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Successful Treatment of High Dose Methotrexate Induced Acute Kidney Injury by Intermittent Venovenous Hemodiafiltration

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Objective: Methotrexate (MTX) is a widely used chemotherapy drug and is excreted mainly from kidney (about 40–90%). High dose of MTX can lead to life-threatening acute kidney injury and damages to digestive tract, liver and bone marrow. We tried to treat an elderly patient with acute kidney injury due to high concentration MTX by intermittent venovenous hemodiafiltration, and observed its efficacy and side effects. **Methods and Results:** A 79 years old female patient with central nervous system lymphoma received chemotherapy of MTX (5 g, iv. for 4 hours) and dexamethasone associated with hydration and alkalization treatment. Her creatinine was 70 µmol/L (GFR 56.13 ml/min) before chemotherapy. Twenty hours after MTX infusion, blood MTX concentration elevated to 45.6 µmol/L (by chemiluminescence method). She suffered from acute renal failure (creatinine to 184 µmol/L) without response to conservative treatment. After venovenous hemodiafiltration for 5 times, MTX reduced to less than 0.1 µmol/L, and creatinine returned to 101 µmol/L (GFR 38 ml/min) without obvious side effects. **Conclusion:** Intermittent venovenous hemodiafiltration can effectively and safely remove MTX from blood.

Key words: Methotrexate; Acute kidney injury; Venovenous hemodiafiltration.

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The Changes of Arterial Stiffness and Their Associated Factors with Long-Term Prognosis in Hemodialysis Patients

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Objective: To investigate the changes of arterial stiffness in end-stage renal disease (ESRD) patients and their associated risk fac-

tors for arterial stiffness and long-term prognosis. **Methods:** Two hundred patients including 95 patients on hemodialysis, 55 patients on peritoneal dialysis and 50 patients with stage 2–3 chronic kidney disease (CKD) in Peking Union Medical College Hospital were enrolled in this prospective study. They were followed up for 28 months. Brachial-ankle pulse wave velocity (baPWV) and ankle-brachial BP index (ABPI) were measured by a device (VP1000, Japan Colin) at the beginning and end of this study. The changes of hypotension and baPWV were monitored 0, 1st, 2nd and 4th hour during hemodialysis. Echocardiography was used to evaluate the cardiac structural and functional changes. Clinical data of these patients were collected. Plasma CRP, Scr, BUN, Hb, Ca, P, iPTH, Alb, Palb, CHO, TG, LDL and HDL were measured. **Results:** (1) baPWV was significantly higher in ESRD patients, but there was no significant difference between hemodialysis and peritoneal dialysis patients. Correlation analysis showed that baPWV was correlated with age ($r=0.45$, $P<0.0001$), height ($r=-0.22$, $P<0.001$), weight ($r=-0.16$, $P=0.027$), systolic blood pressure ($r=0.206$, $P<0.005$), diastolic blood pressure ($r=0.58$, $P<0.001$), TG ($r=0.313$, $P<0.005$), LVMI (g/m^2 , $r=-0.34$, $P=0.009$), LVDs ($r=-0.447$, $P<0.005$), and LVDd ($r=-0.35$, $P=0.007$) in ESRD patients. baPWV curves in hemodialysis patients with hypotension were different from those in patients without hypotension. (2) After follow-up for 28 months, 15 cases on hemodialysis (15.8%) and 5 cases on peritoneal dialysis (10%) died. baPWV did not change significantly at the beginning and end of this study after exclusion of died cases. (3) Compared with survival patients, older patients died frequently (65.2 ± 10.8 vs. 56.6 ± 12.3 years, $P=0.03$). Patients with lower serum Ca, blood pressure, ABI, and faster tricuspid regurgitation were more likely to have pulmonary hypertension and hypotension during hemodialysis. Kaplan-Meier survival analysis revealed that age (≥ 60 years), hypotension during hemodialysis and pulmonary hypertension were the risk factors for survival, but baPWV, gender, primary disease and Kt/V had no relationship with survival. **Conclusion:** ABI was more valuable in predicting mortality in hemodialysis patients compared with PWV. Pulmonary hypertension and dialysis hypotension were the risk factors for death.

Key words: Arterial stiffness; Pulse wave velocity; Pulmonary hypertension; End-stage renal disease.

Influence of Hemodialysis on Pulse Wave Velocity and Ankle Brachial Index Measurement

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Objectives: Pulse wave velocity (PWV) and ankle brachial index (ABI) were generally applied to evaluate vascular stiffness, to diagnose peripheral artery disease, and to predict vascular calcification as a non-invasive method. In this research, influences of time point of hemodialysis on these two parameters were studied to test the reliability and repeatability for measuring these two parameters in hemodialysis patients. **Methods:** A total of 12 maintenance hemodialysis patients were enrolled in this study. Brachial-ankle PWV and ABI were measured before, during (2 hours after beginning of hemodialysis), after hemodialysis, and next time before hemodialysis treatment. Blood flow, blood pressure, and ultrafiltration were recorded simultaneously. PWV and ABI measured at different time point were compared. Two-way analysis of variance and Student-Newman-Keuls test were applied to compare the differences between different means, and the correlation was analyzed by Pearson correlation analysis. SPSS 11.5 software was used for the statistical analyses. **Results:** PWV was unchanged before and during hemodialysis (21.86 ± 7.17 m/s vs. 24.36 ± 5.56 m/s, $P=0.069$) with a slight increase after hemodialysis (24.34 ± 4.90 m/s vs. 20.70 ± 7.16 m/s, $P=0.17$). Positive correlation was found between each two parameters ($r=0.611$, 0.597 and 0.617 , respectively; $P<0.01$). There was no difference in PWV between before, first, and second hemodialysis (24.51 ± 6.49 m/s vs. 24.76 ± 6.34 m/s, $P=0.774$). No differences in ABI values were found before, during, after, and next time before hemodialysis. Positive correlation was found between each two parameters ($r=0.700$, 0.683 and 0.893 , respectively; $P<0.01$). There was no correlation between the variations of PWV or ABI and ultrafiltration or blood flow. **Conclusions:** Hemodialysis treatment does not affect ABI measurement. PWV increases slightly after hemodialysis, and recovers at next treatment. Comparable consistency of PWV and ABI measurements at different time point of hemodialysis indicates an extensive time window for measuring these two parameters in maintenance hemodialysis patients.

Analysis of Death Causes and Its Related Factors in Young Patients on Maintenance Hemodialysis

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Objectives: Hemodialysis is the main therapeutic management in patients with end stage renal disease (ESRD), and is widely used in clinical practice. Hemodialysis can effectively lessen the uremic symptoms and increase the long-term survival rate in ESRD patients. However, the mortality is still high in maintenance hemodialysis (MHD) patients. Similar to the tendency of increased mortality in the overall MHD patients, the mortality in young MHD patients is also high. In our previous study, the prevalence of hypertension and left ventricular hypertrophy (LVH) in young MHD patients were similar to those in middle-aged and elderly MHD patients. Cardiovascular disease and cerebrovascular disease are the most common complications and the main cause of death in MHD patients. The cause of death in young MHD patients is unclear. This study investigated the causes of death and their related factors in young MHD patients. **Methods:** A total of 71 dead patients who treated with MHD for more than 3 months during the period between January 2006 and January 2011, in the Blood Purification Center of Beijing Chao-Yang Hospital were enrolled in this retrospective study. Among them, 31 patients aged between 22 and 44 years old. Hemodialysis performed 3 times per week and 4 h for a dialysis session. The related data including etiological diagnosis, cause of death and predicted factor of death were compared between the two groups. **Results:** In the five years from January 2006 to January 2011, there were 268 MHD patients who were treated with hemodialysis for more than 3 months in this dialysis center. Seventy-one MHD patients of them died. The five-year overall mortality was 26.5%. In the 268 MHD patients, 120 were young patients, of whom 31 died with the five-year mortality of 25.8%. In the rest 148 MHD patients with middle-aged or elderly patients, 31 died with the five-year mortality of 27.0%. No significant difference was found in the five-year mortality between the two groups ($\chi^2=0.048$, $P=0.826$). Males were significantly higher in young MHD patients than in middle-aged and elderly MHD patients, and the male to female ratio in young vs. middle-aged and elderly MHD patients was 22/9 vs. 18/22 ($\chi^2=4.788$, $P=0.029$). The dialysis duration was significantly less in young MHD patients (20.8 ± 20.4 months) than in the middle-aged and elderly MHD patients (53.2 ± 36.1 months; $t=4.469$, $P=0.000$). The main causes of death in the 71 MHD patients were cardiovascular disease (31/71, 43.7%), cerebrovascular disease (15/71, 21.1%), infection (13/71, 18.3%) and hyperkalemia (12/71, 16.9%). There was no significant difference in patients died of cardiovascular disease between young MHD patients (14/31, 45.2%) and middle-aged and elderly MHD patients (17/40, 42.5%; $\chi^2=0.050$, $P=0.823$). In the young MHD patients died of cardiovascular disease, 71.4% (14/31) were caused by acute pulmonary edema and 28.6% (4/14) by acute myocardial infarction. In contrast in the middle-aged and elderly MHD patients, 17.6% (3/17) died of acute pulmonary edema and 82.4% (14/17) died of acute myo-

cardial infarction. Patients died of acute pulmonary edema were significantly different between young MHD patients and middle-aged and elder MHD patients ($\chi^2=9.120$, $P=0.003$). Patients died of cerebrovascular disease were similar between young MHD patients (4/31, 12.9%) and middle-aged and elderly MHD patients (11/40, 27.5%; $\chi^2=2.233$, $P=0.135$). Patients died of hyperkalemia were 35.5% (11/31) in young MHD patients and 2.5% (1/40) in middle-aged and elderly MHD patients ($\chi^2=13.529$, $P=0.000$). Significant difference was detected in patients died of infection between young MHD patients (2/31, 6.5%) and middle-aged and elderly MHD patients (11/40, 27.5%; $\chi^2=5.173$, $P=0.023$). **Conclusions:** The main causes of death in MHD patients were cardiovascular disease, cerebrovascular disease, infection and hyperkalemia. Mortality in young MHD patients was similar to that in middle-aged and elderly MHD patients. Cardiovascular disease was the first cause of death in young MHD patients, but the main manifestation was acute pulmonary edema. The second cause of death in young MHD patients was hyperkalemia. To improve life quality and long-term prognosis in young MHD patients, prevention and treatment of acute pulmonary edema and hyperkalemia should be emphasized.

Key words: Renal dialysis; Death; Complication; Young patients.

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Characteristics of *E. coli* Related Peritonitis in CAPD Patients

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Objectives: Among patients with chronic renal failure (CRF) and treated with continuous ambulatory peritoneal dialysis (CAPD), infections caused by *Escherichia coli* (*E. coli*) strains are frequent and severe complications, but the characteristics of this group of bacteria are unknown. The aim of this study is to investigate the correlation of *E. coli* isolates and peritoneal dialysis related peritonitis in patients with CAPD. **Methods:** The serotype, phylogenetic background, virulence genes (VGs), and genetic relatedness of the 47 *E. coli* strains from 42 patients with *E. coli* peritonitis were analyzed by slide agglutination test, genomic DNA, PCR and pulsed-field gel electrophoresis (PFGE). In addition, we compared these 47 strains with 21 rectal isolates from these patients and 20 rectal isolates from matched uninfected control subjects for comparison of phylogenetic group and the presence of VGs. **Results:** All of the peritoneal and rectal isolates from patients did not belong to the five intestinal pathogenic/diarrheal *E. coli* strains (e.g. EHEC and EAEC). Phylogenetic groups A, B1, B2, and D accounted for 27.7%, 4.3%, 31.9% and 36.1%, respectively, of the peritoneal isolates. There were not many phylogenetic differences between the peritoneal and rectal isolates from the patients. In contrast, group A+B1 accounted for 83.4% of rectal isolates from control subjects. As for VGs, there were no differences between the rectal and peritoneal isolates from patients. When compared with the 20 rectal isolates from control subjects, the 47 peritoneal isolates exhibited a significant higher prevalence of most

analyzed VGs. PFGE demonstrated that approximately 1/3 peritoneal isolates were genetically identical with the rectal isolates. For the 4 patients who had two or three consecutive episodes, strains from the same patient of different episodes had a close genetic relationship (coefficient of similarity $\geq 80\%$) even if the interval was longer than 8 months. **Conclusion:** The predominant phylogenetic groups of *E. coli* strains causing CAPD related peritonitis are group B2 and D. *E. coli* isolates that caused consecutive episodes are probably the same strain.

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Vitamin C Deficiency Is Prevalent in Patients on Dialysis

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Objectives: Plasma vitamin C is very important in anti-oxidative stress and in anti-inflammation processes. Plasma vitamin C level was generally low in patients on dialysis because of inadequate dietary intake and dialysis loss. Plasma vitamin C level and its possible influencing factors other than dietary intake and dialysis loss were explored in a group of patients on maintenance hemodialysis (MHD) or peritoneal dialysis (PD). **Methods:** In this cross-sectional study, 342 patients on dialysis (127 MHD, 215 PD) without vitamin C supplement were recruited from three dialysis facilities in Beijing, China. Their demographics were recorded. Plasma vitamin C was measured by high-performance liquid chromatography. Patients were classified into four subgroups according to vitamin C level: group A: $<2\mu\text{g/ml}$ ($<11.4\mu\text{mol/l}$, deficient), group B: $2-4\mu\text{g/ml}$ ($11.4-22.8\mu\text{mol/l}$, insufficient), group C: $4-14\mu\text{g/ml}$ ($22.8-79.8\mu\text{mol/l}$, normal), and group D: $>14\mu\text{g/ml}$ ($>79.8\mu\text{mol/l}$, above normal). According to age, patients were divided into three subgroups: group A1 ($<55\text{y}$), group A2 ($55-69\text{y}$), and group A3 ($>69\text{y}$). According to dialysis vintage, patients were divided into three subgroups: group S1 (dialysis vintage of <18 months), group S2 (dialysis vintage $18-49$ months), and group S3 (dialysis vintage >49 months). **Results:** Plasma vitamin C level was in the range of $0.48-15.57\mu\text{g/ml}$ (IQR $1.72-4.54\mu\text{g/ml}$). The percent of patients in groups A, B, C and D was 32.7%, 36.6%, 30.1% and 0.6%, respectively. Plasma vitamin C level was inversely associated with age (Spearman $r=-0.332$, $P<0.01$). Plasma vitamin C level in group A1, A2 and A3 was 3.7 (IQR $2.3-5.2$), 2.7 (IQR $1.8-4.4$), and 2.0 (IQR $1.5-3.4$) $\mu\text{g/ml}$, respectively. Plasma vitamin C level in group S1, S2 and S3 was 3.2 (IQR $2.1-5.4$), 2.6 (IQR $1.7-3.9$), and 2.5 (IQR $1.4-4.3$) $\mu\text{g/ml}$, respectively, and was inversely associated with dialysis vintage (Spearman $r=-0.172$, $P<0.01$). Plasma vitamin C level in MHD patients was 2.3 (IQR $1.4-4.0$) $\mu\text{g/ml}$, which was

lower than 3.2 (IQR 2.0–4.6) $\mu\text{g/ml}$ in CAPD patients. The percentages of vitamin C deficiency ($<2\text{ }\mu\text{g/ml}$) and dehydroascorbic acid concentration in MHD patients were higher than those in CAPD patients. MHD patients also had lower pre-albumin, lower body mass index and higher albumin than CAPD patients. There were no statistically significant differences in age, gender, hemoglobin and hsCRP between CAPD and MHD patients. No significant difference was found in vitamin C level between genders, or among primary causes of end stage renal disease. **Conclusions:** Vitamin C deficiency is common in dialysis patients. Compared with CAPD patients, vitamin C deficiency is more common in MHD patients, especially those with advanced age and longer dialysis vintage.

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Transluminal Angioplasty of Venous Stenoses or Occlusion in Native Autogenous Arteriovenous Fistula

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Objectives: This report summarizes our experience over the past two years at the Third Hospital of Hebei Medical University with the use of percutaneous transluminal angioplasty (PTA) in the treatment of venous stenotic lesion or occlusion in autogenous arteriovenous fistulas, in order to prolong the life time of the native fistulas and release patient's distress of re-operation.

Methods: From August 2009 through April 2011, 26 PTA procedures were performed on stenotic venous lesion or occlusion in native arteriovenous fistulas. 19 patients with dysfunctional or clotted Brescia-Cimino fistulas underwent balloon angioplasty of the 26 associated venous stenoses or occlusions. The 19 patients presented in this report include eleven males and eight females with an age range between 39 and 82 years, and a mean age of 63.5 years. The cause of renal failure was glomerulonephritis in seven patients, hypertension in four patients, diabetes in three patients, polycystic kidney disease in three patients, acute kidney infarction in one patient, and lupus nephritis in one patient. Eleven of these patients had a total of eighteen stenoses, eleven of them were multiple stenoses. Nine stenoses were located at the proximal venous anastomosis (cephalic vein within 2 cm near the anastomosis) and fistula body, and two were located at the anastomotic area and the proximal venous anastomosis. Three stenoses occurred only at the proximal venous anastomosis, and four stenoses occurred only at the fistula body. Eight of these patients had thrombosis, four of them performed thrombolysis with urokinase before PTA, and four patients had PTA directly. Fistulograms were performed to evaluate vascular access following successful thrombolysis (4 instances), or to evaluate the stenosis location. Intravenous heparin, 3000 to 5000 units, was given, and after successful crossing of the stenosis dilatation attempts were begun with an oversized angioplasty balloon catheter (3.5 to 6 mm balloon diameter, 4–7 French catheter, burst pressure 8–21 atmospheres). The balloon was

inflated for two to three minutes each time up to a maximum of three to five inflations. Clinical success was defined as the perception of a continuous palpable thrill and the ability to perform dialysis. **Results:** Fistulograms of the 18 stenosis showed each of the fistulas with a greater than 90% stenosis. Then all the stenosis were treated with PTA. Nine stenoses which located at the proximal venous anastomosis and fistula body gained technical success (residual stenosis less than 30%), and had the ability to perform dialysis. One of the patients had re-stenosis 10 months after the dilation and 9 months after the re-dilation, and both were treated by PTA successfully. The other patient had re-stenosis 9 months after the dilation and 6 months after the re-dilation, at last had fistula plastic operation on the other arm. Three stenoses that occurred only at the proximal venous anastomosis failed to gain technical success, but two of them got clinical success: one had 70% residual stenosis, and dialysis blood flow was less than 160 ml/min, so we did fistula plastic operation at the 5 cm proximal part; the other two had 40% and 50% residual stenosis, but the dialysis blood flow can reach 300 ml/min. Four stenoses occurred only at the fistula body and two multiple stenoses located at the anastomotic area and the cephalic vein near the anastomosis. All gained technical and clinical success. Eight of these patients had thrombosis; three of them performed thrombolysis with urokinase in time, and got succeed, then had PTA. One had 20% residual stenosis, but the balloon ruptured during the dilation. The puncture vein dilacerated during the procedure of picking out of the ruptured balloon. We sutured the vein and got a continuous palpable thrill and the ability to perform dialysis. Two got both technical and clinical success. One had thrombosis for about 4 months long also performed thrombolysis with urokinase, but did not get thrombolysis completely before PTA, gained technical and clinical success. Four occlusions performed PTA directly, and three of them gain technical and clinical success. One of them had thrombosis for about 6 months long, and we could not successful crossing of the occlusion dilatation attempts. At last, we made a new fistula with PTFE grafts on the same arm. 15 out of 18 stenoses gained immediate technical success (residual stenosis less than 30%), and 17 stenoses gained clinical success (The blood flow during hemodialysis reached 250 ml/min after operation), with 94.4% success rate. 7 out of 8 occlusions gained both technical and clinical success, 1 occlusion could not be treated with percutaneous balloon angioplasty, with 87.5% success rate. Immediate overall clinical success was 92.3%. **Conclusion:** PTA is a technique of promise in the non-surgical salvage of venous stenoses or occlusion in autogenous arteriovenous fistulas. It can prolong the useful life of fistula, avoid the pains of surgical revision (of repeat surgery to establish a new fistula or to repair the old one), and save the vascular resources sustaining the life of maintenance hemodialysis patients.

Hemoperfusion Plus Continuous Venovenous Hemofiltration on Patients with Multiple Organ Dysfunction Syndrome

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Objective: In this randomized and controlled clinical trial, we aimed to compare the effect of hemoperfusion (HP) plus continuous veno-venous hemofiltration (CVVH) with CVVH only, on the 60-day mortality among patients with multiple organ dysfunction syndrome (MODS) complicated with acute kidney injury (AKI).

Method: A total of 42 patients with MODS complicated with AKI were randomly assigned into study group (HP plus CVVH) and control group (CVVH). In study group, hemoperfusion was carried out immediately when CVVH was started (0 h), with hemoperfutor installed along the extracorporeal pipeline right after the hemofilter. Hemoperfusion was performed for 2 hours (2 h) and repeated in the next two days at the same moment for the same time. Patients in control group received the same treatment but without hemoperfusion. Blood samples were drawn at 0 h, 2 h, 24 h, 26 h, 48 h, 50 h, and 72 h respectively to test tumor necrosis factor- α (TNF- α), interleukin-1 β (IL-1 β), interleukin-6 (IL-6), and interleukin-10 (IL-10). Ultrafiltrate was collected at the same time to test TNF- α , IL-1 β , IL-6, and IL-10 levels. Additionally, acute physiology and chronic health evaluation II score (APACHE II), oxygenation index, hospitalization time, and some other laboratory test results were documented. **Result:** 22 patients were randomly assigned into study group while 20 patients in control group. The 60-day survival rate was 59.1% in study group and 45.5% ($P > 0.05$) in control group. APACHE II score was dramatically decreased in both groups, but the decrement of APACHE II score from 0 h to 72 h was significantly higher in study group than control group ($P < 0.05$). Plasma levels of TNF- α , IL-1 β , IL-6, and IL-10 at 72 h were significantly lower than 0 h in both groups ($P < 0.05$). Besides, serial plasma levels of TNF- α , IL-1 β , IL-6, and IL-10 in study group were significantly lower than those in control group at the same time ($P < 0.05$). **Conclusion:** HP combined with CVVH may improve the 60-day survival rate of MODS patients with AKI compared with CVVH only, which may be explained by more effective clearance of cytokines.

Impact of Peritoneal Dialysis on the Peritoneal Distribution of Pericytes and Neoangiogenesis in a Uremic Rat Model

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Objective: The mechanism responsible for peritoneal angiogenesis during long-term peritoneal dialysis (PD) has not been fully defined. Pericytes play not only as obligatory constituents of blood microvessels, but also as an important regulator of vascular development, stabilization, remodeling and permeability by cross-talk with endothelial cells. The present study investigated the impact of PD on the distribution of pericytes in peritoneal membrane and the possible role of pericytes in peritoneal neoangiogenesis. **Methods:** Twenty-four male Wistar rats were assigned into the following 3 groups: control group ($n=8$): rats got sham-operation; uremic non-PD group ($n=8$): rats received 5/6 nephrectomy; uremic PD group ($n=8$): uremic rats dialyzed with 4.25% Dianeal (3 ml/100 g of body weight) twice daily. After 4 weeks, peritoneal biopsy samples were obtained to detect morphological changes including the integrity of peritoneal mesothelial cells and density of blood vessels. Distribution of pericytes/endothelial cells was assessed by double immunofluorescence staining (Desmin/VIII). **Results:** Compared to the control rats, uremic PD rats showed greater extent of mesothelial cell loss ($P=0.001$). Uremic non-PD rats also showed mesothelial cell loss with comparison to control rats but did not reach statistical significance ($P=0.317$). Both uremic PD rats and uremic non-PD rats experienced greater hypercellularity of mesothelial layer as compared to the control group ($P=0.001$ and $P=0.002$, respectively). Vessel density of uremic non-PD rats increased significantly when compared with that of control rats (6.9 ± 2.8 vs. $2.6 \pm 1.1/\text{HP}$, $P < 0.001$). PD treatment further remarkably increased the number of vessel with comparison to control rats (22.8 ± 3.3 vs. $2.6 \pm 1.1/\text{HP}$, $P < 0.001$) and uremic non-PD rats (22.8 ± 3.3 vs. $6.9 \pm 2.8/\text{HP}$, $P=0.006$). Significantly less vessel coverage of pericytes was noted in the uremic PD rats in comparison with that of both control rats and uremic non-PD rats. However, no significant difference was observed between uremic non-PD rats and control rats. **Conclusion:** Our results suggested that peritoneal dialysis might induce less recruitment of pericytes to participate in the peritoneal membrane neoangiogenesis observed during long-term treatment.

Key words: Pericyte; Peritoneal dialysis; Angiogenesis.

Gut Bacteria Translocation Resulting in Microinflammation in ESRD Patients

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Objective: Microinflammation frequently develops in end-stage renal disease (ESRD) patients. A large body of work revealed that the guts of ESRD patients display a variety of pathological changes such as mucosal edema, ulceration, erosion and impairment of gastrointestinal motility. However, the relationship between gut bacterial translocation (BT) and microinflammation in ESRD patients has not been widely investigated. To investigate whether gut microbiota dysbiosis and BT occur in ESRD patients and further contribute to microinflammation in ESRD. **Methods:** The subjects were divided into three groups: hemodialysed ESRD patients (n=22), nondialysed ESRD patients (n=30), and healthy controls (n=10). The alteration of gut microbiomes was studied by bacterial 16S ribosomal DNA amplification and DNA pyrosequencing. With the same methods, blood samples from all participants and dialysate samples from dialysed patients were examined to determine if bacterial DNAs were present. Plasma high-sensitive C-reactive protein (hs-CRP) and interleukin-6 (IL-6) of all subjects were detected with a latex strengthened transmission immunoturbidimetric method and an enzyme-linked immunosorbent assay, respectively. **Results:** 1. Pyrosequencing analysis revealed that microbial communities inhab-

ited the gut of the two ESRD case groups were considerably richer with the phylum *Proteobacteria* and the family Enterobacteriaceae compared with the control group. The case groups demonstrated a significant increase in the abundance of Gram-negative facultative anaerobic pathogenic and opportunistic pathogens (*Proteus*, *Escherichia*, *Enterobacter*, *Acinetobacter*, *Proteus*, and *Pseudomonas* species) and, conversely, a reduction in probiotics (*Lactobacillus* and *Bifidobacterium* species) compared with the control group. 2. Bacterial DNAs were detected in 20% (6/30) blood samples from nondialysed patients and 27% (6/22) samples from hemodialysed patients. As expected, the majority of the bacteria detectable in blood were distributed in the gut of ESRD patients, recorded as *Klebsiella* spp, *Proteus* spp, *Escherichia* spp, *Enterobacter* spp, and *Pseudomonas* spp, same as the overgrown bacteria detected in gut. In only two out of the 22 hemodialysed patients, blood circulating bacterial DNA was detected in the dialysate samples of the identical individuals as well. 3. Plasma hs-CRP and IL-6 levels were statistically higher in the two ESRD groups compared with the control group. Within the ESRD case groups, plasma hs-CRP and IL-6 were significantly higher in patients with bacterial DNA in their blood than in those without the DNA. For patients with bacterial DNA in blood, bacterial genomic DNA concentration and plasma level of CRP or IL-6 are positively correlated. **Conclusions:** Gut microbiome dysbiosis occurs in ESRD patients with or without hemodialysis. Certain bacteria overgrow and translocate to blood circulation, thereby contributing to microinflammation status in ESRD patients. To mitigate microinflammation in ESRD patients, future therapeutic strategies may focus on normalizing the altered gut microbial communities or preventing translocation by applying antibiotics or probiotics.

Key words: Bacteria translocation; End-stage renal disease; Gut; Microinflammation.