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The change in carotid arterial inflammation in de novo renal transplant recipients as assessed by 18F-FDG PET/CT

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Objectives : Chronic kidney disease (CKD) is associated with an increased risk of cardiovascular disease, and both are characterized by increased systemic and local inflammation. Local inflammatory activity of the arterial wall can be assessed by measuring 18F-fluorodeoxyglucose (18F-FDG) uptake with positron emission tomography computed tomography (PET/CT). Data on change in arterial inflammation in CKD patients after renal transplantation are not available to date. This study investigated whether the inflammatory activity in carotid plaque was decreased after renal transplantation.

Methods : We assessed 18F-FDG uptake in the right and left carotid arterial walls in 10 patients with CKD stage 5 who underwent renal transplantation. 18F-FDG-PET/CT was performed before transplantation and at post-transplantation 4 months. Carotid plaque inflammation was measured by blood-normalized standardized uptake value of 18F-FDG, known as target-background ratio (TBR). Most diseased segment (MDS) was defined as the 1.5-cm arterial segment, centered on the slice of artery demonstrating the highest FDG uptake at baseline. TBR was evaluated in the MDS and whole carotid artery (Whole). MDS-TBRmax was calculated as the mean of maximum TBR values derived from 3 contiguous axial segments of the MDS, and MDS-TBRmean was calculated as the mean of averaged TBR values of the MDS segment. Whole-TBRmax was calculated as the mean of maximum TBR values for all of the axial segments that composed the carotid artery, and Whole-TBRmean was calculated as the mean of averaged TBR values of the whole carotid artery segments.

Results : Among the 10 patients, 7 patients showed a reduction in MDS-TBRmax and MDS-TBRmean of right carotid artery, and MDS-TBRmax of left carotid artery, and 8 patients showed a reduction in Whole-TBRmax and Whole-TBRmean of right carotid artery, and MDS-TBRmean, Whole-TBRmax, and Whole-TBRmean of left carotid artery. At 4 months post-transplantation, MDS-TBRmax, MDS-TBRmean, Whole-TBRmax, and Whole-TBRmean of both carotid arteries showed a tendency of reduction from baseline; right carotid artery (% reduction [95% confidence interval]: -4.06% [-13.42 to 9.38]; -4.47% [-13.64 to 7.29]; -6.50% [-12.81 to 1.54]; -5.74% [-15.37 to -0.02]);

left carotid artery (% reduction [95% confidence interval]: -6.14% [-14.53 to 7.01]; -7.29% [-17.91 to 4.18]; -6.13% [-15.17 to 8.32]; -8.37% [-17.62 to 6.56]). The Whole-TBRmean of right carotid artery was significantly reduced from baseline (1.33, [1.22 -1.47]) at 4 months post-transplantation (1.22, [1.18 - 1.32], P = 0.047).

Conclusions : Serial FDG-PET/CT of carotid arteries demonstrated that the 18F-FDG uptakes of MDS and whole carotid artery were reduced after renal transplantation. Renal transplantation may confer an anti-inflammatory effect on atherosclerotic plaques in CKD patients.

Keywords : atherosclerosis; FDG-PET imaging; chronic kidney disease; renal transplantation; plaque inflammation