

AbstractID: 3643 Title: Automatic Method of Bone and Static Tissue Removal in Neuro CT Angiography

Purpose:

The purpose of this study was to optimize a post-processing algorithm to eliminate density from bone or other tissues that remain constant during a contrast enhanced CT angiography procedure without compromising the detection of small lesions.

Methods:

Five patients were scanned using a standard brain CTA protocol: kv=120, mA=300, thickness=2.5 mm, interval=1.25 mm, contrast volume=75 cc's, delay=12s). An identical acquisition was obtained prior to contrast injection. To eliminate movement related errors, the data sets were aligned using a standard motion correction algorithm within SPM2. The pre-contrast data were used to form a mask based upon intensity thresholds that would capture bone (>200 HU). Additional image processing was used including smoothing and morphologic operations to improve the removal of the bone signal while minimizing the effects to vessel signal. The optimization process involved successive erosion and dilation operations on the mask. A filter was used on the mask to zero pixels between the skull and the external boundaries of the mask. Subtracting the pre-contrast data from the post-contrast data was performed to remove static signal. The bone mask was then applied to the difference data to create the final image. The post-processed CTA data were transferred to a 3D workstation for viewing and qualitative assessment which included the source images and maximum intensity projections.

Results:

Bone subtraction was successful in all patients without qualitatively significant degradation in contrast-to noise. The clinical data shows it is possible to remove non-vascular signal without compromising the visualization of small aneurysms.

Conclusion:

An automatic method to remove bone density from brain CTA data sets was developed. The method requires a pre- and post-contrast CTA acquisition and thus increases the patients overall radiation exposure though not to significant levels. The automated method will reduce workload and provide non-biased angiographic data for clinical review.