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### **Vereos PET-CT System**

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The Vereos PET/CT system incorporates the industry's first digital solid state detector design for breakthrough advancements in PET imaging capabilities.

#### **Key Features**

- Digital PET System:
  - Digital Photon Counting technology enables precise localization of each PET annihilation event to dramatically improve image quality.
  - Exceptional sensitivity for fast scans, low dose imaging, and advanced applications
  - High resolution for lesion detectability and exceptional anatomic detail
  - Enhanced spatial resolution and contrast performance through point spread function (PSF) technique
- Ingenuity CT sub-system which includes:
  - kV stations of 80, 100, 120, 140 kVp
  - 60 kW generator with optional upgrade to 80 kW (105 kW equivalent) generator
  - 4 cm of coverage for better patient compliance and improved clinical capacities
  - MRC Ice: x-ray tube designed for long life and provides the performance required to meet the needs of volumetric scanning
- iPatient user environment improves PET/CT productivity by working the way the user does

The flexibility of this high performance scanner includes features designed to automate clinical exams, ease through reconstruction and post-processing, and aid in accuracy of diagnoses. Above all, the speed and usability of the Vereos system increases patient throughput including:

- Patient handling and set up
- Scan and image acquisition
- Dose Management
- Reconstruction and display
- Post-processing and communication

#### **PET sub-system**

##### *PET Detector System*

- Crystal Material: LYSO
  - Detector Architecture: Digital Photon Counting, with direct conversion of the scintillation event to a digital signal.
    - 1:1 coupling from crystal to light sensor.
    - Efficient photon counting.
  - Enables quantitative scanning across the clinical spectrum.
  - Uniform spatial resolution across the FOV.
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## **CT Sub-system**

### *System*

Rotate-rotate architecture with optimized geometry for low dose imaging.

### *MRC Ice X-ray Tube*

Liquid coolant carries heat away from the MRC Ice X-ray tube so the CT is ready for the most demanding scans, one right after the other. The Philips MRC Ice X-ray tube is designed to be one of the most reliable in the industry. Built for high volume and 24-hour consistency, there is no waiting for the tube to warm up before the scan and no waiting for it to cool down.

### *CT Detector*

Detector design is fundamental to the objective of acquiring high quality images while managing patient dose. Unlike single matrix detectors that simply sum elements, Philips designs configuration-specific detectors that minimize the separation between elements to always provide the highest geometric detector efficiency. Direct-to-digital signal conversion with TACH2 technology reduces dose and improves image quality.

### *Generator*

The Ingenuity generator uses low-voltage slip ring technology to provide a constant high voltage to the CT x-ray tube assembly.

### *Image Quality*

#### Spatial Resolution

Ultra-high mode:	24.0 lp/cm @ cut-off
High mode:	16.0 lp/cm @ cut-off
Standard mode:	13.0 lp/cm @ cut-off

Noise: 0.27% measured on Philips system phantom (21.6 cm water equivalent)

Low Contrast Resolution: 4.0 mm @ 0.3% as measured on the 20 cm CATPHAN phantom

Absorption Range: -1024 to 3072 Hounsfield units

### *CT Scanning Modes*

#### Spiral Scanning

- Multiple contiguous slices acquired simultaneously with continuous table movement during scans.
- Spiral exposure: Up to 100 sec of uninterrupted spiral scanning
- Spiral pitch: 0.13 to 1.5 (user selectable)

#### Axial Scanning

- Multiple-slice scan with up to 128 contiguous slices acquired simultaneously (via Ingenuity data acquisition and sampling technique) with incremental table movement between scans
- Fused modes for reconstructing partial volume artifacts free thick slices from thin slice acquisition

### *CT Scan Times*

0.4, 0.5, 0.75, 1, 1.5, 2 seconds for full 360° scans

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#### *Test Injection Bolus Timing*

This feature establishes the optimum delay time for contrast injection. By using a test injection, a real-time graph of the enhancement in the selected region of interest is displayed. The delay time is then selected to provide optimal peak contrast enhancement and reduced contrast usage - ideal for CTA.

#### *Bolus Tracking*

This automated injection planning technique permits the user to monitor actual contrast enhancement and initiate scanning at a pre-determined enhancement level. Combine with SAS for full automation and efficacy.

#### *Spiral Auto Start*

Spiral Auto Start integrates the injector with the scanner, allowing the technologist to monitor the contrast injection to check for extravasation, and to initiate and stop the scan (with the pre-determined delay) while in the scan room.

#### *NOTE:*

- *Costs to upgrade an approved injector and any cabling are the responsibility of the user.*
- *Compatible with following Injectors:*  
Medrad Envision/Stellant, Medrad Vistron, Liebel-Flarsheim, Tyco CT 9000, Medtron CT 2, Nemoto Dual Shot, Tyco OptiVantage DH, E-Z-EM Empower, Swiss Medicare, Ulrich Injectors

#### **Dose Management**

Philips' DoseWise philosophy is a set of principles and practices that ensures the best possible outcomes with minimal risk to patients and staff. Vereos PET/CT systems employ a number of features that help provide extremely high dose efficiency.

#### *Digital Photon Counting Technology*

Minimizes the required PET radiation dose by utilizing high stopping power crystal material (LYSO) and 3D acquisition with full axial acceptance angle, and Digital Photon Counting to more efficiently capture scintillation events.

#### *NEMA XR-25 (DoseCheck)*

DoseCheck enables the ability to set dose thresholds and provides alerts and notifications to the scan operator when radiation dose levels will be exceeded.

There are two threshold level values: Notification Values, Alert Values

Notification values apply to a single image series, and Alert values apply to an overall exam. Both CTDIvol and Dose Length Product (DLP) values can be set.

For Alert values that will be exceeded, the system requires the user provide name and password information before proceeding to scan. Also, an additional indication will appear in the Dose Info Page Series when the Notification or Alert values have been exceeded during a scan.

#### *DICOM Structured Report for Dose (DICOM SR)*

Dose SR complies with the IEC, DICOM PS and IHE standards for dose reporting. The report includes CTDIvol and DLP dose values.

#### *Dedicated Pediatric Protocols*

Dedicated CT protocols are developed in collaboration with top children's hospitals, age and weight-based infant and pediatric protocols enhance image quality at low dose.

#### *DoseRight ACS (Automatic Current Selection)*

Personalizes the dose for each patient based on the planned scan by suggesting the lowest mAs settings to maintain consistent image quality at low dose throughout the scan.

#### *DoseRight Angular Dose Modulation*

Automatically controls the tube current angularly, increasing the signal over areas of higher attenuation (e.g., lateral) and decreasing signal over areas of less attenuation (e.g., anteroposterior).

#### *iDose*

Automatically controls the tube current, adjusting the signal along the length of the scan, increasing the signal over regions of higher attenuation (e.g., shoulders, pelvis), and decreasing the signal over regions of less attenuation (e.g., neck, legs).

#### *Dose Displays*

- Volume Computed Tomography Dose Index (CTDIvol)
- Dose-Length Product (DLP)
- Dose Efficiency

### **PET/CT User Environment**

#### *iPatient*

Philips' iPatient is an advanced platform that delivers focused innovations to facilitate patient-centered imaging, now and in the future. This powerful platform puts our customers in control of innovative solutions that drive confidence and consistency through personalized patient centric workflow, increase the ability to do complex and advance procedures with ease and efficiency. iPatient removes unnecessary complexity and allows our customers to get the job done with less stress and greater confidence, and prepares for future innovations that will help improve the care being delivered to the patient.

#### *ExamCards*

ExamCards are the evolution of the scanning protocol. With ExamCards, the results are planned, not the acquisition as traditionally done in CT; this reduces decision points and clicks, saves time and improves operator-to-operator consistency. ExamCards can include reformatted CT, MPRs, MIPS, AC and non-AC PET, and other results, all of which will be automatically reconstructed and can be sent off to where they will be read with no additional work required by the operator.

The Ingenuity Console provides a user environment that is flexible and available wherever it is needed. Designed in collaboration between Philips and its customers, it is a powerful set of PET and CT applications that improves productivity by working the way a user does. Users can do all of their planning, scanning, visualization and archiving in a simple, easy-to-use graphical user interface (GUI) that is harmonized across Philips Medical Systems.

#### *Guided Flow*

Logical Guided Flow graphical user interface increases productivity through ease-of-use features:

- Features and functions are visible, not hidden.
- Most common operations are shown most prominently.

A top-level workflow bar directs the user along important tasks and provides non-linear movement between functions without losing any current work. This provides the user with maximum flexibility for viewing, performing applications, filming or reporting.

### **Patient handling & set-up**

Philips' "Design for Life" approach provides high levels of flexibility for users and comfort for patients. Philips helps improve productivity during patient handling and setup through a variety of features, making patients more comfortable and making technologists' jobs easier.

#### Gantry Features

- *Gantry Aperture:* 700 mm diameter
- *Scan Control Panel:* Controls and displays for patient couch elevation and stroke are located on both sides of the gantry.
- *Scan Control Box:* Gantry and patient couch controls and displays are located conveniently at the operator's console. Additional functions include emergency stop, intercom, and scan enable/pause buttons.
- *AutoVoice:* A standard set of commands for patient communication – before, during and after scanning in multiple languages. Also provides the ability to record customized messages.
- *Intercom System:* Two-way intercom allows patient monitoring and communication.

#### Patient Table

- Stroke: 1900mm
- Scan range (PET & CT): 1900 mm
- Table load capacity: 195 kg (430 lbs.)

#### Table Accessories

From extra padding to optimal support, these table accessories prevent fatigue and discomfort and give both patients and technologists a sense of security. The patient comfort kit includes a patient restraint kit, foam head holder, table pad, foam arm rest, arm boards and a knee pad.

### **Scan Planning**

The iPatient console provides intuitive registration and easy entry of patient information and clinical procedure selection, using anatomic graphical display and sample images.

#### *Expert Protocol Planning*

Tailor protocols to meet specific needs via a selection of parameters optimized for certain studies.

#### *Automatic Procedure Selection*

Maps the procedure selection from the HIS-RIS with individual scan protocol(s) simplifying the scanning process. Only the most relevant scan protocol(s) for any requested procedure are shown to the user, ensuring that only the desired scanning procedures are performed. This is especially useful for infrequent users of the CT scanner.

#### *Scan Ruler*

Provides a visual, highly interactive view of the entire procedure that allows 1-click updates to important study events.

#### *Preset Post-processing*

User-defined presets improve workflow, by automatically opening the relevant post-processing

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applications for a specific type of exam. For example, PET reconstruction can be set up to run concurrently with data acquisition resulting in shorter reconstruction time.

#### *Spiral Scanning*

Multiple contiguous slices acquired simultaneously with continuous table movement during scans allowing for multiple, bidirectional acquisitions

#### *Axial Scanning*

Multiple-slice scan with incremental table movement between scans.

#### *Patient Centering on Surview*

Centering the patient properly is one of the most important factors in getting good image quality. Traditionally, patients are centered using the gantry laser lights. With this advanced feature it is now possible to improve patient centering using the lateral Surview with real time feedback.

#### *Surview Plan*

Planning via interactive mouse control of multiple, independent acquisition series of any type on Surview image. Linking of the PET plan to the CT streamlines workflow by reducing operator interaction.

#### *Dual Surview Planning*

Provides flexibility in exam planning with both anteroposterior and lateral survIEWS.

#### *CT Dynamic Focal Spot*

Dynamic Focal Spot (DFS) doubles the data sampling density from the detectors effectively doubling the number of detectors and providing ultra-high spatial resolution in axial and spiral scanning.

#### *Manual Scan*

Places slice-by-slice scans under operator control with on-line or off-line reconstruction, background image archiving to local or remote storage devices. At any time, the operator is able to switch from automatic to manual scan and back.

#### *Automatic Scan*

Enables automatic execution of pre-planned studies, with concurrent, on-line or off-line reconstruction, background image archiving to local or remote storage devices, without operator intervention.

#### Productivity Tools

##### *DICOM® Modality Worklist*

Provides HIS/RIS interface through DICOM Modality Worklist service class; enhances clinical workflow by importing patient demographics and study information from an information management system.

##### *DICOM® MPPS*

Provides performed exam information (start/end/info) to HIS/RIS using DICOM MPPS (Modality Performed Procedure Step) service.

#### *Split Study*

Many times multiple orders or accession numbers are generated for a patient's CT scan that require only a single scan acquisition. In these instances Philips' Split Study feature allows the user to virtually split the acquisition so that proper accession numbers are assigned to specific areas of the scan acquisition (i.e. chest slices to the chest accession number, etc.) and billing and tracking is completed accurately and appropriately. By assigning the accession numbers quickly and easily during scan setup, scan information is matched accurately in all subsequent steps (matching, reporting, archiving, billing, etc.). Philips' Split Study reduces error and improves workflow efficiency.

### *Prefetch Study*

This feature searches the database (PACS) for previous patient studies (CT, MR, CR, RF). After location and selection, these studies are then sent in the background to the configurable destination.

### **Reconstruction and Display**

PET and CT Data reconstruction is designed to provide the best possible image quality. The Vereos High Definition reconstruction system employs list mode, time-of-flight PET reconstruction and true cone beam CT reconstruction algorithms utilizing Philips patented back projection hardware.

### *PET Reconstruction*

#### *High Definition reconstruction*

Philips' state of the art time-of-flight reconstruction algorithm is a fully 3D iterative technique that utilizes list mode data to reconstruct event-by-event. Reconstruction geometry is defined using the line of response (LOR) as well as Spherically Symmetric Volume (SSV) approach. Time-of-flight performance can be optimized through a variety of reconstruction settings including large kernel, high-quality reconstruction and point spread functionality (PSF). The advanced design allows for extremely fast reconstruction speeds as fast as 30 seconds/bed post-acquisition for a typical whole body scan without degradation in image quality performance. Multiple reconstructions of collected PET data may be performed following the acquisition.

### *CT Reconstruction*

#### *CT Reconstruction Modes*

Concurrent: Axial and spiral modes - image reconstruction concurrent with acquisition

Off-Line (batch): Background image reconstruction of user-defined groups of raw data files with automatic image storage.

#### *ClearRay Reconstruction*

A revolutionary solution to beam hardening and scatter artifact, modeling and simulation technology pre-computes and stores beam hardening and scatter corrections in a database that is later referenced to create a correction that is personalized to each individual patient. As a fully three-dimensional technique, contrast scale stability is preserved across different patient sizes, image uniformity is improved, and organ boundaries are better visualized.

#### *Evolving Reconstruction*

Provides real-time 256 x 256 matrix image reconstruction and display in step with spiral acquisition. Images can be modified for window width and level, zoom and pan prior to reconstruction. At the end of the acquisition, all images are updated with the desired viewing settings.

#### *Fast Preview*

Display real-time 512x512 matrix image reconstruction and 5mm x 5mm contiguous slice display with helical acquisition or off-line reconstruction. Images can be modified for window width and level, zoom, and pan prior to larger matrix reconstruction at the end of the acquisition.

#### *Adaptive Filtering*

Adaptive filters reduce pattern noise (streaks) in non-homogenous bodies, improving overall image quality.

### *RapidView IR Reconstruction*

RapidView IR reconstruction is the result of years of advanced research, and was designed specifically to satisfy the performance requirements and processing power needed to seamlessly integrate the iDose4 Premium Package into your department. RapidView IR provides dramatic improvements in workflow by displaying images at breakthrough rates, regardless of acquisition speed or reconstruction parameter. The majority of factory protocols with iDose4 are reconstructed in less than a minute, with reconstruction speeds up to 18 images per second with iDose4 and up to 25 images per second with standard reconstruction.

### *CT ConeBeam Reconstruction Algorithm - COBRA*

Philips' patented Cone Beam Reconstruction Algorithm (COBRA) enables true three-dimensional data acquisition and reconstruction in spiral scanning. This avoids and/or corrects artifacts present in reconstruction by reducing pixel to noise ratio, resulting in superior multi-slice image quality.

### *Reconstruction parameters*

Any study can be set up to automatically reconstruct using various reconstruction parameters. Exams can be tailored online while planning the scan, or during off-line recon. Up to six different reconstruction assignments are possible for each study. Image reconstruction parameters include image matrix, filters, enhancements, zoom and pan, and archive.

### *Ultra High Resolution Matrices*

Exclusive to Philips, 768 x 768 and 1024 x 1024 image reconstruction matrices display all of the high-resolution data acquired in applications, such as inner ear, spine and high-resolution lung imaging. As resolution increases, larger matrices are required to display the full resolution for the reconstructed field of view.

## **Post-processing and communication**

### Host Computer

*Computer Architecture:* Windows XP Dell Precision host computer

*Main Memory:* 6.0 GB RAM

### Display Monitor

#### *Dual Monitor Configuration*

Expands the iPatient workspace by utilizing two flat panel monitors side-by-side. The left monitor is utilized for scanning operations while the right is used for post-processing activities.

### Image Processing

The interactive image viewer is designed for fast, efficient and simple image review and filming purposes. Images can be handled individually or in user-selected groups.

- Image viewer window: Displays a single image or a selection of images.
- Zoom & Pan: Magnification from 0.8 to 10 times
- Scroll Bar, Leaf and Cine, Invert Image, Image Parameters Display

### Image Graphics

To help interpret clinical images, a variety of text and graphic aids can be individually positioned and manipulated with the mouse:

- Text annotation
- Cursors for pixel value measurements.



- Regions of Interest (ROI) - elliptical, rectangular, curved or freehand, with instantaneous calculation and display of area, average pixel value and standard deviation. Values of several ROIs may be added or subtracted.
- Lines, grid and scales for distance measurements, curved and freehand lines for measuring any shape.
- Arrows for pointing to features.
- Angle measurements.
- Histogram of pixel values in a user-defined region of interest.
- Profile of the pixel values along any line.
- Grid with adjustable spacing for distance assessment

#### Window Control

- Eight user-defined preset windows provide fast and convenient window setting. Mouse-driven fine adjustments of the window center and width enable optimal image viewing
- Highlight Window: paints user-defined range of CT densities in color.
- Double Window: Simultaneous displays two independent CT density ranges on the same image, i.e. thorax slice with lung and mediastinum windows
- Invert Window: Ability to toggle between negative and positive image.

#### Fusion Viewer

The interactive PET/CT image viewer is designed for fast, efficient and personalized image review and filming purposes.

- Unparalleled flexibility in customization: all images are resizable based on user needs
- Dynamic adjustment of modality, view, orientation and size
- Fast sequential access to patient studies for superior workflow
- Intuitive toolbar controls for image review
- "Auto-Hide" of controls for screen maximization
- One click access to routine functionality (triangulation, SUVs)
- Comprehensive region of interest contouring tools with DICOM RT Structure Set export
- Easy saving of key images (DICOM, JPEG, AVIs) for distribution
- One click addition of key images for reports

#### Post-Processing Analysis Tools

##### *SlabViewer*

##### *MPR- Multiplanar Reformation*

##### *Maximum or Minimum Intensity Projection (MIP)*

##### *3-D SSD Reconstruction*

##### *MasterCut*

With the MasterCut feature, MPR (Multiplanar Reformatting) curved cuts along vascular structures can be defined on Maximum Intensity Projection (MIP) or volume rendered images to display panoramic and cross-sectional views that accurately visualize the vasculature.

##### *RelateSlice*

RelateSlice is a Philips-exclusive tool provided in Volume Rendering, 3-D SSD, MIP, and MPR, that correlates the axial image to a user-selected location on multiplanar views and renderings. RelateSlice makes it easy for a user to compare the axial image to its post-processed presentation, improving the user's productivity and diagnostic confidence.

### *Masterlook*

An automated real-time image enhancement, or smoothing, that can be defined for up to three independent density ranges, such as lung, soft tissue and bone.

### *3-D Small Volume Analysis*

3-D Small Volume Analysis permits tumor or nodule characterization with respect to growth rates within the 3-D application. This tool uses automatic segmentation for help in identifying a solitary nodule or tumor (early staging of lung cancer), and measures volumetric parameters such as nodule volume, long axis, and short axis for follow-up purposes.

### *Q-CTA - Quantitative CT Measurement Tool Package*

Q-CTA is a tool kit for quantitative measurements of anatomic structures, such as vasculature pathology from 2-D, 3-D or volume-rendered images.

### *Volume Rendering*

Philips advanced volume rendering 3-D visualization software provides unique simultaneous visualization of vasculature, soft tissue and bone. Unlike conventional 3-D or MIP, volume-rendering visualization offers real time interactive control over opacity and transparency values. This permits viewing through and beyond surrounding structures, such as metallic stents and arterial calcifications, and virtually eliminates the need for organ segmentation.

### *Organ ID*

Automatically isolates lung images for better viewing, including lung limit detection, zoom and pan setting, lung windowing, image enhancement, and image filming.

### *Vessel Analysis*

Ingenuity offers a set of tools for general vascular analysis. It allows the user to easily remove bone, and extract and segment the vessels to quickly perform typical measurements such as intraluminal diameter, cross sectional lumen area, and length of vessel's segments, and angle of the vessels. The package allows the user to display the dataset using volume rendering, Average, or MIP with cross sections images that can be used to delineate aneurysm, presence of mural calcification and lining mural thrombus, branch vessel (celiac, mesenteric, renal) and the ilio-femoral arterial runoff circulation.

### *ScanTools and ScanTools Pro*

The ScanTools package of advanced components and productivity features streamlines routine imaging studies, and comes standard with your scanner. ScanTools Pro is a supplemental set of tools standard on your scanner that enhances productivity, workflow, and diagnostic confidence. The components of ScanTools and ScanTools Pro are located throughout the quote under the appropriate headings.

### Image Management and Archiving

Image archiving is organized according to the DICOM 3.0 hierarchical model, in a DICOM 3.0 compliant image format. Loss less image compression/decompression algorithm is used during image storage/retrieval to/from all local archives. Images can be auto-archived to selected archive media.

### *DVD-RAM*

DVD-RAM is an archive solution for storing CT and other modality datasets. It provides an inexpensive, reliable method for high-speed random access recording. DVD-RAM disks are written with proprietary Philips format and are only readable on Philips EBW (v3.0.1 or higher) and PET/CT scanner units (v3.3 or higher) with DVD-RAM.

### Networking/Connectivity

#### *Network Requirements*

Network connections should be located within 10 feet of the console. The Ingenuity TF supports 10/100/1000Mbps (10/100/1000BaseT) network speeds. For optimal performance, Philips recommends a minimum of 100Mbps network speed (1Gbps preferred) and for the PET/CT network to be segmented from the rest of the hospital network.

#### *DICOM Connectivity*

Ingenuity's full implementation of the DICOM 3.0 communications protocol allows connectivity to DICOM 3.0 compliant scanners, workstations, and printers; supports IHE requirements for DICOM Connectivity. Further details on connectivity and interoperability are provided within the DICOM Conformance statement.

### **Additional features**

#### Other Included Items

- Computer cabinets
- PET sub-system power protection
  - Provides short temporary backup power to several critical components of the PET/CT scanner allowing for proper shutdown of the system.
  - Continuous power will be supplied to the PET gantry to keep power to the detectors, console and CIRS reconstruction computers. This is useful when short (less than 5 minute) power loss occurs.
  - For complete system protection, a full UPS is required.
- Sources (shipped separately), phantoms, and fixtures for daily & monthly QC (PET& CT)
- User documentation.

### **UPS, 125 kVA/480 V/60 Hz**

Uninterruptible Power Supply (UPS) with Voltage Regulator. Provides power to permit up to 30 minutes of scanning after a power failure. This allows the user to complete the patient scan, save data and make an orderly system shut-down. Also insures that incoming power meets Philips Healthcare's specifications for optimal PET/CT system reliability and performance. The UPS regulates utility voltage deviations, stabilizes line frequency, and subdues line voltage surges & spikes, prevents loss of phase and total power outages, while also ensuring positive phase rotation.

Input voltage: 480 VAC/60 Hz. Refer to Planning Reference Documentation for more details.

### **Vereos PET/CT Clinical Education Package:**

**Pre-Handover Onsite Education:** Philips Education Specialists will provide twenty-eight (28) hours of Vereos PET/CT Onsite Education for up to four (4) students, selected by customer, including technologists from night/weekend shifts if necessary. All training must be delivered within the same visit. Course content will include information intended to provide an introduction to the Vereos PET/CT scanner, the newest PET technology hardware. Students should attend all three onsite training sessions which build on prior training events. CEUs are not available in all cases.

Please read Guidelines for more information, which will be provided to you during the scheduling process.

**Initial Handover Onsite Education:** Philips Education Specialists will provide twenty-four (24) hours of Vereos PET/CT Onsite Education for up to four (4) students, selected by customer, including technologists from night/weekend shifts if necessary. All training must be delivered within the same visit. Course content will include information intended to provide the most innovative technology of the digital Vereos PET/CT scanner, the newest PET technology hardware. Students should attend all three onsite training sessions which build on prior training events. CEUs are not available in all cases. Please read Guidelines for more information, which will be provided to you during the scheduling process.

**Follow-up On-site Education:** Philips Education Specialists will provide twenty-four (24) hours of Vereos PET/CT On-site Education for up to four (4) students, selected by customer, including technologists from night/weekend shifts if necessary. All training must be delivered within the same visit. Course content will be customized to the customers' needs and information intended to provide the most innovative technology of the digital Vereos PET/CT scanner. Students should have attended the Pre-handover and Initial handover training sessions to build on prior training events. CEUs are not available in all cases. Please read Guidelines for more information, which will be provided to you during the scheduling process.

**Note:** For education listed above site must be patient-ready. Philips personnel are not responsible for actual patient contact or operation of equipment during education sessions except to demonstrate proper equipment operation. Completion of (2) CT modules and (2) PET Modules will be required prior to attending onsite essentials education. Students access didactic courses through the Philips On-Line Learning Center. CT modules consist of an overview of physics, scanner generations, a review of hardware and software components, data acquisition, and image reconstruction. PET modules include an overview of physics, instrumentation, radiopharmaceuticals, patient preparation, and radiation safety.

Recommendations: If CT Cardiac option is purchased, it is recommended that 98981292425 (CT Cardiac Off-site Educ 28h) is purchased as well as 989801292078 CT Full Travel Pkg. 989801292238 (CT Cardiac On-site Educ 16h) or 989801292450 (CT Cardiac On-site Educ 24h). If PET Cardiac is purchased, it is recommended that 989801292275 (PET Cardiac On-site Educ 8h) or 989801292276 (PET Cardiac OnSite Educ 16h) also be purchased. If system will be used for Diagnostic CT, for an experienced CT Technologist it is recommended that 989801292424 CT Brilliance Essentials Offsite 28h as well as 989801292078 CT Full Travel Pkg also be purchased. If 4D Respiratory Gating is purchased it is recommended that 989801292133 (PET Add On-site Clin Educ 16h).

**Education expires one (1) year from equipment installation date (or purchase date if sold separately). Ref#969970971-20130915**

Vereos comes with the following:

- 128 rows of data per rotation that are sent to be reconstructed
- kV stations of 80, 100, 120, 140 kVp
- 0.4 sec rotation
- 4 cm of coverage for better patient compliance and improved clinical capacities
- MRC Ice: x-ray tube designed for long life and provides the performance required to meet the needs of volumetric scanning

<b>3</b>	<b>80 kW Generator</b>	<b>1</b>
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Enhances CT system performance with 80 kW on-board, high frequency power generator with:

Three selectable voltages: 90, 120, 140 kVp

Maximum Current: 500 mA (at 120 kVp)

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5 Local Kit Vereos - ENG 1

<b>6</b>	<b>Flat Pallet Option Kit</b>	<b>1</b>
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The 53cm RTP flat -panel table insert securely locks into the PET/CT cradle providing a surface consistent with your treatment couch for accurate and reproducible patient positioning.

Made of carbon fiber with a foam core, this 53cm wide insert features Indexed Patient Positioning. Each longitudinal edge of the insert has a series of indents/notches that receive the indexing bar, (Lok Bar included) which accommodates standard patient fixation accessories. The notch locations have the same spacing and nomenclature as the Varian Exact system.

The insert is very lightweight, yet very durable in its construction. It can easily be removed and re-inserted for diagnostic studies. The attachment mechanics ensure that, once the top is re-inserted on the cradle, it will be stable throughout the imaging process. Integral aluminum wire fiducials provide a non-symmetric artifact-free reference to determine data orientation in the treatment planning system. The fiducial are divergent as well, to determine slice position/sequence within the data set.

<b>7</b>	<b>Kit, Label English RTP</b>	<b>1</b>
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## English language labels for RTP flat pallet option

NOTES:

1. One label kit must be chosen when purchasing the RTP flat pallet option.
2. English is the default kit if no other is chosen.

8 NEMA Test Kit for Vereos 1

This kit includes phantoms and accessories necessary to perform NEMA testing for PET imaging. Items are shipped in a durable container for storage on site. The container includes one of each of the following:

NEMA Sensitivity Phantom and holder  
 NEMA Scatter Phantom  
 NEMA Body Phantom  
 Spatial Resolution Test Plate  
 Axial Resolution Fixture  
 Performance Test Manual  
 Consumable Kit  
 25 -- 10 cc Luer-Lock Syringes  
 100 - 22 ga. 1.5" disposable needles  
 100 - 1.5mm x 4" glass tubing  
 50 - 3 cc Luer-Lock Syringes  
 10 - 18 ga 6" disposable needles  
 5 - Spare plastic tubing ( scatter phantom)  
 5 - Spare plastic tubing ( sensitivity phantom)

NOTE: The NEMA Test Kit option is for the materials only. This option does not include on-site testing support from Philips personnel. On-site testing support is available at additional charge.

9	**	<b>PET/CT ECG</b>	1
ECG Gating system for PET and CT cardiac imaging. The system provides a color display with touch screen operations for easy information input and intuitive onscreen navigation with one-touch commands. Includes cart for easy movement and storage.			
NOTE: This item is only supported with version 3.5 or higher. If selected it will only be deliverable upon the release/installation of version 3.5 software release. Selection of the ECG Gating system allows for PET cardiac gating. For CT cardiac gating you must select either Rate Responsive CV Toolkit (NCTB870) or Heartbeat CS Pro Package (NCTA045) along with the PET/CT ECG Gating system (NPTB595).			
10	**	<b>ECG Monitor - English</b>	1
11	**	<b>Mass Storage Peripheral</b>	1
The Mass Storage Device provides 6TB (5.4TiB) of RAID protected system attached storage for patient records.			
12	**	<b>Enhanced DICOM Vwr Study Distr</b>	1
The Enhanced DICOM Viewer provides advanced features such as multi-planar reformats for referring physicians and other recipients of DICOM patient studies on a CD/DVD.			

Key Features:

- Triangulation
- Maximum intensity projection

- Multi-planar reformats
- Image display modes for PET, CT image data with Fusion
- Simple, quantitative SUV measurement

NOTE: This item is only supported on systems running GEMINI 3.5 version or higher. If selected, it will only be deliverable upon the release/installation of GEMINI 3.5 software release.

**13      \*\*                      Research Toolkit for Vereos                      1**

This site support package is a set of programming language routines and documents developed to provide research sites with the capability to read file formats produced by Philips PET/CT scanners. The source code included in the Luminary Package is intended to assist research sites in conducting their own PET research efforts.

The routines included in the Luminary Package can be used with the MATLAB®, IDL®, and ImageJ applications. PET file readers and writers are included. Image and sinogram readers and writers are also included for use in MATLAB and IDL, image manipulation and data analysis applications. Routines are provided to read List Mode data files. Finally, an image reader plugin for ImageJ, a free, Java-based image manipulation software program is provided. ImageJ program does not support the ListMode format.

NOTE: This item is not to be sold without written approval from the PET Business Unit.

**14      \*\*                      Uniformity Analyzer                      1**

The Uniformity Analyzer assists in detailed optional evaluation of the PET imaging performance. It supports the information needed for some initial and annual qualification assessments, which may need to be performed with a uniform cylinder phantom. The generated statistics may be stored for additional analysis and record keeping

**15      \*\*                      4D Time Of Flight Toolkit                      1**

Philips' 4D TOF (Time-of-Flight) combines the benefits of TOF PET imaging and respiratory correlated imaging for PET/CT. The toolkit enables the user to trigger a scan at a particular breath level (axial and/or spiral CT prospective gating and PET prospective gating) or scan the thorax at different pulmonary phases (spiral retrospective-- CT and PET retrospective gating) and reconstruct the image data from those phases, minimizing artifacts caused by respiratory motion. Philips 4D TOF toolkit gives the clinician tools to accurately reproduce similar respiratory conditions over multiple exams when it is important to visualize a tumor at the same respiratory phase where radiation therapy will later be delivered.

By matching the scan phase with the treatment phase the clinician can be assured of providing the CT simulation plan that delivered the highest tumoricidal dose while maximizing the amount of healthy tissue that is spared. It will also allow multi-phased studies to be imported into a therapy planning system. The user can calculate dose and view the dose curves on different phases of the same anatomy.

The toolkit includes:

- PET/CT acquisition protocols for CT and PET gating
  - Prospective CT gating triggered by an external respiratory device on a pre-selected phase



- Retrospective Tagging enabling ultra low pitch spiral CT acquired and correlated to the respiratory phase of an external respiratory device
- Prospective and Retrospective TOF PET data acquisition
- Respiratory correlated attenuation correction for PET reconstruction
- SUV calculations using respiratory gated image data
- DICOM export of reframed static data for CT and PET
- Bellows pulmonary gating device: a pneumatic mechanism placed around the patient's chest, dynamically observing changes in pressure caused by motion of the chest with a transducer linked to the GEMINI TF 16 & 64 scanners.
- Mayo Device patient feedback device: This device was developed by Mayo Clinic and provides intuitive visual feedback to patients on their respiratory cycle. This feedback can be used to coach patients to better manage their breathing during examinations. The feedback device is only compatible with the Bellows gating device.
- Cables and brackets for connecting to the Varian RPM pulmonary gating device. The Varian RPM device itself is not included and must be purchased separately from Varian. Compatible with Varian RPM version 1.7.

NOTE: This item is only supported on systems running GEMINI 3.5 version or higher. If selected, it will only be deliverable upon the release/installation of GEMINI 3.5 software release.

**16 Laser w/Carinalso, Red Wall 1**

LAP DORADO 3 CT Simulation Laser System with three red movable lasers for identifying the isocenter location: One Ceiling-mounted Sagittal Laser, and Two (Side) Lasers mounted on the wall. The LAP laser system along with the CARINAiso software and control console completes the integration of Tumor L.O.C. CARINAiso software imports patient's surface, isocenter, MLC and field information, along with patient orientation and patient data to enable automatic movement of lasers to patient marking position. LAP will provide one (1) year warranty, pre-installation support by email and phone, and one (1) on-site visit for installation and training of up to a maximum of three (3) days duration.

NOTE: Transfer of isocenter position from Tumor LOC to CARINAiso for automatic movement of laser to patient marking position is only applicable if the system has Tumor LOC and an absolute marking couch.

**17 Computer Table 1**

Computer Table, for the Brilliance Console or the Extended Brilliance Workspace, provides a large enough working space (120cm) to accommodate dual monitors and other peripheral devices.

**18 Operator's Chair 1**

One (1) standard height operator's chair.

**19 Rate Responsive Toolkit 1**  
**GEMINI**

The "Rate Responsive CV toolkit" package is a set of features designed to allow basic cardiovascular imaging of the heart. This package is a prerequisite to the cardiac packages and to the "Stand Alone" applications, it includes:

*Acquisition Features*

**0.4 Second Rotation**

0.4 second 360° rotation provides better temporal resolution in advanced clinical applications such as coronary artery imaging, cardiac perfusion and other high-speed, motion-free imaging. The higher speed especially benefits prospective gating, with up to a 20% improvement in temporal resolution.



## **DoseRight Cardiac**

ECG Dose Modulation reduces the mA of the X-ray beam up to 80% during acquisition of non-desired phases (estimated overall dose reduction to the patient of ~45% for single-phase, end-diastolic imaging). For example, only one phase may be required for coronary CTA, and the system will reduce the mA during the other portions of the acquisition, saving considerable dose.

### **Retrospective Tagging**

Spiral Retrospective Tagging allows the Brilliance CT system to acquire a volume of data while the patient's ECG is recorded. The acquired data is "tagged" using AccuTag and reconstructed retrospectively at any desired phase of the cardiac cycle. This phase selection is accomplished using the Philips' patented Beat-to-Beat Variable Delay Algorithm, which automatically finds the best phase for cardiac CT imaging.

### **Prospective Gating**

Prospective Gating automatically triggers axial multislice scan acquisitions using patient information from the ECG monitor. This feature uses Philips patented Beat-to-Beat variable delay algorithm for accurate and reproducible calcification scoring studies.

### **Integrated ECG Monitor**

Philips' advanced ECG monitor with accompanying stand is used to collect the patient's ECG signal and then transfer the signal to the scanner for gated cardiac CT imaging. The ECG signal is stored on the system for later recall and display in the Brilliance Workspace. This can be used to interactively complete raw data reconstructions at different portions of the ECG cycle. Also can be used to correct reconstruction artifacts caused by irregular heartbeats.

Note: Gemini systems will ship with the GEMINI PET/CT ECG Gate.

#### *Reconstruction Features*

### **COBRA Reconstruction (COBRA Cardiac)**

This reconstruction algorithm along with the adaptive multi-cycle reconstruction algorithm (MaxCycle) delivers the clearest images with the best temporal resolution possible at all times, as low as 53mseconds, in full 3-D conebeam resolution.

#### *Review Features*

### **Cardiac Viewer**

Provides a comprehensive set of user tools that allows quick visualization of one or multiple cardiac phases, synchronization of multiple cardiac phases with interactive slab-MIP tools for review purposes, cine mode for cardiac axes views and a simple "Area-Length" calculation of End Systolic Volume (ESV), End Diastolic Volume (EDV), Cardiac Output (CO) and Ejection Fraction (EF) for basic ventricular functional assessment.

### **Calcium Scoring**

Cardiac scoring program which provides Agatston, Volume and Mass scores. Incorporates a database of > 5,000 asymptomatic multislice cardiac scoring patients.

#### *Reporting Features*

### **CT Reporting**

Provides reporting capabilities for paper print of clinical results from the Philips Brilliance Workspace including display of key images and results frames. The report is available for paper or electronic distribution to referring physicians, patients, or for medical records. Each report is editable and new default templates can be easily created and included in the system configuration. The report can be saved as a PDF file for digital transfer or printed.

Metal Artifact Reduction for Orthopedic implants reduces artifacts in image data caused by high density metal objects such as prosthetic hip replacements. This artifact reduction may aid diagnosis and help treatment planning accuracy by enhancing visualization of critical structures and target volumes

*Prerequisite:* For installed base upgrades on Brilliance CT-16-slice, Brilliance CT 64-channel, Brilliance CT 64-channel w/ Essence technology, Ingenuity family and iCT family. O-MAR requires iDose4.

**21** **iDose4 for PET/CT** **1**

*iDose4* is an iterative reconstruction technique that gives you control of the dial so you can personalize image quality based on your patients' needs at low dose. When used in combination with the advanced technologies of the Philips CT scanner families, this 4th-generation reconstruction technique provides a unique approach to managing important factors in patient care — a new era in low-energy, low-dose and low-injected-contrast imaging.

iDose4 balances high image quality, low dose, natural appearance, and easy workflow. iDose4 iteratively removes noise, prevents artifacts, and preserves morphological information using statistical and structural models in both projection (raw) and image domains.

iDose4 reconstruction is achieved in seconds rather than minutes. iDose4 features the RapidView IR console — hardware advances designed specifically to satisfy the performance requirements and processing power needed to reconstruct the majority of reference protocols in 60 seconds or less.

As part of our ongoing commitment to streamlining workflow for radiologists, iDose4 is easy to use and easy to adopt into your existing standard of care. The operator simply plans the scan as they normally would. Designed to seamlessly integrate into your CT department, iDose4 provides the look and feel of conventional higher-dose images without long processing times.

**22** **Barcode reader** **1**

Barcode Reader enters patient data from a HIS/RIS into the patient data form. Used in conjunction with DICOM Modality Worklist.

**23** **SyncRight (WO Injector)** **1**

SyncRight enables bi-directional communication between the scanner and SyncRight Injector. This communication allows for improved workflow.

*Prerequisite: iPatient*

**Medrad Stellant P3T PA:**

Medrad Catalog # 3028465

P3T PA (Pulmonary Angiography) tailors each patient's contrast protocol based on four primary components:

- Patient and procedure data gathered by healthcare personnel
- P3T algorithm for protocol generation
- DualFlow technology (the simultaneous injection of contrast and saline).
- An optional transit bolus that refines the protocol (P3T PA also works with bolus detection software)

P3T PA software enables increased diagnostic studies by fitting into the established CTPA workflow and making consistent administration of personalized dosing practical.

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Philips does not warranty the Medrad Stellant CT Injector System or its options but will pass on the Medrad warranty provided in countries where MEDRAD operates. In these countries Medrad or a MEDRAD authorized Distributor warrants each new injector system; including control unit, display control, remote panel and injector head against defects in material and workmanship, under proper, normal use and service for a period of one year (12 months) from the date of installation. There will be no charge for any action deemed necessary by Medrad, including parts, travel, or labor to fulfill the terms of the warranty, during normal business hours (8:30am to 5:00pm, local time, Monday through Friday, except MEDRAD recognized holidays).

24

**SyncRight Injector - OCS  
Medium**

1

The SyncRight Injector is a MEDRAD Stellant D with DualFlow option. The injector, when bundled with the SyncRight (WO Injector) option, interfaces with Ingenuity CT allowing bi-directional communication.

This injector comes with an Overhead Counterpoise system with a ceiling column length of 850 mm (33.5").

Medrad Stellant D CT - Dual Syringe w/DualFlow - Overhead Counterpoise System (Medium):

The Stellant CT Injection System is comprised of the injector head located in the screening room and a touch screen Display Control Unit (DCU) and Base unit, which is typically located in the control room. The three components are connected by a communication link.

Control console system with Dual 200 ml variable speed injector head with automatic docking, Auto Advance and Auto retract. Includes touch screen display input, 75 ft. cable to control console, injector head overhead mount, operation manual and two 200 ml syringe kits.

Stellant D with DualFlow option is more than a saline flush after a contrast bolus. Now you can inject both contrast and saline at the same time. The key is the simultaneous injection capability of the DualFlow option. DualFlow enables variable ratios of plunger motion from the contrast and saline syringes simultaneously. With the proper ratio, left and right heart ventricles can be illuminated uniformly for improved image quality.

Philips representatives are responsible for the unpacking, assembly and installation of the CT Injector equipment. Medrad will be available for technical assistance, by phone: call (412) 767-2400. Medrad will also provide an operational checkout, final calibration, in-service of the equipment and initial applications training. Please contact the local Medrad sales office at least two weeks in advance to schedule installation. Call (412) 767-2400.

Philips does not warranty the Medrad Stellant CT Injector System but will pass on the Medrad warranty. Medrad warrants each new injector system; including control unit, display control, remote panel and injector head sold in North America and Europe against defects in material and workmanship, under proper, normal use and service for a period of one year (12 months) from the date of installation. There will be no charge for any action deemed necessary by Medrad, including parts, travel, or labor to fulfill the terms of the warranty, during normal business hours (8:30am to 5:00pm, local time, Monday through Friday, except holidays).

25

**P3T Abdomen**

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**Medrad Stellant P3T Abdomen:**

Medrad Catalog # 3018741

P3T Abdomen enables clinicians to automatically calculate and deliver personalized contrast injection protocols. It is indicated for use with CT imaging of abdominal organs (i.e. liver, pancreas, and kidneys). The P3T Abdomen automatically adjusts contrast volume based on scientific methods, according to patient, procedure, and prescribed physician parameters. P3T Abdomen facilitates consistency amongst clinicians in delivering a personalized contrast injection protocol. P3T Abdomen aids in patient safety by tailoring contrast volume according to unique patient-imaging needs. Added safety constraints on Maximum Iodine Load and Maximum Flow Rate will help ensure individualized protocols are compliant with a clinician's practice.

Target Availability: With Results Driven Scanning

Prerequisite: SyncRight

Philips does not warranty the Medrad Stellant CT Injector System or its options but will pass on the Medrad warranty provided in countries where MEDRAD operates. In these countries Medrad or a MEDRAD authorized Distributor warrants each new injector system; including control unit, display control, remote panel and injector head against defects in material and workmanship, under proper, normal use and service for a period of one year (12 months) from the date of installation. There will be no charge for any action deemed necessary by Medrad, including parts, travel, or labor to fulfill the terms of the warranty, during normal business hours (8:30am to 5:00pm, local time, Monday through Friday, except MEDRAD recognized holidays).

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|-----------|--|----------|
| <b>26</b> | <b>Full Travel Package for OffSite Training</b>  | <b>7</b> |
|           | <p>Includes one (1) participant's airfare from North American customer location to Cleveland, Ohio, with modest lodging, ground transportation, and meal expenses. Breakfast/dinner provided by the hotel, and lunch/breaks are catered by Philips. All other expenses will be the responsibility of the attendee. Details are provided during the scheduling process.<br/>Note: Cancellation/rescheduling policy strictly enforced.<br/>Expires one (1) year from the earlier of equipment delivery date or purchase date.</p>  |          |
| <b>27</b> | <b>24 Hours of Additional OnSite Clinical Education</b>  | <b>1</b> |
|           | <p>Clinical Education Specialists will provide twenty-four (24) hours of tailored PET OnSite Education for up to four (4) students, selected by customer, including technologists from night/weekend shifts if necessary. All training must be delivered within the same visit. CEUs are not available in all cases. Please read Guidelines for more information, which will be provided to you during the scheduling process. Note: Philips personnel are not responsible for actual patient contact or operation of equipment during education sessions except to demonstrate proper equipment operation. Education expires one (1) year from the earlier of equipment delivery date or purchase date.</p>                 |          |
| <b>28</b> | <b>24 Hours of CT Apps OnSite Clinical Education</b>   | <b>2</b> |
|           | <p>Clinical Education Specialists will provide twenty-four (24) hours of tailored PET CT Applications OnSite Education for up to four (4) students, selected by customer, including technologists from night/weekend shifts if necessary. All training must be delivered within the same visit. CEUs are not available in all cases. Please read Guidelines for more information, which will be provided to you during the scheduling process. Note: Philips personnel are not responsible for actual patient contact or operation of equipment during education sessions except to demonstrate proper equipment operation. Education expires one (1) year from the earlier of equipment delivery date or purchase date.</p> |          |
| <b>29</b> | <b>CT Cardiac OnSite Educ 16h</b>  | <b>1</b> |
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<b>30</b>	<b>PET Cardiac OnSite Educ 16h</b>	<b>1</b>
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31	CT Brilliance Ess Add OffSite 28h	7
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<b>32</b>	<b>PET Cardiac Remote Educ 2.5h</b>	<b>1</b>
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33	PET 4D Resp Gating Remote Educ 2.5h	1
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One Philips Clinical Specialist will provide two and a half (2.5) hours of remote education, on PET and CT Respiratory gated imaging. This coaching session will be comprised of three stages: interactive computer-based training, procedure observation, and post-processing support. The customer will be able to review all aspects of Respiratory gated imaging including but not limited to Generating Protocols, scanner setup, Prospective and Retrospective imaging techniques offline image reconstruction and image post processing. This course is designed for GEMINI users who have been trained on-site in respiratory gating but need a refresher course.

CEUs are available in most cases. Please read Guidelines for more information, which will be provided to you during the scheduling process. Education expires one (1) year from equipment installation date (or purchase date if sold separately).

**34 PET ACR Assist OnSite 8h 1**

One Philips Clinical Specialist will provide eight (8) hours of training onsite at the customer facility. The customer will be assisted in acquiring phantom scans, adjusting image parameter protocols as needed, saving images to send to ACR and completing required ACR paperwork. CEUs are not available for this session.

Education expires one (1) year from equipment installation date (or purchase date if sold separately).

**35 Vereos Third Party Services 1**

Philips marketing partner, Healthcare Success Strategies, works directly with our PET/CT customer to create a customized marketing plan for their clinic or healthcare facility that will identify and outline various marketing opportunities tailored for their region. Note: this is a consultative only offering, and any execution of any or all of the customer marketing plan is not the responsibility of Philips. Results are not claimed or guaranteed by Philips.

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