Prospective Randomized Trial on Radiation Dose Estimates of CT Angiography Applying Iterative Image Reconstruction: The PROTECTION V Study.

The purpose of this study was to assess the potential of iterative image reconstruction (IR) of images for radiation dose reduction in coronary computed tomography angiography (CTA). Therefore, IR in combination with 30% tube current reduction was compared with standard scanning with filtered back projection (FBP) reconstruction. Lately, new IR techniques with advanced raw data processing have been introduced by different computed tomography vendors, thus allowing for either image noise reduction at unchanged radiation dose levels or radiation dose reductions at comparable image noise levels. In this prospective, multicenter, multivendor noninferiority trial, we randomized 400 consecutive patients to 1 of 2 groups: a control group using standard FBP image reconstruction and standard tube current or an interventional group using IR technique and 30% tube current reduction. The primary endpoint was to demonstrate noninferiority in image quality (IQ) in the IR group. IQ was assessed on a 4-point scale (1, nondiagnostic IQ; 4, excellent IQ). Secondary endpoints included total radiation dose estimates and the rate of downstream testing during 30-day
follow-up. Median IQ in the IR group was noninferior compared with the conventional FBP group (IR, 3.5 [interquartile range: 3.0 to 4.0]; FBP, 3.4 [interquartile range: 2.8 to 4.0], p for noninferiority < 0.016). The radiation exposure was significantly lower in the IR group (median dose-length-product 157 [interquartile range: 114 to 239] mGy·cm vs. 222 [interquartile range: 141 to 319] mGy·cm for IR vs. FBP, respectively, p < 0.0001). The rate of downstream testing did not differ significantly (7.7% vs. 7.9% for IR vs. FBP, respectively, p = 0.94). Coronary CTA image quality is maintained with the combined use of a 30% reduced tube current and IR algorithms when compared with conventional FBP image reconstruction techniques and standard tube current. (Prospective Randomized Trial On Radiation Dose Estimates Of CT Angiography In Patients: NCT01453712).