WORLD KIDNEY DAY

Usama Alanan, MD, s PhD

Saturday 16 March 2021

MANARA UNIVERSITY

جَـامعة المَـنارة
MANARA UNIVERSITY

Prof. Joel Kopple, M.D. put forward the idea of World Kidney Day in **2003**.

- IFKF (International Federation of Kidney Foundations) was established in **2000**.
- Prof. Dr. Joel D. Kopple is one of the first founders of IFKF.
- IFKF arranged its first congress in Capadocia.

FIRST STEPS FOR WORLD KIDNEY DAY

- Prof. Dr. Joel F. Kopple offered to IFKF president to hold a World Kidney Day on November 2003.
- Then International Federation of Kidney Foundations and International Society of Nephrology created a committee
- Beginning from 2004 some works had already been started on arranging World Kidney Day.
- First World Kidney Day was held on **9th March 2006**.
- First World Kidney Day's announcement arrived late to our foundation so we organized a world kidney day meeting within the Foundation Week activities.

1st World Kidney Day

2006 World Kidney Day Theme

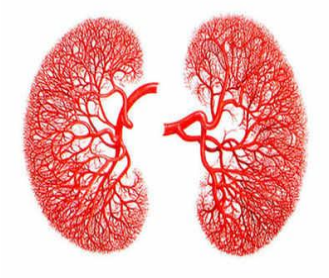
"Are Your Kidneys O.K.?"

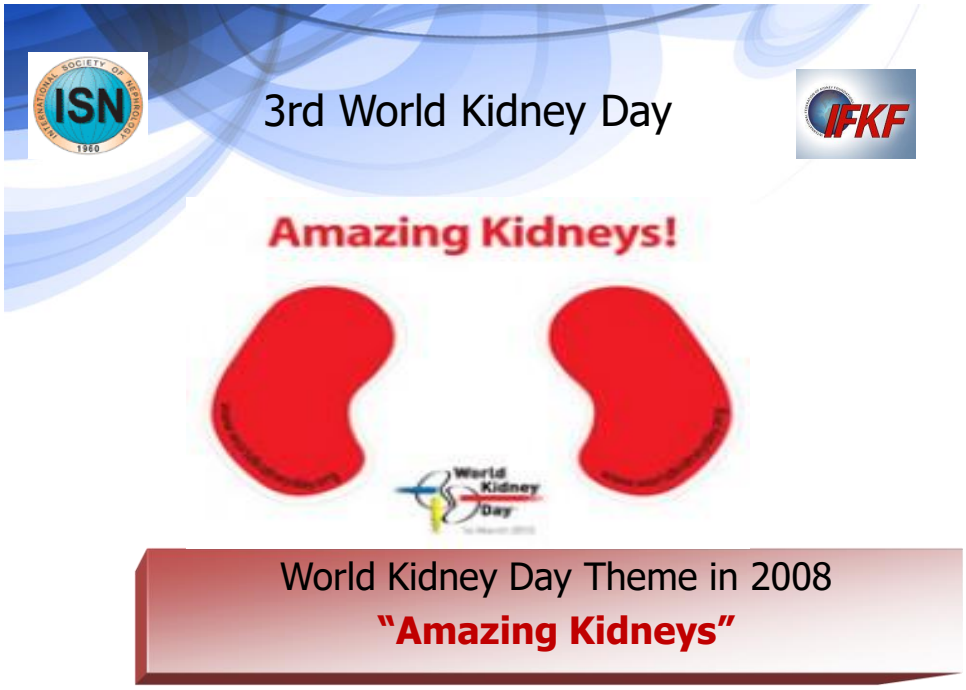
7th International IFKF Meeting, Giardini Naxos, Italy 2006

2nd World Kidney Day

2007 World Kidney Day Theme:

"CKD is Common, Harmful and Treatable"



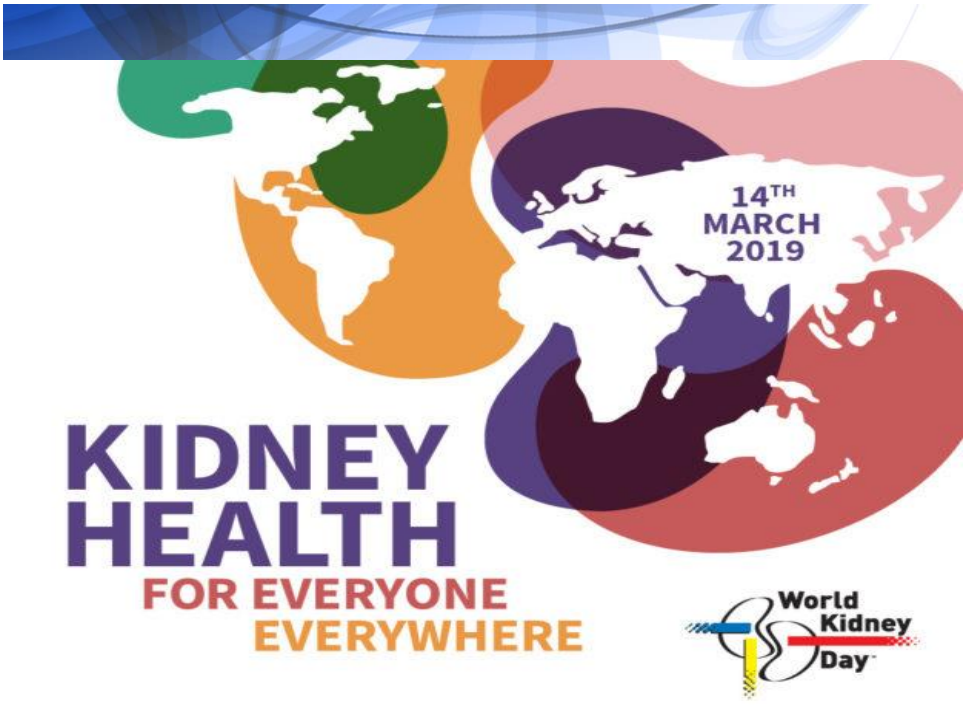


World Kidney Day Theme in 2009:
"Protect Your Kidneys: Keep Your Pressure Down"

5th World Kidney Day's Main Subject is Diabetes (2010)

Dünya Böbrek Günü
11 Mart 2010

Main Theme: "Protect Your Kidneys, Control Diabetes

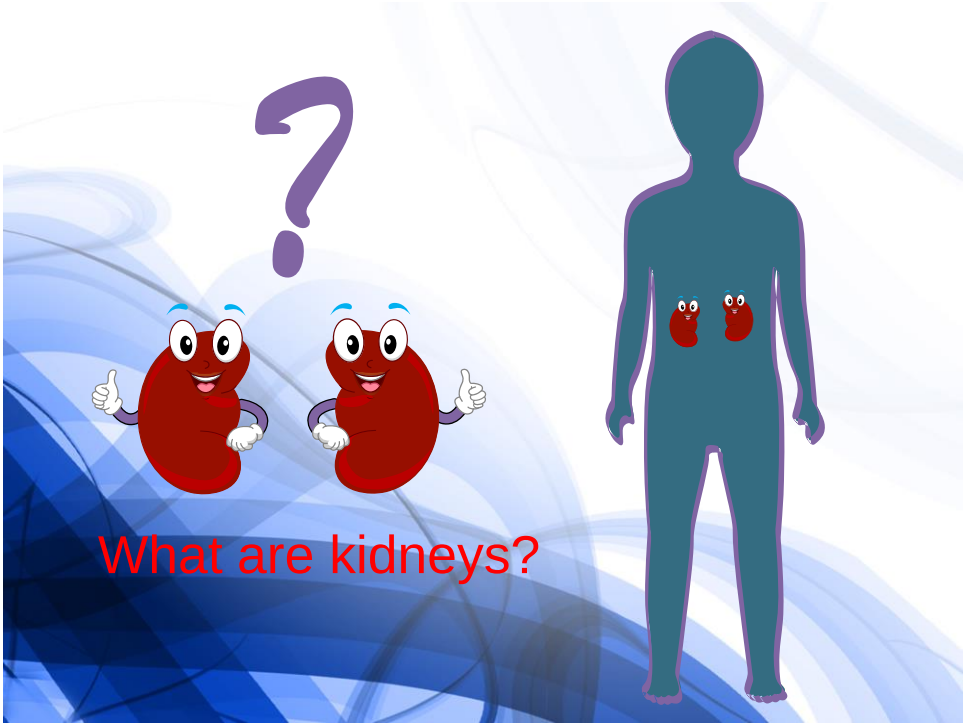



Good governance, care for the environment
Start early: Optimize women's and child health
Kidneys & Women's Health
8 March 2016
Healthy lifestyle Prevent kidney stones, obesity
START THE DAY WITH 2 GLASS OF water
10 MARCH 2016
KIDNEY DISEASE & CHILDREN
ACT EARLY TO PREVENT IT!
KIDNEY HEALTH
FOR EVERYONE
EVERYWHERE
14TH MARCH 2019
Be vigilant: Prevent AKI
STOP
KIDNEY ATTACK
Kidneys for Life: Stop Acute Kidney Injury
Protect your kidneys, Save your heart!
Protect your kidneys – control diabetes!
Diagnose and treat diabetes and hypertension early
Holistic integrated care

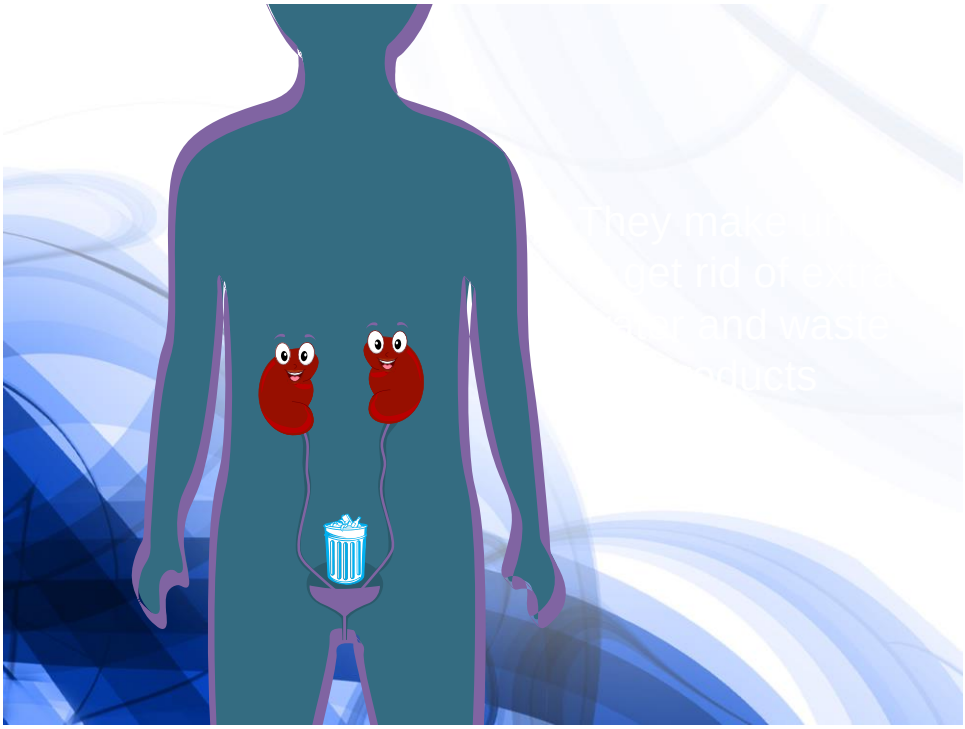

Food Supplements
Haem
CARBOBURN
PROSPAN
Collagen C-Ugarit
spirited young
UGARIT

LIVE AND GIVE LIFE

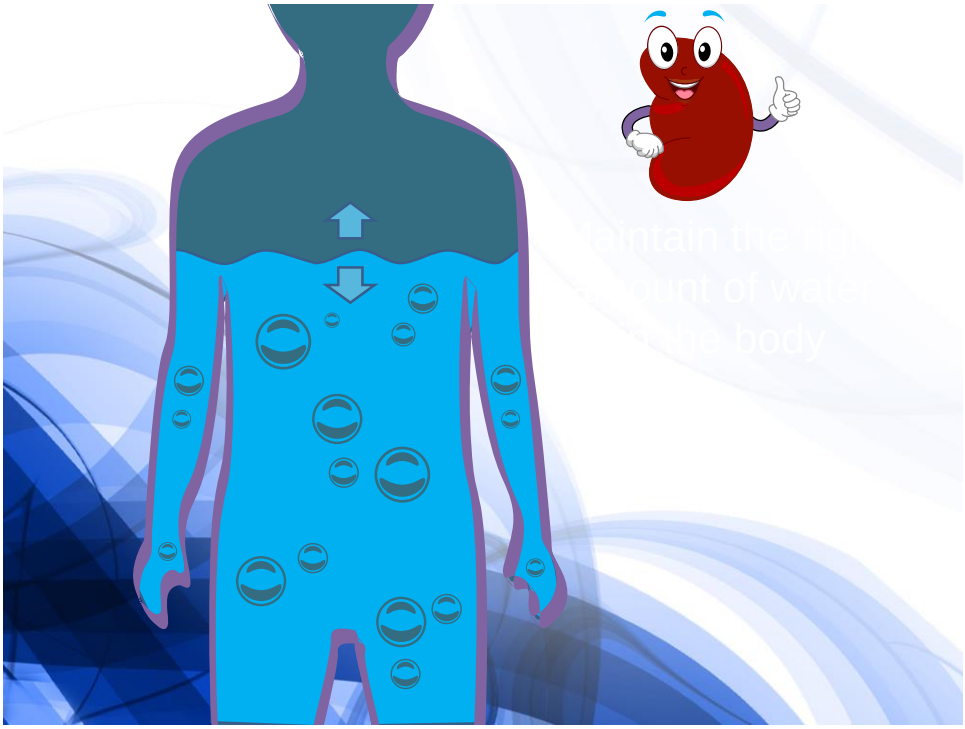
Dr. USAMA

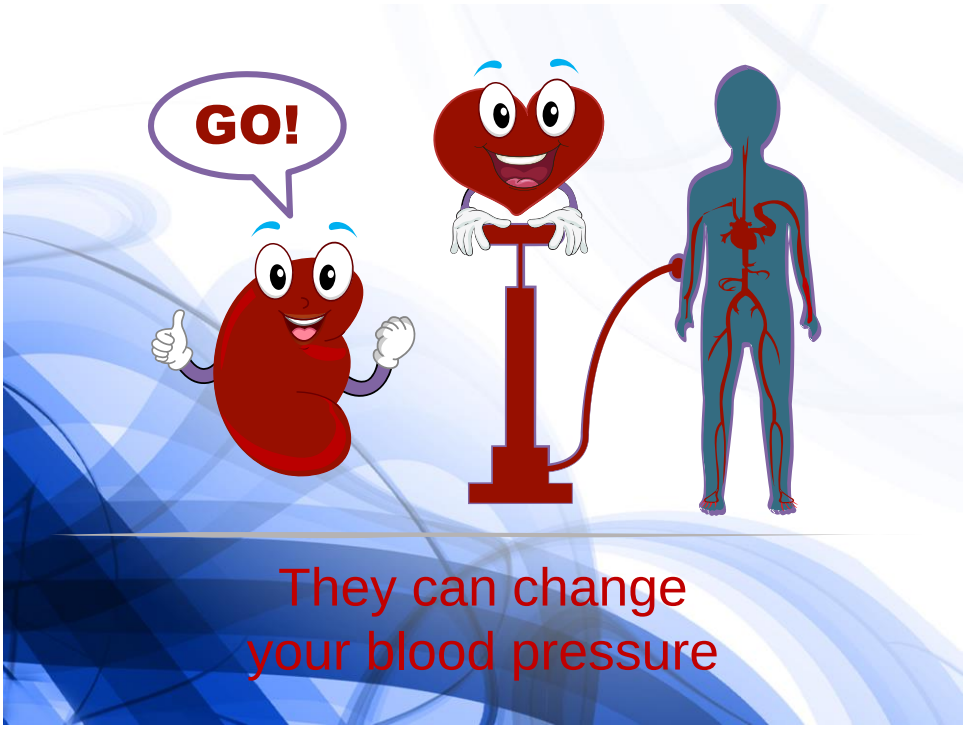


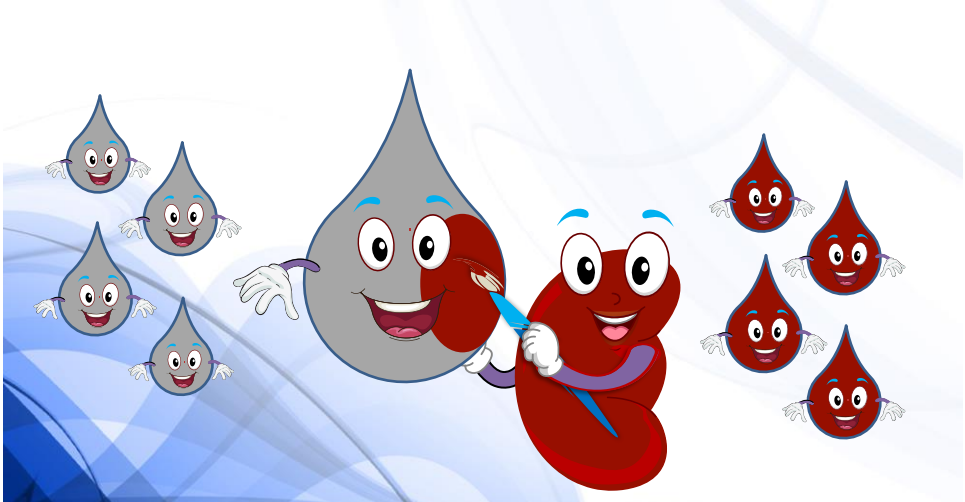
Kidneys check the nutrients that you get from food



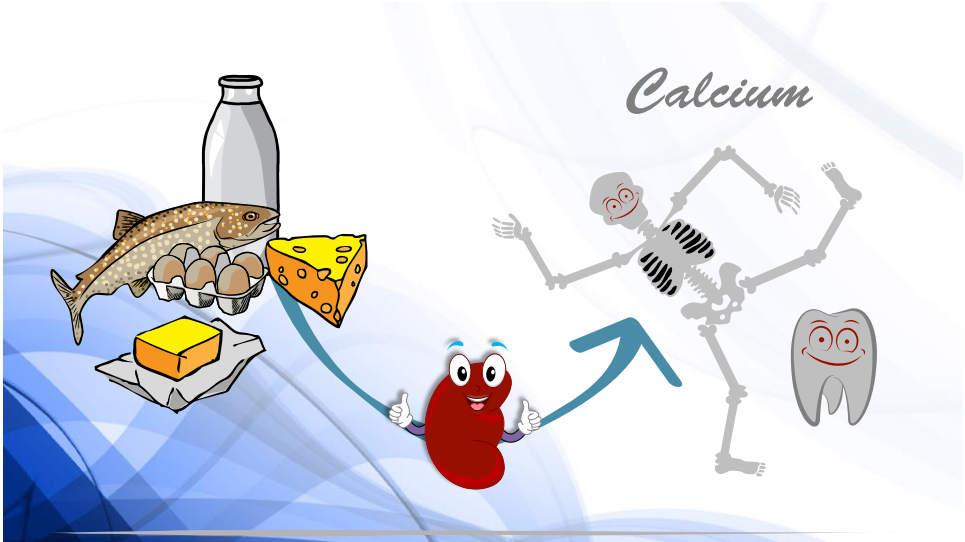
They make u
get rid of extra
and waste
oducts



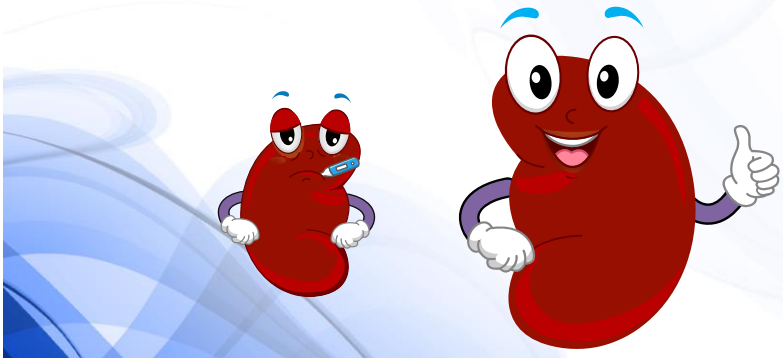

GO!
They can change
your blood pressure



They help the body
make red blood cells

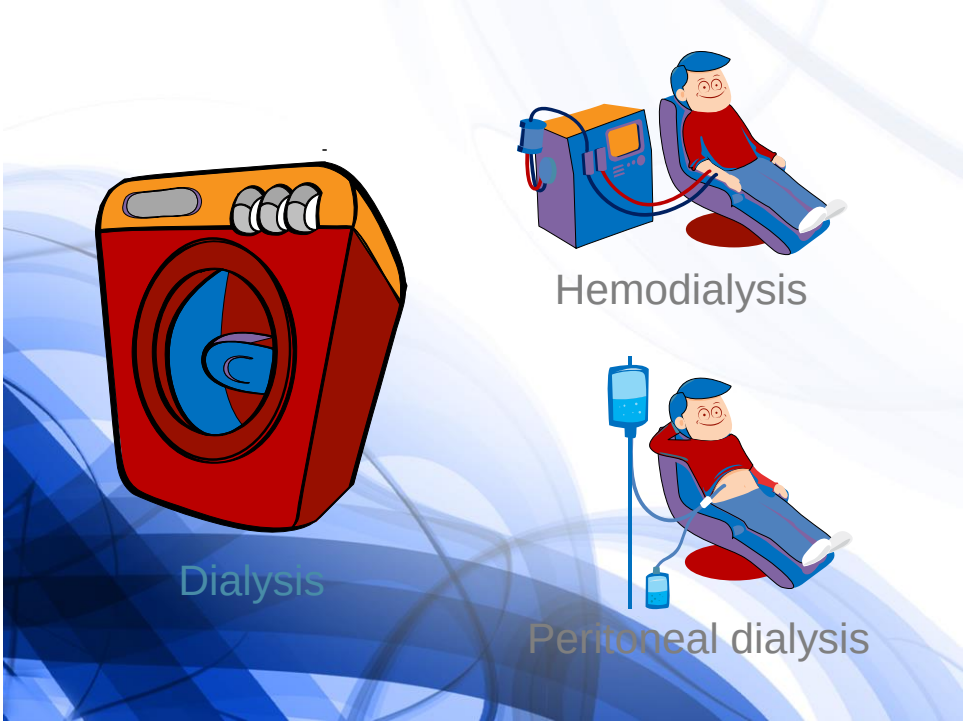


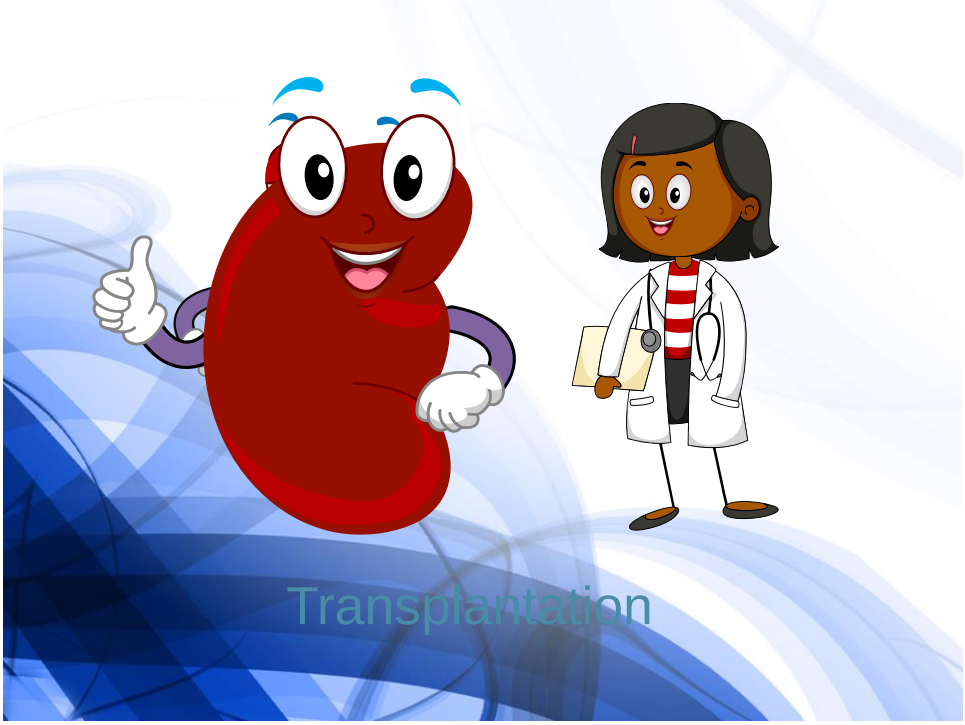
They produce
active vitamin D



Your body can work with only 1 kidney

Kidneys don’t work well


Hemodialysis
Dialysis
Peritoneal dialysis


Transplantation

RENAL DAMAGE BY DRUGS

Dr. Usama Alanan

مبادئ تحديد الجرعة الدوائية:

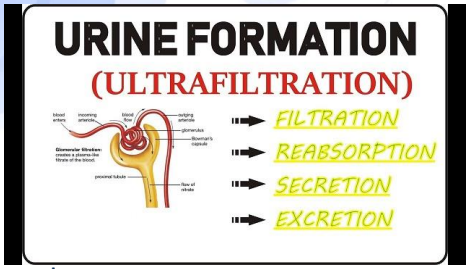
الديناميكية الدوائية: هي العلاقة بين تركيز الدواء والجواب الذي يحدثه وتعتمد على: الوصول للهدف وألفة المستقبلات وعددها وعلى اصطناع البروتين (المرسال الثانوي)

الحرائك الدوائية: هي العلاقة بين الجرعة المطبقة والتركيز بالمصل، وتعتمد على الامتصاص والطرح والتوزع والاستقلاب

تحديد تركيز الدواء المطلوب:

- العلاقة بين تركيز الدواء والجواب عليه يأخذ شكل سيني (Sعلاقة غير خطية) فعند الوصول للحد الأعلى لا يمكن الحصول على نتائج إضافية إلا السمية

MECHANISM OF URINE FORMATION



- it consist of the following steps:
- Glomerular filtration
- Tubular reabsorption
- Active tubular secretion

- Urine formation begins with glomerular filtration. The volume of fluid filtered is about 180/L day of which more than 99 % gets reabsorbed in the renal tubules; urine output is about 1-1.5 L/day. After filtration, fluid traverses in the renal tubules. The tubular fluid contains Na+, K+, HCO3-, amino acids, glucose etc.

Screening for Acute Kidney Injury

		RIFLE criteria	
		sCreatinine	Urine output criteria
Increasing severity	Risk	↑ sCrea × 1.5	< 0.5 ml/kg per h × 6 h
	Injury	↑ sCrea × 2	< 0.5 ml/kg per h × 12 h
	Failure	↑ sCrea × 3 or ⩾ 0.5 mg/dl if baseline sCrea ↑ > 4.0 mg/dl	< 0.3 ml/kg per h × 24 h or anuria × 12 h
Outcome	Loss	Complete loss of renal function > 4 weeks	
	End-stage	End-stage renal disease	

Slide Title

The main mechanisms of nephrotoxicity are

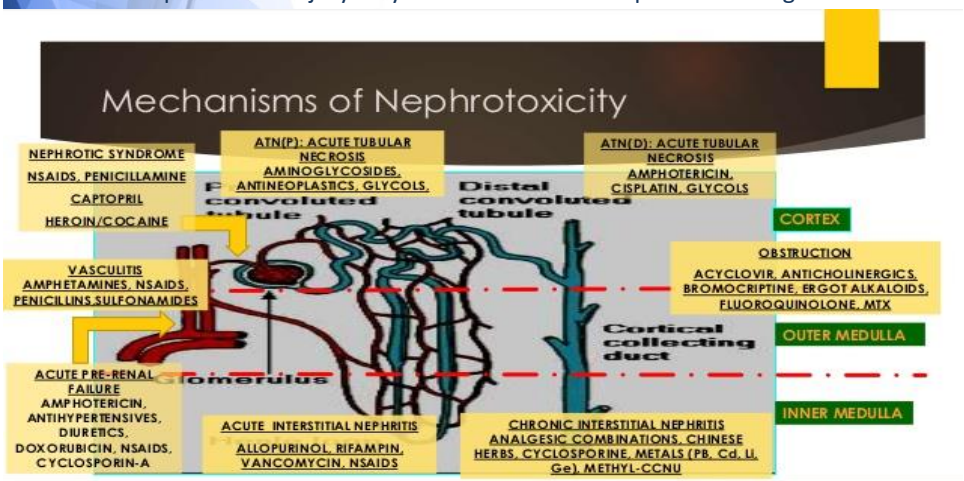
- vasoconstriction
- altered intraglomerular hemodynamics
- tubular cell toxicity
- interstitial nephritis
- crystal deposition
- thrombotic microangiopathy
- osmotic nephrosis.

الآليات الرئيسية للسمية الكلوية هي

- تضيق الأوعية
- تغير ديناميكا الدم داخل الكبيبة
- سمية الخلايا الأنبوبية
- التهاب الكلية الخلالي
- ترسب البلورات
- اعتلال الأوعية الدقيقة الخثاري
- التناضحي.

Mechanism of drug-induced acute kidney injury

- Drugs may damage the kidney by several mechanisms.
- Understanding these mechanisms is the key to providing more-efficacious preventive measures. While there are numerous potentially nephrotoxic drugs, only a limited number of patterns of renal injury exist. On the other hand, different patterns of injury may be associated with a particular drug.

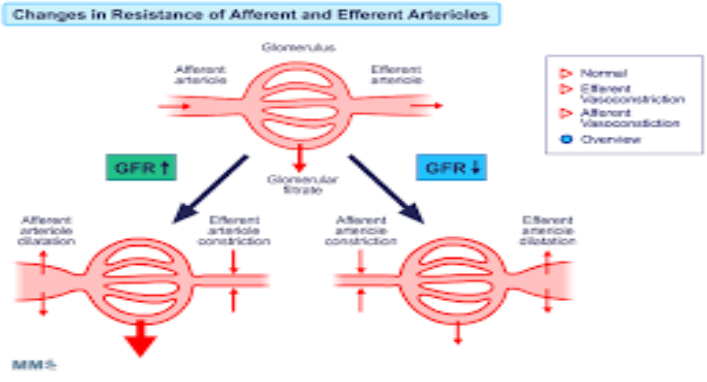


Common Drugs leading to Nephrotoxicity

- Antibiotics:
  - Aminoglycoside, Vancomycin
- Anti Fungals
  - Amphotericin B
- Immunomodulators
  - Calcineurin inhibitors
  - Chemotherapeutic agents
  - Cyclosporin, Tacrolimus
- Antivirals
  - Acyclovir
- Anti Hypertensives
  - ACE inhibitors, ARBs
  - Diuretics
  - β-blockers
- NSAIDs /cox-2 inhibitors
- Cocaine
- Ethylene glycol
- Occupational toxins (heavy metals, organic solvents)
- Herbal remedies

1- vasoconstriction

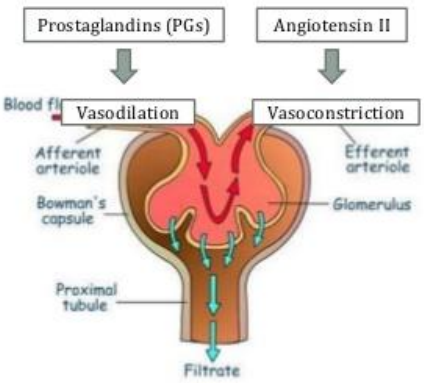
This is the main mechanism of acute nephrotoxicity for **calcineurin inhibitors** and vasopressors and contributes to the nephrotoxicity of **amphotericin** and **contrast agents**.



Silvester W, Bellomo R, Cole L. Epidemiology, management, and outcome of severe acute renal failure of criticall illness in Australia. Crit Care Med 2001; 29:1910—1915.

2- Altered intraglomerular hemodynamics:
تغير ديناميك الدم داخل الكبيبة

- Pathogenesis is via reducing the **volume** OR **pressure** OR **both** of blood delivered to the kidney
- **Common medications**
  - NSAIDs
  - ACEI, ARBs
  - Calcineurin inhibitors (e.g. cyclosporine, tacrolimus)

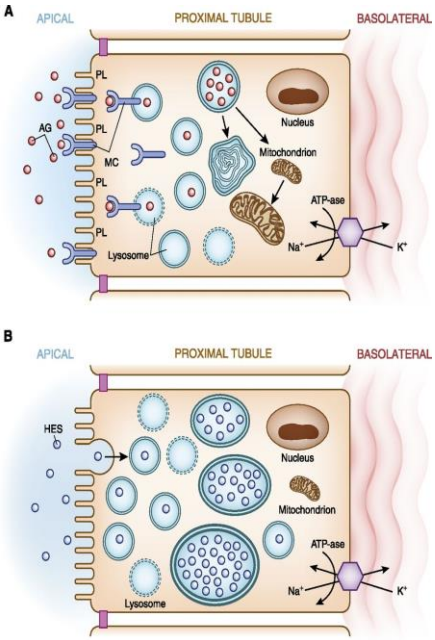


–*Functional*

http://biologigonz.blogspot.com/2010/02/mengenal-ginjal.html

3- Tubular cell toxicity:

The role of the proximal tubule in concentrating and reabsorbing the glomerular filtrate renders it vulnerable to toxic injury. Tubular toxicity is, at least in part, dose-dependent and is the cause of kidney injury associated with **aminoglycosides, amphotericin, calcineurin inhibitors, cisplatin, methotrexate, antivirals such as foscarnet, cidofovir and antiretrovirals, pentamidine, cocaine, and contrast agents**.



Kodner CM, Kudrimoti A. Diagnosis and management of acute interstitial nephritis. Am Fam Physician 2003; 67:2527—2534.

4-Interstitial nephritis:

This is mediated by inflammation of the interstitium and tubules. It occurs on an **allergic basis** in an idiosyncratic and nondose-dependent manner. The onset after dug exposure ranges from 3 to 5 days with a second exposure up to several weeks with a first exposure. It has been associated with antibiotics (**beta-lactams, quinolones** (especially ciprofloxacin), rifampin, macrolides, sulfonamides, tetracyclines), most **NSAID**, **diuretics** (thiazides, loop diuretics, and triamterene), **anticonvulsants** (phenytoin), cimetidine and **ranitidine**, **allopurinol**, antivirals (acyclovir, indinavir), and **cocaine**

Markowitz GS, Perazella MA. Drug-induced renal failure: a focus on tubulointerstitial disease. Clin Chim Acta 2005; 351:31—47.

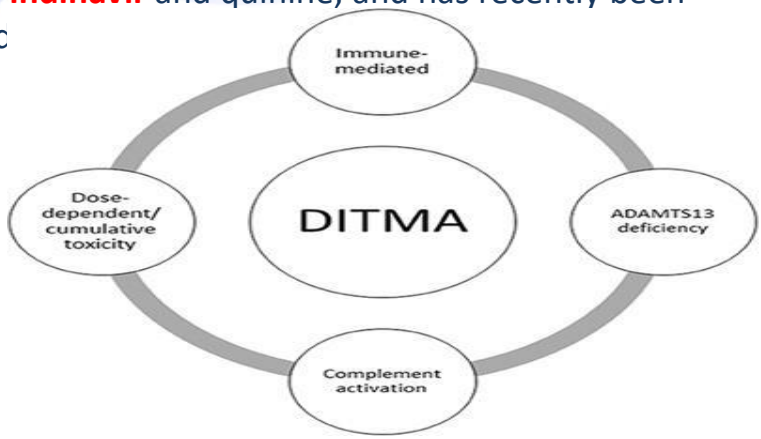
5-Crystal deposition:

- The precipitation of crystals in distal tubular lumens is mostly pH-dependent and explains the nephrotoxicity occurring with **acyclovir, sulfonamide, methotrexate, indinavir, and triamterene** .
- **Uric acid** and **calcium phosphate** crystals occur in **tumor lysis syndrome**, most commonly observed following chemotherapy for high-grade lymphoproliferative malignancies.

Davidson MB, Thakkar S, Hix JK, et al. Pathophysiology, clinical consequences, and treatment of tumor lysis syndrome. Am J Med 2004; 116:546— 554.

(6) Drug-induced thrombotic microangiopathy:

This has been reported with **mitomycin, cyclosporin, tacrolimus, OKT3, interferon, ticlopidine, clopidogrel, cocaine, indinavir** and quinine, and has recently been reviewec



Dlott JS, Danielson CF, Blue-Hnidy DE. J McCarthy L. Drug-induced Thrombotic Thrombocytopenic Purpura/Hemolytic Uremic Syndrome: A Concise Review. Ther Apher 2004; 8:102—111.

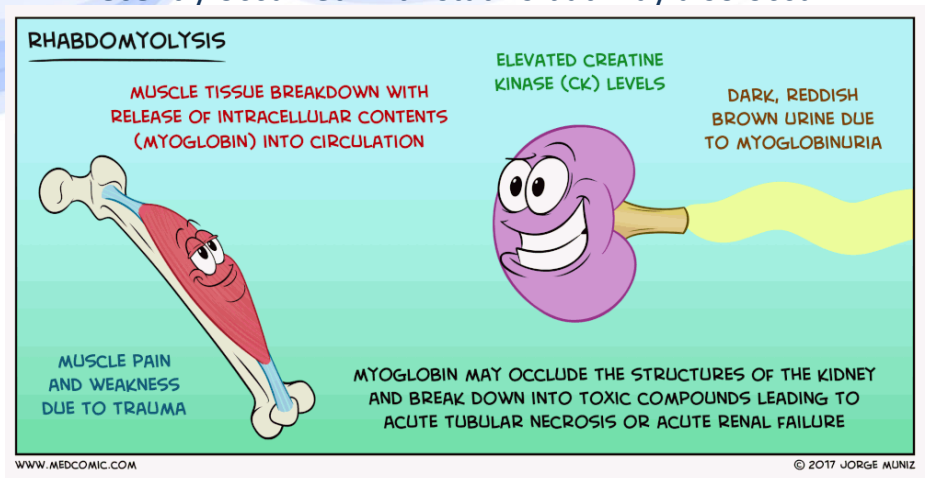
(7) Osmotic nephrosis:

- **Hyperoncotic solutions** may decrease GFR due to their effect on glomerular filtration pressure or because of osmotically induced tubular damage.
- Osmotic nephrosis is the mechanism of nephrotoxicity associated with high doses of **mannitol, immunoglobulins**

Perazella Man. Cayc AV. Acute renal failure and intravenous immune globulin: sucrose nephropathy in disguise? Am J Ther 1998; 5:399—403.

(8) Rhabdomyolysis:

- Rhabdomyolysis with resulting kidney injury has recently occurred with statins but may also occur



Coco TJ, Klasner AE. Drug-induced rhabdomyolysis. Curr Opin Pediatr 2004; 16:206—210.

Recent research

Therapeutic agents may be injurious to tubules via a variety of subcellular mechanisms such as :

- **inducing mitochondrial dysfunction**
- **disruption of lysosomal and cell membranes**
- **shifting of ion gradients (e.g. calcium)**
- **free radical formation.**

Prevention of drug-induced acute kidney injury

- Prevention of drug-induced AKI requires knowledge of and attention to:

(a) the presence of **risk factors** for nephrotoxicity.

(b) **alternative therapies** for drugs with potential nephrotoxicity.

(c) appropriate **drug dosing** adapted to altered kinetics.

(d) the correct assessment of **kidney function** before and during treatment with the aim of early recognition of kidney injury.

(e) **preventive measures** for nephrotoxicity (general and specific).

Education, vigilance, and early intervention are therefore the major avenues for prevention of iatrogenic kidney injury

Risk factors for nephrotoxicity

Chronic risk factors

- Older age (>65 years)
- Chronic kidney disease
- Diabetes mellitus
- Malignancy
- Cardiovascular disease
- Liver disease
- Chronic pulmonary disease
- Hypertension
- Peripheral vascular disease

Acute risk factors

- Sepsis/infection
- Volume depletion (true and effective)
- Acute decompensated heart failure
- Hypotension
- Complex (major) surgery
- Trauma
- Mechanical ventilation

Abbreviation: ICU, intensive care unit.

Kidney International (2012) **81**, 1172–1178

Correct assessment of kidney function

- ان الجرعة الزائدة للمرضى الذين يعانون من اختلال وظائف الكلى أو الكبد هي أحد الأنواع الرئيسية للأخطاء التي تسبب أحداثًا دوائية ضائرة.

- الجرعات الصحيحة للعقاقير ، بناءً على وظيفة العضو ، تتطلب فهم بعض مبادئ الحرائك الدوائية الرئيسية

- في كثير من الحالات ، تتفوق الحاجة إلى العلاج على التسمم الكلوي. في هذه الحالات ، سوف تكون هناك حاجة لاتخاذ تدابير لمنع أو على الأقل تقليل الضرر الكلوي الناجم عن الأدوية.

METHODS OF DOSE REDUCTION

- **Loading Doses**
- **Maintenance Doses**
- **Ongoing Assessment**
- **Therapeutic Drug Monitoring**
- **Clinical Response**

Prescribing for a Patient with Renal Dysfunction

- Ascertain level of **renal function** (estimated **GFR/CCr**)
- Establish integrity of **liver metabolism**
- Establish **loading dose**
- **Maintenance dose** - dose reduction vs. interval extension
- Check for **drug interactions**
- Decide whether blood level **monitoring** is indicated
- **Location** of Drug Action
- Method of **Administration**

Cockroft-Gault Equation

CKD

Creatinine clearance
- Cockroft- Gault formula

$$\frac{(140 - \text{age}) \times \text{body mass (kg)}}{\text{Serum creatinine concentration} \times 72}$$

Female x coefficient 0.85

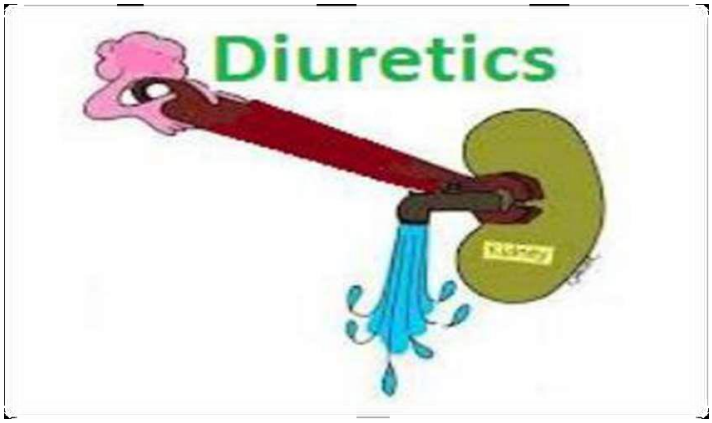
Table 35.1 Drug-Induced Clinical Kidney Syndromes

Kidney Syndrome	Causative Agents
Acute Kidney Injury	
Prerenal	Cyclosporine, tacrolimus, radiocontrast, Am B, ACE inhibitors, ARBs, NSAIDs, interleukin-2, exenatide
Intrarenal	
Vascular disease	Gemcitabine, anti-VEGF drugs, propylthiouracil, interferon
ATN	AGs, AmB, cisplatin, tenofovir, ifosfamide, pemetrexed, polymyxins, vancomycin, pentostat, zoledronate, warfarin
AIN	Immune checkpoint inhibitors, penicillins, cephalosporins, sulfonamides, rifampin, NSAIDs, interferon, ciprofloxacin, others
Crystal nephropathy	Methotrexate, acyclovir, sulfonamides, indinavir, atazanavir, ciprofloxacin, sodium phosphate
Osmotic nephropathy	IVIG, HES, dextran, mannitol
Postrenal	Methysergide, drug-induced stones, alpha-agonists
Proteinuria	Gold, NSAIDs, anti-VEGF drugs, penicillamine, interferon, pamidronate
Tubulopathies	AGs, tenofovir, cisplatin, ifosfamide, AmB, pemetrexed, cetuximab
Nephrolithiasis	Sulfadiazine, atazanavir, indinavir, topiramate, zonisamide
CKD	Li^+, analgesic abuse, cyclosporine, tacrolimus, cisplatin, nitrosourea

ACE, Angiotensin-converting enzyme; *AmB,* Amphotericin B; *AIN,* acute interstitial nephritis; *AGs,* aminoglycosides; *ARBs,* angiotensin receptor blockers; *ATN,* acute tubular necrosis; *CKD,* chronic kidney disease; *HES,* hydroxyethyl starch; *IVIG,* intravenous immune globulin; *Li^+,* lithium; *NSAIDs,* nonsteroidal antiinflammatory drugs; *VEGF,* vascular endothelial growth factor.

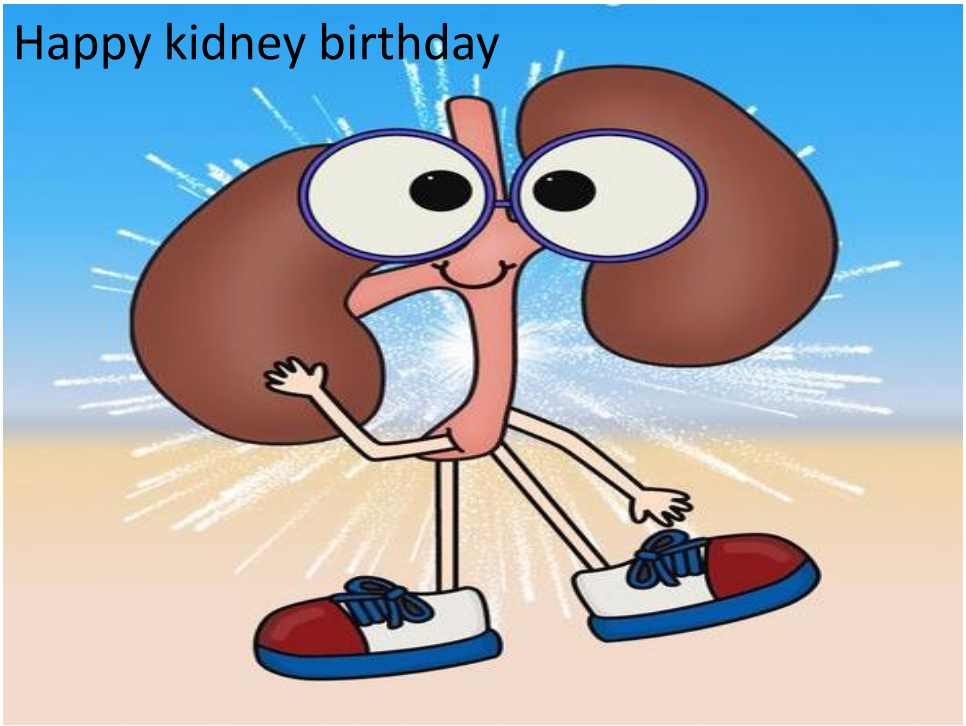
Diuretics

- Diuretics are drug that promote excretion of Na+ and water in urine




جامعة
المنارة
الإيمان بالشباب
Believing in young people
UGARIT
Welcome
PROSPAN


KIDNEY
HEALTH
STOP
UGARIT
Welcome
PROSPAN
UNIPHARMA
The Quality You Trust
EMPA


Happy kidney birthday