Purpose:
Since the introduction of Adaptive Statistical Iterative Reconstruction (ASIR), multiple studies have been conducted to demonstrate its potential in noise reduction and dose saving. On the other hand, the influence of ASIR on system resolution has not been fully studied: high contrast measurements such as MTF and bar patterns could not explain the blurring effect of ASIR on low contrast objects, and an objective evaluation on the system resolution for objects of different contrast levels is missing. Here we tried to fill this gap.

Methods:
A novel method is proposed under the assumption that the effect of ASIR on low contrast images can be characterized by transfer functions, which can be determined from noise power spectra acquired with and without ASIR. To verify the effectiveness of this method, synthesized images were obtained by filtering low contrast FBP images with the transfer functions, and were then compared with ASIR images. For objects with intermediate contrasts, the effect of ASIR was studied by mimicking objects of the same geometry but different contrast levels through partial volume effect. A thin tungsten wire was imaged with its length covering different portions of the slice thickness, and then profiles and FWHM were obtained to compare the resolving power of the system.

Results:
Agreement between the synthesized images and ASIR images verified the effectiveness of the proposed method. For 10 cm DFOV and SS100, ASIR's blurring effect on low contrast images was measured as 0.5 lp/cm drop on the 5% MTF. For ASIR images of the tungsten wire with 30-500 HU signal difference, the FWHM of the wire varied with a COV of 2.23%, showing that ASIR did not significantly change the system resolution on intermediate-contrast objects.

Conclusions:
ASIR's blurring effect on objects of varying contrast levels could be objectively determined using the proposed methods.