

AbstractID: 8359 Title: Evaluating Effective Doses and Image Quality for Multislice CT using Automatic Tube Current Modulation

Purpose: Automatic tube current modulation (ATCM) is one of innovative techniques to lower radiation doses in computed tomography (CT) scanning. The purpose of this study is to estimate the image quality, organ doses and effective doses in clinical multi-detector CT examinations using ATCM techniques.

Method and materials: An anthropomorphic phantom was scanned on a Siemens Sensation 64 multi-detector CT scanner with CARE Dose4D software which offered nine combinations of ATCM. The scanning regions included head, neck, chest, abdomen and pelvis. The image quality was derived from noise distributions in each image slice using MatLab. Organ doses and effective doses were measured by high sensitivity thermoluminescent dosimeters (LiF: Mg, Cu, P) which were inserted into the anthropomorphic phantom at the selected organs.

Results: CARE Dose 4D software tends to trigger increasing intensity modulation in the parts of shoulder (upper lung) and lower lung, but to trigger decreasing intensity modulation in the parts of head, neck, middle lung, abdomen and pelvis. Effective doses from ATCM were lower than those from fix tube current except neck examinations. The dose decreases vary from 36% to 68.5% in head examinations, 12.0% to 38.9% in chest examinations, 31.4% to 43.4% in abdomen examinations, and 33% to 55.5% in pelvis examination, but the dose increases are from 18.4% to 48% in neck examinations. The noise increase ratios, which were derived from the images using ATCM comparing with those using fix tube current, are from -1.9% to 2.5%, -15.0% to -19.9%, -13.1% to 0.7%, 7.6% to 15.7%, and 16.2% to 28.0% in head, neck, chest, abdomen and pelvis examinations, respectively.

Conclusion: ATCM techniques with appropriate use could reduce effective doses but slightly increase image noises. ATCM is an efficient method to reduce patients' radiation doses during CT scanning if there is no influence on the diagnostic acceptability.