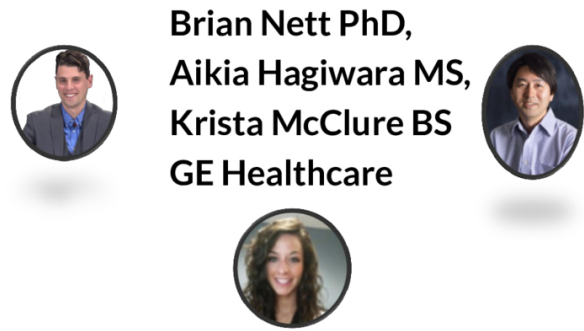


To quantify the impact of a z resolution enhancement reconstruction technique in axial CT image reconstruction with standard evaluation metrics



BACKGROUND:

The Fine Z image reconstruction option enables enhancement of the Z resolution through a combination of adaptive z detail enhancement in the projection and the image space. It takes advantage of the rich data available when there is overlap in the image space, i.e. 0.625mm thickness with a 0.3125mm interval. In the same manner that reconstruction kernels have been used for years to improve in-plane spatial resolution, the Fine Z option enables enhanced z resolution with the associated trade-off of increased image noise.

METHODS:

1. Z Resolution was measured with the sloped wire methodology where the wires had slope of 4:1.
2. Noise was measured with a 20cm water phantom using the console tool for noise measurement with a central ROI within the phantom.

RESULTS:

- The z resolution and the noise were both increased with the Fine Z mode, see center panel.



Fine Z mode, enables kernel like behavior in the z direction for higher resolution in z direction.

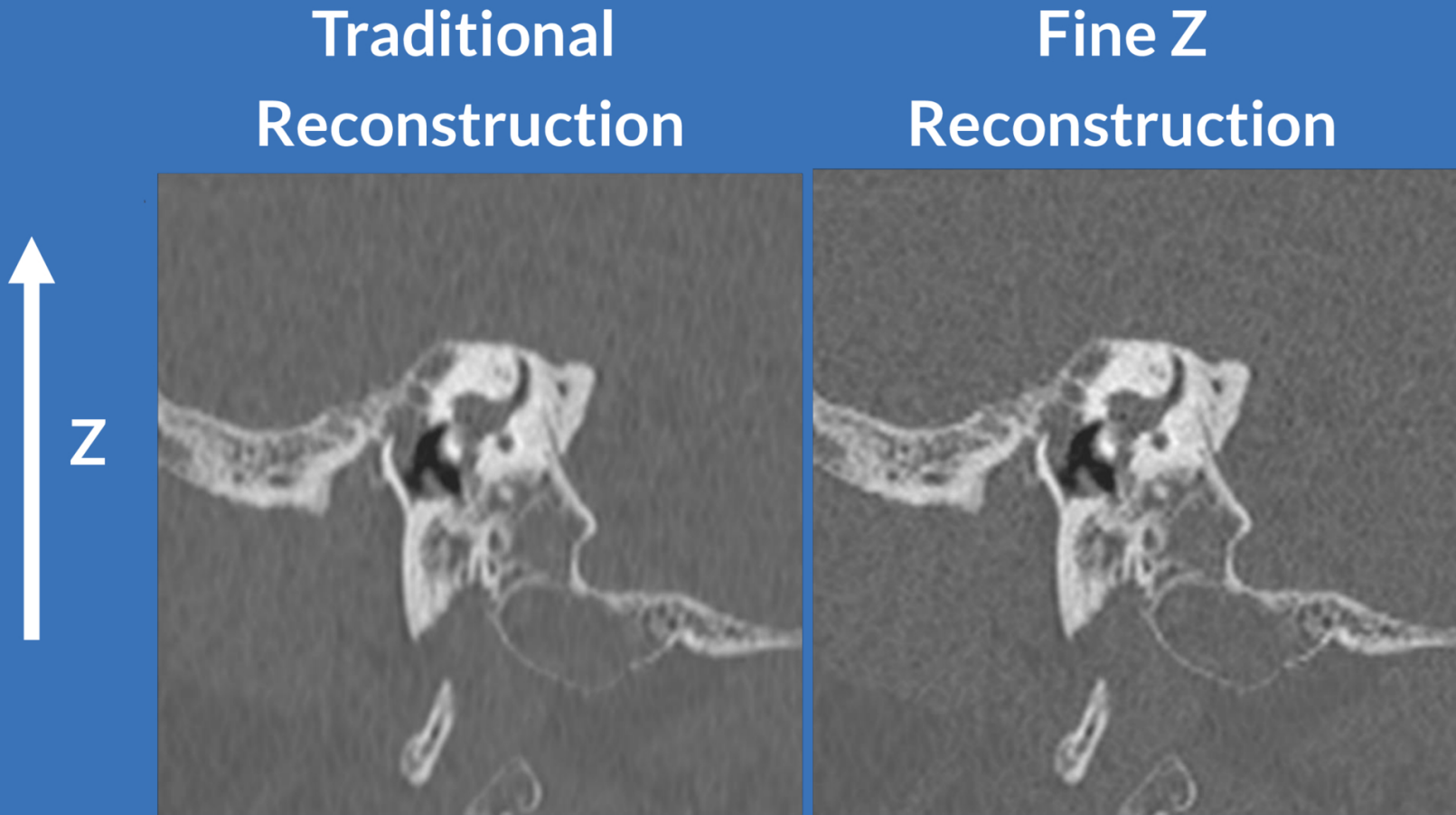


Figure 1.

Image Resolution in Z

$$\frac{MTF_{50} \text{ Fine Z}}{MTF_{50} \text{ Trad.}} = 1.35$$

$$\frac{MTF_{10} \text{ Fine Z}}{MTF_{10} \text{ Trad.}} = 1.30$$

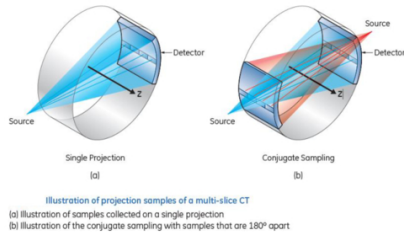
Image Noise

$$\frac{\sigma \text{ Fine Z}}{\sigma \text{ Trad.}} = 1.22$$

EXTRA SPECIFICS IF YOU ARE INTERESTED

APPLICABLE CONFIGURATIONS:

Axial scans provide conjugate ray data which can be leveraged to enable improved resolution. The Fine Z mode operates only with overlapped images 0.625 thickness with 0.3125 interval.



PARAMETERS:

The z resolution was assessed on the Revolution CT with the standard sloped wire methodology where in-plane measurements of the length of a sloped wire (slope 4:1) are used to assess z axis spatial resolution. Data was acquired for 4 z locations to cover the complete 160mm z extent, reconstructed with the bone plus kernel with 14mm DFOV. Noise was assessed with measurements from a 20cm water phantom, reconstructed with bone plus kernel 25cm DFOV.

FIGURE 1:

80mm axial scan acquired with 140kVp, 165mA, 1s and reconstructed with a display field of view of 140mm. Both image sets use overlapped axial reconstruction (0.625 thick with 0.3125 interval), and the bone plus reconstruction kernel.

GE MICT
3000 N Grandview Blvd,
Waukesha WI

