

Teaching Course ALANEPE

Marzo 2019. Tucumán, Argentina

Prematurez y Bajo peso de nacimiento: consecuencias renales a futuro

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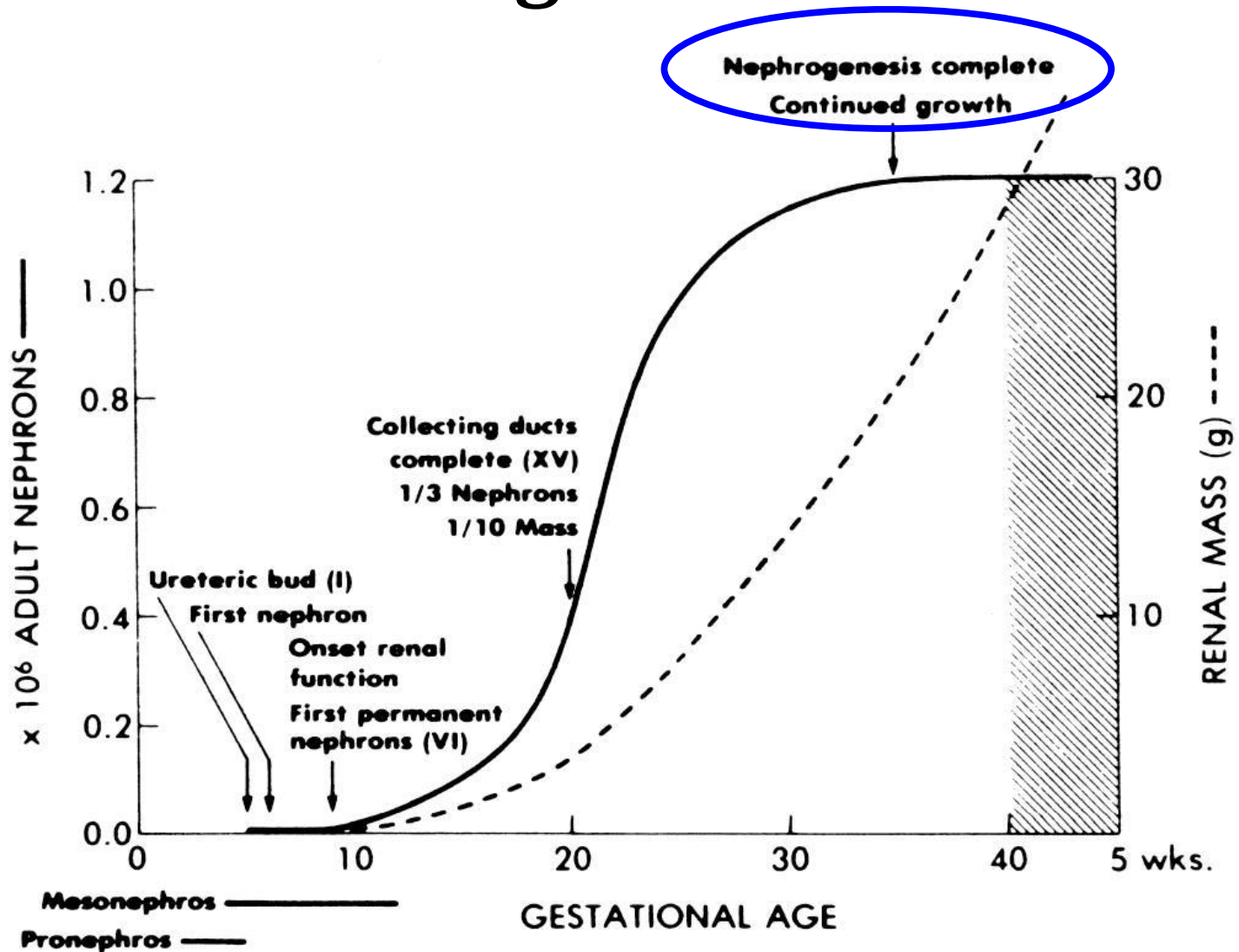


Hechos reales



- 10% de los RN son preT, 1% < 28 sems. EG.*
- La nefrogénesis se completa entre las 34 y 36 semanas de EG. 60% en 3er trimestre (28-34s)
- En niños MBPN nefrogénesis se completa a los 40 días de nacido
- La medicina actual permite la sobrevivencia de niños nacidos (muy) prematuramente.
- El compromiso multisistémico, incluyendo al renal, es frecuente en estos niños.

Nefrogénesis



Riñón del Recién Nacido



≠



RNT = Maduro

RnpT = Inmaduro

Blood Pressure in Young Adults Born at Very Low Birth Weight

Adults Born Preterm International Collaboration

Karl
APIC Ad

10–887.

Table 1
ELBW (

Por cada ↓ 2 mmHg, ↓ 7-14 % riesgo de IAM y ↓ 9-19 % AVE

1 in

Blood				
Systol				
	Women	4.7 (3.2 to 6.3)†	4.9 (3.0 to 6.8)†	5.3 (3.2 to 7.4)†
Diastolic	All	2.1 (1.3 to 3.0)†	2.4 (1.3 to 3.4)†	2.3 (1.1 to 3.4)†
	Men	1.9 (0.7 to 3.0)†	2.1 (0.6 to 3.5)†	2.0 (0.4 to 3.6)†
	Women	2.4 (1.3 to 3.6)†	2.6 (1.2 to 4.0)†	2.6 (1.0 to 4.3)†

Adjusted for age and cohort (dummy coded). Analyses including both sexes are in addition adjusted by sex. POPS indicates The Dutch Project on Preterm and Small for Gestational Age Infants; and VLBW, very low birth weight.

*In this comparison, cohorts 7 (Vancouver) and 8 (McMaster) include no VLBW subjects so their controls are excluded as well. Cohort 5 (POPS) not included.

†Statistical significance.

Extrauterine environment
(↑ oxygen)

?

↑ THBS1
↑ COL18A1
↑ PF4
↓ pAKT

Decreased
angiogenesis

Endothelial
progenitor cells

Neonatal
interventions

Neonatal
events

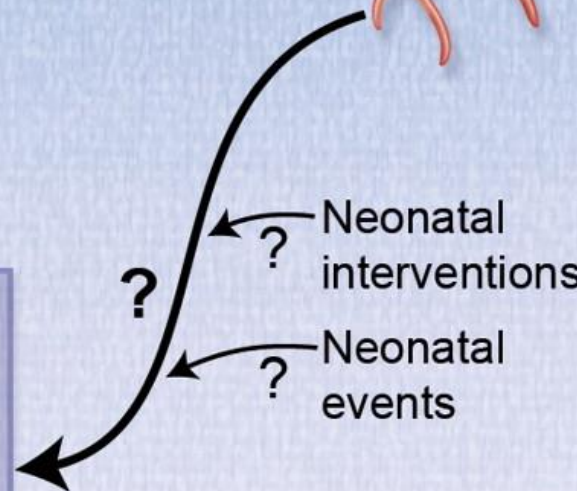
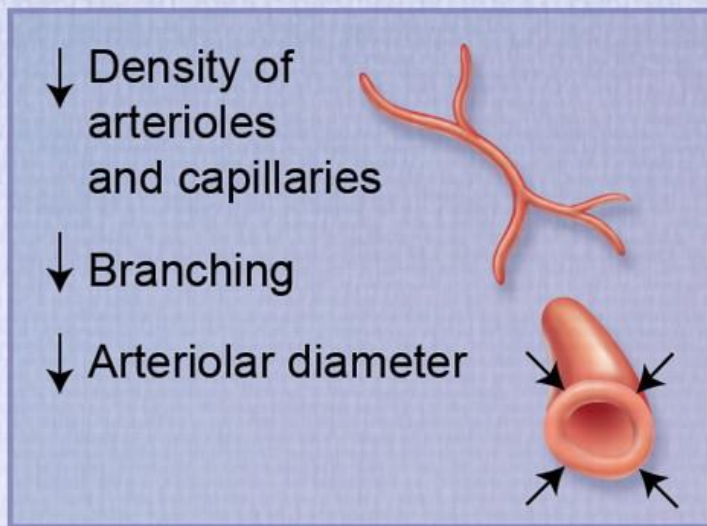
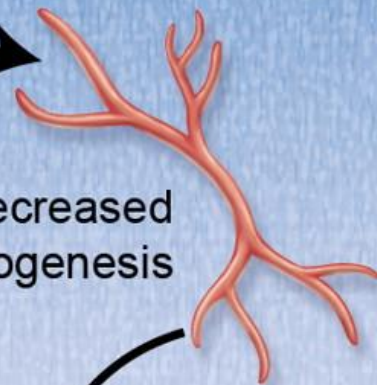
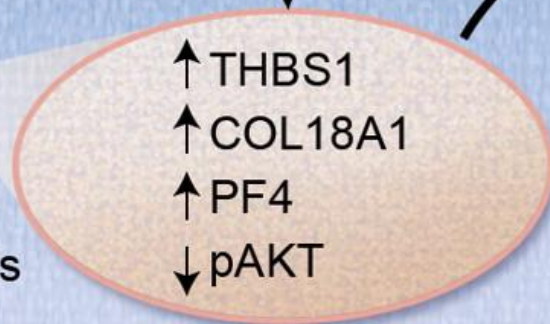
↓ Density of
arterioles
and capillaries

↓ Branching

↓ Arteriolar diameter

Preterm birth
Low birth weight

↑ Risk of hypertension



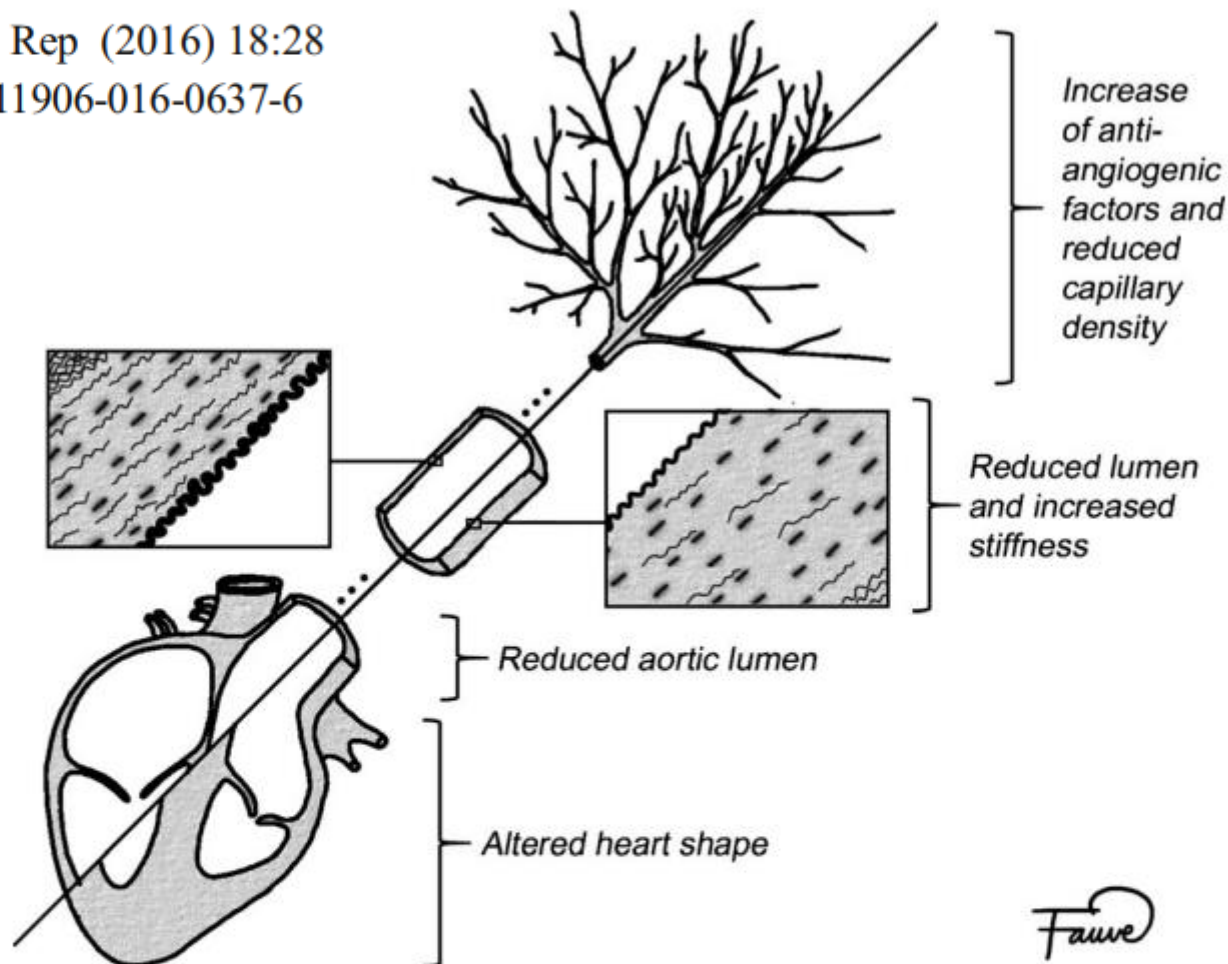


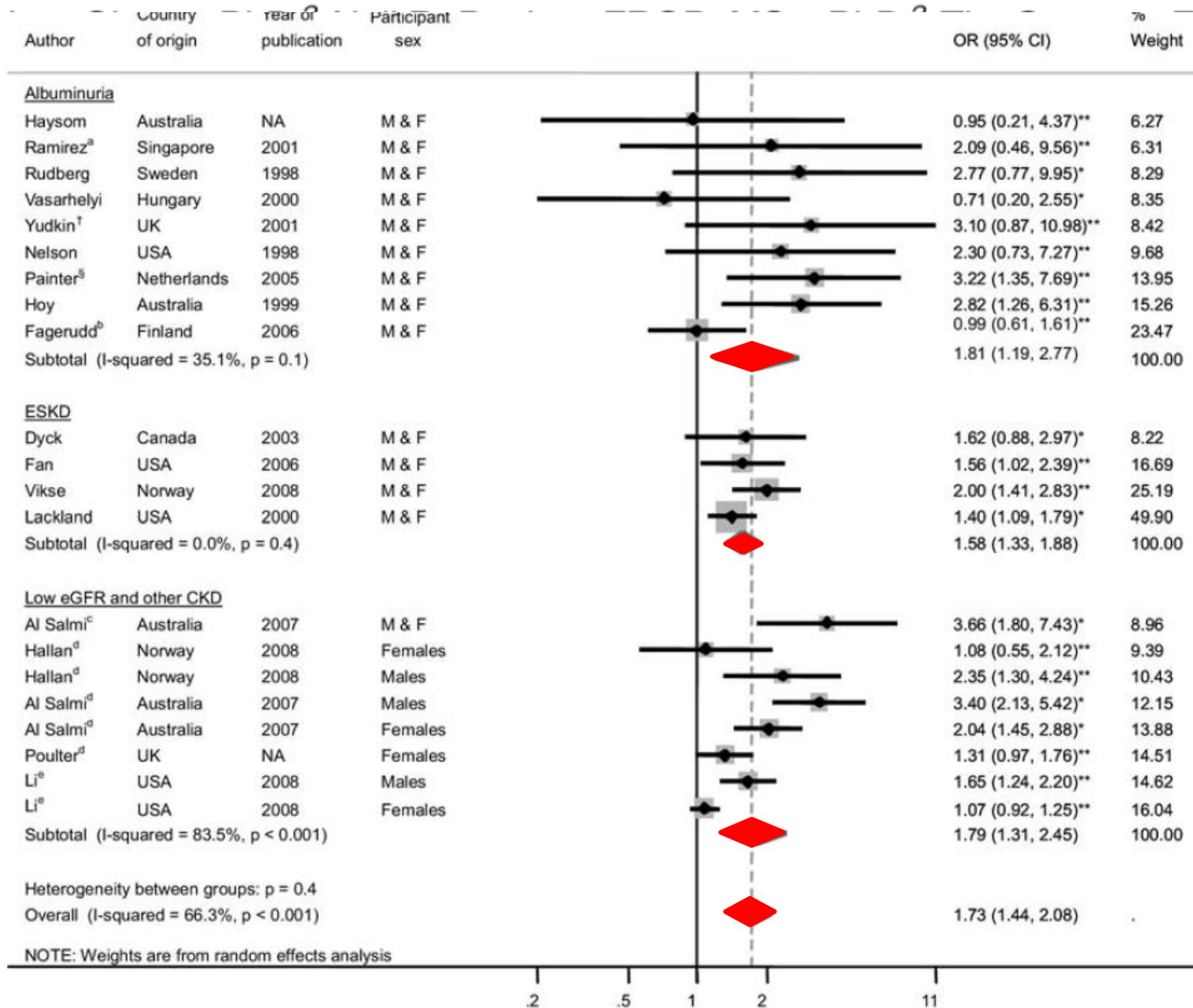
Fig. 1 Schematic representation of changes observed in the cardiovascular system of individuals born preterm as well as experimental animal models of preterm birth-related conditions. Reduced cardiac length with increased ventricle wall thickness, changes in wall structure and stiffness of conduit arteries as well as reduced microvascular density, which associates with an anti-angiogenesis profile, are illustrated and discussed in this review

Is Low Birth Weight an Antecedent of CKD in Later Life? A Systematic Review of Observational Studies

Sarah L. White, MPH,¹ Vlado Perkovic, FRACP, PhD,¹ Alan Cass, FRACP, PhD,¹

Choon
Leigh Hay

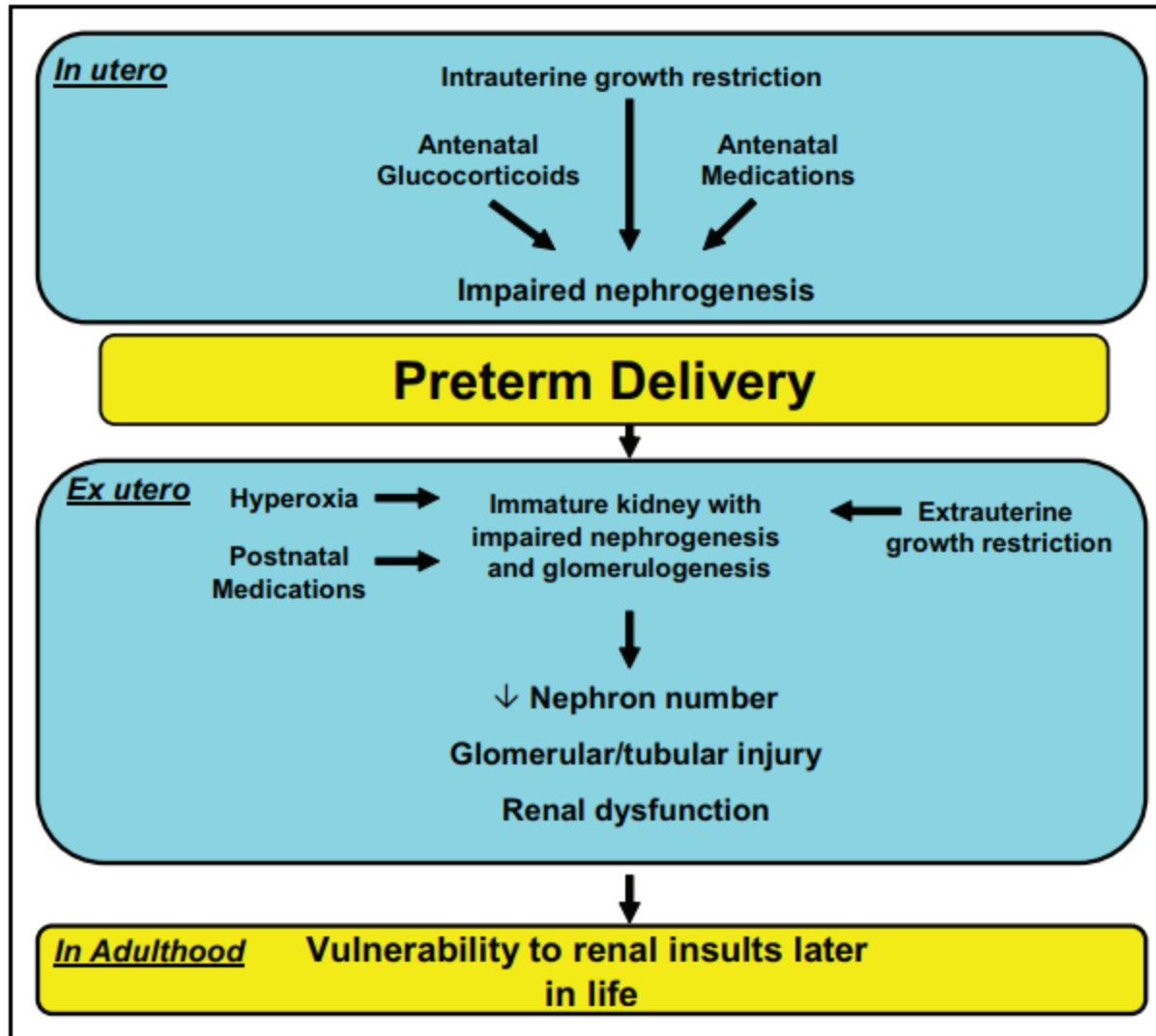
ID,³
P, MD,⁶



Preterm Birth and the Kidney: Implications for Long-Term Renal Health

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Renal function and blood pressure are altered in adolescents born preterm

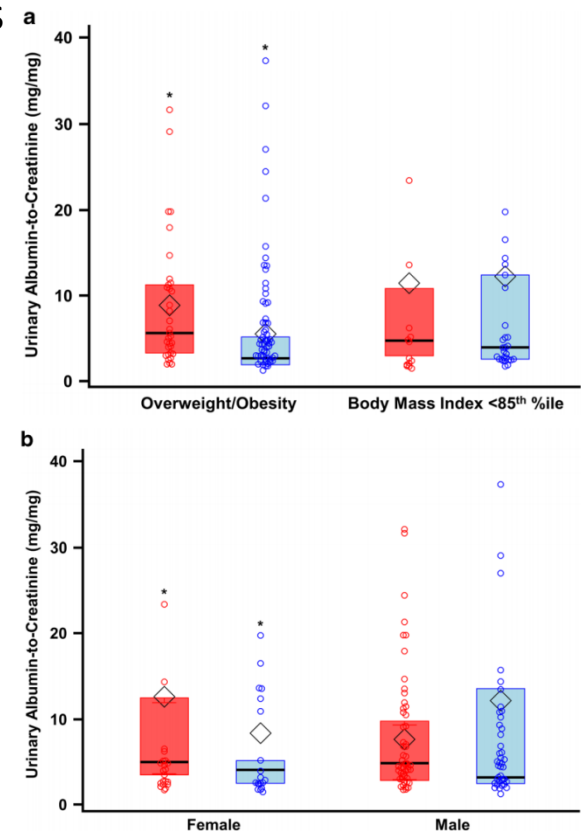
Andrew M. South^{1,2,3} • Patricia A. Nixon^{1,4} • Mark C. Chappell^{2,5} • Debra I. Diz^{2,5} • Gregory B. Russell⁶ • Elizabeth T. Jensen³ • Hossam A. Shaltout^{2,7,8} • T. Michael O'Shea⁹ • Lisa K. Washburn^{1,2}

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96 RN MBPN vs. 43 RNT, evaluados a los 14 años

Table 2 Blood pressure and renal function in adolescents born preterm compared to those born term

	Preterm <i>n</i> = 96	Term <i>n</i> = 43
SBP (mmHg)	108.4 (10.0)*	103.8 (6.8)
DBP (mmHg)	62.0 (8.9)*	58.6 (7.9)
SBP z-score	−0.09 (0.91)*	−0.67 (0.64)
DBP z-score	−0.2 (0.83)*	−0.62 (0.72)
High BP	14 (15%)*	1 (2%)
Elevated BP	10 (10%)	1 (2%)
Stage 1 hypertension	3 (3%)	0 (0%)
Stage 2 hypertension	1 (1%)	0 (0%)
Blood urea nitrogen (mg/dL)	11.7 (3.2)	11.9 (3.1)
Creatinine (mg/dL)	0.8 (0.13)	0.79 (0.11)
eGFR (mL/min/1.73 m ²)	126.2 (21.9)*	134.3 (21.4)
ACR (mg/g)	4.9 [3.0, 11.0]	4.0 [2.5, 10.9]
Albuminuria (ACR > 30 mg/g)	7 (7%)	3 (7%)



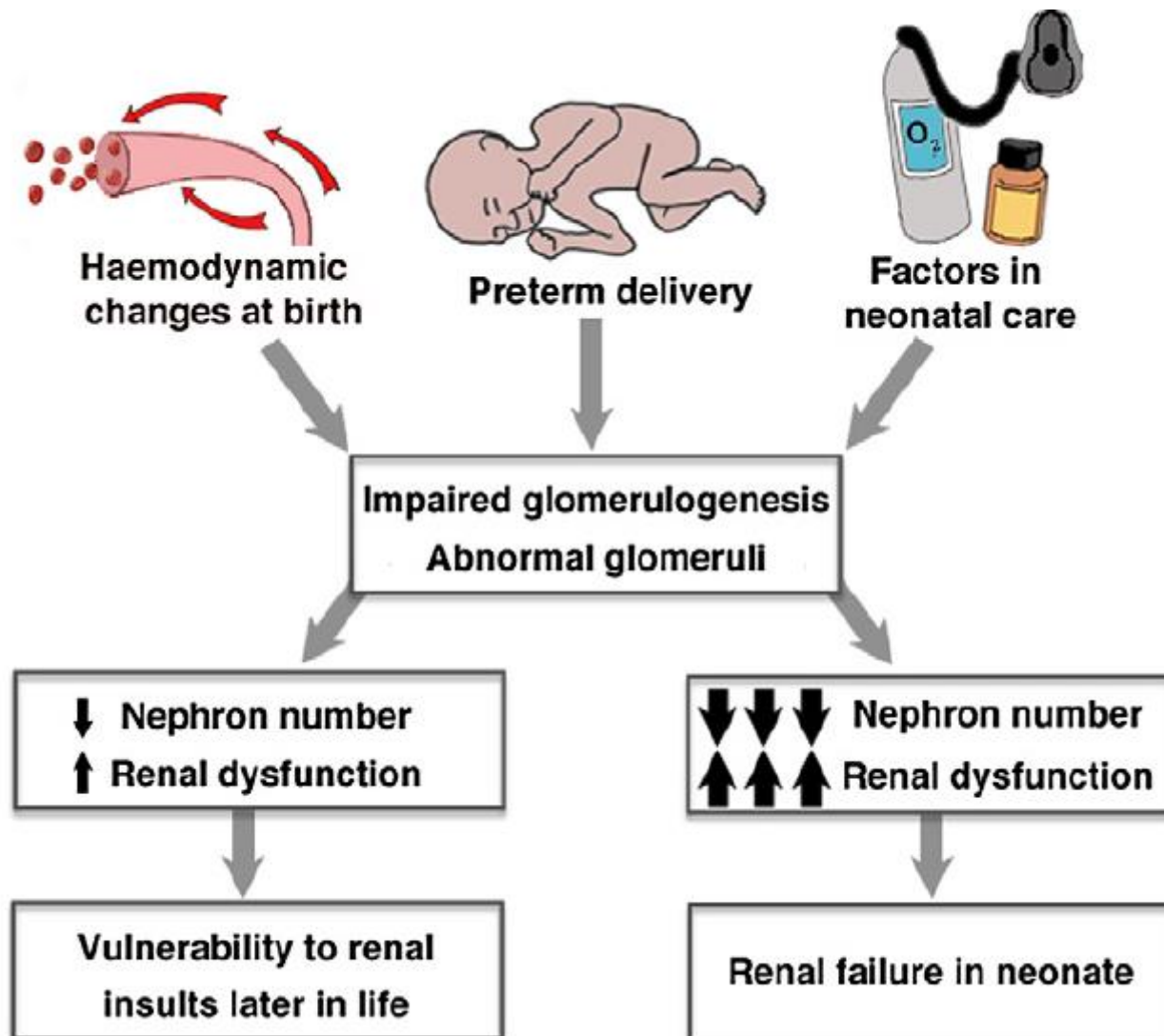
Monitorización ambulatoria de presión arterial en escolares con antecedente de prematurez extrema

Ambulatory blood pressure monitoring in school children with a history of extreme prematurity

Andrea Solís^a, Jaime Cerda^b, Claudia González^c

19 niños 5-7 años EG 28-31 sems (1000-1556 gr)
11 (58%) con catéter umbilical

9 (47,4%) ausencia de DIP nocturno sistólico y/o diastólico
3 con sospecha de HTA, los 3 obesos
FX renal normal, sin MAU





Low birth weight is a conditioning factor for podocyte alteration and steroid dependance in children with nephrotic syndrome

Giovanni Conti¹ · Dominique De Vivo¹ · Claudia Fede¹ · Stefania Arasi¹ · Angela Alibrandi² · Roberto Chimenz¹ · Domenico Santoro³

Table 1 Main demographic and clinical characteristics of study population according to birth weight

	LBW (n = 21)	NBW (n = 68)	
Male	13	43	
Age at onset of NS (months)	55	53	
Follow-up period (years)	7.4	7.7	
Cortico-resistance, n (%)	8 (38)	5 (7)	
Cortico-sensitivity, n (%)	13 (62)	63 (93)	
Renal biopsy, n (%)	8 (38)	5 (7)	
Focal segmental glomerulosclerosis, n (%)	8 (38)	4 (6)	p<0.03

NBW normal birth weight, *LBW* low birth weight, *NS* nephrotic syndrome



Low birth weight is a conditioning factor for podocyte alteration and steroid dependance in children with nephrotic syndrome

Giovanni Conti¹ · Dominique De Vivo¹ · Claudia Fede¹ · Stefania Arasi¹ · Angela Alibrandi² · Roberto Chimenz¹ · Domenico Santoro³

89 niños con SN idiopático → 21 niños BPN

Table 2 Clinical course of study participants with cortico-sensitive nephrotic syndrome (CSNS) (n=76) according to low vs. normal birth weight

	LBW (n=13)	NBW (n=63)
No relapse, n (%)	1 (7.7)	17 (27)
Non-frequent relapses, n (%)	2 (15.4)	18 (28.6)
Cortico-dependence, n (%)	10 (76.9) ^a	28 (44.4)
Cortico-dependent patients treated with immunosuppressive drugs, n (%)	8/10 (80) ^b	20/28 (71.4)

NBW normal birth weight, LBW low birth weight, OR odds ratio, CI confidence interval

^aOR 4.744; 95% CI 1.188–18.936; $\chi^2 = 4.158$, $p < 0.05$

^bOR = 4; 95% CI = 1.153–13.877; $\chi^2 = 3.842$, $p = 0.05$

The Impact of Kidney Development on the Life Course: A Consensus Document for Action

The Low Birth Weight and Nephron Number Working Group

Table 7

Examples of primary kidney diseases that progress more rapidly in patients with low birth weight (LBW)

Clinical findings

IgA nephropathy [172, 173]

Increased hypertension and glomerulosclerosis in LBW children Increased progression to end-stage renal disease if LBW and/or small for gestational age, especially among males

Membranous nephropathy [181]

LBW associated with steeper decline in glomerular filtration rate

Minimal change disease [172, 174, 177]

More relapses and steroid dependence in LBW children

Chronic pyelonephritis [179]

Patients with progressive deterioration in renal function had lower birth weight

Autosomal dominant polycystic kidney disease [178]

Earlier onset of end-stage renal disease with lower birth weight

Focal-segmental glomerulosclerosis [180]

Very LBW and preterm birth are risk factors for focal-segmental glomerulosclerosis

Alport syndrome [182]

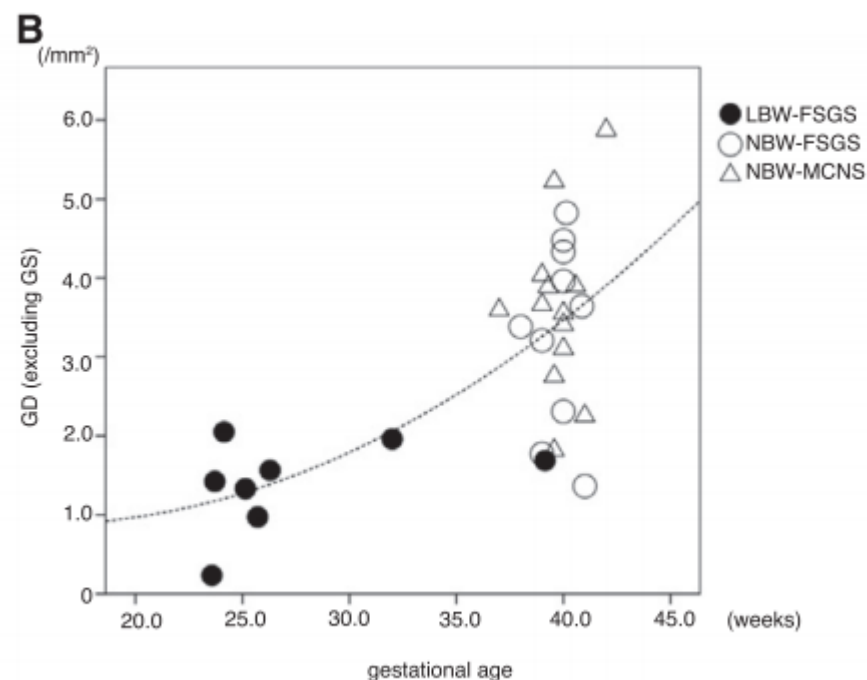
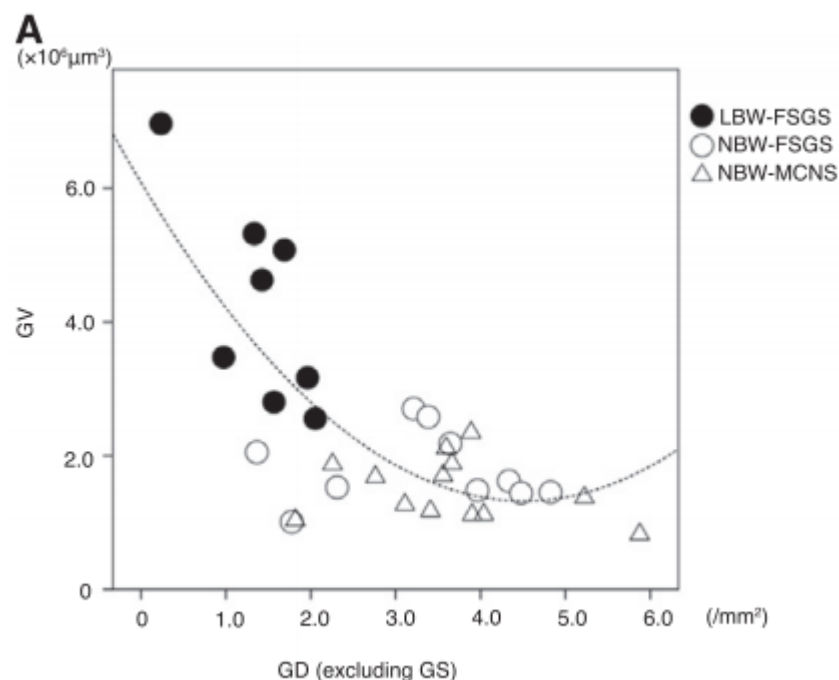
More rapid progression in LBW identical twin

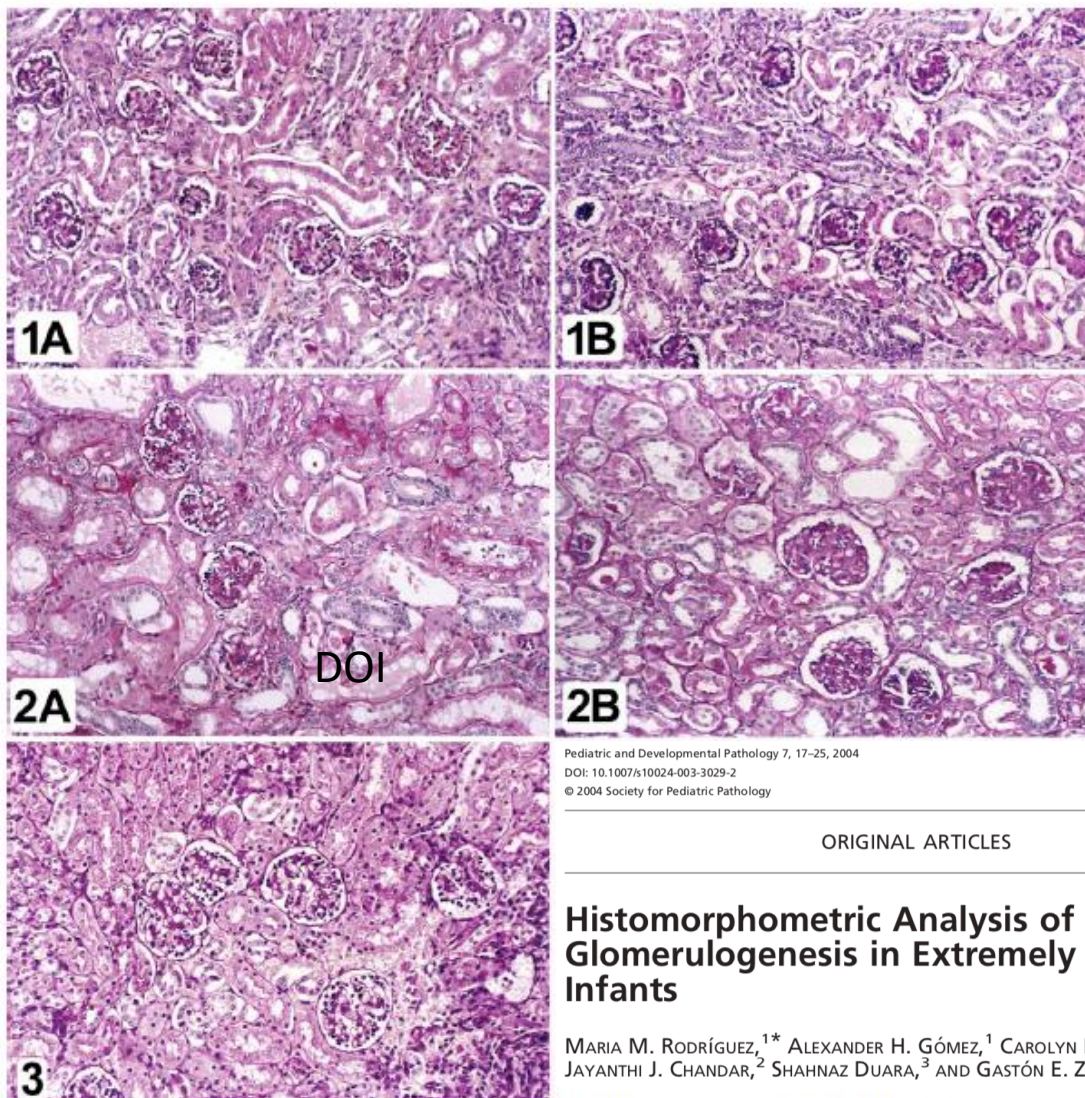
Glomerular Density and Volume in Renal Biopsy Specimens of Children with Proteinuria Relative to Preterm Birth and Gestational Age

Kentaro Koike,* Yohei Ikezumi,[†] Nobuo Tsuboi,* Go Kanzaki,* Kotaro Haruhara,* Yusuke Okabayashi,* Takaya Sasaki,* Makoto Ogura,* Akihiko Saitoh,[†] and Takashi Yokoo*

31 niños edad promedio 11 años

8 LBW-FSGS vs. 10 NBW-FSGS vs. 13 NBW-MCNS





Pediatric and Developmental Pathology 7, 17–25, 2004
 DOI: 10.1007/s10024-003-3029-2
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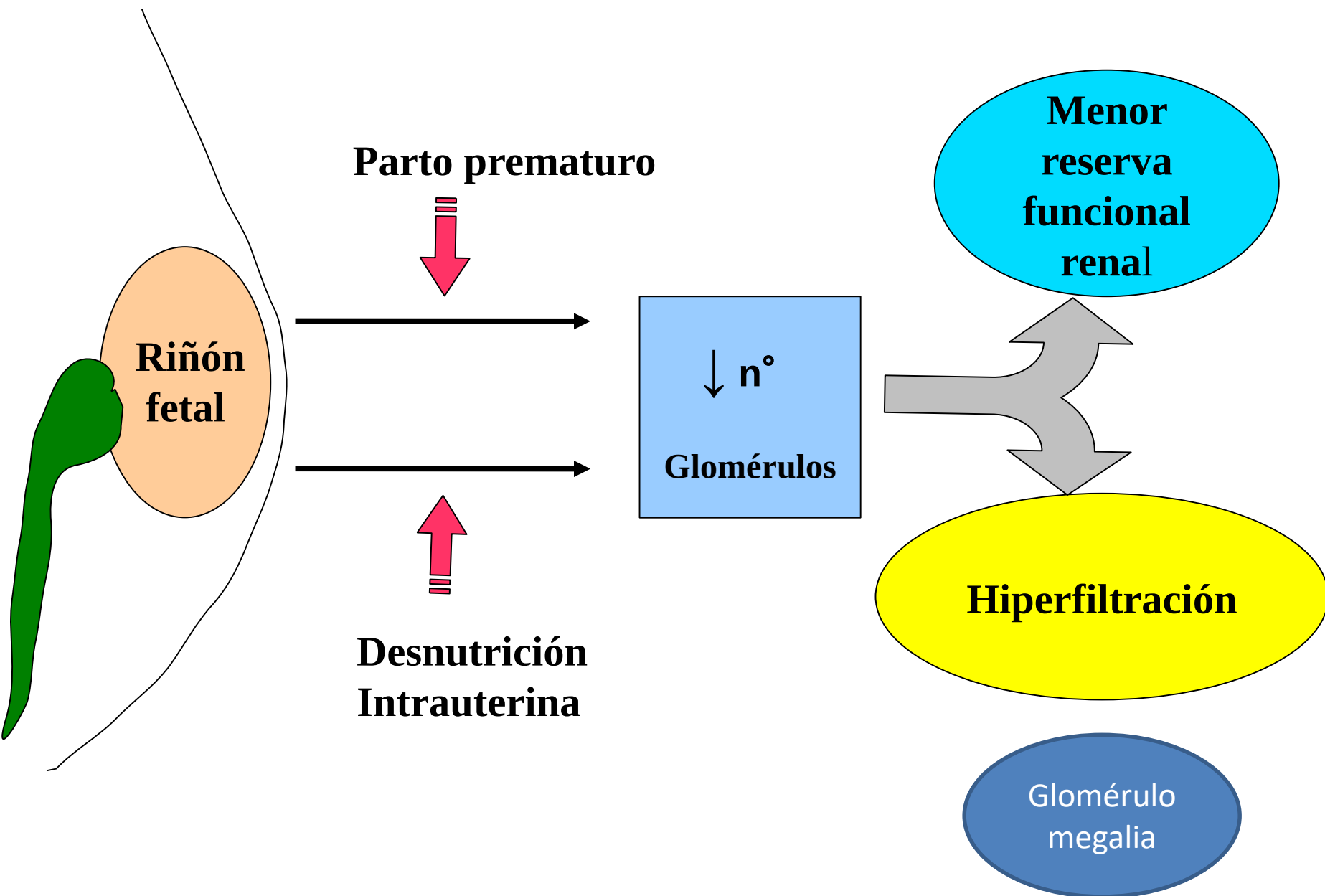
ORIGINAL ARTICLES

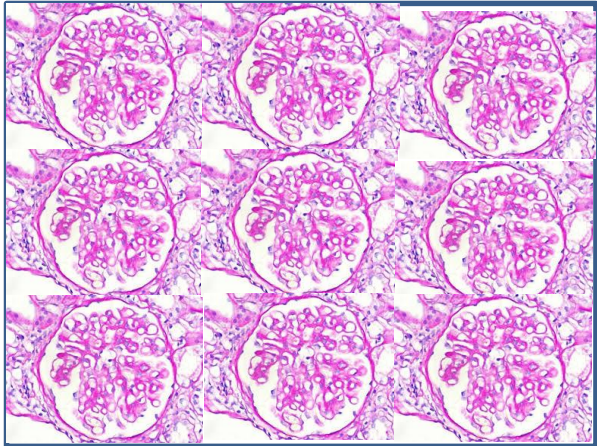
Histomorphometric Analysis of Postnatal Glomerulogenesis in Extremely Preterm Infants

MARIA M. RODRÍGUEZ,^{1*} ALEXANDER H. GÓMEZ,¹ CAROLYN L. ABITBOL,²
 JAYANTHI J. CHANDAR,² SHAHNAZ DUARA,³ AND GASTÓN E. ZILLERUELO²

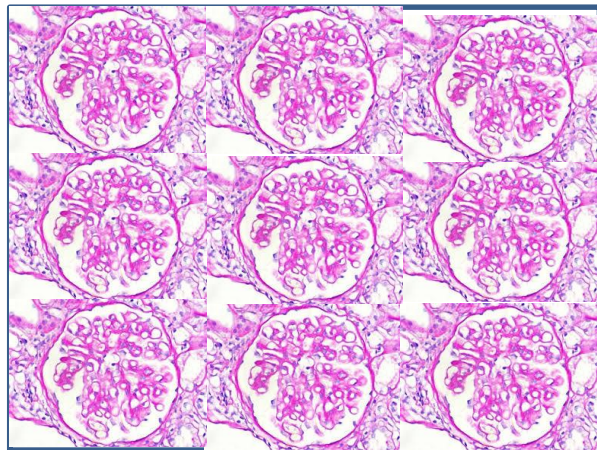
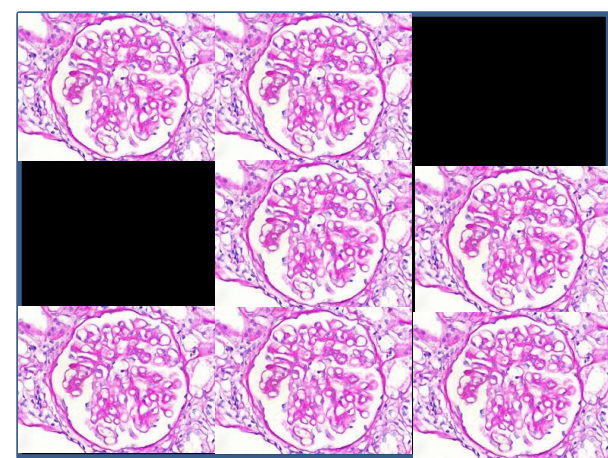
Figure 2 Composite photomicrograph depicts examples of each group as studied by computer-assisted morphometry with periodic acid-Schiff-stained slides (20× lens). Groups 1A and 1B were very similar regarding glo-

merular size. However, glomeruli from the group of preterm infants without renal failure (RF) who survived ≥ 40 days (2B) were larger than the preterm group with RF surviving ≥ 40 days (2A) and term infants without RF (3).





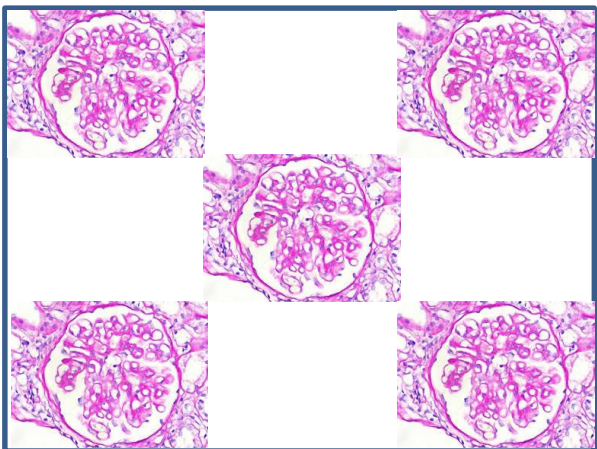
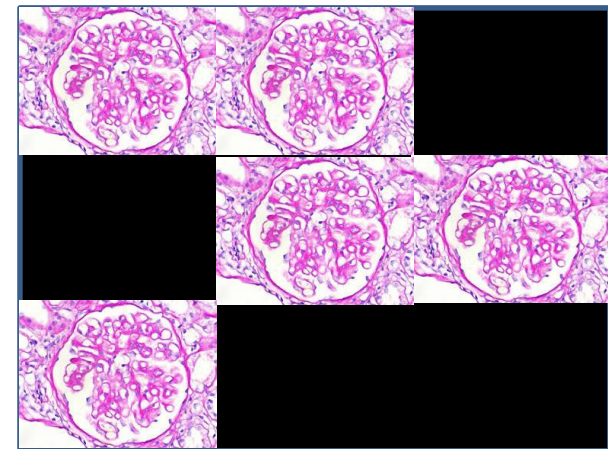
Envejecimiento



Envejecimiento



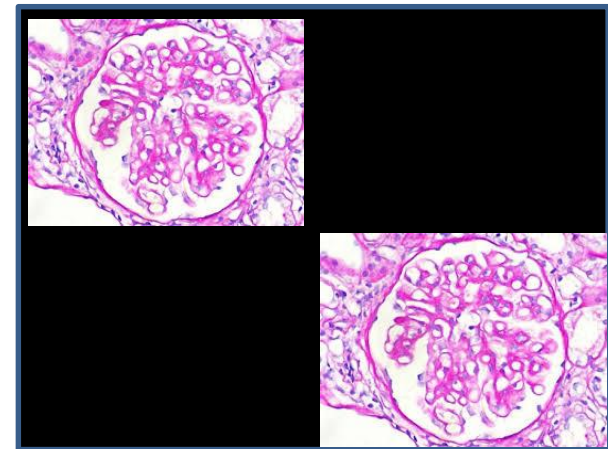
+ AKI + Nefrotóxicos



Envejecimiento



+ AKI + Nefrotóxicos



Conclusiones

- Nacer preT y/o BPN afecta el desarrollo y maduración del sistema CV y renal, efectos que pueden verse a largo plazo.
- Considerarlos en grupos de riesgo de HTA, CKD y podocitopatías. ¿Tx renal?
- Eventos peri y post natales pueden ser “2º hit”.
- Hay suficiente evidencia para recomendar un seguimiento específico y a largo plazo de personas que nacen prematuramente.

