PHILIPS

Advanced molecular imaging

# Diagnostic confidence with low PET dose

## PURPOSE OF STUDY

**Several clinical indications necessitate repeat/follow up PET/CT examinations. An example is the staging and monitoring of oncology patients. Radiation exposure from imaging systems and PET tracer administration may cause long-term effects. However, reduction in PET tracer dose may negatively impact the diagnostic image quality and quantitative assessment of scans. The aim of this study is to investigate the impact of tracer dose reduction on 18F-FDG PET scans using digital PET/CT. It explores the ability of low dose PET with digital PET/CT to accurately grade and quantitatively assess SUV for target lesion and normal tissue. The following is a summary of the study, "Next Generation Digital PET/CT: A Phase I Intra-Individual Comparison with Current Photomultiplier TOF PET/CT"*, which was presented by Knopp. et al, at the Radiological Society of North America Annual Meeting in 2015.**

## Overview

A comparison of image characteristics using the next generation, solid state, digital PET/CT system was made to current photomultiplier detector based Time of Flight (TOF) PET/CT.* The study cohort consisted of 25 clinical care patients.

The order of imaging (placement on the system) was randomized with the photomultiplier based PET/CT imaging at 75 minutes and digital PET/CT at 55 and 95 minutes post IV. Image characteristics were assessed by three blinded readers using a scoring system and blinded quantitative ROI analysis.

## Results

- Image quality and detectability was consistently rated significantly higher ($p<.01$) on the digital PET/CT.
- Confidence of lesion detectability was rated significantly higher on the digital PET/CT when evaluating lesions of <15 mm. Additionally, smaller (<15 mm) and metabolically active lesions revealed substantially higher SUV values, suggestive that in vivo, the improved recovery coefficient will lead to more correct, precise metabolic activity readouts.

- Tracer dose simulations indicate that no impact on quality and detectability was found while reducing the count equivalency from 13 mCi 18F-FDG to 6 mCi.

## Conclusion

The results of the study suggest the image quality and lesion detectability of the digital PET/CT exceeds that of the current photomultiplier detector based TOF PET/CT.* In addition, tracer dose reduction (of 50%) is possible in clinical FDG PET imaging compared to clinical standard of care dosing, without compromising diagnostic image quality or quantitative assessment with the digital PET/CT.

## CLINICAL RELEVANCE

**Dose reduction in PET radiopharmaceutical administration does not have to be a trade-off between radiation exposure and diagnostic image quality. Utilizing the right tools with appropriate reconstruction algorithms, reduced dose can be administered – with no reduction in diagnostic confidence.**

Knoop et al, Next Generation Digital PET/CT: A Phase I Intra-Individual Comparison with Current Photomultiplier TOF PET/CT, RSNA 2015.
*Systems used in study: Digital PET/CT is the Vereos Digital PET/CT, TOF PET/CT is the GEMINI TF

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



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