AbstractID: 3651 Title: Determination of Optimal kV for Imaging Iodine and Bone in Computed Tomography

Purpose: To determine the kV that will yield optimal contrast to noise ratio (CNR) at a constant patient dose for iodine/ soft tissue and bone/ soft tissue contrast in head and small body studies.

Method and Materials: A head phantom containing water equivalent material and a bone ring to simulate the skull (for head studies) was used to obtain the data. To measure the contrast of iodine to water and bone to water, cylindrical plugs were inserted into the phantom: two plugs contained different dilutions of iodine contrast (Omnipauqe 300mgI/ml), one contained bone equivalent material, and one contained water. This phantom was scanned at kV values ranging from 80 to 140 kV. The contrast was measured as the difference in CT number between the iodine and bone plugs and the water plug. The noise measurements were taken from the water plug. Noise was determined at constant dose (CTDI w), so that the mAs was increased as the kV decreased. Both image noise and image contrast increased as the kV decreased. The relevant parameter for determining optimal kV is the contrast to noise ratio (CNR) at a constant dose as a function of kV.

Results: The optimal kV, within the range of 80 to 140 kV, for the imaging of both iodine and bone is 80 kV. Limitations to this kV selection include the possible presence of increased artifacts in bone imaging, and CT scanner limitations in mAs that might not allow low kV with an adequate level of image noise.

Conclusion: The common use of 120 to 140 kV in CT scanning may not be optimal for many studies whose primarily objective is the discernment of iodine or bone contrast, such as in brain perfusion studies. The use of lower kV settings may be advantageous in these cases.