# Correlation of blood pool and liver uptake values with radionuclide extravasation in FDG PET

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## Background

Standardized uptake value requires accurate knowledge of the injected dose of radiotracer and should be sensitive to extravasation. Recent reports suggest that extravasation in FDG-PET can reduce standard uptake values in tumor in real world situations. However, few studies have explored the relationships between radionuclide extravasation events and change in standard uptake values for blood pool and liver, which are often used for a comparison metric to tumor in clinical practice. The present study attempts to determine the relationship between uptake values of blood pool and liver with extravasation events.

## Methods

Extravasation data collected during a previous quality improvement project utilizing a monitoring device that can estimate the presence and severity of infiltration evens (Lara; Lucerno Dynamics; Cary, NC) was deidentified and retrospectively analyzed. All PET scans for which Lara data was available at a single center from February 2017 to May 2017 were included. Exclusion criteria included PET agents other than F-18 FDG, injection sites other than an upper or lower extremity, injection through a central line, incomplete extravasation monitoring data, or imaging field less than skull base to thigh. After exclusion criteria, 438 FDG PET scans were analyzed. Patient demographic data including age, height, as well as blood glucose, injection site, and injection technique were included. SUVmax blood pool, SUVmax liver, SUVmax brain, SUVmax subcutaneous fat, and standard deviation values for blood pool and liver were measured. Each PET scan was also subjectively assessed for image quality on a 3-point scale. Data was then analyzed utilizing the Excel Data Analysis toolpak.

## Results

There was no significant correlation between blood pool SUVmax and injection quality score ($R^2$=0.001). There was no significant correlation between blood pool standard deviation and injection quality score ($R^2$=0.0061). No significant correlation between liver SUVmax and injection quality score was found ($R^2$=0). No significant correlation between liver uptake standard deviation and injection quality score was found ($R^2$=0.0007).

## Conclusion

No significant correlation was found between an injection quality score utilizing a radionuclide extravasation monitoring device and uptake values in the liver or blood pool. This suggests that liver and blood pool uptake may be relatively resistant to extravasation events. At least one case report in the literature using the same extravasation monitoring device has suggested that tumor F18 FDG uptake can be affected by radionuclide extravasation (Kiser, Crowley, Wyatt, & Lattanze, 2018). Blood pool and liver values are often used as a reference value for tumor uptake, for example in the Deauville criteria. Therefore, extravasation events may affect clinical interpretation of PET imaging by disproportionately affecting tumor uptake and sparing blood pool and liver uptake

## References

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2. Mettler FA, Guiberteau MJ. *Essentials of Nuclear Medicine Imaging*. 6th ed. Philadelphia, PA: Elsevier; 2012.