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Improvement of brain function after hemodialysis in ESKD patients

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Objectives : There have been numerous concerns about the neurologic impairment in ESKD patients with or without renal replacement treatments. Recently, several studies demonstrated that functional and structural deteriorated changes of brain in ESKD. However, there were lack of evidence of improvement of brain function after hemodialysis. Our study is aimed to explain the differences of brain function after hemodialysis.
Methods : This prospective study was designed with 10-patient of ESKD, who had not been on renal replacement treatment previously and having no underlying neurological diseases. We examined each patient two times with diffusion-weighted MRI (dMRI), first at the time of hemodialysis and second 3-month after start of hemodialysis. The diffusion tensor imaging (DTI) tractography was reprocessed by q-sampling imaging (GQI) method and then, the resultant value of the quantitative anisotropy (GQ) were interpreted to detect trajectory of tracts within white matters.
Results : We compared the results of differential tractography in pre-dialysis and post-dialysis. There were considerable changes with increased QA after dialysis, especially in cingulum, thalamic radiation, corpus callosum, and superior longitudinal fasciculus. Those structures are important due to their distinct structural roles of emotion, cognition, and so on. Not only for that, those have significant roles as functional connectivities in between other structures as well.
Conclusions : Previous several studies had shown that impairment of brain functions in ESKD patients. In our study, improvement of functional and structural brain connectivities after hemodialysis was possibly explained with increased QA in several structures, such as in cingulum, thalamic radiation, corpus callosum, and superior longitudinal fasciculus.

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Patients with ESRD	**Altered white matter tracts**
Patient 1	Lt. corticospinal tract, Lt. medial lemniscus, Rt. fornix, Rt. medial lemniscus, Lt. dentatorubrotl tract
Patient 2	Rt. corticostriatal tract posterior part
Patient 3	Lt. cingulum parolfactory part, Lt. cingulum fronto-parietal part, Lt. superior longitudinal fascic thalamic radiation anterior part, Lt. thalamic radiation superior part, Lt. fornix, Lt. cingulum fro parahippocampal part, Corpus callosum tapetum, Corpus callosum forceps minor
Patient 4	Rt. inferior fronto-occipital fasciculus, Rt. thalamic radiation anterior part
Patient 5	Lt. inferior fronto-occipital fasciculus, Corpus callosum forceps minor
Patient 6	Lt. inferior fronto -occipital fasciculus, Rt. reticular tract, Rt. superior longitudinal fasciculus, I thalamic radiation anterior part, Rt. thalamic radiation anterior part
Patient 7	Rt. reticular tract, Rt. fornix, Corpus callosum forceps major
Patient 8	Lt. superior longitudinal fasciculus, Lt. cingulum fronto-parietal part, Lt. inferior longitudinal fa Lt. cingulum fronto -parahippocampal part, Lt. inferior fronto -occipital fasciculus, Corpus ca tapetum, Rt. corticostriatal tract superior part
Patient 9	Rt. superior longitudinal fasciculus, Rt. cingulum fronto -parietal part, Lt. superior longitu fasciculus, Rt. cingulum fronto-parahippocampal part
Patient 10	Rt. reticular tract, Rt. medial lemniscus, Rt. corticospinal tract, Rt. thalamic radiation posterior Middle cerebellar peduncle, Rt. cingulum parahippocampo-parietal part

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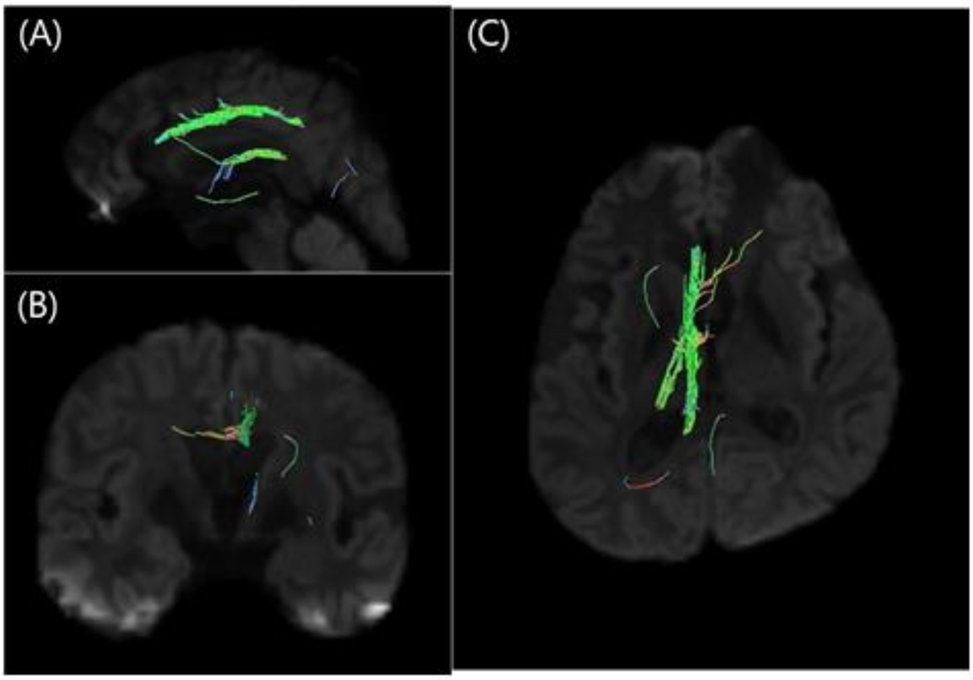
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