

## **18F-Choline: Is shine-effect an issue for prostate SUV quantification? An evaluation based on Monte Carlo simulations of the XCAT phantom**

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18-fluorine-choline (18F-Choline) is a relatively new radiopharmaceutical for Positron Emission Tomography (PET), proposed as an alternative for 11-carbon-choline (11C-Choline), and indicated for staging, restaging and therapy monitoring in prostate cancer. In clinical routine, 18F-Choline images are eventually evaluated using a quantitative parameter known as Standardized Uptake Value (SUV). Nevertheless, recently published data about “shine-through” effect in PET with other radiopharmaceuticals such as FDG, suggests that urinary excretion with high accumulation in the bladder can compromise a correct evaluation of the prostatic region in 18F-Choline PET studies, thus affecting both detectability and quantification values. Under this hypothesis, we conducted an evaluation of the impact of bladder “shine-through” on prostate cancer quantitative evaluation. Monte Carlo simulation package SimSET and the XCAT Phantom were used to produce realistic images in a well-controlled framework for different tumor and bladder activity concentrations. Our results showed that “shine-through” contribution is highly dependent on bladder/tumor contrast ratio, leading to clear SUV overestimations for high bladder/tumor ratios. Our findings suggest that 18F-Choline SUV values obtained for prostate cancer evaluations has to be used with extreme caution, and must be dropped when bladder is visually more active than the lesion. It is valuable to mention that 11C-Choline PET studies avoid this problem and is more suitable for quantitative evaluation of the prostatic region.

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