IMPROVED LOCALIZATION OF EXTRATEMPORAL ICTAL ONSET-ASSOCIATED BLOOD FLOW CHANGES USING A 72-DETECTOR SCANNING FOCUSED COLLIMATOR SPECT SYSTEM

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1. SPECIFIC AIMS

High resolution (3-4 mm) single-photon emission computed tomography (SPECT) has been recently developed using a 72-detector spiral scanning focused collimator system (InSpira, NeuroLogica Corp). Two goals of this study were as follows:

• The resolution of this technology was compared with a conventional 2-detector fan beam collimator system (Siemens, 8-10 mm resolution). Ictal and baseline SPECT series were acquired to visualize extra-temporal +/- temporal ictal onset-associated blood flow changes.

• Novel Relative ictal SPECT Co-registered to MRI (RISCOM) was compared with conventional Subtraction ictal SPECT (SISCOM) post-processing. Concordance of post-SPECT acquisition processing with semantic, MRI, positron emission tomography (PET), MEG & electrocortiography (ECOg) facilitated delineating targets for resective surgery.

1. METHODS

Eight subjects with medically refractory extratemporal +/- temporal epileptic sources were enrolled in this investigator-initiated IRB-approved study prior to resection.

A. 3T gapless pre- and post-gadolinium volumetric MRI of the brain and non-infused head CT were completed for each subject.

B. 27-32 scalp contacts were applied for presurgical long-term video-EEG monitoring.

C. A single injection of Ceretec (Tc99m-HMPAO) in 5cc 09% NaCl was completed (mean time to injection from clinical or presurgical long-term video-EEG monitoring. HMPAO) in 5cc 09% NaCl was completed (mean time to injection from clinical or presurgical long-term video-EEG monitoring. HMPAO in 5cc 09% NaCl was completed (mean time to injection from clinical or presurgical long-term video-EEG monitoring.

D. An interictal SPECT scan on both systems were completed for each subject about 24 hrs following the last seizure.

E. SISCOm analyses of the Siemens 2-detector datasets were performed using the Analyse® version 10 software package.

F. RISCOM image processing for the InSpira datasets was performed where:

RISCOM voxel value=Weighting factor*(CentralBaseline)

Weighting factor=(Central-Baseline voxel)/(Central-Baseline voxel).

G. Presurgical baseline FDG-PET & interictal MEG were incorporated into the workflow.

I. Pre-rectective chronic and/or intraoperative ECoG further refined the ictal onset regions & validated the transient blood flow changes.