GE Healthcare

Discovery VCT

Our vision.

It began with a vision. A vision to help shape a new age of healthcare, in which disease will be better understood so it can be detected and diagnosed early with confidence. A vision allowing effective treatment with therapies tailored to individual patients. For us, that vision is **Discovery**™.

At GE Healthcare our goal is to accelerate and simplify the way disease is diagnosed and treatment is monitored. By integrating our elite PET imaging technology with our breakthrough volume CT, we can now provide a single system that captures all clinically relevant information for oncology, cardiology and neurology applications. It's a new approach in disease management - but don't take our word for it.

See. For yourself.

Discovery VCT
Leading technology, complete care.

With the best balance in resolution and sensitivity, Discovery VCT offers a complete set of clinical applications to help physicians provide accurate disease diagnosis, staging, treatment planning and follow up. Our most advanced offering in PET/CT technology, Discovery VCT takes you in a new path of disease management: a single, less invasive diagnostic tool for an efficient evaluation of disease.

And now with the world's first integrated PET/CT operator's console – Discovery Dimension – Discovery VCT provides physicians with a complete set of assessment tools, enabling them to see not only the location, but also the extent of disease, leading to an individualized treatment path for the patient.

Exclusive, clinically relevant technology

Oncology
- 4Dx – Assess cardiac and respiratory motion for accurate lesion detection
- VUE Point – Excellent image quality with higher signal-to-noise ratio (SNR)
- Rad Rx – Apply CT radiology prescription parameters when acquiring CTAC

Cardiology
- 5-Beat Cardiac™ – Scan the entire heart in one brief breath hold with a low dose
- 2D – High count rate, low scatter fraction dynamic acquisition

Neurology
- Cortex ID – Easy, robust and clinically validated review/analysis of PET and PET/CT neurological scans

See. The complete picture.

To understand PET/VCT better, think about a geographic landscape captured from an aerial view. The different quality and density of vegetation is representative of a PET image, while the water systems are analogous to a VCT image.

Only by combining this information together can there be a true correlation between the flow of the water systems and the relative quality of vegetation. This information would be critical to a geologist trying to restore proper irrigation to an area of desolate terrain. The same analogy works for PET/VCT imaging with a physician assessing the appropriate treatment path for their patients.
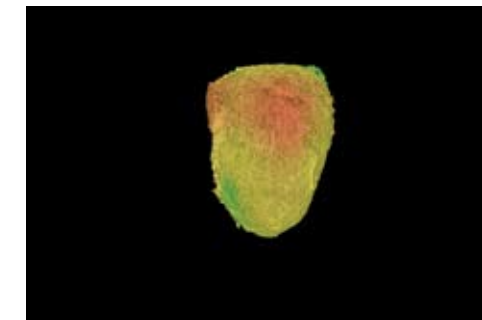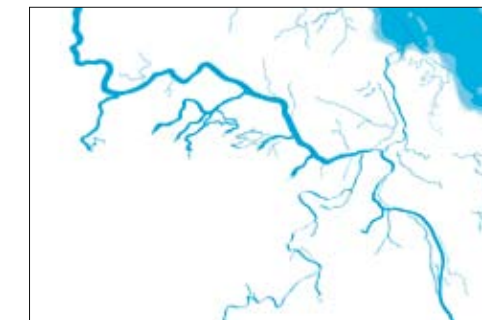

PET   VCT   PET/VCT

See. Volume CT.

Discovery VCT incorporates GE's 64-slice LightSpeed™ VCT technology to give you an outstanding combination of high-speed, sub-millimeter resolution and wide coverage that is critical to diagnostic confidence.
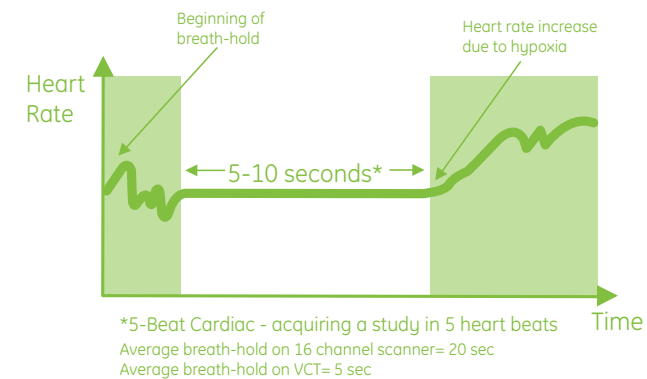
With Discovery VCT, you can freeze cardiovascular motion, view pure arterial phase imaging and experience excellent multi-planar reformats through routine high resolution acquisitions. Our industry-leading CT gives you the speed, power and image quality critical for coronary imaging. This means reduced imaging time, shorter breath holds, lower exposure, wide coverage in a single acquisition and the ability to image a broader range of patients.

5-Beat Cardiac

Fully robust and repeatable procedure

Discovery VCT offers the unique opportunity to scan in just 5 beats, imaging the coronary arteries, cavities and myocardium assessment in pure arterial phase. 5-Beat Cardiac minimizes heart rate variability, delivering a diagnostic study for virtually every patient. Delivering a true coverage of 40 mm per rotation, a rotation speed of 0.35 sec, for an acquisition in a short breath-hold, Discovery VCT makes cardiac CT a routine examination.

Heart Rate

Beginning of breath-hold

Heart rate increase due to hypoxia

5-10 seconds*

Time

*5-Beat Cardiac - acquiring a study in 5 heart beats
Average breath-hold on 16 channel scanner= 20 sec
Average breath-hold on VCT= 5 sec

Triple RuleOut

All in one chest pain management

The Triple RuleOut™ acquisition, based on an ECG gated protocol, allows extended anatomical coverage for a patient exhibiting acute chest pain in an emergency environment. This information is critical to ruling out coronary disease, pulmonary embolism or aortic dissection– the three most life-threatening causes of chest pain. All in just 12 seconds during one simple, less invasive exam from a single contrast injection.

CT Angiography

Pure arterial phase from head to toe

With virtually no trade-off between speed and high resolution, Discovery VCT provides a complete assessment of vascular segments including lumen views and the vessel wall. Optimized injection protocols combined with flexibility in the acquisition parameters lead to a large anatomical coverage within arterial phase and consequently to new limits in vessel visualization. The combination of excellent image quality and color-coded plaque capability, makes CT angiography a new standard in vascular investigation.

Organ Perfusion

Wide tumor coverage in one rotation

Volume CT perfusion provides results in the evaluation of primary tumor targets, metastases and therapy follow-up. The 4 cm coverage of Discovery VCT doubles the viewable tumor size and tissue region. CT is also a technique of choice for lung nodule assessment, including growth over time and progress of therapy. In addition, CT shows a growing impact on colon cancer and polyp characterization as a less invasive technique well-tolerated by the patient.

See. Elite clinical PET performance.

In today's PET/CT scanners, the PET event detection and processing chain is a sophisticated balance of many technologies including material science, detector design/assembly and electronics. Discovery VCT is based on our premium, reliable and upgradeable platform with the most complete clinical acquisition choices relevant to disease diagnosis, treatment planning and follow-up.

Highest sensitivity

The foundation of PET imaging

Discovery VCT has been optimized for advanced clinical applications with improved spatial resolution while maintaining high sensitivity– the foundation of PET imaging. Our BGO crystals deliver the best sensitivity available on the market and the highest peak NECR (Noise Equivalent Count Rate) in the clinical range. Resolution is also improved by the smaller matrix crystal, improved PMT and better calibration stability.

Clinical choice

2D, 3D and 4D acquisition options

Discovery VCT provides physicians with clinically relevant choices to image a broad patient population with a variety of clinical conditions. Physicians can choose the optimal protocol to see the full extent of disease while avoiding motion artifacts, enhancing visualization and increasing quantitative accuracy. Only GE offers 2D, 3D and 4D imaging, as well as dynamic gated PET to help you assess the full extent of functional parameters key to patient outcomes and prognoses.

- 2D – Cardiac applications and large patients
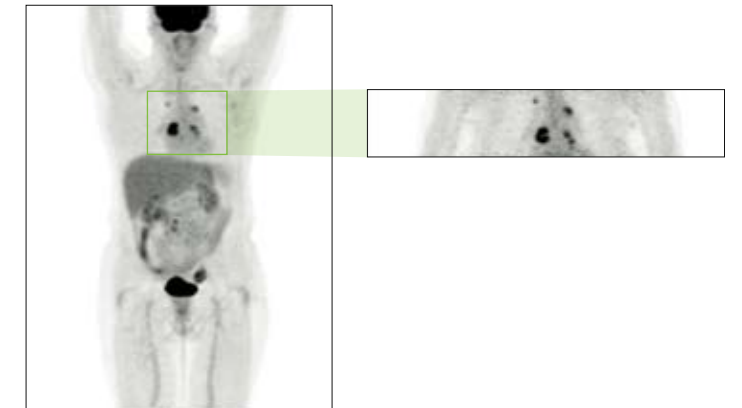- 3D – Oncology applications and pediatric patients
- 4D – Motion management
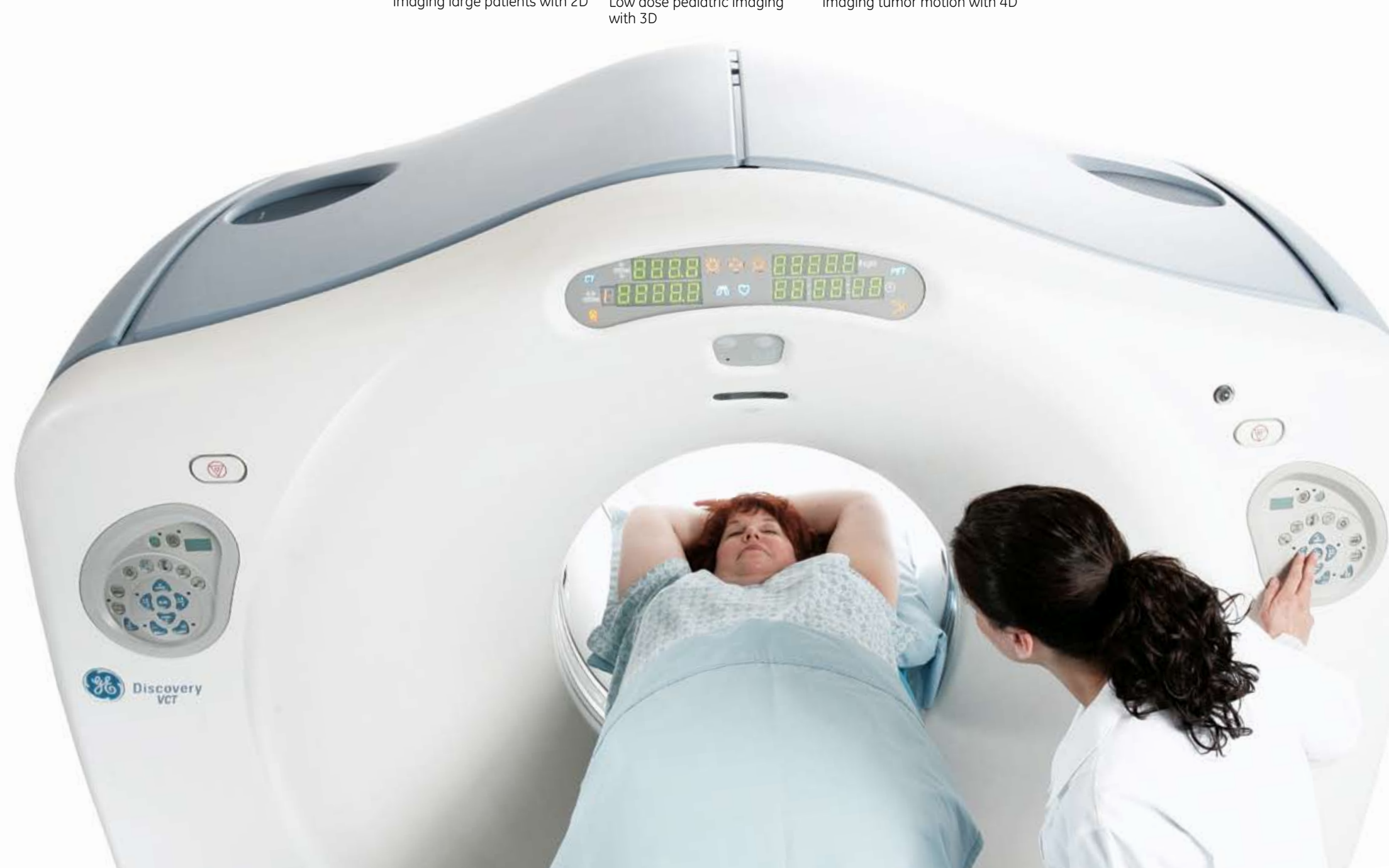
2D

3D

4D

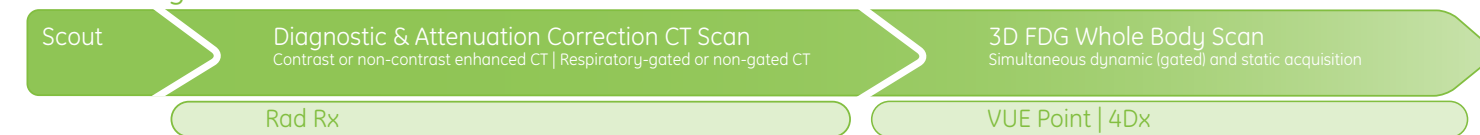Imaging large patients with 2D

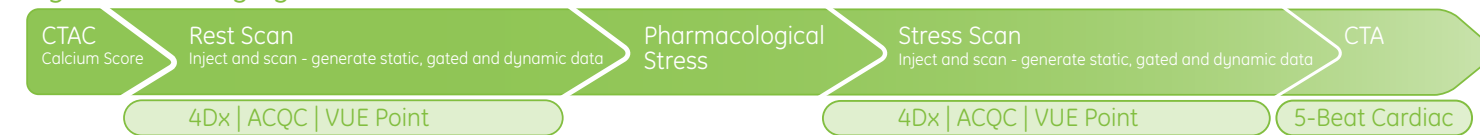Low dose pediatric imaging with 3D

Imaging tumor motion with 4D

See. Discovery Dimension.

Discovery VCT includes our Discovery Dimension, the first fully integrated PET/CT operator's console for improved workflow, database management and image review. Now clinicians can process and review acquired data directly on the console, as well as manage, network and retrieve from a single patient database.

Whole Body FDG Scan

Scout	Diagnostic & Attenuation Correction CT Scan Contrast or non-contrast enhanced CT | Respiratory-gated or non-gated CT	3D FDG Whole Body Scan Simultaneous dynamic (gated) and static acquisition
	Rad Rx	VUE Point | 4Dx

Myocardial Imaging

CTAC Calcium Score	Rest Scan Inject and scan - generate static, gated and dynamic data	Pharmacological Stress	Stress Scan Inject and scan - generate static, gated and dynamic data	CTA
	4Dx | ACQC | VUE Point		4Dx | ACQC | VUE Point	5-Beat Cardiac

See. All in one.

Rad Rx – Capturing the full capability of CT with PET can be a workflow limitation. Rad Rx offers the ability to acquire a CT scan using the same parameters or technique used in a radiology prescription. The same CT scan can be used for attenuation correction with no need to acquire separate scans.

- Workflow optimization with simultaneous acquisition of attenuation correction CT and radiology prescription CT
- Multiple series, multiple groups acquisition capability; any combination of helical, cine, axial
- Eliminate "banana" artifact by using cine CT acquistion for CTAC

See. Flexibility.

VUE Point Reconstruction – Optimal image quality in multiple acquisition modes has always been a priority. VUE Point intelligent reconstruction technology, a GE exclusive, provides a higher signal-to-noise ratio (SNR) and the flexibility of outstanding image quality for all patient types in both 2D and 3D modes.

- Exceptional image quality in any mode
- Images available in real-time while you scan
- Improved quanitative accuracy

See. Motion.

4Dx – No longer will you need to bring your patients back for a gated study. 4Dx puts motion to work for you, enabling gated and static acquisition in the same scan for enhanced visualization and management in areas of interest subject to motion.

- Simultaneous dynamic (gated) and static acquisition
- Multiple dynamic axial fields of view in the same study
- View full extent of tumor motion for advanced radiation treatment planning

See. True cardiac alignment.

ACQC – Now you have the ability to eliminate cardiac PET/CT misregistration. Attenuation Correction Quality Control (ACQC) ensures true cardiac PET and CTAC image fusion alignment. This tool can help determine the shift vector required to correct misalignment between the PET and CTAC data.
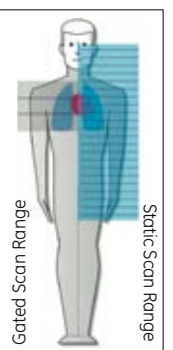
- Properly align PET and CT image data sets together
- Save the shift information to use in retrospective reconstruction
- Flexibility to use any CT data set from the series

CT slice thickness

3.75mm

1.25mm

3.75mm

CT Scan Range

PET Scan Range
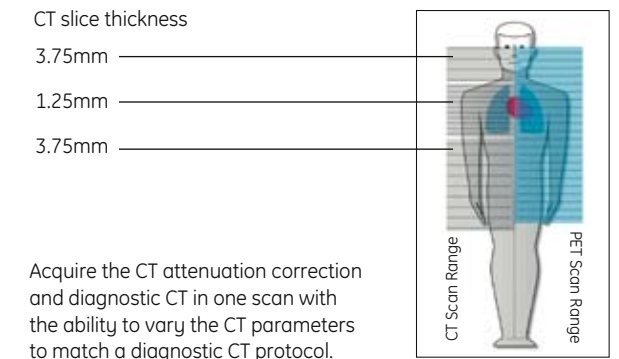
Acquire the CT attenuation correction and diagnostic CT in one scan with the ability to vary the CT parameters to match a diagnostic CT protocol.
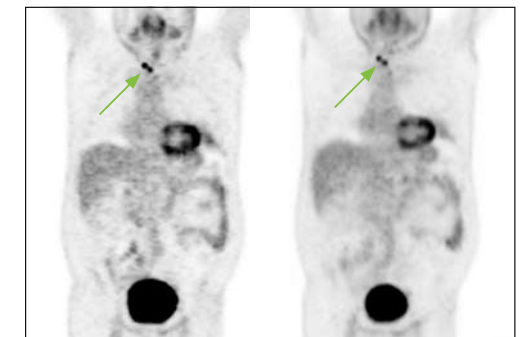
See the distinct separation of the two lesions located in the neck region in both 2D and 3D imaging modes.

Gated Scan Range

Static Scan Range

Complete a gated and static study in a single acquisition.
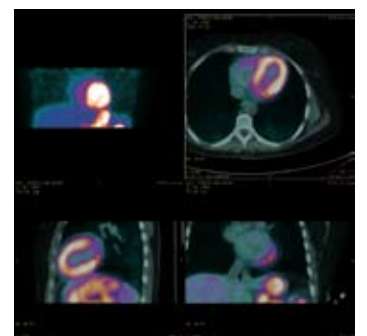
With ACQC, the operator is able to properly align the PET and CT image data sets together.

See. Vast applications.

AW VolumeShare™ image visualization and analysis builds on the foundation of the trusted Advantage Workstation® (AW) from GE Healthcare. Its advanced capabilities address your important clinical and workflow challenges across the enterprise — and beyond.

Key features

- On-demand access to comprehensive, customizable, multi-modality analysis tools and applications
- Ease-of-use to process a heavy workload, whether oncology, cardiology or neurology
- One-touch segmentation, multiphase data comparison and standard uptake values

Discovery VCT applications

- Cardiology – CardIQ Physio, CardIQ Fusion, Dynanic VUE, SmartScore, CardIQ Xpress, VesselIQ Xpress, CardIQ Function and CardEP
- Oncology – PET/CT Fusion, Lung Volume Computer Assisted Reading (VCAR), Advantage4D and AdvantageSim MD
- Neurology – Perfusion 4 and Cortex ID

CardIQ Physio   CardIQ Fusion
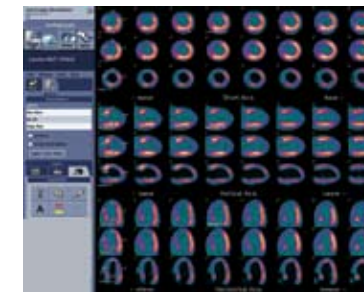
CardIQ™ Physio enables cardiac PET perfusion and viability reformat with quantitative analysis capability. This tool provides a GE platform for future, integrated PET/CT cardiac applications.

CardIQ™ Fusion is an integrated post processing image analysis tool to effectively display, reformat and analyze 2D or 3D cardiac CT images for qualitative or quantitative assessment of heart anatomy and coronary artery vessels from individual phases.

VesselIQ Xpress   CardIQ Function
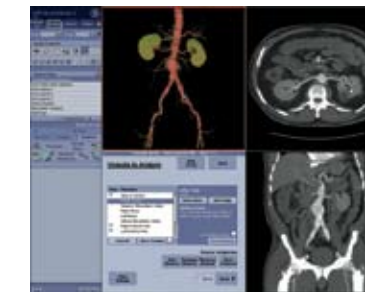
VesselIQ™ Xpress is a premium 2D and 3D clinical analysis tool for vascular studies providing fast analysis for routine cases and easy tools for challenging ones including: plaque analysis, stenosis quantification, aneurysm measurement and bone segmentation

CardIQ™ Function provides quantification of the heart's pumping capacity assessed by CT, to determine the need for device implantations. This application displays cardiac CT images and semi-automatically or manually calculates left ventricular (LV) and right ventricular (RV) functional parameters.

Lung VCAR   AdvantageSim MD
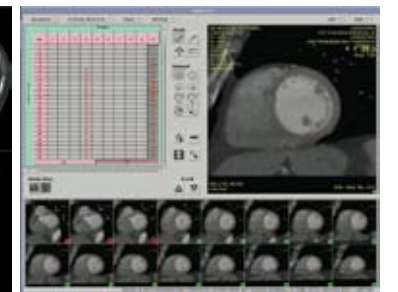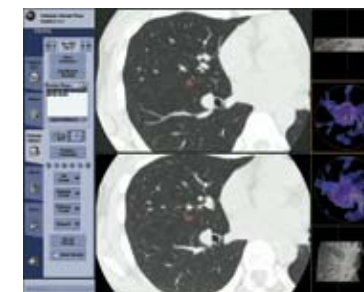

Lung VCAR™ is the first application package designed specifically for volume CT imaging offering auto-visualization and quantitative analysis for lung nodule diagnostics. From early detection through nodule follow-up, Lung VCAR helps clinicians provide precise and informed diagnostic decisions for improved patient management.

AdvantageSim™ MD is the latest generation of GE Healthcare's industry-leading simulation and localization software for radiation therapy planning. Experience complete 4D multi-modality contouring in one pass – making radiotherapy planning fast and precise.

Perfusion 4   Cortex ID
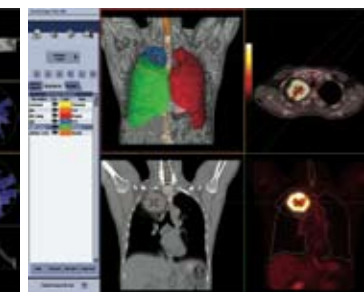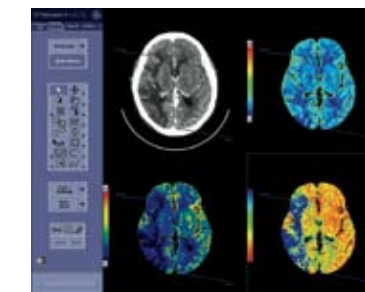

Perfusion 4 enables stroke management, thanks to quantitative maps of blood volume, blood flow, mean transit time and tumor assessment with capillary permeability surface product. When combined with VolumeShuttle, Perfusion 4 analysis can be extended to a large axial coverage with a single contrast injection.

Cortex ID offers easy, robust and clinically validated review/analysis of PET and PET/CT neurological scans. It allows a comparison of images from age stratified normals and patient groups, depicting brain functions that may have been altered by the disease processes.
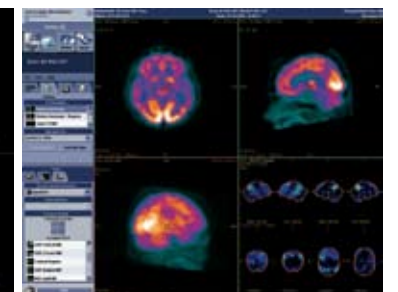
See. Oncology.
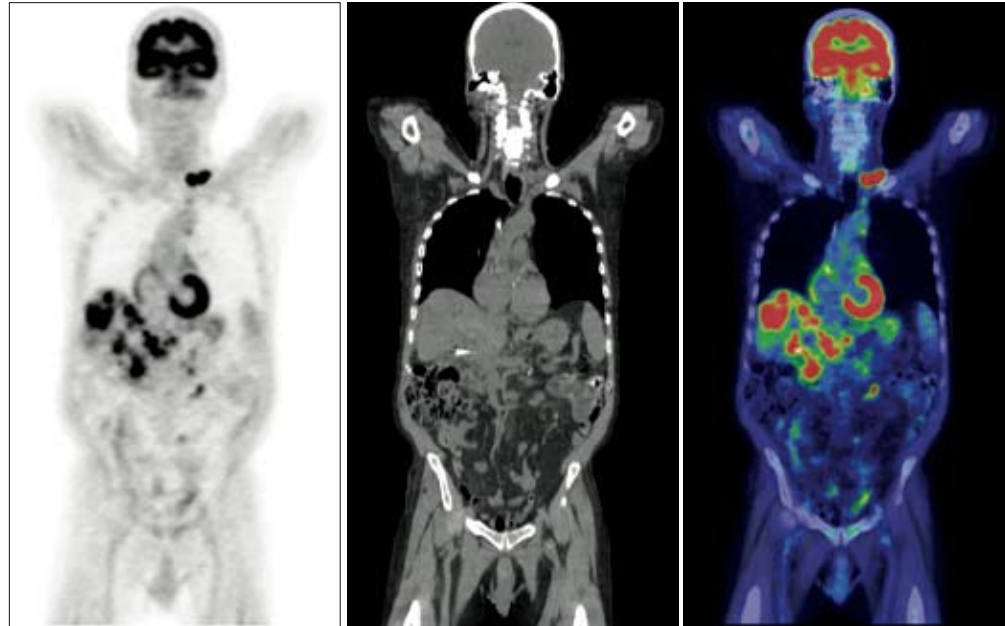
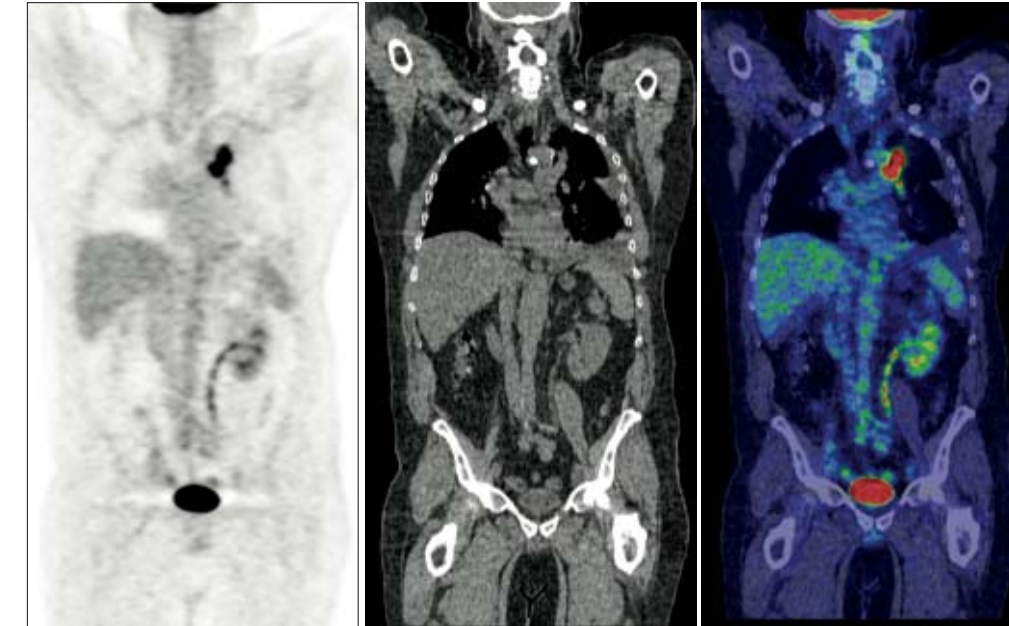## Case A

Patient History
Male
71 in, 169 lbs

Indication
Determine extent of disease

Protocol
Injection of 12.6 mCi ^{18}F-FDG followed by3D whole body PET imaging 63 minutes later. Total scan time was 6 minutes with 1 minute per bed position. Non-contrast enhanced, non-breath hold CT images were obtained over the same region for attenuation correction and for correlation with PET images.

Impression
This patient has a history of colorectal cancer and was referred to a PET/CT center for a follow-up to evaluate recurrence. The patient's CEA level had been rising and complained of some abdominal discomfort. A large amount of uptake was noted in the left supraclavicular region and small pulmonary nodes in the mediastinum. Multiple areas of FDG were observed in the liver confirming recurrent disease.

Case B

Patient History
Female
72 in, 243 lbs

Indication
Determine extent of disease

Protocol
Injection of 9.6 mCi ^{18}F-FDG followed by 2D whole body PET imaging 61 minutes later. Total scan time was 12 minutes. Non-contrast enhanced, non-breath hold CT images were obtained over the same region for attenuation correction and for correlation with PET images.

Impression
A large FDG avid mass was observed in the left upper lobe of the lung. Multiple areas of FDG uptake were also noted in the pulmonary nodules of the mediastinum.

See. Cardiology.
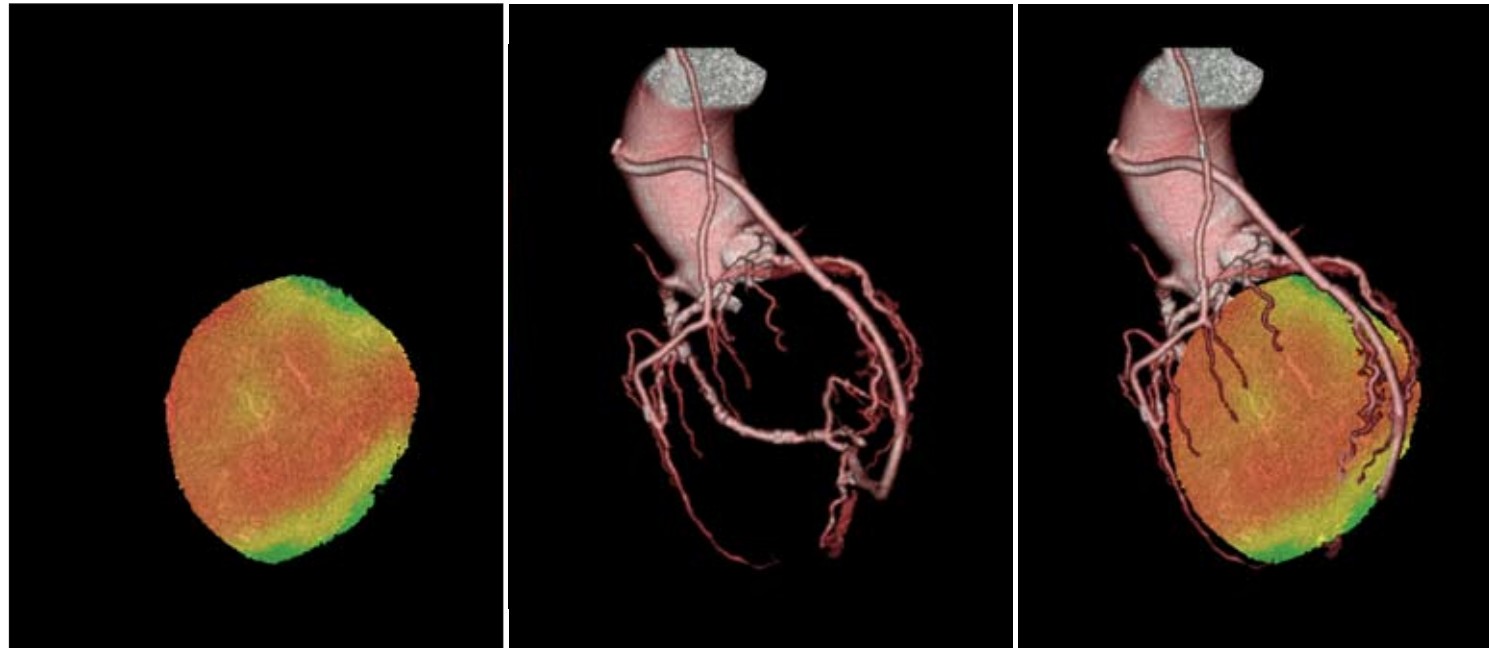
Case C

Patient History
58 year-old male

Indication
Evaluation for non-anginal chest pain, dyspnea and palpitations. Cardiac risk factors include hypertension and diabetes with family history of ischemic heart disease and obesity.
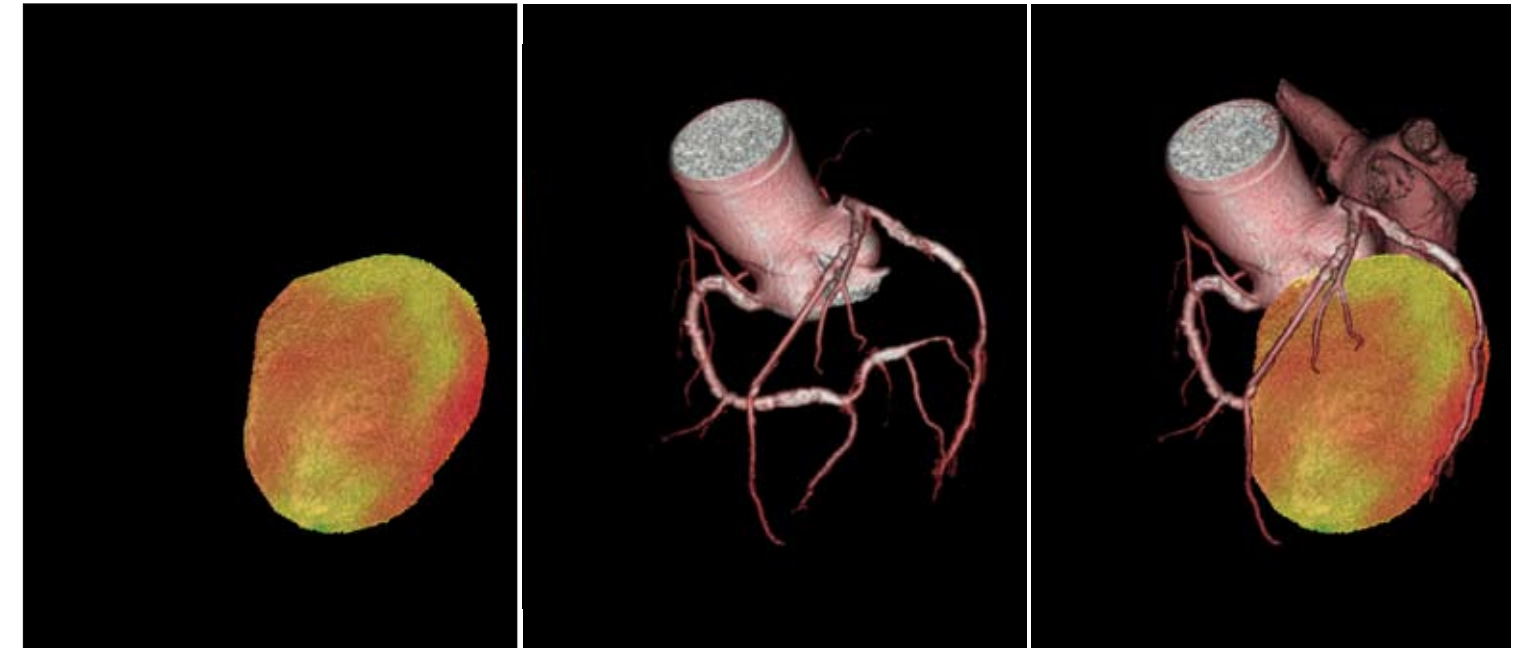
PET Protocol
Myocardial perfusion PET study following IV administration of 60 mCi of Rubidium-82 at rest and 60 mCi of Rubidium-82 during peak Dypiridamole stress, respectively. Gated images were obtained at rest and during peak stress.

CT Protocol
Breath-hold cardiac CT was performed using the Discovery VCT scanner with 0.35 sec rotation time. Contrast injection was timed and the patient received 60 cc at a rate of 5 cc/sec. Average heart rate was 65 bpm.

Impression
The PET perfusion scan demonstrated no evidence of ischemia or scar tissue. The gated PET scan demonstrated normal global left ventricular function. There is no evidence of coronary artery calcification. The PET/CT test results are normal, suggesting no evidence of flow-limiting coronary artery disease.

Case D

Patient History
63 year-old male
67 in, 210 lbs

Indication
Evaluation for coronary artery disease, typical chest pain and increasing fatigue with exertion.

PET Protocol
Myocardial perfusion PET study following IV administration of 61 mCi of Rubidium-82 at rest and 60 mCi of Rubidium-82 during peak Adenosine stress, respectively. Gated images were obtained at rest and during peak stress.

CT Protocol
Breath-hold cardiac CT was performed using the Discovery VCT scanner with 0.35 sec rotation time. Contrast injection was timed and the patient received 60 cc at a rate of 5 cc/sec. Average heart rate was 62 bpm.

Impression
PET perfusion scan demonstrated a small defect in the anterolateral wall that is reversible. CTA showed a mild complex plaque with non-obstructive stenosis in the LCX. The first obtuse marginal branch shows a stent. The left main length shows severe calcification with a <50% luminal stenosis. The first diagonal branch shows a large vessel with a <50% ostial stenosis. The first RPL of the RCA demonstrated a stent that is patent. Follow-up was recommended.

Discover.
Leading technology, complete care.

Healthcare Re-imagined

GE is dedicated to helping you transform healthcare
delivery by driving critical breakthroughs in biology
and technology. Our expertise in medical imaging
and information technologies, medical diagnostics,
patient monitoring systems, drug discovery, and
biopharmaceutical manufacturing technologies is
enabling healthcare professionals around the world
discover new ways to predict, diagnose and treat
disease earlier. We call this model of care "Early
Health." The goal: to help clinicians detect disease
earlier, access more information and intervene
earlier with more targeted treatments, so they
can help their patients live their lives to the fullest.
Re-think, Re-discover, Re-invent, Re-imagine.

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imagination at work