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Limited Field of View Image Reconstruction Technique for Improved Resolution in Medical Multi-Modal Imaging

Tech ID: 21305 / UC Case 2010-806-0

BRIEF DESCRIPTION

Researchers at the University of California, Irvine (UCI) have developed a limited field of view (LFOV) single photon emission coherence tomography (SPECT) reconstruction technique that can be implemented on a multi-modality MRI/SPECT system. This technique may be used to obtain simultaneous MRI and SPECT images on a shorter time scale with improved resolution and at a lower cost when compared to other image reconstruction techniques.

FULL DESCRIPTION

Simultaneous imaging with MRI and SPECT has many benefits as described in UC Case No. 2008-756. One of the major limitations of nuclear imaging techniques such as SPECT is the poor spatial resolution that is on the order of several millimeters when parallel-hole collimators are used. This limitation could be improved with the use of pinhole collimation and increased image magnification. Unfortunately this results in the loss of detection sensitivity and increased imaging time to retain a good signal-to-noise (SNR) in the images. In addition the increased image magnification requires the use of larger detectors thus increasing the cost of the imaging system.

However one of the important aspects of nuclear imaging systems like SPECT is that radio-labeled tracers mainly accumulate at a target organ while the surrounding tissue has a low frequency background and a lower uptake signal. In such a situation it may be sufficient only to image with high resolution within a LFOV only the target organ which is considered to be the region of interest (ROI).

The novel technique developed at UCI requires the identification of the ROI with a priori MRI and SPECT image acquisition. Then the MRI image is reconstructed to determine the ROI. The ROI is then targeted within the LFOV for high resolution analysis. With the new unique UCI technique, the MRI/SPECT image of the ROI is reconstructed with high spatial resolution. Also artifacts caused by radioactivity outside of the LFOV are removed thereby providing accurate results that can improve the quantification of SPECT images.

ADVANTAGES

This technique can be used with a smaller nuclear detector for multi-modal imaging thus reducing system costs. Also faster image reconstruction may be implemented since a smaller region is to be reconstructed.

TESTING

This method has been demonstrated on various phantoms.

PATENT STATUS

Country	Type	Number	Dated	Case
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OTHER INFORMATION

KEYWORDS

MRI, SPECT, multi-modal

CATEGORIZED AS

- » **Imaging**
- » Medical
- » **Medical**
- » Diagnostics
- » Imaging
- » Screening

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Issued Patent

9,110,171

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RELATED CASES

2010-806-0, 2008-756-1,
2008-645-2

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