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Kidney and bladder imaging
Challenges for the pediatric urologist
Wishes for the nuclear medicine expert

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Nuclear medicine for pediatric urology

- Very low radiation exposure
- Image + function

- MAG-3 (EC)
- DMSA
- Cr-EDTA

Wish list

- How much obstruction is there in a hydronephrotic kidney?
- How much function is there in every kidney?
- How "accurate" is the renal function in neonates, infants, children?
- How well can we compare sequential scans with relative function / diuretic curves (between a neonate and an infant)?
- Can we compare relative function or images between a diuretic scan (MAG-3) and a static (DMSA)?
- How comparable are studies amongst different centers?
  Do you have "Belgian/International" guidelines (for children) ?
- In a hydroureteronephrosis / megaureter:
  is (standard) 20 minutes good/enough to "see" the diuretic curve?
- How important is the bladder filling for the diuretic curve?
- How accurate is the differential function in a renal duplication?
- Pediatrician ask for DMSA 6mo after febrile UTI vs pediatric urologist ASAP: can we see the difference between acute (temporary) scar and permanent ?
- Should a (pediatric) urologist (first) look at the images? Or only read the report?

- How has the indirect/direct voiding cystourethrogram with isotopes have evolved? Subjective expertise required? Reproducible to "watch"? Vesicoureteral reflux? Subvesical obstruction (valves / sphincter dyssynergia)?

Source

ELSEVIER

Seminars in
NUCLEAR
MEDICINE

Pediatric Nephro-Urology: Overview and Updates in Diuretic Renal Scans and Renal Cortical Scintigraphy

Zvi Bar-Sever, MD,* Amer Shammas, MD,† Farshid Gheisari, MD,† and Reza Vali, MD, MSc†

https://doi.org/10.1053/j.semnuclmed.2021.12.002
0001-2998/

eau GUIDELINES

Guidelines

Paediatric Urology

Want to read the guideline in your own time? Download the PDF

Download full guideline

Looking for a quick overview? Check the pocket guidelines.

Download pocket guidelines

Simple definitions of terminology

- Differentiate: dilatation (hydronephrosis)

and

obstruction

(*be "as smart" as your radiologist / nuclear specialist*)

Dilatation is what we **see**

- Obstruction (impairment of flow!) is what we **think** it is...

- So: can **dilatation** be something else?

Dilatation of the upper urinary tract

- **Obstructed** flow? *(one-way)*
  UPJ (ureteropelvic junction obstruction), megaureter
- **Reflux**? *(wrong-way or two-way)*
  VUR (vesicoureteral reflux), megaureter

Dilatation of the upper urinary tract

* Or none of the above...

(megacalycosis megaureter)

(High urinary output :

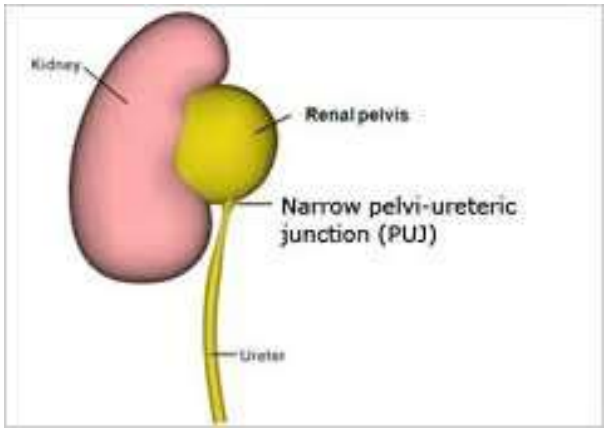
(Polydipsia, diabetes insipidus))

Obstruction / (dilatation)

1. Obstruction of the **upper Urinary Tract**
   UPJ (ureteropelvic junction obstruction)
   UVJ (ureterovesical junction obstruction)
2. Obstruction of the **duplicated UT**
   obstruction or ureterocoele UP / reflux LP
   obstruction or ureterocoele UP / normal LP
   (other)
3. obstruction of the **lower UT**

4. Combined :
   VUR and UPJ

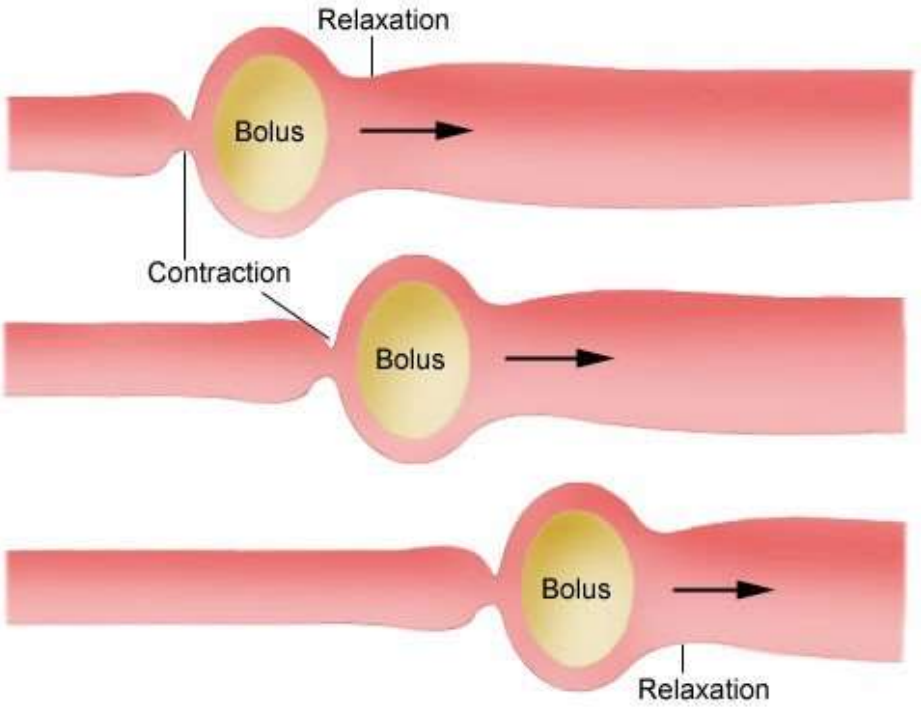
UPJ (ureteropelvic junction **obstruction**)



- 1/1000 newborns
- >60% diagnosed prenatally
- 2/3 boys
- 60% left
- 20% bilateral
- **Ethiology (intrinsic/extrinsic)**
  Abnormal peristalsis (muscular/ neurologic)
  Crossing vessel

Extrinisic

Intrinsic



What's the (clinical) difference ?

- **Intrinsic**
  neonatal hydronephrosis
  "permanent"

- **Extrinsic**
  "moderate"
  clinical "later" in life (adolescent)
  specifically "high hydration"…

Question: can a diuretic renogram provoke the situation ?
Intrinsic versus extrinsic?

The "Well Tempered" Diuretic Renogram: A Standard Method to Examine the Asymptomatic Neonate with Hydronephrosis or Hydroureteronephrosis

A report from combined meetings of The Society for Fetal Urology and members of The Pediatric Nuclear Medicine Council—The Society of Nuclear Medicine

The Journal of Nuclear Medicine • Vol. 33 • No. 11 • November 1992

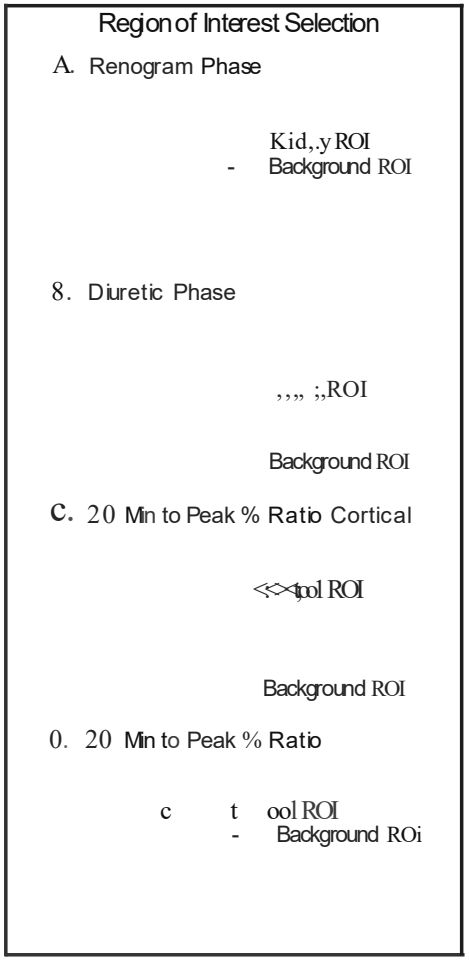


FIGURE 1. ROIs for the renogram phase (A), diuresis phase (B), 20 min to peak % ratio cortical renogram (C) and 20 min to peak % ratio determinations (0).

rercem uwerenuat .Kenat r uncuon. J ne tow counts 01 the renogram curve for each kidney minus background during the interval between 60 sec and the appearance of radioactivity in the calyces are used to determine differ ential renal function for the entire kidney. This measure-

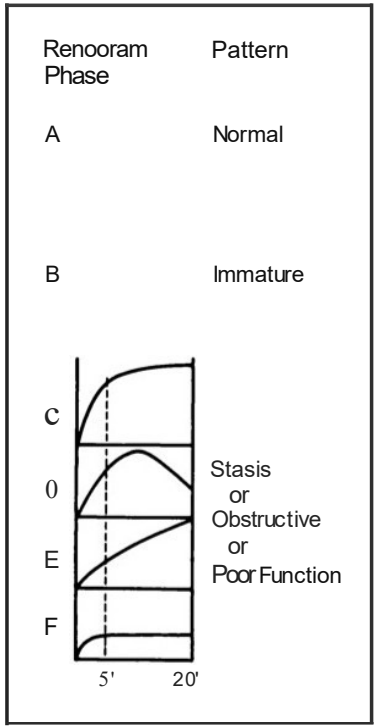


FIGURE 2. Stereotypical patterns of ""'Tc-MAG3 ren ogram time-activity curves. Variations of the typical pat· terns are frequent.

factors which may or may not reflect obstruction. For example, an upward slope of the diuretic portion of the renogram curve suggests obstruction; however, when function is poor or there is marked HN/HUN, an upward slope may simply reflect poor function in a large capacity

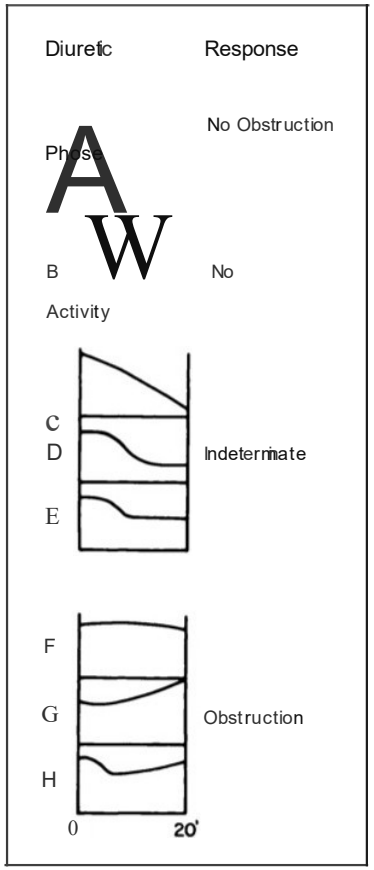


FIGURE 3. Stereotypical patterns of """Tc-MAG3 diuresis phase time-activity renogram curves. Each of these patterns can accompany some but not all of the renogram cuve patterns shown in Figll'e 1.

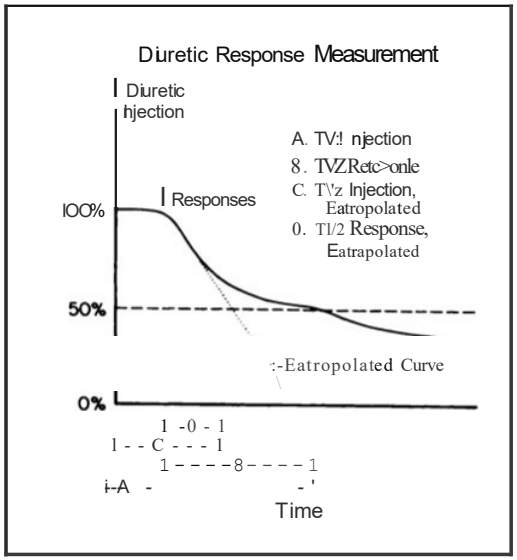


FIGURE 4. Stylized Furosemide response curve ilustrates four methods of measuring the half-time clearance of the radio nuctlde from the collecting system of the kidney. (A) Half-time injection. The Interval between the time of Furosemide Injection and when there is 50% reduction of activity in the collecting system. (B) Half-time response. The interval between the time of the initial observed diuretic response (usualty within 2 min after Furosemide injection) and when there Is 50% reduction of activity in the collecting system. (C) Half-time Injection, extrapolated. The interval between the time of injection and the time extrapolated curve from the initial observed diuretic response, whieh intersects with a 50% reducbn of activity. (0) Half-time response. e x t r olated. The interval between the time of the initial observed diuretic response and when the extrapolated curve Intersects with a 50% reduction of activity. Note: other methods include a computer-derived exponential fit of the primary response and ratios of activty at differing t me intervals.

Questions that we have (and the parents too)

- Can we wait? Chance to grow out?
- How long can we wait?
- Do we compromise anything if we wait?
  = which kidney will eventually deteriorate?
- Does it harm to perform surgery if not necessary?
- What can we do?
- If we need to do something, how?

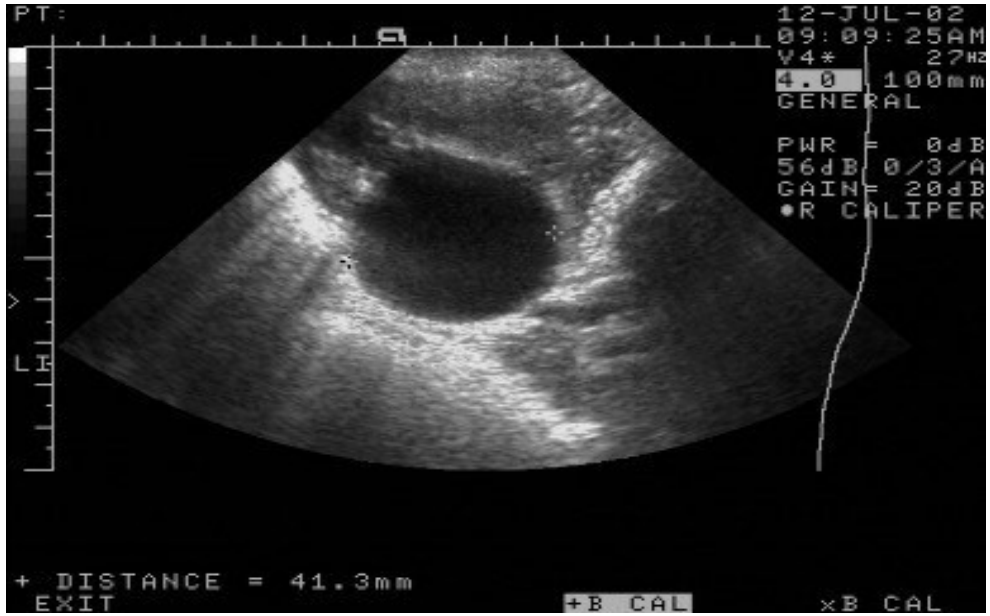
Fetal physiology rules

- Prenatal kidney = 10% (normal) RBF
- Last trimester: increased "volume" production

- But also **"high elasticity"**
  of the renal pelvis/ureter

Antero-posterior diameter

- To be measured



- In a transverse fashion
- At the level of the hilum
- <u>In the same state of hydratation</u>

Identical hydratation situation / clinical circumstances

- 1 baby bottle
  ca 30 minutes
  before the exam

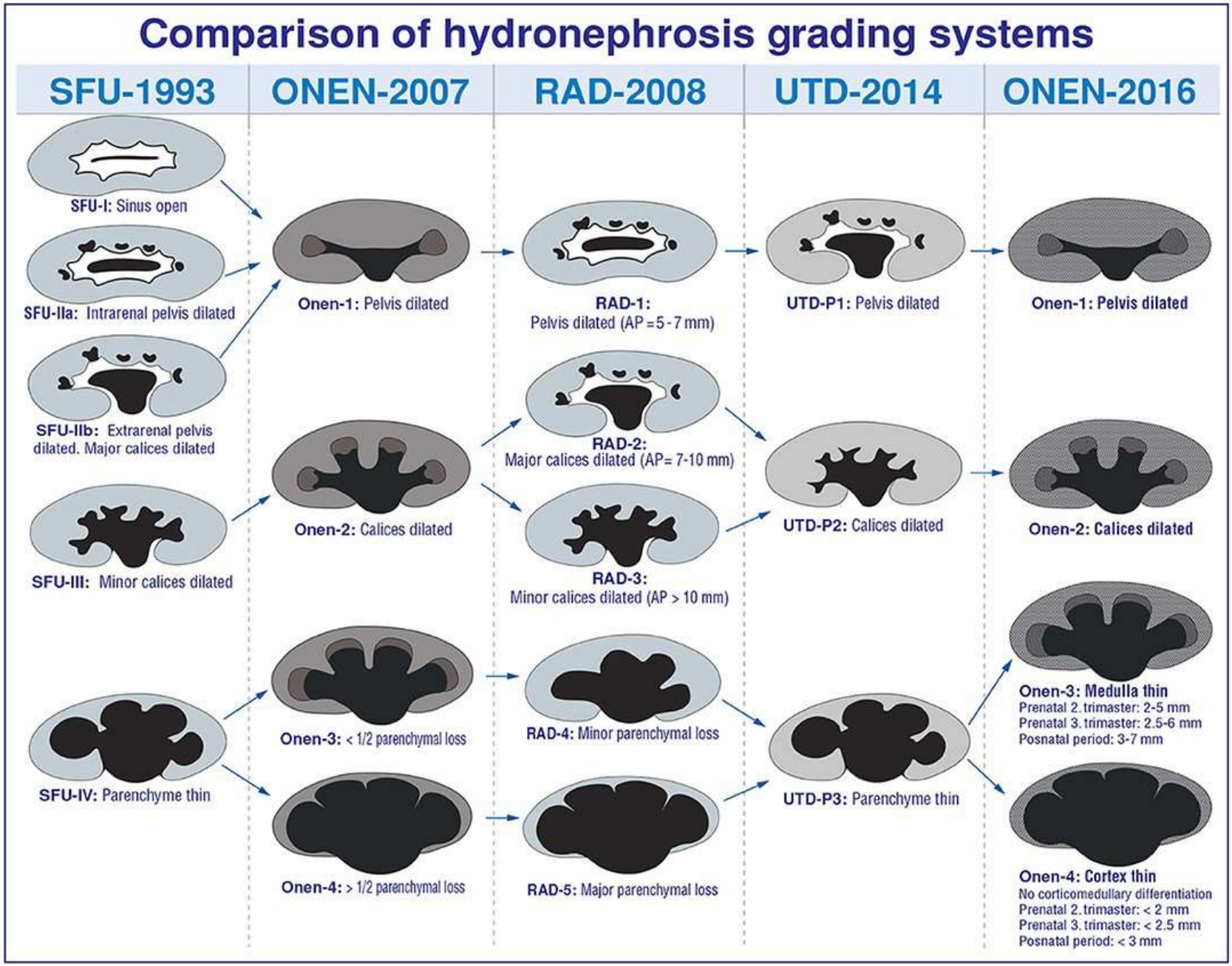
- 1 can of Cola
  ca 30 minutes
  before the exam

ULTRASOUND @ birth / 3 months

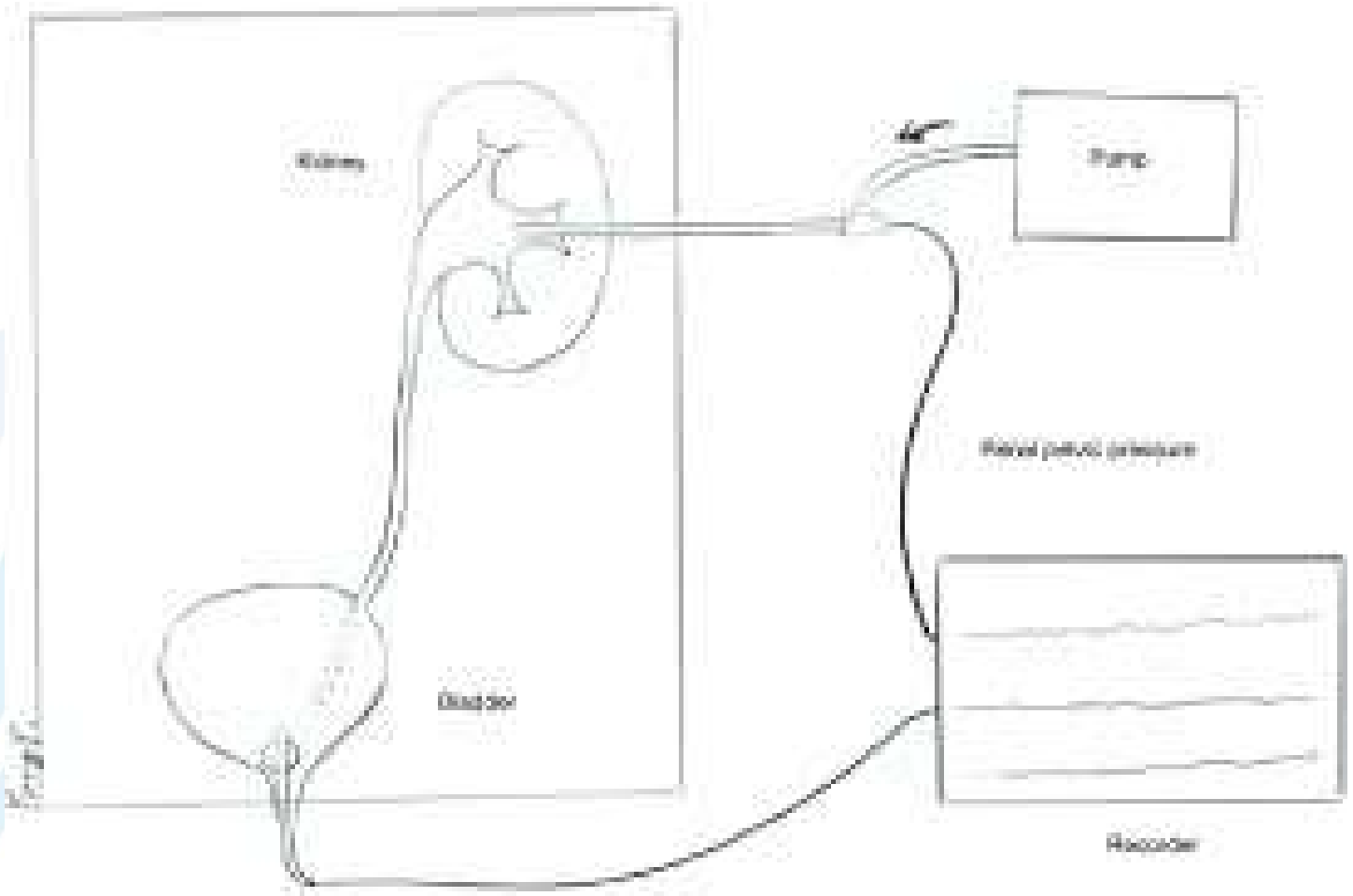
- < 15-19 mm : 90% no need for surgery
- > 35 mm : 90% need for surgery
- 20 mm < x < 50 mm : grey zone (30%-70% Sx)
- **Identische Situation / Hydratation!!!**

Desai, Dhillon, Duffy : Progress in Paediatric Urology vol 2, 1999

SFU / Radiology / UTD / Onen grading



Whitaker test



ISOTOPES

- **Dynamic**

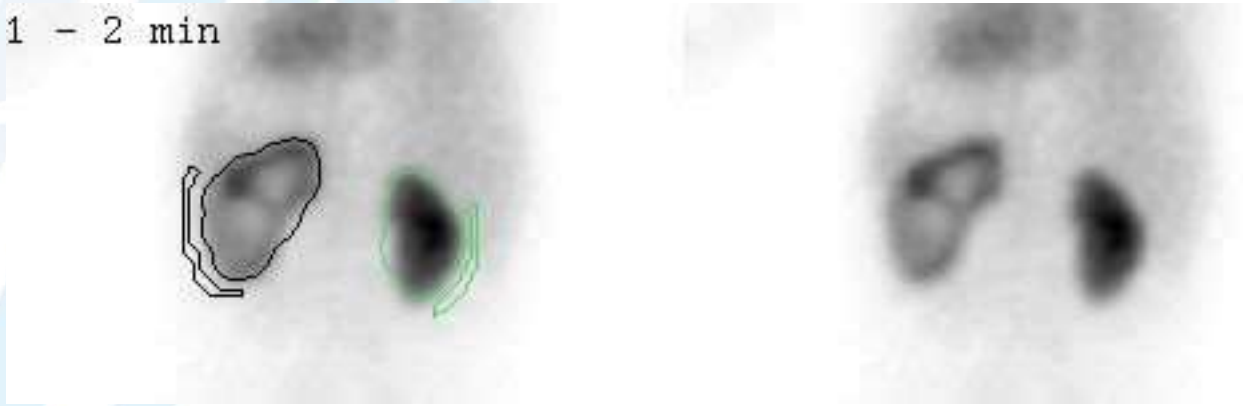
  Tracer: DTPA
  MAG-3

- **Static**

  DMSA

Dynamic: MAG-3 (MercaptoAcetyl Triglycerine)

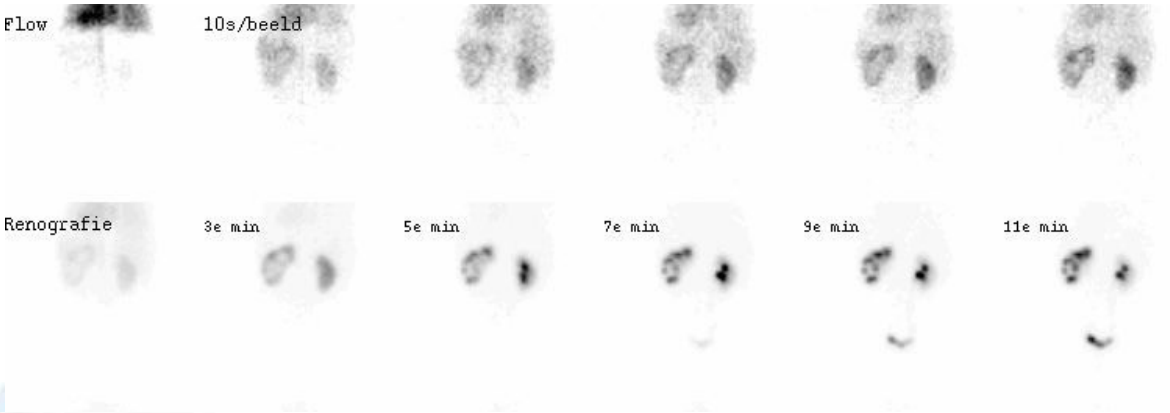
- Absorbed by the proximal tubules and secreted in the tubular lumen

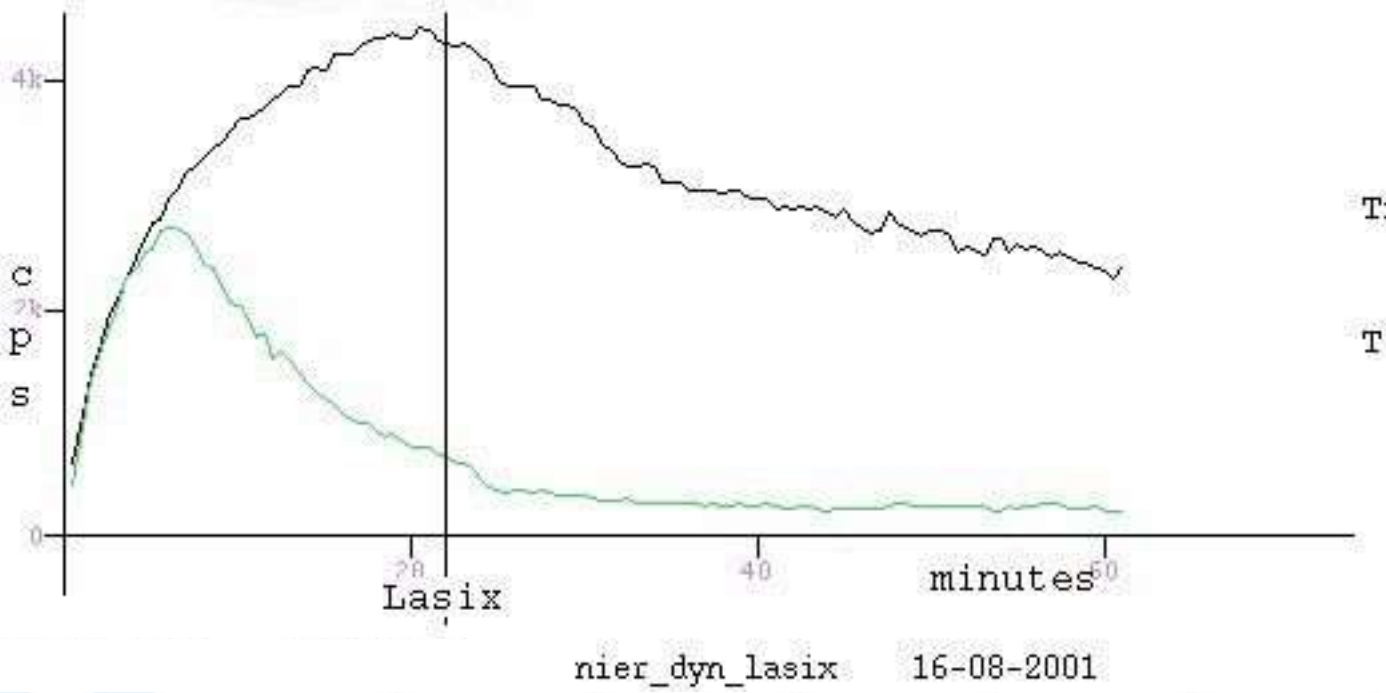


Uptake (1-2 min)

Left	Right
53%	47%

Dynamic: MAG-3 (MercaptoAcetyl Triglycerine)





	Left	Right
Times to peak (min)		
	20.00	5.50
T 1/2 (min) Post-Lasix		
	> 39.00	7.00

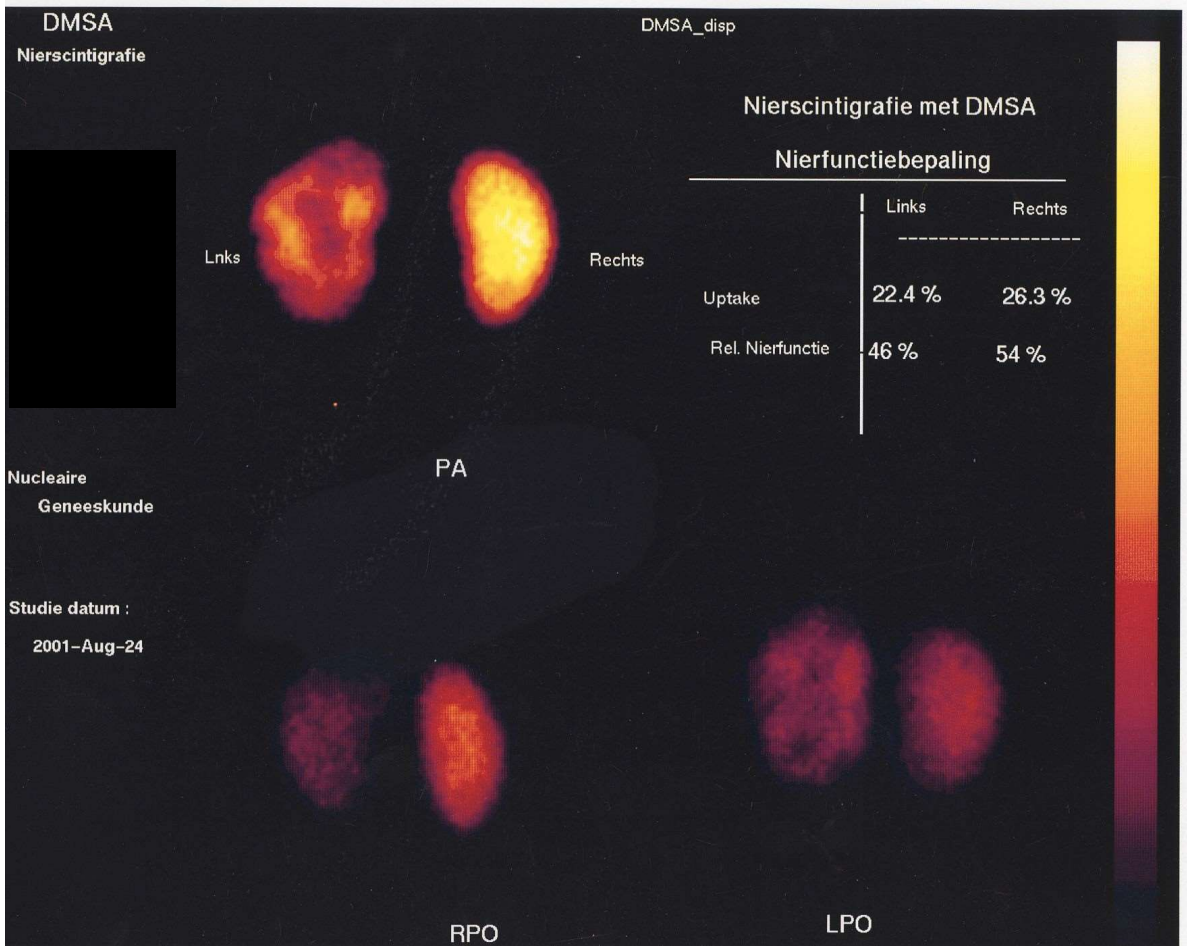
Dynamic: DTPA ?

- “Cheaper”
- Small children: not accurate
- Impaired renal function: not accurate

DMSA: static (NOT FOR HYDRONEPHROSIS)

- Active uptake in the proximal tubules <u>2-3 hours</u>
  <u>AFTER INJECTION</u>

- Scars / Pyelonephritis



“Practical problem”

- 1st year: Left 68% Right 32%
- 2nd year: Left 72% Right 28%

- What happened?
  Left improved or right got worse?

Isotope study :

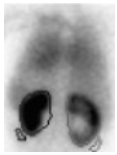
- How to interpret a deterioration of **split function**?
  Piepsz A, Ismaili K, Hall M, Collier F, Tondeur M, Ham H.
  Eur Urol. 2005 May;47(5):686-90. Epub 2005 Jan 11

  "In patients with unilateral or bilateral urological disorders, deterioration of split renal function does not necessary correspond to a loss of function of the affected kidney. SKGFR often modifies the interpretation of split function."

  "Single Kidney Glomerular Filtration Rate (SKGFR) =

  obtained by means of the combination of Tc-99m MAG3 split function and overall glomerular filtration rate as given by the chromium Cr 51 ethylenediamine tetraacetic acid (EDTA) clearance"

1 - 2 min



Uptake 1(-2 lin)

Left	Right
53t	47%

```
**********************************************
*                                            *
*  UNIVERSITAIRE ZIEKENHUIZEN LBUVEN         *
*                                            *
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                    : klaring
Studietype

Naam
RMD num.mer
COntactnummer
Datum                82.0 cm
Len9te               11.0 kg
Gewicht
Lichaamsopp.    0.5 m2

Fractie externe standaard  : 142.260
Volume spuit          0.334 g
Volume rest         : 28.916 g


counts op 40.0 minuten:
-Standaard       1786473.88 cnts
-Rest counts     137578.00 cnts
-Totale dosis    84985504.00 cnts
-Rest-dosis      3978246.25 cnts
-Netto-dosis     81007256.00 cnts


Distributievolume         3556.19 ml
Klaring                   24.58 ml/min
Genormaliseerd klarin9    87.54 ml/1.73m2/min
```
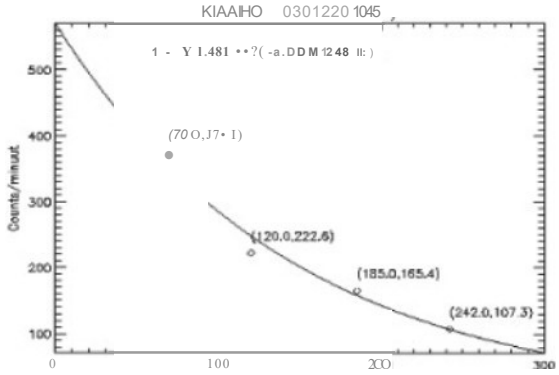
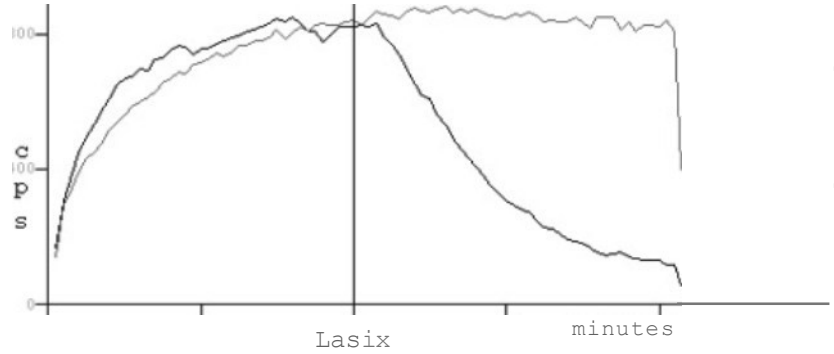



Post-Mict

Post-Kict Rll.tio (Post-Mict/Reno pn-luix)

Left	Right
	78%



Tiaes to peak (ain)

Left	Right
15.SO	25.SO

T 1/2 (min)	Post-Lui>
8	22

(COrrectie volgens Brochner-Mortensen,
Scan. J. Clin. Lab. Invest. 1972; 30: 271-274)
GFR - 1.1 x (klaring -3.7)
GFR : 92.22 ml/1.73m2/min

Single Kidney Glomerular Filtration Rate (SKGFR)

- = to see if from one yr to the next:

  the kidney gets better or worse

  (you can't tell by only the % function rate)

- **MAG-3 + Cr51-EDTA**
  (ask your nuclear medicine specialist)

OR….?

- Can you calculate GFR from MAG-3 or DMSA?

FUNCTION: is there a cut off ?

Journal of Pediatric Urology (2012) 8, 25–28

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Journal of Pediatric urology

Long-term results of pyeloplasty in poorly functioning kidneys in the pediatric age group☆

Rajesh Bansal, M.S. Ansari*, Aneesh Srivastava, Rakesh Kapoor

Department of Urology and Renal Transplantation, Sanjay Gandhi Postgraduate Institute of Medical Sciences, Urological Society of India, Lucknow 226014, India

Table 1 Data for patients in Group II.

No.	Preop. function (%)	Postop. function (%)	Intervention
1	0	25	PCN → Open pyeloplasty
2	5	20	Open pyeloplasty
3	8	23	Open pyeloplasty
4	4	22	Laparoscopic pyeloplasty
5	4	24	Laparoscopic pyeloplasty
6	10	0	Lost to follow up

INDICATIONS FOR SURGERY

- **DECREASE** in relative (differential) **function** (> 7-8%): although better is
  "single kidney glomerular filtration rate"
  (SKGFR)

- **Renal differential function < 35%**
- **SYMPTOMS** : urinary tract infection, pain

- **Significant (continuous) increase in AP diameter**

Isotope studies : >18 MONTHS

- **Renal pelvis volume during diuresis in children with hydronephrosis: implications for diagnosing obstruction with diuretic renography.**
  Koff SA, **Binkovitz L**, **Coley B**, **Jayanthi VR**
  J Urol. 2005 Jul;174(1):303-7

"Consequently, ***T1/2*** *appears to be particularly vulnerable to inaccuracy in diagnosing obstruction in this age group (< 18mo), and, therefore,* ***it should not be relied*** *on as an operative determinant."*

18 Months:

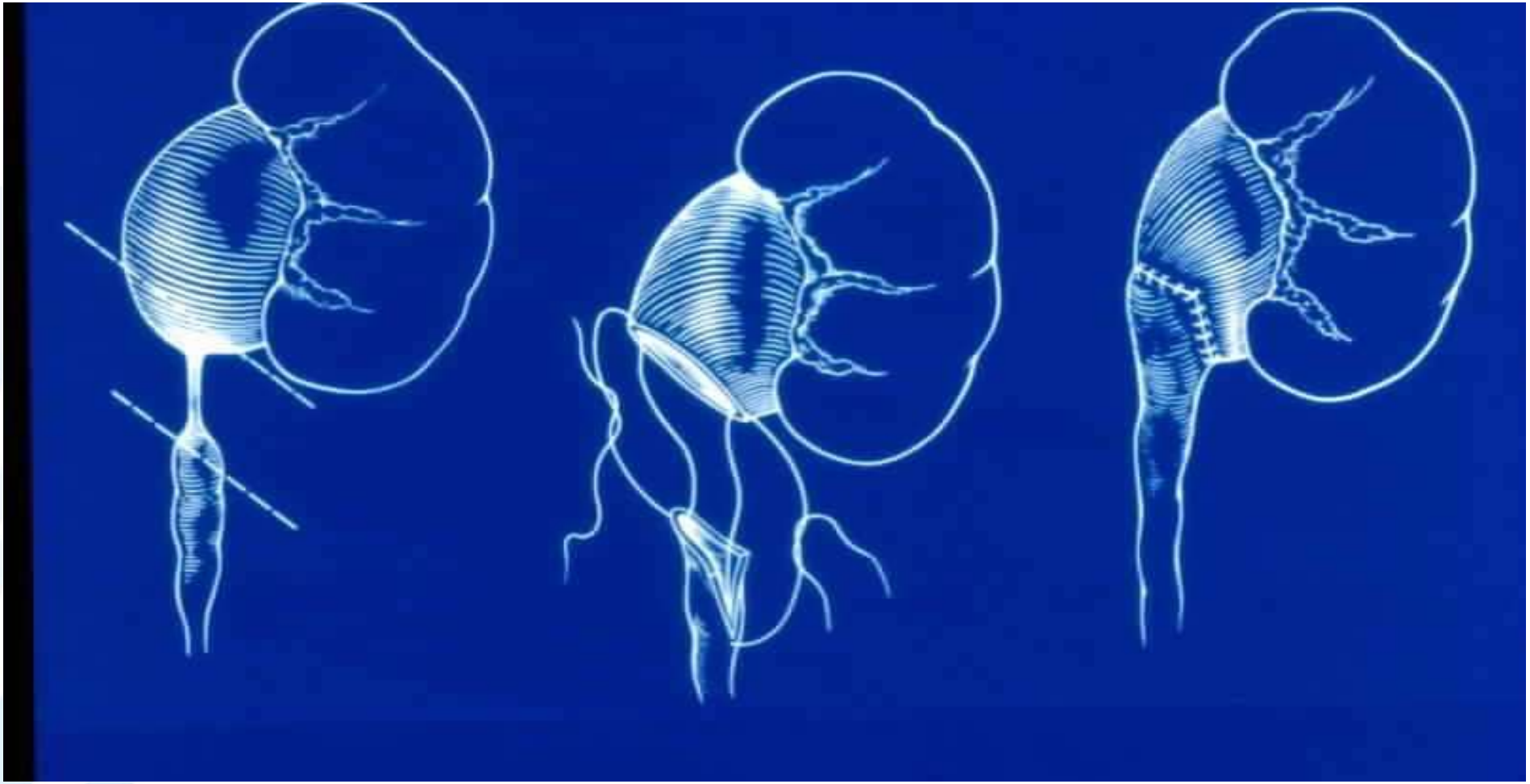
Elasticity = compliance of the renal pelvisê

Increase : **IMPORTANT !**

- Sequential studies
- Good circumstances
- **Identical hydratation situation**

- Ultrasound = “moment”

Dismembered Pyeloplasty (Anderson Hynes)



Journal of Pediatric Urology (2013) 9, 779–783

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Journal of Pediatric urology

Time course of hydronephrotic changes following unilateral pyeloplasty

Kwanjin Park [a,*], Minki Baek [b], Sung Yong Cho [a], Hwang Choi [c]

[a] Department of Urology, Seoul National University, Republic of Korea
[b] Department of Urology, Sungkyunkwan University, Republic of Korea
[c] Department of Urology, Armed Forces Capital Hospital, Republic of Korea

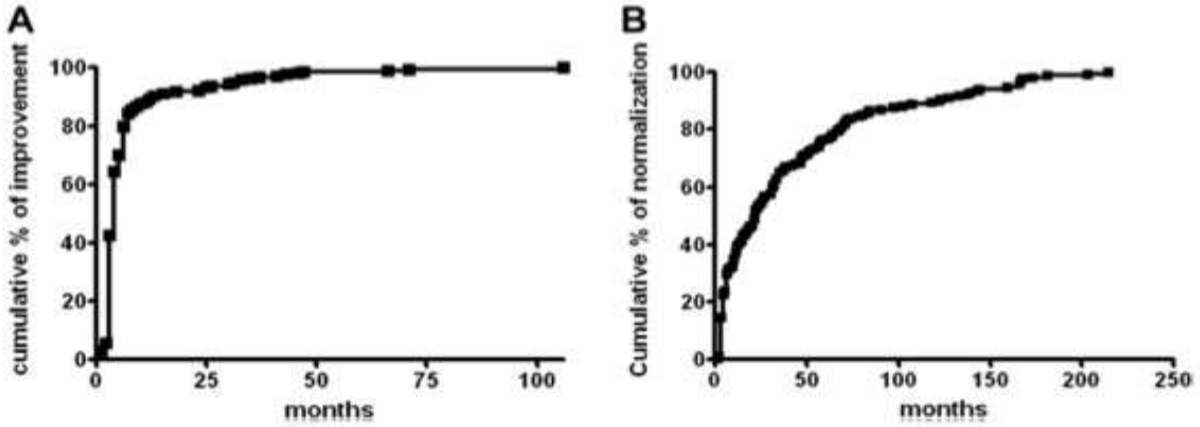
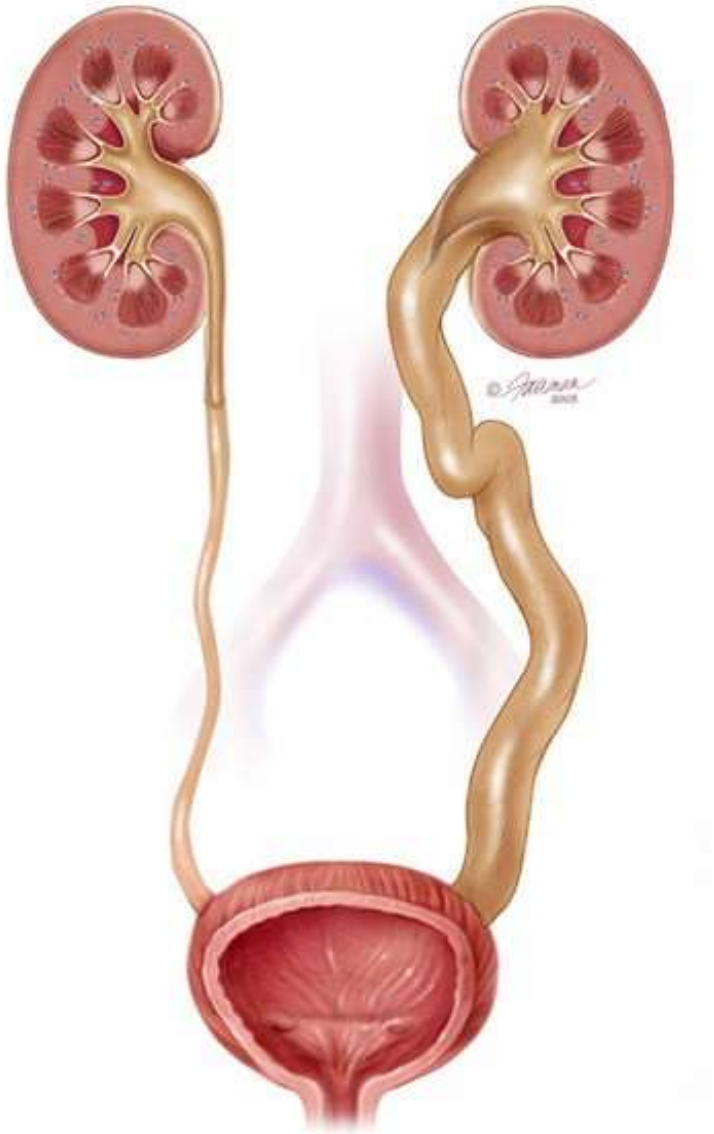


Figure 1 The cumulative rate of improvement (A) and normalization (B) following DMP.

It is NOT necessary to perform systematically Isotope studies

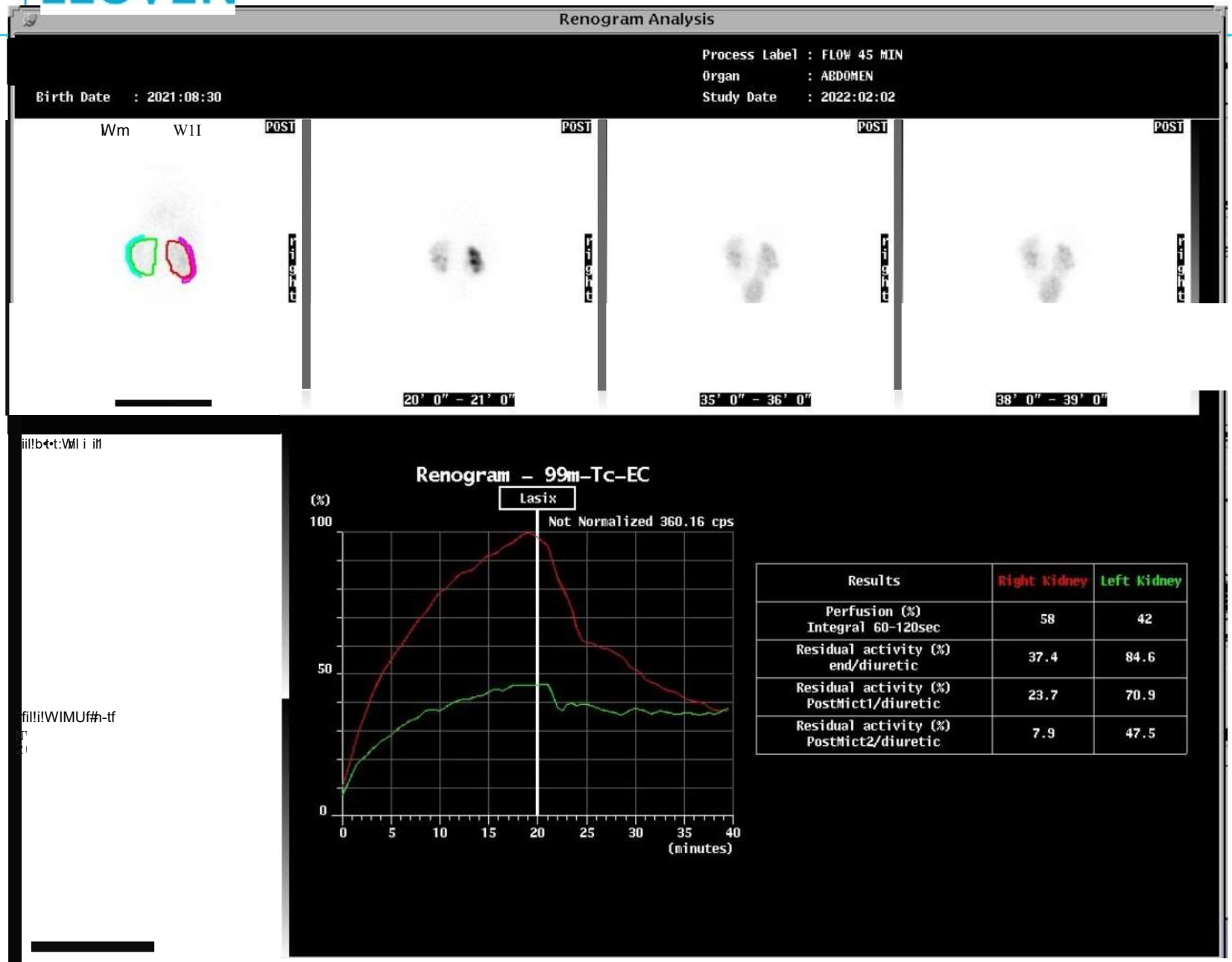
Improving (+/- 8Mo) and Normalising (+/- 41Mo)

A megaureter example



- The "volume of the renal pelvis
  + the entire ureter

Is 20 minutes enough to fill renal pelvis + entire ureter (in all children) ?


Renogram Analysis
Process Label : FLOW 45 MIN
Organ : ABDOMEN
Study Date : 2022:02:02
Birth Date : 2021:08:30
POST
20' 0" - 21' 0"
35' 0" - 36' 0"
38' 0" - 39' 0"
Renogram - 99m-Tc-EC
Lasix
(%)
100
50
0
Not Normalized 360.16 cps
0 5 10 15 20 25 30 35 40
(minutes)
Results | Right Kidney | Left Kidney
Perfusion (%) Integral 60-120sec | 58 | 42
Residual activity (%) end/diuretic | 37.4 | 84.6
Residual activity (%) PostMict1/diuretic | 23.7 | 70.9
Residual activity (%) PostMict2/diuretic | 7.9 | 47.5

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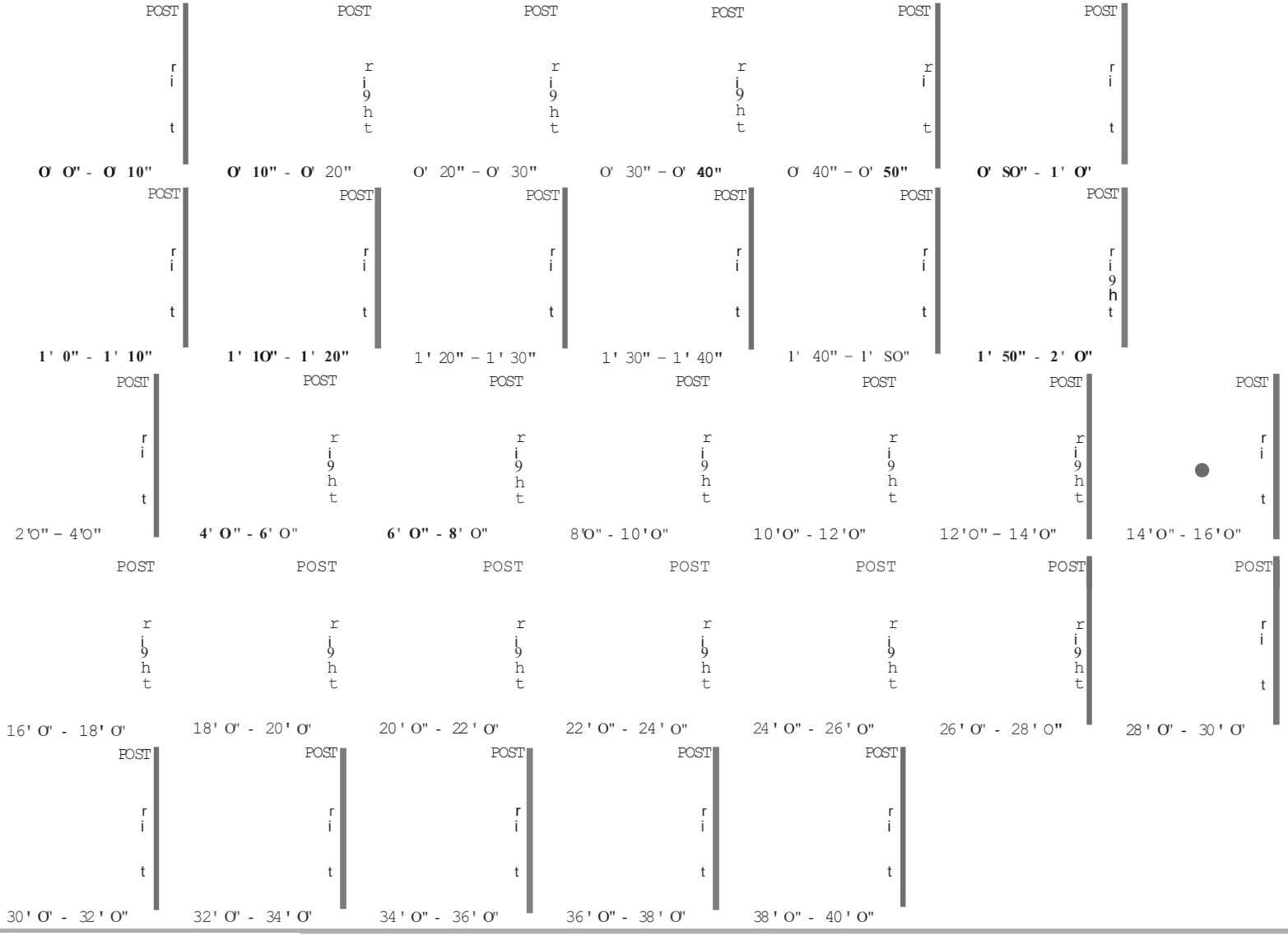
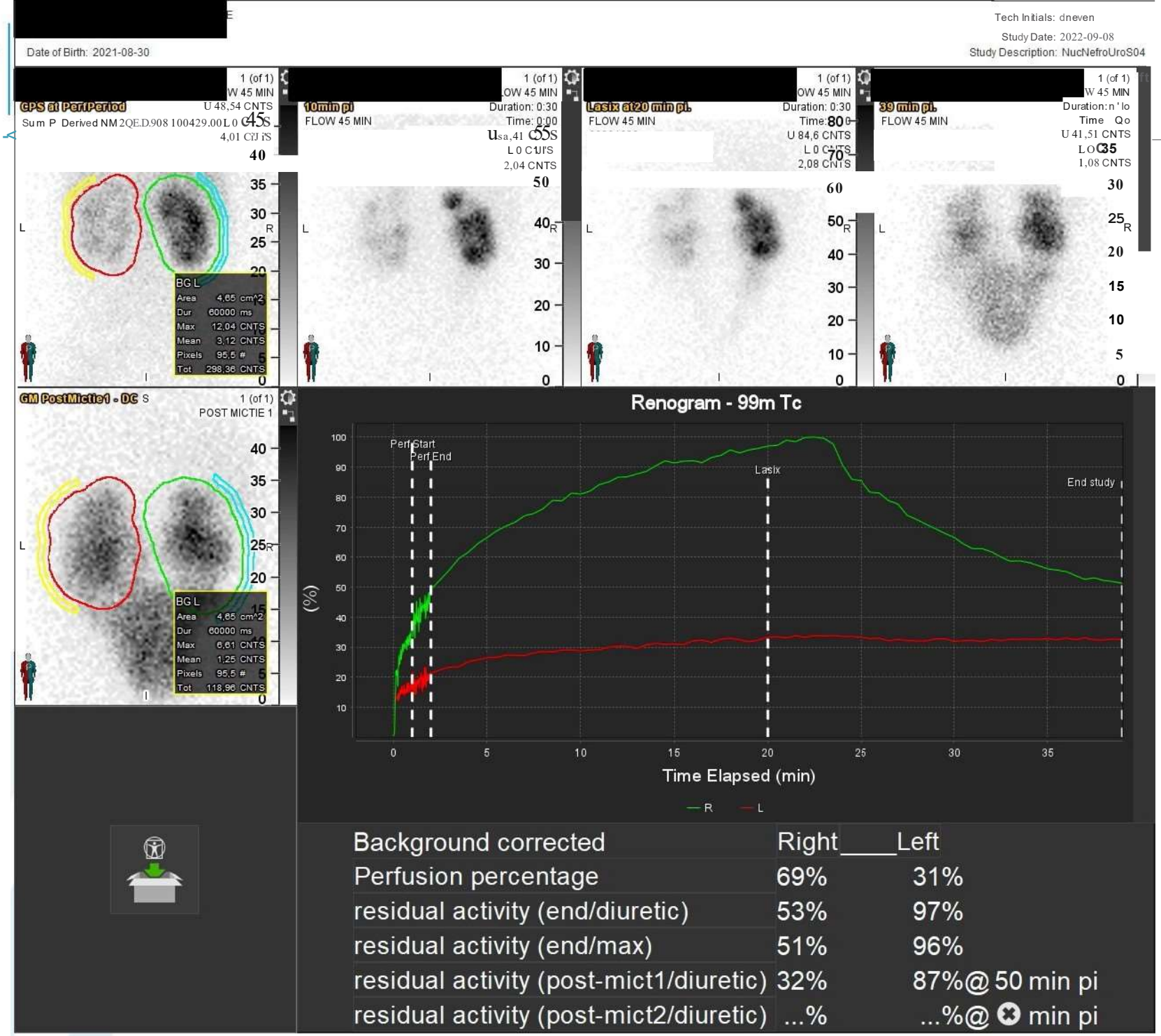
Renogram Analysis

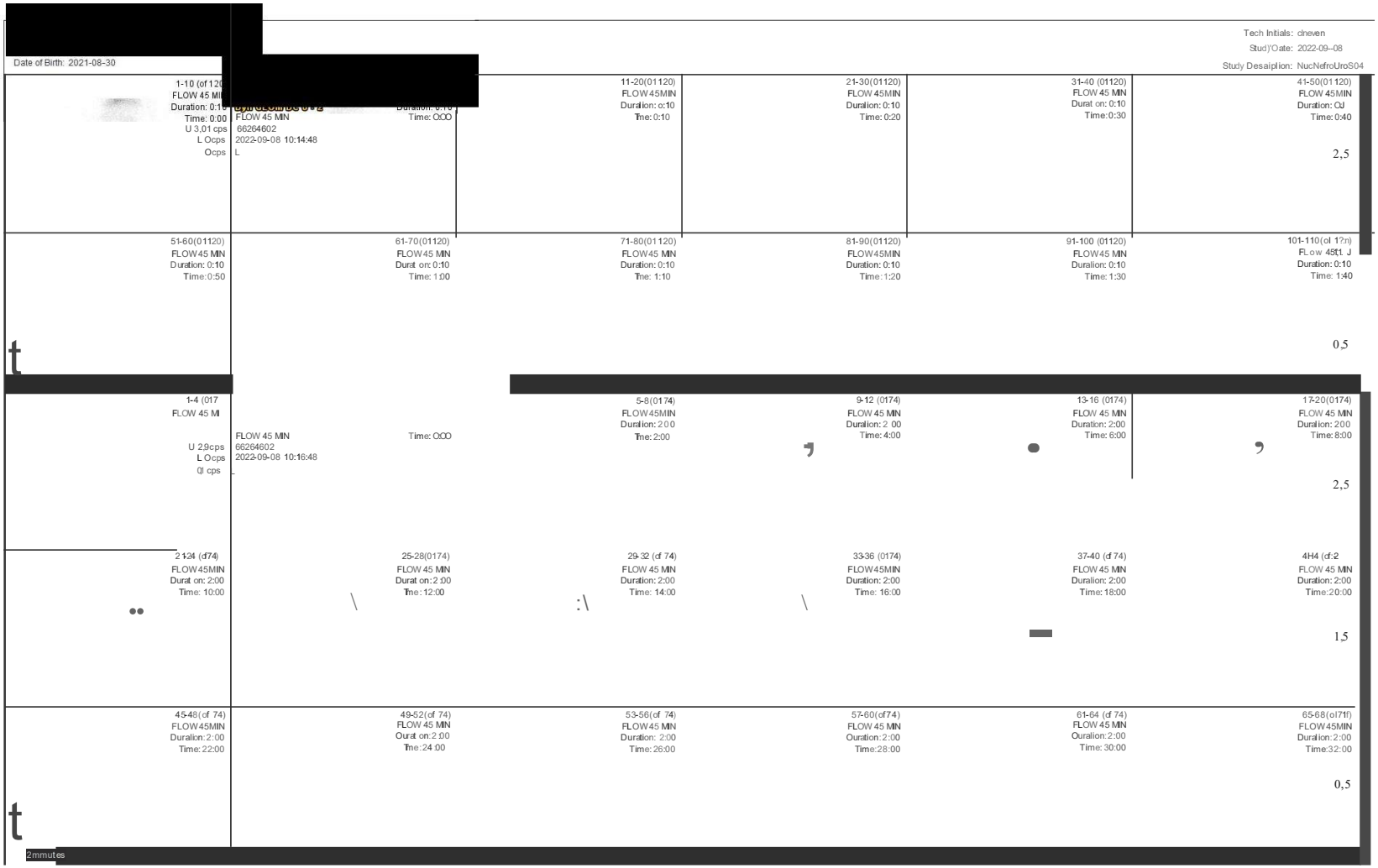
[redacted]

Birth Date 2021:08:3D

Process Label FLOW 45 MIN
Organ ABDOMEN
Study Date 2022:02:02




Tech Initials: dneven
Study Date: 2022-09-08
Study Description: NucNefroUroS04
Date of Birth: 2021-08-30
GPS at PerfPeriod
10min pi
Lasix at20 min pi.
39 min pi.
FLOW 45 MIN
BG L
Area 4,65 cm^2
Dur 60000 ms
Max 12,04 CNTS
Mean 3,12 CNTS
Pixels 95,5 #
Tot 298,36 CNTS
GM PostMictie1 - DC
POST MICTIE 1
Max 6,61 CNTS
Mean 1,25 CNTS
Tot 118,96 CNTS
Renogram - 99m Tc
Perf Start
Perf End
Lasix
End study
(%)
Time Elapsed (min)
R
L
Background corrected
Right
Left
Perfusion percentage
69%
31%
residual activity (end/diuretic)
53%
97%
residual activity (end/max)
51%
96%
residual activity (post-mict1/diuretic)
32%
87%@ 50 min pi
residual activity (post-mict2/diuretic)
...%
...%@ min pi


Tech Initials: cneven
Stud)'Oate: 2022-09-08
Study Desaiplion: NucNefroUroS04
Date of Birth: 2021-08-30
1-10 (of 120
FLOW 45 MI
Duration: 0:10
Time: 0:00
U 3,01 cps
L Ocps
Ocps
FLOW 45 MIN
66264602
2022-09-08 10:14:48
L
Time: OOO
11-20(01120)
FLOW 45MIN
Duration: 0:10
Time: 0:10
21-30(01120)
FLOW 45MIN
Duration: 0:10
Time: 0:20
31-40 (01120)
FLOW 45 MIN
Durat on: 0:10
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41-50(01120)
FLOW 45MIN
Duration: 0J
Time: 0:40
2,5
51-60(01120)
FLOW 45 MIN
Duration: 0:10
Time: 0:50
61-70(01120)
FLOW 45 MIN
Durat on: 0:10
Time: 1:00
71-80(01120)
FLOW 45 MIN
Duration: 0:10
Time: 1:10
81-90(01120)
FLOW45MIN
Duration: 0:10
Time: 1:20
91-100 (01120)
FLOW45 MIN
Duration: 0:10
Time: 1:30
101-110(ol 1?n)
FLow 45(1 J
Duration: 0:10
Time: 1:40
0,5
1-4 (017
FLOW 45 MI
FLOW 45 MIN
66264602
2022-09-08 10:16:48
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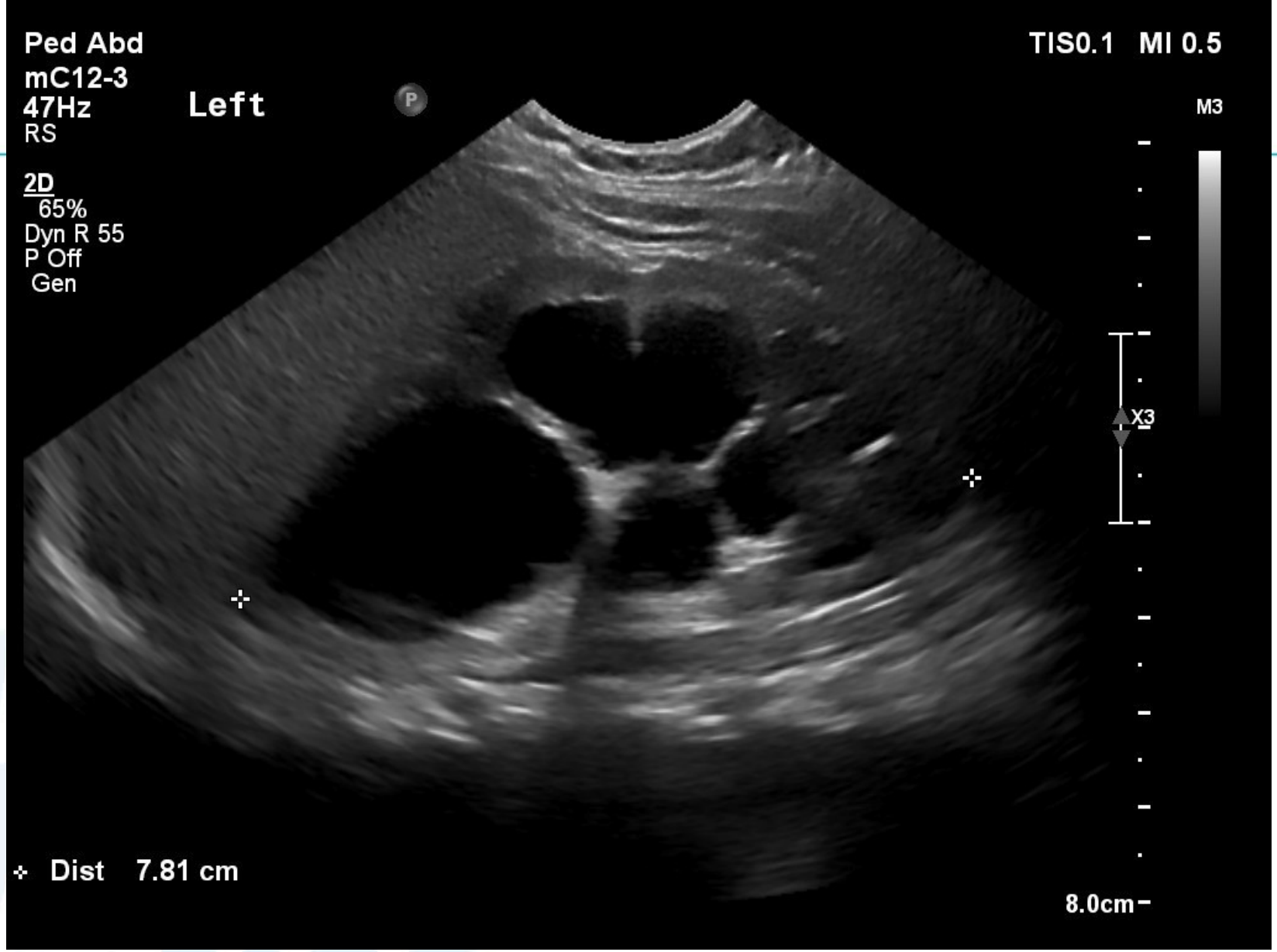
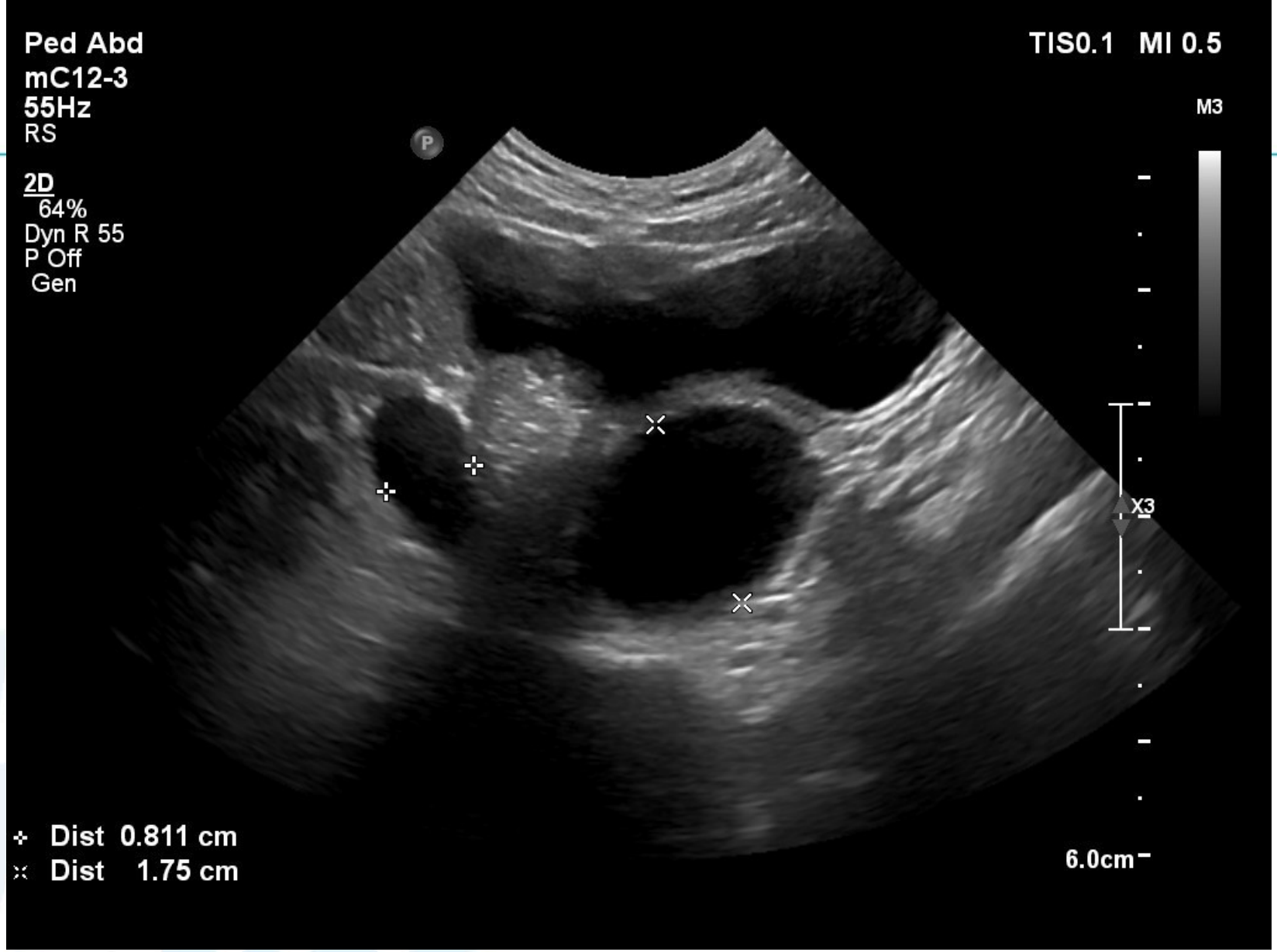
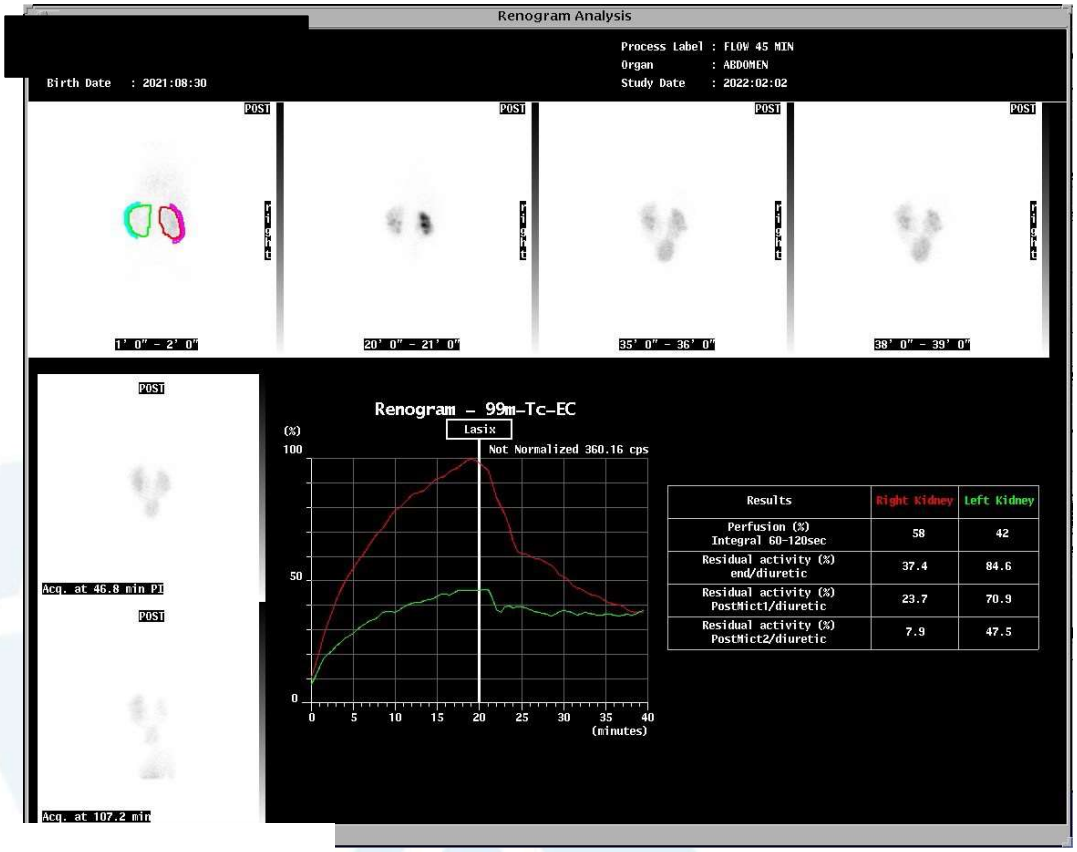
L Ocps
0l cps
Time: OOO
5-8(0174)
FLOW45MIN
Duration: 2:00
Time: 2:00
9-12 (0174)
FLOW 45 MIN
Duration: 2 :00
Time: 4:00
13-16 (0174)
FLOW 45 MIN
Duration: 2:00
Time: 6:00
17-20(0174)
FLOW 45 MIN
Duration: 2:00
Time: 8:00
2,5
2-24 (of74)
FLOW45MIN
Durat on: 2:00
Time: 10:00
25-28(0174)
FLOW 45 MIN
Durat on: 2:00
Time: 12:00
29-32 (of 74)
FLOW 45 MIN
Duration: 2:00
Time: 14:00
33-36 (0174)
FLOW45MIN
Duration: 2:00
Time: 16:00
37-40 (of 74)
FLOW45 MIN
Duration: 2:00
Time: 18:00
4H4 (of:2
FLOW 45 MIN
Duration: 2:00
Time:20:00
1,5
45-48(of 74)
FLOW45MIN
Duration: 2:00
Time: 22:00
49-52(of 74)
FLOW 45 MIN
Ourat on: 2:00
Time: 24:00
53-56(of 74)
FLOW 45 MIN
Duration: 2:00
Time: 26:00
57-60(of74)
FLOW 45 MIN
Ouration: 2:00
Time: 28:00
61-64 (of 74)
FLOW 45 MIN
Ouration: 2:00
Time: 30:00
65-68(of7f)
FLOW45MIN
Duration: 2:00
Time:32:00
0,5
2mmutes

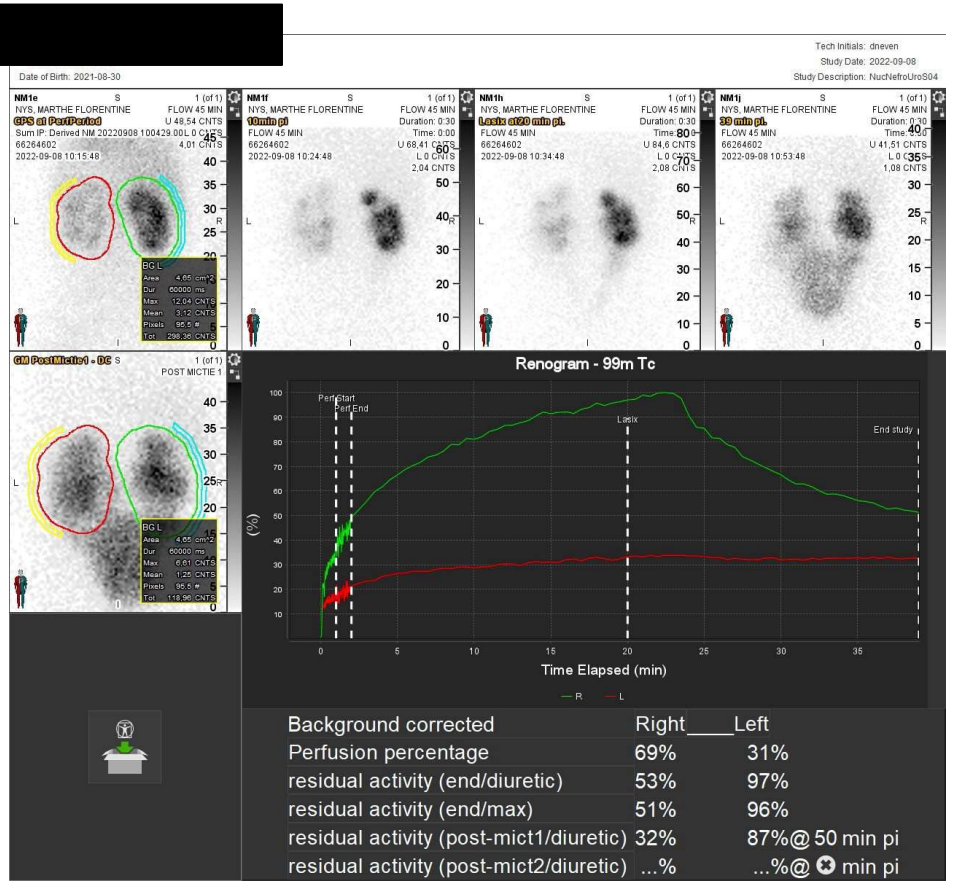

Ped Abd
mC12-3
47Hz
RS
Left
TIS0.1 MI 0.5
M3
2D
65%
Dyn R 55
P Off
Gen
X3
Dist 7.81 cm
8.0cm


Ped Abd
mC12-3
55Hz
RS
2D
64%
Dyn R 55
P Off
Gen
TIS0.1 MI 0.5
M3
X3
6.0cm
Dist 0.811 cm
Dist 1.75 cm


Ped Abd
mC12-3
55Hz
RS
2D
64%
Dyn R 55
P Off
Gen
TIS0.1 MI 0.5
M3
X3
6.0cm
Bladder L 4.92 cm
Bladder H 1.91 cm

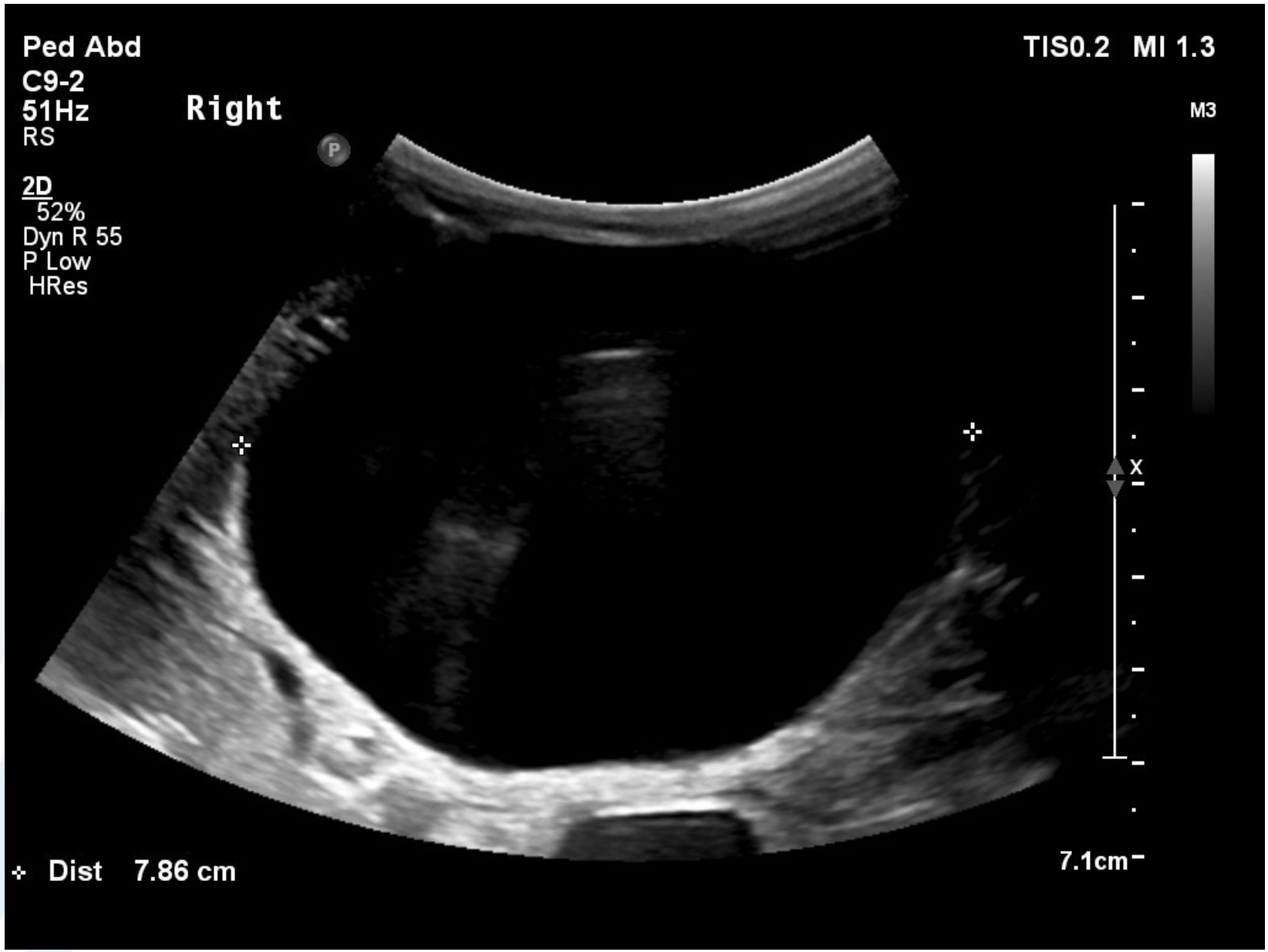
Is it really changed ? What happened ?

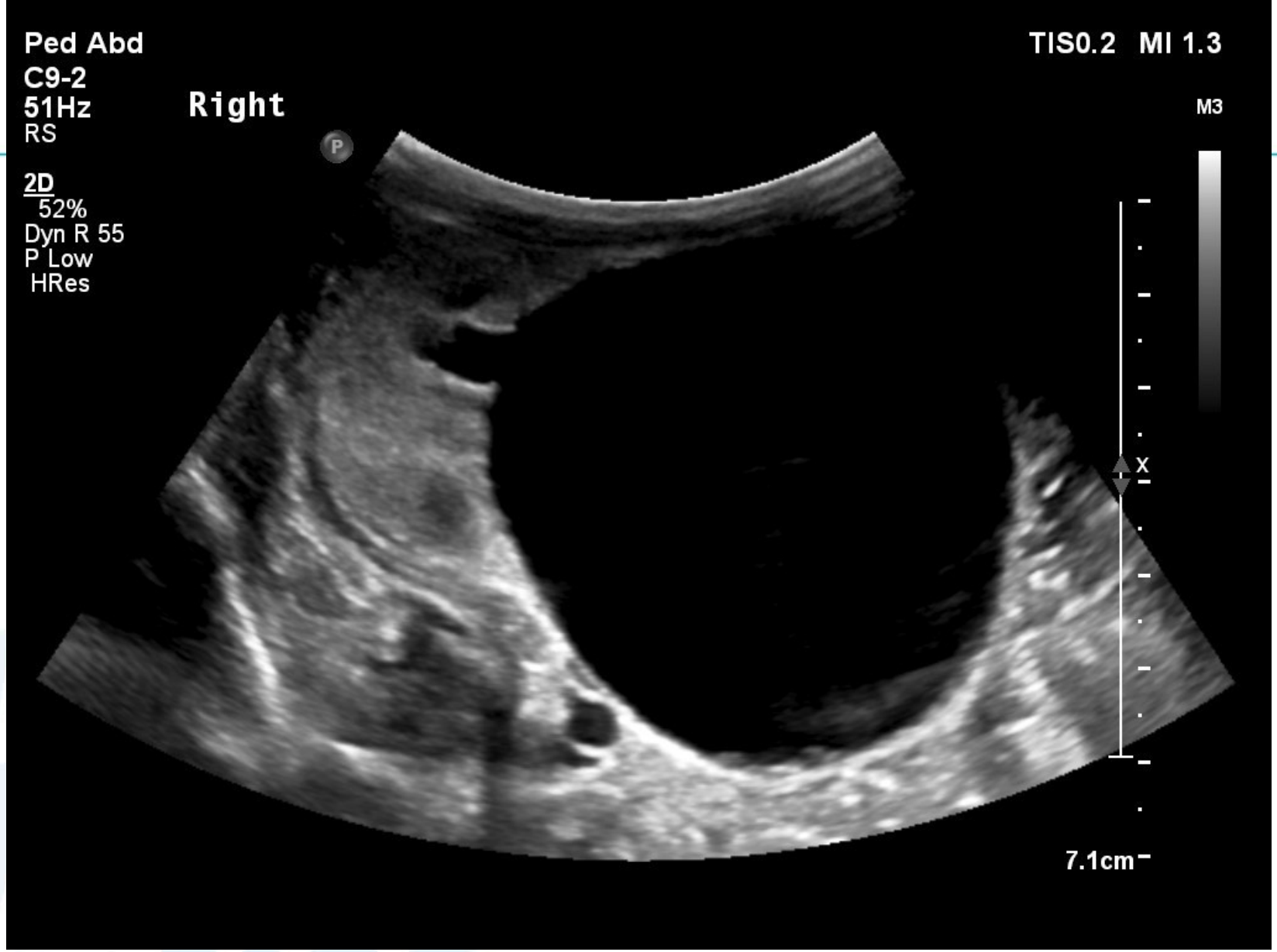




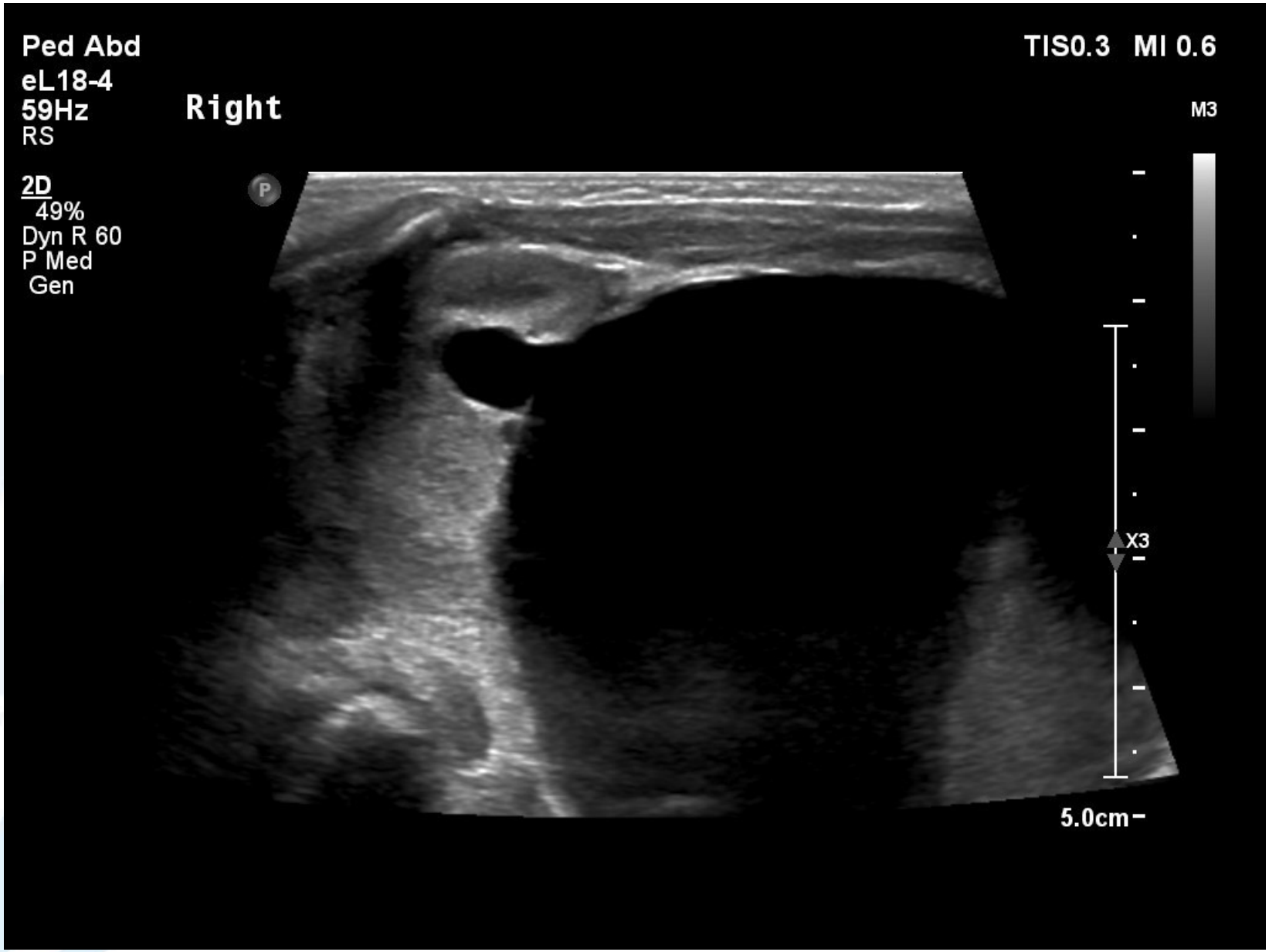
And what about the bladder ?

Newborn


Ped Abd
C9-2
51Hz
RS
2D
52%
Dyn R 55
P Low
HRes
Right
TIS0.2 MI 1.3
M3
X
7.1cm
Dist 7.86 cm


Ped Abd
C9-2
51Hz
RS
2D
52%
Dyn R 55
P Low
HRes
Right
TIS0.2 MI 1.3
M3
X
7.1cm

6 weeks : “tubular function / reaction to furosemide



He

- Underwent surgery @ 1 week of age …

- Do we still do an isotope exam?
- When?

DMSA

Seminars in NUCLEAR MEDICINE

ELSEVIER

Pediatric Nephro-Urology: Overview and Updates in Diuretic Renal Scans and Renal Cortical Scintigraphy

Zvi Bar-Sever, MD,* Amer Shammas, MD,† Farshid Gheisari, MD,† and Reza Vali, MD, MSc†

Table 1 Clinical Indication of 99mTC-DMSA in Children.

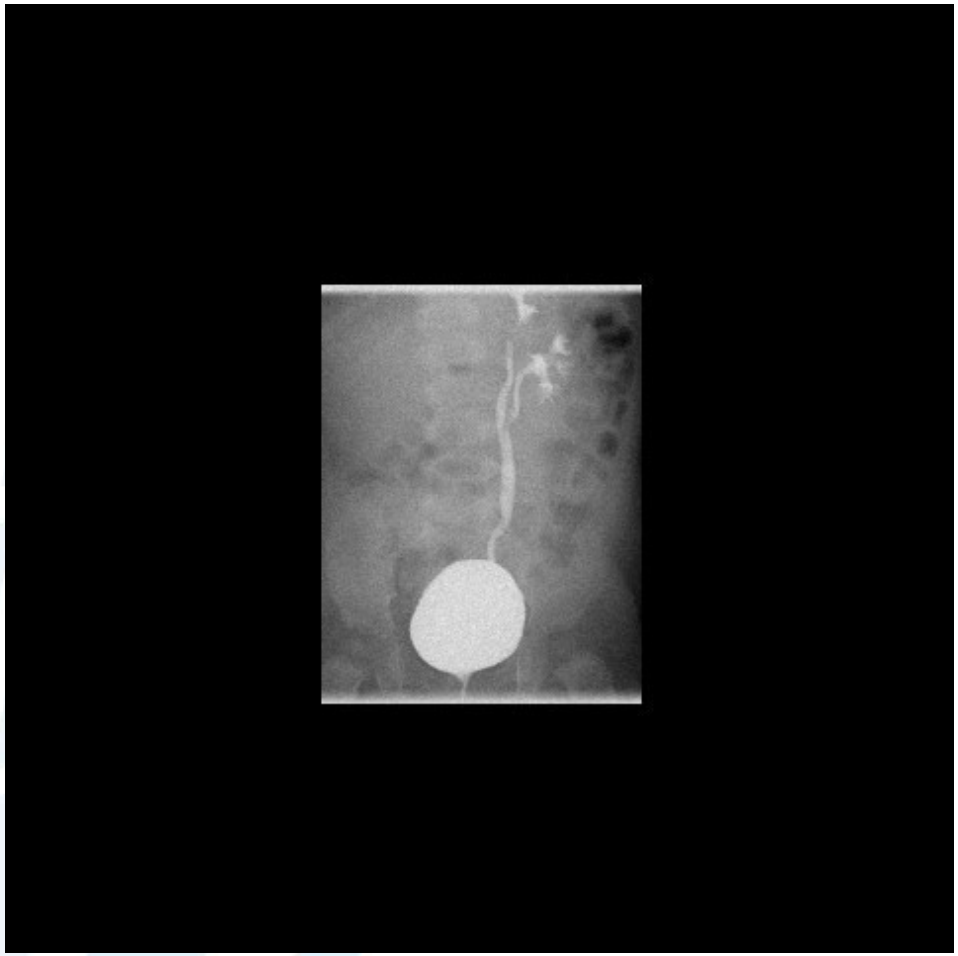
Diagnosis of acute pyelonephritis
Diagnosis of permanent renal cortical scar 6 months after pyelonephritis
Diagnosis of cortical kidney injuries following trauma
Diagnosis and classification of structural renal abnormalities (single kidney, duplex kidney)
Diagnosis of ectopic kidney and cross-fused kidney
Calculation of differential renal function and when possible individual differential function of the kidney poles in cases of duplex kidneys
Identification of dysplastic kidneys and determination of their function
Assessment of the kidneys in secondary hypertension
Evaluation of kidneys function in renovascular hypertension before and after surgery
Assessment of differential and regional kidney function in nephrolithiasis before and after treatment
Surgical decision-making in patients with UPJ obstruction or VUR (differential renal function)
Radiotherapy planning, to improve target delineation and preserve renal function

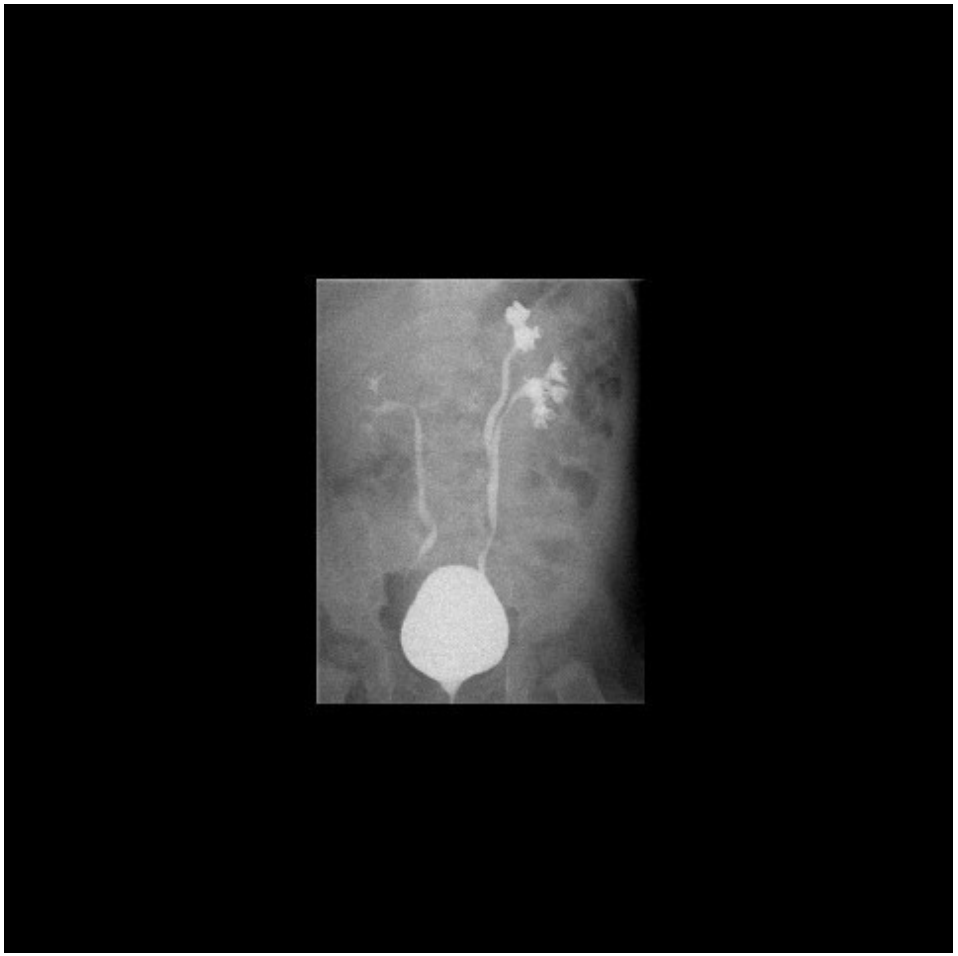
Is this true?

So…, when is it possible ?

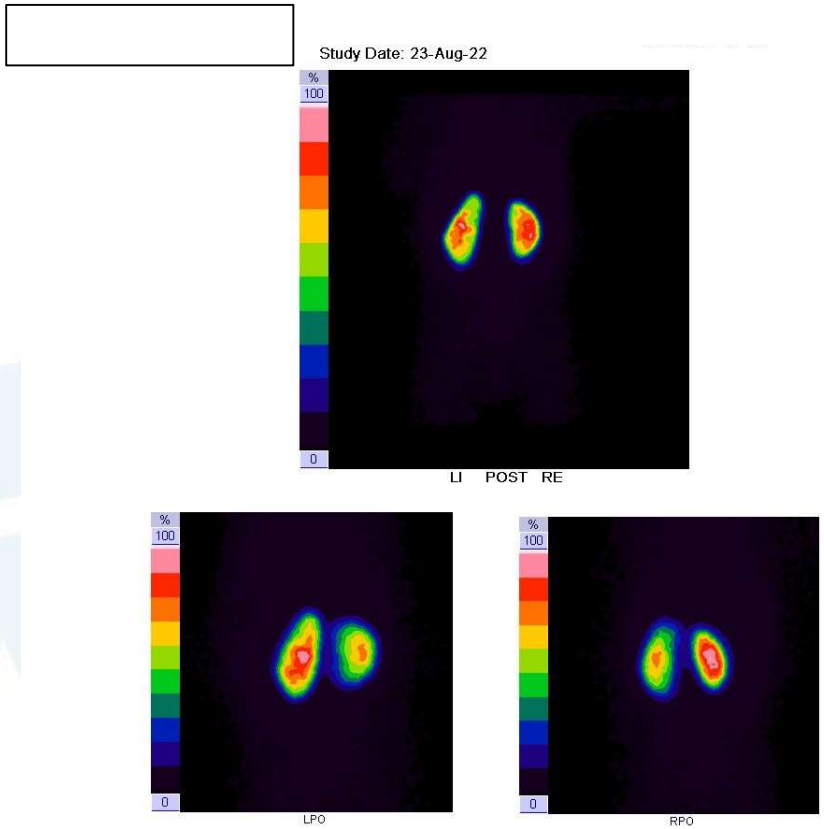
Cr-EDTA is not necessary?

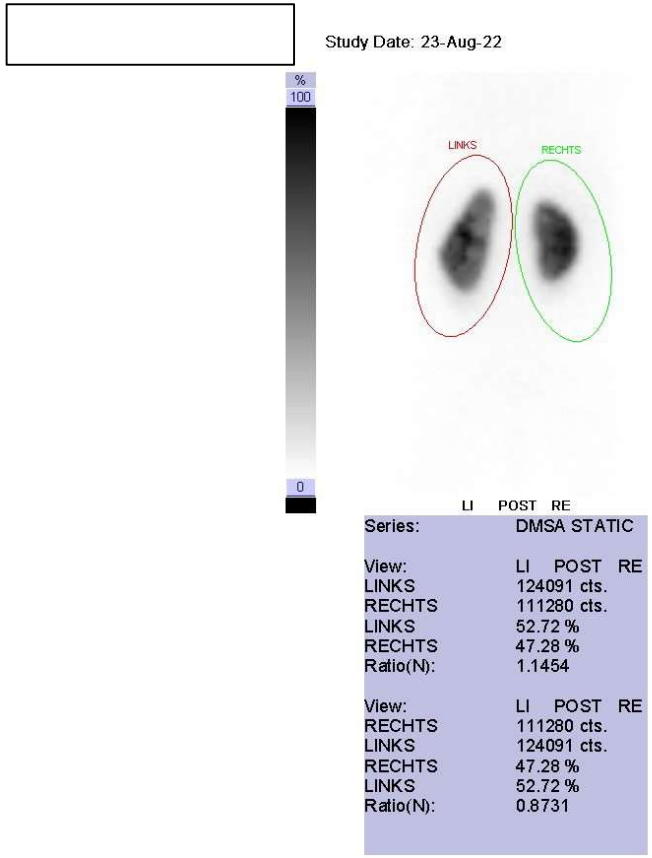
Renal duplication





Renal duplication





It seems to have function in the left upper pole ? Little bit less…?

DMSA after febrile UTI
Why do pediatricians wait 6 months ?

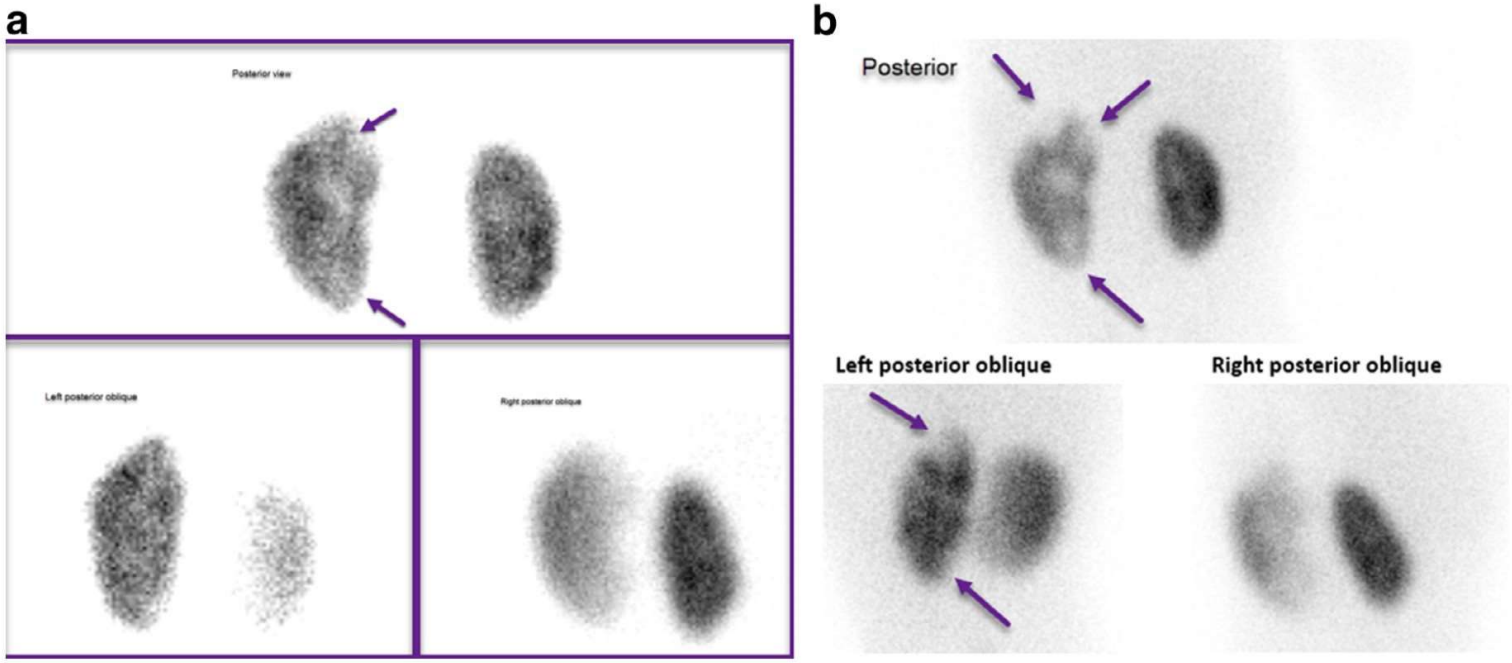
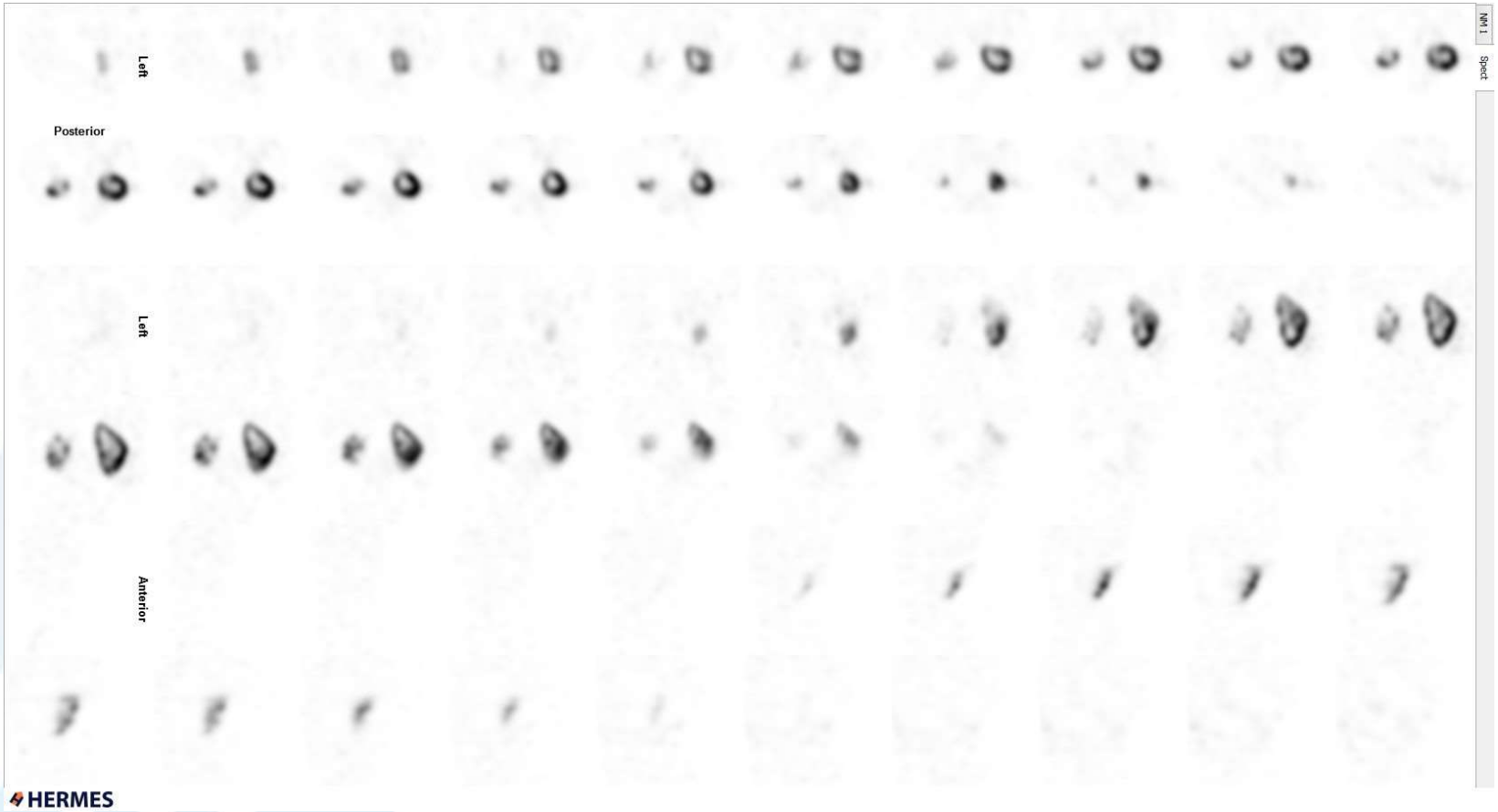


Figure 3 Tc-99m-DMSA scan was performed in a 12 months male during an episode of UTI. Pinhole images are shown in (A). The left kidney is slightly larger than the right kidney with mild diffuse decreased uptake and foci of more decreased activity in the upper and lower poles, without significant volume loss. These findings were suggestive of acute pyelonephritis. The effect of the infection was evaluated 12 months later with a follow-up Tc-99m-DMSA scan. Pinhole images are shown in (B). Foci of cortical defects are seen in the upper pole of the left kidney with volume loss suggestive of scars. There is also reduced uptake and cortical thinning in the lower pole possibly indicating the presence of additional scars.

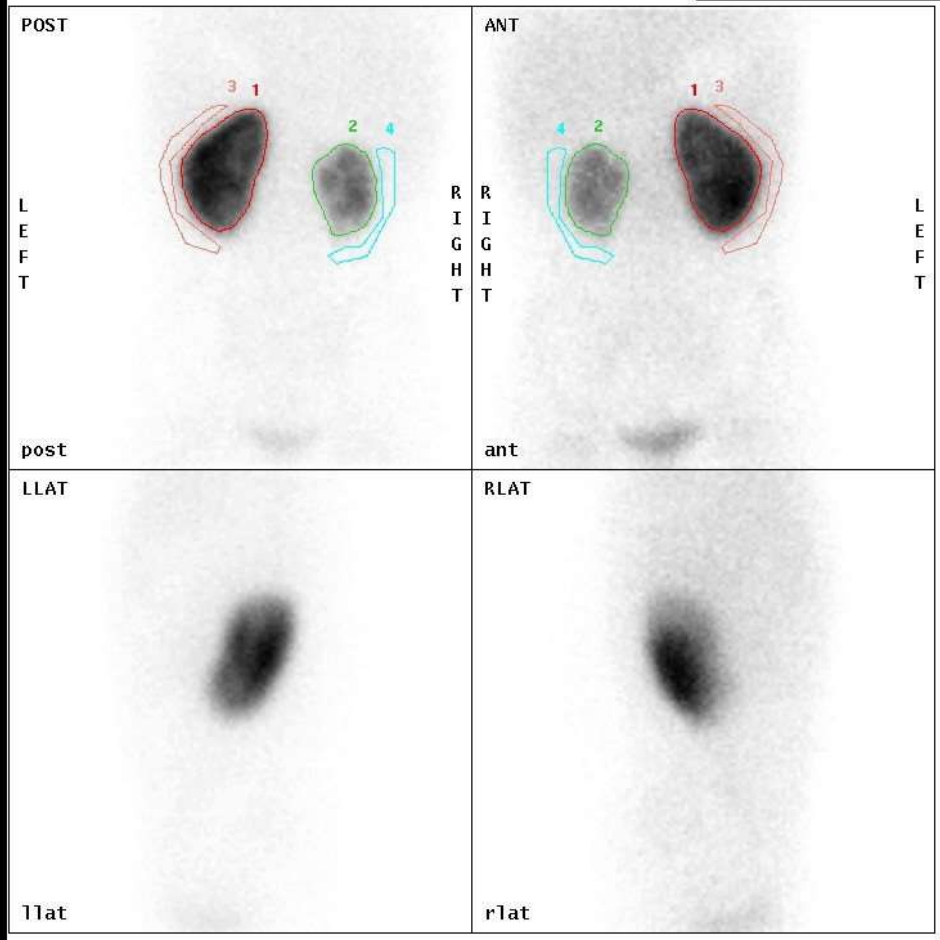
One of our patients



DMSA Analysis

[redacted]

Institute : Algemeen ziekenhuis,Tur
Description :
Study Date : 2021:05:04, 14:42:38



Age (years): 6

	Left	Right
Relative Uptake POST	78.2%	21.8%
Relative Uptake ANT	79.8%	20.2%
Geometric Mean	79.0%	21.0%
Kidney Depth	4.08 cm	4.08 cm
Absolute Uptake	20.0%	5.3%

Total Absolute Uptake = 25.3 %

- New scars?
- Old scars
- Dysplasia?

The bladder and the diagnosis of vesicoureteral reflux

Society of Nuclear Medicine Procedure Guideline for Radionuclide Cystography in Children

version 3.0, approved January 25, 2003

Authors: Gerald A. Mandell, MD (DuPont Hospital for Children, Wilmington, DE); Douglas F. Eggli, MD (Pennsylvania State University/Milton S. Hershey Medical Center, Hershey, PA); David L. Gilday, MD (Hospital for Sick Children, Toronto, Ontario, Canada); Sydney Heyman, MD (Children's Hospital of Philadelphia, Philadelphia, PA); Joe C. Leonard, MD (Oklahoma Children's Memorial Hospital, Oklahoma City, OK); John H. Miller, MD (Children's Hospital Los Angeles, Los Angeles, CA); Helen R. Nadel, MD (Children's Hospital, British Columbia, Vancouver, Canada); Amy Piepsz, MD (CHU St. Pierre, Department of Radioisotopes, Brussels, Belgium); and S. Ted Treves, MD (Children's Hospital, Boston, MA).

UZ LEUVEN

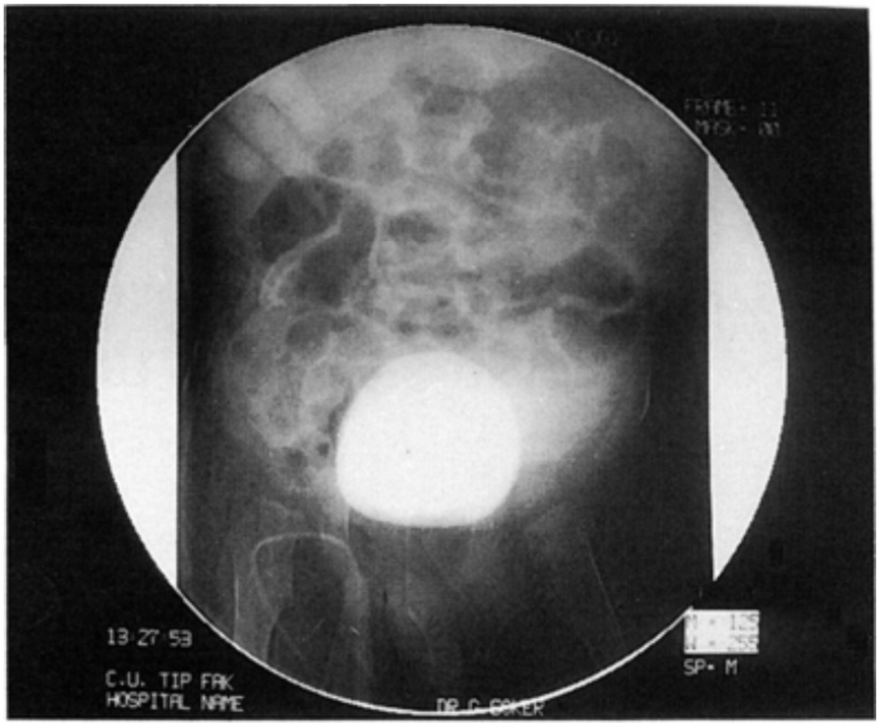
ORIGINAL ARTICLE

Annals of Nuclear Medicine Vol. 17, No. 7, 549-553, 2003

Comparison of direct radionuclide cystography and voiding direct cystography in the detection of vesicoureteral reflux

Aysun SOKAN,* Aysun K. BAYAZIT,** Mustafa KiBAR,* Ayttil NOYAN,**
SUreyya SoYUPAK,*** Zeynep YAPAR* and Ali ANARAT**

*Departments of *Nuclear Medicine, **Pediatric Nephrology, and ***Radiology,*
<;ukurova University School of Medicine

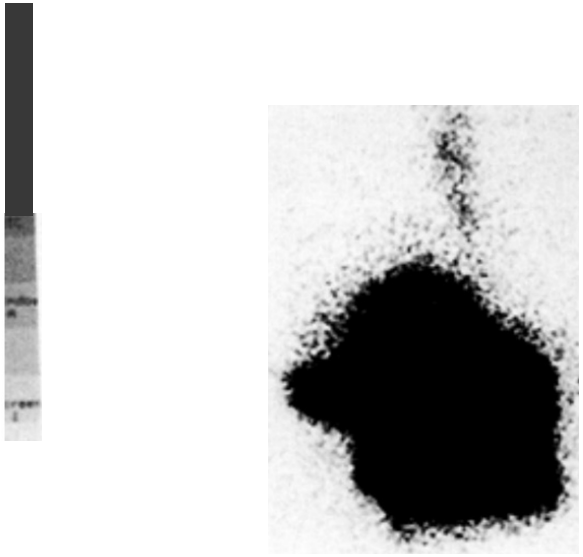


Pediatrics International {2006) **48**, 287-291 doi: 10.1111/j.1442-200X.2006.02206.x

Original Article

Comparison of direct radionuclide cystography and voiding cystourethrography in detecting vesicoureteral reflux

TAMER UNVER,[1] HARIKA ALPAY,[1] NESE KARAASLAN BIYIKLP AND TUNC ONES[2]
Departments of [1]Pediatric Nephrology and [2]Nucleer Medicine, Marmara University School of Medicine, Tophanelioglu cd, Altunizade, Istanbul, Turkey



Facit

- Low gonadal radiation exposure is an important advantage of DRC. In Kaude's study, the gonadal radiation dose for VCUG was reported 269 mRad for girls and 105 mRad for boys, 12 whereas the gonadal radiation dose for DRC was lower than 10 mRad. 4 The difference between the two methods is 50 – 100 times less for DRC which is an important advantage. In our study, a dose of 1 mCi Tc-99m pertechnetate was used that causes a gonadal radiation dose less than 10 mRad.

- The most important disadvantage of DRC is that it cannot demonstrate lower genitourinary anatomy in detail. DRC does not defi ne urethral morphology and is unable to show posterior urethral valves that may be associated with VUR in boys which is the main disadvantage of the technique.

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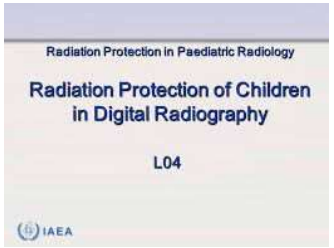

Wish list

- How much obstruction is there in a hydronephrotic kidney?
- How much function is there in every kidney?
- How "accurate" is the renal function in neonates, infants, children?
- How well can we compare sequential scans with relative function / diuretic curves (between a neonate and an infant)?
- Can we compare relative function or images between a diuretic scan (MAG-3) and a static (DMSA)?
- In a hydroureteronephrosis / megaureter: is (standard) 20 minutes good/enough to "see" the diuretic curve?
- How important is the bladder filling for the diuretic curve?
- How well is the differential function in a renal duplication?
- Pediatrician ask for DMSA 6mo after febrile UTI vs pediatric urologist ASAP: can we see the difference between acute (temporary) scar and permanent ?
- Should a (pediatric) urologist (first) look at the images? Or only read the report?

- How has the indirect/direct voiding cystourethrogram with isotopes have evolved? Subjective expertise required? Reproducible to "watch"? Vesicoureteral reflux? Subvesical obstruction (valves / sphincter dyssynergia)?