It was my pleasure to meet many of you at the Society of Nuclear Medicine in San Antonio a few weeks ago, many of you for the first time. As the new General Manager of Nuclear Medicine for Philips Healthcare, I am excited by all the latest discoveries in our field.

At SNM this year, we focused on Imaging 2.0, Philips approach to address the challenges that surfaced by speaking with over 3,000 customers this past year. These challenges include the demand for stronger service and cost reduction, as well as workflow solutions to address patient loads. Hybrid imaging is at the forefront of diagnostic imaging technology today, and new developments in molecular imaging and personalized medicine hold the promise for better patient outcomes and care. I hope you had the opportunity to view our latest innovations and talk with a representative about what we are working on and how Philips can help address your clinical needs.

With most of my career focused on marketing and sales, I have a reputation for building strong customer relationships. During my tenure at Philips over the past 10 years, I have served in various marketing and sales leadership roles in Interventional X-ray and Diagnostic X-ray, where I was responsible for over 60% of Philips North American Imaging business. During this time, Philips Interventional X-ray business grew to a dominant market position by listening to our customers and providing tangible solutions to meet their requirements.

You can trust that I will bring this same leadership to the Nuclear Medicine business. I look forward to visiting your facility with my teams, getting to know you and your staff and addressing your needs with the latest solutions in Nuclear Medicine. I also hope to see many of you again at upcoming events such as ASTRO and RSNA – where Philips will continue to bring you new Imaging 2.0 solutions in clinical collaboration, patient focus, and improved economic value.

Until then, enjoy your summer.

Rich Fabian
General Manager, Nuclear Medicine
Handling anxiety

Anxiety is a normal human reaction. Patients often experience anxiety when going to a hospital for a scan. Due to increased anxiety, unknown surroundings and objects in a hospital may appear more negative and threatening than under normal circumstances. Excessive anxiety can make patients less capable of processing information given to them by the staff.

Philips Ambient Experience provides a positive environment for patients and healthcare professionals to enhance clinical processes and patient care. Ambient Experience integrates architecture, design and enabling technologies, such as dynamic lighting, sound and imaging, to allow patients to personalize their environment and surround themselves in a relaxing atmosphere.

The innovative, people-focused solution allows patients to select room themes, empowering them to be involved in their own care. Specifically for oncology patients Ambient Experience offers the possibility to choose a different theme for each follow up scan to help make each return visit a little different.

Look how Ambient Experience can impact your PET/CT suite. Take an interactive 360° tour at http://www.healthcare.philips.com/main/products/ambient_experience/clinical_solutions/demos/freiburg/index.wpd
Introducing TruFlight Select PET/CT

Our newest PET/CT scanner makes Time-of-Flight (TOF) technology accessible virtually to everyone. Thanks to Imaging 2.0, a new approach to imaging technology, the TOF technology that was previously available only on premium systems is now available to all.

According to a recent NIH study,1 TOF scans can help improve lung and liver lesion detectability. In the study, the improvement was more pronounced in heavy patients. Philips proprietary TOF technology, Astonish TF, reduces noise in PET imaging and has up to 30% contrast improvement, resulting in exceptional image quality for increased diagnostic confidence and improved small lesion detection. Furthermore, 4D TOF respiratory motion management enhances accuracy through reduced motion artifacts all leading up to improved clinical results.

Diagnostic CT capabilities also allow the system to be used not only for PET/CT scans, but also for standalone CT scans, thereby serving a dual purpose. This is just another way Philips has optimized our systems technologically, clinically, and operationally to fit within your individual needs.

With up to 5 times higher sensitivity than non-TOF scanners, you may be able to reduce radiopharmaceutical dosing in some or all studies. With fast acquisition and reconstruction speeds, TruFlight allows customers to improve workflow, maintain low patient exposure, and create superb images all at an affordable price.

The TruFlight Select was launched at this year’s Society of Nuclear Medicine annual meeting in San Antonio Texas.

BrightView XCT Version 2.5

Philips Healthcare is pleased to announce the release of BrightView XCT Version 2.5 software with enhanced soft tissue image quality achieved through iterative CT reconstruction for better uniformity and less noise. Philips first introduced this iterative reconstruction software at the 2010 Society of Nuclear Medicine meeting as Full Iterative Technology (FIT) – the first hybrid system to provide both iterative SPECT and CT reconstruction capabilities. FIT builds on the value of Astonish SPECT reconstruction, iterative technology that has been proven in practice to improve image quality and reduce dose. This leading technology provides the necessary foundation for advancing future developments in iterative CT reconstruction.

Iterative reconstruction can be more sensitive to motion. Therefore iterative reconstruction is not available for 60 second cardiac attenuation correction scans. To achieve the maximum benefit of iterative reconstruction, it is important to use breath holding techniques when acquiring localization images of the chest, abdomen or pelvis. Because some patients are unable to fully comply with breath holding instructions, filtered back projection images are always available.

Version 2.5 software is delivered with BrightView XCT systems manufactured in May 2011 and is available as an upgrade to the installed base at no charge.

The images below demonstrate uniformity improvements

The images below demonstrate noise reduction
Philips Nuclear Medicine case study contests

You are invited to participate in two exciting new case study contests.

Philips is pleased to announce case study contests for our BrightView XCT and GEMINI TF Big Bore PET/CT systems.

### BrightView XCT

Case studies for BrightView XCT case study contest must demonstrate how the addition of attenuation correction and localization capabilities add significant value to a SPECT study.

Case study contest winner will be announced at the European Association of Nuclear Medicine Meeting (October 2011).

**Case study submissions must be completed between June 1, 2011 – September 9, 2011.**

For complete information on the BrightView XCT case study contest, please contact Jody Garrard, Senior Product Manager, SPECT/CT jody.garrard@philips.com

### GEMINI TF Big Bore

Case studies for GEMINI TF Big Bore case study contest must demonstrate the clinical value of Time-of-Flight PET/CT in radiation therapy planning.

Case study contest winner will be announced at the ASTRO’s 53rd Annual Meeting (October 2011).

**Case study submissions must be completed between June 1, 2011 – September 2, 2011.**

For complete information on the GEMINI TF Big Bore PET/CT case study contest, please contact Raffi Kayayan, PhD, Senior Product Manager, PET/CT raffi.kayayan@philips.com

Don’t miss out on this exciting opportunity. Contact us today.
With the introduction of Precedence, and more recently of BrightView XCT, came a new method to perform myocardial perfusion imaging with attenuation correction (AC). Some of our customers who had previous experience using Vantage, our line source based attenuation correction, have noted differences between the attenuation correction they were used to with Vantage and what they’re seeing now. This article summarizes the differences between legacy Vantage attenuation correction and CT-based attenuation correction available with BrightView XCT and Precedence.

**Reconstruction method**

Vantage acquisitions have historically used the MLEM, or maximum likelihood expectation maximization method, to reconstruct the SPECT data. While MLEM can also be used with CT-based attenuation correction, it is more typical to use OSEM (ordered subset expectation maximization) or Astonish (which is OSEM with resolution recovery) for CT-AC reconstructions. While MLEM and OSEM are both iterative reconstruction methods, OSEM converges more rapidly because there are more updates per iteration. This allows for more sophisticated physics modeling to be incorporated into the reconstruction algorithm while maintaining clinically acceptable reconstruction times.

**Scatter correction**

For Vantage with MLEM, scatter is estimated from the measured counts in a fixed “scatter” energy window located between the 140 keV emission peak for Tc-99m and the 100 keV transmission peak of the Gd-153 line sources. (Scatter correction is only applied for Tc-99m Vantage studies; scatter correction is not used with Tl-201 Vantage studies.) This estimated scatter component is subtracted from the emission projection data prior to reconstruction.

For CT-AC with OSEM, scatter correction is performed using the ESSE (Effective Source Scatter Estimation) method. With this approach, the estimate of the scatter is calculated from the emission image estimate, the attenuation map, and a pre-calculated three-dimensional scatter kernel that is specific to the emission photon energy and the target energy windows. This modeled scatter component is then added to the current estimate for forward-projection before it's compared to the measured projection data in the iterative reconstruction process. This scatter correction method can be used with any emission isotope provided that the appropriate scatter kernel exists on the workstation. (On the EBW NM, scatter kernels currently exist for Tc-99m, Tl-201, I-123, I-131, In-111, Ga-67, and Lu-177.)

**Resolution recovery**

For Vantage with MLEM, the projection data is filtered with a sharpening filter based on an average distance between the detector and the heart prior to reconstruction.

For CT-AC, Astonish performs resolution recovery using the patient to collimator distance as well as the collimator distance response function. During the acquisition of patient data, the distance from the collimator to the center of rotation is recorded for each projection angle. During the reconstruction process, the amount of blurring is calculated based on this measured distance and a mathematically calculated or measured collimator response function like the example shown below. The counts are spread over multiple pixels during both the forward- and back-projection steps of the iterative reconstruction and the degree of broadening is determined by the distance between the pixel and the collimator and the collimator response function.

![LEHR resolution vs. distance](chart)

**Attenuation correction**

When it comes to the actual attenuation correction piece of the reconstruction, the main difference between Vantage and CT-AC is how a tissue transmission density image is acquired and how the attenuation map is created from this image. For Vantage acquisitions, the attenuation map is reconstructed from the Gd-153 line source...
transmission projection data. For CT-AC, the attenuation map is
generated from the X-ray CT image by converting the Hounsfield
values to linear attenuation coefficients using a piecewise linear
model. In both cases, the resulting attenuation map is a matrix
of linear attenuation coefficients at 100 keV (the emission peak for
Gd-153). Furthermore, the application of attenuation correction
during the iterative reconstruction process is also the same for
Vantage and CT-AC. The attenuation map is used to calculate
the amount of attenuation from each point in the object through
the body in the forward-projection process. Since the emission
energy is typically not 100 keV, the linear attenuation coefficients
in the attenuation map are scaled to the appropriate emission
photon energy using the relative linear attenuation coefficients
for water at the two energies.

The bottom line
Iterative reconstruction methods are well suited to improve image
quality and clinical performance by incorporating internal modeling
of the imaging physics in SPECT reconstructions to correct for
the major factors degrading image quality. The more accurately
the imaging physics can be modeled, the more accurate the
reconstruction process can be.

For Vantage with MLEM, scatter correction and resolution recovery
are achieved by applying relatively rudimentary corrections to
the projection data prior to reconstruction. When processing
Vantage data with MLEM, the *-EMSCR emission projection
data is loaded into AutoSPECT. In this naming convention, “EM”
stands for emission, “SC” is for scatter correction, and “R” is
resolution recovery; the scatter correction and resolution recovery
have already been applied to the projection data before the
reconstruction begins.

CT-AC with OSEM or Astonish, on the other hand, uses a more
sophisticated scatter model and incorporates the scatter correction
into the iterative reconstruction process. The resolution recovery
provided by Astonish is based on measured distance and a measured
collimator response function also incorporated into the iterative
reconstruction process. By more accurately modeling the imaging
physics in the reconstruction process, CT-AC images reconstructed
with Astonish correspond more closely to the true activity
distribution as demonstrated by phantom experiments.

Using Astonish with Vantage data
With the introduction of AutoSPECT Pro on EBW NM, some
Vantage customers now have the opportunity to use Astonish
with their Vantage data from some cameras. Since Astonish
needs the measured radial distance for each projection in order
to calculate the amount of collimator blur, only those Philips
cameras that record this radius information can be used, that is,
Forte release 2.0 or later and CardioMD release 2.0 or later.
When reconstructing Vantage data with Astonish, it’s important
to remember that the raw emission data, not the *-EMSCR files
used with MLEM, should be loaded into AutoSPECT Pro. Since
Astonish applies scatter correction and resolution recovery
during the iterative process, uncorrected projection data should
be used as the input data.

It’s also important to note that AutoSPECT Pro on EBW NM
has two types of preferences that can be used for attenuation
correction; the difference between these two types of
preferences is the behavior of the AC Map step. For a Vantage
preference, the AC Map step allows the user to set up and
execute the reconstruction of the Gd-153 transmission data in
order to generate the attenuation map. For a CT-AC preference,
the AC Map step allows the user to check (and adjust if
necessary) the registration between the SPECT data and the
CT data used to generate the attenuation map. In order to
reconstruct Vantage data with attenuation correction, you must
start with a Vantage preference; you cannot change a CT-AC
preference into a Vantage preference or vice versa.

When creating preferences for reconstructing CardioMD data
with AC using Astonish, there is a characteristic of CardioMD
data that one needs to keep in mind; only the primary data
set acquired on CardioMD will contain the radius information
required by Astonish. This will be the gated data set for a gated
acquisition and the “EM” data set for a non-gated study. So for
a gated study, only the gated data and the transmission data
(*-TRSC) should be loaded into a Vantage preference. The stress
and rest buckets must remain empty because the summed stress
and rest data sets will not contain the radial information required
by Astonish. However, AutoSPECT Pro will sum the gated data
on the fly to facilitate the reconstruction of the summed data
with Astonish and AC. For a non-gated study, the raw emission
data (“*-EM”) and the transmission data (*-TRSC) should be
loaded into a Vantage preference.

Clinical update

How to process Gated Blood Pool SPECT acquisitions in AutoSPECT

Most people are familiar with processing Gated Blood Pool SPECT studies (GBPS) in AutoQUANT/QBS but many are not as familiar with how to reconstruct and reorient these studies in AutoSPECT+ or AutoSPECT Pro.

Reconstruction
One of the hardest parts about processing a GBPS (Gated Blood Pool SPECT) is the reconstruction. Since GBPS studies are less common than SPECT perfusion studies, most people will reconstruct the data as they are used to, which means only including the left ventricle.

Correct reconstruction limit lines include pulmonary conus (LAO and RAO projection)
Incorrect reconstruction limits potentially exclude RV and pulmonary conus (LAO projection)

Reorientation
The lack of familiarity with GBPS can also lead to incorrect reorientation and cropping. Cropping of structures other than the LV can lead to segmentation failures.

Correct cropping and reorientation
Incorrect reorientation on the vertical long axis image (long axis of the LV should be horizontal)
Multiple cropping errors (the atria are cropped, and the pulmonary conus is truncated)

Adapted with permission from the “Gated Blood Pool SPECT Processing with QBS/BPGS” white paper by Serge Van Kriekinge, PhD, dated May 26, 2010. Available upon request. Images courtesy of Serge D. Van Kriekinge, PhD, Cedars-Sinai Medical Center.
Are you aware?

Are you aware of the new ACR Accreditation deadline and the “emergency use” clause in the ACR Program Requirements?

Are you aware that Philips has a Clinical Education website that provides links to education resources such as courses, product documentation, and “Quick Step” procedures?

Are you aware that you can be kept up to date on the latest Philips products and solutions through the Philips Interactive FlashDrive?

If not, read on . . . .

ACR accreditation deadline

Currently, the ACR Nuclear Medicine/PET Accreditation Program is a voluntary process. However, effective January 1, 2012, all providers that bill for CT, MRI, breast MRI, nuclear medicine, and PET under part B of the Medicare physician fee schedule must be accredited in order to receive reimbursement for the technical component from Medicare.

The ACR website has information on the accreditation process for SPECT and PET, including requirements for accreditation, frequently asked questions, and application forms.
http://www.acr.org/accreditation/nuclear.aspx

The site also includes a very helpful document that describes the SPECT phantom criteria that can help you evaluate your results before you submit them. Refer to the document “ACR Phantom Criteria.”
http://www.acr.org/accreditation/nuclear/qc_forms.aspx

The document states the reconstructed uniformity criteria as:
Satisfactory: Faint ring artifacts visualized in the UNIFORMITY and in the complete set of all slices that are not thought to be clinically significant or vice versa. Marginal: Strong artifacts are seen in no more than two slices of the complete set.

These criteria apply to all isotopes submitted. The document also includes detailed requirements for contrast and resolution that are isotope specific. If a phantom acquisition receives two “Marginal” scores, it fails.

In order to meet the requirements we recommend that your SPECT system be tuned by your service engineer before you acquire your phantom images and that you use a non-circular orbit for your acquisition.

We encourage you to start your application process early to avoid any unplanned delays at the end of the year.

Emergency use clause

Per the Nuclear Medicine/PET Accreditation Program Requirements document dated 2/28/2011, on the ACR website, a Nuclear Medicine camera does not need to be accredited for an isotope or procedure if it is used only infrequently for that isotope. If less than 5 examinations are performed outside a unit’s accreditation status in any 30 day period, or less than 25 examinations in any 12 month period, you need not submit phantom or clinical examples for that isotope for your unit and you will not jeopardize the facility’s accreditation status.

Refer to page 3 of the Nuclear Medicine/PET Accreditation Program Requirements document dated 2/28/2011 on the ACR website for full details of the Emergency Use Requirement.
Clinical Education Quick Steps

One of the many resources available on the Clinical Education website is “Quick Steps.” Quick Steps are abbreviated “How to” guides for frequently asked acquisition and processing procedures. For example, there are Quick Step guides for:

- Acquiring SPECT Phantom Data for ACR accreditation
- Setting up Shortcut keys on EBW NM workstation
- Acquiring 18F NaF Bone Scan on Gemini TF Big Bore system

In order to access the Quick Steps, you must be a registered Philips customer.

Clinical Education website registration

1. Launch Internet Explorer and enter [www.philips.com/clinicaleducation](http://www.philips.com/clinicaleducation) in the address line. The Philips Clinical Education website will be displayed.

2. Click on the First Time User section to create an account. Your Philips Site Number is your key to gain access to the secure “customers only” Clinical Education website.

3. Follow the screen instructions for registration.

Accessing Quick Step documentation

1. Once you have registered, log in.

2. Under the heading Documentation,
   - click on Hybrid Imaging for PET/CT and Precedence documentation; or
   - click on Nuclear Medicine for SPECT documentation

3. Read the information on Navigating Documentation and then select the product of interest from the links on the left side of the page.

4. The Quick Steps are located under the product Quick Steps and Guides tab.

The Philips Customer Care Solutions Center in Atlanta has a full team of technical and clinical associates to support you. Call us at 800-722-9377.
Philips Interactive FlashDrive

Stay in touch with the latest in Philips nuclear medicine products and services, including image galleries, demo videos, and peer testimonials.

The Philips Interactive FlashDrive makes it simple to stay up to date through a convenient and easy-to-use dynamic tool that gives you the choice of updating information whenever you connect to the Internet.

**Access is simple**
Contact your Sales Representative to receive this drive.

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See the answer in our next Point Source newsletter.
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If you have a question or concern that you would like to see answered, please write us at pointsource@philips.com

Please note that this method of communication is not a means for service or regular support issues. Not all questions or concerns will be addressed in the newsletter but all will be answered.

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How to reach us
www.philips.com/healthcare
healthcare@philips.com

Asia
+49 7031 463 2254

Europe, Middle East, Africa
+49 7031 463 2254

Latin America
+55 11 2125 0744

North America
+1 425 487 7000
800 285 5585 (toll free, US only)

Please visit www.philips.com/nuclearmedicine