

Long (Long) Term Follow-up of Children with MCDK

Dr JJ Kim

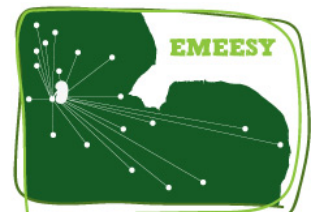
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EMEESY Nephrourology Study Day

4 March 2016

Nottingham Children's Hospital

Nottingham University Hospitals 
NHS Trust



Question...

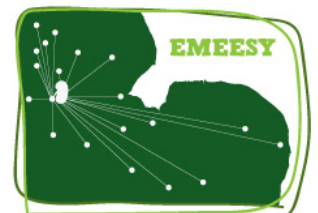
- Aims:
 - To review the literature for long-term prognosis of children with MCDK
- Question:
 - Do you agree with the following statement (Scale 1-10)?
 - Children with MCDK have very good long-term prognosis with minimal risk of renal impairment



Medicine is a science of
uncertainty and an art of
probability.

William Osler

Medical research is the
science of bias.



G Gaslini Children Hospital, Genoa KI 2009

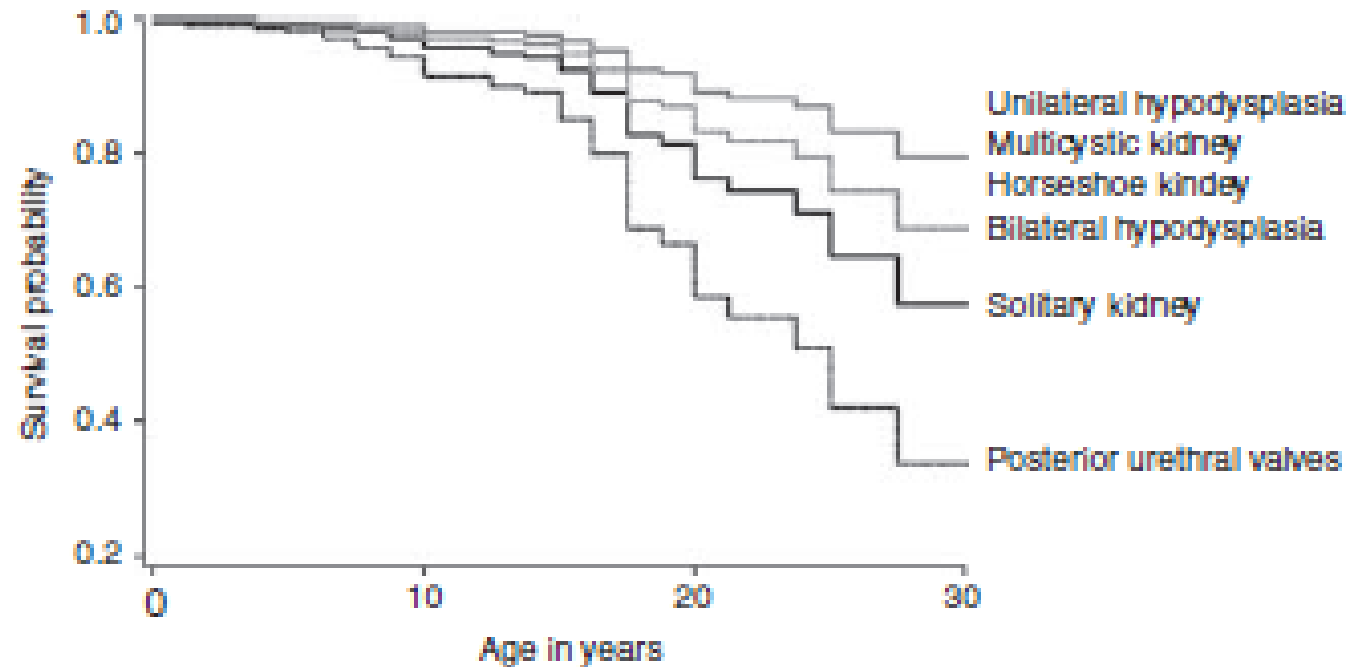
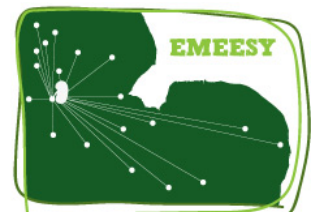
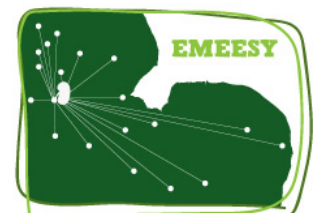
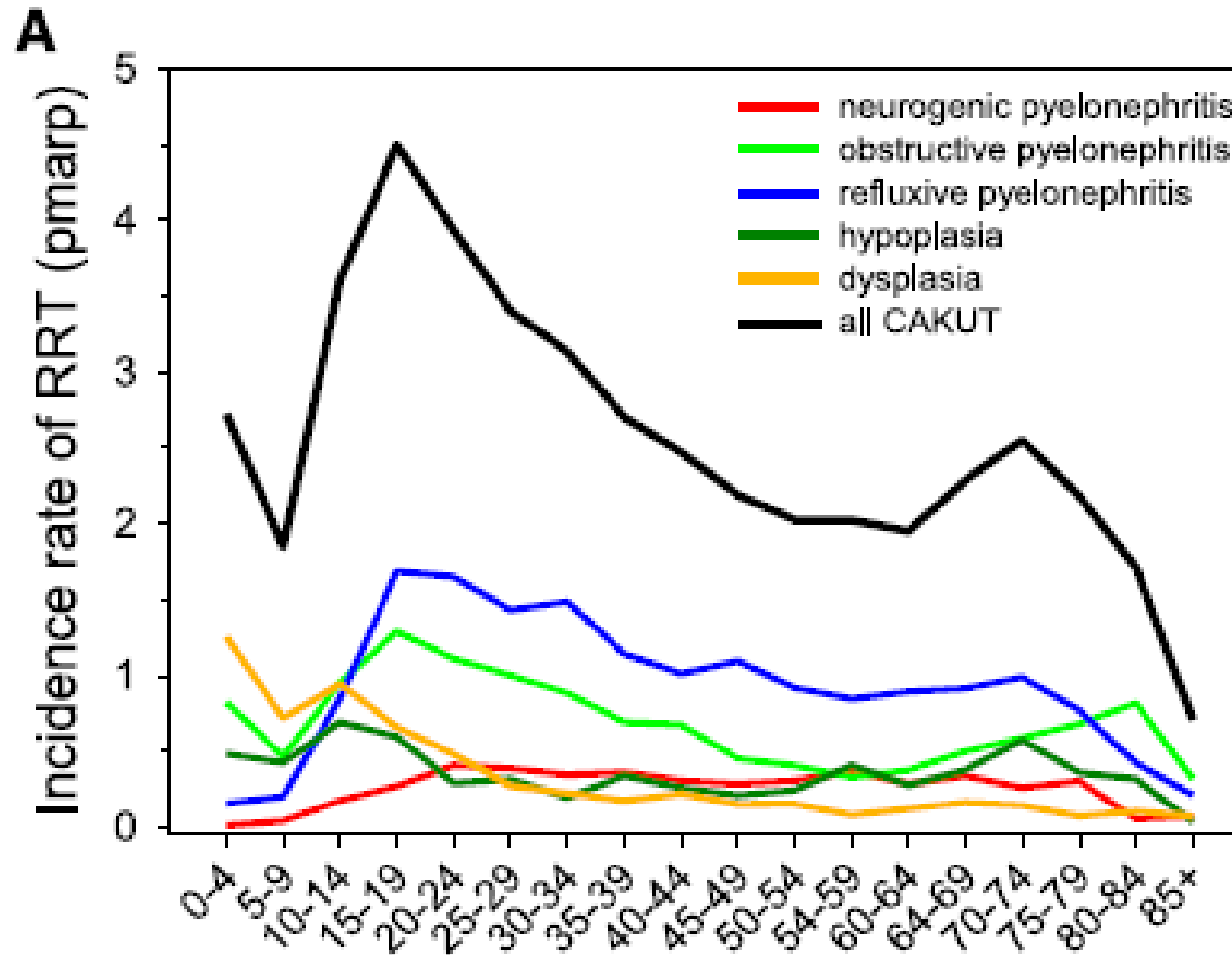


Figure 1 | Survival probabilities by CAKUT category, adjusted for the concomitant presence of vesicoureteral reflux, time-varying values of serum creatinine (mg per 100 ml) and proteinuria (≥ 1 g/day vs less), and referral period (before 1990 vs 1990 and thereafter).



Adult ERA-EDTA (1990-2009)



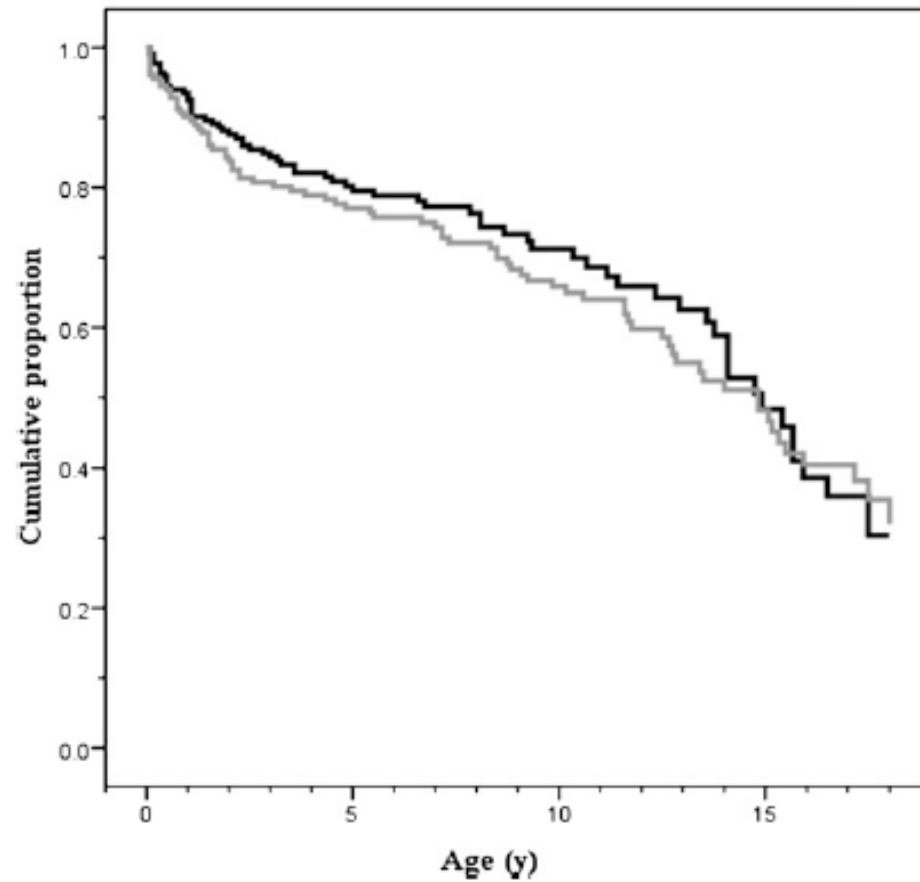
KIMONO – Kidney of MONofunctional Origin

- Retrospective two centre study (Netherlands)
 - 223 congenital
 - 184 acquired
- Annual BP with oscillometric method (Dinamap)
- Renal injury
 - Microalbuminuria
 - Hypertension (>2 SDS, $>97^{\text{th}}$ centile)
 - Use of renoprotective medication
- Compensatory hypertrophy
 - ≥ 2.5 SDS ($>99^{\text{th}}$ centile)



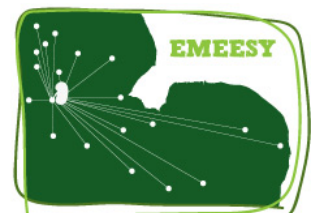
KIMONO

Development of renal injury in the KIMONO-cohort
based on type of solitary functioning kidney



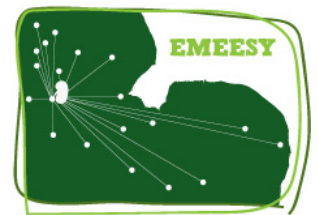
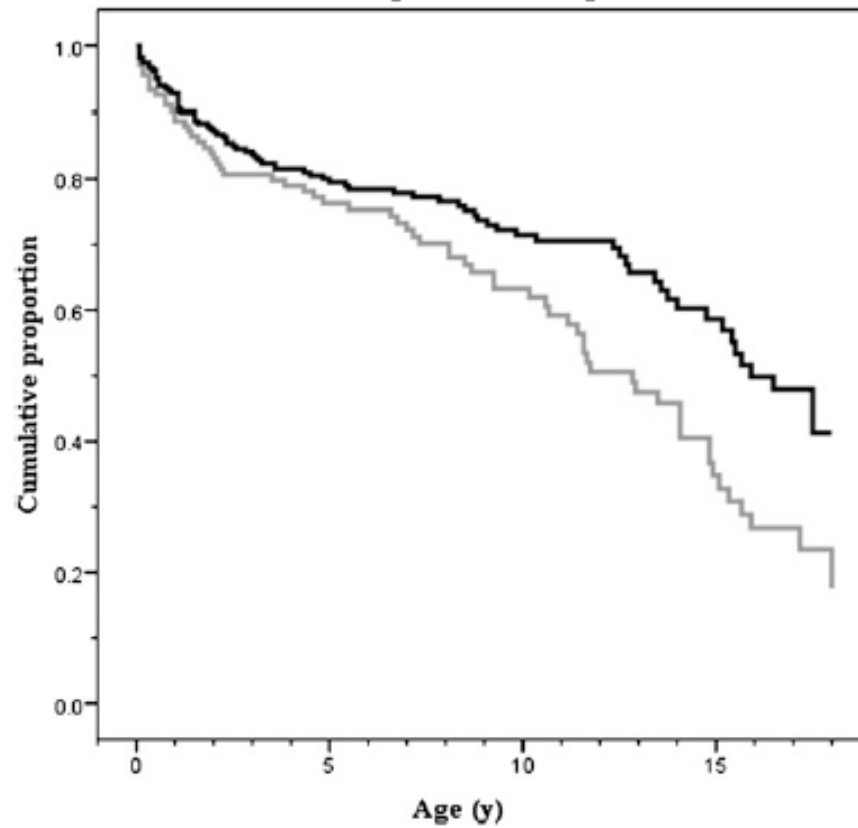
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KIMONO

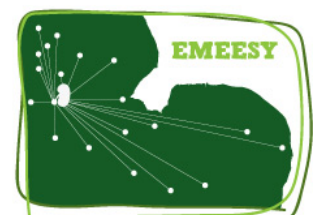
Development of renal injury in the KIMONO-cohort based on the presence of ipsilateral CAKUT



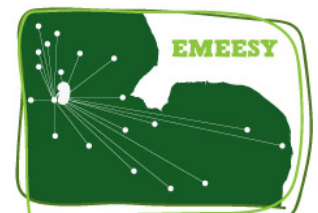
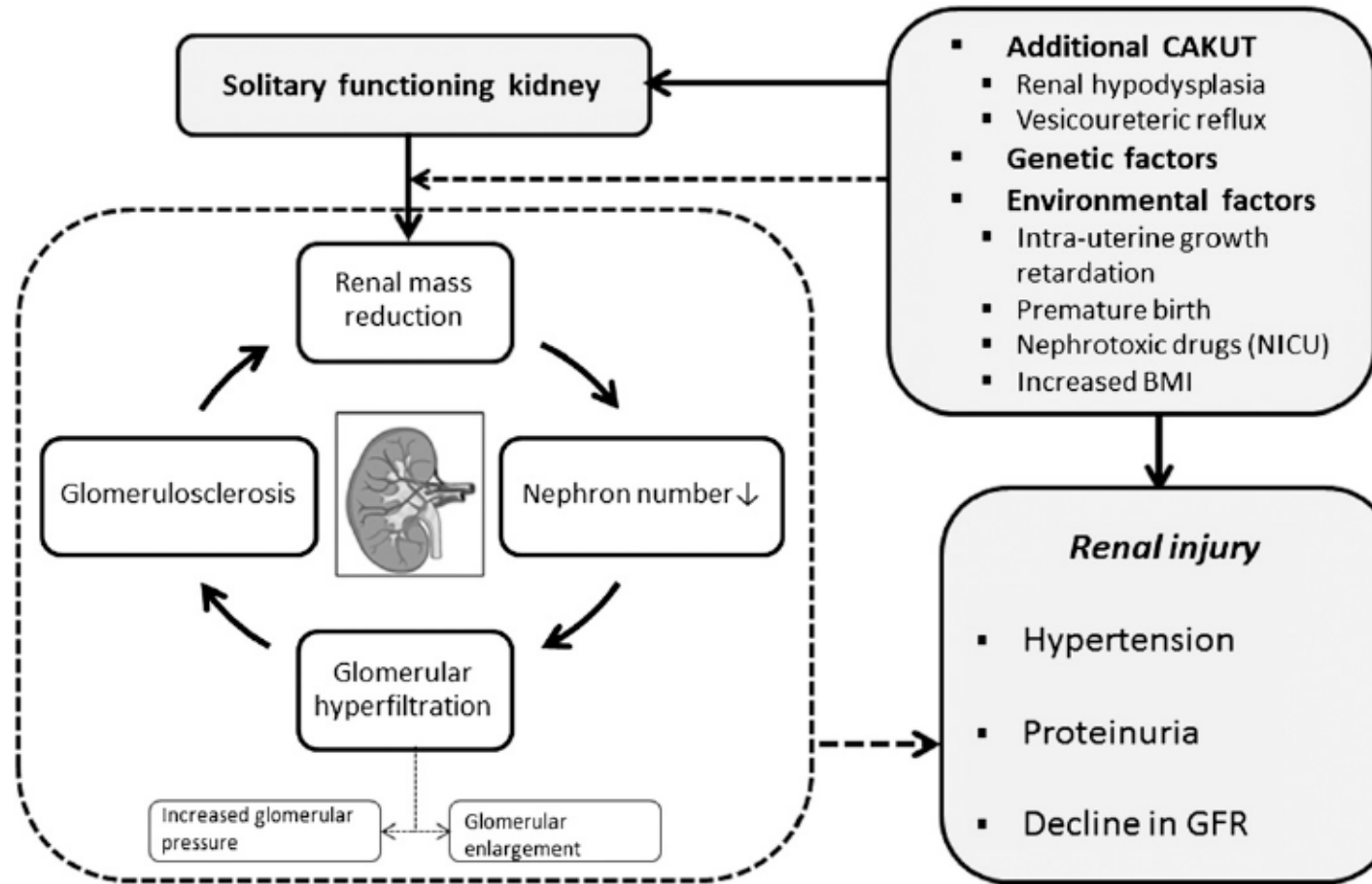
KIMONO

TABLE 5 Multivariate Analysis of Risk Factors for Renal Injury in Children With an SFK

	SFK (<i>N</i> = 357)	
	OR (95% CI)	P
Female sex	0.73 (0.44–1.22)	.23
Age, y	1.09 (1.04–1.13)	<.001
Ipsilateral CAKUT	1.66 (1.02–2.69)	.04
Birth weight <2500 g	2.08 (0.96–4.51)	.07
Urinary tract infections	1.56 (0.94–2.58)	.08
Renal length SDS	0.91 (0.83–1.00)	.04



Hyperfiltration Hypothesis (Brenner)



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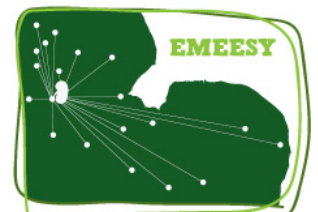
Nephron Number in Patients with Primary Hypertension

Gunhild Keller, M.D., Gisela Zimmer, M.D., Gerhard Mall, M.D.,
Eberhard Ritz, M.D., and Kerstin Amann, M.D.

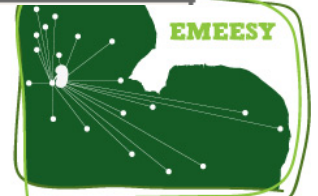
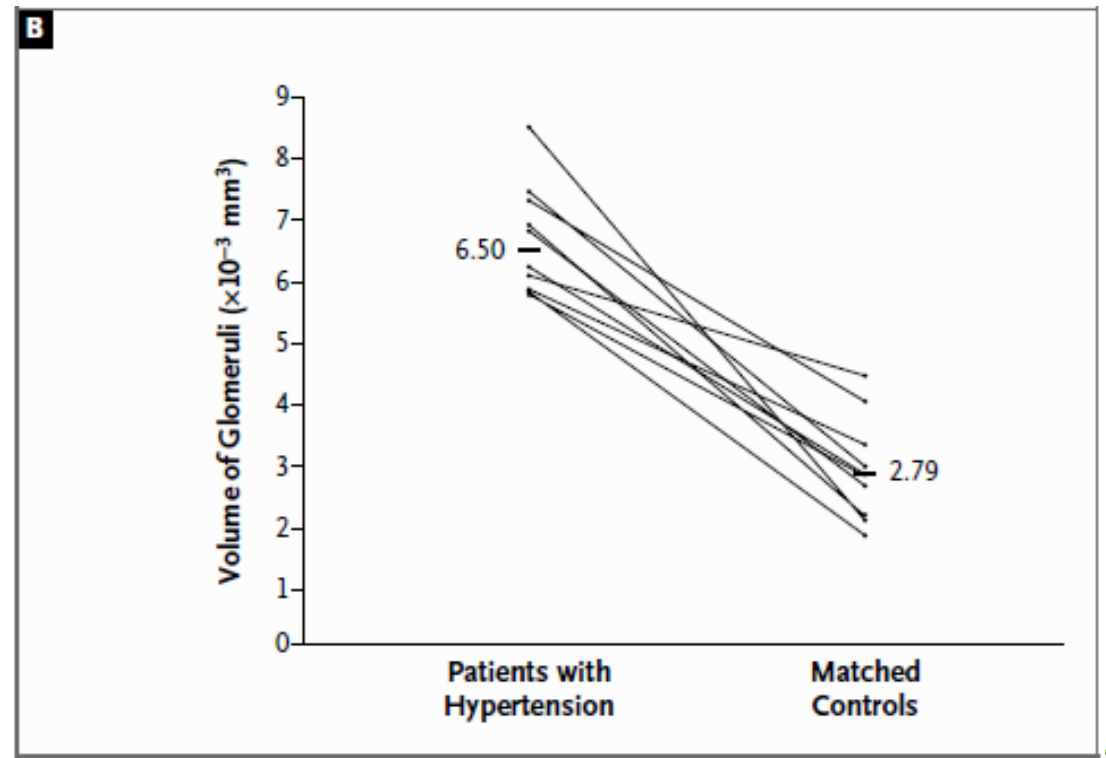
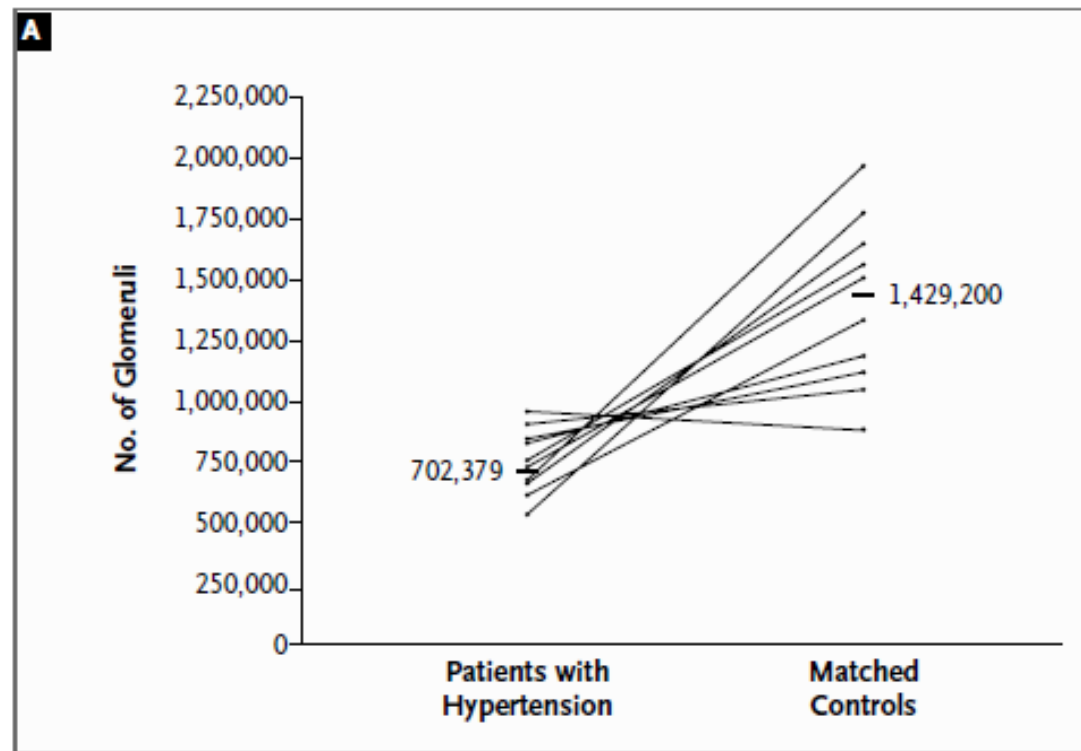
10 adult cadavers with primary hypertension vs 10 matched controls
(road traffic accidents)

Nottingham Children's Hospital

Nottingham University Hospitals **NHS**
NHS Trust



Nephron Number in Primary HT, NEJM



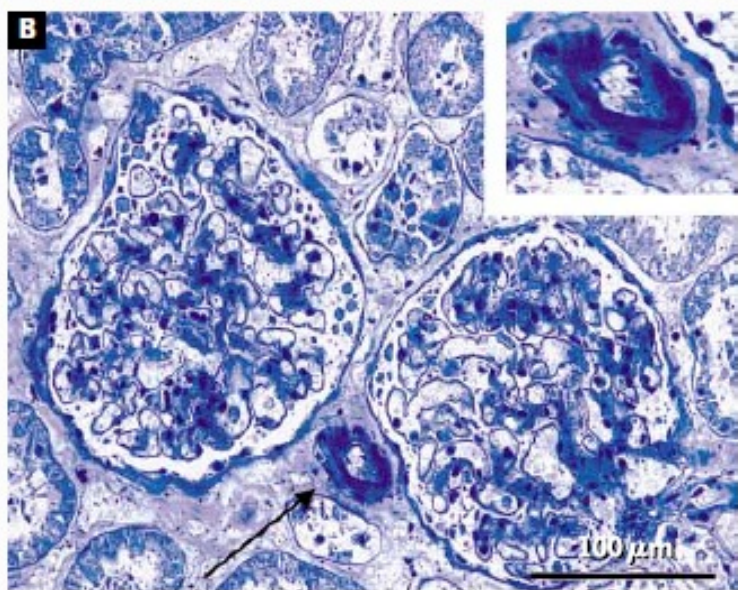
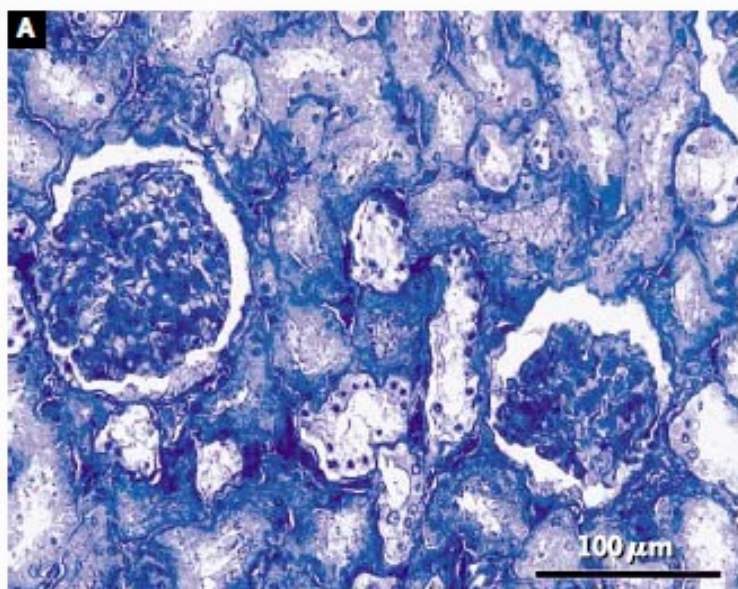
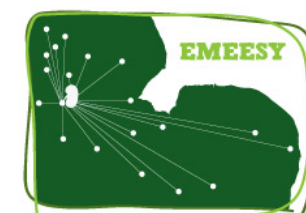


Figure 2. Representative Light Micrographs of Renal Cortex from a Normotensive Control (Panel A) and a Patient with Hypertension (Panel B).

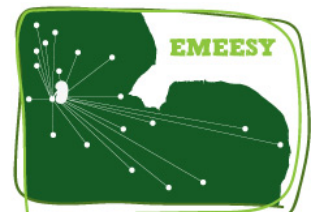
The patient with hypertension has larger glomeruli and typical arteriolar changes with hyalinosis (arrow and inset).



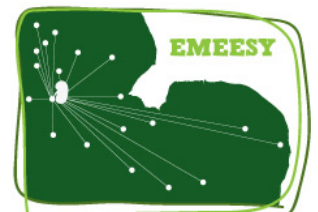
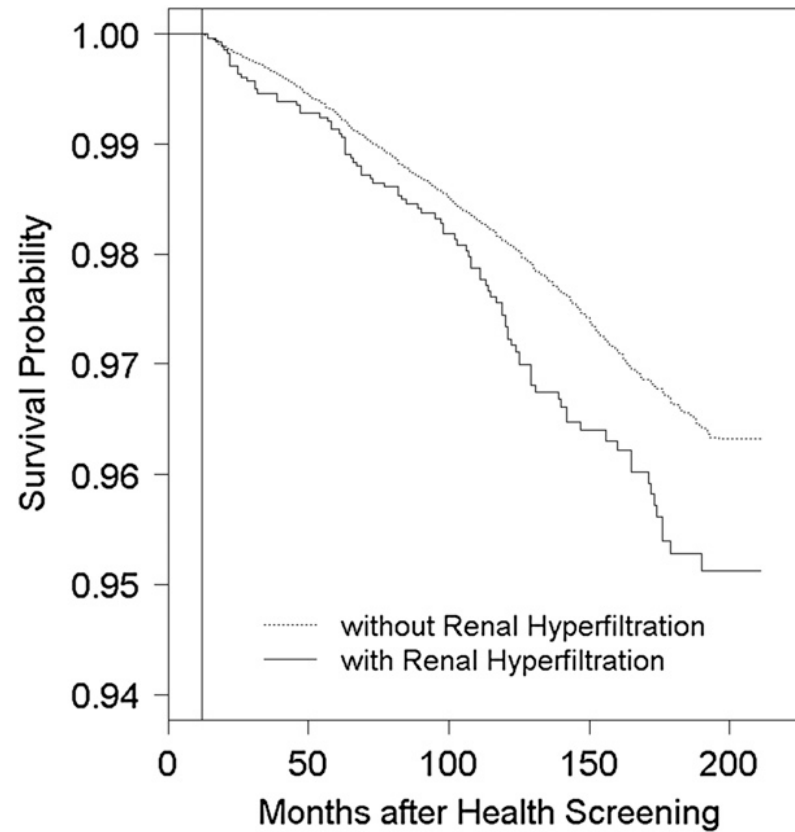
Renal hyperfiltration α mortality

Table 1. General characteristics of participants at the time of the health screening

Characteristics	Alive (n=41,760)	Deceased (n=1743)	Total (n=43,503)	P Value ^a
Men, %	21,086 (50.5)	1204 (69.1)	22,290 (51.2)	<0.001
Age at screening (yr)	48.9±10.3	56.9±10.5	49.2±10.4	<0.001
Smoking, %				
Nonsmoker	55.0	37.9	54.3	<0.001
Former smoker	18.1	22.2	18.3	
Current smoker	26.9	40.0	27.5	
Regular exercise, %	35.0	30.8	34.8	<0.001
Regular alcohol intake, %	48.1	49.3	48.1	0.35
History of antihypertensive therapy, %	8.8	14.7	9.0	<0.001
History of diabetes therapy, %	5.7	12.2	6.0	<0.001
Systolic BP (mmHg)	128.9±20.4	135.2±23.7	129.2±20.6	<0.001
Diastolic BP (mmHg)	79.0±12.5	81.4±13.5	79.1±12.5	<0.001
BMI (kg/m ²)	23.9±3.0	23.8±3.1	23.9±3.0	0.04
<18.5, %	2.9	4.5	2.9	<0.001
>25.0, %	34.3	33.0	34.3	
Serum creatinine ^b (mg/dl)	0.98±0.15	1.00±0.14	0.98±0.15	<0.001
FSG (mg/dl)	98.3±24.3	108.0±38.9	98.7±25.2	<0.001
Serum cholesterol (mg/dl)	200.9±36.6	201.4±41.7	200.9±36.8	0.61
Serum triglyceride (mg/dl)	135.4±94.8	145.9±103.5	135.8±95.2	<0.001
Serum HDL-cholesterol (mg/dl)	52.8±13.5	50.6±13.7	52.8±13.5	<0.001
eGFR ^c (ml/min per 1.73 m ²)	80.4±11.5	77.5±11.0	80.3±11.5	<0.001
RHF, ^d %	5.0	5.9	5.0	0.09
Albuminuria, ^e %	3.3	6.8	3.4	<0.001
LBM ^f				
1st Quartile, %	47.4±8.8	48.3±8.8	47.4±8.8	<0.001
2nd Quartile, %	24.4	36.0	24.9	<0.001
3rd Quartile, %	25.0	23.8	25.0	<0.001
4th Quartile, %	25.4	20.1	25.2	<0.001
	25.1	20.1	24.9	<0.001



Renal hyperfiltration α mortality



Birmingham (Taylor) 2003

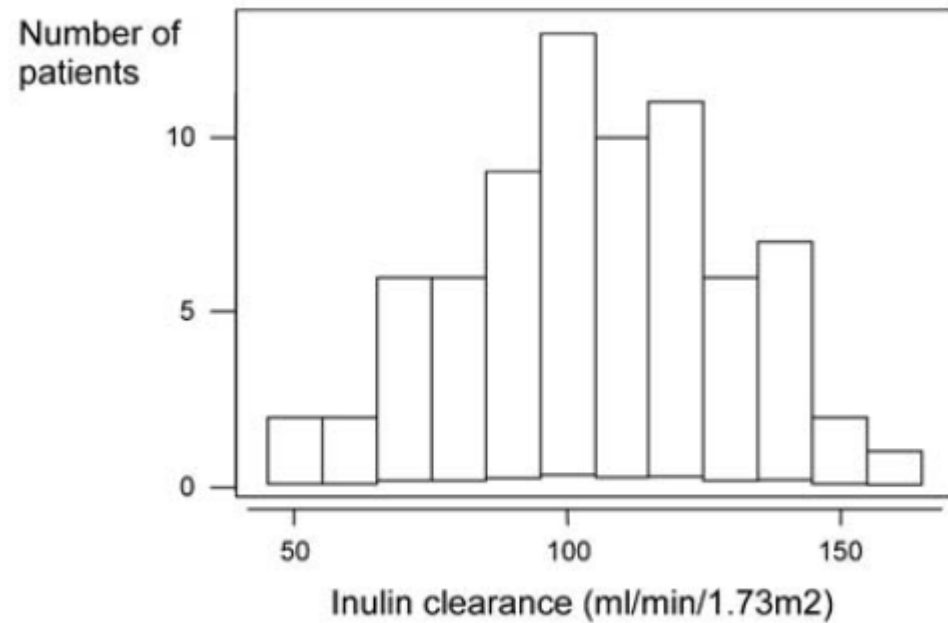


Fig. 3 Histogram of inulin clearance (ml/min per 1.73 m²)

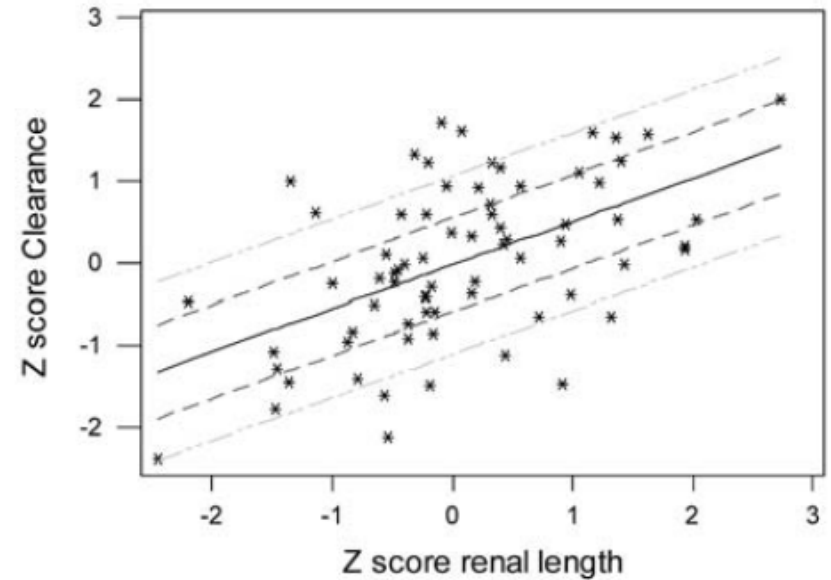
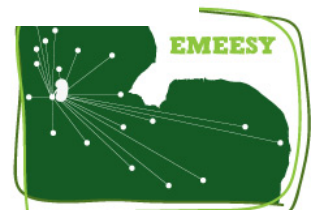


Fig. 4 Scatter plot and regression of inulin Z score versus renal length Z score showing 10th, 25th, 75th, and 90th percentiles

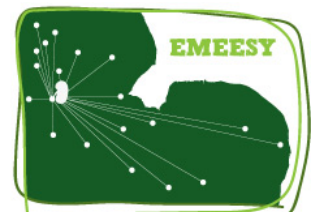


Shirzai et al (Ped Neph 2013)

Table 1 Demographic data and renal functional parameters of SK and control groups

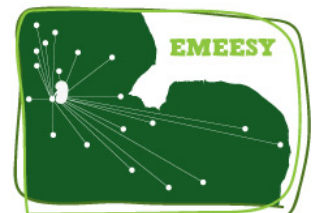
	SK group	Control group
Male <i>n</i> (%)	18 (40.9)	9 (36.0)
Female <i>n</i> (%)	26 (59.1)	16 (64.0)
Age (years)	9.6±3.6	9.3±3.3
BMI (kg/m ²)	17.4±3.9	17.9±3
Serum Cys C (mg/l)	0.9±0.2	0.9±0.1
Serum Cr (mg/dl)	0.6±0.2	0.5±0.1
24-h urine MA (mg/m ² /day)	115.8±203.2	55.9±71.8
24-h urine β2 MG (mcg/m ² /day)	122.73±179.4	80.5±79.1

SK Solitary kidney; *BMI* bodymass index; *Cys* cystatin; *Cr* creatinine; *MA* Microalbumin; *β2MG* β2 Microglobulin

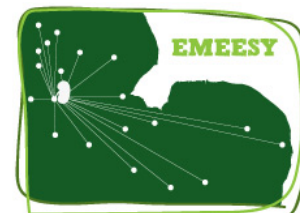
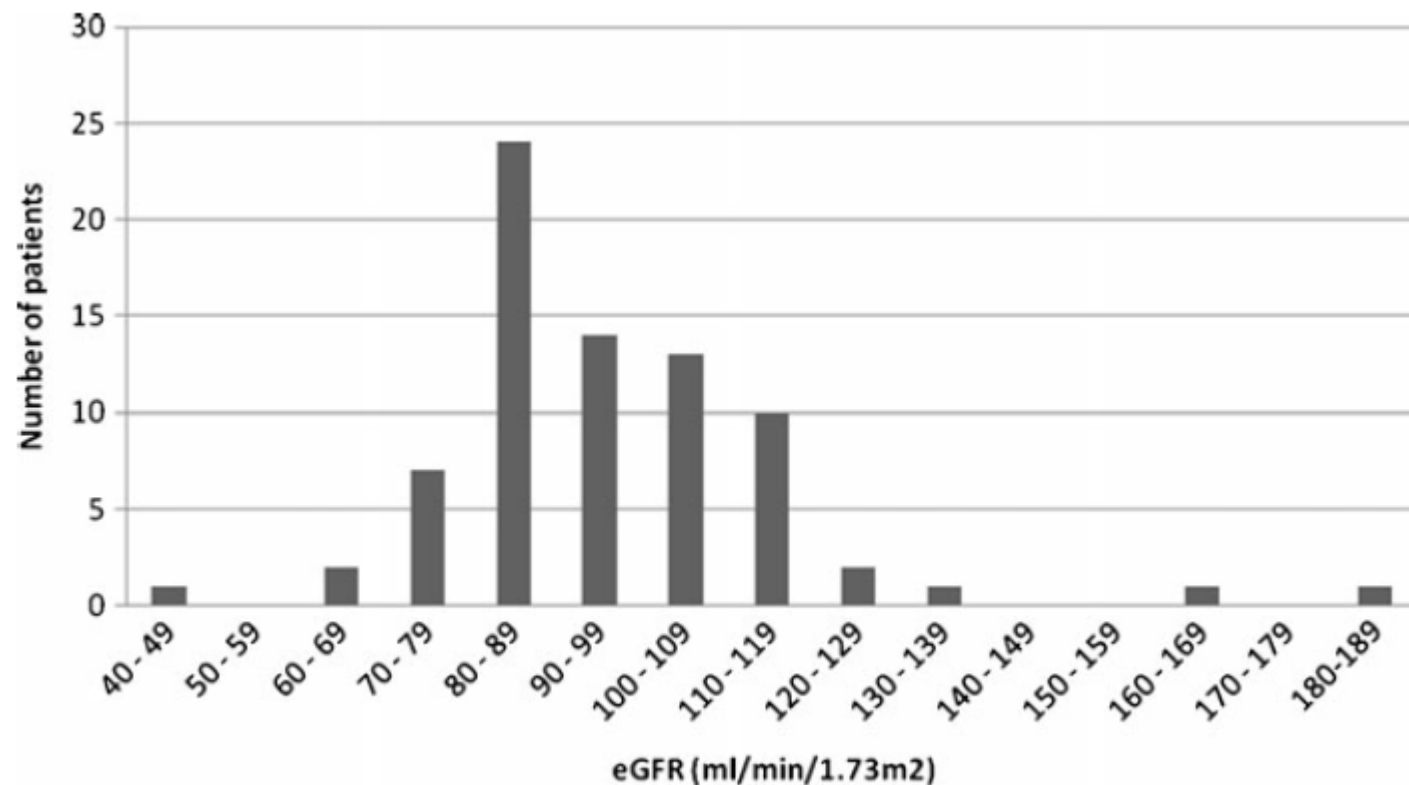


Trent & Anglia MCDK Group

- All antenatal MCDK
 - Common protocol
 - N=323
 - Median FU – 10 years
-
- No Hypertension
 - ?proteinuria

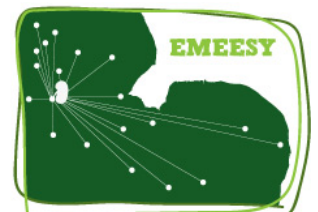


Trent & Anglia MCDK Group



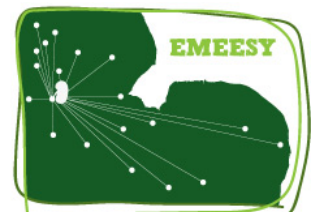
Question...

- Aims:
 - To review the literature for long-term prognosis of children with MCDK
- Question:
 - Do you agree with the following statement (Scale 1-10)?
 - Children with MCDK have very good long-term prognosis with minimal risk of renal impairment



Conclusions

- Is the long-term prognosis good? **Probably yes**
 - Is there risk of mild CKD? **Yes**
 - Do they need life-long FU? **Yes**
 - Is hyperfiltration harmful? **Probably yes**
-
- Accurate imaging is vital!



Hypothesis

