PHILIPS

Clinical Elements

Neuro image quality improvements using Spectral Detector CT (SDCT)

PURPOSE OF STUDY

This study was performed to evaluate the benefits of virtual monoenergetic (monoE) imaging in neuro imaging. The researchers from the Radiology Department of Cologne, Germany, demonstrated that monoE images generated at 65 keV and 120 keV allow for improved gray and white matter differentiation and evaluation of image quality around the posterior fossa.

The following is a summary of the study published in *Investigative Radiology 52(8):470-476, August 2017.*

Overview

The overlap between gray and white matter on unenhanced neuro images acquired with a CT scan poses a huge diagnostic challenge while evaluating pathologies in the brain. Beam hardening artifacts arising from posterior fossa also affect neuro image quality making it challenging to make a confident diagnosis.

With the Philips IQon Spectral CT scanner, conventional images can be created, in addition to virtual monoE images at a range of different energy levels (keV). Virtual monoE images are created from perfectly matched low and high energy projection data. These keVs range from 40-200 keV. While low monoEs can be used to improve contrast resolution, high monoEs may help to improve image quality around the posterior fossa.

Subjective and objective evaluations of virtual monoE images were performed to determine the best monoE level for gray and white matter differentiation and to evaluate image quality around beam hardening artifacts. Virtual monoE images were reconstructed from 40 keV to 120 keV in increments of 5 keV. Two different observers evaluated the images for image quality ratings in basal ganglia and posterior fossa. For objective analysis, ROIs were placed at different locations in the head to measure noise and signal to noise ratio (SNR) for gray and white matter and contrast to noise ratio (CNR) between gray and white matter.

Results

Virtual monoE images received superior image quality ratings in subjective analysis by the two radiologists. The best assessment of the gray-white matter differentiation was observed at 65 keV. Image quality at the posterior fossa was rated the best at 120 keV.

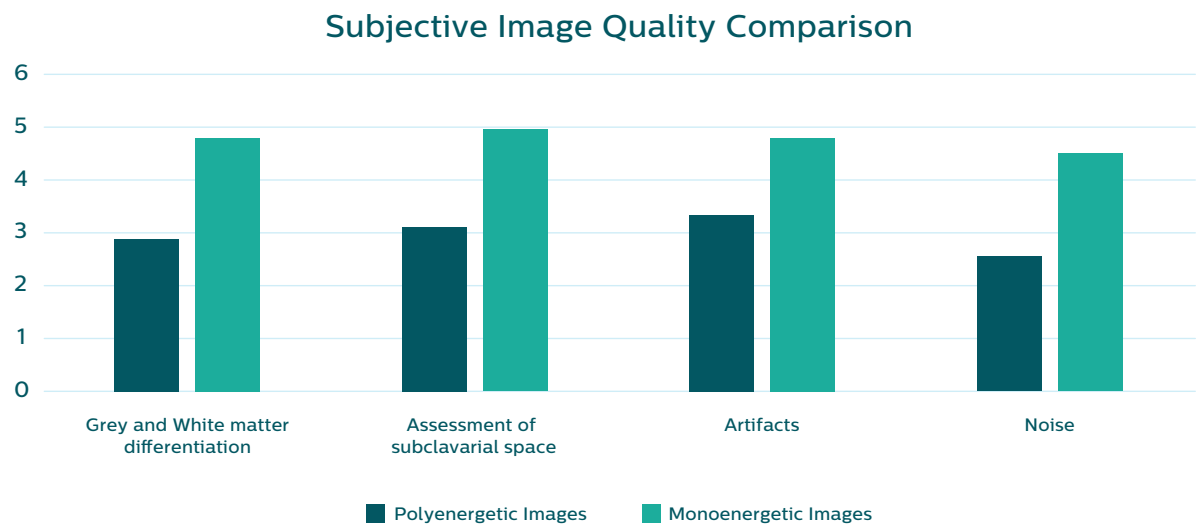
Objective analysis showed that noise was lower in virtual monoE images as compared to conventional images. SNR and CNR was higher in virtual monoE images as compared to conventional images.

Conclusion

Optimal gray and white matter image quality was obtained at low monoE reconstructions. Furthermore, image quality in the posterior fossa was observed to be best at higher monoE reconstructions. Utilization of SDCT resulted in overall image quality improvements.

CLINICAL RELEVANCE

SDCT presents a clinical opportunity to improve confidence in diagnosis of neuro diseases by improving image quality.



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Results from case studies are not predictive of results in other cases. Results in other cases may vary.