



Food and Drug Administration  
10903 New Hampshire Avenue  
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Silver Spring, MD 20993-0002

Siemens Medical Solutions USA, Inc.  
Molecular Imaging  
% M. Alaine Medio  
PET and PCS Regulatory Projects Manager  
810 Innovation Drive  
KNOXVILLE TN 37932

June 1, 2017

Re: K170904  
Trade/Device Name: Biograph Horizon PET/CT  
Regulation Number: 21 CFR 892.1200  
Regulation Name: Emission computed tomography system  
Regulatory Class: II  
Product Code: KPS, JAK  
Dated: May 3, 2017  
Received: May 4, 2017

Dear Alaine Medio:

We have reviewed your Section 510(k) premarket notification of intent to market the device referenced above and have determined the device is substantially equivalent (for the indications for use stated in the enclosure) to legally marketed predicate devices marketed in interstate commerce prior to May 28, 1976, the enactment date of the Medical Device Amendments, or to devices that have been reclassified in accordance with the provisions of the Federal Food, Drug, and Cosmetic Act (Act) that do not require approval of a premarket approval application (PMA). You may, therefore, market the device, subject to the general controls provisions of the Act. The general controls provisions of the Act include requirements for annual registration, listing of devices, good manufacturing practice, labeling, and prohibitions against misbranding and adulteration. Please note: CDRH does not evaluate information related to contract liability warranties. We remind you, however, that device labeling must be truthful and not misleading.

If your device is classified (see above) into either class II (Special Controls) or class III (PMA), it may be subject to additional controls. Existing major regulations affecting your device can be found in the Code of Federal Regulations, Title 21, Parts 800 to 898. In addition, FDA may publish further announcements concerning your device in the Federal Register.

Please be advised that FDA's issuance of a substantial equivalence determination does not mean that FDA has made a determination that your device complies with other requirements of the Act or any Federal statutes and regulations administered by other Federal agencies. You must comply with all the Act's requirements, including, but not limited to: registration and listing (21 CFR Part 807); labeling (21 CFR Part 801); medical device reporting (reporting of medical

device-related adverse events) (21 CFR 803); good manufacturing practice requirements as set forth in the quality systems (QS) regulation (21 CFR Part 820); and if applicable, the electronic product radiation control provisions (Sections 531-542 of the Act); 21 CFR 1000-1050.

If you desire specific advice for your device on our labeling regulation (21 CFR Part 801), please contact the Division of Industry and Consumer Education at its toll-free number (800) 638-2041 or (301) 796-7100 or at its Internet address

<http://www.fda.gov/MedicalDevices/ResourcesforYou/Industry/default.htm>. Also, please note the regulation entitled, "Misbranding by reference to premarket notification" (21 CFR Part 807.97). For questions regarding the reporting of adverse events under the MDR regulation (21 CFR Part 803), please go to

<http://www.fda.gov/MedicalDevices/Safety/ReportaProblem/default.htm> for the CDRH's Office of Surveillance and Biometrics/Division of Postmarket Surveillance.

You may obtain other general information on your responsibilities under the Act from the Division of Industry and Consumer Education at its toll-free number (800) 638-2041 or (301) 796-7100 or at its Internet address

<http://www.fda.gov/MedicalDevices/ResourcesforYou/Industry/default.htm>.

Sincerely,

A handwritten signature in blue ink that reads "Michael D. O'Hara". The signature is written over a large, semi-transparent blue "FDA" logo.

For

Robert Ochs, Ph.D.

Director

Division of Radiological Health

Office of In Vitro Diagnostics

and Radiological Health

Center for Devices and Radiological Health

Enclosure

## Indications for Use

510(k) Number (if known)

K170904

Device Name

Biograph Horizon PET/CT

Indications for Use (Describe)

The Siemens Biograph Horizon PET/CT systems are combined X-Ray Computed Tomography (CT) and Positron Emission Tomography (PET) scanners that provide registration and fusion of high resolution physiologic and anatomic information.

The CT component produces cross-sectional images of the body by computer reconstruction of X-Ray transmission data from either the same axial plane taken at different angles or spiral planes taken at different angles. The PET subsystem images and measures the distribution of PET radiopharmaceuticals in humans for the purpose of determining various metabolic (molecular) and physiologic functions within the human body and utilizes the CT for fast attenuation correction maps for PET studies and precise anatomical reference for the fused PET and CT images.

The system maintains independent functionality of the CT and PET devices, allowing for single modality CT and / or PET diagnostic imaging.

These systems are intended to be utilized by appropriately trained health care professionals to aid in detecting, localizing, diagnosing, staging and restaging of lesions, tumors, disease and organ function for the evaluation of diseases and disorders such as, but not limited to, cardiovascular disease, neurological disorders and cancer. The images produced by the system can also be used by the physician to aid in radiotherapy treatment planning and interventional radiology procedures.

This CT system can be used for low dose lung cancer screening in high risk populations.\*

\*As defined by professional medical societies. Please refer to clinical literature, including the results of the National Lung Screening Trial (N Engl J Med 2011; 365:395-409) and subsequent literature, for further information.

Type of Use (Select one or both, as applicable)

Prescription Use (Part 21 CFR 801 Subpart D)

Over-The-Counter Use (21 CFR 801 Subpart C)

### CONTINUE ON A SEPARATE PAGE IF NEEDED.

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## **510(k) Summary**

as required by 21 CFR Part 807.87(h)

### Identification of the Submitter

Submitter: M. Elaine Medio, RAC  
PET and PCS Regulatory Projects Manager  
Siemens Medical Solutions USA, Inc.  
Molecular Imaging  
810 Innovation Drive  
Knoxville, TN 37932

Manufacturer: Siemens Medical Solutions USA, Inc.  
Molecular Imaging  
2501 North Barrington Road  
Hoffman Estates, IL 60192

Telephone Number: (865)218-2703

Fax Number: (865)218-3019

Date of Submission: March 24, 2017

### Identification of the product

Device Proprietary Name: Biograph Horizon PET/CT Systems

Common Name: Positron Emission Tomography (PET) System  
Computed Tomography (CT) System

Classification Name: Emission Computed Tomography System per 21 CFR  
892.1200  
Computed Tomography X-Ray System per 21 CFR  
892.1750

Product Code: 90 KPS and 90 JAK

Classification Panel: Radiology

Device Class: Class II

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Marketed Devices to which Equivalence is claimed

Predicate:

Device Proprietary Name: Biograph Horizon PET/CT Systems  
Manufacturer: Siemens Medical Solutions USA, Inc.  
Product Code: 90 KPS and 90 JAK  
Device Class: Class II  
510(k) Number: K152880

Reference Devices:

Device Name: Somatom Perspective CT  
Biograph mCT Family of PET/CT systems  
Biograph Horizon and Biograph mCT PET/CT Systems  
Update to Indications  
510(k) Numbers: K151765 (Somatom Perspective CT)  
K151486 (Biograph mCT Family PET/CT)  
K162736 (Biograph Horizon and Biograph mCT PET/CT  
Systems Update to Indications)

Device Description:

The Biograph Horizon PET/CT systems are combined multi-slice X-Ray Computed Tomography and Positron Emission Tomography scanners. These systems are designed for whole body oncology, neurology and cardiology examinations. The Biograph Horizon systems provide registration and fusion of high-resolution metabolic and anatomic information from the two major components of each system (PET and CT). Additional components of the system include a patient handling system and acquisition and processing workstations with associated software.

Biograph Horizon software is a command based program used for patient management, data management, scan control, image reconstruction and image archival and evaluation. All images conform to DICOM imaging format requirements.

The software for the Biograph Horizon systems which is the subject of this application is substantially equivalent to the commercially available Biograph Horizon software.

Modifications include:

- Corrections to software anomalies and addition of new software features, including:
  - Continuous Bed Motion
  - HD·Chest (including Stitched HD Chest)
  - Whole Body Gating

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- HD FoV for Attenuation Correction
  - Phased Matched Gating
  - Low Dose CT Protocols for PET AC
  - SMART Mobile Connect
  - PET Dose Report
  - Enhanced IT Security
  - Scan Protocol Management
  - TeamViewer
  - Dual Topo
  - True Stack

Additionally, minor modifications have been made to the patient bed electronics due to obsolescence issues. These changes do not affect system performance characteristics and have no impact on safety or effectiveness.

**Intended Use:**

The Siemens Biograph Horizon systems are combined X-Ray Computed Tomography (CT) and Positron Emission Tomography (PET) scanners that provide registration and fusion of high resolution physiologic and anatomic information.

The CT component produces cross-sectional images of the body by computer reconstruction of X-Ray transmission data from either the same axial plane taken at different angles or spiral planes taken at different angles. The PET subsystem images and measures the distribution of PET radiopharmaceuticals in humans for the purpose of determining various metabolic (molecular) and physiologic functions within the human body and utilizes the CT for fast attenuation correction maps for PET studies and precise anatomical reference for the fused PET and CT images.

The system maintains independent functionality of the CT and PET devices, allowing for single modality CT and / or PET diagnostic imaging.

These systems are intended to be utilized by appropriately trained health care professionals to aid in detecting, localizing, diagnosing, staging and restaging of lesions, tumors, disease and organ function for the evaluation of diseases and disorders such as, but not limited to, cardiovascular disease, neurological disorders and cancer. The images produced by the system can also be used by the physician to aid in radiotherapy treatment planning and interventional radiology procedures.

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\*As defined by professional medical societies. Please refer to clinical literature, including the results of the National Lung Screening Trial (N Engl J Med 2011; 365:395-409) and subsequent literature, for further information.

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**Performance Testing / Safety and Effectiveness:**

Performance testing for the CT subsystem was included in the original premarket notification for the CT subsystems and there have been no changes affecting this testing.

PET Testing in accordance with NEMA NU2:2012 was conducted on two different configurations of the Biograph Horizon systems, a 3 ring version and a 4 ring version (TrueV).

| <b>Performance Criteria</b>   | <b>Results</b> | <b>Acceptance</b>   |
|---|----------------|---|
| <b>Resolution – Full Size</b>   |                |   |
| Transverse Resolution FWHM @ 1 cm                                     | Pass           | ≤ 4.7 mm  |
| Transverse Resolution FWHM @ 10 cm                                    | Pass           | ≤ 5.5 mm  |
| Transverse Resolution FWHM @ 20 cm                                    | Pass           | ≤ 7.6 mm  |
| Axial Resolution FWHM @ 1 cm  | Pass           | ≤ 5.0 mm  |
| Axial Resolution FWHM @ 10 cm   | Pass           | ≤ 7.0 mm  |
| Axial Resolution FWHM @ 20 cm   | Pass           | ≤ 11.3 mm   |
| <b>Resolution – 256 x 256</b>   |                |   |
| Transverse Resolution FWHM @ 1 cm                                     | Pass           | ≤ 7.3 mm  |
| Transverse Resolution FWHM @ 10 cm                                    | Pass           | ≤ 7.6 mm  |
| Transverse Resolution FWHM @ 20 cm                                    | Pass           | ≤ 8.9 mm  |
| Axial Resolution FWHM @ 1 cm  | Pass           | ≤ 6.1 mm  |
| Axial Resolution FWHM @ 10 cm   | Pass           | ≤ 7.3 mm  |
| Axial Resolution FWHM @ 20 cm   | Pass           | ≤ 11.9 mm   |
| <b>Count Rate / Scatter / Sensitivity</b>                             |                |   |
| Sensitivity @435 keV LLD  | Pass           | ≥ 5.8 cps/MBq<br>≥ 10.9 cps/MBq (TrueV)                     |
| Count Rate peak NECR  | Pass           | ≥ 78 kcps @ ≤ 26 kBq/cc<br>≥ 135 kcps @ ≤ 26 kBq/cc (TrueV) |
| Count Rate peak trues   | Pass           | ≥285 kcps @ ≤ 53 kBq/cc<br>≥ 465 kcps @ ≤ 42 kBq/cc (TrueV) |
| Scatter Fraction at peak NECR   | Pass           | ≤ 40%   |
| Mean bias (%) at peak NEC   | Pass           | ≤ 6%  |
| <b>Image Quality (4 to 1) - (% Contrast / Background Variability)</b> |                |   |
| 10mm sphere   | Pass           | ≥ 10% / ≤ 10%   |
| 13mm sphere   | Pass           | ≥ 25% / ≤ 10%   |
| 17mm sphere   | Pass           | ≥ 40% / ≤ 10%   |
| 22mm sphere   | Pass           | ≥ 55% / ≤ 10%   |
| 28mm sphere   | Pass           | ≥ 55% / ≤ 10%   |
| 37mm sphere   | Pass           | ≥ 60% / ≤ 10%   |

All Performance testing met the predetermined acceptance values.

The device labeling contains instructions for use and any necessary cautions and warnings to provide for safe and effective use of the device.

Risk Management is ensured via a risk analysis in compliance with ISO 14971 to identify and provide mitigation to potential hazards beginning early in the design cycle and continuing throughout the development of the product. Siemens Medical Solutions, USA Inc. adheres to recognized and established industry standards such as IEC 60601-1 series and 21 CFR 1020.30 and 21 CFR 1020.33 to minimize electrical, mechanical and radiation hazards.

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Verification and validation of Siemens systems is performed in accordance with documented procedures, design and code reviews, test plans and specifications. Traceability of the requirements specified in the requirement specifications and functional specifications is ensured during component integration, software validation and system testing.

**Statement regarding Substantial Equivalence:**

There have been no changes implemented in the modifications to the Biograph Horizon that impact either the fundamental technology or the indications for use. The Biograph Horizon with the modifications outlined in this Premarket Notification is substantially equivalent to the currently commercially available predicate device.