisitions
- Fast reconstruction
- Integrated design with minimal siting impact

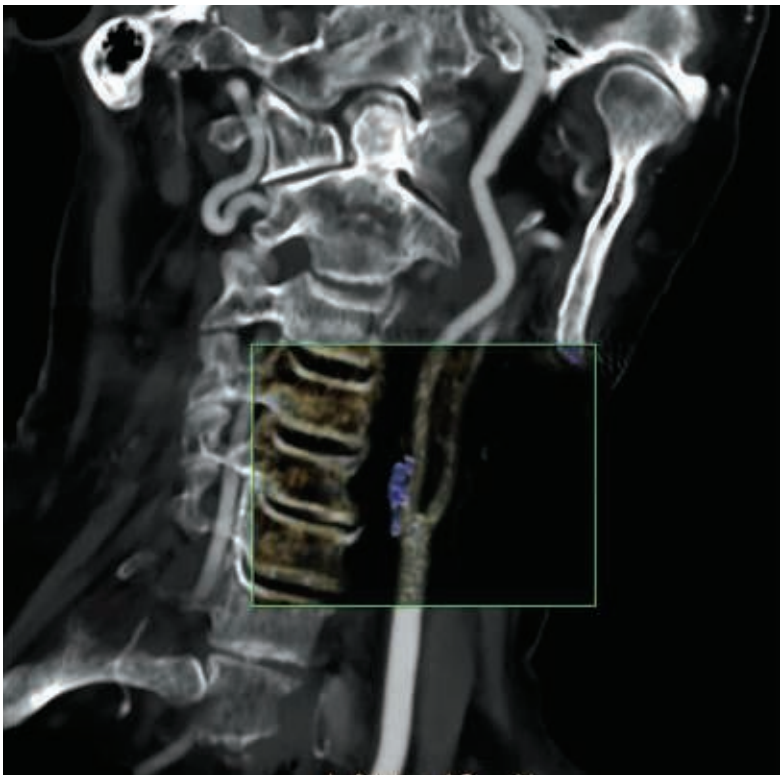
The speed for demanding applications

Innovations in hardware and the reconstruction algorithm result in a reconstruction speed – less than three minutes for the majority of reference protocols – that allows model-based benefits to be achieved in even the most demanding applications.

IMR Platinum

IMR Platinum is the first knowledge-based solution to overcome the motion sensitivity associated with traditional model-based solutions. This allows it to be used in highly advanced acquisitions, such as cardiac CTA.





Scan parameters: 100 kVp, 200 mAs, 8.8 mGy, 35.1 mGy×cm, 0.7 mSv (k = 0.0021), slice thickness 0.9 mm, 795 images
Reconstruction time: 0:40 minutes

* In clinical practice, the use of IMR 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.

** Lower image noise assessed using a Reference Chest Protocol; Improved spatial resolution using Reference Abdomen and Thorax Protocols; Improved low-contrast detectability using a Reference Abdomen Protocol; and dose reduction using a Reference Abdomen Protocol. All metrics tested on phantoms. Data on file.

Lower dose* with **higher image quality**

Managing radiation dose is integral to any radiology practice. IMR is a breakthrough that allows for significant dose reduction* relative to current-generation reconstruction techniques.

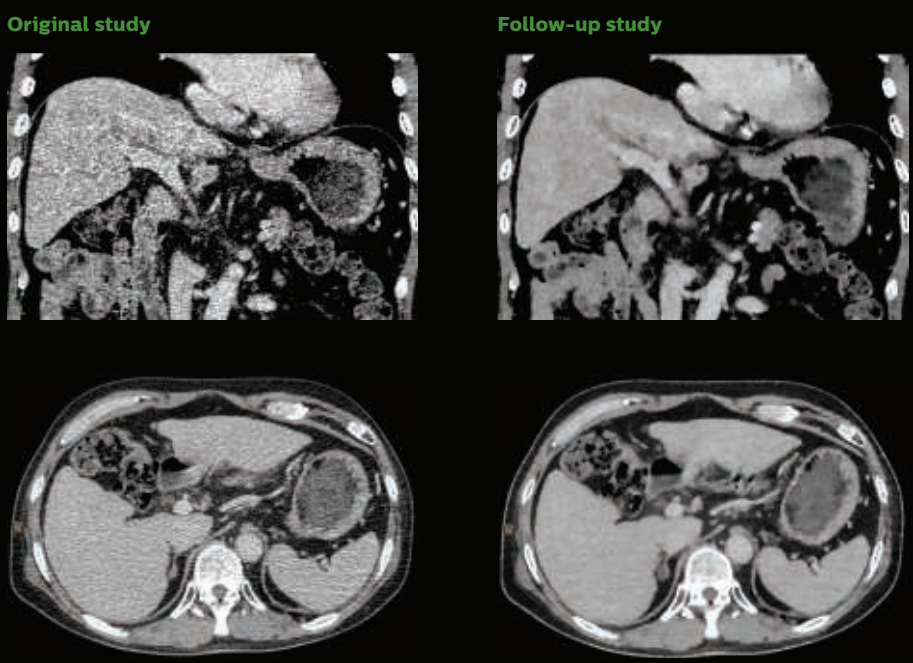
Lower dose and much more

Even more importantly, IMR allows for lower dose* while simultaneously improving image quality. This balance has not been realized before in Philips CT. Previous-generation iterative techniques typically aimed for lower dose while maintaining image quality.

With IMR, you can achieve 60% to 80% lower dose and at the same time improve low-contrast detectability by 43% to 80% and lower noise by 70% to 83% relative to standard (FBP) reconstruction.*

High-quality patient care through low dose, low contrast, and low noise

IMR allows for lower dose* with lower noise and with improved contrast.

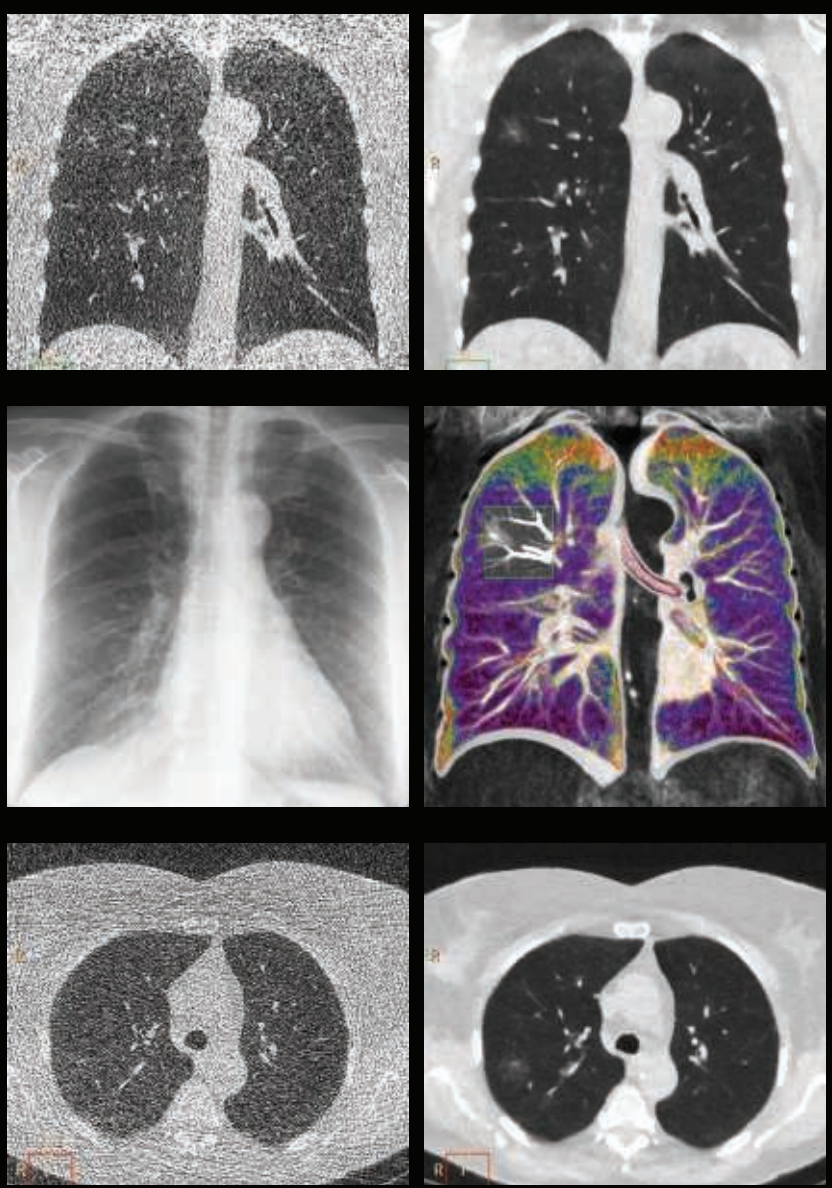


Standard reconstruction (FBP)
Scan parameters: 120 kVp, 249 mAs, 14.6 mGy, 277.4 mGy×cm, 4.2 mSv

IMR
Scan parameters: 120 kVp, 93 mAs, 5.5 mGy, 104.5 mGy×cm, 1.6 mSv
Reconstruction time: 1:32 minutes

* In clinical practice, the use of IMR 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. Low-contrast detectability and noise were assessed using Reference Body Protocol comparing IMR to FBP; measured on 0.8 mm slices, tested on the MITA CT IQ Phantom (CCT183, The Phantom Laboratory), using human observers.

The **images speak** for themselves



66-year-old: chest CT
Scan parameters: 80 kVp, 10 mAs, 0.2 mGy, 8.2 mGy×cm, 0.11 mSv (k = 0.014*), slice thickness 1 x 0.5 mm, 635 images
Reconstruction time: 1:30 minutes

"I have used IMR for several months under various clinical conditions. I believe that IMR changes the face of CT in many ways. It improves the image quality by reducing the noise and increasing low contrast detectability even at lower radiation dose."

Emmanuel Coche, MD, PhD
Professor, Head of CT Unit
Department of Medical Imaging
Cliniques Universitaires
St-Luc, Belgium

* AAPM Technical Report 96. In clinical practice, the use of IMR 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.

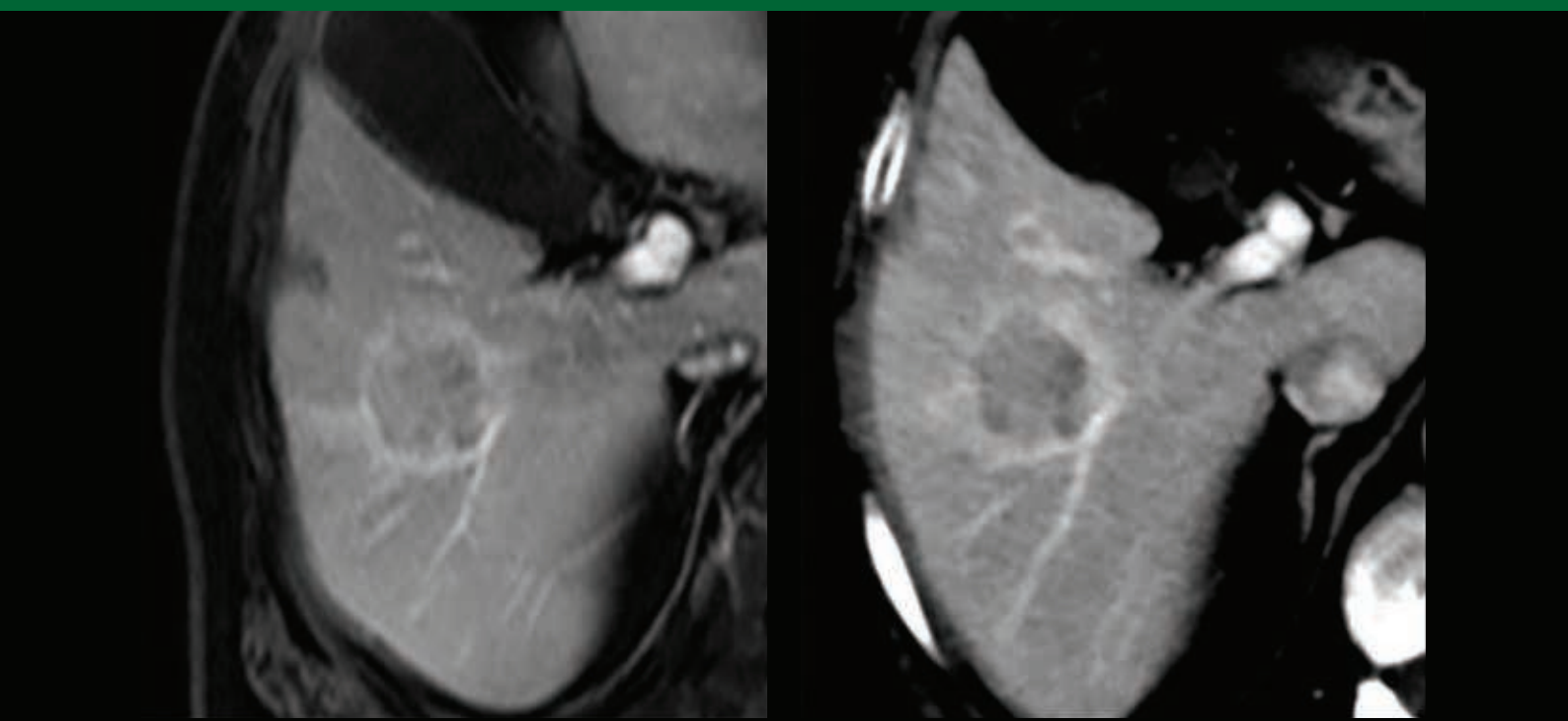
Industry-leading low-contrast resolution

IMR provides significant improvements in low contrast detectability, giving you confidence through enhanced visualization of fine detail and improved accuracy in detecting small, subtle structures. This outstanding improvement helps strengthen the position of CT as the backbone of radiology.

Open new clinical doors

With IMR you can achieve 2.5x to 3.6x improvement in low-contrast detectability.* This opens the doors to the industry-leading low-contrast resolution specification of 2 mm @ 0.3%, measured at a low dose of 10.4 mGy and 7 mm slice thickness.

Lesion detected on CT and confirmed with MR



3T MR **IMR**

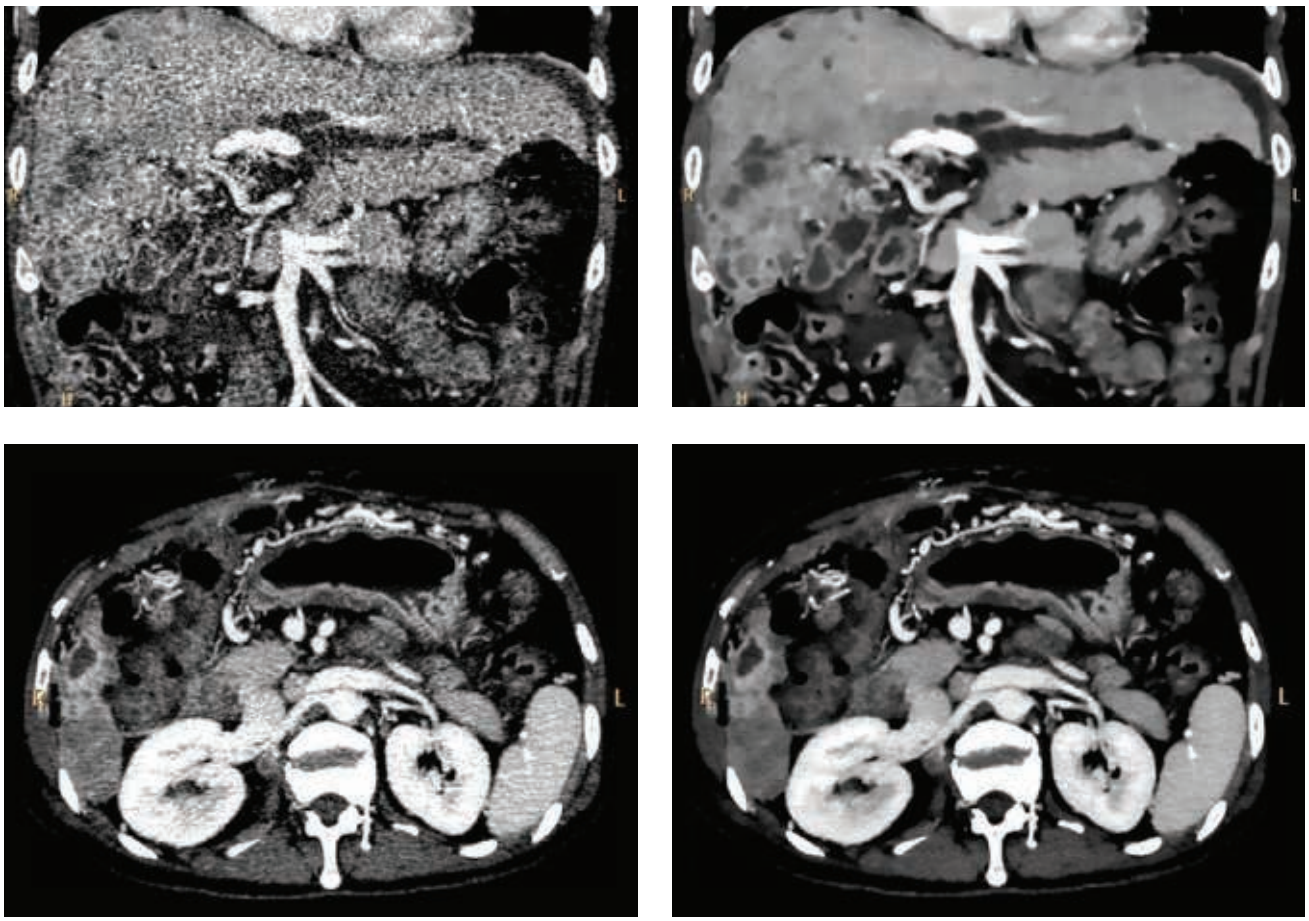
Long associated with MR, this improvement in low-contrast resolution is a breakthrough made possible through the first Philips iterative model reconstruction technique built with a unique knowledge-based approach.

* Low-contrast detectability was assessed using reference body protocol, on the MITA IQ phantom (CCT183, The Phantom Laboratory), using 36 human observers, based on 200 datasets. Data on file.

Increased **confidence**

Standard reconstruction

IMR



Scan parameters: 80 kVp, 70 mAs, 1.5 mGy, 51.5 mGy×cm, 3.0 mSv (k = 2 x 0.03*), slice thickness 1 x 0.5 mm, 353 images
Reconstruction time: 1:06 minutes

"We have been using IMR for routine body imaging, and are extremely excited about the virtually noise-free benefits of improving lesion conspicuity and anatomical detail. This new technological development provides diagnostic information that helps us increase our confidence in making a diagnosis. These significant benefits are likely to help strengthen CT's position as the backbone of radiology."

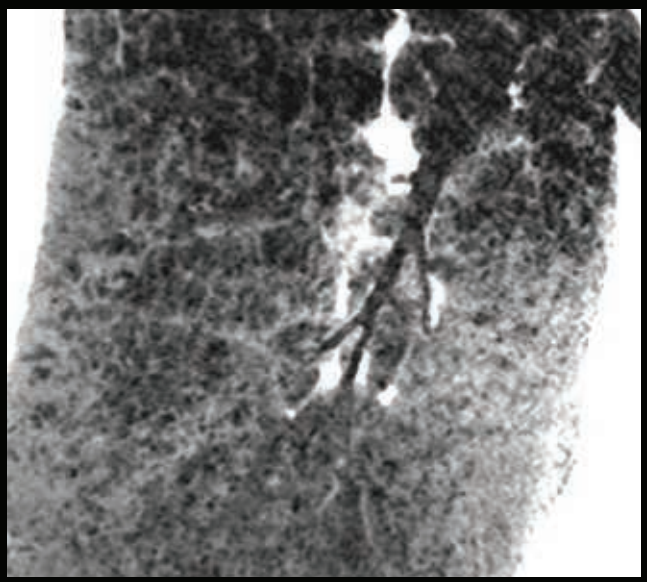
Barry Daly, MD, FRCR
Professor of Radiology, University of Maryland School of Medicine
Chief of Abdominal Imaging and Vice Chair for Research, University of Maryland Medical Center, USA

* AAPM Technical Report 96

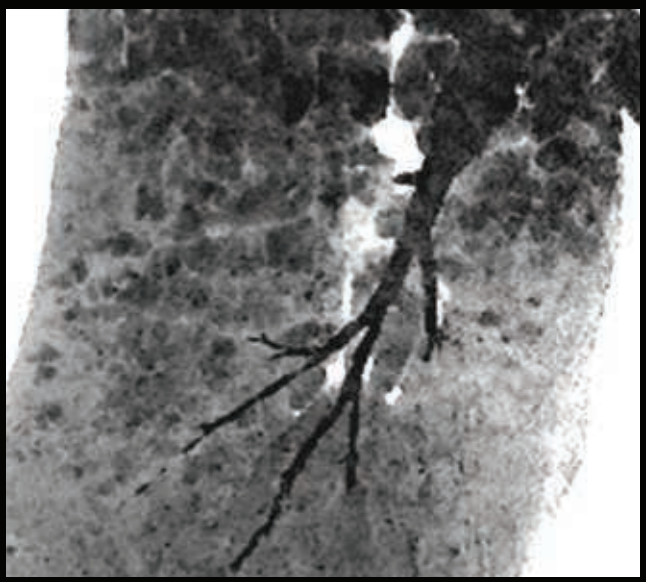
Virtually **noise-free** images

Reveal information and increase confidence

Limited visualization of the airways in the FBP image. Comparatively, the virtually noise-free image quality capabilities of IMR reveal structural information not seen in traditional FBP reconstruction.



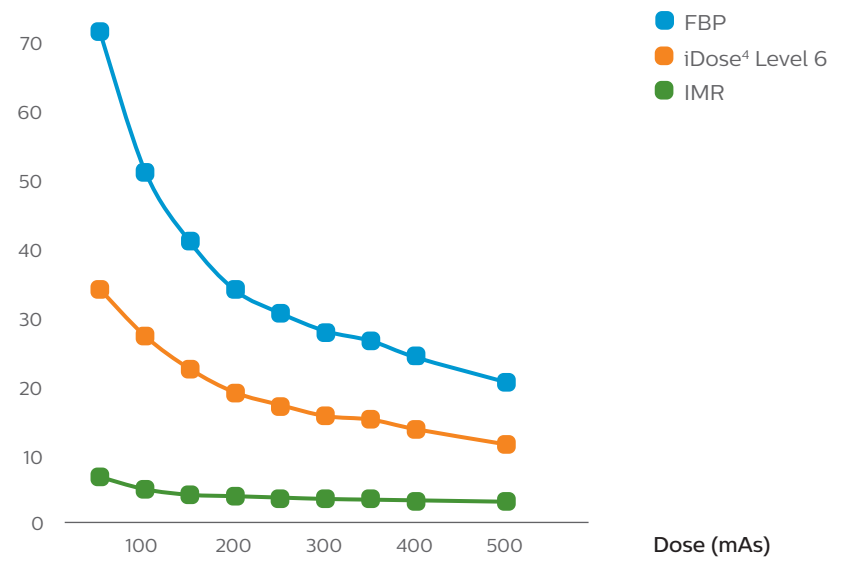
FBP
Scan parameters: 100 kVp, 171 mAs, 6.7 mGy



IMR
Scan parameters: 100 kVp, 171 mAs, 6.7 mGy
Reconstruction time: 1:22 minutes

Noise and artifacts limit visualization of critical structural information. IMR breaks the strong linkage between noise and dose, allowing for virtually noise-free* images through 73% to 90% noise reduction, helping reveal information previously hidden in noise.

Virtually noise-free
Noise (Standard Deviation in HU)

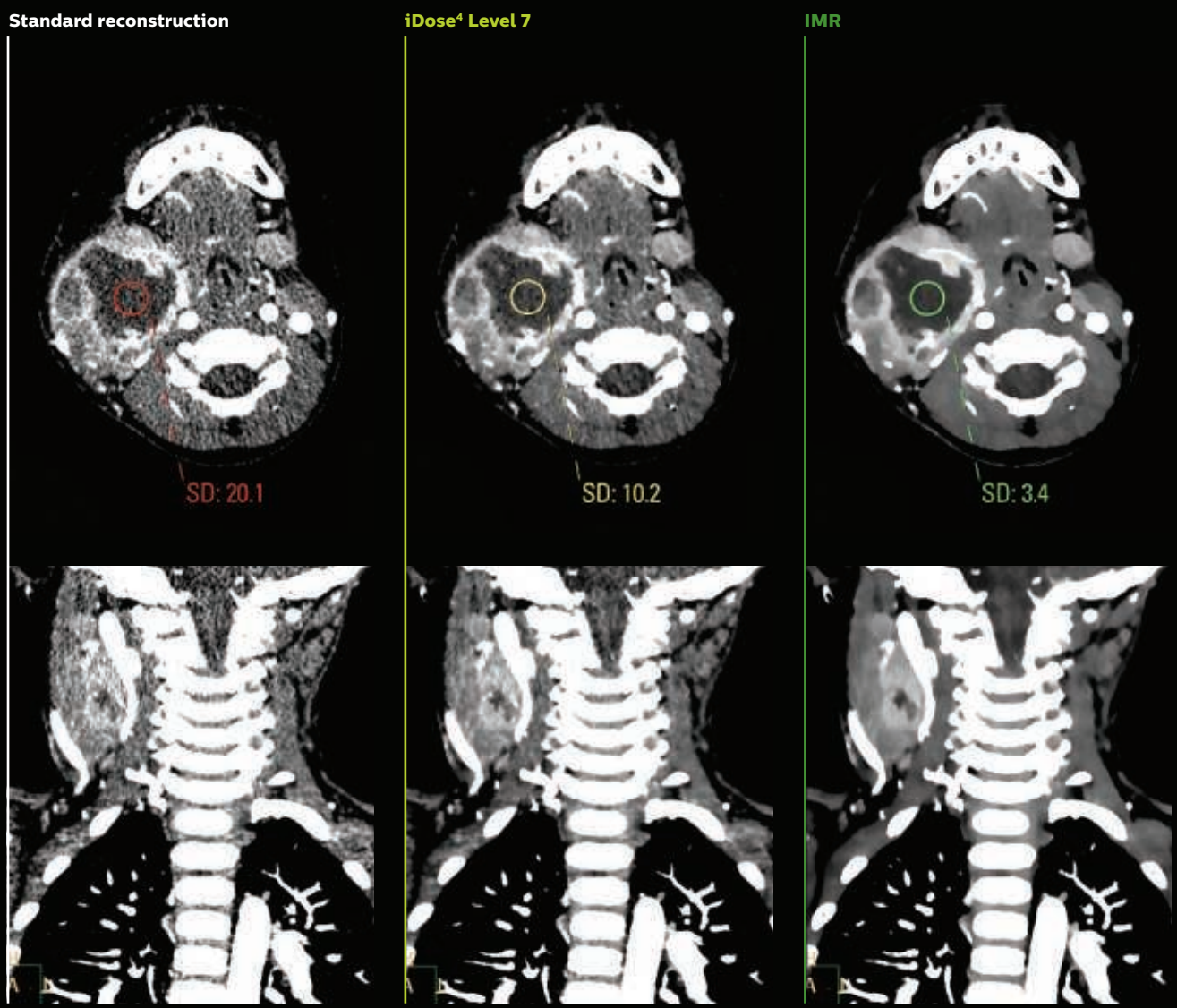


* Image noise as defined by IEC standard 61223-3-5. Image noise was assessed using reference body protocol, on a phantom. Data on file.

Experience the **evolution** of CT

"Reconstruction techniques are rapidly evolving from FBP to hybrid- to model-, and now towards knowledge-based, helping us reveal new information. Our use of IMR shows significant improvements in the key components of image quality metrics, even when compared to previous-generation reconstruction techniques. We believe this to be the future of CT."

Yoshinori Funama, PhD
Professor, Department of Medical Physics, Kumamoto University, Faculty of Life Sciences, Japan



2-year-old: CTA
Scan parameters: 80 kVp, 151 mAs, 3.0 mGy, 45.9 mGy×cm, 1.1 mSv (k = 2 x 0.012*) **Reconstruction time:** 1:25 minutes

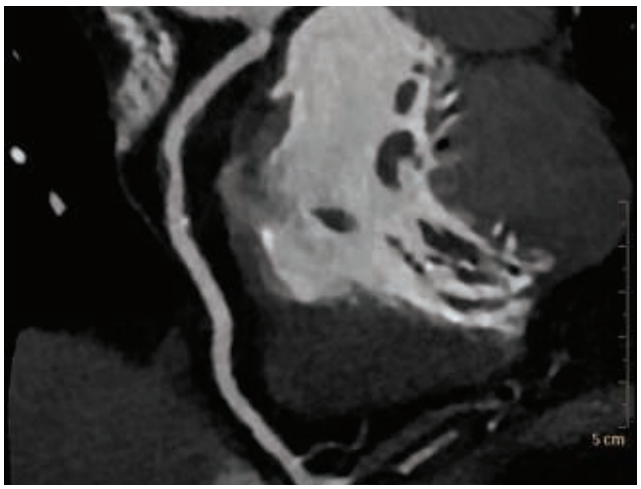
* AAPM Technical Report 96

Improved spatial resolution with low noise and low dose

High spatial resolution helps improve the visualization of small structural detail. In the past, high spatial resolution required the use of filters (with FBP) that resulted in high image noise or increasing radiation dose.

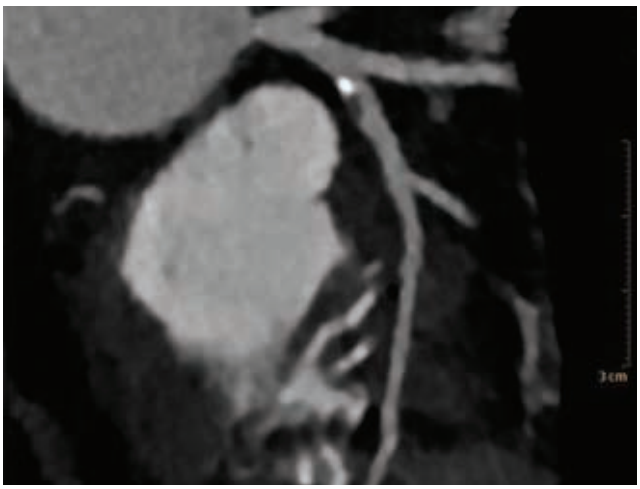
IMR significantly improves spatial resolution with low noise and low dose*

Retrospectively gated spiral



Scan parameters: 120 kVp, 353 mAs, slice thickness 0.67 x 0.34 mm, 387 images
Reconstruction time: 2:00 minutes

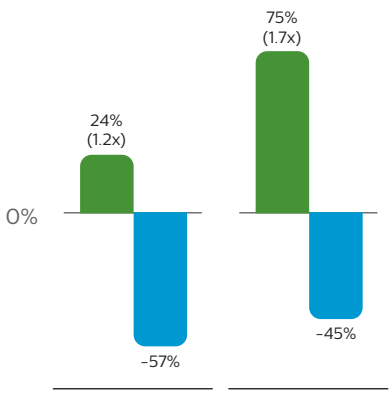
Visualization of adjacent calcified and soft plaque



Limited spatial resolution with FBP can hinder visualization of the lumen in the presence of heavy calcified plaque, due to blooming. This can be challenging when balancing low-dose needs of the patient.

Breaking the link between spatial resolution and noise

IMR breaks the strong linkage between spatial resolution and image noise, allowing for increased spatial resolution and, at the same time, lower image noise and low dose. This helps visualize fine detail, while maintaining low dose to patients.



With IMR you can achieve 1.2x to 1.7x improvement in spatial resolution, while simultaneously lowering noise.*

	4 mGy	20 mGy
Spatial resolution change (%) - IMR vs. FBP	24%	75%
Noise change (%) - IMR vs. FBP	-57%	-45%

* Spatial resolution as defined by high-contrast spatial resolution. Spatial resolution and image noise were assessed using a reference body protocol, on a phantom. Data on file.

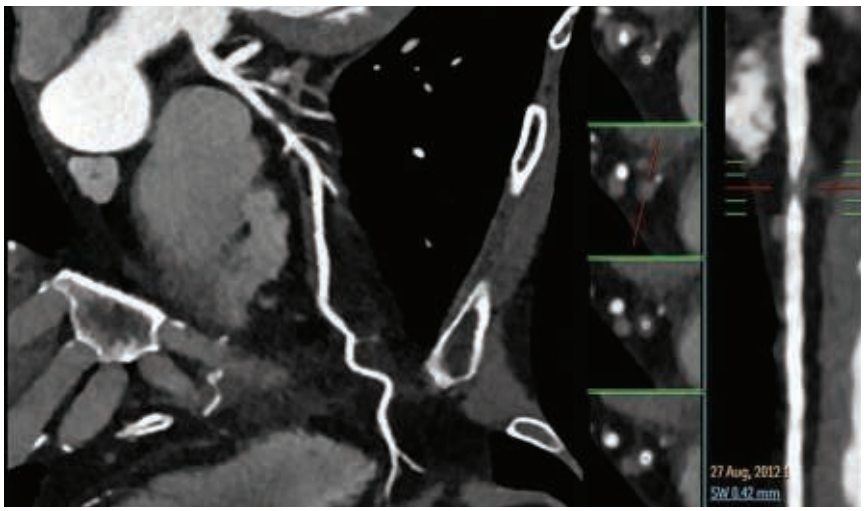
Designed for **even the most challenging** clinical applications

Knowledge-based iterative reconstruction algorithms such as IMR differ from traditional iterative reconstruction methods because with IMR, reconstruction becomes an optimization process that takes into account data statistics, image statistics, and system models. The result? Virtually noise-free images, improved low-contrast, improved resolution, and low dose.

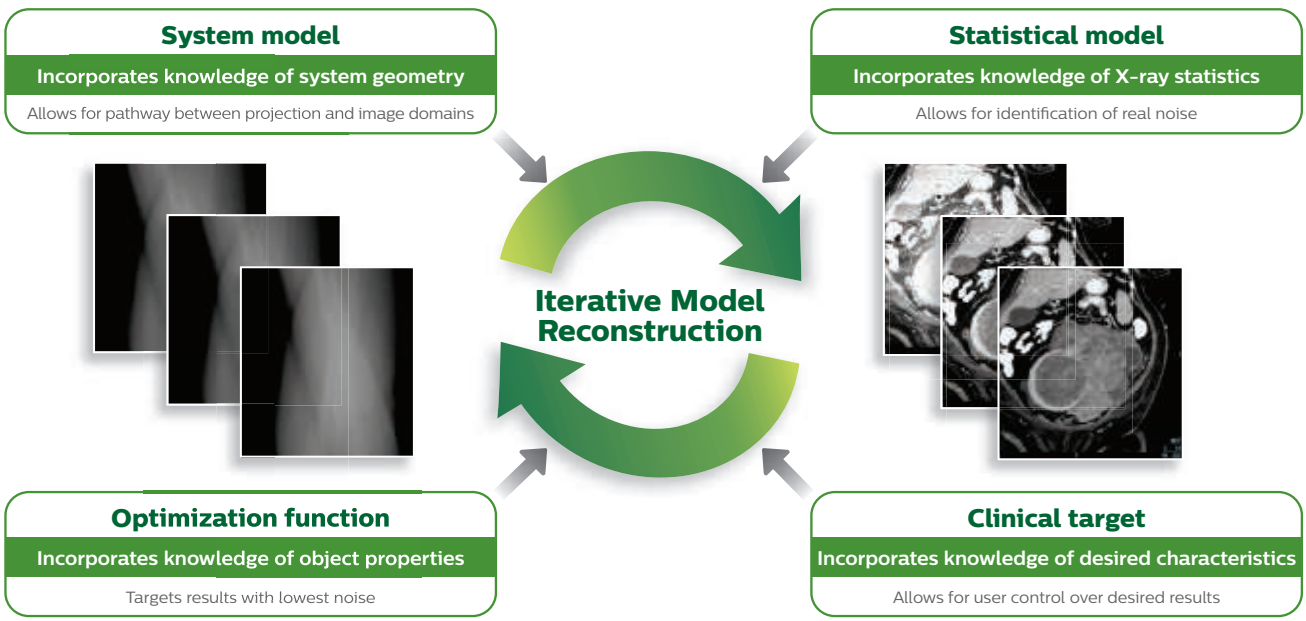
Overcoming traditional challenges

IMR is the first knowledge-based solution that overcomes the traditional challenges of motion sensitivity, allowing it to be used in even the most challenging applications such as cardiac CTA and perfusion studies.

First knowledge-based solution for cardiac CTA

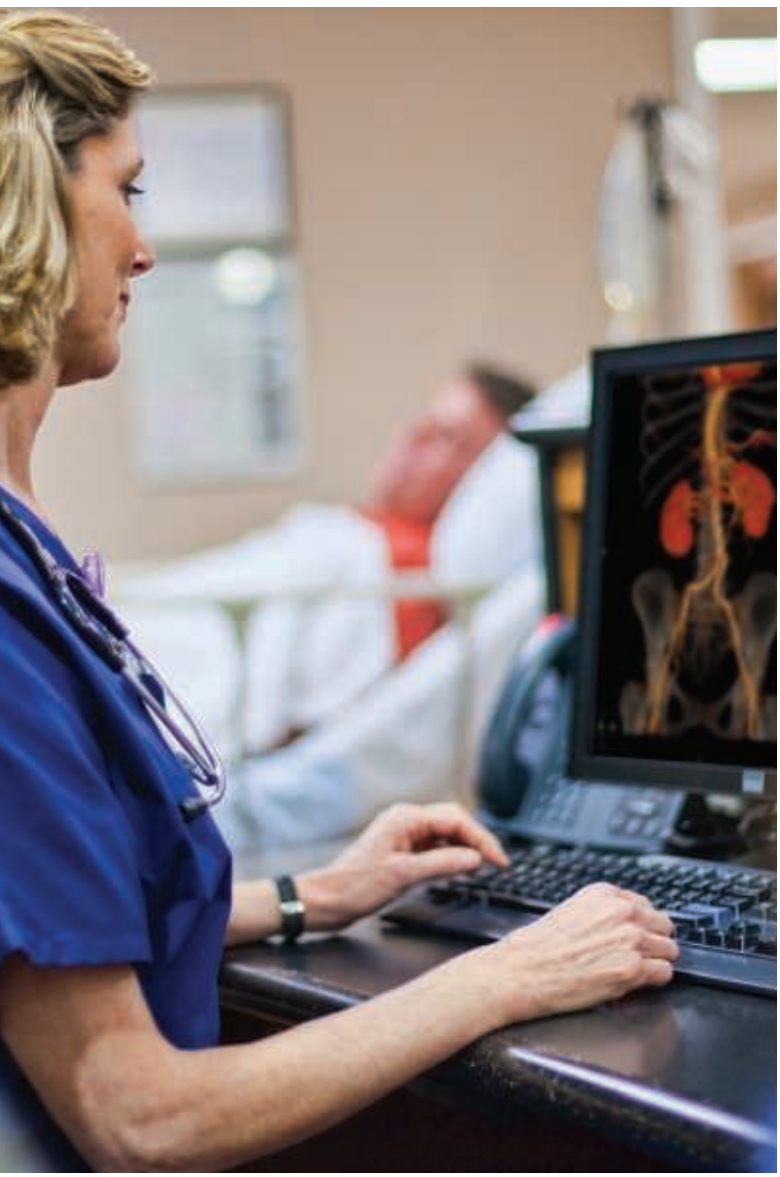


Scan parameters: 100 kVp, 110 mAs, 5.2 mGy, 67.5 mGy×cm, 59 BPM, 0.9 mSv (k=0.014), slice thickness 0.67, 380 images
Reconstruction time: 1:38 minutes



Workflow **powered** by iPatient

IMR is made possible by Philips iPatient, an advanced platform that puts you in control of enhancing your CT system today, while getting you ready for the challenges of tomorrow.



Personalize your control with iPatient and IMR

No two patients are identical, and truly focusing on the patient requires the ability to personalize your control. This means consistently achieving high image quality and managing dose appropriately every day. iPatient and IMR working together bring you new methods to facilitate patient-specific dose management and increased diagnostic confidence.

Fast time to diagnosis

iPatient helps simplify complex procedures by automating routine tasks so you can focus on what is more advanced and challenging. Save time, too, because with iPatient, scan times are automatically reduced and exam times are shortened, in some cases up to 24%.*

Consistency in results

Working with the iPatient architecture, IMR provides the benefits of virtually noise-free imaging consistently across the broad range of patients, from pediatric to bariatric.

More focus on the patient

While you're working to boost return on investment now, you're also accessing a flexible platform that will support future innovations.

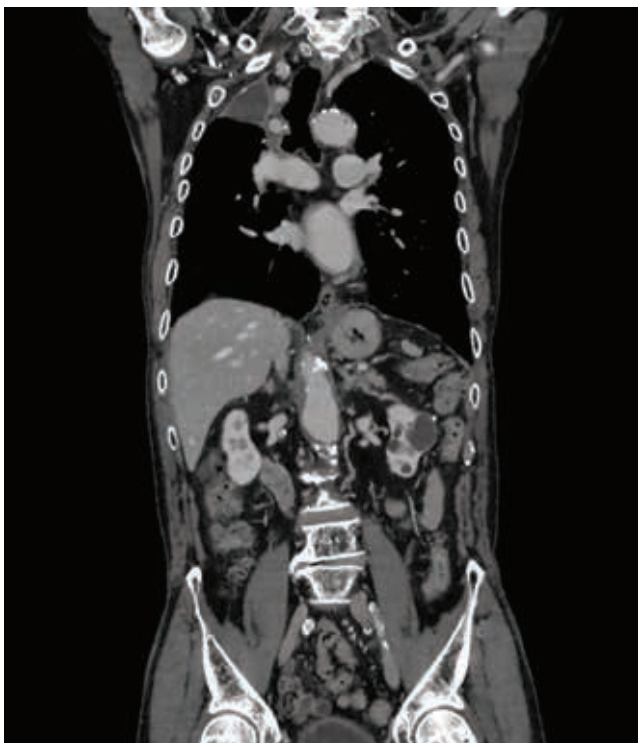
In control with iPatient

In control offers a multitude of ways to facilitate patient-centered imaging. It means that although every day may be different, you're confident the results can be consistent. It's also having the knowledge to define what you need in terms of image characteristics, and allowing you to adjust the settings automatically.

* In a study done using multiphasic liver CT exams, the iPatient software platform reduced time-to-results by 24% and clicks per exam by 66%.

Majority of protocols reconstructed **< 3 minutes**

IMR, together with iPatient and next-generation reconstruction hardware, allows you to achieve fast time-to-diagnosis with confidence and consistency.



Scan parameters: 68.5 cm (999 images)
Reconstruction time: 1:28 minutes

Speed powered by innovation

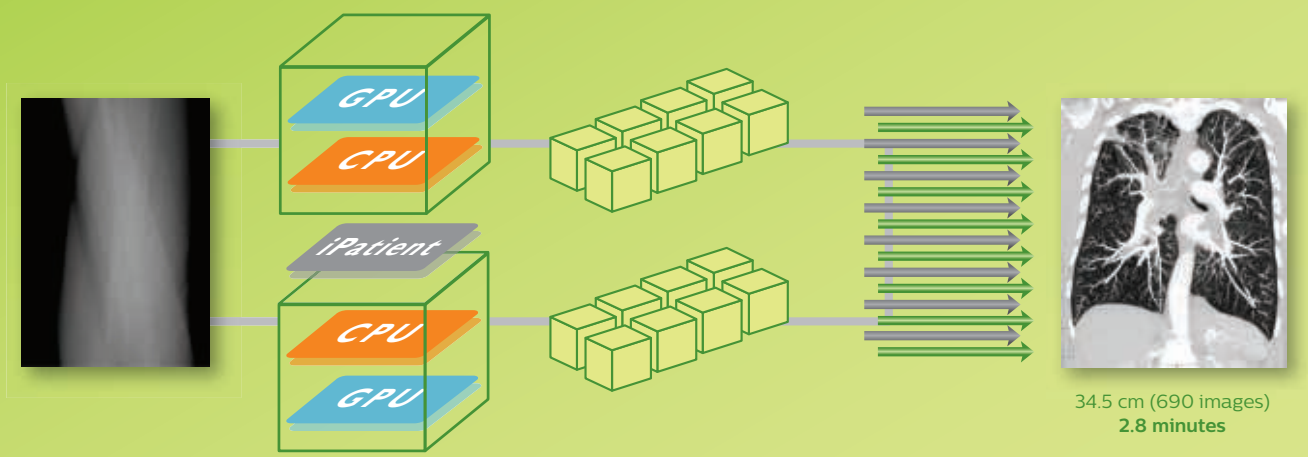
With innovations in hardware and the reconstruction algorithm, IMR can be used in the most demanding applications with a reconstruction time of less than three minutes for the majority of reference protocols.

Compact for easy siting

This implementation of architecture allows for compact hardware small enough to fit the operator console room. With remote siting capabilities, the hardware can also be remotely located in the scanner room.

HyperSite IMR reconstructor

HyperSite IMR is specifically designed to provide reconstruction speed that allows IMR to be routinely used in inpatient, outpatient, and emergency care settings.

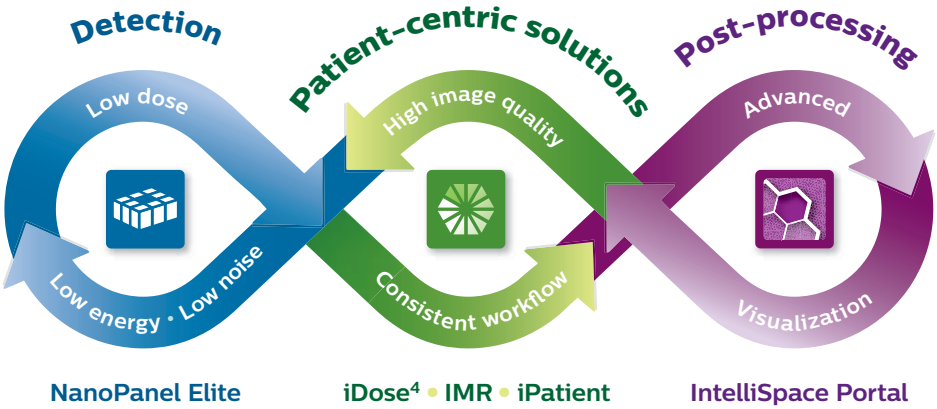


34.5 cm (690 images)
2.8 minutes

Through the synergy of CPU and GPU technology, IMR hardware provides highly parallel architecture capable of breaking large volumes of data into smaller packets that, with iPatient architecture, now simultaneously process the data to provide fast reconstruction.

Elite imaging

Our Elite solutions balance innovative technologies that enhance the entire imaging chain and uphold patient-centric clinical excellence. From the NanoPanel Elite detector to IMR and iPatient to the real-time radiology offered by the IntelliSpace Portal, our goal is always to bring you advances that matter to patient care.



Leading CT detector design

Philips was first to bring integrated, modular CT tile detector technology to the market in 2007. With thousands of NanoPanel-based systems installed globally, Philips continues to lead in CT detector design with the introduction of the NanoPanel Elite – our newest tile detector and a 4th-generation solid-state detector.

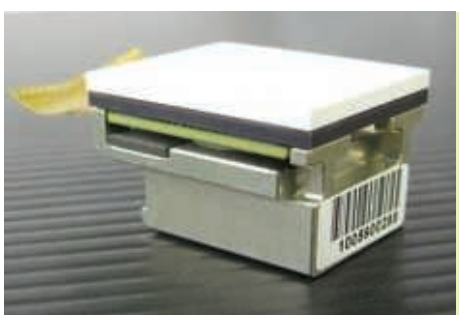
Advantages of Elite detector technology

- Reduces image noise at low energy and low dose
- Direct integration technology
- Miniaturization and integration provide a low-noise, high-fidelity signal
- Marked image noise improvement

Real-time radiology

The IntelliSpace Portal option provides a true multimodality, multivendor, and multiuser workspace that facilitates a high level of collaboration among radiologists and referring physicians while streamlining imaging workflow.

- Advanced visualization virtually anywhere, anytime gives access to information to increase diagnostic confidence
- Thin-client architecture that makes image data and applications available for CT, MR, and Molecular Imaging images
- Tooling to allow easy communication among clinicians of advanced visualization results



NanoPanel Elite detector

NanoPanel Elite is the Philips second-generation tile detector technology and is engineered for low-dose, low-energy, and low-noise imaging.

Confidence for the future

Knowledge-based confidence is just part of the value Philips brings to you now and in the future. We're dedicated to you and your patients, and our systems grow with you as your needs grow.

IMR is available on new and existing* iCT, and Ingenuity scanners (64 slices and above), as well as Brilliance CT 64-channel with Essence technology.

- Ingenuity Elite with IMR
- Ingenuity Elite
- Ingenuity Core

- iCT Elite with IMR
- iCT Elite
- iCT SP

- Brilliance CT 64-channel with Essence technology

Philips SmartPath provides you easy access to solutions and innovations for the full life of your computed tomography system, so you can boost your clinical and operational potential and achieve your organizational goals.

Optimize your system's performance both now and in the future with regular and ongoing updates, including functionality improvements and remote technical support.

Enhance your equipment with regular technology upgrades, and take advantage of the newest features and capabilities.

Transform your investment at the end of your system's life by transitioning seamlessly to a next-generation solution or refurbished option.

The images and descriptions contained herein provide technical specifications and optional features which may not be included with the standard system configuration. Contact your local Philips Representative for a complete specific system details.

Some or all of the products, features, and accessories shown or described herein may not be available in your market. Please contact your local Philips Representative for availability.

The iCT Elite with IMR, iCT Elite, and iCT TVI are configurations of the iCT. The Ingenuity Elite with IMR and Ingenuity Elite are configurations of the Ingenuity CT.

* Additionally, IMR is available as an upgrade to the iCT TVI, iCT, Ingenuity CT, Ingenuity Core[128], and Brilliance CT 64-channel scanners with Essence technology.

Please visit www.philips.com

Printed in The Netherlands.
4522 991 28651 * JUN 2017