The Uptake of $^{18}$F-FDG by Renal Allograft in Kidney Transplant Recipients is not Influenced by Renal Function

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Objective. $^{18}$F-Fluorodeoxyglucose ($^{18}$F-FDG) positron-emission tomography coupled with computed tomography (PET/CT) imaging has been recently proposed as a non-invasive tool for the diagnosis of renal allograft acute rejection (AR) in kidney transplant recipients (KTR). Still, the influence of kidney function on the renal graft uptake of $^{18}$F-FDG remains debated.

Methods. We retrospectively identified all KTR who underwent at least one $^{18}$F-FDG PET/CT between January 2010 and December 2015. KTR with documented pyelonephritis or AR, as well as patients under chronic hemodialysis, were excluded. Medical, biological and technical parameters were extracted from a prospective database. Estimated glomerular filtration rate (eGFR) was assessed using chronic kidney disease (CKD)-EPI equation. Mean standardized uptake values (SUVmean) of renal graft cortex and aorta were measured in 4 and 1 volumes of interest, respectively. Spearman's rank correlation coefficient ($\rho$) and analysis of variance (ANOVA) were performed.

Results. Eighty-two KTR aged of $58 \pm 13$ underwent $^{18}$F-FDG PET/CT for tumor staging (n=46), suspected infection (n=11) or fever of unknown origin (n=25). Male-to-female ratio was 1.4. Mean eGFR was $50 \pm 19$ ml/min/1.73m² [range: 20.7; 94.4], including CKD stage 1 (n=3), stage 2 (n=21), stage 3a (n=20), stage 3b (n=29) and stage 4 (n=9). PET/CT imaging was performed within $67 \pm 15$ min following injection of $3.7 \pm 0.6$ MBq/kg of $^{18}$F-FDG. Mean glycemia at the time of injection was $113 \pm 34$ mg/dl. Mean kidney and aorta SUVmean were $1.8 \pm 0.2$ and $1.7 \pm 0.3$, respectively. No significant correlation was observed between eGFR and kidney SUVmean ($\rho = 0.119; p = 0.28$) or aorta SUVmean ($\rho = -0.144; p = 0.20$) considering the whole cohort. ANOVA showed no difference of kidney ($p = 0.62$) and aorta ($p = 0.85$) SUVmean between CKD groups. Mean coefficient of variation (on the basis of kidney SUVmean of $\geq 3$ consecutive $^{18}$F-FDG PET/CT in 15 patients with no significant change of eGFR) reached $13.05\%$.

Conclusion. Our data suggest that the uptake of $^{18}$F-FDG by renal allograft within an hour post injection is not significantly impacted by CKD.