

**International Scientific Committee of Radionuclides in Nephro-Urology
(ISCORN)**

Abstracts Part 1 - Clinical (C1 - C19)

May 16-19, 2004 - La Baule (France)

C1 - AN APPROACH TO DIAGNOSIS OF THE OBSTRUCTIVE NEPHROPATHY IN ADULTS: DIURESIS RENOGRAPHY IN SEMIORTHOSTATIC POSITION. OUR EXPERIENCE.

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Objective: a new approach to study the obstructive nephropathy in adults, with Diuresis Renography in Semiorthostatic position

Methods: we had studied 45 pts (15 m, 30 f) with dilatation of the calyces or pelvis demonstrated with ultra-sound. The patient should be well hydrated and without diuretics or ACE inhibitors for 48 hr before the study. The patient was seated with back directly in contact to gamma camera, tilted by 90°. After intravenous access was obtained, a dose of 74 Mbq, in 0.2 ml, of ^{99m}Tc-DTPA was injected. The images were acquired dynamically for 20 minutes. Further 300-400 ml water was drunk during study. At 10 min. after injection, during acquisition, a dose of 2 mg of furosemide was administered i.v.

Results: In our experience the response to furosemide begins 2 minutes after administration and the maximum diuresis was reached normally during the dynamic acquisition ($T_{1/2} = 4.6$ min ± 0.6). In 33/44 pts the test demonstrated a fast washout of the tracer from dilated pelvis.

Conclusion: The semiorthostatic position determines a faster washout of the tracer and avoids physiologic or non-specific retention of the tracer in the renal pelvis. That gives significance to the indices: T_{max} (normal value: 3.7 min ± 0.5), and $T_{1/2}$. In pts with suspected obstructive nephropathy, the semiorthostatic position joint to furosemide determines a prompt clearance of the tracer. The retention of tracer at 20 min. was considered strong suspicious for obstruction. This approach we appear more specific and time saving, in diagnosis of obstructive nephropathy.

C2 - RELATIONSHIP BETWEEN RENAL VOLUME, CORTICAL FUNCTION OF HYDRONEPHROTIC KIDNEYS AND RESPONSE TO FRUSEMIDE IN F-15 DIURETIC RENOGRAPHY

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Objectives: In patients with advanced hydronephrosis a large number of diuretic renographic studies give inconclusive/equivocal results for diagnosing outflow tract obstruction. The aim of this study is to demonstrate the relationship between renal volume, cortical function and response to frusemide in diuretic renography.

Methods: 24 patients with unilateral hydronephrosis (18M, 6F), in whom the hydronephrotic kidneys showed equivocal response on F+20 diuretic renography were evaluated. Patients with CRF, VUR, hydroureteronephrosis and bilateral hydronephrosis were excluded from the study group. All patients underwent F-15 diuretic renography and renal absolute %DMSA uptake determination. Total renal volume estimation was performed by ultrasonography.

Results: The renal cortical function of hydronephrotic kidneys, showing Type III curve pattern, as determined by the absolute %DMSA uptake, was decreased (mean uptake = 16.84 ± 7.4) when compared to the contralateral unaffected kidney showing Type I curve pattern (mean uptake = 21.46 ± 6.41). Seven out of 24 hydronephrotic renal units, with equivocal response on F+20 diuretic renography showed a conclusive curve pattern (obstructed/non-obstructed) on F-15 diuretic renography. The renal cortical function of the responding hydronephrotic renal units, (those which showed a response on F-15 study), was not significantly different from those that did not show any response on F-15 renography ($p > 0.5$). Also, the renal volume in these 7 hydronephrotic renal units, [range: 77.7 ml to 220.9 ml; (mean = 154.5 ml)], was not significantly different from the contralateral unaffected renal unit in the same patient [range: 71.7 ml to 220.7 ml; (mean = 109.9 ml)]. However, the renal volume of all non-responding renal units (n=17) was significantly increased (mean = 299ml) when compared to the contralateral unaffected renal unit in the same patient (mean = 103.55ml).

Conclusion: In grossly hydronephrotic kidneys with reasonably preserved cortical function, the renal volume becomes the deterministic factor for response to frusemide in F-15 diuretic renography.

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C3 - A MAG 3 FOLLOW UP PROTOCOL FOR ANTENATALLY DETECTED PELVI URETERIC DILATATION.

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This prospective study was designed to evaluate our follow up protocol based on Mag 3 furosemide renal scanning for children with pelvi ureteric (P.U.) dilatation on antenatal ultrasound (U.S.) and suspected of P.U. obstruction.

Methods: from December 2000 to June 2003, our study included 72 patients either with left (43) or right (22) or bilateral (7) P.U. dilatation (79 renal units) on antenatal U.S., confirmed by post natal (U.S.) at 2 weeks with an antero posterior pelvis diameter exceeding 12 mm. A first MAG 3 and a second U.S. were performed at about 2 months. Early pyeloplasty was decided if the relative kidney function was <40 % and/or the P.U. dilatation exceeded 50 mm. When aged 6 months, non operated patients had another U.S. and MAG 3. Late pyeloplasty was decided in case of severe persisting or worsening obstruction, impairment of 5 % or more of the function, significantly increasing P.U. dilatation on U.S., pyelonephritis or pain. Operated patients had a MAG3, 3 months to 1 year after surgery.

Results: The 29 operated patients (31 %) have no loss in renal function and an improvement of drainage in 88 % cases. The 43 non operated patients (69 %) have no loss of function and minimal or stable obstruction patterns.

Conclusion.: This follow up protocol seems adequate in preventing functional impairment for PU dilatation and, on the other hand, avoids excessive surgical indications.

C4 - SUPRA NORMAL RENAL FUNCTION IN UNILATERAL HYDRONEPHROSIS IN CHILDREN. STUDY WITH MAG3 AND DMSA

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Hyperfunction of hydronephrotic kidney, when compared with controlateral kidney, has been well documented by MAG3. Its significance and outcome after surgery is not well documented.

We compare and follow up MAG3 and DMSA scintigraphy in unilateral hydronephrosis in 204 children prospectively enrolled (age : 35m, 0-235m). 93 were followed up (1to 5 y), 77 out of 93 underwent pyeloplasty. A total of 333 MAG3 and 120 DMSA (late acquisition, 18h after IV injection) were analyzed. A cut off value >4% between the two kidneys was used to consider renal hyperfunction.

Results Supranormal renal function at diagnosis was found in 53% of MAG3 and only 20% of DMSA ($p<0.001$).After surgery the proportion decreased to 41% of MAG3 scans ($p< 0.003$), but remained stable for DMSA. If we consider DMSA as the gold standard to estimate separate renal function, the proportion of hyperfunctioning kidneys (difference MAG versus DMSA >4%) was higher : 64% at diagnosis and dramatic decrease after surgery, 14% ($p<0.001$). Hyperfunction was more frequent in patients < 1 year old (60% versus 49%, NS)

Conclusion:1) DMSA scan (proximal tubular uptake , late acquisition after IV) and MAG3 (filtration , tubular secretion , immediate acquisition) do not give superposable results 2) DMSA is more predictive of late renal function. 3) Hyperfunction detected by MAG3 is partially reversible after surgery and could be considered as an adaptative phenomenon and/or as an artefact. However some patients kept persistant hyperfunction, suggesting a possible long standing positive effect due to a partial obstructive uropathy.

C5 - CORRELATION BETWEEN GFR BY BLOOD SAMPLING METHOD WITH ^{99m}Tc-DTPA AND MUSCLE, FAT, AND WATER CONTENTS OF THE WHOLE BODY IN NORMAL SUBJECTS

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Objective: We investigated whether renal glomerular filtration rate (GFR) is affected by body contents such as muscle volume, fat volume, and water volume or not.

Methods: After receiving their informed consent, ninety-four normal subjects (female 60, male 34, age range 22 to 59years, mean 40 years) participated in this study. GFR was calculated by using Christensen-Watson method 4 hours after injection of ^{99m}Tc-DTPA. The value of body components consisting of muscle, fat, and water contents was obtained by using bioelectrical impedance method.

Results: Under the condition that all data were corrected to standard surface area of 1.73m², there was no correlation between GFR and muscle, fat, and water volume of the whole body. The correlation coefficients(R) were 0.029, 0.108 and 0.118 respectively. The mean GFR was 120±16 ml/min/1.73m². As to the correlation between GFR and age, R was 0.359. The mean GFR in female and male was the same value. Under no-correction by body surface area, the correlation coefficients between GFR and muscle, fat, and water volume, body surface area and age were 0.542, 0.300, 0.617, 0.636 and 0.195 respectively. The mean GFR of female was 105±18 ml/min and that of male was 122±16 ml/min.

Conclusion: GFR with correction by body surface area was not affected by the volume of muscle, fat, and water of body component, in addition to gender. Correlation between GFR and age was weak. GFR without correction tend to correlate with the vale of body surface area.

C6 - EVALUATION OF RENAL FUNCTION IN DONORS WITH ^{99m}Tc-DTPA AND ^{99m}Tc-MAG3 SCINTIGRAPHIES AND BLOOD SAMPLING METHODS BEFORE AND AFTER NEPHRECTOMY

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Objective: We retrospectively examined the effect of nephrectomy on renal function in living related donor for renal transplant short term after operation by using ^{99m}Tc-DTPA and MAG3 scintigraphies and blood sampling methods.

Methods: ^{99m}Tc- DTPA scintigraphy was carried out before and the 8.1±0.84 days after nephrectomy. In 59 donors (female 40, male 19, age range 35 to 76 years, mean 54.2 years), GFR was calculating by using Christensen-Watson method. ^{99m}Tc-MAG3 scintigraphy was carried out before and the 7.6±0.5 days after nephrectomy. TER was calculated by using Russel method in 60 donors (female 40, male 20, age range 23 to 75 years, mean 53.5 years). Renal depth correction was done by using CT images. Peak time (time of maximum counts of renal cortex) and C₂₀/C_p(renal cortical counts at 20 min / peak counts of renal cortex) were also evaluated.

Results: The mean GFR was 109.0±16.4 ml/min/1.73m² and that of TER was 378.8±74.4 ml/min/1.73m². Compensatory increased filtration and extraction of preserved kidney after nephrectomy occurred in the both GFR and TER. The mean GFR increased by 10.3% to 57.5±9.4 ml/min/1.73m² (p<0.0001) and the mean TER increased by 8.2% to 196.2±40.6ml/min/1.73m² (p=0.007). Changes of peak time with ^{99m}Tc-DTPA was -19 seconds (p<0.0001) and that of ^{99m}Tc-MAG3 was -7seconds (p=0.0646). Changes of C₂₀/C_p with ^{99m}Tc-DTPA was 0.01 (p=0.0444) and that of ^{99m}Tc-MAG3 was 0.07 (p<0.0001).

Conclusion: Compensatory increased filtration and extraction of preserved kidney one week after nephrectomy occurred in the both GFR with ^{99m}Tc-DTPA by 10.3% and TER with ^{99m}Tc-MAG3 by 8.2%.

C7 - RENAL ^{99m}Tc -DMSA SCINTIGRAPHY IN CHILDREN WITH RECURENT URINARY TRACT INFECTIONS AND VESICOURETHERIC REFLUX

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AIM: Comparison of results renal ^{99m}Tc -DMSA scintigraphy in children with urinary tract infections (UTI) and vesicouretheric reflux (VUR) to results in children with UTI without VUR.

MATERIAL AND METHODS: Renal ^{99m}Tc -DMSA scintigraphy was done in 170 children with UTI, in 88 of whom were presented VUR, proved by micturating cystourethrography (MCU). In 13 of them grade of VUR was I, in 30 grade II, in 23 grade was III, in 17 IV, and in 5 grade of was V. In 82 children with UTI, VUR could not be detected by MCU. Findings of renal ^{99m}Tc -DMSA scintigraphy were classified as: 1. normal, 2, probably normal, 3. equivocal, 4. probably abnormal, 5. abnormal.

RESULTS: In patients with UTI and VUR incidence of abnormal findings was 49% (43/88), normal 43% (38/88), and equivocal findings were 8% (7/88). The highest abnormal finding incidence was found in 5 patients with VUR grade V (100%). In VUR grade IV incidence of abnormal findings was 71%. In patients with VUR grade I 77% findings were normal, in patients with VUR grade II 53% findings were normal, and in patients with VUR grade III 30% findings were normal. In patients with UTI without VUR incidence of abnormal findings was 10% (8/82), normal 83% (68/82) and equivocal findings were 7% (6/82).

CONCLUSION: Results of our study confirmed importance of renal ^{99m}Tc -DMSA scintigraphy in investigation of children with UTI. In patients with UTI and VUR incidence of abnormal renal ^{99m}Tc -DMSA scintigraphy findings was significantly higher (43/88), partcularly in children with higher VUR grade, than in patients with UTI without VUR (8/82) ($p < 0.001$).

C8 - IMPROVED EVALUATION OF CORTICAL SCARRING BY RENAL IN-PLANE TC-99M DMSA SPECT REORIENTATION

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Introduction and Aim: Tc-99m DMSA SPECT is widely used as part of renal scintigraphy for evaluation of scarring. SPECT reconstruction is done according to the body orthogonal planes. The objective of this study is to generate in-plane renal SPECT to avoid false positive or negative findings related to variable anatomical obliquity of the individual kidney.

Materials and Methods: Reorientation of the renal in-plane SPECT was done for each kidney separately after standard Tc-99m DMSA SPECT acquisition using a dual head camera. In the transaxial plane the gap created by the renal pelvis was rotated to 9 or 3 o'clock for left and right kidneys respectively. In the frontal and sagittal planes the renal long axis from pole to pole was set to the vertical position. Slices were generated along the new orientation and were compared to those generated the body orthogonal planes.

Results: the renal in-plane slices showed the renal architecture more clearly than the orthogonal cuts. Cortical defects were better delineated on the in-plane images while many apparent defects on the orthogonal cuts were found to be related to the way slicing was done and did not show on the in-plane slices.

Conclusion: Tc-99m DMSA renal in-plane SPECT was more accurate for detection of cortical abnormalities and gave better definition of renal architecture than conventional orthogonal SPECT reconstruction.

C9 - 99MTC-MAG3 DYNAMIC IMAGING IN DIAGNOSIS OF PYELONEPHRITIC CHANGES AND RENAL SCARRING : A COMPARATIVE STUDY WITH 99MTC-DMSA.

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Objective:

Our work aims to evaluate the role of 99mTc-MAG3 dynamic study in detection of renal scarring in comparison to 99mTc-DMSA scan as a gold standard.

Methods:

A total of 120 patients with different urologic problems were examined by 99mTc-MAG3 dynamic studies and 99mTc-DMSA scans (four patients had solitary kidneys, therefore the total number of renal units was 236). The recommended dose of 99mTc-DMSA was intravenous (I.V.) injection of 74-111MBq (2-3 mCi) and images (posterior, anterior and two poster-obliques) were taken 2-4 hours following tracer administration and obtained in a 256 x 256 matrix. 99mTc-MAG3 dynamic renography was done by I.V. injection of 111MBq (3 mCi). The patient should be supine in position and digital data acquisition at 2s / frame for one minute followed by 15s /frame for 19 minutes should be collected in 128 x 128 matrix . Whenever indicated; furosemide was injected I.V. as 1mg/Kg 3minutes after tracer administration. Regions of interests were taken for kidneys and background areas at 2-3 minute image. Data analysis should include differential renal uptake percentage in 99mTc-DMSA scans however in 99mTc-MAG3 studies; renogram curve pattern, differential renal function and clearance half times were utilized.

Results:

99mTc-DMSA detected pyelonephritic changes in 116 renal units while scan was normal in the remaining 120 renal units . The overall sensitivity of 99mTc-MAG3 in detecting pyelonephritic changes was 77.59% and specificity was 100%. According to DMSA scan ; patients were classified into three groups : group 1 (21 renal units), group 2 (42 renal; units) and group 3 (53 renal units). We found that; sensitivity of 99mTc-MAG3 in comparison to 99mTc-DMSA scan in group 1 was 23.8% , in group 2 was 90.47% and in group 3 was 88.68%.

Conclusion:

We conclude that; 99mTc-MAG3 dynamic imaging is not only a sensitive method for detecting pyelonephritic changes , but also has the advantage of reducing the radiation hazards by doing single modality for both renal function assessment and renal scarring detection.

C10 - RESOLUTION OF TRANSIENT SCINTIGRAPHIC LESIONS IN ACUTE PYELONEPHRITIS: WHAT SHOULD THE OPTIMAL TIME BE FOR DISTINGUISHING ACUTE LESION AND SCAR?

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Introduction: Kidney scintigraphy with Tc-99m DMSA (RS-DMSA) can be used in diagnosis of acute pyelonephritis and renal scars. As acute inflammatory lesions disappear in time, scar tissue persists. Follow-up scintigraphies are commonly performed 6 month later but there are reports suggesting renal scarring and persistent inflammation could still not be distinguished. The purpose of our study is to determine the ideal time needed for resolution of transient lesions after acute pyelonephritis.

Material and Methods: Basal RS-DMSA was performed in a total of 102 children, 29 girls and 79 boys, aged between 35 days and 11 years, after the first attack of urinary tract infection, within the first three days of onset of fever. Thirty four patients with detected scar in basal scintigraphy were underwent to scintigraphic evaluation again six months after the recovery. Scintigraphic evaluation was repeated at the end of first year in 13 patients in whom scar was detected in scintigraphy of the sixth month. Of 34 patients during their evaluation period, neither took any medication nor experienced a new infection attack.

Results: The mean age of patients was 5.9 ± 4.7 years. Basal scintigraphy was normal in 68 patients, renal lesion was detected in 34 patients. Control scintigraphy which was performed six months later, revealed loss of paranchimal lesions in 21 of 34 patients and existence of lesions in 13 patients (%38). In the last scintigraphy which was done at the end of first year, loss of lesions in 7 of 13 patients and persistence of them in 6 were observed. Comparing to the scintigraphic findings at the end of first year, the positive predictive value of RS-DMSA performed at the sixth month in determining scar tissue were found to be 46 %.

Conclusion: Because of the possibility of persistence of inflammatory lesions at the sixth month of follow-up, scintigraphic evaluation performed at that time would be misleading. We think that, for differentiation of acute lesion and scar tissue, it would be appropriate to perform paranchymal scintigraphic examination at end of first year.

C11 - THE DIAGNOSTIC VALUE OF POWER DOPPLER SONOGRAPHY IN ACUTE PYELONEPHRITIS: EVALUATION ACCORDING TO Tc-99m DMSA SCINTIGRAPHY

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Introduction: The diagnosis of acute pyelonephritis remains mostly on clinical findings, but because of difficulties in its diagnosis in children, imaging techniques are needed. Renal scintigraphy with Tc-99m DMSA (RS-DMSA) is a very sensitive and valid technique in diagnosis of APN in children. But since still some dose of radioactive agent usage is of concern, seeking of new methods has been going on. Many of the pyelonephritic lesions were demonstrated to be ischemic in APN. It could also be possible to define ischemic lesions by power doppler sonography (PDS). In this study, the place of PDS in diagnosis of APN were tried to be settled by evaluating it according to RS-DMSA.

Material and Methods: Thirty patients with likely diagnosis of acute pyelonephritis due to high fever, bacteriuria and positive urine culture were included into the study. Patient's age were between 8 months and 9 years, and the mean age was 4.7 ± 3.2 years. RS-DMSA and PDS imaging were performed to all patients within 6 days of onset of symptoms. Abnormality criteria of PDS were increase in kidney size, increase in thickness of sinusoidal wall, existence of vascular defect, and changes in echogenity (fokal and diffuse hyperechogenity or focal hypoechogenity).

Results: Paranchimal pathology (decreased DMSA uptake) in kidney was detected in 19 of 30 patients by scintigraphic evaluation and 11 patients revealed to be normal. Doppler examination showed abnormality in 2 patients out of 11 patients with normal sintigraphic findings, while 13 patients were concluded to be abnormal in scintigraphically abnormal 19 patients. According to RS-DMSA, the sensitivity of PDS was found to be %68.4, specificity was %81.8, positive predictive value was %86.6, negative predictive value was %60, false negative ratio %40 and accuracy was %73.3.

Conclusion: It has been concluded that, PDS cannot be used in place of RS-DMSA in diagnosing APN

C12 - AN INTERESTING DISCORDANCE BETWEEN DTPA AND DMSA RENAL SCAN IN ECTOPIC KIDNEY

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ABSTRACT

We are continually aware that it is necessary to obtain a complete patient history before embarking on a nuclear medicine procedure. This is important especially if the case is a complex study. If patient's clinical history is not complete by any way, care should be taken by other imaging modalities. In this case the findings of urinary diversion changes were presented. The patient was 49 year-old man who has been referred for DTPA renal scintigraphy to determine renal function as an ectopic kidney and operated urinary bladder tumor. Tc-99m DTPA scintigraphy showed normal localized, approximately normal in shape left kidney and ectopic and large right kidney localized on the right lower abdominal quadrant. Left kidney had normal perfusion, prolonged concentration and minimally delayed excretion (non-obstructive stasis on the collecting system). Right kidney had significantly decreased perfusion, delayed concentration and no excretion. Left ureter was visualized throughout the study and localized obliquely to the right kidney. After those findings we asked DMSA scan for additional information especially for differential renal function.

On the Tc-99m DMSA scintigraphy, left kidney was almost normal except a minimal contour irregularity; however, right kidney had no radiotracer uptake. Because the patient was from another hospital, we called the physician and asked more medical history. We learned that the patient had an operation of ilial neobladder (e.g. urinary bladder was totally resected, a new bladder was formed from ileal loop and ureters were bilaterally anastomosed to this new bladder). He also had right crossed-fused renal ectopia. So what we saw in DTPA scan as the right kidney was just an illeal neobladder. Otherwise this appearance might be reported as a hidronephrotic obstructed ectopic pelvic right kidney. Right and left kidneys were found together as crossed fused renal ectopia which was difficult to describe scintigraphically. So it is very important to force the referring physician to give sufficient information about the history of the patient while he/she is asking a scintigraphic study and also paying attention to correlative imaging.

C13 - DELAYED PERITRANSPLANT ACTIVITY ON EARLY POSTOPERATIVE Tc-99m DTPA RENAL SCINTIGRAPHY: A sign of dermal backflow due to renal interstitial edema?

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Objective: The most frequent complication of renal transplantation is peritransplant fluid collection. Such lesions include hematomas, lymphoceles and urinomas. Most lymphoceles show hypoactivity on renal scintigraphy. Some lymphoceles appear to have become “filled in” on delayed imaging, or may show a rim of increased activity. This study investigated recipients who showed no fluid collection on either ultrasonography or computed tomography, but exhibited increased peritransplant activity on delayed images obtained with Tc-99m DTPA.

Methods: Eleven renal transplant recipients underwent Tc-99m DTPA renal scintigraphy on day 3 post-transplantation. In addition to routine 20-minute acquisition for renal function evaluation, at least one delayed image was obtained more than 30 minutes after initial scanning. Every recipient showed increased activity in the area surrounding the transplant on the delayed images. In six cases, a renal biopsy was obtained at the time the scintigraphy study was done.

Results : All 11 recipients had mild-to-moderate delayed graft function. In three of the six kidney biopsies, the diagnosis was acute rejection. The other three recipients had interstitial edema but did not show the typical features of acute rejection.

Conclusion: Renal transplant recipients exhibit a range of immune reactions in the early stage after transplantation. The predominant feature is interstitial edema. Interstitial edema and lymphocele formation are also known to occur in some forms of acute rejection. Dermal backflow of activity has been described in lymphoscintigraphy. We propose that delayed increased peritransplant activity in kidney recipients without fluid collection, and lymphoceles that appear to have become filled in on late imaging represent dermal backflow of activity due to interstitial edema. Such findings must be interpreted cautiously to prevent misdiagnosis of urinary leakage.

C14 - A SPECIFIC MORPHOLOGIC MARKER FOR CHRONIC RENAL ALLOGRAFT NEPHROPATHY :upper to lower pole asymmetry of the graft

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Objective: It is known that reducing the functioning kidney mass exerts a significant alloantigen-independent influence for chronic allograft nephropathy (CAN). CAN is usually progressive with the histologic appearance of interstitial filtration, fibrosis, tubular atrophy and glomerulosclerosis. In this study we have correlated a specific morphologic change in renal allografts, that is the asymmetry between upper and lower poles with biopsy findings.

Methods: This study included 14 renal allograft recipients who have demonstrated a specific morphologic pattern on Tc-99m DTPA renal scintigraphy. All had an enlarged upper pole compared to the lower pole, that is upper to lower pole asymmetry. Radionuclide imaging was performed following iv bolus injection of 340 MBq of Tc-99m DTPA. Function images were acquired at every 30 sec for 20 minutes. For the definition of morphologic changes, images obtained during 1-3 minutes post-injection were evaluated. All recipients had a normal appearing allograft obtained during the first week after the operation. All had renal biopsy at the time of morphologic change.

Results: In all recipients the diagnosis was chronic renal allograft nephropathy. Nine had stasis in the upper pole alone and 3 showed stasis in the upper pole as well as other sites.

Conclusion: In this study, recipients with an asymmetry between upper and lower poles were evaluated. This asymmetry may be due to shrinkage of the lower part of the kidney together with the hypertrophy of the upper pole. Shrinkage of the lower pole could be due to the proximity to bladder. Chronic pressure effect on the lower pole may be responsible for this kind of morphology change. Reduction of kidney mass at the lower pole accompanied with fibrosis might be a trigger for CAN. The upper pole seemed to be the most common site for calyceal stasis.

C15 - COMPARISON OF EARLY SCINTIGRAPHIC FINDINGS IN PEDIATRIC AND ADULT RECIPIENTS OF ADULT KIDNEYS: RELATIONSHIP TO HYPOPERFUSION AND HYPERFILTRATION

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Objective: The literature contains contradictory results related to the effects that allografts that are not perfectly size-matched have on long-term renal graft function. Authors who accept hyperfiltration as the non-immunologic mechanism that leads to chronic graft loss recommend against using small-for-size kidneys. On the other hand, it is known that pediatric recipients are more prone to hypertension. The aim of this study was to compare early-postoperative scintigraphic findings in pediatric and adult recipients of adult kidneys using Tc-99m DTPA renal scintigraphy.

Methods: This study included 20 pediatric and 20 adult recipients of adult kidneys. Tc-99m DTPA renal scintigraphy was performed on postoperative day 7. Early postoperative course of all recipients were uncomplicated. Images were acquired every second for the first minute (perfusion evaluation) and then every 30 seconds for 20 minutes (function evaluation). The following parameters were computed: the ratio of peak activity at perfusion to peak uptake on the graft curve (P:U), time to maximum uptake (Tmax), glomerular filtration rate (GFR), and activity retained at 20 minutes (R20).

Results: The pediatric patients had a significantly longer mean Tmax and a significantly lower mean P:U than the adult recipients ($p < 0.05$ for both). The children also had a lower mean GFR ($p > 0.05$) and a slightly higher mean R20 ($p > 0.05$).

Conclusion: The results indicate that the early-postoperative scintigraphy findings in pediatric and adult recipients are significantly different. The longer Tmax and a lower P:U in pediatric recipients may suggest absence of capacity for future hyperfiltration or relative hypoperfusion considering the size of the adult kidney. Long-term effect of these findings in relation chronic allograft loss needs to be determined.

C16 - THE RATIO OF PEAK KIDNEY ACTIVITY AT PERFUSION TO THAT AT UPTAKE ON Tc-99m DTPA RENAL SCINTIGRAPHY: an indicator of activated tubuloglomerular feedback mechanism ?

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Objective: To our knowledge, there is no study in the literature which evaluated the ratio of peak kidney activity at perfusion to that at uptake (P:U) on Tc-99m DTPA renal scintigraphy. We previously observed that there is a significant increase in this ratio together with a decrease in time to max concentration (Tmax) in renal transplant donors early after the operation compared to preoperative values. It was suggested in a previous study that the hyperfiltration response following unilateral nephrectomy is limited by an appropriately activated tubuloglomerular feedback (TGF) system. Acetazolamide is known as an activator of TGF mechanism. In this study, we tried to make clear the pathophysiologic nature of P:U and Tmax and their relation to TGF activation by acetazolamide interventional Tc-99m DTPA renal scintigraphy.

Methods: In this study, Tc-99m DTPA renal scintigraphy images were evaluated in 2 different settings: A) 12 renal transplant donors before, early (within 2 days) and late after the operation B) 12 patients with normal kidney function before and after acetazolamide intervention. The second group had a baseline scintigraphy first. Interventional scintigraphy was performed 10 minutes following 500 mg iv acetazolamide injection. The images were acquired every second for the first one minute and then every 10 second for 20 minutes. The following parameters were computed: Glomerular filtration rate (GFR), the ratio of maximum count rate at perfusion to that at uptake (P:U) on the kidney curve and Tmax.

Results: In renal transplant donors, early after the operation P:U was significantly higher and Tmax was significantly shorter compared to preoperative values. Late after the operation, there was an increase in the mean Tmax and GFR values together with a significant decrease in P:U compared to early preoperative values. In the acetazolamide interventional group, there was a significant decrease in the mean GFR and a significant increase in the mean P:U values after acetazolamide intervention compared to baseline values. The mean Tmax was shorter after acetazolamide intervention.

Conclusion: Our results suggest that an increase in P:U and a decrease in Tmax is an indicator of activated TGF mechanism. Our findings in renal transplant donors suggest that the early changes on Tc-99m DTPA renal scintigraphy, i.e. increased P:U and shorter Tmax are a reflection of TGF activation. Changes that occur late after nephrectomy, i.e. increase in GFR and Tmax and decrease in P:U are a reflection of hyperfiltration.

C17 - THE RELATION BETWEEN POSTTRANSPLANT DIABETES MELLITUS AND EARLY POSTOPERATIVE GRAFT FUNCTION

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Objective: Posttransplant diabetes mellitus (PTDM) occurs at varying rates in renal transplant recipients. Although its exact cause is not known, it is known to have an association with male gender, black race, the use of immunosuppressants and with acute rejection episodes. In this study we have evaluated patients with PTDM in relation to early graft function, type of donor and rejection episodes.

Methods: Twenty-six renal transplant recipients with PTDM (20 M, 6 F: 19 from living related and 7 from cadaveric donor) were included in this study. Early graft function was assessed by Tc-99m DTPA renal scintigraphy obtained on day 3 and 7 postoperation. Scintigraphic evaluation was based on visual and quantitative evaluation of perfusion, concentration and excretion pattern of the grafted kidney. Pre and postoperative blood creatinine levels obtained within the first month and the number of acute rejection episodes within the first 2-year after the operation has been recorded. PTDM cases and episodes of acute rejection that occurred within 3 week postoperation were regarded as early onset.

Results: The source of the graft kidney was a living related donor in 73% of the recipients. Sixteen patients (62%) become hyperglycemic within 3 weeks of posttransplantation. Twenty-two out of 26 patients (85%) had acute rejection episode (13 early and 9 late). All except 5 patients (81%) had a normal scintigraphy on day 7 after the operation. Three out of five patients with impaired graft function had early acute rejection. None had acute tubular necrosis during the early postoperative period.

Conclusions: Our results have shown that the presence of PTDM is closely linked to normal early postoperative graft function, the presence of a living related donor and acute rejection episodes. Elevated blood viscosity is known to have an association with insulin resistance. We hypothesize that a rapid increase in blood viscosity as a result of excellent early graft function might be responsible for the development of PTDM.

C18 - DOES ACE GENE POLYMORPHISM AFFECT THE CAPTOPRIL SCINTIGRAPHY AND RENAL CLEARANCE OF 99MTC-MAG3?

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Objective: ACE (I/D) gene polymorphism has been suggested to play an important role in the individual response to ACE inhibition. The DD genotype is reported to be associated with higher risk and poor response to ACE inhibition therapy in diabetic and nondiabetic renal diseases. However, there are conflicting reports in the literature. Therefore, in this study, renal responses to captopril were compared among diabetic patients with DD, ID or II genotypes to test whether ACE genotype would affect the 99mTc-MAG3 clearance and renogram pattern.

Methods: 43 patients (25 F, 18 M, mean age: 56.2 \pm 10) with NIDDM were studied. Captopril scintigraphy was performed at baseline and after oral administration of 50 mg captopril using 99mTc-MAG3. Plasma ACE levels were measured before and one hour after captopril administration. TER measurements were done for the estimation of 99mTc-MAG3 clearance according to single sample method. Blood samples were obtained for DNA extraction and the ACE/I/D genotyping was performed by polymerase chain reaction (PCR) method.

Results: Subgroups according to ACE genotype (DD, ID, II) were not different for age, sex, BMI, renal clearance, HA1c, but for baseline ACE levels (DD;33.2 \pm 16 U/L vs ID;19 \pm 11 vs II;21.3 \pm 15, p=0.02). ACE levels after captopril decreased significantly in all subgroups. Baseline and Captopril TER values were not different within subgroups.

Subgroup	TER change (mL/min) (baseline-captopril)	Percent change (%) (mean \pm SE)
DD (n=18)	+30 \pm 16	+5.3 \pm 3.6
ID (n=15)	-18 \pm 24	-7.4 \pm 6.3
II (n=10)	-45 \pm 26	-13.4 \pm 7.8

TER change and percent change in TER values were significantly different between DD and II subgroups (p< 0.05). II subgroup responded to captopril with a rise in 99mTc-MAG3 clearance, however decline in 99mTc-MAG3 clearance was observed in DD subgroup.

Conclusion: ACE gene polymorphism seems to affect the response of 99mTc-MAG3 clearance to captopril. Captopril scintigraphy may have a potential use in the prediction of responsive patients to ACE inhibition.

C19 - REFERENCE VALUES OF ^{123}I -OIH SINGLE KIDNEY CLEARANCE IN NORMAL SUBJECTS FROM 0 TO 18 YEARS OLD

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Objective: To assess age-related functional development in pediatric patients (pts).

Methods: Among 4111 children routinely examined by ^{123}I -OIH renal sequential scintigraphy (RSS) from January 1994 to December 2003, 905 patients (age-range 0.15-18y) fulfilled the following requirements: 1) mild ultrasonographic hydronephrosis (SFU grade ≤ 2) with right differential renal function (DRF) $\leq 53\%$ and $\geq 47\%$ (494 pts) 2) known or suspected UTI with normal ultrasound, normal serum creatinine, normal DMSA and DRF $\leq 53\%$ and $\geq 47\%$ (411 pts). Hence, the analysis comprised 1810 renal units. ^{123}I -OIH single kidney clearance (Cl) was assessed according to previously validated method and expressed as ml/min/1.73m²BSA (La Cava G et al. *Contrib Nephrol.* 1990, Imperiale A et al. *J Nucl Med.* 2003). Patients were divided in 21 age classes as follow: from 0 to 2 years old, eight three-months classes; from 2 to 14 years old, twelve one-year classes; from 14 to 18 years old, one four-year class. Cl data were plotted against age and fitted using a growing exponential function ($y=a-be^{-cx}$) as suggested by Lithgoe MF (*Eur J Nucl Med.* 1994).

Results: Exponential function best describing the relationship between Cl and age was:

$$Cl = 312 - 200e^{-0.58 \cdot \text{Age}(\text{months})}$$

Hence, Cl at birth, time 0, was 112ml/min/1.73m²BSA and doubling time was 36 days. Mean Cl of first 4 classes (0-12 months) was lower than mean Cl of all other classes ($p < 0.001$). At two years of age Cl reached a plateau of 311ml/min/1.73m²BSA. **Conclusion:** Normal renal function increases until about one year of age reaching 97% of the mature value as showed in Fig1.

