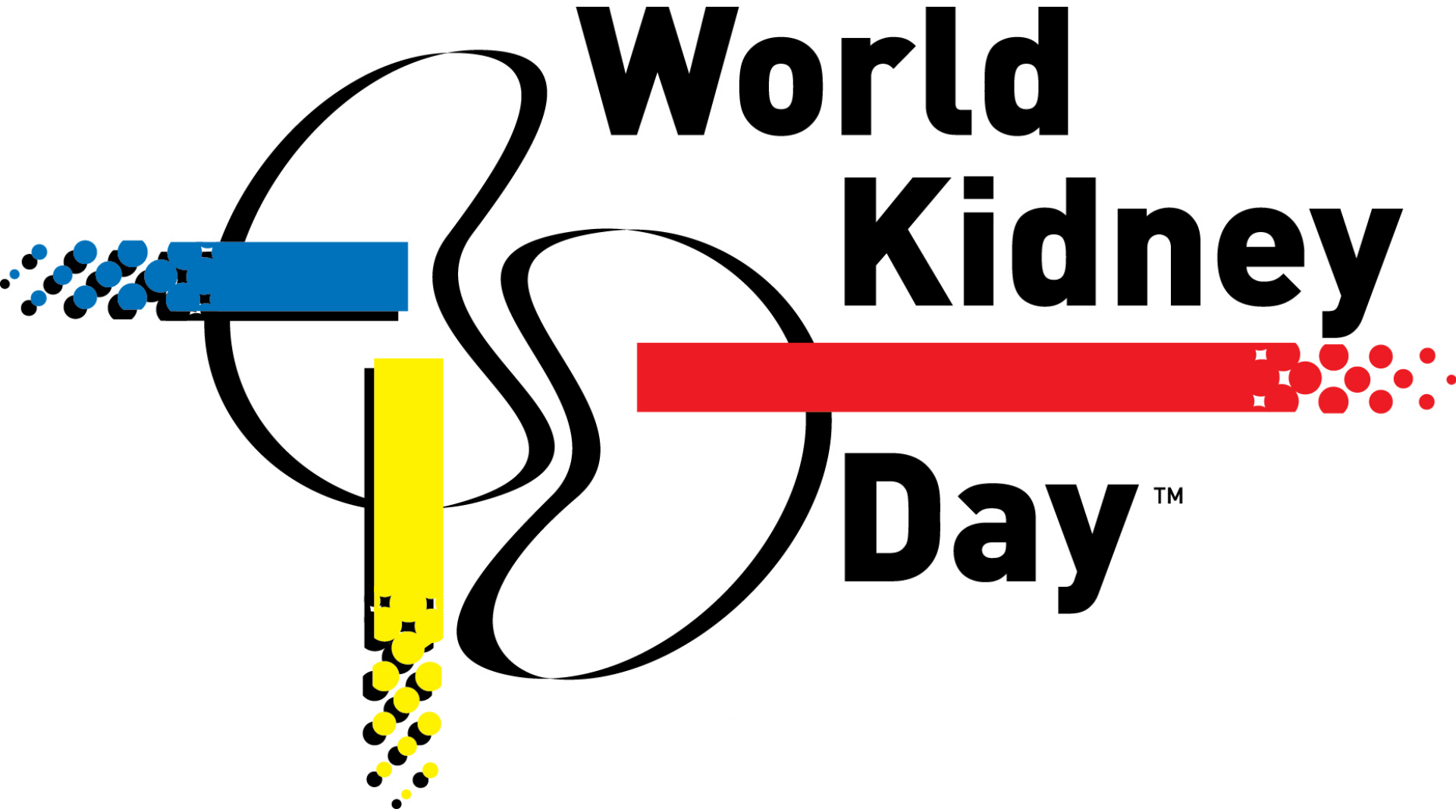

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ISN

IFKF International Federation of Kidney Foundations
Improving kidney health worldwide

WKD Mission

World Kidney Day aims to raise awareness of the importance of our kidneys to our overall health and to reduce the frequency and impact of kidney disease and its associated health problems worldwide.

World Kidney Day is a joint initiative of ISN and IFKF International Federation of Kidney Foundations

History

World Kidney Day started in 2006 and has not stopped growing ever since. Every year, the campaign highlights a particular theme.

- **2017** Kidney Disease & Obesity – Healthy Lifestyle for Healthy Kidneys
- **2016** Kidney Disease & Children – Act Early to Prevent It!
- **2015** Kidney Health for All
- **2014** Chronic Kidney Disease (CKD) and aging
- **2013** Kidneys for Life – Stop Kidney Attack!
- **2012** Donate – Kidneys for Life – Receive
- **2011** Protect your kidneys: Save your heart
- **2010** Protect your kidneys: Control diabetes
- **2009** Protect your kidneys: Keep your pressure down
- **2008** Your amazing kidneys!
- **2007** CKD: Common, harmful and treatable
- **2006** Are your kidneys OK?

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WKD Steering Committee & Team

World Kidney Day Steering Committee 2018

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2018 Campaign

Date: March 8, 2018

Theme: Kidneys & Women's Health – Include, Value, Empower

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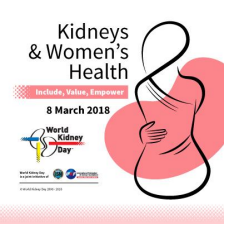

Kidneys & Women's Health – Include, Value, Empower

Chronic Kidney Disease (CKD) affects approximately **195 million** women worldwide and it is currently the **8th** leading cause of death in women, causing **600,000** female **deaths** each year.

The risk of developing CKD is at least as high in women as in men, and may even be higher. Women are more often affected by certain kinds of kidney diseases such as lupus nephritis (a kidney disease caused by an autoimmune disease) and pyelonephritis (kidney infection). Kidney disease is also linked to pregnancy: women who have CKD are at increased risk for negative outcomes in pregnancy, both for the mother and the baby; in turn, pregnancy-related complications can increase the risk of kidney disease.

In 2018, World Kidney Day and International Women's Day will be marked on the same day, offering the opportunity to highlight the importance of women's health and particularly their kidney health. On what will be its 13th anniversary, the campaign will promote affordable and equitable access to health education, care and prevention for all women and girls globally.

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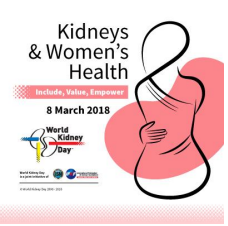

WKD Scientific Editorial 2016

World Kidney Day™

- **Title:**
  - ***"What we do and do not know about women and kidney diseases; Questions unanswered and answers unquestioned: Reflection on World Kidney Day and International Women's Day."***
- **Authors:**
  - ***Giorgina B Piccoli, Mona Alrukhaimi, Zhi-Hong Liu, Elena Zakharova, Adeera Levin***

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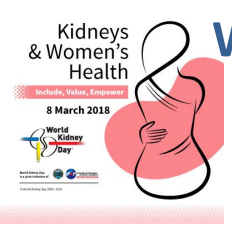

What we do and do not know about women and kidney diseases

Reflection on World Kidney Day and International Woman's Day

World Kidney Day™

Girls and women make up approximately 50% of the world's population.

Women in the 21st century continue to strive for equity in business, commerce, and professional endeavors, while recognizing that in many situations, equity does not exist.

In various locations around the world, access to education and medical care is not equitable amongst men and women; women remain under-represented in many clinical research studies, thus limiting the evidence base on which to make recommendations to ensure best outcomes.

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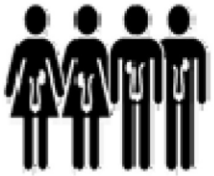
What we do and do not know about women and kidney diseases

Reflection on World Kidney Day and International Woman's Day

Gender differences in access to medical care and data lacking to evaluate extent of difference	Incidence of specific autoimmune diseases (SLE, RA, SS) more prevalent in women; pregnancy is unique challenge for women with risks of AKI, CKD, and flare of AI diseases	Less women than men on dialysis, less AVF on HD; reasons not well studied_	Women less likely to be kidney transplant recipients (living or deceased); women more likely to donate for living KT
			
Access to medical care	Chronic Kidney Disease (CKD)	Chronic Dialysis	Kidney Transplantation

SLE = Systemic Lupus Erythematosus; RA = Rheumatoid Arthritis; SS = Systemic Scleroderma; AKI = acute kidney injury; CKD = chronic kidney disease; AI = autoimmune; AVF = arteriovenous fistula; HD = hemodialysis; KT = kidney transplant

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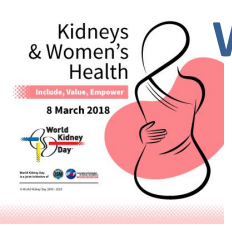

What we do and do not know about women and kidney diseases

Reflection on World Kidney Day and International Woman's Day

World Kidney Day

Pregnancy, preeclampsia (PE) , pregnancy-induced hypertensive disorders, and fetal health.

The importance of women's health to present and future kidney health

Pregnancy is the most common cause of AKI in women of childbearing age. PE is the principal cause of acute kidney injury (AKI) and maternal death, particularly in developing countries.

Several diseases and conditions can lead to pregnancy-related AKI.

Causes vary in different regions. Septic abortion after an illegal procedure is the leading cause of early AKI in countries where legal abortions are not available, while PE after assisted fertilization is becoming a leading cause in developed countries.

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What we do and do not know about women and kidney diseases

Reflection on World Kidney Day and International Woman's Day

Kidneys & Women's Health
Include, Value, Empower
8 March 2018

World Kidney Day

Seminar

Pre-eclampsia

Ben W J Mol, Claire T Roberts, Shakila Thangaratinam, Laura A Magee, Christianne J M de Groot, G Justus Hofmeyr

Pre-eclampsia affects 3–5% of pregnancies and is traditionally diagnosed by the combined presentation of high blood pressure and proteinuria. New definitions also include maternal organ dysfunction, such as renal insufficiency, liver involvement, neurological or haematological complications, uteroplacental dysfunction, or fetal growth restriction. When left untreated, pre-eclampsia can be lethal, and in low-resource settings, this disorder is one of the main causes of maternal and child mortality. In the absence of curative treatment, the management of pre-eclampsia involves stabilisation of the mother and fetus, followed by delivery at an optimal time. Although algorithms to predict pre-eclampsia are promising, they have yet to become validated. Simple preventive measures, such as low-dose aspirin, calcium, and diet and lifestyle interventions, show potential but small benefit. Because pre-eclampsia predisposes mothers to cardiovascular disease later in life, pregnancy is also a window for future health. A collaborative approach to discovery and assessment of the available treatments will hasten our understanding of pre-eclampsia and is an effort much needed by the women and babies affected by its complications.

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Introduction

Pre-eclampsia is a pregnancy-specific syndrome that affects 3–5% of pregnancies and is traditionally diagnosed when a pregnant woman presents with increased blood pressure and proteinuria.[1] Pre-eclampsia is one of the main causes of maternal, fetal, and neonatal mortality, especially in low-income and middle-income countries.[2] In this Seminar, we describe the current management of pre-eclampsia in terms of prediction, prevention, diagnosis, treatment, and long-term consequences. Our aim is to provide a guide for the optimal management of pre-eclampsia, both in low-resource and high-resource settings.

The acute clinical importance of pre-eclampsia lies in its relation to maternal and neonatal mortality and morbidity. When left untreated, pregnant women with pre-eclampsia have severe complications such as eclampsia, liver rupture, stroke, pulmonary oedema, or kidney failure, which can all be lethal.[3] Pre-eclampsia is also related to fetal growth restriction and preterm birth, either spontaneous or through iatrogenic delivery. Children born to mothers with pre-eclampsia have an increased risk of bronchopulmonary dysplasia and cerebral palsy, caused by preterm birth and being small for gestational age.[4,5] Pre-eclampsia decreases health-related quality of life and increases the risk of post-partum depression.[6,7]

The cause of pre-eclampsia is unclear. Some women are genetically predisposed to developing the disease which may run in families.[8] Robust associations have been identified between pre-eclampsia and gene variants involved in thrombophilia, inflammation, oxidative stress and the renin angiotensin system.[9,10] In a meta-analysis of studies to identify gene variants associated with pre-eclampsia, 22 variants were reproducible across studies with 7 remaining significant upon meta-analysis. However, thrombophillic gene variants in F2 and F5 have been consistently associated with the disease.[11–13] Interactions between maternal gene variants and genes encoding fetal HLA-C have been shown to predispose pregnancies to pre-eclampsia in white people, sub-Saharan Africans, and the Chinese Han population, suggesting a role of an impaired immune tolerance in the pathogenesis of pre-eclampsia.[14–16] In women with pre-eclampsia, placental antiangiogenic factors are upregulated and disrupt the maternal endothelium, leading to an antiangiogenic state that can result in clinical signs of pre-eclampsia.[17]

Definition of pre-eclampsia

The diagnostic criteria for pre-eclampsia were changed by the International Society for the Study of Hypertension in Pregnancy (ISSHP) in 2014.[18] ISSHP defines pre-eclampsia as de-novo hypertension present after 20 weeks of gestation combined with proteinuria (>300 mg/day), other maternal organ dysfunction, such as renal insufficiency, liver involvement, neurological or haematological complications, uteroplacental dysfunction, or fetal growth restriction. As proteinuria is no longer required in the new definition, proteinuric and non-proteinuric pre-eclampsia are now two separate categories.

Hypertension is defined as systolic blood pressure higher than 140 mm Hg or diastolic blood pressure higher than 90 mm Hg on two occasions that are 4–6 h apart.[19–21] Blood pressure should be measured in a seated and upright position or in a left lateral recumbent

Search strategy and selection criteria

We searched PubMed and the Cochrane Library with the terms "pre-eclampsia" and "hypertension and pregnancy", and cross-referenced them with the following terms: "epidemiology", "definition", "prediction", "prevention", "management", "clinical trials", "preconception care", and "thrombophilia". We restricted the search to studies done in humans and published in English. We limited our search to publications between January, 2010, and January, 2015, with a focus on publications after 2012. We also referred to older key publications. We then specifically looked at the themes of the review—ie, diagnostic studies, prognostic studies, intervention studies, and studies on long-term maternal risk.

Panel 2: Pre-eclampsia management strategies in low-resource settings

- Effective family planning services
- Algorithms for prediction of pre-eclampsia
- Calcium supplementation (1·5–2 g daily) for women with low dietary calcium intake
- Consider treatment with low-dose calcium (500 mg daily) if a high dose is unachievable
- Aspirin (75 mg daily) for women at high risk
- Frequent routine screening in the third trimester (basic antenatal care plus)
- Appropriate for prediction of disease progression
- Use of low-cost antihypertensive drugs, such as α-methyldopa
- Availability of magnesium sulphate for treatment of eclampsia
- Consideration of the cost vs benefit ratio of routine prophylaxis with magnesium sulphate in settings with limited resources for maternal monitoring
- Consider delivery in case of proteinuria and severe hypertension
- Use of a transcervical balloon with traction for labour induction to minimise uterine hyperstimulation,[18] with low-cost titrated oral misoprostol solution as second-line treatment[19]
- Conservative use of caesarean section
- Investment in health services

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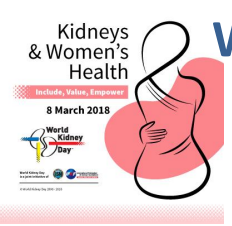

What we do and do not know about women and kidney diseases

Reflection on World Kidney Day and International Woman's Day

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PE and hypertensive disorders of pregnancy occur in 3–10% of pregnancies; the kidney is the main target of an unbalanced pro-angiogenic and anti-angiogenic derangement, leading to hypertension, proteinuria, and widespread endothelial damage. The incidence of PE, higher in low-middle income countries, peaks at the extremes of reproductive age for reasons mentioned above.

CKD is a risk factor for PE and hypertensive disorders of pregnancy. Even minor alterations of kidney function are risk factors for PE. Newer definitions of PE recognize differences between "placental" and "maternal" causes of PE, based on novel angiogenic-antiangiogenic markers, which may be important for management during and after pregnancy.

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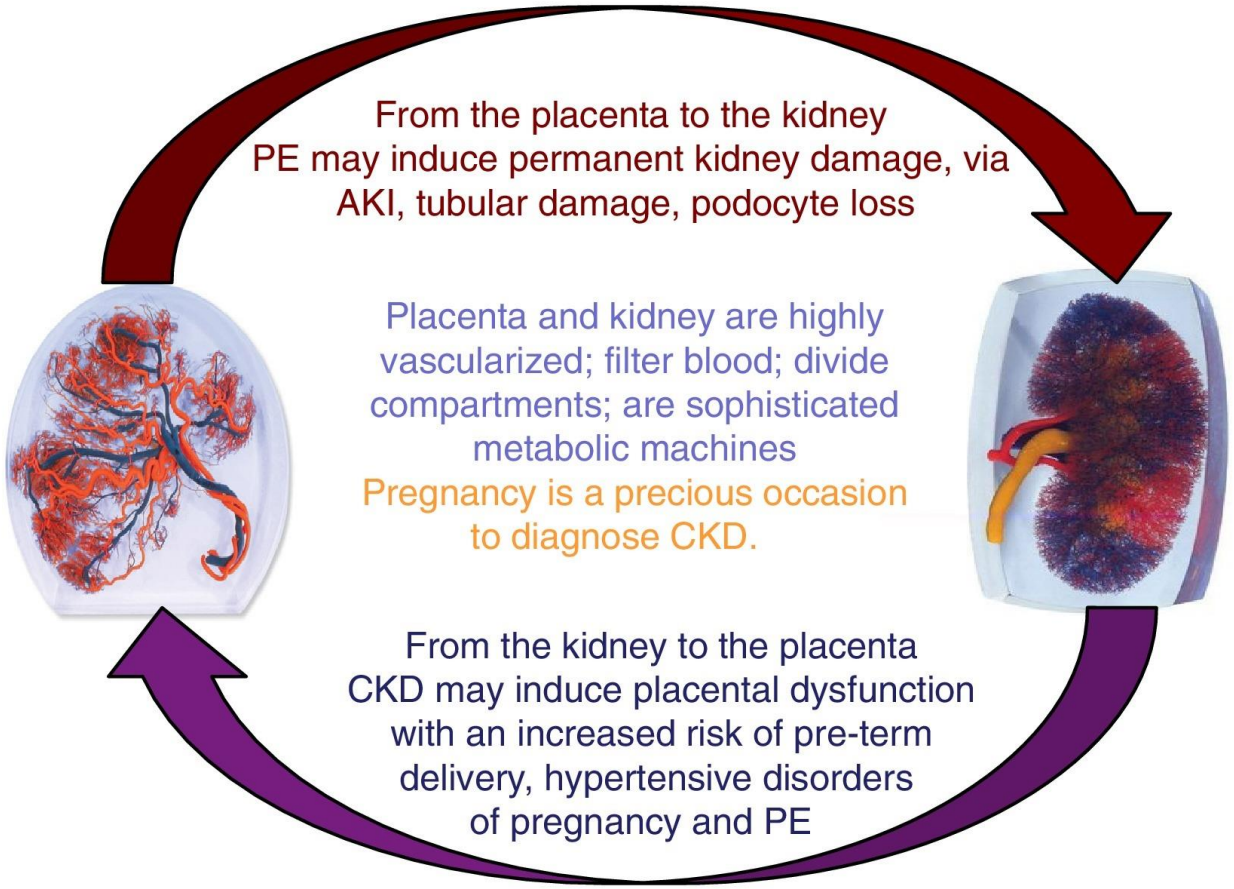

PE = preeclampsia; AKI = acute kidney injury; CKD = chronic kidney disease

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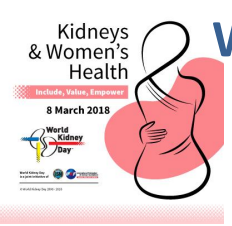
There are long term effects of PE on both maternal and fetal health, but this remains an area of active research with many unknowns.

PE is a risk factor for the future development of CKD and ESRD in the mother. The reasons are not fully understood; podocyte loss, endotheliosis, tubular and vascular damage may co-exist.

PE is associated with intrauterine and perinatal death, preterm delivery, and restricted intrauterine growth; the latter two are linked to "small babies".

Small babies and preterm babies have highly increased risks of neurological deficits and postnatal complications, especially sepsis. risks may be higher in low-income countries, since survival and deficit-free survival depend on the provision of postnatal intensive care.



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World Kidney Day

In the long term, small babies are at risk for the development of diabetes, metabolic syndrome, cardiovascular diseases (CVDs), and CKD in adulthood.

Since kidney development is completed in the last phases of pregnancy, delayed, insufficient kidney growth, resulting in low nephron number is probably the basis of the increased risk of CKD and hypertension in small for gestational age, and preterm babies.

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What we do and do not know about women and kidney diseases

Reflection on World Kidney Day and International Woman's Day

World Kidney Day

Viewpoint

A developmental approach to the prevention of hypertension and kidney disease: a report from the Low Birth Weight and Nephron Number Working Group

Valerie A Luyckx, Norberto Perico*, Marco Somaschini, Dario Manfellotto, Herbert Valensise, Irene Cetin, Umberto Simeoni, Karel Allegaert, Bjorn Egil Vikse, Eric A Steegers, Dwomoa Adu, Giovanni Montini, Giuseppe Remuzzi, Barry M Brenner, for the writing group of the Low Birth Weight and Nephron Number Working Group†*

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Introduction

In 2008, the World Health Assembly endorsed WHO's Global Action Plan for the Prevention and Control of Non-Communicable Diseases (NCDs) 2013–2020,[1] based on the realisation that NCDs cause more deaths worldwide than do communicable diseases. This plan strongly advocates prevention as the most effective strategy to curb NCDs. Furthermore, the life-course approach, which was highlighted in the Minsk Declaration,[2] reflects increasing recognition that early development affects later-life health and disease.[1] Optimisation of early development offers the opportunity for true primary prevention of NCDs.

Developmental programming in the kidney has been recognised for more than two decades, but its contribution to the global burden of kidney diseases remains underappreciated by policy makers.[3] In view of the many factors known to affect fetal kidney development, including maternal health and nutrition, exposure to stress, poverty, pollutants, drugs, and infections during gestation,[3] a holistic strategy to prevent such programming effects is consistent with the life-course approach and aligns with the United Nations (UN) Sustainable Development Goals to foster health.[2]

Chronic kidney disease is an important contributor to the NCD burden that has been relatively neglected in WHO's Global Action Plan for the Prevention and Control of NCDs, despite chronic kidney disease being a major cause of hypertension and a major risk multiplier of cardiovascular disease.[1,4] Although the prevalence of chronic kidney disease in many low-income countries remains unknown, the disease is most prevalent among disadvantaged populations within industrialised nations—eg, African-Americans and Aboriginal Australians.[5] The number of people receiving dialysis or transplantation is projected to double, from 2·6 million in 2010 to 5·4 million in 2030.[6] In 2010, 2·3–7·1 million adults died from lack of access to dialysis and transplantation in low-income countries.[6] In view of the clinical outcomes and often prohibitively high costs of treatment, prevention and early detection are the only sustainable solutions to address this growing global burden.

To address the neglected issue of developmental programming of kidney disease and hypertension, a multidisciplinary working group was convened, including international expert obstetricians, neonatologists, and nephrologists (appendix). We argue that WHO's Global Action Plan for the Prevention and Control of NCDs does not adequately address the effect of developmental origins of NCDs, particularly in low-income and middle-income countries, where developmental risk is highest and the burden of NCDs is growing fastest.[7] The working group identified the need to raise awareness of the role of developmental programming in renal disease and suggests locally adapted preventive strategies that could have long-term benefits on health and heath cost-savings worldwide, integrating obstetric, neonatal, and nephrology perspectives.

Gestational age, birthweight, nephron number, and kidney disease risk

Barker and colleagues[8] were the first to show that adults born at low birthweight (<2·5 kg) were at increased risk of cardiovascular disease. Subsequently, Brenner and colleagues[9] proposed that developmental programming in the kidney might reduce nephron number, which could contribute to hypertension through limitation of sodium excretion because of a decreased filtration surface area, and could increase the risk of chronic kidney disease by reducing renal adaptive capacity if further nephrons are lost through injury. This hypothesis plausibly linked the observations that low birthweight, hypertension, and chronic kidney disease occur more frequently in disadvantaged populations.[9] Most nephrons form during the third trimester in utero; therefore, preterm birth or insults experienced during this phase might affect nephrogenesis and reduce nephron number.[3] Indeed, intrauterine growth restriction (which affects the growth of splanchnic organs), preterm birth, and low birthweight are all associated with a low nephron number as well as higher blood pressure in later life.[3,10] A lower nephron number is associated with adult hypertension.[3] Findings of a meta-analysis[11] indicate that low birthweight confers a 70% increased risk of chronic kidney disease—defined as albuminuria, reduced glomerular filtration rate, or end-stage kidney disease—compared with normal birthweight. Similarly, preterm birth has also been associated with a lower glomerular filtration rate and higher albuminuria in young adulthood.[12] These findings support the developmental programming hypothesis.

In view of the challenges of measuring nephron number in vivo, intrauterine growth restriction, preterm

Panel 1: Recommendations for actions[13]

- Gestational age and birthweight should be recorded for all infants to identify those who are growth-restricted, preterm, and low-birthweight
- A gestational age less than 37 weeks or a birthweight less than 2·5 kg (low birthweight), growth restriction, or being born from a pregnancy complicated by pre-eclampsia or gestational diabetes should be documented prominently in an infant's medical record
- Growth-restricted, preterm, and low-birthweight infants should be monitored regularly for hypertension, excessive weight gain, albuminuria, and hyperglycaemia
- Awareness of the risk of acute kidney injury in preterm and growth-restricted infants must be raised and preventive strategies implemented:
  - Consistent definitions for acute kidney injury should be used (neonatal acute kidney injury KDIGO [Kidney Disease Improving Global Outcomes] classification)[15]
  - Use of potentially nephrotoxic drugs (antibiotics such as aminoglycosides and vancomycin, antifungals such as amphotericin B, and non-steroidal anti-inflammatory drugs) and radiocontrast agents should be minimised in low-birthweight, preterm, and growth-restricted neonates
  - When used, nephrotoxic drugs should be administered at the lowest effective dose, drug levels should be monitored, and attention should be paid to fluid balance and renal function
  - Fluid management should be tailored to optimise circulating volume and blood pressure
  - Implementation of early-warning systems in electronic health records should be considered to identify at an early stage neonates with or at risk of acute kidney injury[10]
- Neonatal acute kidney injury episodes should be recorded and communicated in the medical record to facilitate complete handoff of care
- Nutrition and growth in neonates and early childhood should be optimised through promotion of breastfeeding and putting emphasis on healthy balanced diets and regular physical activity
- Mothers of growth-restricted, preterm, or low-birthweight babies or who have pre-eclamptic pregnancies should be monitored in the long term
- Mothers with gestational diabetes should be followed up in the long term
- The first and all subsequent peripartum periods should be used to educate women about nutrition, weight control, and preconception counselling
- More resources should be allocated to enhance maternal health, fetal growth, and full-term pregnancies
- Resources should be allocated globally to enhance maternal health, fetal growth, and full-term pregnancies by leveraging UN Sustainable Development Goal 3, to ensure healthy lives and promote wellbeing for all at all ages:
  - By 2030, reduce the global maternal mortality ratio to less than 70 per 100 000 lives
  - By 2030, end preventable deaths of newborns and children younger than 5 years, with all countries aiming to reduce neonatal mortality to at least as low as 12 per 1000 livebirths and under-5 mortality to at least as low as 25 per 1000 livebirths
  - By 2030, ensure universal access to sexual and reproductive health-care services—including for family planning, information, and education—and the integration of reproductive health into national strategies and programmes
  - Achieve universal health coverage, including financial risk protection, access to quality essential health-care services, and access to safe, effective, quality, and affordable essential medicines and vaccines for all
  - Strengthen the implementation of WHO's Framework Convention on Tobacco Control in all countries, as appropriate
  - Substantially increase health financing and recruitment, development, training, and retention of health workforce in developing countries
- Potential living kidney donors with a history of preterm birth, growth restriction, or low birthweight, or women who had pre-eclampsia should be warned of potential greater long-term risk
- Consistent with WHO's emphasis on a life-course approach, an annual global Birth Day could be launched to raise awareness about birth circumstances (birthweight, gestational age, exposure to gestational diabetes, or pre-eclampsia) and their possible outcomes in later life, and to emphasise a healthy lifestyle to combat these risks

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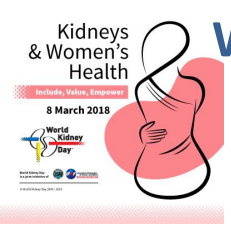

What we do and do not know about women and kidney diseases

Reflection on World Kidney Day and International Woman's Day

World Kidney Day

Pregnancy in chronic kidney disease

CKD is a risk factor for adverse pregnancy outcomes from its early stages.
The risks increase from CKD stage 1 to CKD stage 5

Hypertension and proteinuria at baseline are important modulators of risks;
malformations are not increased with respect to the overall population
maternal death is unusual
incidence of preterm delivery and of small for gestational age babies is increased in stage 1 CKD patients, and rises with the worsening of kidney function.
The effect of pregnancy on CKD progression is not fully understood: decrease in kidney function is unusual in early CKD, but the risk increases as CKD severity increases.

Pregnancy after kidney donation suggest that reduction of kidney parenchyma may be associated with a higher risk of PE.

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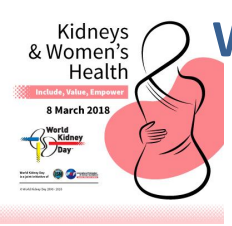

What we do and do not know about women and kidney diseases

Reflection on World Kidney Day and International Woman's Day

World Kidney Day

Pregnancy in chronic kidney disease

Pregnancy is a potential occasion for the initial diagnosis of CKD.

In poorly or unevenly resourced countries, advanced CKD may be discovered only during pregnancy.

The implications of dialysis initiation may present important clinical and ethical issues;
in highly resourced countries with established prenatal care, the diagnosis of earlier stages of CKD may lead to more intensive therapy and surveillance

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Pregnancy in dialysis and transplantation

Fertility is reduced in ESRD; Australian and European data suggest a 1:10 ratio from general population to transplantation and from transplantation to dialysis (1:100 probability as compared to the general population).

The first sporadic cases of successful pregnancy on dialysis were described in the 70s, but in the new millennium this became an acknowledged real clinical possibility.

More than 1000 pregnancies have been reported in dialysis patients.
The most important advance has been the demonstration of a strong relationship between the intensity (frequency and duration) of the dialysis sessions and positive pregnancy results: thus, intensifying dialysis is the current standard of care.
Changing attitudes toward counseling women with advanced CKD may be impacted, with the knowledge of positive outcomes on dialysis for women and their offspring.

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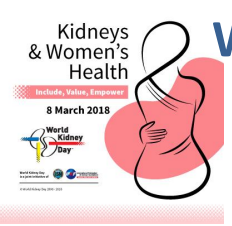

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Pregnancy in dialysis and transplantation

Fertility is partly restored after kidney transplantation.
Even in an ideal situation the risk of complications is higher in women with transplanted kidneys than in the general population.
(normal kidney function, no hypertension or proteinuria, at least 2 years after transplantation, without recent rejection episodes)

The outcomes of pregnancy after kidney transplantation share the same risk factors as CKD (kidney function, hypertension, and proteinuria).

Assisted fertilization techniques are increasingly popular in some settings, but dedicated studies in CKD patients are few;
multiple pregnancies may bear an added risk in CKD patients, with both native and transplanted kidneys.

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Autoimmune diseases, women, and kidney disease

Autoimmune diseases as SLE, RA, and SS preferentially affect women. Sex differences in the incidence and severity result from a complex interaction of hormonal, genetic, and epigenetic factors.

Table 2 – Sex differences in the incidence and severity of autoimmune diseases.

	SLE	RA	SS
Peak incidence	Reproductive age	Perimenopausal	After 50–60 years
Female/male ratio	Peak 15:1 Total 9:1	Peak 4:1 After 60 years 1:1	Peak 14:1 Total 3:1
Influence of estrogen			
High levels	Negative	Positive	?
Low levels	?	Negative	Negative

SLE, systemic lupus erythematosus; RA, rheumatoid arthritis; SS, systemic scleroderma.

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Autoimmune diseases, women, and kidney disease: SLE

SLE is an autoimmune disease affecting approximately five million people worldwide; disproportionately predominant in women (9:1 female to male ratio; 15:1 in reproductive years) and individuals of non-European ancestry

Numerous non-HLA genetic markers may predispose individuals of European, Hispanic, and Afro-American ancestry to lupus.

SLE affects kidneys in about 50% of patients, including glomerular, interstitial, and vascular lesions.

Kidney disease is a critical concern in counseling women with lupus considering pregnancy, with previous kidney involvement

Estrogen's primary effects are mediated by transcription activity of the intracellular estrogen receptors, whose profile is altered in T-cells from female SLE patients.

Cathespin S has recently been identified as a potential cause of lupus, triggering the immune system to attack healthy cells, particularly in females

Poverty is associated poor prognosis in SLE.

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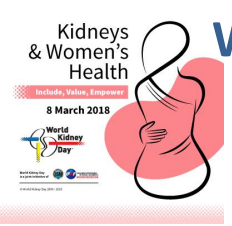
Autoimmune diseases, women, and kidney disease: RA

RA also preferentially affects women (4:1 ratio to men) with the peak incidence in the perimenopausal years, suggesting an association with estrogen deficiency
Renal involvement in RA is relatively common and multifactorial and is a predictor of mortality in RA patients.
The risk of CKD is significantly higher in patients with RA.

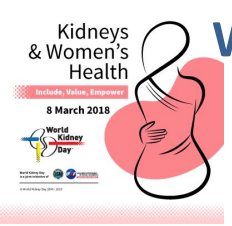
The development of CKD may result from several ongoing processes, including specific renal involvement associated with RA (e.g., glomerulonephritis, interstitial nephritis), chronic inflammation, comorbidities, and nephrotoxic anti-rheumatic drugs.
The strong association between RA activity and AA amyloidosis increases morbidity and is the main cause of ESRD with RA and nephropathy. Importantly, some of the life-long and combined RA pharmacotherapy can lead to various renal side effects.



Autoimmune diseases, women, and kidney disease: SS

SS predominantly affects women (female-to-male ratios ranging from 3:1 to 14:1), with the peak incidence in the fifth and sixth decades.
Estrogen may play a role in scleroderma through its stimulatory effect on TGF-beta 1 receptor and platelet-derived growth factor receptor.

Vasculopathy is important manifestation in SS, and the low estrogenic state associated with menopause may aggravate vascular manifestations.
SS can also be complicated by kidney disease, including scleroderma renal crisis, which represents a form of malignant hypertension with acute renal failure; or ischemic nephropathy leading to slowly progressive CKD, accompanied by hypertension and albuminuria.
Normotensive acute renal failure in patients with SS may be caused by interstitial nephritis or ANCA vasculitis, a separate entity with poor outcome.



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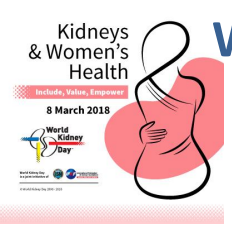
Women, chronic kidney disease, and access to renal replacement therapies

Although renal replacement therapy (RRT), including dialysis and transplantation is life-sustaining, not all patients receive RRT.

The rate of ESRD treated by RRT differs greatly between countries and regions, and intricately depends on the economy of a country and health care system.

Worldwide, only 50% of patients requiring RRT receive treatment and in low and middle-income countries and regions, even less.

The equality of access to RRT for women and girls is of particular concern because, in many societies, they are disadvantaged by discrimination rooted in sociocultural factors.



What we do and do not know about women and kidney diseases

Reflection on World Kidney Day and International Woman's Day

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Women, chronic kidney disease, and access to dialysis

At least two million people may have died prematurely due to lack of access to RRT with treatment gaps being much larger in low-income countries.
By 2030, the estimated number of RRT should be more than double to 5.439 million, with the most growth in Asia

There are few data to compare the gender difference for the treatment gaps.
Studies in Africa show that men were more likely to receive RRT than women.
In Japan, the incidence of treated ESRD in females was less than half of that in males
No explanations are given for this finding.

One US study reports women having significantly higher odds ratio of 1.70 for late initiation of dialysis compared to men.
Awareness levels of previous kidney disease in women were reported much lower than in men, which may contribute to later initiation of RRT.

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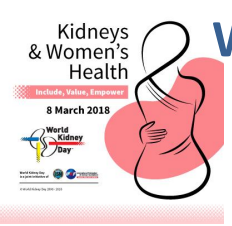
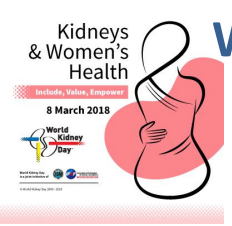


Women, chronic kidney disease, and access to dialysis

Mortality rates are similar in men and women on dialysis, but the incident rates of some dialysis-associated complications and morbidity are higher in women. A US report of hospitalizations in 111,653 patients undergoing maintenance hemodialysis describes higher hospitalization rates in women, and higher risk for 30-day readmissions.

Prevalence of arteriovenous fistula is lower among female than male hemodialysis patients. This may be due to a number of different factors, including anatomical/surgical issues relating to vessel size, timing of referral, and attitudinal differences. This has not been systematically studied.

Dialysis dose may be lower in women who have a smaller volume of urea distribution; anemia, nutrition, and quality of life may be less well controlled. Reasons are not certain.



Women, CKD, and access to transplantation

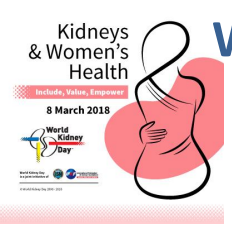
Transplantation represents the best form of RRT in patients without contraindications.

Worldwide data describes that women are less likely than men to be kidney transplant recipients, either from a cadaveric or living donor, but are more likely to serve as living donors for kidney transplantation.

Data from different countries, including the US, France, China, and India, confirm lower transplant rates in women than men, less likelihood of women being registered on national transplant waiting lists, and longer time from dialysis initiation to listing.

Sex inequality also exists in the pediatric population.

A survey from 35 countries participating in the European Society for Pediatric Nephrology/ERA-EDTARegistry reported girls had a lower access to renal transplantation than boys.



Women, CKD, and access to transplantation

Socioeconomic factors play a role in the inequality of transplantation between sexes, especially in the low and middle-income countries.

Different employment status and incomes may contribute to sex differences in transplantation. Psychosocial factors and education of women have been suggested as a contribution to sex disparity.

US data found black women were less likely to want living donor kidney transplantation compared with men. They were also less likely to have been evaluated for a kidney transplant.

Irrespective of age, women were more likely not to have had discussions with medical professionals. This result may imply that there is a need for better clinical guidelines and education for women, their social network, and their providers.

What we do and do not know about women and kidney diseases

World Kidney Day

Reflection on World Kidney Day and International Woman's Day

Present and future: what we do not know

In high income countries with increasing maternal age and assisted fertilization, there may be an increase in PE and multiple pregnancies, which may predispose to PE, intrauterine growth restriction, or both. Will this lead to an increase in CKD and CVD for women in the future?

We do not know if and how pregnancy outcomes are modulated by the different nephropathies, hypertension and proteinuria. Indications on when to start dialysis in pregnancy are not established, nor is the specific role of frequency and duration.

Will higher age at transplantation, and reduced fertility impact short and long-term outcomes of mothers and their babies?

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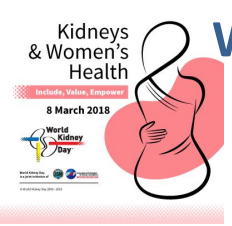

What we do and do not know about women and kidney diseases

Reflection on World Kidney Day and International Woman's Day

World Kidney Day

Present and future: what we do not know

Despite elegant demonstrations for the role of sex hormones in vascular health and immunoregulation, the predominance in females of SLE, RA, and SS remains unexplained.

Thrombotic thrombocytopenic purpura has a higher incidence in women, though this is likely due to the association with other conditions more common in women.

The incidence of kidney involvement in SLE during pregnancy and similarities/differences in those with PE have not been well studied.

The role of different medications and responses to medications for autoimmune diseases relative to sex has also not been well studied.

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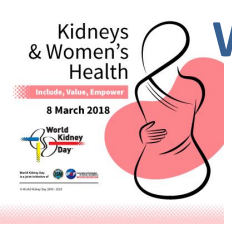

What we do and do not know about women and kidney diseases

Reflection on World Kidney Day and International Woman's Day

World Kidney Day™

Present and future: what we do not know

If women are more likely to be living donors, at differential ages, does this impact both CVD risk, and risk for ESKD?
Are the additional exposures that women have after living donation compounded by hormonal changes on vasculature as they age?
How are the risks of CKD and PE increased in female kidney living donor?

In the context of specific therapies for the treatment or delay of CKD progression, do we know if there are sex differences in therapeutic responses to ACEi/ARB?
Should we look at dose finding/adjustments by sex?

Do we know the impact of various therapies by level or ratio of sex hormones?
In low-middle income countries how does changing economic and social cultures impact women's health, and what is the nutritional impact on CKD of increasing predominance of obesity, diabetes, and hypertension?

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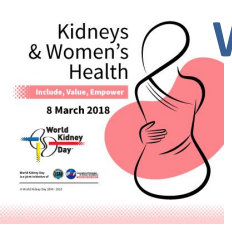

What we do and do not know about women and kidney diseases

Reflection on World Kidney Day and International Woman's Day

World Kidney Day

Conclusions

Women have unique risks for kidney diseases: kidney diseases, as well as issues related to access to care, have a profound impact on both the current and next generations. Advocating for improved access to care for women is critical to maintain the health of families, communities, and populations.

Focused studies on the unique contribution of sex hormones, or the interaction of sex hormones and other physiology, is important to improve our understanding of the progression of kidney diseases. Immunological conditions such as pregnancy (viewed as a state of tolerance to non-self) as well as SLE and other autoimmune and systemic conditions common in women, better studied may also lead to breakthroughs in understanding and care paradigms.

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What we do and do not know about women and kidney diseases

Reflection on World Kidney Day and International Woman's Day

Conclusions

There is a clear need for higher awareness, timely diagnosis, and proper follow up of CKD in pregnancy. In turn, pregnancy may also be a valuable occasion for early diagnosis of CKD, allowing planning of therapeutic interventions.

On its 13th anniversary, World Kidney Day promotes affordable and equitable access to health education, healthcare, and prevention for all women and girls in the world.

The coinciding of World Kidney Day and International Women's Day offers an opportunity to develop and define best practices and future research agendas, and ultimately, to optimize the outcomes of all people living with or at risk for kidney disease

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2018 Campaign

Date: March 8, 2018

Theme: Kidneys & Women's Health – Include, Value, Empower

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