



siemens.com/biograph-pet-ct

Motion Management

Biograph Family of PET/CT Scanners

Motion Management— Biograph Family of PET/CT Scanners



Percentage of
oncological disease
located in the chest
or abdomen¹

In 90% of PET/CT oncology cases, disease is located in the chest or abdomen.¹ Those areas are subject to respiratory motion, which can displace organs and lesions by a range of 5 to 30 mm in each breathing cycle.² Since PET acquisitions typically require several minutes, those lesions will move during respiration, resulting in blurred images.

To minimize the effect of breathing, an external device can be used to measure the respiratory cycle and to synchronize it with the PET/CT scan, a technique called respiratory gating. When motion for respiration is corrected, partial volume effect is reduced, and the visualization of small lesions is improved.

The Biograph™ family of PET/CT scanners provides a comprehensive solution for respiratory motion management and supports various external trigger devices from different manufacturers.

CT Respiratory Gating

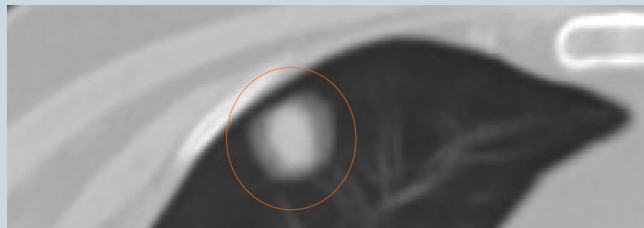
CT respiratory gating can be performed in prospective and retrospective mode. It also supports advanced reconstruction methods such as average CT and temporal maximum intensity projection (t-MIP). In a t-MIP image the voxel value for a certain position is the maximum throughout all breathing phases for that position, and therefore, the spatial displacement of a lesion can be visualized in a single image.

PET Respiratory Gating

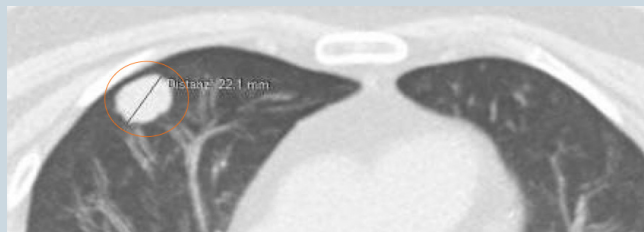
On the Biograph family of PET/CT scanners, PET is acquired in list-mode and respiratory motion is managed with reconstruction software. This provides a high level of flexibility, as various reconstruction methods and the reconstruction range can be selected retrospectively.

Biograph scanners support several gating reconstruction modes, such as phase- and amplitude-based gating and up to 24 gates.

Conventional CT



t-MIP



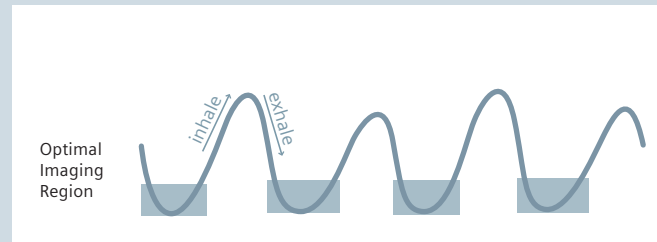
Data courtesy of AZ Turnhout, Belgium.

Combining PET and CT Respiratory Gating

All Biograph scanners provide a similar interface for both PET and CT gating. The phase-matched gating option enables one-click matching of PET and CT-gated datasets for improved registration and attenuation correction.

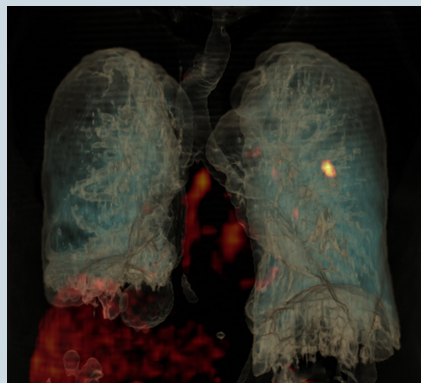
HD•Chest

HD•Chest is an automated solution for PET amplitude-based gating that analyzes each patient's individual breathing pattern and identifies the portion of the respiratory cycle with the least motion. This area of the cycle is where the most data can be collected, without motion, in the shortest amount of time. Using the list-mode data that synchronizes with the optimum area of the respiratory curve, a virtually motion-frozen image is reconstructed.

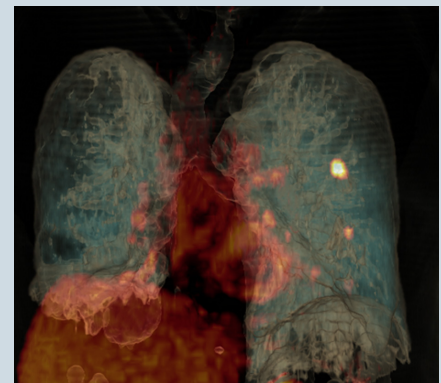


In a 2014 study, HD•Chest detected 13.8% more lesions than static reconstruction.³ In this example, one additional small lesion on the left lung is visualized with HD•Chest that cannot be seen on the static image.

Static

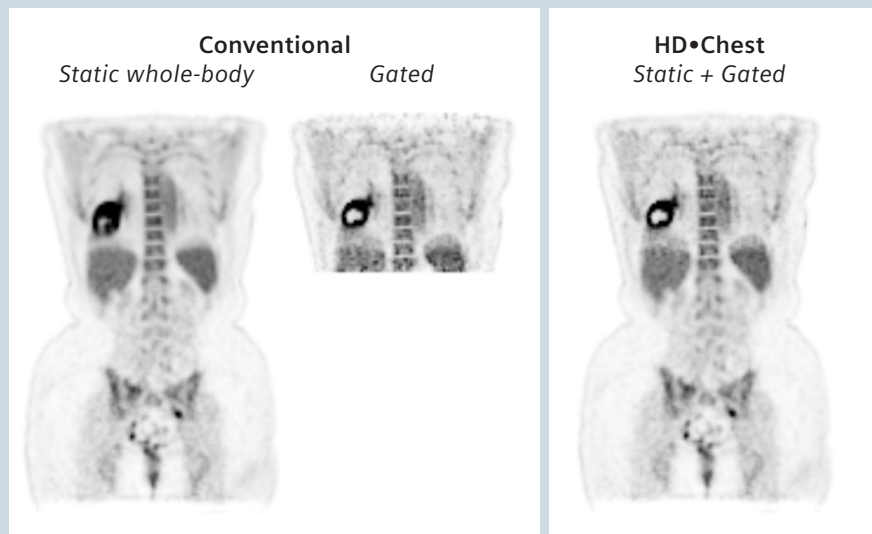


HD•Chest



Data courtesy of University of Tennessee, Radiology and Radiation Therapy, Knoxville, Tennessee, USA.

Finally, HD•Chest images can be integrated in the whole-body dataset. This can help minimize the number of images the physician has to interpret, **reducing reporting time while providing more clinical information.**



Data courtesy of University of Tennessee, Radiology and Radiation Therapy, Knoxville, Tennessee, USA.

Siemens Healthcare Headquarters

Siemens Healthcare GmbH
Henkestr. 127
91052 Erlangen
Germany
Telephone: +49 9131 84-0
siemens.com/healthcare

Global Business Line

Siemens Medical Solutions USA, Inc.
Molecular Imaging
2501 North Barrington Road
Hoffman Estates, IL 60192
USA
Telephone: +1 847 304-7700
siemens.com/mi

"Siemens Healthineers" is considered a brand name. Its use is not intended to represent the legal entity to which this product is registered. Please contact your local Siemens organization for further details.

Order No. A91MI-10443-1C-7600 | Printed in the USA
MI-3095.KBK.JV.TW.3000
© Siemens Healthcare GmbH, 09.2016

¹ BIO-TECH SYSTEMS, INC. Report 2008

² Grills, Inga S et al. "Potential for reduced toxicity and dose escalation in the treatment of inoperable non-small-cell lung cancer: A comparison of intensity-modulated radiation therapy (IMRT), 3D conformal radiation, and elective nodal irradiation." *International Journal of Radiation Oncology, Biology • Physics*, Volume 57, Issue 3, 875-890

³ Van Der Gucht, et al. "Impact of a new respiratory amplitude-based gating technique in evaluation of upper abdominal PET lesions." *Eur Radiol.*, Mar, 83(3):509-15, 2014

Siemens Molecular Imaging reserves the right to modify the design and specifications contained herein without prior notice. Please contact your local sales representative for the most current information. Some options and functionality will not be available immediately on product release. Where certain options and functionality are not available on delivery, these will be delivered as part of subsequent software or hardware releases. Please confirm availability and timing with your representative.

Trademarks and service marks used in this material are property of Siemens Healthcare GmbH. All other company, brand, product and service names may be trademarks or registered trademarks of their respective holders.