

## Second Day

Thursday, December 17

O301

### Allopurinol in Diabetic Nephropathy

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**Introduction.** Diabetic nephropathy is the most prevalent cause of end stage renal disease (ESRD). Besides factors such as angiotensin II, cytokines, and vascular endothelial growth factor (VEGF) and uric acid may play a role as the underlying cause of diabetic nephropathy.

**Methods.** In this double-blinded, randomized, clinical trial, 40 patients with type 2 diabetes mellitus (DM) and diabetic nephropathy with proteinuria (at least 500 mg/24h) and serum creatinine (Cr) level < 3 mg/dl were divided into two groups of 20, in the nephrology Clinics of Isfahan from August 2006 to May 2008. Case group received allopurinol (100 mg/day) and control group received placebo for four months. Administration of antihypertensive and renoprotective drugs (angiotensin converting enzyme inhibitors (ACE inhibitors) and angiotensin receptor blockers (ARBs) continued for both groups, without changes in dosage.

**Results.** Each group consisted of 9 men and 11 women. There were no difference between two groups regarding age, body-mass index (BMI), duration of diabetes, systolic and diastolic blood pressure, fasting blood sugar, serum blood urine nitrogen (BUN), serum creatinine (Cr), serum potassium, and urine volume ( $P > 0.05$ ). Serum level of uric acid and 24-hour urine protein were significantly lower in the case group after four months of receiving allopurinol, compared with the control group ( $P < 0.05$ ).

**Conclusion.** Low dose of allopurinol (100mg/day) reduces severity of proteinuria after four months of administration, which is probably due to decreasing the serum level of uric acid. Thus, allopurinol can be administered as an adjuvant, cheap therapy with low side-effects for the patients with diabetic nephropathy.

O302

### Sildenafil and Congenital Nephrogenic Diabetes Insipidus

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**Introduction.** Congenital nephrogenic diabetes insipidus (CNDI) is a rare hereditary disease associated with severe polyuria due to ADH resistance resulting from AVPR2 or AQP2 mutations. Severe polyuria can result in hydronephrosis which can ultimately lead to end-stage renal disease in the most extreme cases. Recent experimental studies suggest that treatment with

sildenafil may enhance cyclic adenosine monophosphate (cAMP)-mediated apical trafficking of AQP2. Controlled clinical trials have not previously been undertaken in CNDI patients. This study was designed to determine if treatment with sildenafil was more effective in decreasing urine volume in CNDI patients as compared to treatment with hydrochlorothiazide (HCTZ)-amiloride plus indomethacin.

**Methods.** A total of 14 children (aged 2 to 10 years) with newly diagnosed CNDI were evaluated. Patients were excluded if they had renal tubular acidosis, chronic hypokalemia or hypercalcemia, and known cardiac, liver, or kidney disease. All 14 patients received sildenafil (experimental group) first, for 4 weeks, followed by HCTZ-amiloride plus indomethacin (conventional group) for 4 weeks, with a 2-week washout period between the treatments. The primary endpoint was 24-hr urine volume on experimental vs. conventional treatment regimens.

**Results.** Mean change in daily urine volume for experimental group was -3.1 L (95% CI, -1.3 to -4.9 L) vs. -1.2 L (95% CI, -0.8 to -1.6 L;  $P = 0.008$ ) for conventional group, and the mean change in urine osmolality for experimental group was 530 mOsm/kg (95% CI, 289 to 771 mOsm/kg) vs. 219 mOsm/kg (95% CI, 134 to 304 mOsm/kg;  $P = 0.005$ ) for conventional group. Mean change in urine cAMP excretion was 1405 nmol/day (95% CI, 956 to 1854 nmol/day) for experimental group vs. 869 nmol/day (95% CI, 658 to 1080 nmol/day;  $P = 0.003$ ) for conventional group.

**Conclusion.** Treatment with sildenafil alone in patients with CNDI resulted in significant reduction in 24-hr urine volume and number of voids per day as compared to treatment with HCTZ-amiloride plus indometacin.

O303

### Renoprotective Effect of Ethanolic Extract of Crocus Sativus L. (Saffron) Stigma in Alloxanized Diabetic Rats

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**Introduction.** Diabetes mellitus is a metabolic disorder as old as mankind and its incidence is considered to be high all over the world. Renal insufficiencies are the most important causes of death in this disease. A multitude of herbs have been described for the treatment of diabetes throughout the world. The aim of the present study was to assess the protective effect of ethanolic saffron extract (*Crocus sativus* L) on early renal injuries in alloxan-induced diabetic rats.

**Methods.** Male wistar rats were randomly assigned to six different groups of 12, including healthy rats,

normal healthy rats receiving ethanolic saffron extract, mild diabetic (MD) rats, mild diabetic rats receiving ethanolic saffron extract, severely diabetic (SD) rats, and severely diabetic rats receiving ethanolic saffron extract. The ethanolic extract of saffron was administered intraperitoneally to treatment groups for 30 days at a dose of 40 mg/kg dissolved in 10 ml/kg body weight of ISS. Control groups received ISS (10 ml/kg) in this manner. Animals of the different groups were sacrificed by cervical dislocation at the end of experiment. Tissue specimens were fixed in 10% buffered formalin and 5-micron thick sections were prepared using routine histopathological techniques. Histopathological studies of the kidneys were conducted in all experimental rats. Biochemical studies include urea, uric acid, and creatinine.

**Results.** Significant increased values of urea, uric acid, and creatinine were seen in diabetic rats. The extract caused significant reductions in the levels of the mentioned parameter in diabetic rats. Histopathology of the kidney in diabetic rats showed a spectrum of changes including membranoproliferative glomerulitis, enlargement of lining cells of tubules, lymphocytic infiltration, hyperemia, and hemorrhage. The mentioned injuries were more prominent in SD rats. The histopathological appearance of kidneys in ethanolic extract treated diabetic rats was near normal.

**Conclusion.** The findings of the present study indicate that ethanolic extract of *Crocus sativus* L. stigma has protective effect on early diabetic nephropathy in experimental induced diabetes. Therefore, ethanolic extract of saffron stigma is recommended for prevention of early renal injuries in diabetes mellitus.

### O304

## Calcitriol Treatment for Lowering of Albuminuria in Type 2 Diabetic Patients

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**Introduction.** Renin-angiotensin system (RAS) plays a major role in the development of diabetic nephropathy. Calcitriol (active form of vitamin D3) negatively regulates RAS and therefore, may decrease albuminuria and hypertension in diabetic patients. We tested this hypothesis in type 2 diabetic patients with vitamin D deficiency.

**Methods.** A total of 119 type 2 diabetic patients were enrolled in the study. Serum levels of 25 (OH) D, creatinine, and albumin excretion rate (AER) were measured for all patients. Patients with vitamin D deficiency underwent calcitriol treatment for 8 weeks and after this period, the laboratory results were compared with the results before treatment.

**Results.** Mean age of the patients was  $55.3 \pm 11.2$  year. Mean 25 (OH) D concentration was  $32.4 \pm 21.6$  ng/ml. Prevalence of hypovitaminous D, was 26.1% among the diabetic patients. Vitamin D deficiency

had a significant relationship with microalbuminuria ( $P = 0.04$ ), and glomerular filtration rate ( $P = 0.02$ ). Patients with vitamin D deficiency underwent supplementation therapy with active form of vitamin D. Supplementation with active form of vitamin D had a beneficial effect on albumin excretion rate and ACR decreased after treatment. Although this change was not significant ( $P = 0.22$ ), the effect on reducing the systolic and diastolic blood pressure was significant ( $P = 0.03$  and  $0.004$ , respectively).

**Conclusion.** It seems that vitamin D has a negative effect on release of renin which is a key factor in regulation of blood pressure and may protect against albuminuria by suppression of renin.

### O305

## Color Doppler Ultrasound Assessment of Arterio-Venous Fistula in Chronic Hemodialysis Patients in Kerman City

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**Introduction.** A well functioning arterio-venous fistula is essential for the maintenance of hemodialysis in patients with chronic renal failure. Color Doppler ultrasonography has been proven to be effective in the assessment of anatomical vascular feature, flow measurements, and complications. The purpose of the present study was to evaluate these factors in arterio-venous fistula with color Doppler ultrasound.

**Methods.** Between October and December 2008, we examined 54 hemodialysis patients (35 men and 19 women) in Shafa Hospital by Doppler ultrasound. The examination was done at least one hour after hemodialysis when the blood pressure was normal and the patient was hemodynamically stable.

**Results.** The mean age of the patients was 56 years (range, 13 to 77years), mean fistula age was 21 months (range, 5 to 192 months), and mean period of dialysis was 26 months (range, 2 to 204 months). A total of 45 and 6 patients had primary and secondary fistulas. Form 54 patients, 47.17% had normal flow volume, 20.75% had high FV, and 32.27% had low FV. Flow volume in 5 patients (9.43%) was very critical and almost had AVF failure. The mean FV was 817 cc/min and was significantly higher in antecubital (proximal) fistulas and lower in snuff box (distal) fistulas. The mean diameter of feeding artery was 5.40mm. In our study, there was a strong correlation between FV and localization of the fistulas and also diameter of the feeding arteries. The most common side effect was aneurysms and tortuse vessel (39.62% and 39%, respectively). Other side effects included thrombosis, edema, AVF failure,. We observed a correlation between fistula age and side effects, and also between FV and tortuse veins. We did not find

a correlation between FV and other side effects and could not detect suitable FV only based on side effects. **Conclusion.** We conclude that there was a high level of abnormalities present in arterio-venous fistulas. Color Doppler ultrasound enables early detection of groups with a higher risk and it can guide the nephrologists for subsequent specific treatments before the condition progresses to morbidity, and also can help the surgeon in selection of the surgical procedure.

## O306

## Impact of Transplant Glomerulopathy on Allograft Outcome

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**Introduction.** Recent studies of surveillance and clinical biopsies showed that the prevalence of TG is higher than expected, affecting 4% of the transplants at 1 year posttransplant and 20% at 5 years. Current evidence supports that TG is a unique pathology distinct from other forms of chronic allograft injury. TG is a progressive pathology that with or without CAN, leads to reduced graft survival and in some studies predicts allograft outcome more than CAN. In this study, we evaluated the prevalence of TG in kidney transplant biopsies in our hospital between 2006 and 2009 and association between TG and allograft survival was also evaluated. **Methods.** In a cross-sectional study, we reviewed allograft biopsies of patients admitted in our hospital between 2006 and 2009. The indications for biopsies were allograft dysfunction or new proteinuria. Biopsies were evaluated for CAN and Transplant glomerulopathy with LM and IF by one expert pathologist (according to BANFF 2007 criteria CAN was graded as grade I, II, and III and TG was defined as more than 10% of non-sclerotic glomeruli with GBM duplications in LM). We looked for frequency of CAN and CAN+TG in our patients. Also, we evaluated allograft survival in CAN with and without TG.

**Results.** A total of 166 biopsies were evaluated. A total of 27 patients had CAN (16%) and 14 had CAN+TG (8%) in biopsies. All of the CAN and TG patients had proteinuria. We measured the Cr when the patients underwent biopsy, though mean of Cr in CAN group was 2.5 versus 3.2 in CAN+TG group ( $P = 0.23$ ). Mean last creatinine in CAN patients was 3.4 mg/dl versus 4.5 mg/dl in CAN+TG patients ( $P = 0.22$ ; mean follow-up after biopsy was 1.3 year). It demonstrates that 1.3 year after biopsy, in CAN and CAN+TG groups, Cr increases

(especially in the latter), though the graft survival is worse than CAN group. Nine patients in CAN+TG group (64%) progressed to ESRD versus 5 patients in CAN group (18%;  $P = 0.003$ ). The graft survival in CAN group was better than CAN+TG group.

**Conclusion.** Transplant glomerulopathy is associated with poor allograft outcomes. The presence of TG may be associated with worse allograft outcomes compared to CAN alone.

## O307

## Hemodialysis and Hemofiltration Which Membrane for Which Kind of Therapy

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**Introduction.** For treatment of acute or end stage renal failure an enormous variety of hemofilters and membranes are offered by industry. It is up to the doctors to decide which type of filter should be used for treatment an individual patient, The cut-off of the membranes ranges from 1.000 to 100 000 Daltons, Urea clearance from 100 to 300 ml/min, Membrane area from 0.8 to 2.0 sqm, Membrane polymers include cuprophane, cellulose acetate, polyacrylonitrile. There are membranes with or without negative charge and with or without adsorbing capacity. The duration of single treatment varies between 3hrs and 30hrs depending on the kind of renal failure. The mode of therapy includes hemodialysis, pre- post-dilution hemofiltration and hemodiafiltration as well as continuous hemofiltration-hemodiafiltration therapy.

**Methods.** In our own experiments, we have analyzed the permeability of different membranes for substances of different molecular weight using SDS-PAGE.

**Results.** The results show the variety of protein permeability of these membranes and their alteration during progression of therapy. Whereas all high-flux membranes show a decrease of protein permeability during therapy surprisingly some membranes maintain their permeability for compounds up to 20 000 Daltons even for 30hrs. This may be important for continuous hemofiltration therapy. There are even membranes which cannot be used for hemofiltration because of too ample protein loss.

**Conclusion.** Dependent on the mode of therapy the specific properties of hemofilters and their membranes should be taken into consideration.

## O401

## Comparison between Clinical and Paraclinical Effect of Iminoral vs Neoral in Prevention of Rejection in De novo Renal Transplant Patients

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**Introduction.** Cyclosporine is the key drug in organ transplantation. In Iran, we have more than 2500 new renal transplantations each year and because of this, the government pays a huge amount of money to subsidize the imported cyclosporine in the form of Neoral. Recently, an Iranian drug company introduced this drug in the name of Iminoral which has been approved by different authorities in Iran and abroad, (including the Ministry of Health in Iran and European Directorate for the Quality of Medicines Certification Unit and FDA, Department of Health and Human Services, Center for Drug Evaluation and Research). Our study is the first clinical trial to compare the effect of Iminoral vs. Neoral in preventing acute rejection in renal transplantation and also to compare the side effects of these two drugs.

**Methods.** In this multicenter double-blinded randomized controlled trial, 208 kidney transplantation patients were randomized into treatment or control groups and followed for one year after transplantation. These patients have been taken either Iminoral (Iranian product of cyclosporine) or Neoral (Novartis). The main goal of the study was to compare the rate of acute allograft rejection diagnosed by clinical judgment, laboratory and imaging study, and allograft biopsy if needed. We have also studied and compared the known side effects of cyclosporine in both groups. All patients got treatment according to protocol adjusted for this study and evaluated clinically and laboratory at period of the study. Other than routine tests like Renal function tests, urinalysis and urine culture, FBS, lipids level, liver function tests, CBC and the Cyclosporin level (both C0 and C2) was measured in each clinical visit and it was considered at determined time.

**Results.** A total of 208 patients (54% in group A and 46% in group B) were enrolled in the study. Of these patients, 51% were men and 49% women. Mean age of the group A and B patients was 37 and 38 years, respectively. Median time on hemodialysis before transplantation was 23 and 16 months, respectively. Eight percent of the patients in group A and 24% of them in group B had deceased

transplantation. Mean creatinine level in both groups was similarly 1.29 mg/dl and the maximum level was 4.3 and 4.9 mg/dl in groups A and B, respectively. The C0 level of cyclosporine was 181.29 and 213.13 and C2 level was 711.22 and 774.56 in groups A and B, respectively. There was no difference in the rate of UTI occurrences, hyperglycemia (denovo and uncontrolled previously diagnosed diabetes), skin and gastrointestinal disorders, neurological involvement, and other complications.

**Conclusion.** According to this study, there is no significant difference in the rate of acute rejection whether we used the Iminoral or neoral in the first year after transplantation. There is also no difference in side effects of cyclosporine in both groups. We conclude that the use of Iminoral in kidney transplantation is safe and effective and can be used as an alternative for Neoral.

O402

## Emerging Cardiovascular Risk Assessment After Kidney Transplantation in Diabetic and Non-diabetic Patients: Looking for Early Markers

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**Introduction.** Evidence demonstrates that cardiovascular (CV) risk reduces after kidney transplantation (Tx). However, CV disease is still a major cause of death in the kidney Tx population. With the increasing inclusion of diabetic (DM) patients for kidney Tx, the evaluation and prevention of CV disease and nephropathy in this population becomes more important and must include traditional as well as emerging risk markers.

**Methods.** One-hundred kidney Tx patients including 33 DM (mean age, 51 ± 14 years) were evaluated for renal-cardiovascular risk factors/markers including blood pressure, lipids, glucose control, homocysteine, and arterial stiffness. Also, the tests were repeated a year later in 47 individuals.

**Results.** With a comparable Tx history and medication, there was no significant difference in the evaluated risk factors between DM and non-DM groups except for a greater augmentation index (AI) in the former group [20.5 (SE = 2.3) vs 13.1 (SE = 2.2)]. A multivariate analysis revealed that DM was an independent determinant for AI and a model containing age, SBP, DM, post-Tx time, gender, and GFR contributed in 39% of the AI variance. Furthermore, only post-Tx time and homocysteine were independently associated with GFR. Repeated testing after a year demonstrated a significant reduction in the carotid-femoral pulse wave velocity (CF-PWV) and SBP ( $P = 0.027$  and  $0.007$ , respectively).

**Conclusion.** In contrast to non-Tx groups, AI was significantly greater in DM kidney Tx patients compared

to their non-DM counterparts despite a comparable PWV. Nevertheless, CF-PWV improved after a year of follow-up. This may reflect progressive ventricular and large arterial function improvement despite remaining small arterial defects after kidney Tx.

## O403

### Evaluation of Cyclosporine Level and Renal Graft Function in Renal Transplant Recipients with Plasminogene Activator Inhibitor (PAI-1) Polymorphisms

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**Introduction.** Chronic allograft nephropathy is observed in renal transplant recipients. Here we assess the correlation of plasminogene activator inhibitor 1 (PAI-1) polymorphisms and renal graft function in renal transplant recipients (RTRs).

**Methods.** The present study was performed in the Drug Applied Research Center, Tabriz Medical University, Tabriz, Iran from September 2003 to December 2005 on 61 RTRs [35 males and 26 females, with a mean age of 36.47 (range 12-61) years] with stable allograft function (Cr < 2.2 mg/dl). The patients were randomized in to two groups treated with two different drug regiments [cyclosporine + prednisolone + azathioprine (CPA) group vs. cyclosporine + prednisolone + cellcept (CPC) group]. Following the DNA extraction from the blood leukocytes, the genotypes of PAI-1 were determined by Amplification Refractory Mutation System Polymerase Chain Reaction (ARMS-PCR). The magnitude of clearance of creatinine (ClCr), urea, blood pressure, urinary protein excretion rate and cyclosporine through level in the setting of each of the above PAI-1 polymorphisms was determined. The ClCr was measured by modification of diet in renal disease formula. Values were expressed as mean ±SD and  $P < 0.05$  was considered to indicate statistical significance.

**Results.** There was no significant relationship between each genotype of the PAI-1 alone and ClCr, blood pressure, and the degree of urinary protein excretion rate. In CPC group, the mean level of cyclosporine A was higher in 5G/5G genotype than in 4G/5G and 4G/4G genotypes ( $P < 0.027$ ,  $P < 0.022$  respectively). Cyclosporine level in patients with 4G/4G genotype receiving CPA was higher than patients treated with CPC ( $P < 0.036$ ) but among patients with 5G/5G genotypes, individuals

receiving CPC regiment had higher cyclosporine level ( $P < 0.04$ ). However, patients older than 45yrs with 5G/5G genotype had lower urea level compared to 4G/5G group ( $P < 0.033$ ).

**Conclusion.** We didn't find any relationship between ClCr and PAI-1 polymorphisms, though urea seems to be relatively lower in 5G/5G genotype. Cyclosporine A level was significantly higher in 5G/5G genotype.

## O404

### Necessity of Prevention of Human Cytomegalovirus after Kidney Transplantation; One Center Experience

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**Introduction.** Human cytomegalovirus (CMV) is one of the most common viral infections after kidney transplantation. Between 2005 and 2007, the frequency of CMV in the early posttransplant period was 42.9% to 54.8%. More than 90% of the patient population has CMV markers in Saint-Petersburg.

**Methods.** There were 69 recipients of kidney grafts from deceased donors divided into 3 groups: Group 1 (G1), 20 CMV-negative (PCR) patients, in whom oral valganciclovir was administered on day 10 after transplantation; administered dose depended on serum creatinine clearance. In 8 patients valganciclovir was given for 100 days and in 12 patients for 180 days; Group 2 (G2), included 18 patients, CMV-negative, without antiviral treatment; Group 3 (G3), included 31 patients, CMV-positive in the early posttransplant period, treated by IV ganciclovir for negative PCR. All recipients got standard immunosuppressive therapy: Tac/CyA, MMF/MPA, and steroids. The frequency of CMV infection (positive PCR) and CMV disease were evaluated from 6 to 18 month and from 18 to 24 months after kidney transplantation.

**Results.** There were no cases of CMV disease in all groups. The frequency of positive PCR was the highest in G2: from 6 to 18 month, it was 55.6% and from 18 to 24 month, 11.1%. In G3, positive PCR was found in 19.4% and 6.5% cases. In these groups, we found relapse of CMV infection in 12.9% in G3 and in 5.5% in G2 vs. 0% in G1. In valganciclovir treated group (G1), there were only 2 patients who had positive PCR from 6 to 18 month (10%) and all patients were CMV-negative from 18 to 24 months after transplantation ( $P < 0.05$ ). The dose of valganciclovir was not higher than 450 mg once a day according to serum creatinine clearance. There were no adverse events in G1.

**Conclusion.** Prevention of human CMV with oral valganciclovir can be recommended for all patients after kidney transplantation. Duration of treatment must not be less than 100 days and is better to be continues for

180 days. The dose of valganciclovir (450 mg once a day) is effective and safe.

#### O405

### Characteristics that BK Viremia May Correlate in our Renal Transplant Recipients

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**Introduction.** Over the last 10 years, Bk virus has been increasingly recognized as an important cause of renal allograft dysfunction. This probably reflects more recognition and reporting of the disease, but also the effect of more powerful maintenance immunosuppressive regimens incorporating MMF and tacrolimus. The specific role of different immunosuppressive agents and other characteristics as risk factors for BKV nephropathy has not been well studied.

**Methods.** In a cross-sectional study, we reviewed all patients who underwent kidney transplantation in our center between September 2008 and September 2009, and the correlation of BK viremia with CMV antigenemia, corticosteroid pulse therapy, ATG, cyclosporine blood level, gender, and blood group was studied.

**Results.** A total of 121 out of 205 patients were checked for BK viremia by qualitative plasma PCR. Of these, 75 were male patients, and 11 were BK viremic (10.7% of the recipients). The mean Cr in BK viremia positive group, 1 month after transplantation, was 1.2 mg/dl, in contrast to negative group that was 1.4 mg/dl. Between 3 and 6 month after transplantation, the mean Cr in positive and negative groups was 1.8 mg/dl and 1.35 mg/dl, respectively. The mean cyclosporine starting dose in BK viremic group was 6.59 mg/kg and 6.75 mg/kg in negative group without a statistically significant difference. Mean of trough cyclosporine blood trough levels in months 1, 2, and 3 in BK viremic patients were 281, 279, and 233 ng/ml that when comparable to BK negative patients (310, 321, and 233 ng/ml;  $P > 0.05$ ). Same results were drawn when C2 cyclosporin blood levels was considered ( $P > 0.05$ ). Ten out of 11 BK viremic patients were male but in BK negative group, 65 of 110 were male. (Odds ratio = 6.9). Frequency of BK viremia was more common in males ( $P = 0.038$ ). CMV antigenemia test was positive in 5/11 BK viremic patients but in negative group, was positive in 18/110 patients (odds ratio = 4.25). This means positive CMV antigenemia was more frequent in BK viremic group

( $P = 0.019$ ). Regarding corticosteroid pulse therapy, 6/11 BK viremic patients were retreated by corticosteroid pulse therapy versus 30/110 patients in BK negative group. The odds ratio for corticosteroid pulse therapy was 3.2. Frequency of BK viremia was more in those patients in whom, immunosuppressive treatment was intensified by steroid pulses ( $P = 0.05$ ). Correlation between BK viremia and blood group and induction with ATG were not statistically significant.

**Conclusions.** The results of this study have shown that BK viremia is correlated with male gender, CMV antigenemia, and corticosteroid pulse therapy, but not with ATG, blood group, and cyclosporine blood level.

#### O406

### Presentation of CMV after Kidney Transplantation

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**Introduction.** Cytomegalovirus (CMV) is a common infection in kidney transplant recipients and is a main cause of mortality and morbidity. Post-transplant CMV infection increases the rate of admission and prolongs hospitalization in the kidney transplanted patients. Identifying characteristics and risk factors of this infection optimizes therapy in these patients.

**Methods.** In this retrospective study, 86 CMV antigen-positive cases out of the total 1200 kidney transplant recipients were investigated, clinical and laboratory findings were identified, and the presence or absence of recurrences after antiviral treatment was compared regarding to the level of immunosuppression (ATG, steroid pulse, and cyclosporine blood level). The signs and complications included fever, graft dysfunction, abdominal pain, diarrhea, and pneumonitis. Type of donor, immunosuppression, and the interval between surgery and antigenemia were studied. Laboratory findings were evaluated for kidney function, leukopenia, thrombocytopenia, microangiopathy, and hepatitis.

**Results.** Of 86 identified CMV antigen positive patients, 68.6% were males, and the overall mean age of the patients was  $43.19 \pm 15$  years. Seventeen percent of the donors were cadavers. The vast majority of the patients (80.2%) presented with increased creatinine as the first finding; whereas, fever (37%), diarrhea (10.5%), and abdominal pain (5.8%) were less common. In laboratory findings, 24.4% had thrombocytopenia, 20% had elevated liver enzymes, and 15.1% had leukopenia. The mean interval between surgery and antigenemia was  $19.67 \pm 38.76$

weeks. Eight out of 86 patients (9.3%) had late-onset CMV (> 52 weeks after transplantation). Fifteen out of 86 patients (17.44%) had recurrences, four of them (4.6%) more than once. There was no significant difference in the level of immunosuppression between those with

recurrence and those without it ( $P < 0.005$ ).

**Conclusion.** The most common presentation was renal allograft dysfunction in our study. Late-onset CMV disease may be considered as a cause of allograft dysfunction.