



**PHILIPS**

Advanced molecular imaging

# Proven accuracy inspires confidence

Philips Vereos Digital PET/CT



Empowering the people  
**behind the image**



At Philips we believe that there is always a way to make life better. In healthcare, that 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. And for Philips molecular imaging, no solution integrates data and technology more seamlessly than **Vereos Digital PET/CT**.

# Treatment pathways have to be accurate

In the transition from volume- to value-based care, accurate treatment pathways are essential. PET/CT must be able to detect small lesions quickly and efficiently. Better patient care begins with a PET/CT solution that can:

- Deliver meaningful insights that enhance patient care while managing costs
- Offer a better experience for patients and staff
- Provide a path to the future

What if one solution could meet the needs of patients, clinicians and administrators by providing proven accuracy for more confident decisions?



# Fully digital and clinically proven

Philips Vereos Digital PET/CT is the world's first and only fully digital, clinically proven PET/CT solution supported by rigorous clinical **evidence measured in years**, not months. With more than four years of investigational studies and **over 100 published clinical studies**, Vereos exemplifies an established total solution to reveal more to help you improve patient care and manage costs.

With Philips Vereos Digital PET/CT, proven accuracy inspires confidence.



## Powered by Philips proprietary Digital Photon Counting (DPC) technology

With DPC and digital technology across the imaging chain, Vereos Digital PET/CT provides breakthrough solutions including:



### Clinically proven

- Improved detectability and characterization of small lesions<sup>1</sup>
- IntelliSpace Portal provides an award-winning advanced visualization, review and analysis platform



### A positive experience that matters

- Fast scans, low PET dose
- Ambient Experience provides a positive environment for patients and caregivers




### Ready for the future

- Highest count rate in the industry for enhanced diagnostic confidence with emerging applications that use short half-life tracers
- Illumeo with adaptive intelligence offers a connected solution for advanced visualization to remove barriers to efficiency

A PET scan image of a human brain, showing a cross-section. The brain tissue is rendered in shades of blue, with a prominent, bright yellow and orange lesion located in the lower central region, likely representing a tumor or a site of high metabolic activity. The text "Clinically proven" is overlaid in white on the upper left portion of the image.

Clinically  
**proven**



“We are surprised that we can now see smaller metabolic activity at a level of clarity and precision that we have not seen before...”

**-Dr. Michael V. Knopp, Professor,  
The Ohio State University Wexner  
Medical Center, USA**

# Reveal small lesions

While visualization of small lesions is essential for clinicians to detect disease, stage and assess response to therapy for oncology patients, in molecular imaging, the challenge is being able to detect these small lesions reliably<sup>2</sup>.





# Clinically proven

Vereos provides improved detectability and characterization of small lesions<sup>1</sup> for a fast, simple and confident path to diagnosis, staging and treatment monitoring.

## The proven capabilities of the Vereos Digital PET/CT allow for:

**Improved detectability** and characterization of small lesions<sup>1</sup>

Improved image quality and detectability at **1/2 the PET dose**<sup>3</sup>

Uncompromised lesion detectability at **1/10 the time**<sup>4</sup>

## Lower costs

Vereos enables significantly shorter scan times while overcoming the visualization challenges in PET imaging to detect smaller lesions. Fast scanning allows for shorter exam times, increasing overall patient throughput.

Clinically proven

## Integrated workflows with Philips IntelliSpace Portal

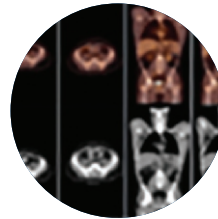
IntelliSpace Portal is a suite of best-in-KLAS\* applications and workflows across clinical areas from oncology to neurology to cardiology that helps enhance visualization and quantify information to support the reading and follow-up of complex cases.



### Oncology/Body/Lung

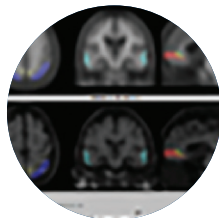


Multimodality  
Tumor Tracking

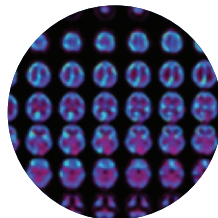


NM Review

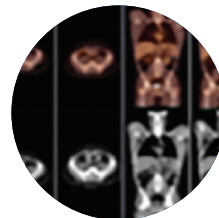
### Neuro



NeuroQ Amyloid

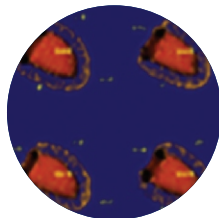


NeuroQ 3.7

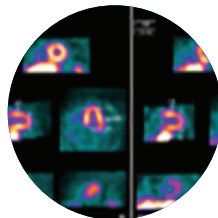


NM Review

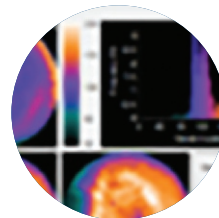
### Cardiovascular



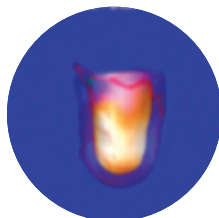
Cedars Sinai  
Cardiac Suite  
2015



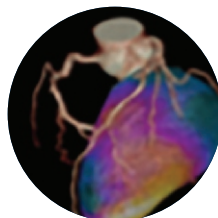
Emory Cardiac  
Toolbox 4.1



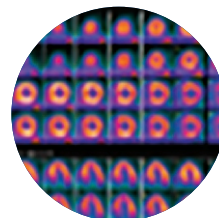
Emory Cardiac  
Toolbox  
SyncTool



Emory Cardiac  
Toolbox  
HeartFusion



CT/AMI Fusion



Corridor4DM



Clinically proven

## Case study

# Small lesion detectability

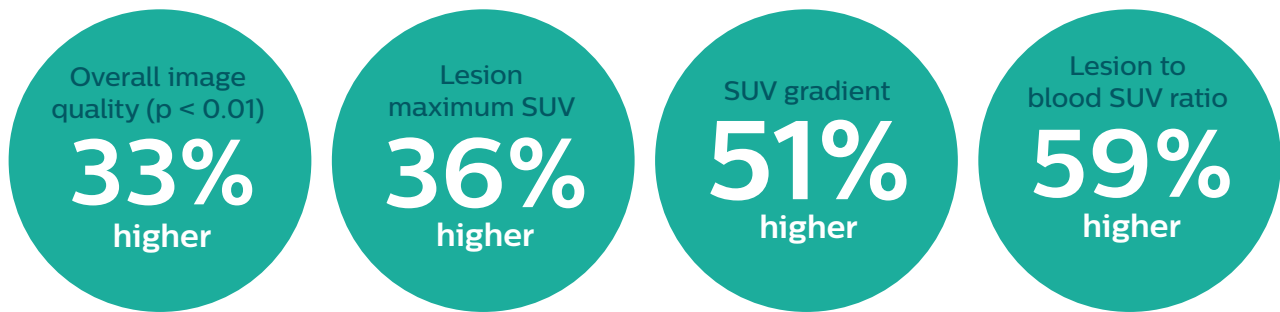
Case Western Reserve University and University Hospitals Case Medical Center

In a clinical study conducted at Case Western Reserve University and University Hospitals Case Medical Center, researchers concluded Digital Photon Counting technology provides better image quality, diagnostic confidence and accuracy than the traditional photomultiplier technology\*.

The study also found that the Digital PET/CT system showed additional suggestive lesions (0.5-0.9 cm), that were not seen with traditional PET, providing advantages in detecting small tumor lesions and disease staging.

\*GEMINI TF

## DPC when compared to Photomultiplier Technology images



## Clinical case example

# Small lesion detectability

## Whole Body

Images courtesy of University of Vermont Medical Center, Vermont, USA

### Clinical Benefit

Ability to visualize small lesions.

### Case Summary

- Whole Body PET/CT performed on Vereos Digital PET/CT
- 2 mm voxel reconstruction performed to minimize partial volume effect
- Large area of increased uptake in the neck
- Multiple small areas of increased uptake in the chest
- An additional small focus of activity in the neck

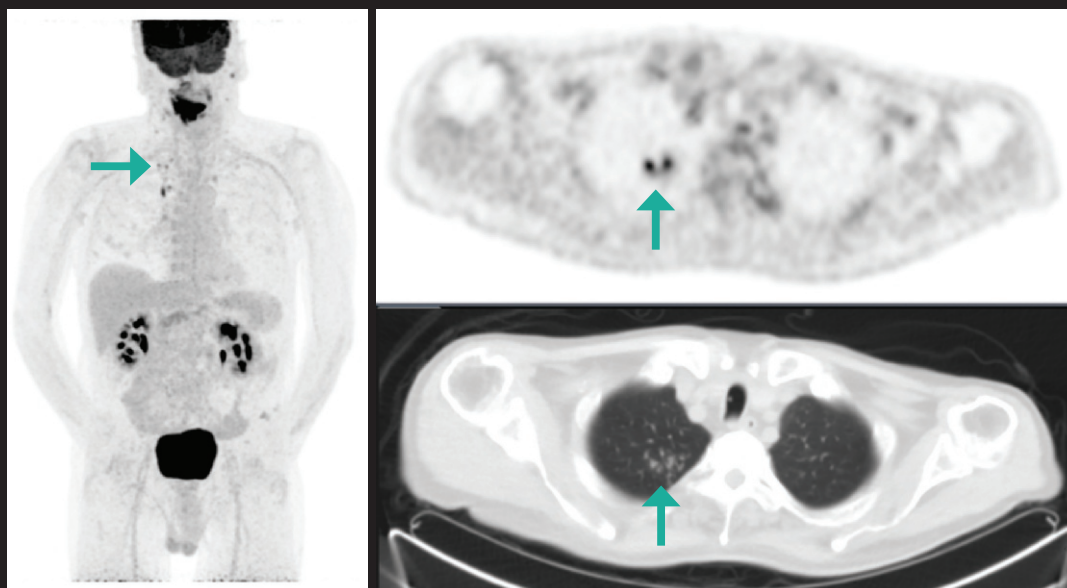
### Tools used

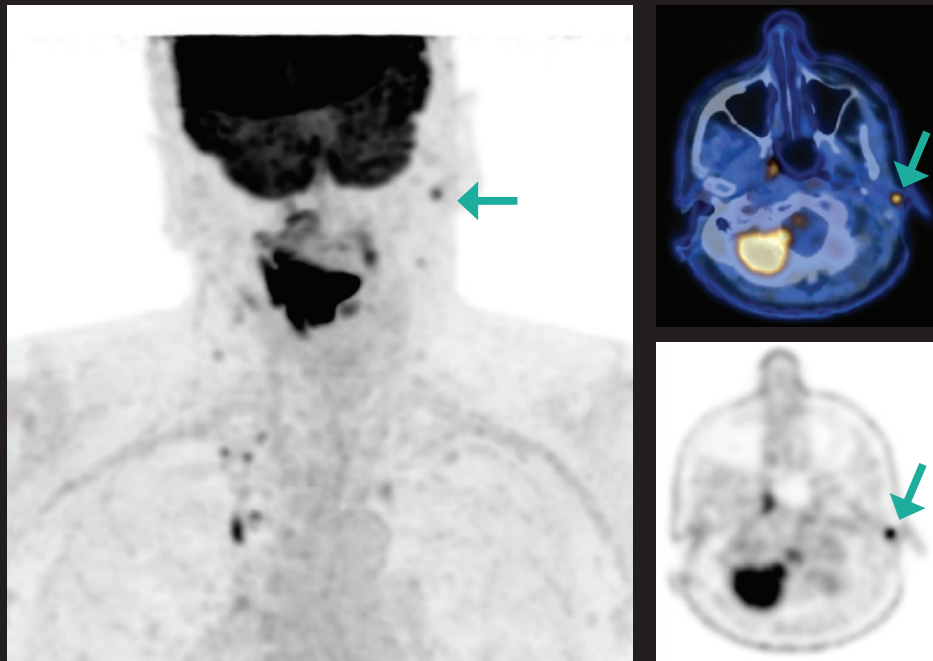
IntelliSpace Portal NM Viewer

67 yo M , 54.4 kg, 1.64 m

14 mCi / 520 MBq, F-18 FDG, 95 min delay, 90 sec/bed

2mm voxel reconstruction





Clinical case example

## Small lesion detectability

Whole Body

Images courtesy of University of Vermont Medical Center, Vermont, USA

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### Tools used

IntelliSpace Portal NM Viewer

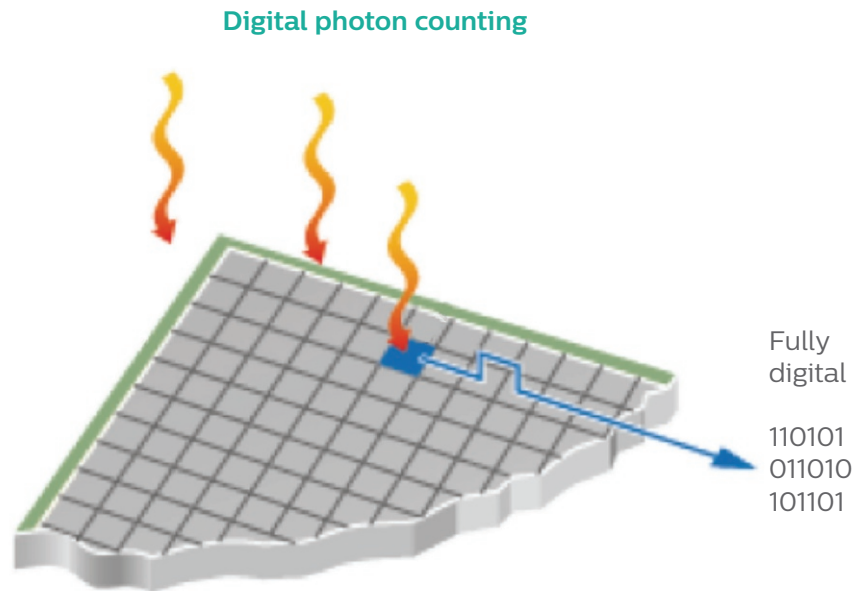
67 yo M , 54.4 kg, 1.64 m

14 mCi / 520 MBq, F-18 FDG, 95 min delay, 90 sec/bed

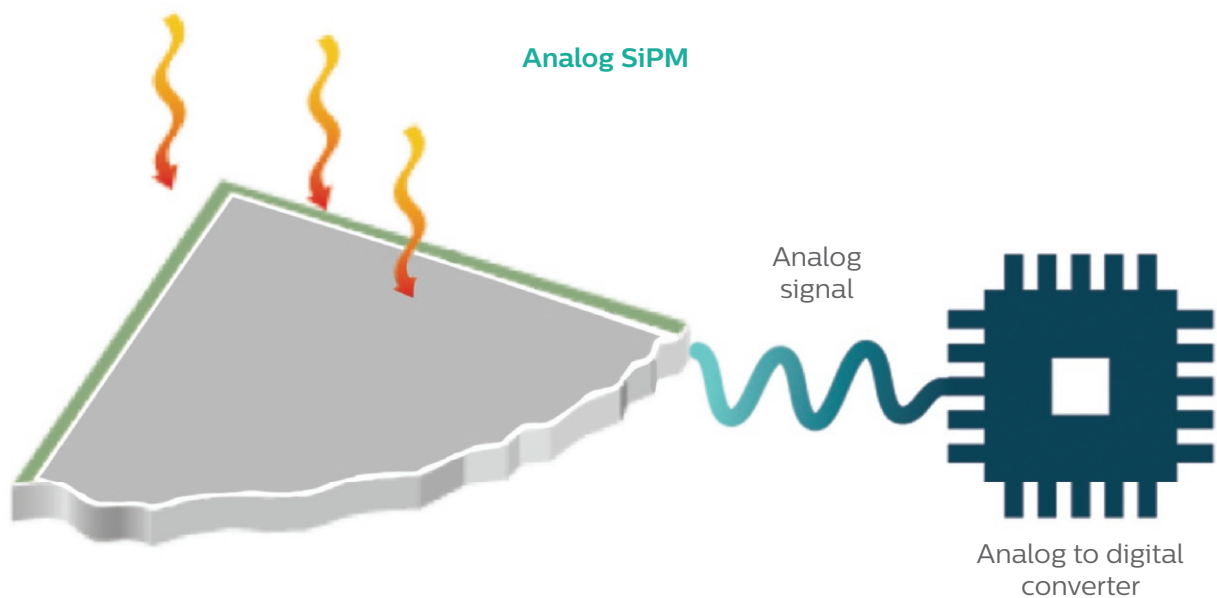
2mm voxel reconstruction

# Digital photon counting

Unlike PET/CT scanners that use analog detection technology, Vereos Digital PET/CT uses proprietary, fully digital DPC technology and algorithms to convert light directly to a digital signal for improved sensitivity, spatial, timing and energy resolution through the entire field of view.



Each pixel contains thousands of microcells that enable detection of single photons.







# A positive experience that matters



# Make every scan as productive as possible

In today's healthcare environment, you can't afford anything less than a solution that keeps the big picture in mind:

- ✓ Dose optimization without sacrificing image quality
- ✓ Fast and efficient exams
- ✓ Patient and staff experience during the imaging process



# A positive experience that matters

Vereos Digital PET/CT, with its proven performance, is designed for a positive patient and staff experience throughout the imaging process so you can get the most value from every scan.

Fast scanning and low PET dose

Uncompromised lesion detectability  
at 1/10th the time<sup>4</sup>

Focus on the patient

The proprietary iPatient platform  
features patient-specific methods to  
optimize\* image quality and CT dose



\*Optimization refers to the use of strategies and techniques that facilitate the management and control of both image quality and dose.





## Ambient Experience offers the value of a positive distraction



Significant FDG uptake has been noted in active (tense) skeletal muscle, simulating disease.<sup>5</sup> Philips Ambient Experience, based on years of design research and collaboration, incorporates dynamic lighting, projection and sound to provide a positive distraction for patients. This eases the patient experience while also facilitating excellent clinical conditions during each procedural step of the imaging exam.

A positive experience that matters

## Case study

# Fast scanning

The Ohio State University Wexner Medical Center, Ohio, USA

In a study conducted at The Ohio State University Wexner Medical Center, researchers found that digital PET/CT is capable of fast and ultrafast PET imaging, allowing for uncompromised lesion detectability at 1/10<sup>th</sup> the time.<sup>4</sup>

The dynamic range of scanner speeds, enabled by the digital PET/CT, allows for personalization of scanning protocols for the most challenging patient populations.

Uncompromised  
lesion detectability at  
**1/10<sup>th</sup>**  
the time.<sup>4</sup>

Whole Body PET	BMI <28	BMI 28-33
Bed Speed	30s/bed	60s/bed
Lesion Detection	100%	100%



## Case study

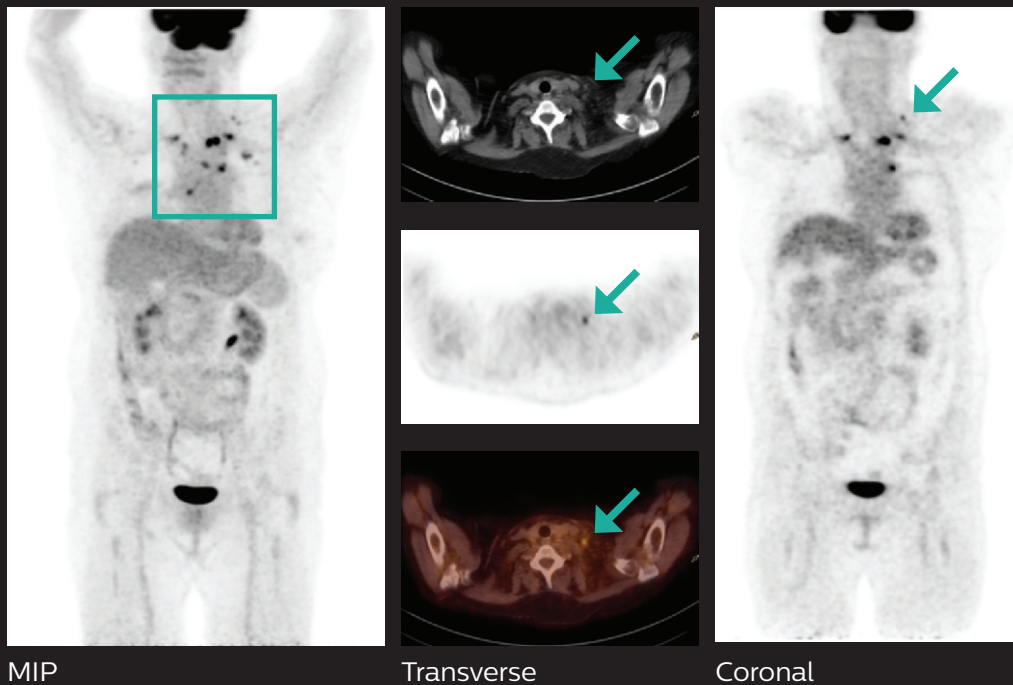
# Low PET dose

The Ohio State University Wexner Medical Center, Ohio, USA

Researchers at The Ohio State University Wexner Medical Center conducted a study that found PET tracer dose reduction of 50% is possible with digital PET/CT compared to clinical standard of care dosing—without compromising diagnostic image quality or quantitative assessment.

Uncompromised  
image quality and  
detectability at  
**50%**  
less PET dose.<sup>3</sup>





## Clinical case example

# Fast scans, low PET dose

## Whole Body

Images courtesy of Clinique De Genolier, Genolier, Switzerland

### Clinical Benefit

Ability to visualize small lesions.

### Case Summary

- Whole Body PET/CT performed on Vereos Digital PET/CT
- Low activity administered and fast scan performed
- Multiple small areas of increased uptake in the chest
- An additional focus of activity in the neck, measuring 5.5 mm on CT

### Tools used

IntelliSpace Portal NM Viewer

64 yo F , 68.5 kg, 1.71 m

5.6 mCi / 207 MBq, F-18 FDG, 72 min delay, 30 sec/bed, 5 min total

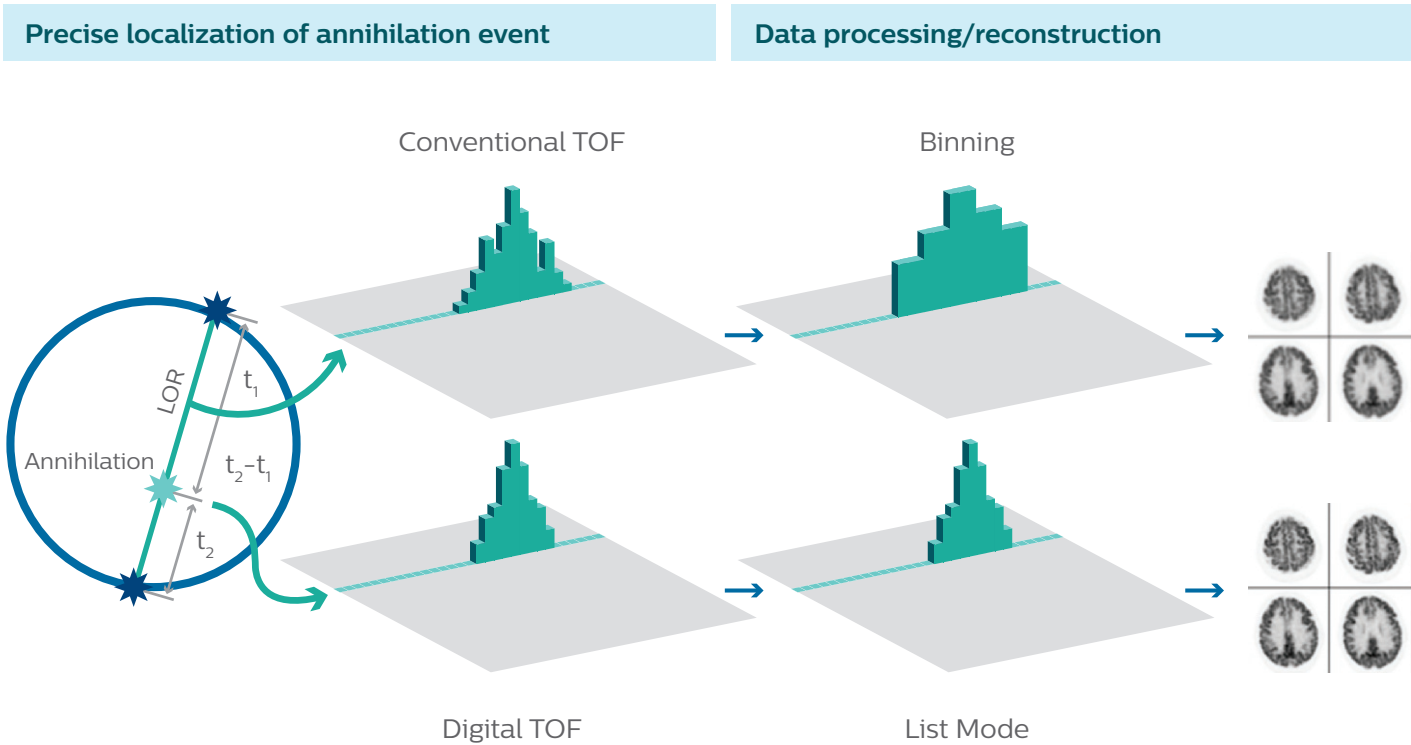
2mm voxel reconstruction



The fully digital difference  $\oplus$

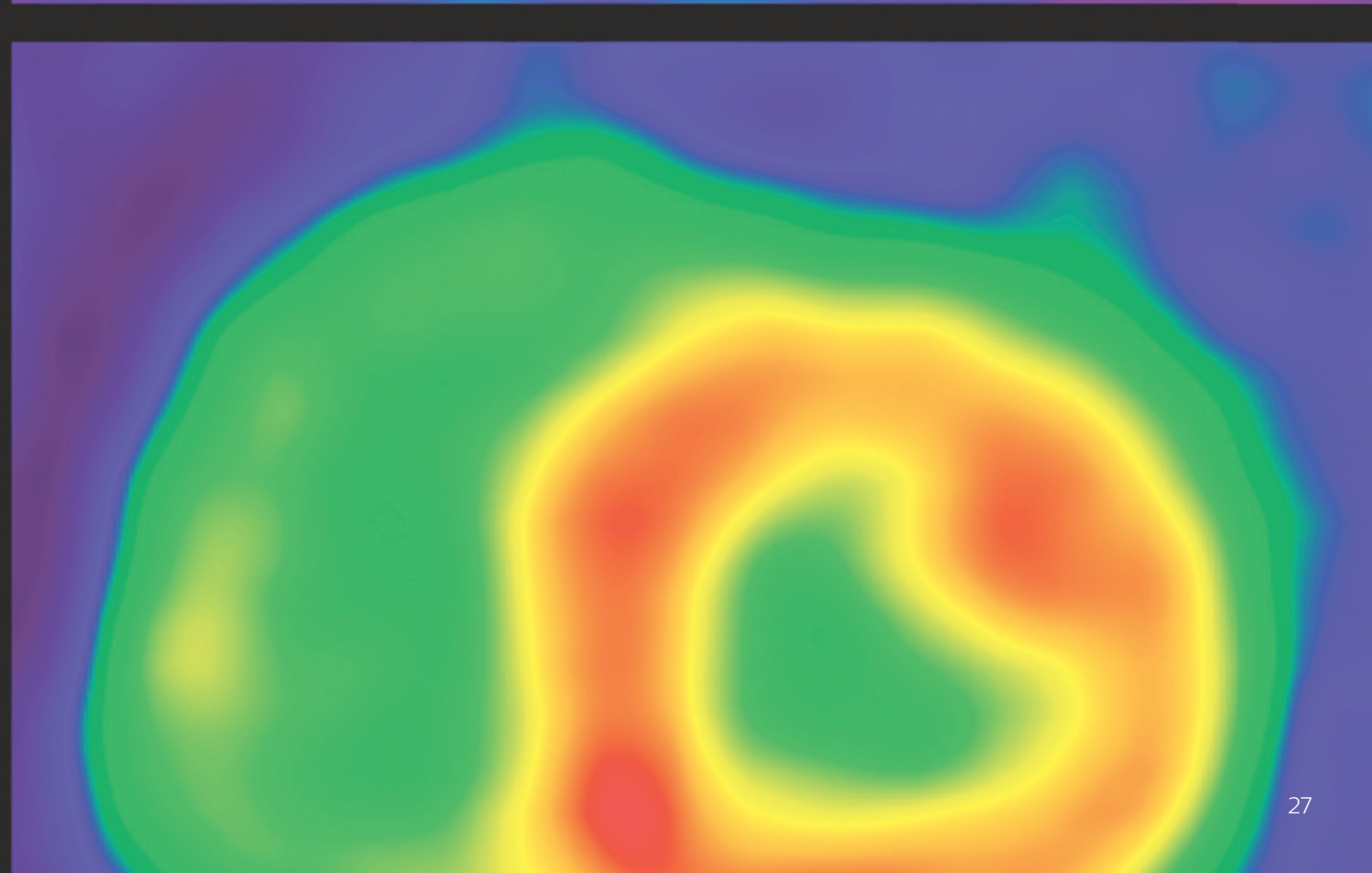
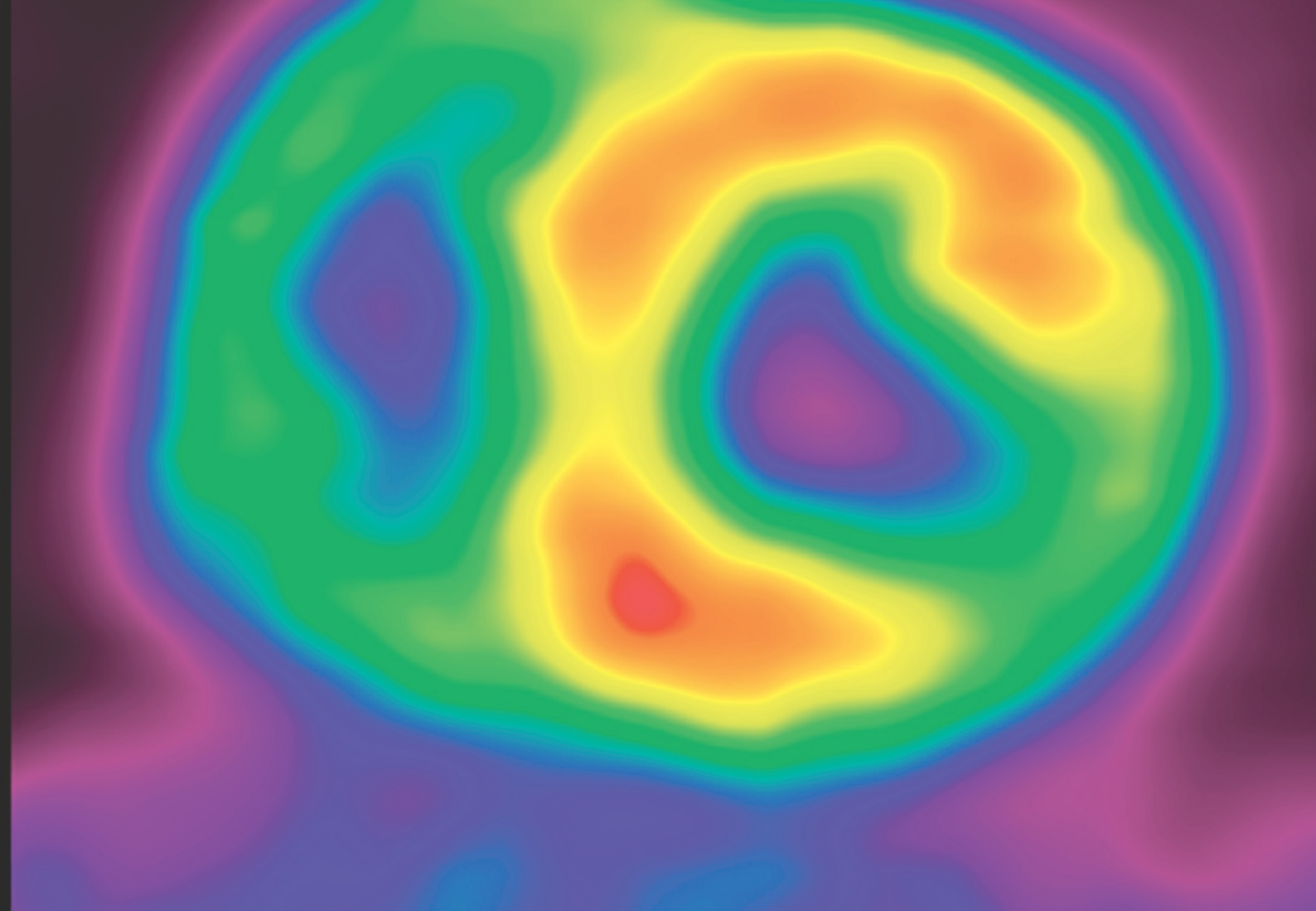
# Digital Time-of-Flight (TOF)

Digital technology drives superb signal-to-noise ratio over a wide range of activity concentrations, resulting in significantly reduced acquisition times and PET dose.





Ready for  
**the future**



# Stay ahead of evolving care

Today's care decisions are more complex than ever. Caregivers need to assess benefits and risks for each step of the care continuum while using input from multiple specialists and preparing for new diagnostic capabilities on the horizon.



# Ready for the future

Vereos Digital PET/CT allows you to elevate your clinical practice today while it accelerates your readiness for the emerging applications of tomorrow.

## Extend your PET/CT capabilities to new clinical areas

Enhance your organization's reputation and ability to attract top talent. Vereos Digital PET/CT offers industry-leading high count-rate performance (dynamic range) for enhanced diagnostic confidence with emerging precision medicine applications. With Vereos, you have opportunities to expand beyond FDG in areas such as:

Shorter half-life tracers

Neurodegenerative disorders

Targeted radiotherapy

Personalized molecular medicine



## Change how you see, seek and share clinical information

Illumeo, with adaptive intelligence,\* is a new paradigm of clinically intelligent software that augments the skills of clinicians and redefines how they currently interface with images. Designed to empower radiologists and work for them, it provides the technology and tools that enhance their expertise and efficiency—all within a single workspace.

*\*Adaptive intelligence features an intelligent user interface with easily accessible in-context tools and inspection modes to meet the needs of the user.*

## Clinical case example

# Short-lived radiopharmaceuticals

## Whole Body

Images courtesy of University of Vermont Medical Center, Vermont, USA

### Clinical Benefit

Classify the state of myocardial perfusion at rest and with pharmacologic stress.

### Case Summary

- Resting perfusion images performed with a 7 minute acquisition, followed by a stress acquisition of 7 minutes
- Decreased myocardial uptake with stress is seen

### Tools Used

IntelliSpace Portal  
Emory Cardiac Toolbox

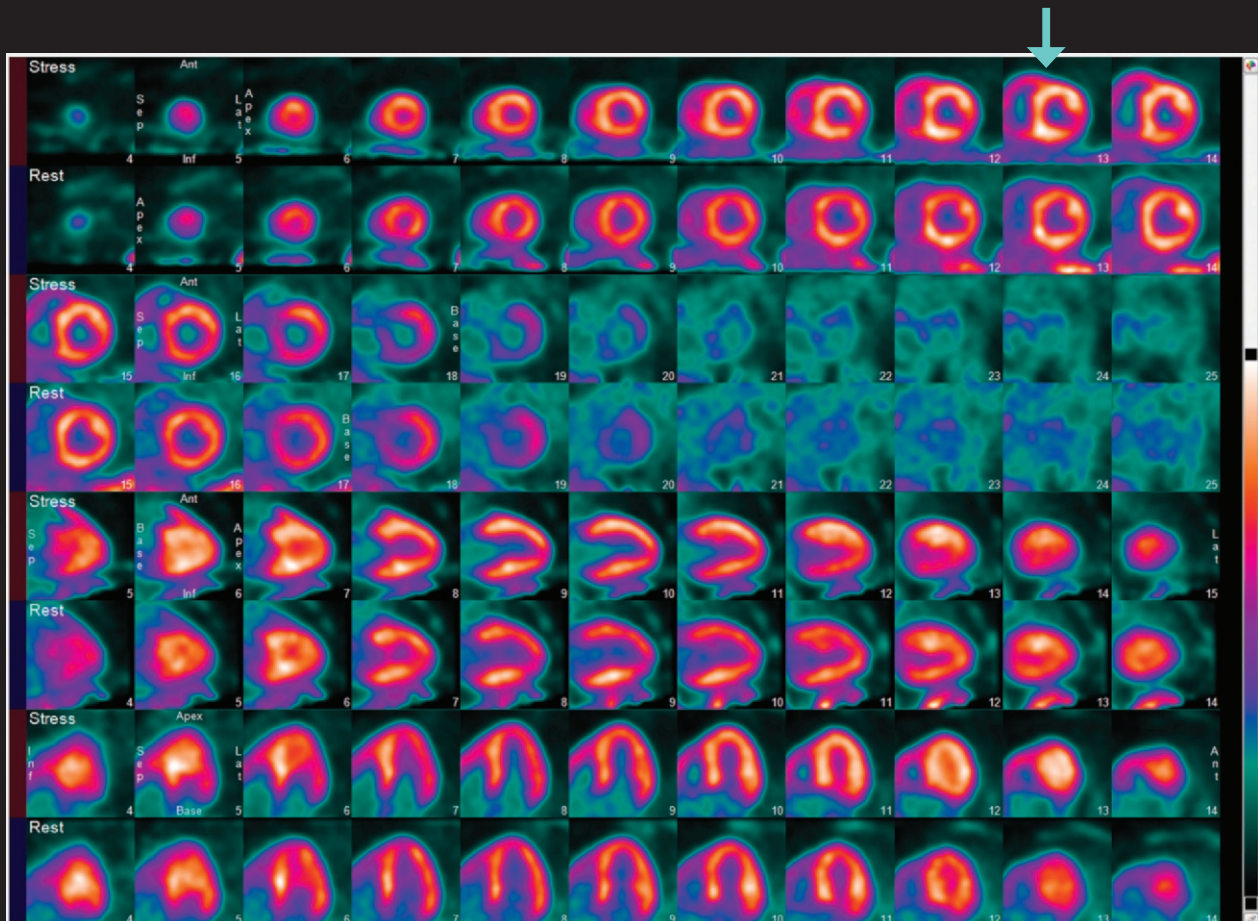
57 yo M

158 kg, 1.76 m

Rb-82 Chloride

Rest: 30 mCi / 1110 MBq

Stress: 30 mCi / 1110 MBq



## Clinical case example

# ECG Gating

## Whole Body

Images courtesy of University of Vermont Medical Center, Vermont, USA

ECG Gating performed during the dynamic acquisition, permitting assessment of myocardial wall motion.

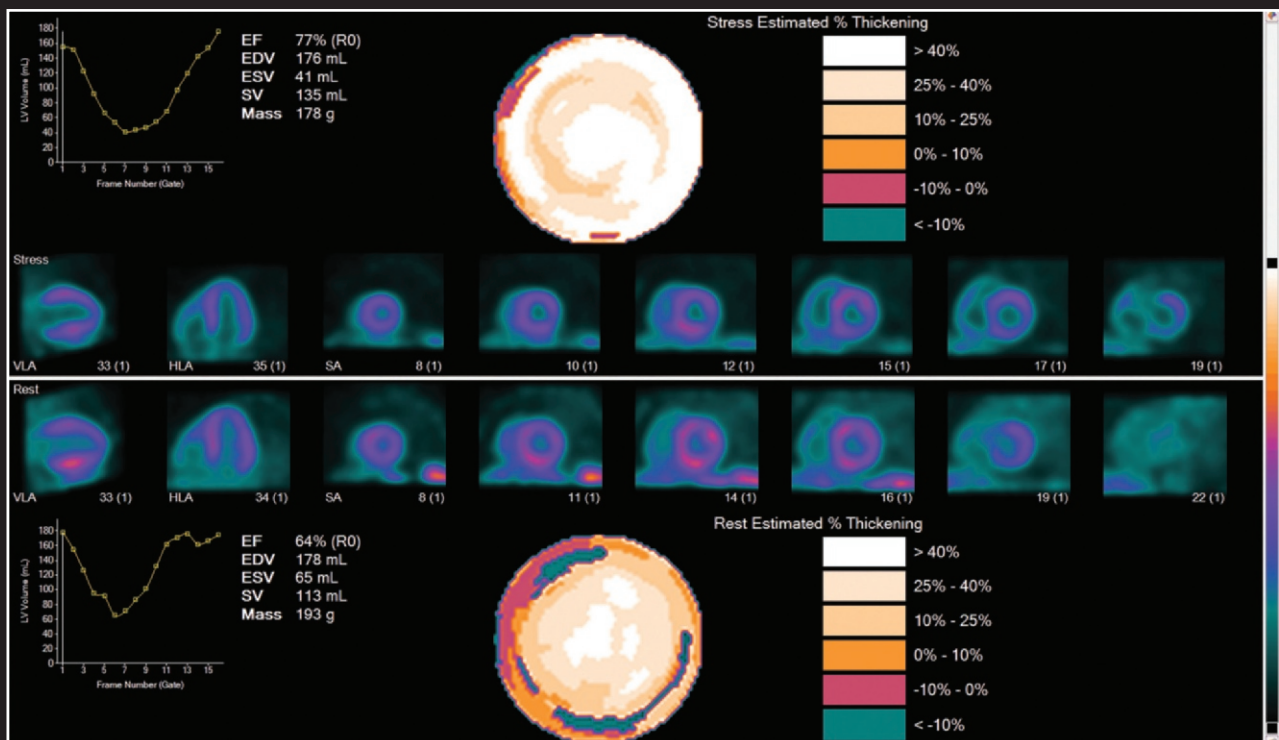
Stress EF: 77%

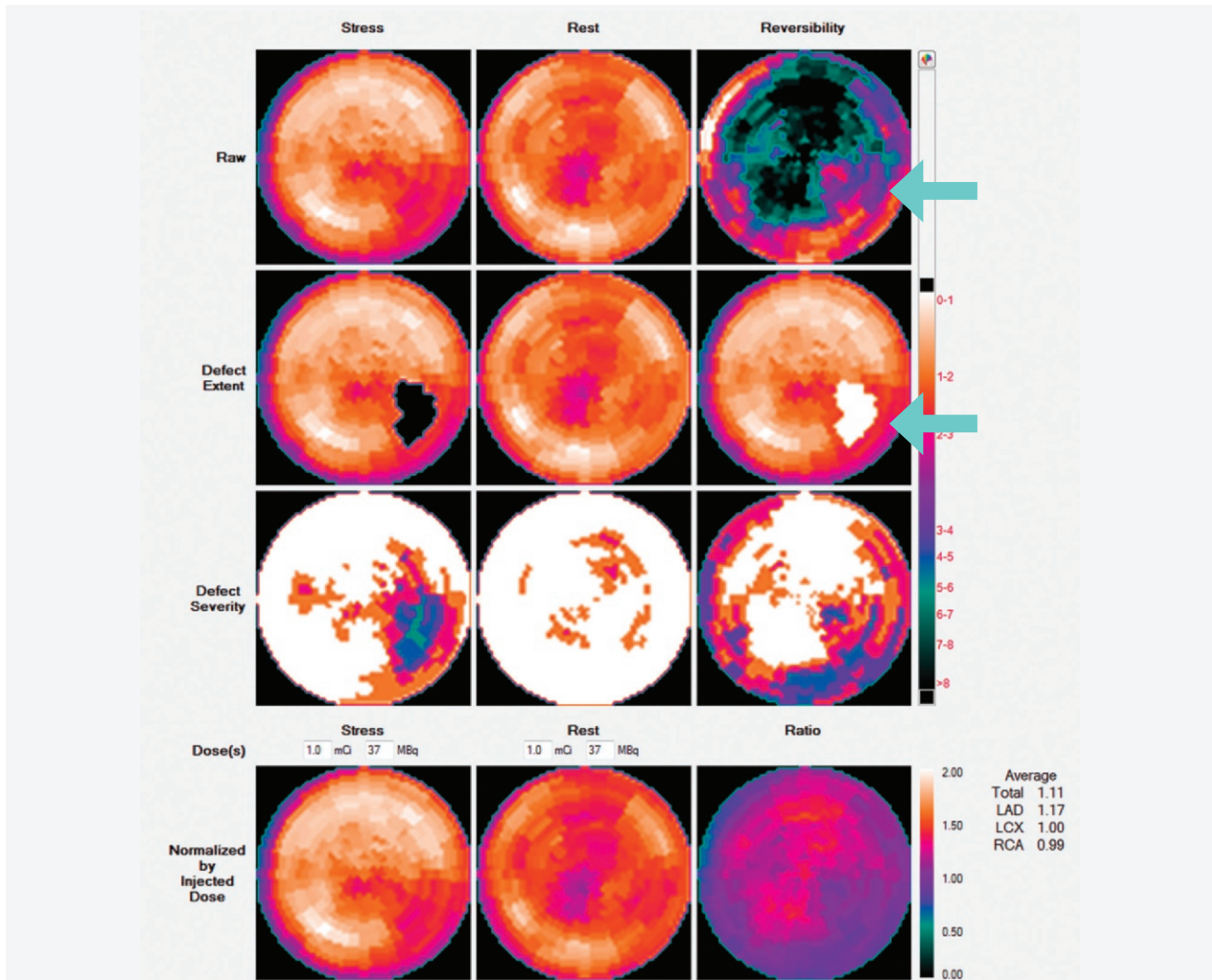
Rest EF: 64%

Rb-82 Chloride

Rest: 30 mCi / 1110 MBq

Stress: 30 mCi / 1110 MBq





Clinical case example

# Myocardial perfusion analysis

Whole Body

Images courtesy of University of Vermont Medical Center, Vermont, USA

IntelliSpace Portal supports

Emory Toolbox\* (Syntermed)

Corridor4DM\* (Invia)

QPET\* (Cedars-Sinai)

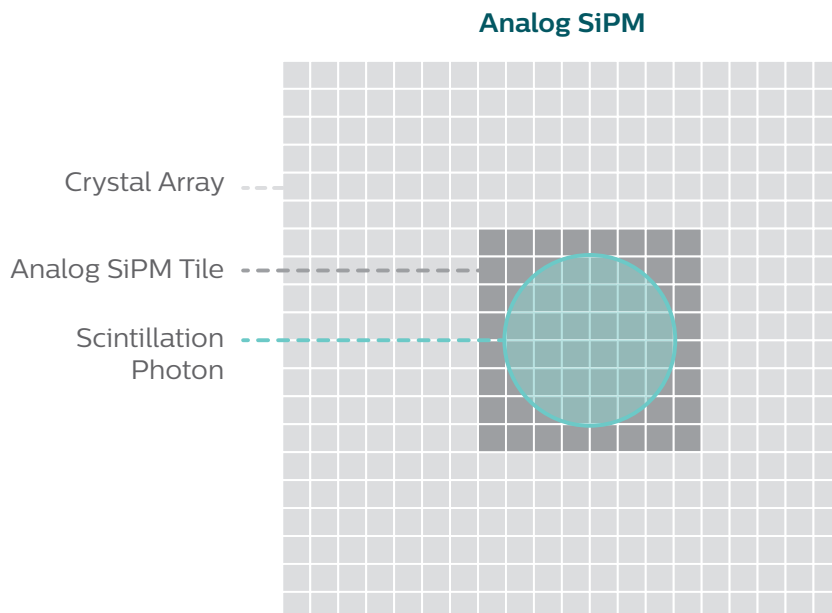
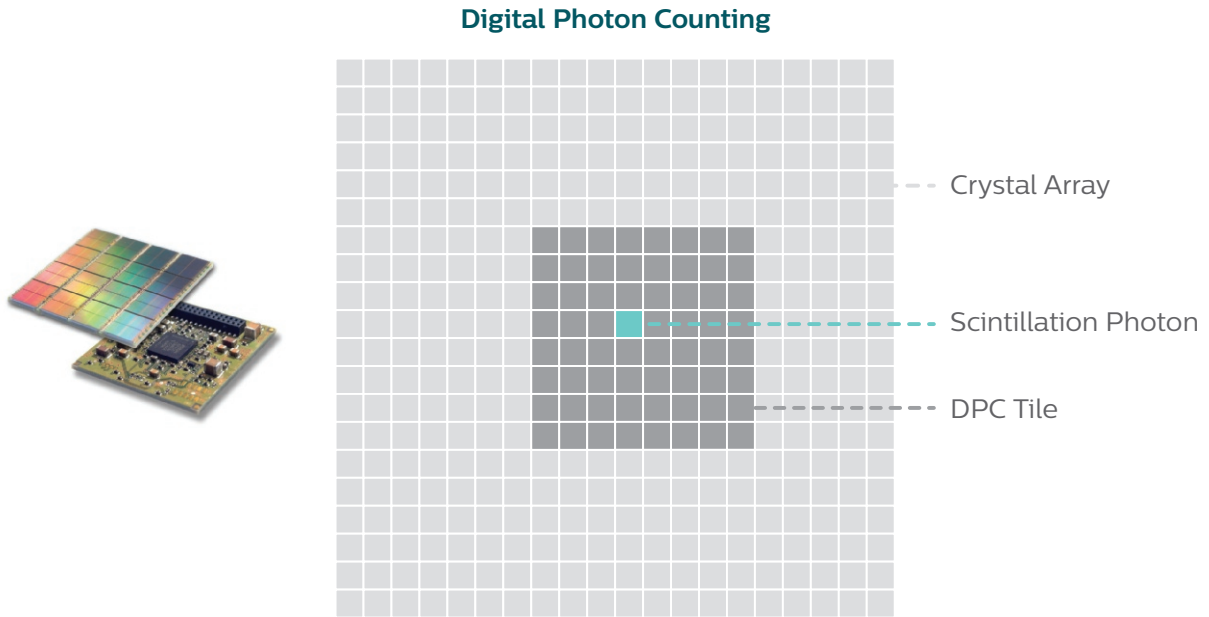
## Generation of stress, rest and reversibility surfaces and polar maps.

- Display the pattern of LV myocardial perfusion
- Display of the severity and extent of perfusion defects using radiopharmaceutical and gender-specific reference data



# 1:1 coupling of crystal to detector

Each crystal is connected to a single digital photon counting detector. This 1:1 coupling of crystals to digital detectors allows for a much higher count rate capability and improved spatial resolution compared to analog systems.\*



A woman with dark hair, wearing a light purple button-down shirt, is shown from the chest up. She is holding a silver pen in her right hand and gesturing with her left hand. She has a thoughtful expression, looking slightly to the left of the camera. The background is a blurred blue wall.

# The value of proven support

The Philips portfolio of solutions and services helps you realize the maximum potential of fully digital PET/CT imaging while reducing operational costs and making it easy and more cost-effective to keep your technology up-to-date.



Philips **DoseWise** encompasses a set of techniques, programs and practices based on the ALARA (As Low As Reasonably Achievable) principle and supports outstanding image quality at low dose.

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

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

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

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**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.

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

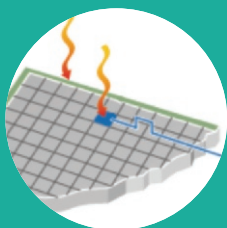
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**NetForum Community** brings healthcare professionals together online to share best practices, leverage experience, and optimize system performance.

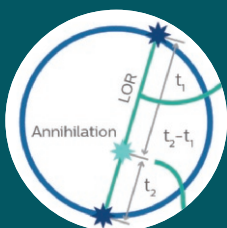
# Fully digital from beginning to end

Vereos has unique and proprietary Digital Photon Counting (DPC) technology for outstanding advances all along the imaging chain.



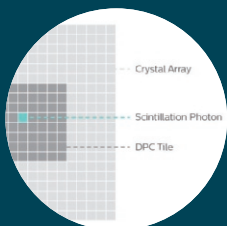
## Clinically proven performance

**Digital Photon Counting** – direct conversion of light to a digital signal for improved sensitivity, spatial, timing, and energy resolution through the entire field of view.



## An enhanced experience for patients and staff

**Digital Time-of-Flight** – superb signal-to-noise ratio over a wide range of activity concentrations resulting in significantly reduced acquisition times and PET dose.



## Ready for the future

**1:1 coupling** – precise location of objects at higher count rates and improved spatial resolution through 1:1 coupling of crystal to detector.





PHILIPS

# Accurate treatment pathways **start here**

With Philips Vereos Digital PET/CT, your organization can leverage the technological innovation of Digital Photon Counting to:

## **Deliver:**

- Improved detectability and characterization of small lesions<sup>1</sup>
- Uncompromised image quality and detectability at 1/2 the PET dose<sup>3</sup>
- Uncompromised lesion detectability at 1/10 the time<sup>4</sup>

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**Offer an enhanced experience for patients and staff through fast scans and low PET dose in an environment designed for successful PET/CT imaging**

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**Welcome the future with the highest count rate in the industry and a connected solution that unites workflow and visualization**

This 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 the world's first and only fully digital PET/CT.

## **References:**

1. Nguyen NC, Image Quality and Diagnostic Performance of a Digital PET Prototype in Patients with Oncologic Diseases: Initial Experience and Comparison with Analog PET, J Nucl Med 2015; 56:1378–1385.
2. Hussain T, Nguyen QT. Molecular Imaging for Cancer Diagnosis and Surgery. Advanced drug delivery reviews. 2014;66:90-100. doi:10.1016/j.addr.2013.09.007.
3. Knopp,M, Binzel,K, Bardos,P, Knopp,M, Wright,C, Zhang,J, Nagar,V, Hall,N, Maniawski,P, Next Generation Digital PET/CT: A Phase I Intra-Individual Comparison with Current Photomultiplier TOF PET/CT. Radiological Society of North America 2015 Scientific Assembly and Annual Meeting, November 29 - December 4, 2015, Chicago IL.
4. Zhang J., Evaluation of speed of PET acquisition: How fast can we go? - A validation of list mode PET simulation approach with true acquisitions, SNMMI 2017 Med May 1, 2015 vol. 56 no. supplement 3 1823
5. Ahmad Sarji S. Physiological uptake in FDG PET simulating disease. Biomedical Imaging and Intervention Journal. 2006;2(4):e59. doi:10.2349/bij.2.4.e59.





This Philips product is intended to be installed, used, and operated only in accordance with the safety procedures and operating instructions given in this document for the purposes for which it was designed. The purposes for which the product is intended are given within this document. However, nothing stated in this document reduces users' responsibilities for sound clinical judgment and best clinical procedure.

The Philips Vereos PET/CT system is a diagnostic imaging device that combines Positron Emission Tomography (PET) and X-Ray Computed Tomography (CT) systems. The CT subsystem images anatomical cross-sections by computer reconstruction of X-Ray transmission data. The PET subsystem images the distribution of PET anatomy-specific radiopharmaceuticals in the patient. The PET/CT system is used for the purposes of detecting, localizing, diagnosing, staging, re-staging, and follow-up for monitoring therapy response of various diseases in oncology, cardiology, and neurology.

The system is intended to image the whole body, heart, brain, lung, gastrointestinal, bone, lymphatic, and other major organs for a wide range of patient types, sizes, and extent of diseases. Both subsystems can also be operated as fully functional, independent diagnostic tools, including application of the CT scanner for diagnosis and for use in radiation therapy planning. Installation, use, and operation of this product is subject to the law in the jurisdictions in which the product is used. Users must only use and operate the product in such ways as do not conflict with applicable laws or regulations that have the force of law.

Uses of the product for purposes other than those intended and expressly stated by the manufacturer, as well as incorrect use or operation, may relieve the manufacturer (or his agent) from all or some responsibility for resultant non-compliance, damage, or injury.