**Supplementary table (2):** Case reports of basal ganglia related movement disorders in patients with uremia due to chronic kidney disease

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| **Reference** | **Population**  **studied** | | **\*Therapy** | **Comorbid medical illness** | **Type of study** | **Findings** | **Course** |
| **Case reports of Parkinsonism** | | | | | | | |
| **Wang et al.4** | Three adults with ESKD | | Hemodialysis | The first and second patients had ischemic heart disease and acute pulmonary edema with hypoxemia and the third had metabolic acidosis. | Case-report | The first patient had generalized dyskinesias and bilateral basal ganglia lesions. The second and third patients had gait disturbance and bilateral BG lesions | Spontaneous clinical and neuroimaging recovery. |
| **Wangand Cheng5** |  | | | | Prospective: 6  [March 1996 to June 2001] | Metabolic acidosis  Acute onset of parkinsonism and dystonia, disturbed consciousness, dysarthria, dysphagia and ataxia.  Bilateral symmetrical BG lesions which were hypointense in T1WI of MRI and hyperintense in T2WI. | Patients had various neurologic outcomes as shown below with resolution of imaging lesions within 3-8 weeks. |
| A 61-year-old male | | Hemodialysis  for 2.3 years | Diabetes mellitus  Coronary heart disease  Hypertension | Persistence of movement disorder |
| A 45-year-old female | | Continuous  ambulatory  peritoneal  dialysis  for 3 years | Diabetes mellitus  Hypertension | Clinical recovery |
| A 60-year-old female | | Hemodialysis  for 2 years | Diabetes mellitus | Persistence of movement disorder despite resolution of BG lesions |
| A 50-year-old female | | Hemodialysis  for 3 years | Diabetes mellitus | Clinical and neuroimaging recovery |
| A 63-year-old Asian female | | Hemodialysis  for 2 years | Diabetes mellitus  Hypertension  Cerebrovascular stroke | Persistence of movement disorder and BG lesions |
| A 52-year-old male | | Hemodialysis  for 2 years | Diabetes mellitus  Hypertension | Clinical recovery |
| A 59-year-old male | | Hemodialysis  for 1.25 years | Diabetes mellitus | Retrospective: 6 [analysis of the medical records] | Clinical and neuroimaging recovery |
| A 67-year-old female | | Hemodialysis  for 5 years | Diabetes mellitus | Persistence of movement disorder despite resolution of BG lesions |
| A 67-year-old male | | Hemodialysis  for 1 year | Diabetes mellitus | Persistence of movement disorder despite resolution of BG lesions |
| A 50-year-old male | | Hemodialysis  for 1.6 year | Diabetes mellitus  Coronary heart disease  Pulmonary edema  Hypertension | Improved neurologic outcome and regression of neuroimaging findings |
| A 49-year-old male | | Hemodialysis  for 8.4 months | Diabetes mellitus  Coronary heart disease | Clinical recovery |
| A 49-year-old female | | ND | Diabetes mellitus | Clinical and neuroimaging recovery |
| **Wanget al.6** | Two adults | | Hemodialysis | Diabetes mellitus | Case-report | Acute movement disorders  Fluorodeoxyglucose-positron emission tomography (FDG-PET) scan showed reduced glucose metabolism in the bilateral BG of the two patients and absent in the bilateral putamen | ND |
| **Ohtake et al.7** | A man with diabetic nephropathy | | Hemodialysis | Diabetes mellitus | Case-report | Gait disturbance  Dysarthria  High serum and cerebrospinal fluid (CSF) manganese concentrations  MRI showed hypointense lesions in the bilateral BG on T1WI which were hyperintense on T2WI | Infusion of edetic acid, a chelating agent, resulted in improvement of clinical and MRI findings |
| **Lee et al.8** | A 48-year-old man with ESKD | | Hemodialysis  for 4 years | Adult polycytic kidney disease | Case-report | Acute Parkinsonism  Initial MRI showed hypointense lesions in the bilateral BG on T1WI which were hyperintense on T2WI and FLAIR (compatible with vasogenic edema). The centers of these lesions were hyperintense on DWI and hypointense on ADC (compatible with cytotoxic edema). There was no gadolinium enhancement. MR-angiography showed prominent lenticuostriate arteries. SPECT imaging after 3 days from the onset showed increased cerebral blood flow in BG Bilaterally. | Improvement of neurologic condition. Repeated MRI (5 weeks after onset) showed disappearance of BG lesions, prominent lenticulostriate arteries with discrete slit like pallidal high signal lesions on T2WI and ADC (compatible with ischemia). Subtraction SPECT imaging showed hyperperfusion of BG bilaterally.  The authors suggested that the vasogenic edema of BG was the prominent mechanism of underlying BG lesion and resulted from focal hyperemia secondary to abnormal vasodilatation of lenticulostriate arteries. The discrete pallidal slit-like regions were the result of irreversible damage (ischemia). |
| **Cupidi et al.8** | A 68-year old female with mild uremia | | none | Diabetes mellitus  Coronary heart disease  Hypertension | Case-report | Acute parkinsonism | Gradual clinical recovery within months with associated with improvement of kidney function |
| **Kim et al.10** | A 55‐year‐old woman, with diabetic nephropathy and uremia | | Hemodialysis  for 4 years | Diabetes mellitus Hypertension | Case-report | Acute mental confusion  Parkinsonism  A dystonic foot  Bilateral symmetrical swollen  BG lesions which were hypointense on T1WI, hyperintense on T2WI with perifocal edema, hyperintense on DWI with marked bright bilateral globus pallidus and hypointense in apparent diffusion coefficient (ADC) particularly in globus pallidus compared to putamen. | Hemodialysis resulted in improvement of consciousness within a week, gradual and slight improvement of neurological symptoms within 2 months, normalization of DWI and ADC findings except presence of marked hyperintese signal in bilateral globus pallidus on ADC map and T2WI suggesting cystic degeneration within the damage tissue. |
| **da Silva et al.11** | Nine patient | | Five were on regular hemodialysis and five were not on dialysis | ND | Case-report | Parkinsonian symptoms and a mixed syndrome with prominent vestibular auditorysymptoms in a 48-year old female patient on hemodialysis (manganese level = 1.18 ng/ml)  Vestibular syndrome in a 33-year-old male on hemodialysis (manganese level = 0.86 ng/ml)  Myoclonus in a 45-year old male on hemodialysis (manganese level = 2.24 ng/ml)  Parkinsonism in a 43-year old female on hemodialysis (manganese level = 1.35 ng/ml)  MRI of the above mentioned 4 patients had bilateral symmetric hyperintensities in the globus pallidus on T1WI.  The remaining 5 patients without dialysis treatment (except one) were unremarkable. | ND |
| **Li et al.12** | A 77-year-old man with ESKD | | Daily automated peritoneal dialysis for 6 years | Diabetes mellitus | Case-report | Lactic acidosis  Subacute symptoms of gait disturbance, dysarthria, dysphagia and lethargy.  Bilateral symmetrical BG lesions which were hypointense in T1WI and hyperintense in T2WI, FLAIR and DWI | Slow clinical recovery despite resolution of BG lesions within 3 weeks |
| **Nishimura et al.13** | An 60-year-old male with ESKD | | Continuous ambulatory peritoneal dialysis for 1 year | Diabetes mellitus | Case-report | Parkinsonism developed over a period of 3 months.  A mild disturbance of consciousness, asterixis, bilateral extensor plantar responses.  Metabolic acidosis  Swollen bilateral BG lesions which were hyperintense in T2WI. The pattern of DWI and ADC map indicated vasogenic and cytotoxic edema in bilateral globus pallidus. | Persistence of movement disorder despite resolution of BG lesions. |
| **Case reports of chorea and dystonia** | | | | | | | |
| **Hung et al.4** | A-67-year-old man | Hemodialysis  for 6 months | | Diabetes mellitus  Hypertension | Case-report | Chorea  Lactic acidosis  Low thiamine concentration  Bilateral BG lesions | Clinical and neuroimaging recovery occurred after intravenous thiamine |
| **Hung et al.15** | A-67-year-old man | Hemodialysis  for 6 months | | Diabetes mellitus  Hypertension | Case-report | Chorea  Lactic acidosis  Low thiamine concentration  Bilateral BG lesions | Clinical and neuroimaging recovery occurred after intravenous thiamine |
| A-55-year-old man | Hemodialysis  for 9 months | | Diabetes mellitus |
| **Lee et al.16** | Four adults with ESKD | Hemodialysis | | Diabetes mellitus | Case-report | Sudden chorea  MRI-Brain of three patients showed bilateral symmetrical lesions in BG which were hypointense on T1WI and hyperintense on T2WI. In two patients, DWI and ADC showed that BG lesions were consistent with vasogenic edema and there were small foci of cytotoxic edema within the lesions | Marked clinical recovery occurred after repeated hemodialysis with marked resolution of BG lesions. |
| **Park et al.17** | A 68-year-old woman with ESKD | Hemodialysis | | Diabetes mellitus | Case-report | Sudden chorea  bilateral lesions in the external segments of bilateral globus pallidus in the form of focal vasogenic edema and later cystic degeneration | Gradual clinical recovery occurred with optimization of hemodialysis |
| **Kiryluk et al.18** | A 71-year woman with ESKD of 1 year duration | Hemodialysis | | Advanced focal segmental glomerulosclerosis which progressed to ESKD within one year | Case-report | Acute chorea  Lesions in putamen and globus pallidus bilaterally which were hypointense on T1WI and hyperintense on T2WI and FLAIR with no enhancement with gadolinium. | Optimization of dialysis resulted in clinical recovery within 12 days and resolution of neuroimaging lesions within one and half months. |
| **Shin et al.19** | A 44-year man with ESKD | Hemodialysis | | ND | Case-report | Acute chorea  RLS  Hypoglycemic injury to BG and thalamus | Haloperidol (1.5-3 mg/d) was used to treat chorea.  RLS improved with tramadol |
| **Dicuonzo et al.20** | An adult | Hemodialysis | | Diabetes mellitus | Case-report | Chorea  Bilateral symmetric BG lesions  In MR-spectroscopy, the authors reported abnormal spectra from the putamen bilaterally which were characterized by excess lipid and lactate and significant reduction of the neuronal marker N-acetyl-aspartate (NAA) (15 to 25% below normal) and elevation of lactate. | Clinical and neuroimaging recovery |
| [**Wali**](http://www.ncbi.nlm.nih.gov/pubmed/?term=Wali%20GM%5Bauth%5D) **et al.21** | A 67-year-old man with ESKD | Hemodialysis | | Diabetes mellitus | Case-report | Acute onset generalized dyskinesia and mild confusion.  Bilateral symmetrical BG lesions which were hypointense on T1WI and hyperintense on T2WI, FLAIR and DWI and hypointense on ADC in the central portion of BG and surrounded by perilesional hyperintensities. | Clinical recovery within 2 weeks and complete resolution of neuroimaging lesions. |
| **Lin et al.22** | Two adults | Hemodialysis | | ND | Case-report | Acute generalized chorea  Metabolic acidosis  Bilateral BG lesions (cytotoxic edema) | Clinical and neuroimaging recovery with supportive treatment and correction of metabolic derangement. |
| **Renard et al.23** | A 35- year-old woman | Hemodialysis | | Drug-related interstitial tubulointerstitial nephropathy  Diabetes mellitus type 1 | Case-report | Dystonia  MRI-brain was performed after 6 months and showed bilateral putaminal lesions with a slight left sided predominance. | ND |

ND, not determined, BG, basal ganglia, RLS, restless leg syndrome, GTC, generalized tonic-clonic

\*Therapy for uremia