

بِسْمِ اللّٰهِ الرَّحْمٰنِ الرَّحِیْمِ

*in the name of god*

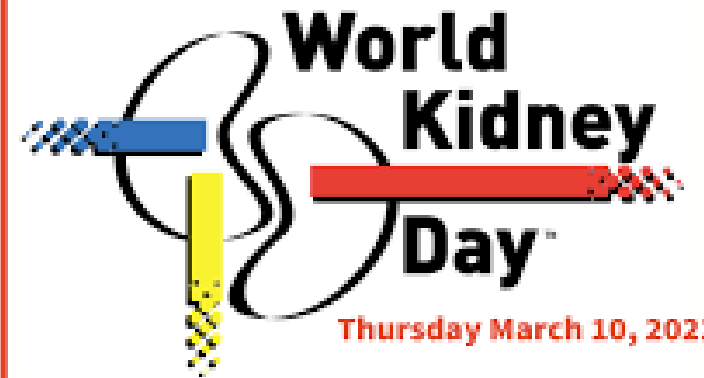


**10 MARCH 2022**  
**Kidney Health for All**  
World Kidney Day 2022  
[www.worldkidneyday.org](http://www.worldkidneyday.org)

Bridge the  
knowledge gap  
to better  
kidney care.



World Kidney Day is the initiative of  
International Society of Nephrology (ISN) and International Federation of Kidney Physicians (IFKID)



Thursday March 10, 2022

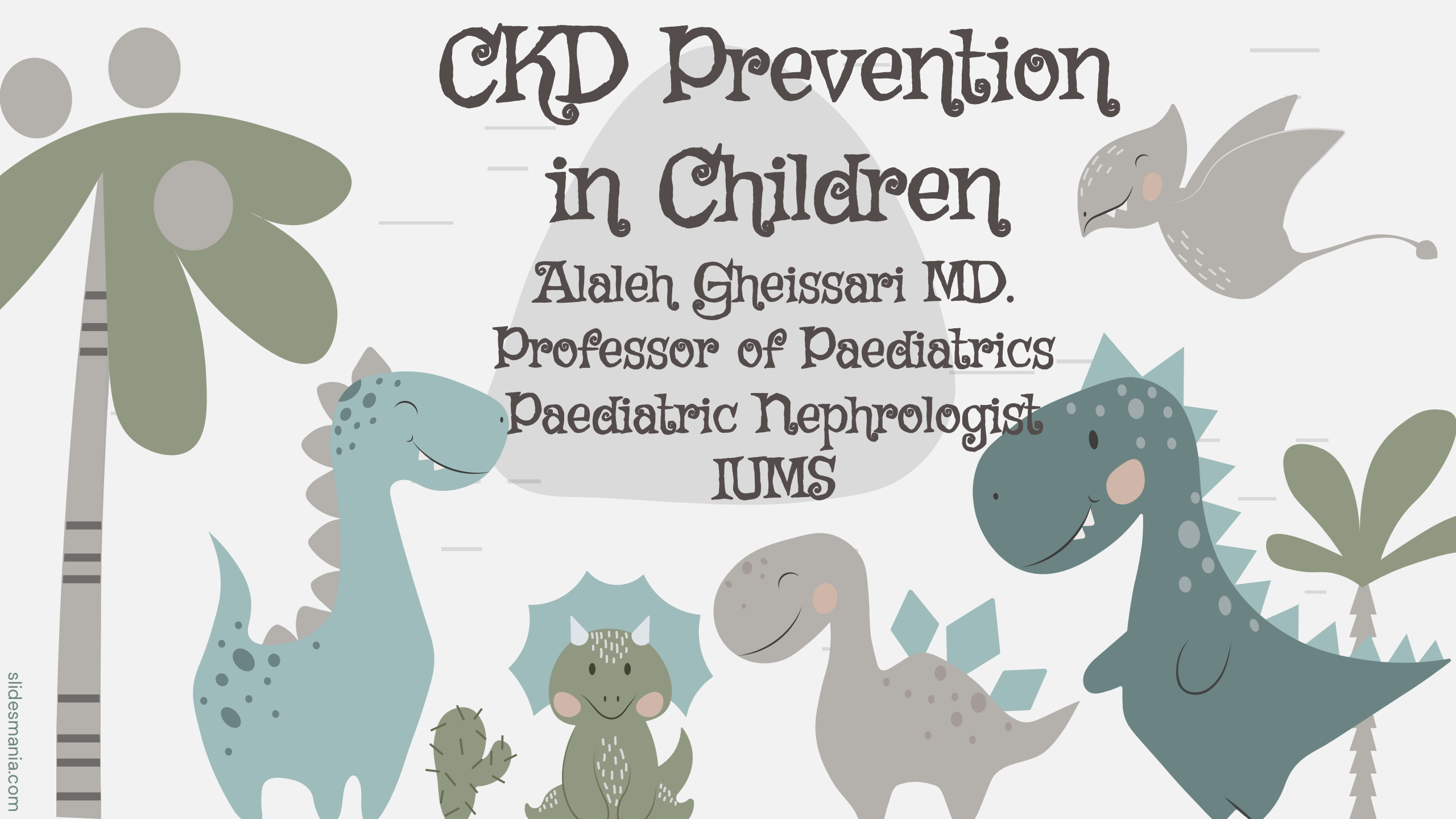
“Bridge The Knowledge Gap”



THE  
KIDNEY  
PROJECT

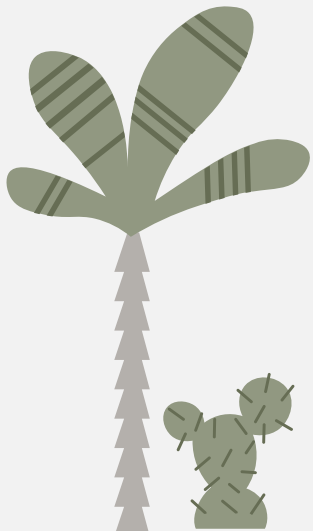
# CKD Prevention in Children

Alaleh Gheissari MD.  
Professor of Paediatrics  
Paediatric Nephrologist  
IUMS



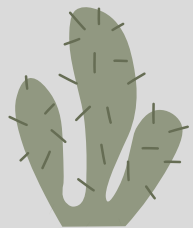
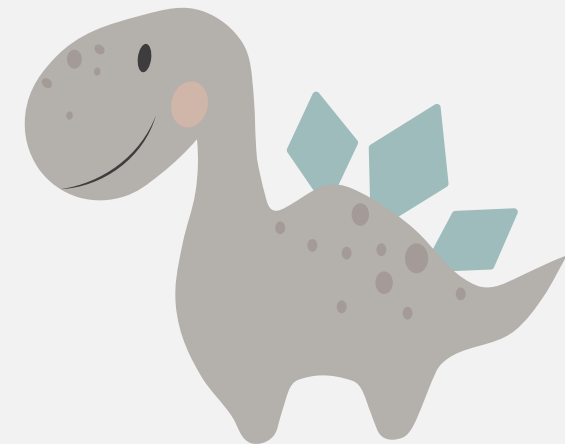
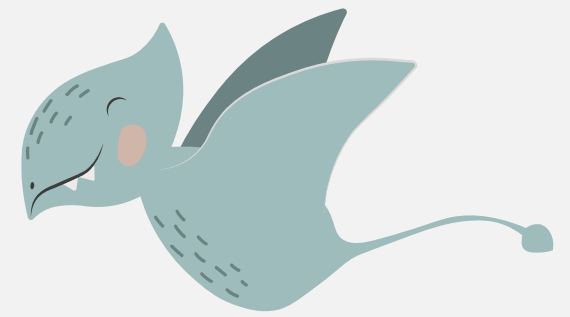
# Global strategies

- WHO has been outlining strategies to reduce mortality from chronic non-communicable diseases by 2022.
- CDC have launched public health strategies to prevent the development, progression and complications of the disease in the United States.



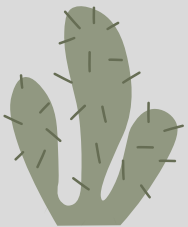
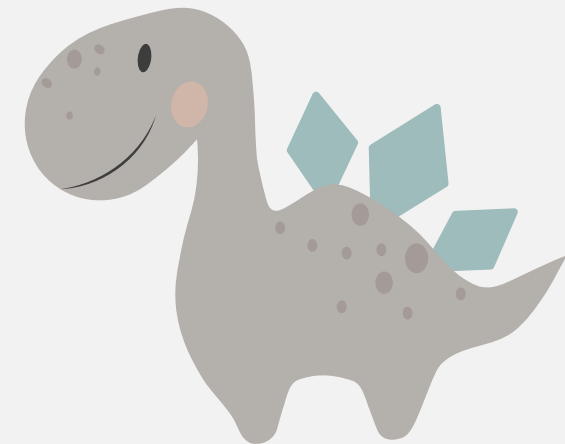
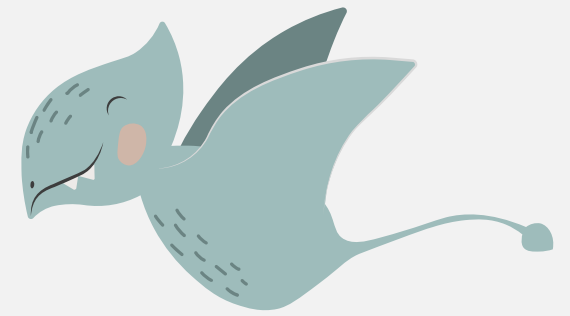
# CKD Definition

- **Kidney damage for  $\geq 3$  months,**
  - as defined by:
- structural or functional abnormalities of the kidney with or without decreased glomerular filtration rate (GFR) manifested by one or more of the following features:
  - abnormalities in the composition of the blood or urine,
  - abnormalities in imaging tests,
  - abnormalities on kidney biopsy;



# CKD Definition

- **GFR <60 ml/min/1.73 m<sup>2</sup> for ≥3 months**
  - with or without the other above-mentioned signs of kidney damage.



# An Analysis of the CURE-CKD Registry

prevalence & demographic- data



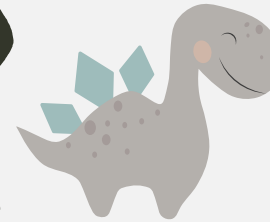
20.2% < 1  
year

- Non-Latino white: 52.8%



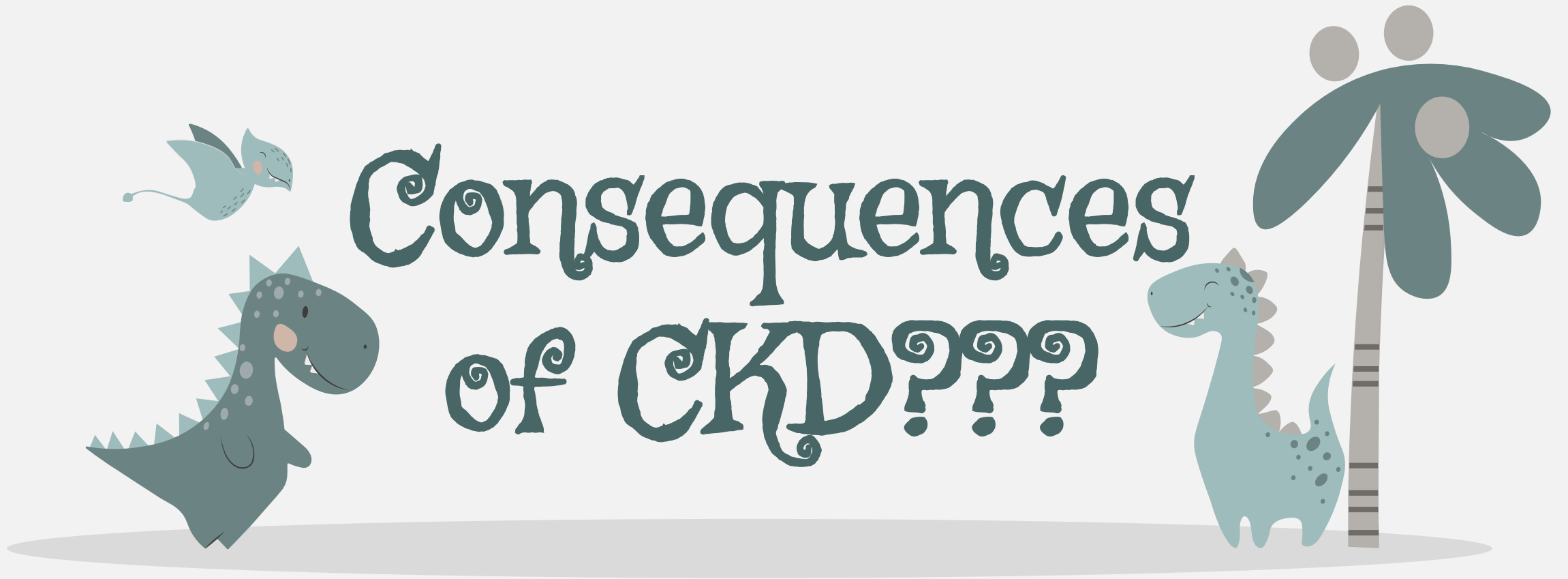
20%: CKD  
stage 1, 2

- 43.8% boys



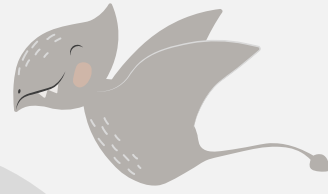
UACR, mg/gm

- >30 to ≤300:
  - 1.6%



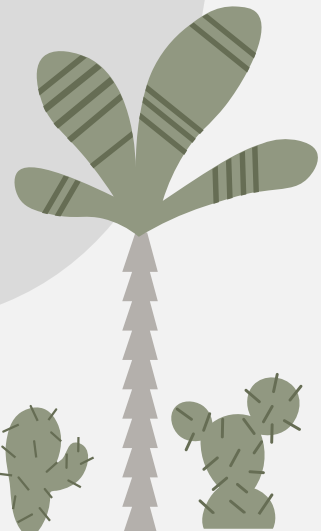
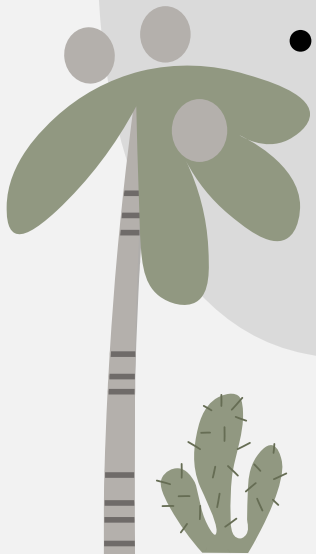
This is where you section ends. Duplicate this set of slides as many times you need to go over all your sections.





# Cardiovascular Disease risk factors

- Hypercalcemia,
  - Hyperphosphatemia,
  - High parathyroid hormone (PTH),
  - Very low or high vitamin D levels
  - Anemia
  - Malnutrition
- A multitude of middle and large molecular weight substances together labelled 'uremic toxins',
  - Chronic inflammation,
  - Oxidative stress,
  - Hyper-homocysteinemia



# Levels of Prevention



**Fetus and  
Perinatal**

**Childhood**

**Adulthood**



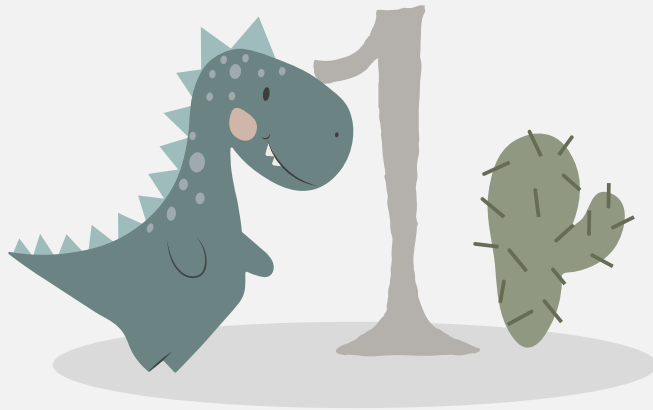
# Did you know?

- In 1986, the epidemiologist **David Barker** proposed the theory of a fetal and infantile origin for adult diseases:
  - “Adverse environments during fetal life and early childhood imply an increased risk of illness during adulthood.”

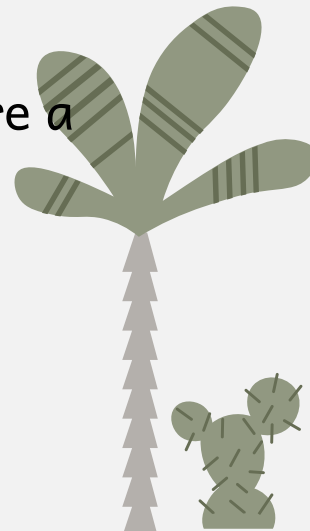




# Fetal programming and chronic adult diseases



- In Pediatrics, kidney diseases can be “silent” with nonspecific signs and symptoms.
- The first responsible doctors are pediatricians and family doctors.
- In fact, prevention of kidney disease must begin before a woman becomes pregnant.
  - It is called fetal and infant programming of non-communicable chronic diseases of adults **(NCDA)**.



# Fetal Programming

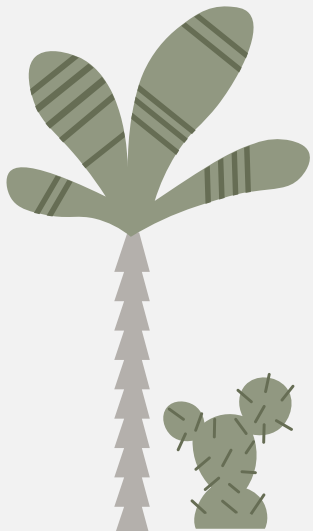
Unfavorable intrauterine environment → inhospitable experiences suffered by the embryo/fetus → adaptations of the embryo/fetus (epigenetic phenomena) → impaired renal maturation



**“FETAL AND PERINATAL PROGRAMMING OF KIDNEY DISEASES IN ADULTS”**

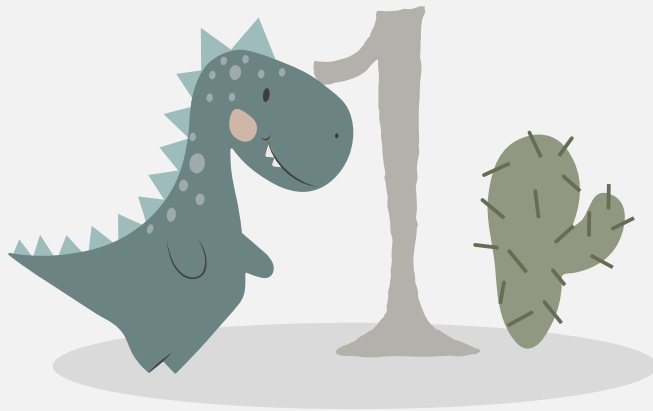


Help  
Children  
to save  
future  
Adults





# Factors induce fetal programming:

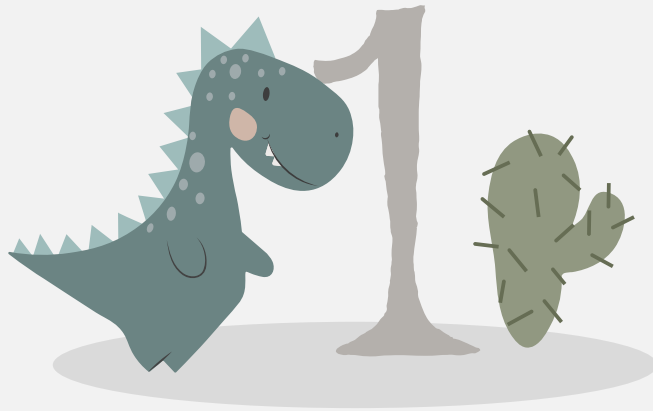


- **I. Maternal:**
- Maternal nutrition (mainly proteins and glucose);
- Consumption of illicit drugs alcohol and tobacco
- Hypertension;
- Pre-eclampsia;
- Primiparity;
- Maternal overweight / obesity;
- Mother born small for gestational age or with fetal growth restriction;
- Asthma;
- Polycystic ovary syndrome.

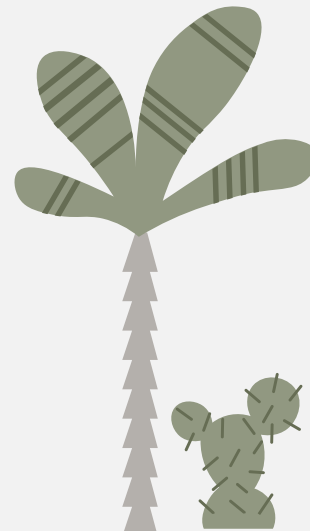




# Factors induce fetal programming:



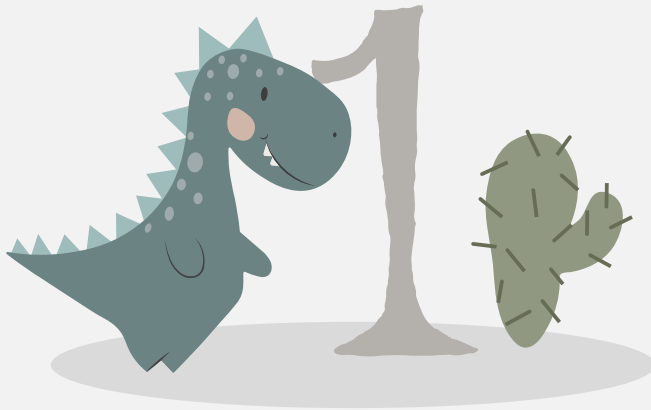
- **II. Placental:**
- Changes in uterus - placental circulation;
- Changes in nutrient transfer;
- Placental infarction;
- Abnormal development of the placenta.





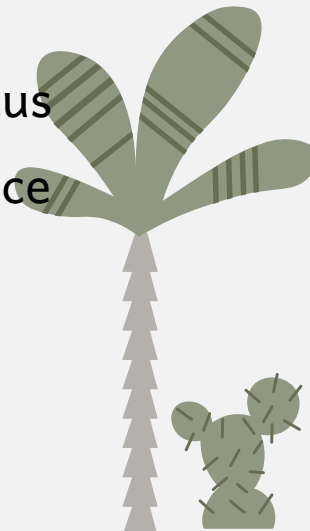


# Factors induce fetal programming:



- **III. Fetal:**
- Chromosomal abnormalities.

Regarding kidney diseases, unfavorable intrauterine environment could cause adaptations of the embryo/fetus resulting in compromised renal maturation. This sequence of events is called ***fetal and perinatal programming of kidney diseases in adults.***





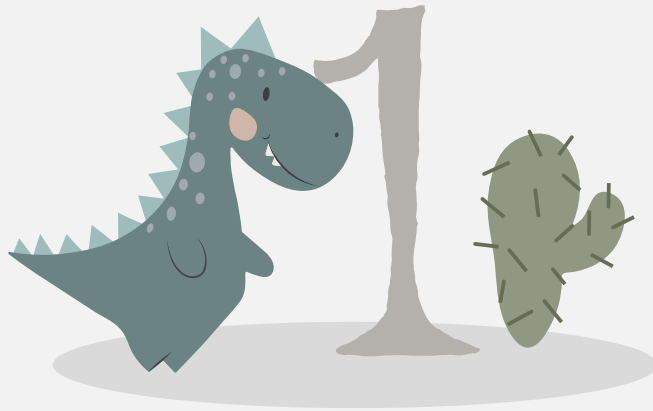
# Prevention of kidney diseases in childhood

- Considering all the evidence, in April 2016 a Workshop was held with the aim of highlighting the association between fetal and child development and the increased risk of adult diseases, **with a focus on arterial hypertension and CKD.**





# Identify Children at risk for CKD.

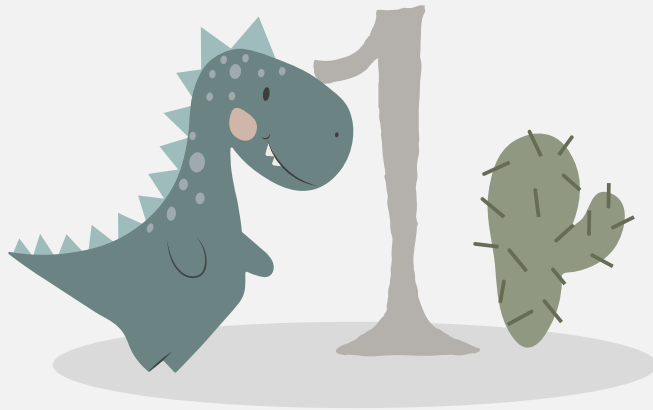


- **who should be screened?**
- I. Family history of CKD or other genetic kidney disease
- II. Family history of hypertension, diabetes and cardiovascular disease in parents, uncles and grandparents
- III. Low birth weight and premature babies

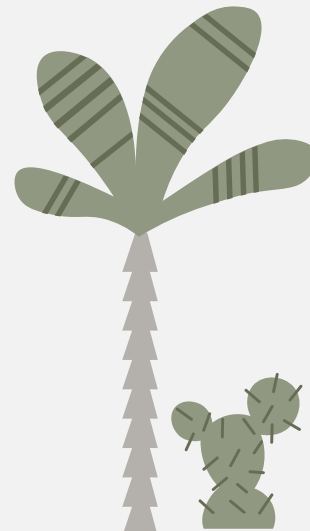




# Identify Children at risk for CKD continue

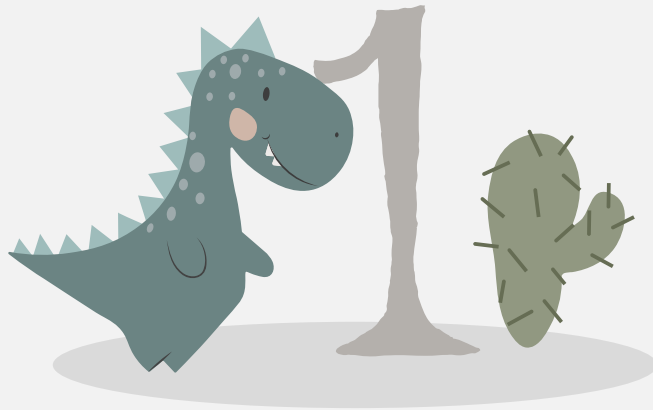


- IV. History of long hospital stay in the neonatal period
- V. Renal dysplasia / hypoplasia
- VI. Spinal cord tumors and traumas
- VII. Congenital malformations of the urinary tract

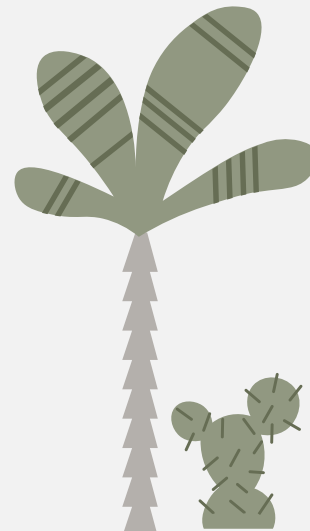




# Identify Children at risk for CKD *continue*

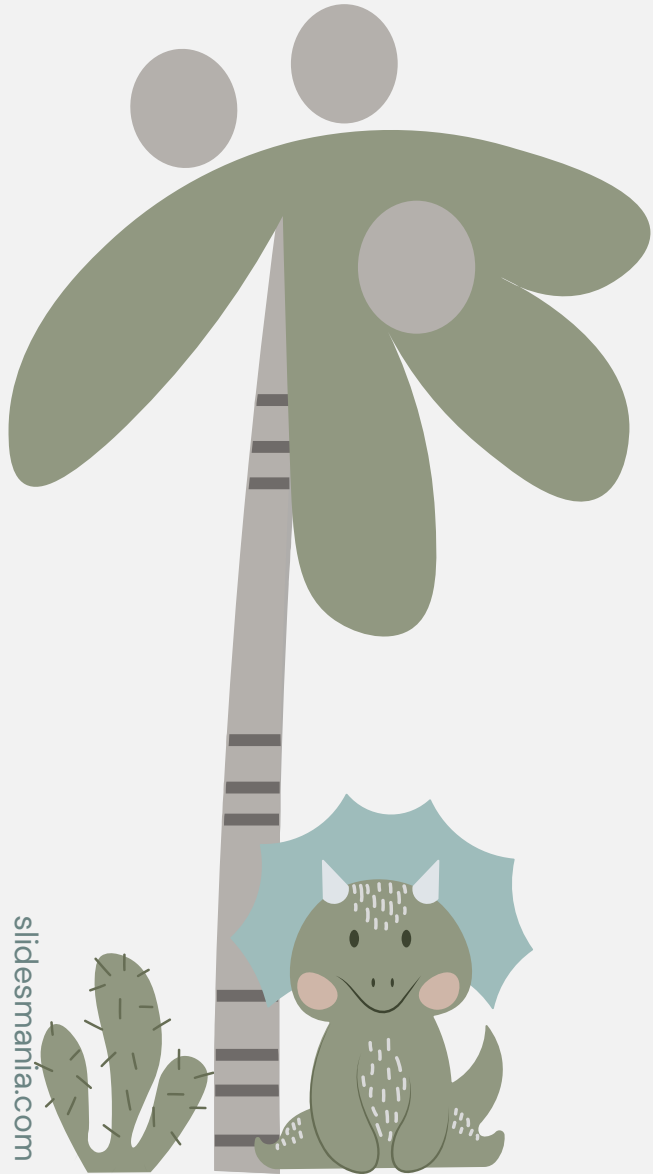


- VIII. Previous history of hemolytic-uremic syndrome
- IX. Previous history of glomerulopathies
- X. Overweight / obese children
- XI. Bladder diseases (neurogenic, non-neurogenic bladder, lower urinary tract dysfunction).



# Different aspects of CKD Prevention?

- **Primary prevention** aims to eliminate or reduce exposure to factors that cause renal disease.
- **Secondary prevention** in which the prevention of the progression of renal damage from stage 1 to stage 5 is carried out by introducing appropriate measures at various stages of CKD.
- **Tertiary prevention** strategies are focused on the: reduction or delay of long-term complications, impairments or disabilities in established disease, requiring renal replacement therapy (RRT).





# Primary preventive strategies

## 1. Control of possible future pregnancy:

- Avoid using drugs (ACEi, AG II RBs, NSAIDs, illicit drugs)
- **I.** Control of overweight/obesity and metabolic syndrome
- **II.** Control of dyslipidemia
- **III.** Pay attention to the future mother's nutrition
- **IV.** Prevent disease (rubella, toxoplasmosis, cytomegalovirus, etc.)
- **V.** Guide on the importance of genetic counseling
- **VI.** Use folic acid.





# Primary preventive strategies

## 2. Control of the pregnant woman:

- Avoid using drugs (ACEi, AG II RBs, NSAIDs, illicit drugs)
- **I.** Control of overweight / obesity and metabolic syndrome
- **II.** Control of dyslipidemia
- **III.** Pay attention to the future mother's nutrition
- **IV.** Prevent disease (rubella, toxoplasmosis, cytomegalovirus, etc.)
- **V.** Prohibit the use of tobacco and alcohol
- **VI.** Prevent prematurity, if possible
- **VII.** Early detection of intrauterine growth restriction.







# Primary preventive strategies

## 3. Infant control:

- Avoid using drugs (ACEi, AG II RBs, NSAIDs, illicit drugs)
- **I.** Stimulate breastfeeding
- **II.** Take care of infant nutrition
- **III.** Attention to secondhand smoke
- **IV.** Watch out for postnatal catch up.





# Primary preventive strategies

## 4. Child and adolescent control :

- **I.** Prevent overweight / obesity and dyslipidemia
- **II.** Promote food education
- **III.** Encourage physical activity
- **IV.** Encourage breastfeeding
- **V.** Prohibit the use of tobacco and alcohol.





# Primary preventive strategies

Parents and caregivers must have a healthy lifestyle:

- **I.** To avoid soft drinks, industrialized juices, sweets, sausages, canned goods, salt;
- **II.** Provide a diet rich in fruits, vegetables, milk and with a reduced content of saturated fats;
- **III.** Ensure adequate intake of potassium with many fruits;
- **IV.** To avoid quick and processed snacks;
- **V.** Do regular physical exercises and be an example;
- **VI.** To avoid second hand smoke;
- **VII.** To read labels to check the content of the food.





# Secondary preventive strategies

## 1. Postnatal preventive measures should include (pay attention to):

- **I.** Low birth weight and extremely premature infants
- **II.** Postnatal nutrition (Obesity, FTT)
- **III.** Monitoring of albuminuria and blood pressure
- **IV.** Appropriate and early approach to sepsis and the possibility of acute kidney injury
- **V.** Early correction of metabolic disorders (polyuria, hyperkalemia, bicarbonaturia, etc).
- **VI.** Beware of clinical situations where there is a reduction in the number of nephrons (renal agenesis, VUR IV and V, UPJO & UVJO)





# Secondary preventive strategies

- **VII.** Attention to nephrotoxic drugs (ACEi, ARBs NSAIDs, antibiotics - aminoglycosides)
- **VIII.** Be careful with the use of nephrotoxic contrasts
- **IX.** Early correction of hypovolemia and shock with rapid replacement and volume maintenance
- **X.** Appropriate and early approach to UTI
- **XI.** Appropriate and early approach to glomerulopathies, (proteinuria, BP, dyslipidemia)
- **XII.** Control of metabolic diseases (glycemic control, dyslipidemia, proteinuria, blood pressure)
- **XIII.** Attention to rare diseases.





# Tertiary preventive strategies

- **I.** Blood pressure control
- **II.** Proteinuria control
- **III.** Dyslipidemia control
- **IV.** Diet control (protein and phosphorus)
- **V.** Anemia control
- **VI.** Vitamin D normalization
- **VII.** Bone mineral disease control
- **VIII.** Metabolic acidosis control.





“

CKD is common, harmful and  
treatable”

— Irene M. Pepperberg

# References



- Prevention of pediatric chronic kidney disease. Urology & Nephrology Open Access Journal.2020
- Chronic kidney disease in children. Clinical Kidney Journal, 2016.
- Adiposity, Sex, and Cardiovascular Disease Risk in Children With CKD: A Longitudinal Study of Youth Enrolled in the (CKiD) Study. AJKD 2020.
- Reducing the burden of cardiovascular disease in children with CKD: prevention vs. damage limitation. Pediatric Nephrology 2021.
- Urologic Care and Progression to End-Stage Kidney Disease: (CKiD) Nested Case-Control Study. Journal of Pediatric Urology 2019.
- Clinical Characteristics of and Risk Factors for CKD Among Adults and Children: An Analysis of the CURE-CKD Registry. JAMA Network Open 2019.







**Do you have any questions?**