VERITON-CT Series

360° CZT Digital SPECT/CT

SPECTRUM
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www.spectrum-dynamics.com

Contents

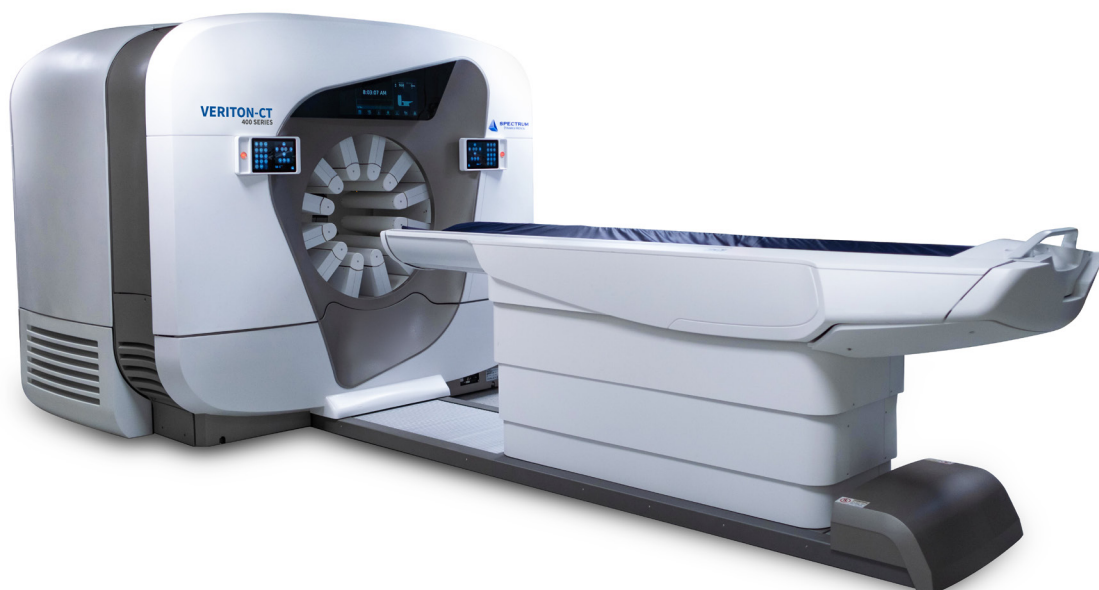360° CZT DIGITAL SPECT/CT

System Overview
360° CZT DIGITAL SPECT/CT

VERITON-CT Digital SPECT/CT System

VERITON-CT Digital SPECT/CT hybrid system is a solid state, CZT-based SPECT scanner integrated with a 16 or 64-slice premium CT scanner. Each imaging component, the digital SPECT and the premium CT, can be used independently, as stand-alone scanners. The multi-purpose SPECT component uses a variety of 3D scanning modes and advanced imaging features designed to enhance image quality, using low-dose protocols. The CT component is a whole-body, multi-slice CT scanner platform designed for routine radiological imaging procedures, with low dose and artifact reduction features. The SPECT images can be corrected for attenuation with the CT images and combined to merge the patient's physiological and anatomical images. The VERITON-CT system is integrated with the Operator's Console, providing a single location for data acquisition, reconstruction, advanced post processing and analysis. The Operator's Console can be networked with a user defined review workstation for further image display and review.

Key components of VERITON-CT Series include:

- **Wide Bore Gantry:** 80 cm wide bore size for both SPECT and CT
- **Patient Imaging Table:** for 200 cm continuous, hybrid SPECT/CT total body scan range
- **Single Photon Emission Computed Tomography (SPECT) Scanner:** featuring 12 CZT-based detectors in a 360° ring-shaped gantry
- **Multi-Slice Computed Tomography (CT) Scanner:** choice of 16-slice or 64-slice high resolution scanner
- **TruView Operator's Console:** for patient's database management, data acquisition, post processing, quantitative analysis, and image review
- **MIM-SD:** operator's console image quantitation and review platform

System Configuration

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VERITON-CT Example Configuration

Wide-Bore Gantry equipped with four control screens.

Patient imaging table with integrated ECG module with storage compartment for both the module and ECG leads cables. Table includes ruler markings on each side of the bed.

Digital SPECT Scanner with twelve (12) digital, Cadmium Zinc Telluride (CZT) based detectors for direct photon conversion in a 360° configuration.

Advanced SPECT Image Quality Tools
- Iterative Reconstruction with Resolution Recovery
- Dynamic Spline Reconstruction
- Partial Volume Correction
- High Peak Correction
- LVC or Cardiac Prior Reconstruction
- Penalized-Likelihood Reconstruction
- Point Spread Function Recovery
- Multi-View Planar based on 3D attenuation corrected data

Premium CT Scanner with choice of 16-slice or 64-slice configuration.

Advanced CT Image Quality Tools
- Low Dose Iterative Reconstruction (LISA)
- Metal Artifact Reduction (rMAR)
- Extended Field of View Reconstruction (eFOV-CT)
- Dose Modulation (AEC)
- Variable Adaptive Filtering (VAF)

MIM-SD for advanced post processing of 3D and 4D SPECT and SPECT/CT data

Operator's Console, **TruView**, with dual monitor configuration, for acquisition, reconstruction, and advanced post-processing.

System Configuration

360° CZT DIGITAL SPECT/CT

VERITON-CT Example Configuration

Researcher tools for list-mode data applications

Applications Training: four consecutive days of on-site clinical training

Table accessories include:

- Knee support cushion
- Patient support straps
- Table extender
- Arms support cushion
- Mattress pad

Quality Control Accessories

- Cobalt-57 Line Source
  (first source included in the configuration)
- Line source shielded storage box
- Source tubes
- Calibration jig
- CT quality control phantom
- CT phantom foam holder

Gantry

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Gantry Dimensions

Height	2.37 m / 7 ft 8 in
Length	2.24 m / 7 ft 3 in
Width	2.48 m / 8 ft 1 in
Weight	3,350 kg / 7,385 lb
Bore size NM	80 cm
Bore Size CT	80 cm

Gantry Specifications

Operator Control Screens
- Front   2
- Back   2

Gantry Information Screen   Yes

Emergency Stops
- 4-Gantry
- 1-Control Room

Patient Positioning Guides
- Laser Landmark Touch-Screen
- Interactive Virtual Ruler
- Persistence Scope
- CT-Based: Localizer

Patient Table

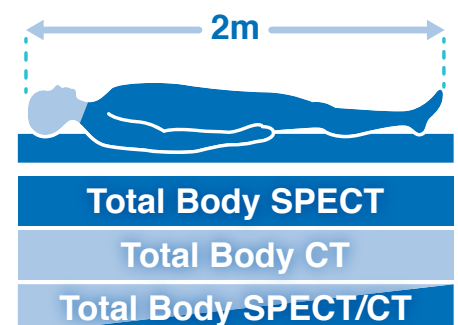## 360° CZT DIGITAL SPECT/CT

Patient Table Design Specifications

Weight	900 kg / 1,984 lb
Pallet Material	Carbon Fiber
Pallet Thickness	16 mm
Pallet Width	40 cm
Attenuation Factor	< 10% for 140 keV
Deflection	< 1.5 mm for 227 kg/500 lb
Maximum Table Height	101 cm
Minimum Table Height	58 cm

Accessories – Standard
- Integrated R-Wave Trigger
- Table Extender
- Patient Straps

Accessories – Optional
- Head Holder

2m

Total Body SPECT
Total Body CT
Total Body SPECT/CT

Patient Table

360° CZT DIGITAL SPECT/CT

Patient Table Performance Specifications

Maximum Patient Weight Capacity	227 kg / 500 lb

Pre-Programmed Motions: Via Gantry Controls or Operator's Console Remote Control Screen

- Table Load
- Table Unload
- Table Pre-Defined Positions
- Home Position

Maximum Continuous Scan Range with Table Extender

• SPECT	2 m / 6 ft 5 in
• CT*	2 m / 6 ft 5 in
• SPECT/CT*	2 m / 6 ft 5 in

Maximum Travel Speed

• Horizontal	180 mm/sec; ± 0.5%
• Vertical	12 mm/sec; ± 0.5%

* Helical scan

SPECT Design

360° CZT DIGITAL SPECT/CT

SPECT Scanner Design Specifications

Detector material	Cadmium Zinc Telluride (CZT)
Detector Pixel	2.46 mm x 2.46 mm
Number of Detectors	96 individual CZT detectors

Configuration Design
- 360-Degree Configuration
- Patented swiveling detectors design

Collision Safety Design Per Detector
- Capacitance Proximity Sensor Array
- Pressure Sensitive Devices

Axial Detector Coverage	32 cm
Detectors Radial Range	23 cm – 80 cm
Intrinsic Spatial Resolution	2.46 mm

Extrinsic/Intrinsic Uniformities [%]

• Differential 200 series	≤ 3 %
• Integral 200 Series	≤ 4 %
• Differential 400 series	≤ 1.5 %
• Integral 400 Series	≤ 4 %

Energy Range

• 200 Series	40 – 200 keV
• 400 Series[1]	40 – 400 keV

Planar Sensitivity – Tc99m

• 200 Series	≥ 175 cps/MBq (≥ 385 cpm/µCi)
• 400 Series[1]	≥ 205 cps/MBq (≥ 450 cpm/µCi)

Maximum Count Rate (@ 5% losses)

• Per detector	225 kcps
• Per system	2,700 kcps

1. Not commercially available in some countries.
   Please contact your local representative for regional availability.
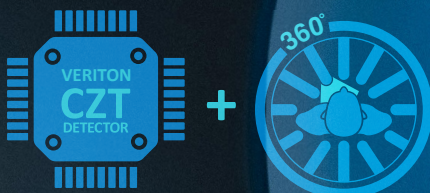
SPECT Performance

360° CZT DIGITAL SPECT/CT

SPECT Scanner Performance Specifications – Tc99m

System Volume Sensitivity (cps/MBq/cm³)

- **200 Series**

Without Focus	≥ 610 k
With Focus	≥ 944 k

- **400 Series[1]**

Without Focus	≥ 760 k
With Focus	≥ 1,175 k

Reconstructed Spatial Resolution with Scatter (mm)

• Central	≤ 4.5 mm
• Radial	≤ 3.9 mm
• Tangential	≤ 3.4 mm

Quantitative Accuracy[*] (%)	5-10%

Energy Resolution: 140 keV (%)

• 200 Series	≤ 5.7%
• 400 Series[1]	≤ 3.8%

* Measured via IEC phantom. May vary based on user set-up and configuration.

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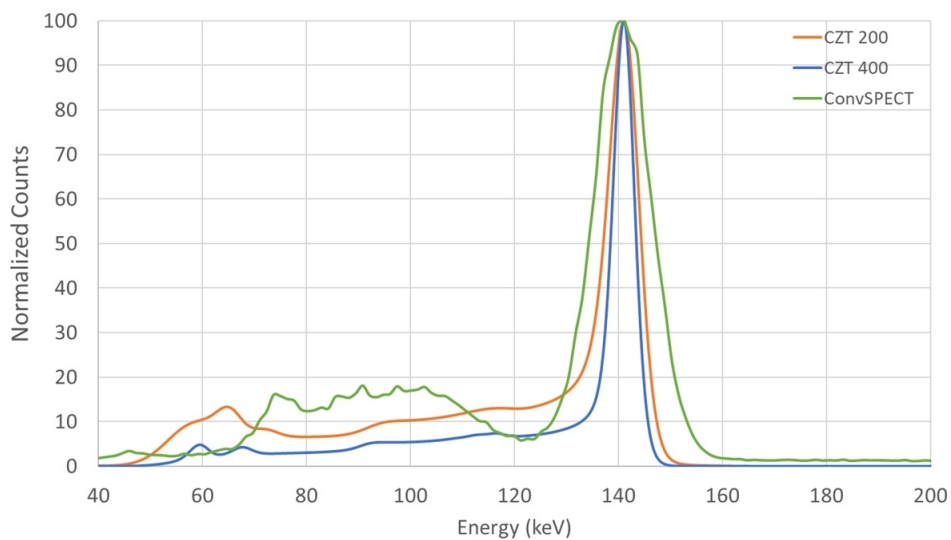
SPECT Performance

360° CZT DIGITAL SPECT/CT

SPECT Scanner Performance Specifications – Lu177

200 Series System Volume Sensitivity (cps/MBq/cm³)

- **113 keV**

Without Focus	≥ 110 k
With Focus	≥ 135 k

400 Series[1] System Volume Sensitivity (cps/MBq/cm³)

- **Dual Peak**

Without Focus	≥ 300 k
With Focus	≥ 365 k

- **113 keV**

Without Focus	≥ 115 k (20% window)
With Focus	≥ 140 k (20% window)

- **208 keV**

Without Focus	≥ 185 k (15% window)
With Focus	≥ 225 k (15% window)

200 Series Energy Resolution: Lu177 (%)

• 113 keV	≤ 7.5%

400 Series[1] Energy Resolution: Lu177 (%)

• 113 keV	≤ 4.5%
• 208 keV	≤ 3.5%

Quantitative Accuracy[*] (%)   5-10%

* Measured via IEC phantom. May vary based on user set-up and configuration.

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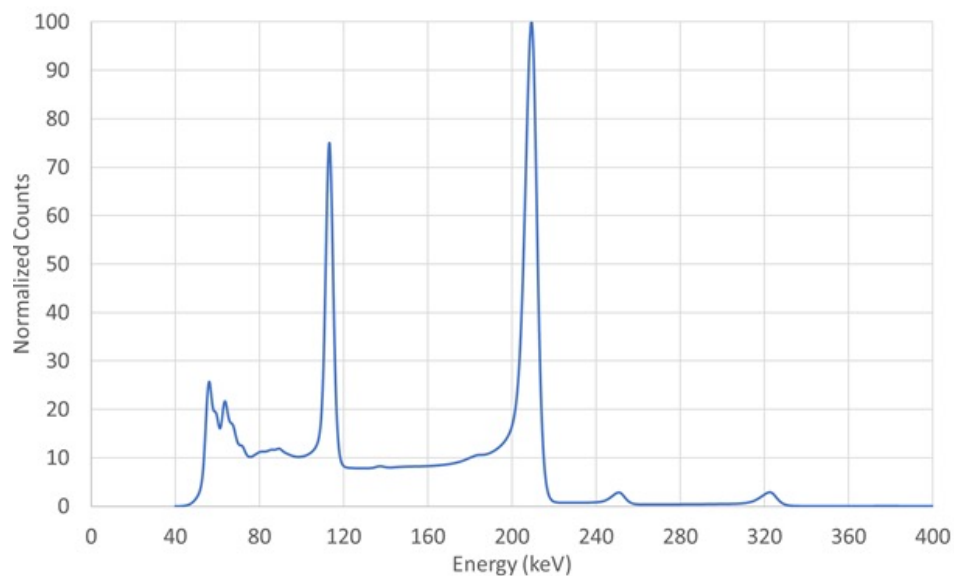
CT Performance

360° CZT DIGITAL SPECT/CT

CT Scanner Specifications	16-Slice	64-Slice
Generator Power	60 kW	80 kW
Generator kV Range (kVp)	80,100,120,140	80,100,120,140
Generator Current Range (mA)	10 – 500	10 – 660
Tube Heat Store Capacity (MHU)	5.3	8
# Detector Elements	14,336	57,344
# DAS Rows	16	64
Detector Material	GOS Ceramic Scintillator	GOS Ceramic Scintillator
Detector Coverage (mm)	20	40
Patient Aperture (Bore Size mm)	80	80
Maximum Rotation Speed (sec)	0.54	0.4
Spatial Resolution (0% MTF)	17.2 lp/cm	18.0 lp/cm
Rotation Speed (360)	0.54, 0.8, 2.0 second	0.42, 0.5, 0.67, 1.0 second
Temporal Resolution (ms)	120	120

16/64

CT Performance

360° CZT DIGITAL SPECT/CT

CT Scanner Specifications	16-Slice	64-Slice
Reconstruction Matrix	512	512
Slice Thickness	0.625	0.625
Reconstruction Speed – Axial/Helical	up to 42 image/second	up to 42 image/second
Selectable FOV	9.6 – 50 cm, any center	9.6 – 50 cm, any center
Extended CT FOV (cm)	85	85
Dose Management	LISA; 4D mA Dose Modulation; Variable Adaptive Filter	LISA; 4D mA Dose Modulation; Variable Adaptive Filter
Metal Artifact Reduction	rMAR	rMAR
Extended Field of View Reconstruction	eFOV	eFOV

16/64

VERITON-CT Software

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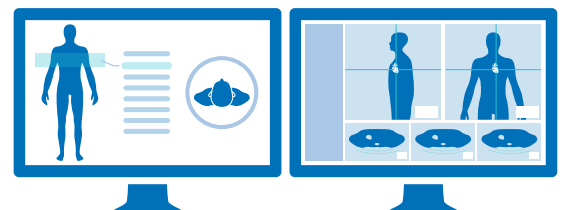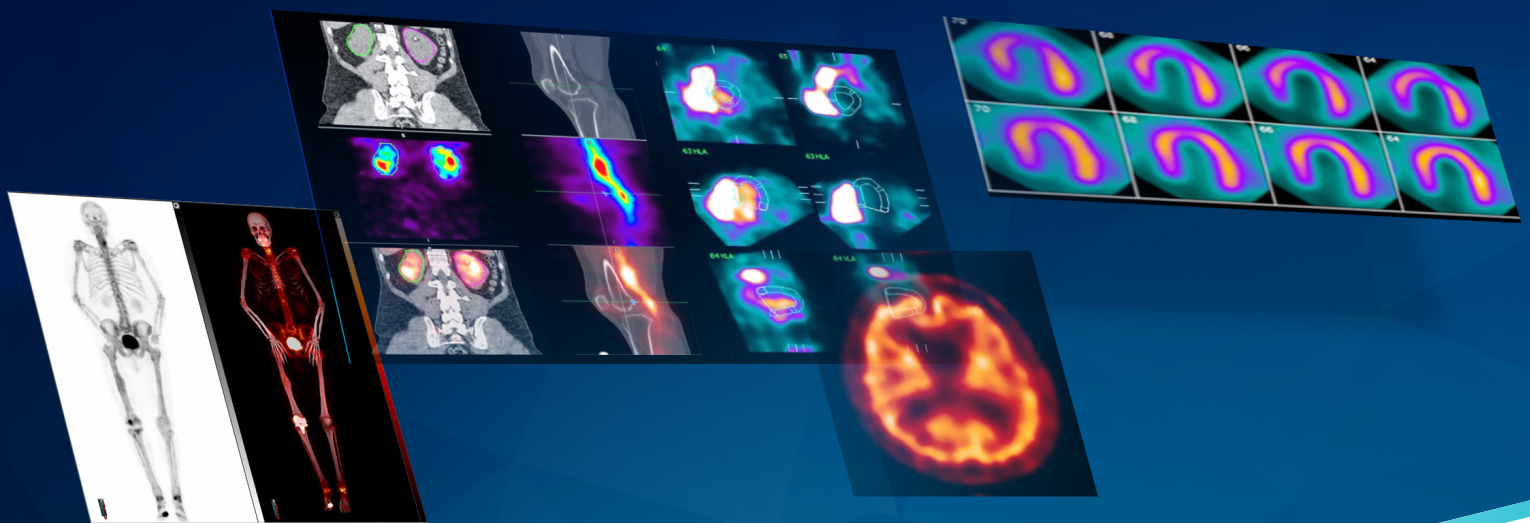## SPECT Acquisition Specifications

Acquisition Options

- SPECT; SPECT/CT
- Dynamic SPECT; Dynamic SPECT/CT
- Gated SPECT; Gated SPECT/CT
- Simultaneous Dual Isotope SPECT; SPECT/CT

Acquisition Type	List Mode
Acquisition Mode	Focus or Non-Focus

VERITON-CT Software

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SPECT Reconstruction Specifications

Reconstruction Options   3D/4D Enhance Toolkit

General SPECT

- Iterative Reconstruction with Resolution Recovery
- Higher Peak Correction

General SPECT/CT Quantitative Reconstruction

- Iterative Reconstruction with Resolution Recovery
- Attenuation Correction
- Partial Volume Correction
- High Peak Correction
- Penalized-Likelihood Reconstruction
- Point Spread Function Recovery
- Scatter Correction
- Multi-View Planar based on
  3D attenuation corrected data

Dynamic SPECT and SPECT/CT   Dynamic Spline Reconstruction

Cardiac SPECT and SPECT/CT   LVC or Cardiac Prior Reconstruction for Cardiac Perfusion

Simultaneous Dual Isotope SPECT/CT   Single Peak and Dual Peak Reconstruction
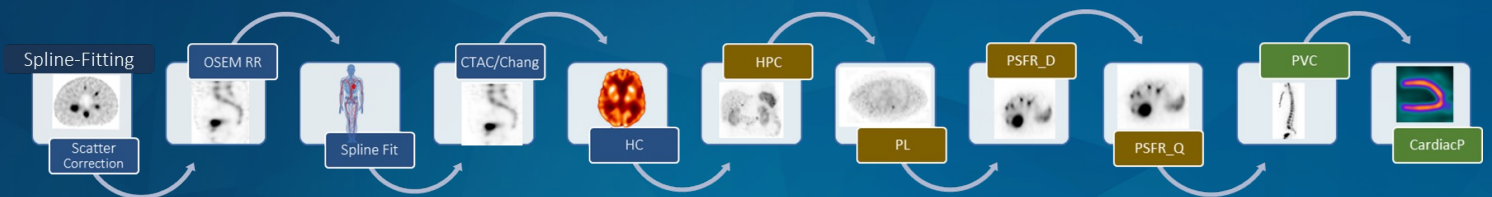
TruView Operator's Console

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TruView Operator's Console Design

Multi-Task Capabilities	Acquisition, Reconstruction, Advanced Image Post-Processing and Review; Data Back-Up	**Advanced Post Processing**	MIM-SD platform
Acquisition Protocols	Factory Defined; Pediatric; User-Customization	**Researcher Tools**	List Mode Data Tools for time reduction, energy window, decay correction
Reconstruction Toolkit	Factory Defined; Pediatric; User-Customization	**Third-Party Tools**	Optional
Database Management	Data transfer; Deletion; Anonymize		
Monitors	Dual-Monitor Configuration		
GPU	Reconstruction Engine Computer		

Third-party post processing software can be added to the scanner configuration and accessed via TruView Operator's Console, without the need to add an additional or separate workstation. Third-party purchasable options include cardiology applications such as Cedars-Sinai Cardiac Suite and Invia 4DM. MIM Neuro for brain quantitation and report generation available.

TruView Operator's Console

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Post Processing

MIM-SD Platform

Receive, transmit, store, retrieve, display, print, and process digital medical images, as well as create, display, and print.

Post-Processing	3D and 4D SPECT and SPECT/CT

Image Fusion Tools	Blend Tool; Translate Tool; Rotate Tool; Fusion Settings Menu

Registration Alignment Tools

- Rigid Assisted Alignment
- Box-based Assisted
- Contour-based Alignment
- Point-based Alignment
- Additional Fusion Tools

User Customizable Tools

- MIM Toolbar
- Radial Menu
- Side Bars
- Keyboard Shortcuts
- User-Defined Workflows

Display and Analysis Tools

Volume rendering for single series and SPECT/CT series MIP fusions. Statistics display viewer.

Organ Segmentation

Anatomical segmentation of multi-modalities to ensure organ and lesion volumes are segmented quickly and effectively. MIM-SD Sector Assist uses segmentation models: Segmentation Surface; Segmentation Regions.

ROI Tools

Reduce the time necessary for the user to define objects in medical image volumes by providing an initial definition of object contours.

Image Manipulation Tools	Annotate; Measure; Sum

TruView Operator's Console

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Post Processing

SUV Measurements

Includes Companion tools: Add SUV sphere; Pin or unpin SUV sphere to a fixed location; Localize to SUV sphere; Localize to the sphere's maximum value; Edit SUV parameters.

SUV calculation types: Body Weight (bw); LeanBody Mass (lbm); Body Surface Area (bsa), and Bq/ml.

SUV displayed statistics: Mean, Max, Longest Diameter, Min, and Max Slice.

General Nuclear Medicine

Tools and applications for General NM processing: Gallbladder, Gastric Emptying, 2D/3D Lung Quant, Renal MAG3, MUGA, Renal DMSA, GI Bleed; Esophageal reflux; HIDA, Cisternogram and Liver Functional Analysis. Included in the suite are custom tools to create user defined analysis of less common procedures such as esophageal emptying, colonic transit, small bowel transit.

Structure Report

Allows user to arrange data from a session in a report that can be saved as DICOM or as a PDF. Structured report templates automate report creation and allow user to quickly gather information as templates for future use and do not contain patient specific data.

4D Imaging

Dynamic 2D and 3D images including the ability to use the static tools for fusion, segmentation, and image manipulation of these types of dynamic volumes.
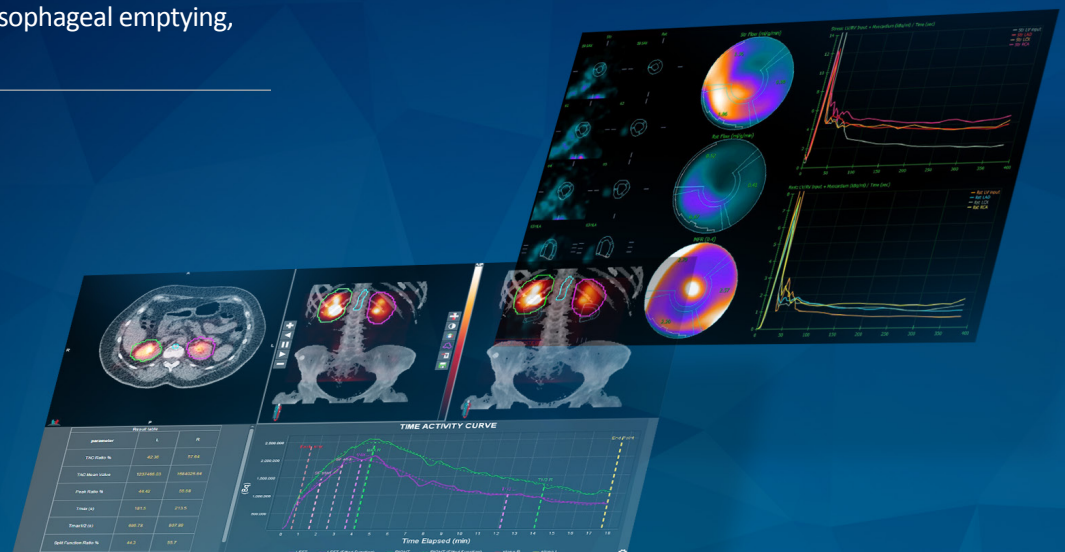
Contact Us

Spectrum Dynamics Medical appreciates the opportunity to share our Nuclear Imaging solutions with you.
To learn more about our products, services and how we can help you, please contact us.

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