

## Commentary

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## How accurate is ultrasonography for the detection of renal cortical defects

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**See article on page 28,** The sensitivity of ultrasonography in detecting renal cortical defects in pyelonephritic patients with or without vesicoureteral reflux

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<sup>99m</sup>Tc-DMSA scintigraphy is a sensitive test to detect inflammation or cortical defects of scar formation. Heterogeneous studies published in the literature have already compared photopenic lesions on renal <sup>99m</sup>Tc-DMSA scintigraphy with renal histopathology in experimentally induced pyelonephritis in pigs or rats. The <sup>99m</sup>Tc-DMSA scintigraphy planar technique has a good sensitivity and specificity (82% and 97%) for the detection of acute pyelonephritis as compared to SPECT DMSA (97% and 66%, respectively) that has a very low threshold for the detection photopenic lesions, which increases the false positive rate [1].

The manifestation of pyelonephritis on <sup>99m</sup>Tc-DMSA is decreased cortical uptake that can be limited to the poles or can be generalized. In contrast, ultrasonography shows an enlarged kidney due to inflammation. Scar formation is a late sequel either congenital or acquired. New American Academy of Pediatrics guideline recommends that renal ultrasonography should be the first step of investigation of children with age below 24 months with first febrile urinary tract infection. The guideline recommends no further investigation in the case of normal renal sonography in these children [2].

Mohkam et al. conducted a study to compare the strength of sonography with renal DMSA in the detection of scar formation in patients with pyelonephritis [3]. They concluded that both could detect renal scar with the same frequency. However, this is challenging that different studies have reported that sonography might miss renal scars; therefore, its equal value to DMSA is questionable [4,5]. The main weak point of their study was lack of a uniform definition for “DMSA changes” or “ultrasonographic changes” that the investigators were looking for.

Using <sup>99m</sup>Tc-DMSA scintigraphy in the acute phase of pyelonephritis and six months later to estimate scar formation in a clinical trial, we found acute pyelonephritis changes in almost two-thirds of kidney units in each group. Subsequently, the rate of renal scar formation was found to be 42% and 23% in participants in the control and vitamin A groups in contrast to none in the vitamin E group [6].

Temiz et al investigated 62 children with urinary tract infection and primary vesicoureteral reflux and evaluated DMSA and renal sonography in detection of renal cortical scar. They found renal sonography was less sensitive in reporting renal cortical scar irrespective of the grade of reflux [7]. On the other hand, Lee et al investigated the

predictive value of sonography and DMSA in 220 children below two years of age for the detection of VUR. They reported that in high grade VUR, both methods had higher predictive positive values (86-88%), but they had lower predictive values (30-41%) for low grade VUR. Patients with either high or low grade VUR and normal renal sonography and DMSA scan showed improvement in follow-up with no need for surgery [8]. Fouzas et al studied children aged less than 24 months with the first febrile urinary tract infection for five years and interestingly, they found DMSA had limitations in the detection of vesicoureteral reflux [9]. Massanyi et al reported the poor sensitivity of renal bladder sonography in diagnosing high grade vesicoureteral reflux [10]. In conclusion, it seems that the value of each imaging study with standard definition should be evaluated in a large prospective study, considering the limitations and restrictions that exist in each region.

## References

1. Craig JC, Wheeler DM, Irwig L, Howman-Giles RB. How accurate is dimercaptosuccinic acid scintigraphy for the diagnosis of acute pyelonephritis? A metaanalysis of experimental studies. *J Nucl Med* 2000;41(6):986-93.
2. Subcommittee on Urinary Tract Infection, Steering Committee on Quality Improvement and Management, Roberts KB. Urinary tract infection: clinical practice guideline for the diagnosis and management of the initial UTI in febrile infants and children 2 to 24 months. *Pediatrics* 2011;128(3):595-610.
3. Mokam, et al. The efficacy of Tc99m dimercaptosuccinic acid (Tc-DMSA) scintigraphy and ultrasonography in detecting renal cortical defect in pyelonephritic patients with or without vesicoureteral reflux. *J ped. Nephrology* 2013;1(1):28-31
4. Shirvani F, Sharifian M, Mohkam M. The Value of Renal Scintigraphy With DMSA for Assessing Vesicoureteral Reflux in Children With Suspected Urinary Tract Infection. *Arch Pediatr Infect Dis* 2012;1(1): 27-30.
5. Mohkam M, Maham S, Khatami A, Naghi I, Otukesh B, Shamshiri AR, et al. Kidney Ultrasonography and Dimercaptosuccinic Acid Scans for Revealing Vesicoureteral Reflux in Children With Pyelonephritis: A 7-Year Prospective Cohort Study of 1500 Pyelonephritic Patients and 2986 Renal Units. *Nephro-Urol Mon* 2012;4(1): 350-5. DOI: 10.5812/kowsar.22517006.1972.
6. Sobouti B, Hooman N, Movahed M. The effect of vitamin E or vitamin A on the prevention of renal scarring in children with acute pyelonephritis. *Pediatr Nephrol* 2013;28(2):277-83
7. Temiz Y, Tarcan T, Onol FF, Alpaya H, Simsek F. The efficacy of Tc99m dimercaptosuccinic acid (Tc-DMSA) scintigraphy and ultrasonography in detecting renal scars in children with primary vesicoureteral reflux (VUR). *International Urology and Nephrology* (2006) 38:149-152.
8. Lee HY, Soh BH, Hong HC, Kim JM, Han SW. The efficacy of ultrasound and dimercaptosuccinic acid scan in predicting vesicoureteral reflux in children below the age of 2 years with their first febrile urinary tract infection. *Pediatr Nephrol* 2009;24:2009-2013.
9. Fouzas S, Krikelli E, Vassilakos P, Gkentzi D, Papanastasiou DA, Salakos C. DMSA Scan for Revealing Vesicoureteral Reflux in Young Children With Urinary Tract Infection. *Pediatrics* 2010;126(3):e513-e519.
10. Massanyi EZ, Preece J, Gupta A, Lin SM, Ming-Hsien Wang MH. Utility of Screening Ultrasound After First Febrile UTI Among Patients With Clinically Significant Vesicoureteral Reflux. <http://dx.doi.org/10.1016/j.urology.2013.04.026>. In press