Certainty lives in **layers**

Philips IQon Spectral CT

Empowering the people **behind the image**

At Philips, we believe there's always a way to make life better—which means breaking down the silos that impede better care. When it comes to imaging, we're taking a systems approach focused on seamlessly connecting data and technology to empower the people behind the image to reach a confident diagnosis. And for Philips CT imaging, no solution integrates data and technology more seamlessly than **Philips IQon Spectral CT.**

A search for solutions

Imaging has long been tasked with finding answers. And as today's healthcare model continues to evolve, imaging is under ever-increasing pressure to find answers that will:

- **Deliver a profound clinical impact**
- **Enhance the patient experience**
- **Lower the cost of care**

What if there was one solution that could meet the needs of patients, clinicians, and administrators by providing a high level of **certainty**—diagnostically, and at every level of a medical organization?

An answer like no other

As the world's first and only detector-based spectral technology, Philips IQon Spectral CT is the only dual-energy solution that provides layers of true spectral data, without compromise.

IQon represents a revolutionary solution in imaging. By enabling the right scan for each patient the first time and simplifying how data and insights are gathered, the IQon helps to improve the imaging experience for patients and staff, aiding clinicians in delivering better patient care and reducing imaging costs for the organization. With Philips IQon Spectral CT, **certainty lives in layers.**

Powered by the revolutionary NanoPanel Prism detector, IQon's layers of spectral data provide breakthrough solutions, including:

Diagnostic certainty
Where the first exam is the right exam

Every scan is spectral, without compromise
Eliminating the patient selection dilemma

Powerful advancements that fit your workflow
Review and analyze spectral results—anytime, anywhere

Diagnostic **certainty**

"With IQon, I have discovered clinical findings that were not visible before. Examples are peripheral PEs on iodine maps and lipid rich gallstones only visible on Z effective maps. The use of monoenergetic images is of real clinical utility in terms of contrast medium optimization and artifact reduction, and VNC represents a real benefit for the patient in terms of radiation dose since results are comparable to a true non-contrast image."

Prof. Emmanual Coche, Director of Radiology
Universite Catholique de Louvain; Louvain-la-Neuve, Belgium

See **beyond** conventional CT

CT is often the go-to imaging modality for a wide range of clinical indications, but conventional CT images aren't always able to provide clinicians the answers they need. Conventional CT images can present a number of challenges, including:

- Indeterminate findings
- Poor visualization of tissue
- The need for repeat scans
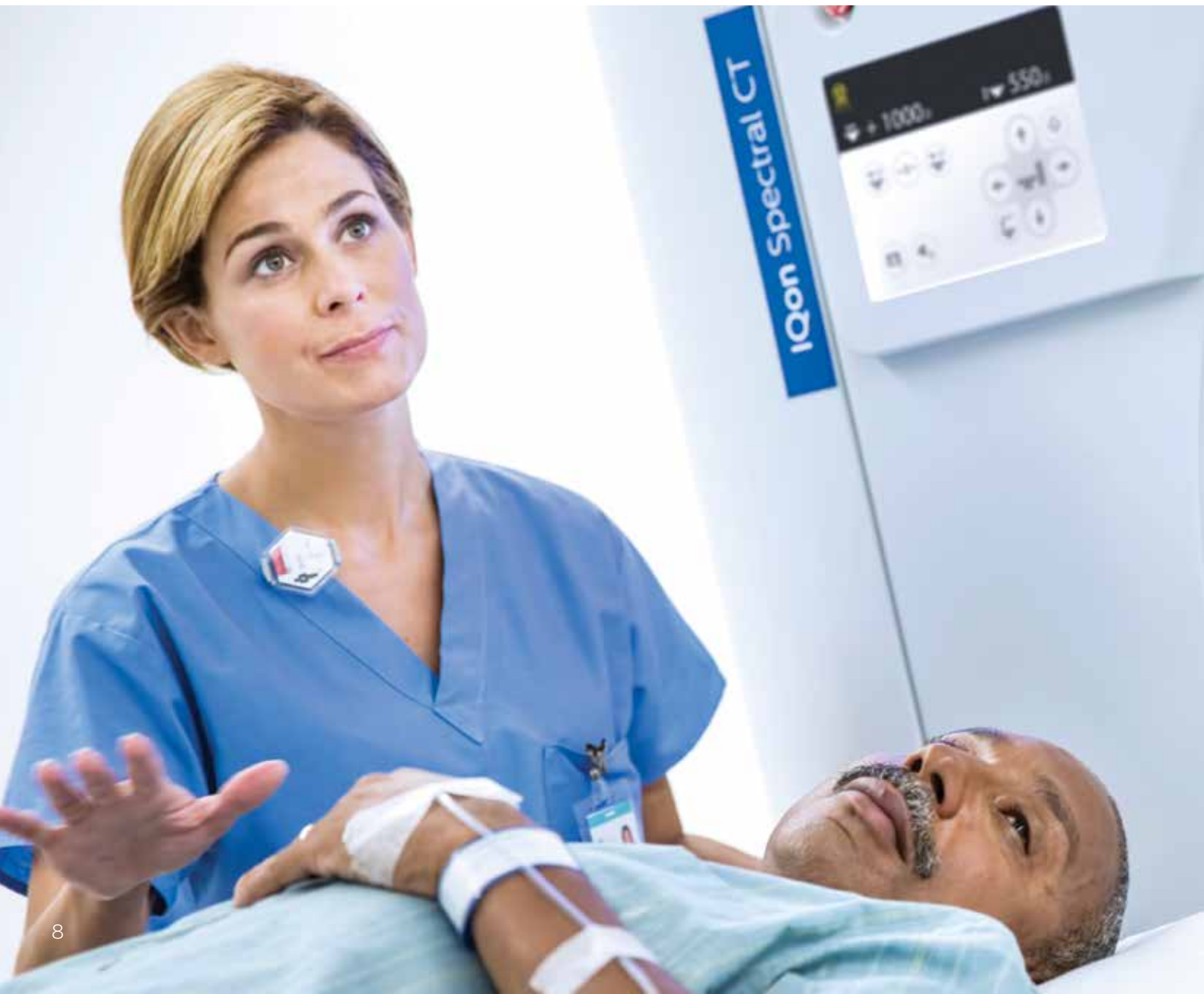
Diagnostic certainty

With IQon Spectral CT, true conventional CT images are paired with layers of spectral results in the same scan, improving diagnostic confidence and lowering costs. Suddenly, what had been invisible is now both visible and diagnostic.

IQon Spectral CT's improved tissue characterization and visualization provides diagnostic certainty **beyond that of conventional CT.**

Rich spectral results

IQon delivers true conventional results paired with diagnostic layers of spectral data 100% of the time, in a single scan.

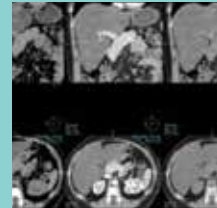**What conventional CT provides:**

Conventional CT

What IQon Spectral CT provides:
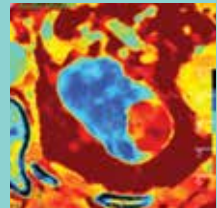
Conventional CT

Monoenergetic

Virtual Non Contrast

Iodine no Water

Iodine Density

Z Effective

Calcium Suppression

Electron Density

Case study

Faster diagnosis, fewer follow-up scans, big economical impact

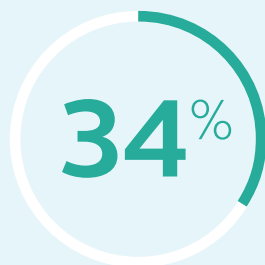CARTI Cancer Center, Little Rock, Arkansas, USA

Dual-energy CT is often used in routine examinations—from thoracic to brain, to neck and spine. Approximately 50% of these exams are performed with injections of iodinated contrast to highlight blood vessels and enhance organ or lesion structures. However, in some patients, the amount of contrast media delivered is of concern due to risk of complications, such as contrast-induced nephropathy (CIN). Efforts to reduce contrast volume in patients may reduce the risk of CIN, as well as provide institutions with clinical and economic benefits. Additionally, the ability of Monoenergetic (MonoE) spectral results from a muti-detector CT to boost iodine signal at low keV's allows for improved visualization of structures at low volumes of iodinated contrast.

A study conducted at the CARTI Cancer Center in Little Rock, AR included 60 patients with reduced renal function. Patients were separated in two groups, with one group scanned with low contrast levels on the Philips IQon Spectral CT, and the other group scanned on a different scanner without contrast.

A retrospective analysis of the 60 patients found that 30 patients who received a non-contrast CT would need additional diagnostic tests within a three-month period, adding time to diagnosis, as well as added expense of additional follow-up exams.

In comparison, utilizing the low MonoE spectral results available for those patients scanned on the IQon Spectral CT, clinicians were able to reduce time to diagnosis for these patients—as well as a reduction in follow-up exams—therefore seeing significant economic benefits.

Use of the IQon Spectral CT resulted in:

34%
shorter time
to diagnosis

25%
decrease in
repeat scans

$**453**
avg. savings per
follow-up scan

For a copy of the full white paper highlighting this study, please visit us at www.philips.com/IQon.

Address indeterminate findings
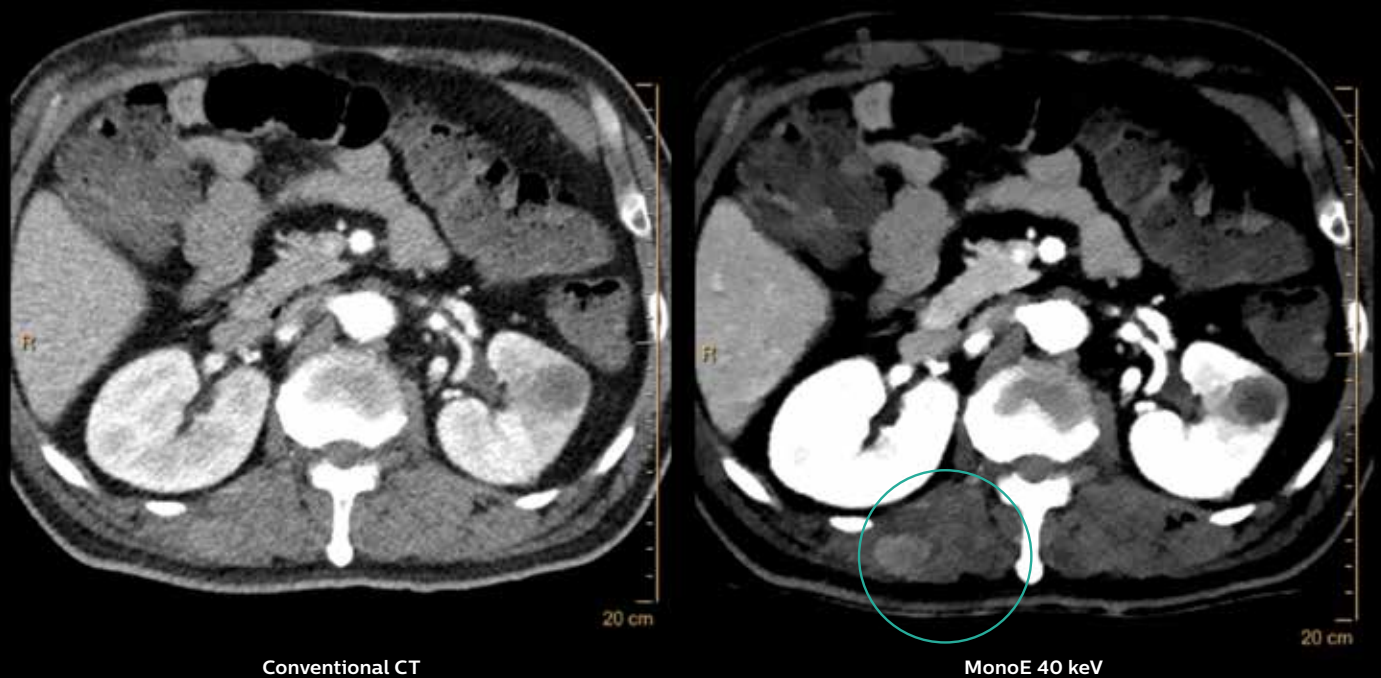
Paraspinal muscle and kidney metastasis

Images courtesy of Hennepin County Medical Center, Minneapolis, Minnesota, USA

Clinical Benefit
Low MonoE images from IQon allowed for better contrast enhancement of kidney lesion and revealed a paraspinal lesion not clearly visible on conventional scans

Case Summary
· Male patient with history of cancer complaining of pelvic pain
· Routine abdomen CT performed on IQon Spectral CT
· Conventional CT images show kidney lesion only
· Using 40 keV MonoE spectral results, clinician identified left kidney lesion, as well as a paraspinal muscle metastatic lesion not clearly visible on conventional image
· Spectral contrast enhancement of lesions helped clinician determine therapy response

Conventional CT   MonoE 40 keV

Results from case studies are not predictive of results in other cases. Results in other cases may vary.

Enhance visualization of tissue
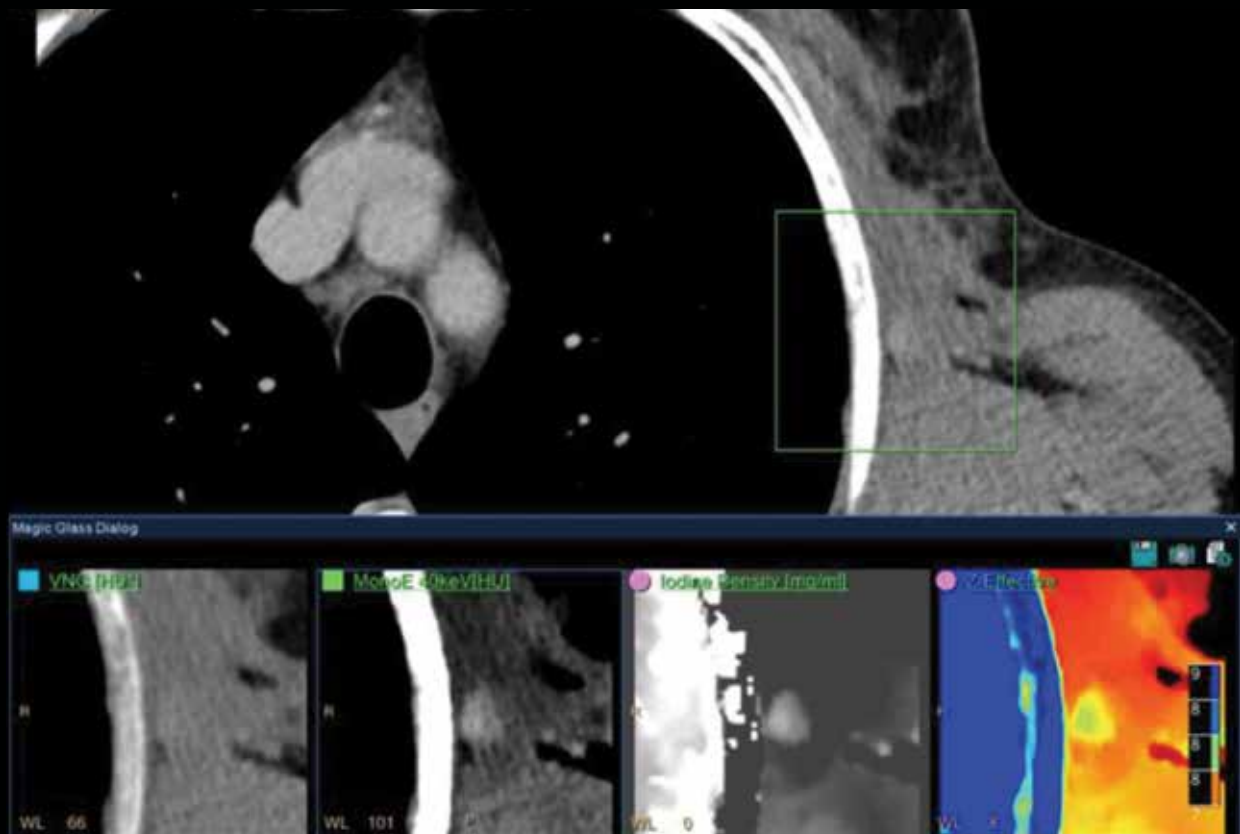
Chest, abdomen, pelvis

Images courtesy of University Cologne, Cologne, Germany

Clinical Benefit
IQon's Spectral Magic Glass helped clinician identify a questionable area and evaluate a lesion

Case Summary
- Patient with history of chondrosarcoma and who had received oncology treatments was scanned on the IQon Spectral CT for a follow-up scan at three months
- Conventional CT post-treatment read as normal
- Using Spectral Magic Glass feature, clinician was able to view multiple spectral results at the same time for a specific region of interest
- Spectral results provided clinician with visualization necessary to identify a small lesion in left axillary region

Results from case studies are not predictive of results in other cases. Results in other cases may vary.

Determine next steps for treatment
Brain

Images courtesy of Technical University Munich, Munich, Germany
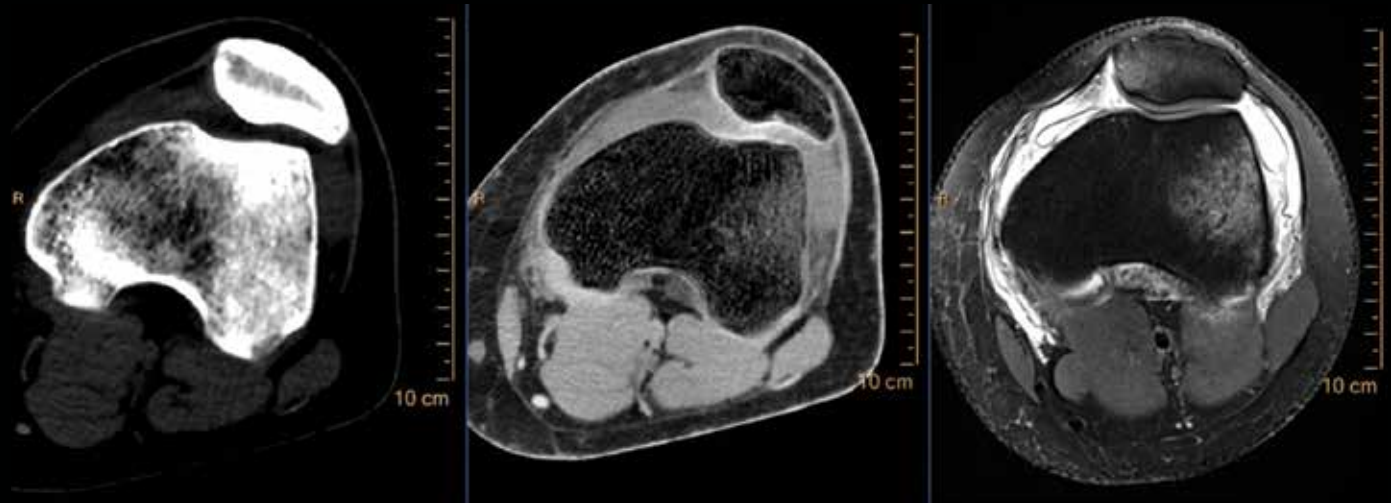
Clinical Benefit
IQon spectral results helped neurologist determine next steps for treatment

Case Summary
- Patient was sent to the hospital for a stat interventional procedure of the brain that was followed up with a CT scan on the IQon
- On conventional CT, radiologist had difficulty determining what was blood and what was contrast due to large residual amount of contrast patient received during interventional procedure
- With IQon, clinician was able to see ghost of contrast contamination using Iodine no Water spectral result
- VNC results helped clinician visualize residual blood from an aneurysm

| Conventional CT | Iodine no Water | VNC |

| Conventional CT | Calcium Suppressed | MRI |

Clinical case example

Expand capabilities with calcium suppression
MSK knee

Images courtesy of Cliniques Universities St-Luc, Brussels, Belgium

Clinical Benefit
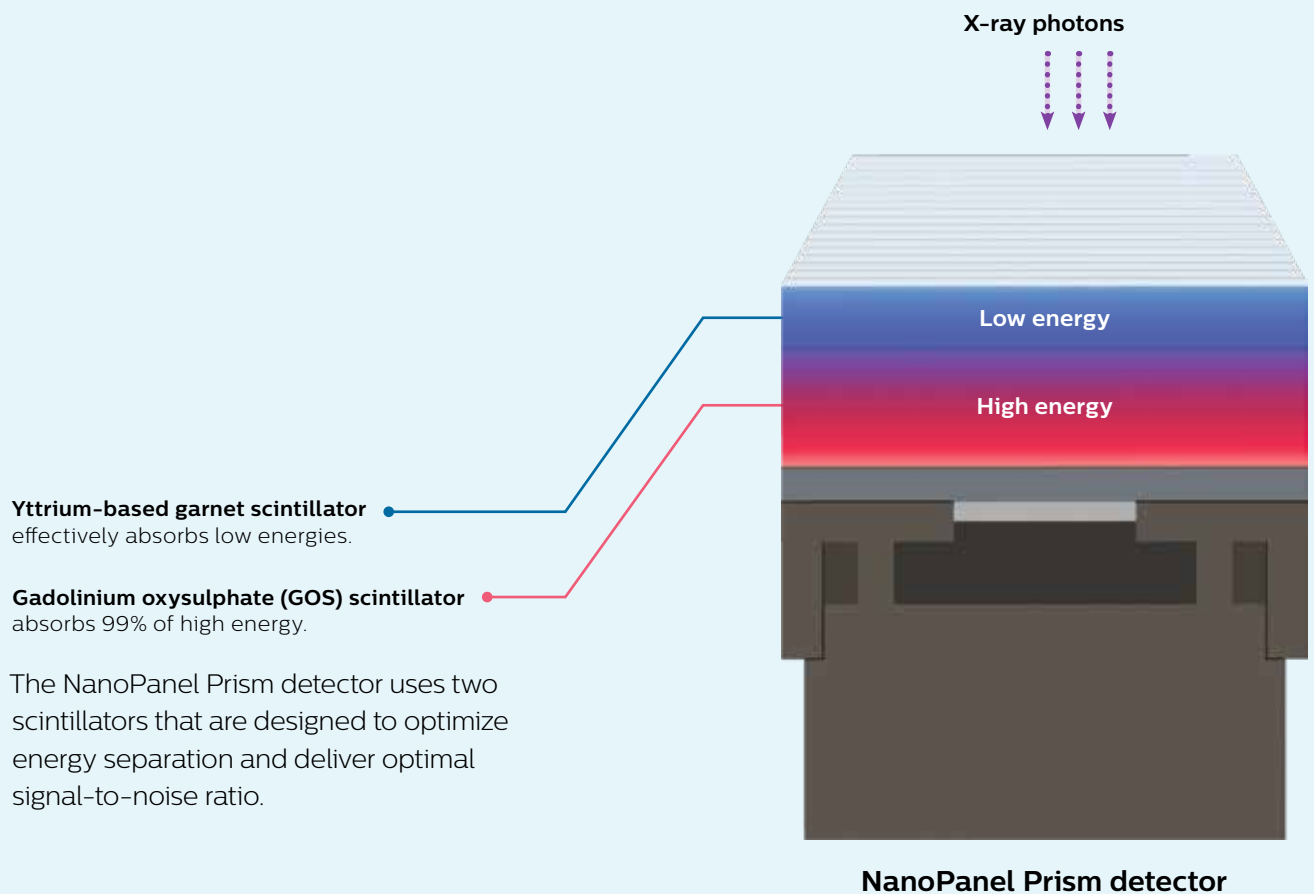IQon Spectral CT can help to suppress calcium and enhance a suspected area of edema

Case Summary
- 18-year-old patient who had fallen received a CT scan to rule out a fracture
- IQon spectral results suggested a bone marrow edema
- Patient then had MRI 24 hours later to rule out any pathology
- Conventional CT scan is not typically able to demonstrate presence of bone marrow edema, which causes decreased fat and increased fluid contents within the bone marrow
- IQon Spectral CT can help to suppress calcium and enhance suspected area of edema

Results from case studies are not predictive of results in other cases. Results in other cases may vary.

The difference is detector-based

Powering the IQon's unique capabilities is Philips' proprietary NanoPanel Prism spectral detector technology.

Utilizing a detector-based versus source-based system to capture spectral data, the NanoPanel Prism detector simultaneously distinguishes and captures high and low photon energy—improving visualization and characterization of tissues and structures while enhancing image quality.

X-ray photons

Low energy

High energy

Yttrium-based garnet scintillator effectively absorbs low energies.

Gadolinium oxysulphate (GOS) scintillator absorbs 99% of high energy.

The NanoPanel Prism detector uses two scintillators that are designed to optimize energy separation and deliver optimal signal-to-noise ratio.

NanoPanel Prism detector

Every scan is **spectral**

"We do not 'pre-select' which cases
to send to the IQon. It is located in an
ED setting and we send as many patients
as possible to the IQon. Some days we
send 135–150 scans through the IQon.
We routinely discover incredible findings
—with diagnostic confidence—based on
the spectral reconstructions."

Chip Truwit, MD, Chief of Radiology
Hennepin County Medical Center; Minneapolis, Minnesota

Improve the
imaging experience

With source-based spectral solutions, clinicians must choose whether to perform a spectral acquisition in advance, which forces trade-offs in dose management and acquisition of true conventional images.

This creates a patient selection dilemma – if the spectral mode on a source-based scanner isn't selected up front, a patient who later would benefit from a spectral scan would require a repeat scan, which can compromise the patient experience and delay time to diagnosis and treatment. In addition, source-based solutions have inherent difficulties that compromise the acquisition of conventional CT images, affecting image quality.

Every scan is spectral,
without compromise

Only the IQon Spectral CT eliminates the need for upfront spectral mode decision-making. Powered by its revolutionary NanoPanel Prism detector technology, the IQon acquires spectral data at the detector rather than the source, enabling:

- Acquisition of true conventional and spectral data simultaneously, in every single scan—while maintaining full use of dose management tools

- The ability to scan a wide range of patient sizes with full spectral view

With the IQon's detector-based spectral technology, there's no need to choose a spectral acquisition in advance—allowing IQon to help eliminate your pre-scan dilemma and extend the certainty of spectral data **to every patient, in every scan.**

Easily accommodate a range of patient sizes from pediatric to bariatric

Pediatric and bariatric abdomen

Pediatric images courtesy of Phoenix Children's Hospital, Phoenix, Arizona, USA
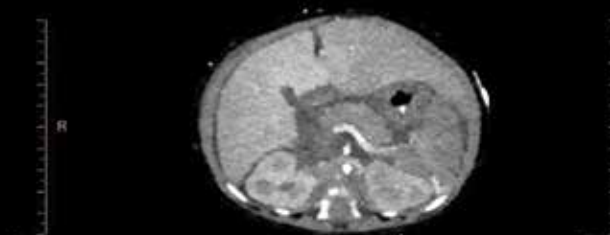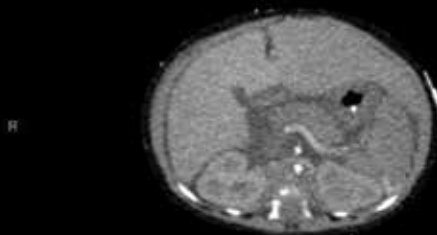Bariatric images courtesy of University Medical Center LSU, New Orleans, Louisiana, USA

Clinical Benefit
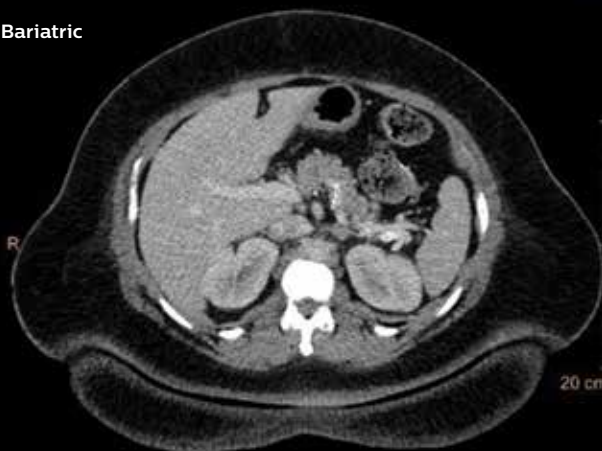Ability to scan a wide range of patient types, from pediatric to bariatric

Case Summary
· With conventional CT, limitations may exist in scanning larger patients, or achieving high image quality for smaller patients
· With IQon, a wide range of patient types can be scanned, from pediatric to bariatric
· Images show scans taken on the IQon showing pediatric abdomen on a six-month old and bariatric abdomen on a patient with a BMI of 68

Pediatric

Bariatric

Conventional   MonoE 50 keV

Results from case studies are not predictive of results in other cases. Results in other cases may vary.

Investigate incidental findings
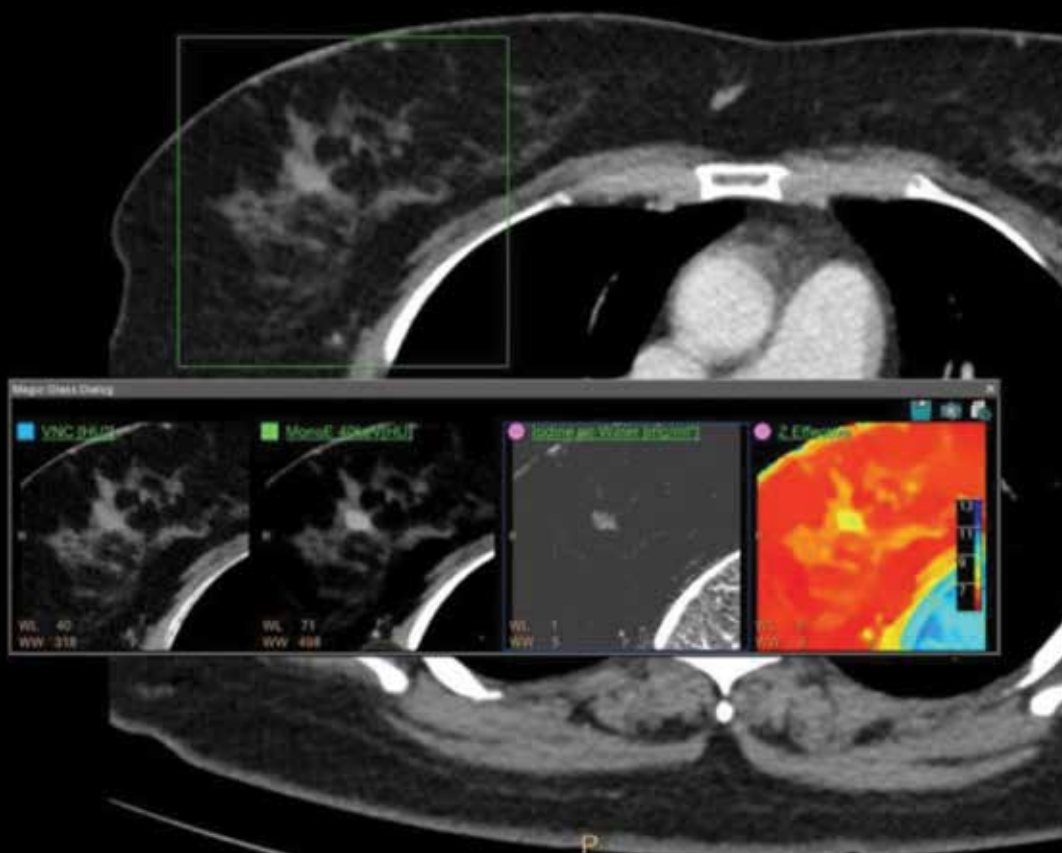
Chest, abdomen, pelvis

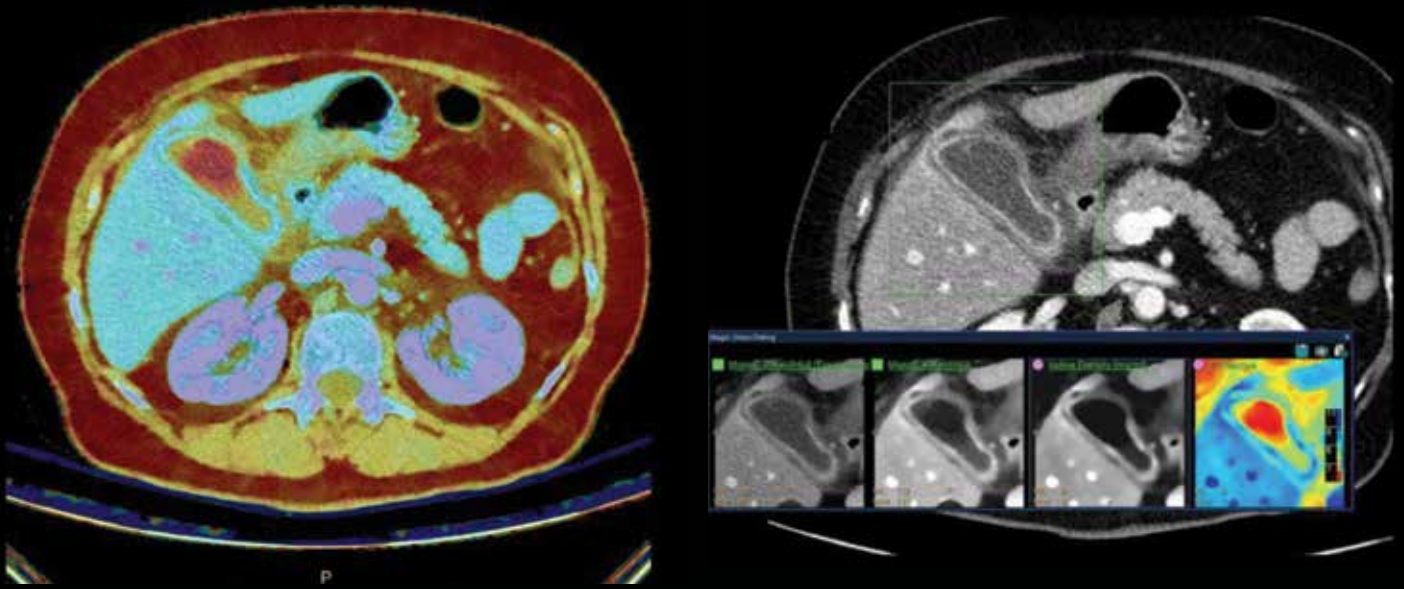Images courtesy of UCL Brussels, Brussels, Belgium

Clinical Benefit
Spectral results allowed clinician to identify lesion that could have easily been missed, therefore allowing expedited patient care and treatment path management

Case Summary
· Patient was scanned on IQon for staging of ovarian cancer
· On chest CT, clinician discovered a lesion in the right breast not easily seen on conventional CT image
· By applying Spectral Magic Glass over breast legion area, clinician was able to determine lesion needed further analysis through a follow-up exam
· Follow-up exam tested positive for malignancy

Reduce the need for further exams

Chest, abdomen, pelvis

Images courtesy of UCL Brussels, Brussels, Belgium

Clinical Benefit
Z effective spectral results eliminated the need for further exams by helping the clinician identify a large cholesterol stone in the gallbladder, as well as wall ischemia

Case Summary
- Patient presented to ED complaining of abdominal pain, and was scanned on IQon
- On conventional images, clinician noticed inflammation of the wall of gallbladder
- Using IQon spectral results, clinician was able to investigate suspicious findings without the
- need for additional exams

Results from case studies are not predictive of results in other cases. Results in other cases may vary.

Detector-based spectral is different than source-based dual-energy

IQon eliminates the patient selection dilemma because every scan is spectral.

Source-based solutions rely on kVp switching between high and low kVp, or on dual-source energies at high and low kVp. Among other difficulties, kVp switching exhibits compromises in speed and with scanning larger patients. Dual-source systems demonstrate compromises in speed, field of view, and with scanning larger patients.
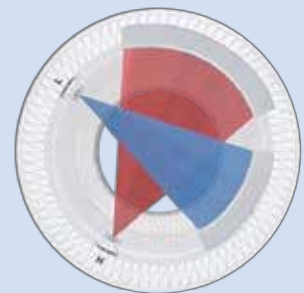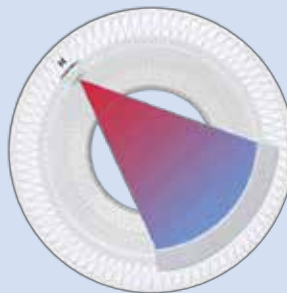
Approach	Detector-based spectral (IQon Spectral CT)	Fast kVp switching	Dual-source
How it works	Detector simultaneously captures high and low energy	Fast switching between high and low kVp	Two tubes 90° apart produce energies at high and low kVp
Generating results	Spectral is always on	Dual-energy mode must be preselected	Dual-energy mode must be preselected
	Eliminates the patient selection dilemma	Compromises in speed and for larger patients	Compromises in speed, field of view, and for larger patients

Powerful advancements that fit your **workflow**

"The IQon has delivered everything it promised and more. Multi-energy CT is now constantly available and increasingly used as our norm for diagnosis. At last, a new iteration of CT has been developed with the radiologist in mind!"

Peter Ball, MD, Radiologist
Ulster Hospital; Belfast, United Kingdom

Make spectral routine

Some source-based dual-energy solutions come with complicated workflows and require extensive training of personnel, which can hamper the seamless adoption of spectral technology by a healthcare organization. If accessing and utilizing the data obtained in a dual-energy scan is too cumbersome to be used every day, then the technology has failed to deliver on its biggest clinical advantage—the potential to positively influence patient diagnoses and the treatment path.

Powerful advancements that **fit your workflow**

Without the need for a separate "spectral" scanning mode or special training, IQon integrates into your current workflow, allowing you to establish a new, spectral standard of care for every patient. Because every scan is spectral from the start, you can acquire and analyze spectral results as part of a routine scan and review retrospectively anytime, anywhere.

IQon Spectral CT with **IntelliSpace Portal** offers a range of applications with seamless workflow, from scanning to reading the exam anywhere in the enterprise

Spectral Magic Glass allows for on-demand simultaneous analysis of multiple spectral results

Spectral Magic Glass on PACS app provides enterprise-wide spectral viewing and analysis

IQon Spectral CT produces spectral results that are viewable during a routine reading, and also allows access to capabilities virtually anywhere in the organization through **enterprise-wide spectral viewing and analysis.**

Enhance visualization of vascular structures

Abdomen CTA for TAVI

Images courtesy of University Hospitals Cleveland Medical Center, Cleveland, Ohio, USA

Clinical Benefit
With spectral results, clinician was able to evaluate abdominal vascular structure utilizing the spectral Advanced Vessel Analysis (AVA) application

Case Summary
· Patient was scanned on IQon to evaluate aortic valve and abdominal aorta
· 50 cc of contrast was administrated to achieve scans
· Visualization of vascular structures was limited on conventional images
· Clinician lowered MonoE to improve contrast enhancement, and used spectral AVA application to better visualize and evaluate vascular structure

Results from case studies are not predictive of results in other cases. Results in other cases may vary.

Clinical case example

Evaluate challenging cardiac cases
Cardiac

Images courtesy of University Medical Center LSU, New Orleans, Louisiana, USA
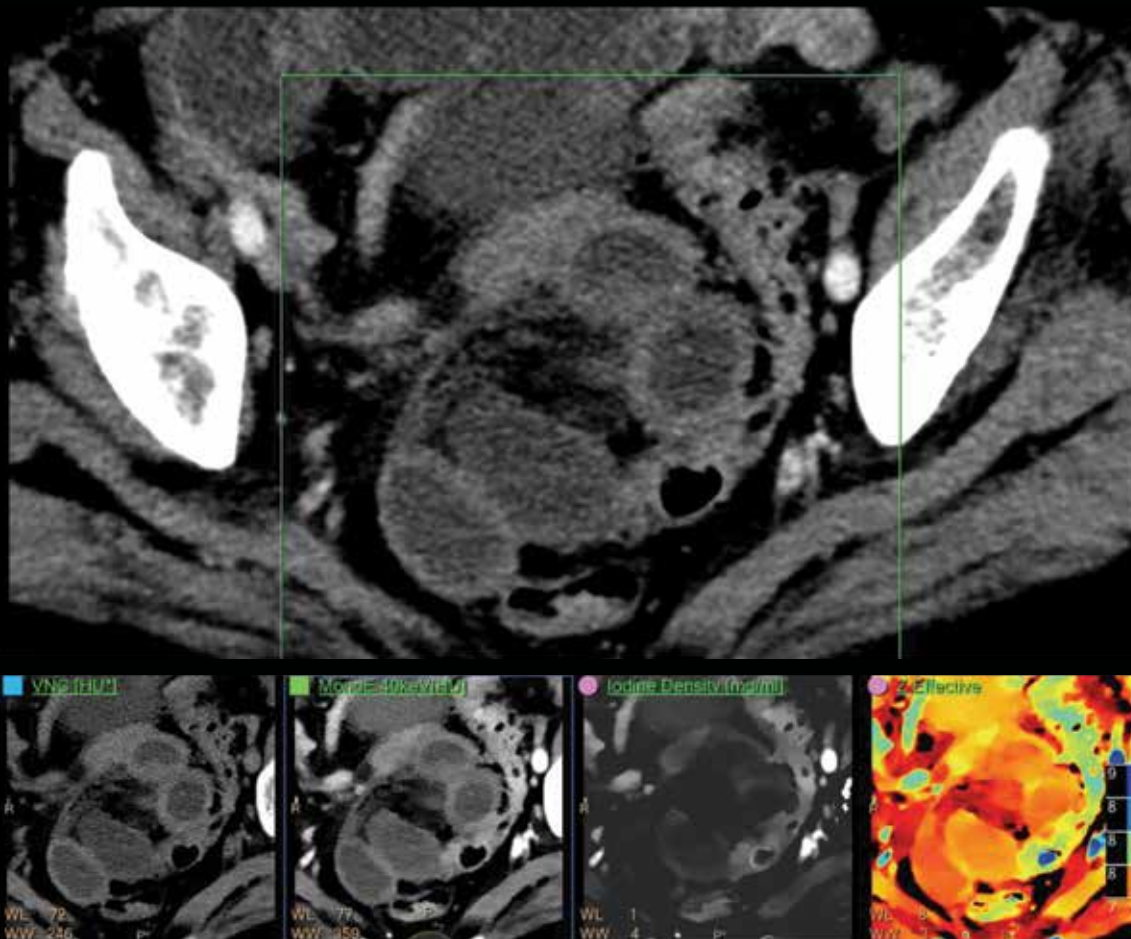
Clinical Benefit
Gated spectral cardiac capabilities allowed clinician to review spectral cardiac anatomy immediately post-scan. Spectral Comprehensive Cardiac Analysis (CCA) software provided clinician with the ability to evaluate the short axis.

Case Summary
· Young male patient admitted to hospital for atypical chest pain
· EKG showed suspected inferior wall infarction, and lab work showed elevated troponins
· Although a younger patient, myocarditis was a suspected diagnosis
· On conventional CT image, gated cardiac CTA showed normal coronary arteries
· However, clinician noticed a suspicious area questionable for an infarct in the inferior wall of the myocardium
· Gated spectral cardiac capabilities allowed clinician to review the spectral cardiac anatomy immediately post-scan
· Spectral CCA software provided the clinician with the ability to evaluate the short axis

MonoE 50 keV
Short axis

MRI
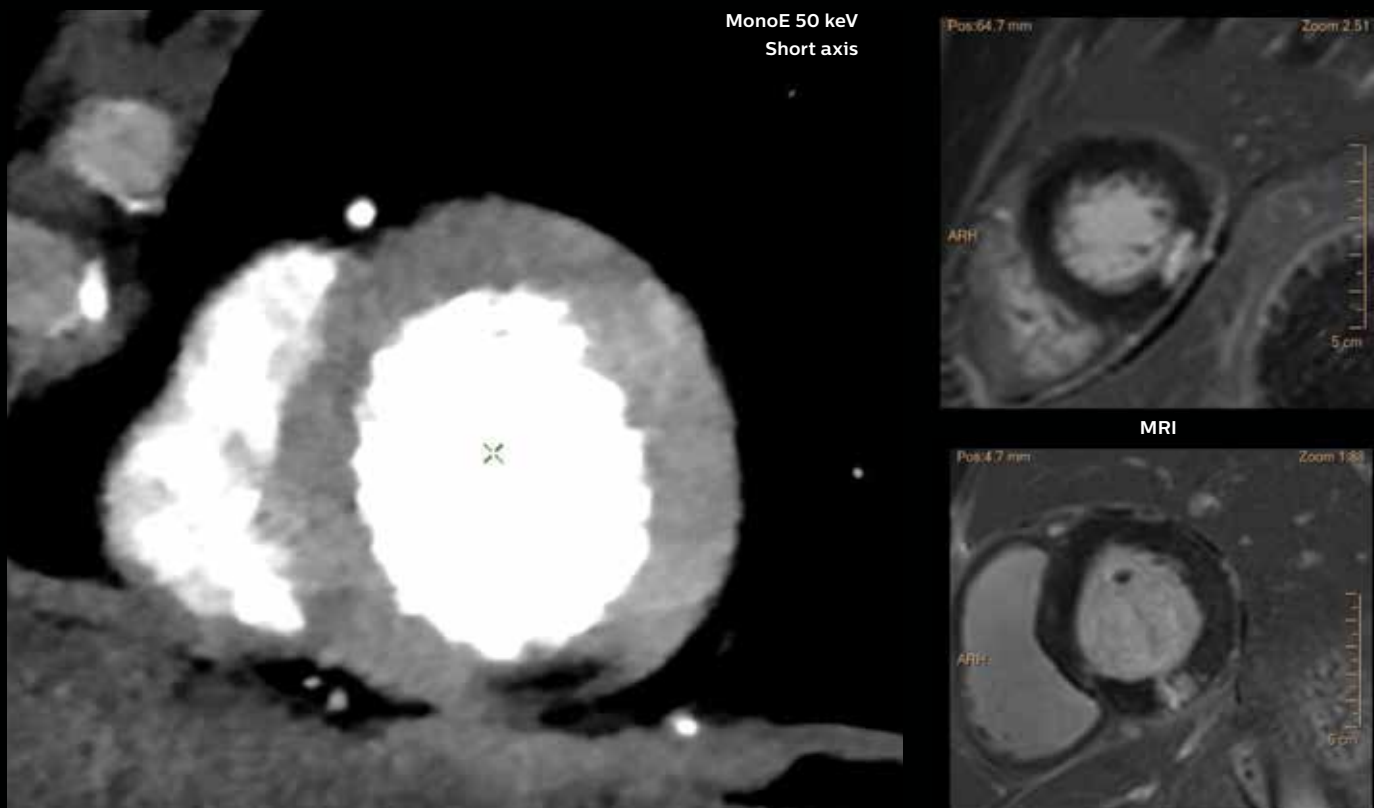
Improve patient care through early detection

Abdomen, pelvis

Images courtesy of CHU L Pradel, Lyon, France

Clinical Benefit
A single scan provided the radiologist with enough data to help in early detection that improved patient care.
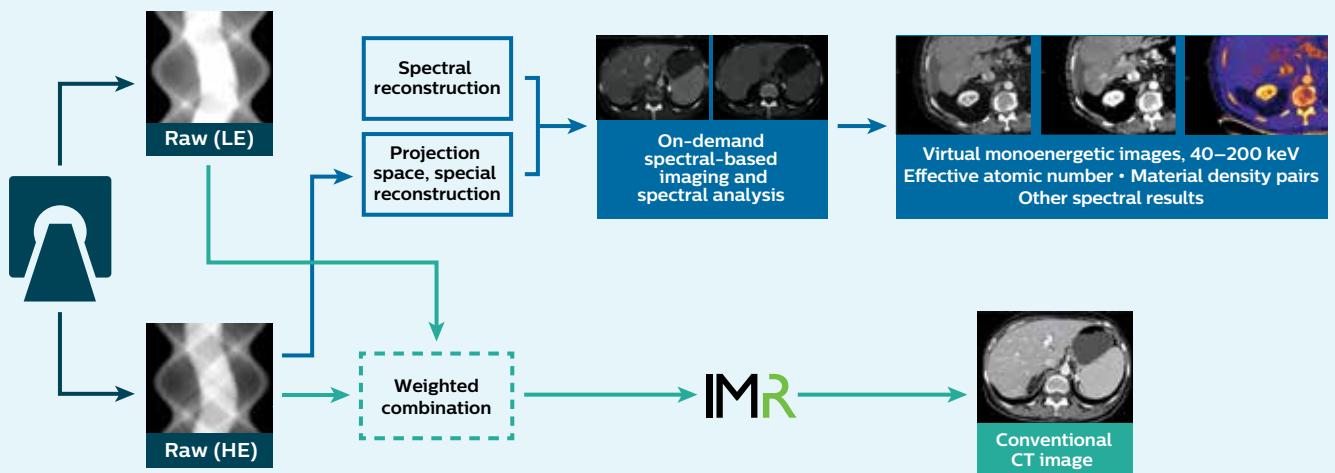
Case Summary
- Elderly female with history of abdominal pain was scanned on IQon for questionable diverticulitis
- No signs of bowel wall ischemia were identified on conventional images
- This helped clinician rule out diverticulitis, but clinician saw signs of ileus
- Using virtual noncontrast and Iodine no Water spectral results, clinician identified an intramural hematoma in areas of the small bowel

Results from case studies are not predictive of results in other cases. Results in other cases may vary.

Why scanning and reconstruction work so well

The IQon's projection space spectral reconstruction enables spectral results with no additional reconstruction or post–processing, so multiple spectral results can be reviewed and analyzed on demand.

Projection space spectral reconstruction

Projection space spectral reconstruction provides a single DICOM entity, known as Spectral Base Image (SBI), that contains sufficient information for retrospective analysis. Spectral applications create various high quality spectral results from the SBI.

Raw (LE)

Spectral reconstruction

Projection space, special reconstruction

On-demand spectral-based imaging and spectral analysis

Virtual monoenergetic images, 40–200 keV
Effective atomic number • Material density pairs
Other spectral results

Raw (HE)

Weighted combination

IMR

Conventional CT image

Integrated solutions from the start

The Philips portfolio of solutions and services helps you realize the full potential of spectral imaging—while potentially reducing operational costs and making it easy and more cost-effective to keep your technology up-to-date.

Low-dose solutions such as Philips **DoseWise** deliver on quality measures, while allowing you to experience all the benefits of spectral data at the same dose levels as a conventional CT scan.

PerformanceBridge offers an integrated portfolio of services and solutions that enables continuous organizational performance improvements.

Asset management to help you manage, monitor, and control clinical assets across our healthcare system.

Updates and upgrades through **SmartPath**, a robust portfolio that delivers expanded clinical capabilities and important workflow efficiency gains.

TechMaximizer allows for technology migration to ensure you are using the most up-to-date hardware and software, while reducing the costs of managing obsolescence.

With **remote services and proactive monitoring**, Philips helps you solve problems 24/7 before they can impact your day-to-day operations.

NetForum Community brings healthcare professionals together online to share best practices, leverage experience, and optimize system performance.

The detector is the difference

The revolutionary NanoPanel Prism detector eliminates the compromises associated with other dual-energy techniques—to deliver spectral insights for every patient, in every scan.

Diagnostic certainty

The unique dual-layer detector distinguishes high- and low-energy data simultaneously, reducing scanning time and improving data integrity.

Every scan is spectral, without compromise

The detector-based solution introduces a unique scanning and clinical application experience, without the pre-decisions required for source-based solutions.

Powerful advancements that fit your workflow

Projection space spectral reconstruction enables spectral results with no additional reconstruction or post-processing.
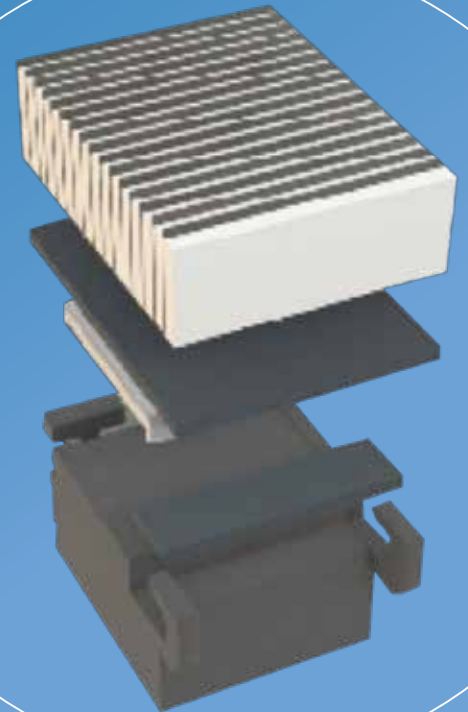
100% of organizations agreed with the following statement: "**IQon Spectral CT has increased my confidence in diagnosis.**"*

***Source: TechValidate survey of 27 customers of IQon Spectral CT
Published: Apr. 24, 2018. TVID:OEB-5FB-539**

Unlock the full potential of a spectral solution

Acquire the right image and the right insights for each patient, in the first exam.

Improve imaging outcomes and enhance the patient experience—while lowering the cost of care.

With IQon Spectral CT, your organization can leverage the technological innovation of spectral detection to:

- **Achieve diagnostic certainty**
- **Acquire spectral data in every scan, without compromise**
- **Harness powerful advancements that fit your current workflow**

Which ultimately means enhanced confidence for your staff, an improved experience for your patients, a simplified process to gather data and insights, and reduced costs for your organization. All through the transformative power of spectral.

With Philips IQon Spectral CT, certainty lives in layers.

Rx Only

CE 0197

PHILIPS

The IQon Spectral CT is a Computed Tomography X-Ray System intended to produce cross-sectional images of the body by computer reconstruction of X-ray transmission data taken at different angles and planes. This device may include signal analysis and display equipment, patient and equipment supports, component parts, and accessories.

The IQon Spectral CT system acquires one CT dataset – composed of data from a higher-energy detected X-ray spectrum and a lower-energy detected X-ray spectrum. The two spectra may be used to analyze the differences in the energy dependence of the attenuation coefficient of different materials. This allows for the generation of images at energies selected from the available spectrum and to provide information about the chemical composition of the body materials and/or contrast agents. Additionally, materials analysis provides for the quantification and graphical display of attenuation, material density, and effective atomic number. This information may be used by a trained healthcare professional as a diagnostic tool for the visualization and analysis of anatomical and pathological structures.

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 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.

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