ADDITIONAL RESOURCES:
Read more on Siemens TrueD

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Software Fine-tunes

Longitudinal Imaging of Cancer

Comparing and evaluating imaging studies from different time points — such as pre- and post-therapy — is key in the diagnosis and treatment of cancer. Siemens Medical Solutions *syngo* TrueD provides the ability to do just that by automatically registering and displaying PET/CT or SPECT/CT images from studies acquired at different times.

TrueD uses advanced visualization tools to display volume-rendered CT images fused with the functional PET or SPECT datasets. Volumes of Interest (VOI) can be drawn to calculate Standardized Uptake Values (SUV) within lesions. Both studies are displayed on the screen at the same time in compare-mode layout, while single-mode layout displays one study — with the other study available in the background. Reporting tools also are included.

Working with the *syngo*-based software since November 2006, is Andreas Wahl, MD, a specialist for nuclear medicine, radiology, and PET/CT for the Röntgenzentrum Hamburg at the PET/CT-Zentrum Hamburg (PET/CT Center in Hamburg, Germany). Since March 2005, specialists at the facility have focused on oncology patients using a Siemens Biograph 16, a 16-slice PET/CT scanner. Wahl discusses TrueD's role in that work.

Q How would you describe the technological developments in the longitudinal imaging of cancer?

WAHL: Functional imaging in conjunction with morphological information is becoming more important in diagnosis and treatment of cancer. This information is necessary to provide quantitative criteria for treatment.

Q Why is TrueD a vital tool for cancer diagnosis?

WAHL: TrueD, our primary evaluation tool for comparing, reporting, and documenting our PET/CT studies, focuses on hybrid imaging studies, which are becoming standard in oncology imaging. Because PET/CT studies produce a large amount of data, physicians need an efficient software tool like TrueD which allows fast and easy display and navigation of the studies.

Q What modalities does it support, and how many imaging sessions or studies can it handle at one time?

WAHL: TrueD supports CT, PET (attenuation-corrected and nonattenuation-corrected) and SPECT data. It can handle a maximum of six image sets, two CT and four PET studies (two AC and two NAC) at one time. That means you can compare PET/CT examinations at two different time points.

Q How has TrueD improved visualization and comparative evaluation of PET/CT and SPECT/CT studies?

WAHL: A set of screen layouts allows users to easily adapt the display of a PET/CT study for different needs during an evaluation. Dual monitors display a PET/CT study with CT, PET and fused images in different orientations. Comparative evaluation is improved and facilitated through automatic registration and special screen layouts, which allow direct, side-by-side comparison. Being able to compare studies from different time points is important.

Q What does TrueD offer that previous technologies did not offer?

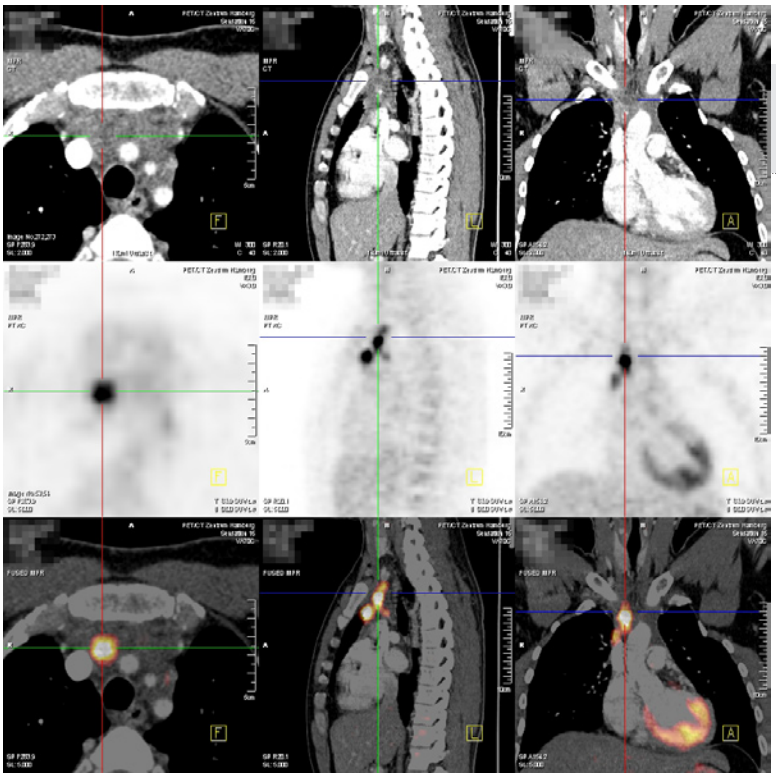
WAHL: TrueD can handle large datasets. It can display two studies for comparison at once. Former software tools had no comparison mode. If they had a way to compare two studies, there were problems with the large amount of data. Also, automatic (rigid) registration of two different time points, with the possibility of manual override, synchronized navigation and windowing is new and specially designed for longitudinal evaluation. The performance of TrueD, including loading and manipulating studies, is considerably faster than previous programs.

Q What are the steps in the workflow for users?

WAHL: Registration is automatic when studies are loaded. The physician then selects the appropriate layout and evaluates PET or CT as separate studies. He or she then evaluates the combined PET, CT and fusion image to determine the relevant lesions/pathologies. Next is the quantitative evaluation/comparison of longitudinal studies, followed by the documentation of the relevant lesions as screenshots/DICOM secondary capture and reporting into the RIS. At the end, a CD or data file is produced with original datasets and screenshots.

Q How has workflow improved?

WAHL: Workflow is made easier because only one software tool is needed for all tasks during the entire process of study interpretation and reporting. Performance, including loading and manipulating studies, is considerably faster. Accuracy is improved with the automatic registration and synchronized tools, reducing misinterpretations from inaccurate settings, which saves time and improves efficiency.



Using Siemens *syngo* TrueD, the images at left show residual activity of a diffuse large-cell B-cell-non-Hodgkin lymphoma in a 32-year-old patient after completion of standard therapy.

Q Can you discuss the role of volumes of interest (VOI), and why they are important to be able to apply across studies?

WAHL: VOIs are a further development of the classical region of interest (ROI), moving it from the image plane into three dimensions. This allows estimation of quantitative parameters (functional and morphological) in selectable volume with customizable thresholds that allow reproducible measurements. Applying VOIs across two time points is essential in detecting differences in lesion characteristics. Looking at the entire volume of a lesion is more accurate in determining changes over time, in comparison to the conventional estimation of the largest diameters, because lesions are not normally an ideal geometric shape.

Q How does VOI help calculate tumor change?

WAHL: The VOI tool provides semi-automatic and reproducible estimation of functional and morphometric characteristics of lesions.

Q How does VOI allow physicians to compare patient scans from two different points?

WAHL: VOIs can be saved to compare to a patient's future studies to allow monitoring over time. Physicians can do comparisons with side-by-side analysis of corresponding images in different planes with a set of quantification tools that can be applied across studies. Automatic registration provides automatic, fast adjusting of two studies for the comparison mode of all three orientations for PET, CT and fusion as closely as a rigid algorithm. Windowing is automatically synchronized for CT, PET and fusion with the possibility of unlinking as needed. Windowing PET with SUV-units helps maintain a standard setting through different studies and time points. Preset CT-Windows are directly accessible through buttons on the sidebar. A VOI quantification table provides a percent change comparison.

Q What is the benefit of the flexible screen layouts?

WAHL: The flexible screen layouts allow physicians to choose specialized layouts for different needs, such as PET-based evaluation, fused images, comparison layouts, and layouts for documentation/printing. Layouts can be easily changed with two mouse clicks from the directly accessible layout menu.

Q How does report generation work?

WAHL: The integrated reporting function facilitates the creation of standardized reports with integrated images and tabulated quantitative data, which can be printed and exported in different formats. It utilizes report templates for single and comparison modes and saves reports in the *syngo* database with images in a series. Reporting is done with the printing/screenshot functions of TrueD and with a separate report generated by the dictation function of our RIS. The integration of a flexible reporting function into TrueD can facilitate this step and provide a more comprehensive report to our referring physicians.

Q How does TrueD change cancer diagnosis and thus improve healthcare?

WAHL: The tool helps a physician provide a more accurate diagnosis, especially where precise quantitative parameters are essential for therapy evaluation and planning. Exact response evaluation reduces under- and over-therapy. A patient will benefit from having his or her individual needs tailored, and healthcare costs also can be reduced by avoiding unnecessary therapy. MII