

CKD

Fb/Nurse-Info

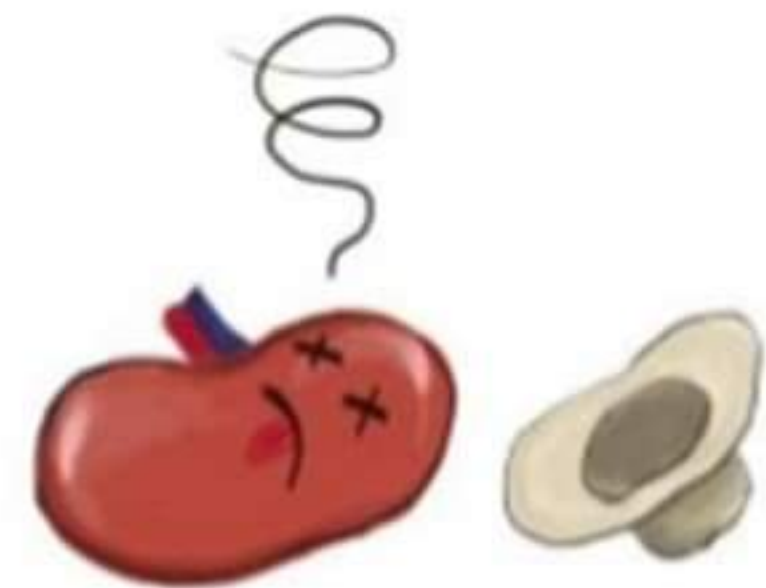
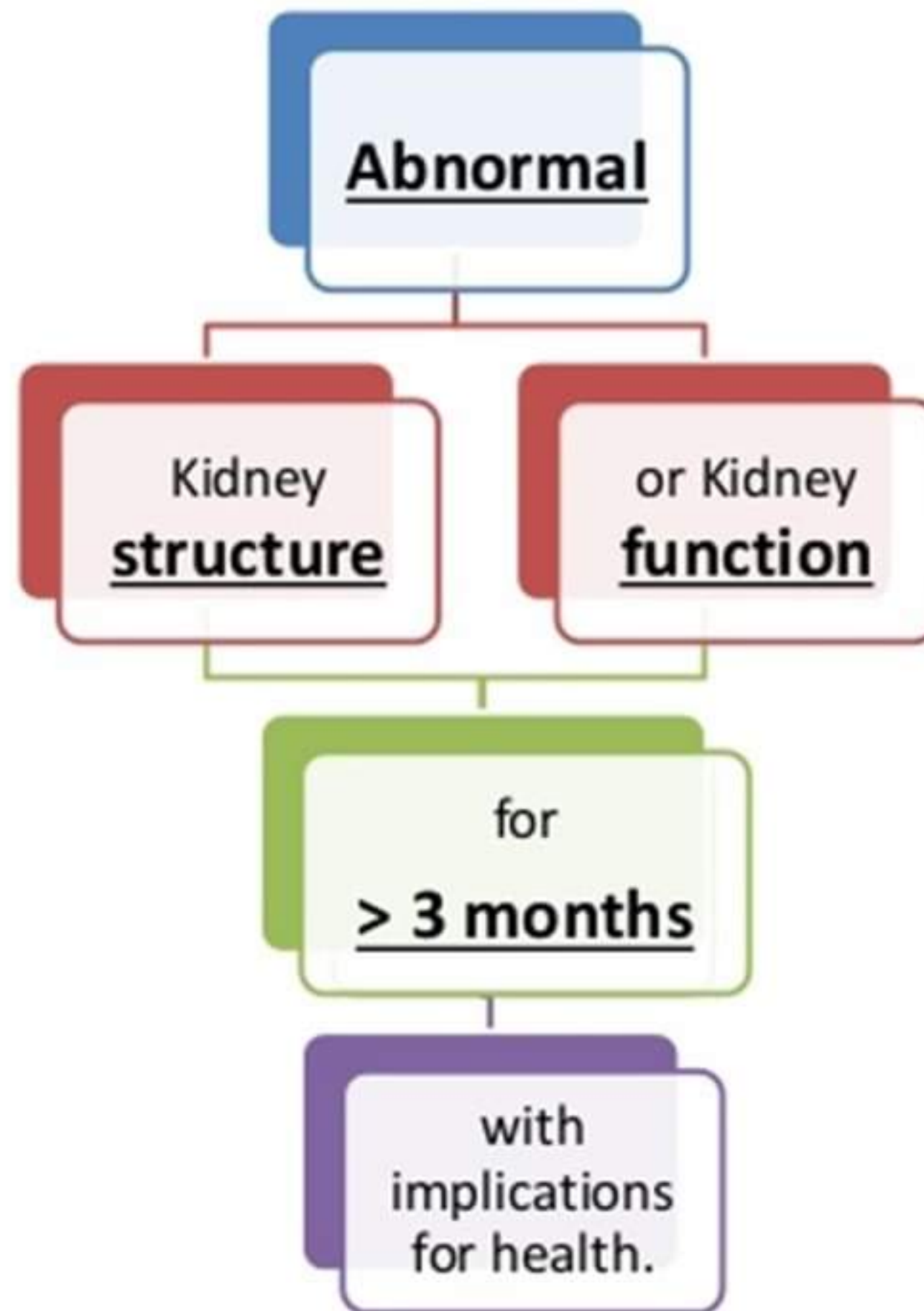
Chronic Kidney Disease



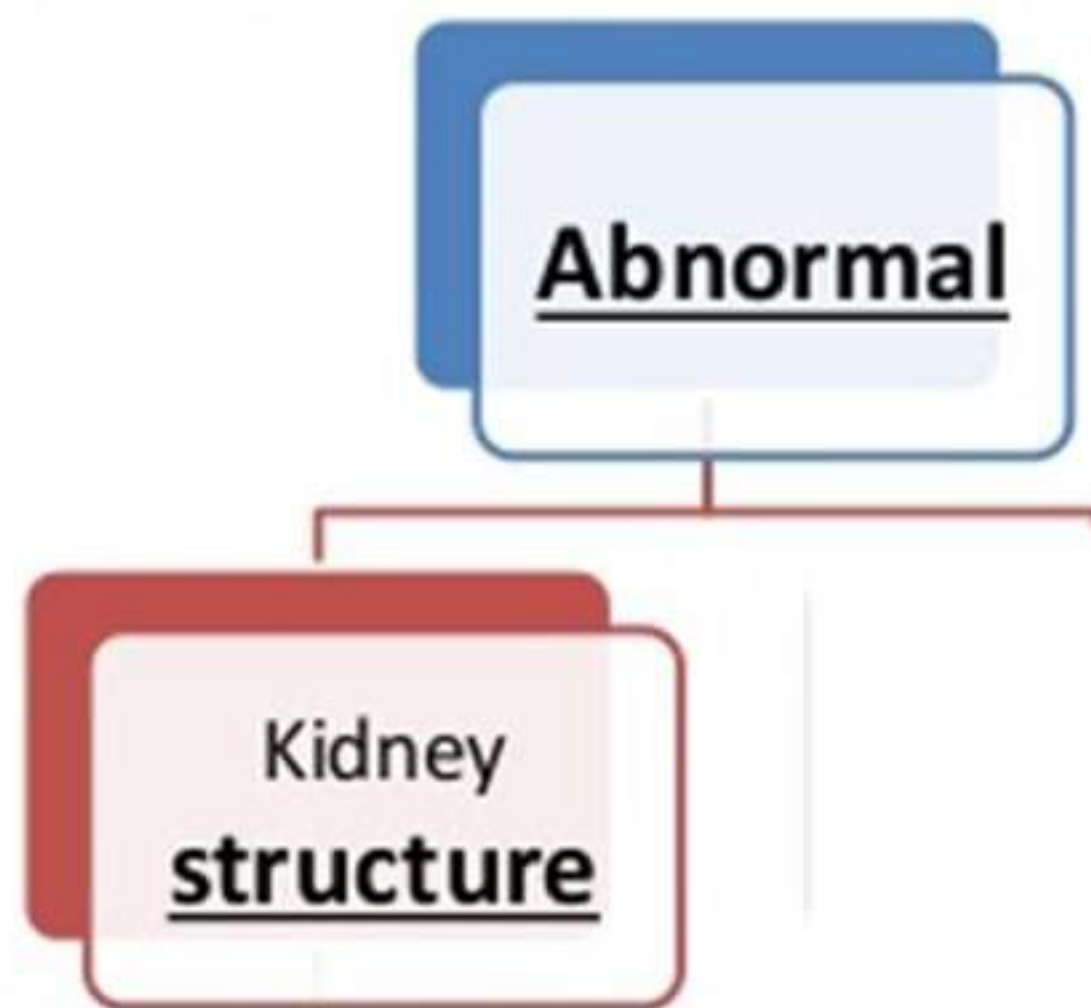
- Topics
 - Background
 - Causes
 - Clinical findings
 - Labs and imaging
 - Complications
 - Treatment
 - Prognosis

Fb/Nurse-Info

What is the definition of CKD?



What is the definition of CKD?



Criteria for CKD (either of the following present for > 3 months)

Markers of kidney damage (one or more)

Albuminuria (AER ≥ 30 mg/24 hours; ACR ≥ 30 mg/g [≥ 3 mg/mmol])
Urine sediment abnormalities
Electrolyte and other abnormalities due to tubular disorders
Abnormalities detected by histology
Structural abnormalities detected by imaging
History of kidney transplantation

Decreased GFR

GFR < 60 ml/min/1.73 m² (GFR categories G3a-G5)

Abbreviations: CKD, chronic kidney disease; GFR, glomerular filtration rate.

Causes of CKD

Table 12.21 Causes of chronic kidney disease

Congenital and inherited disease

Polycystic kidney disease (adult and infantile forms)
Medullary cystic disease
Tuberous sclerosis
Oxalosis
Cystinosis
Congenital obstructive uropathy

Glomerular disease

Primary glomerulonephritides including focal glomerulosclerosis
Secondary glomerular disease (systemic lupus, polyangiitis, Wegener's granulomatosis, amyloidosis, diabetic glomerulosclerosis, accelerated hypertension, haemolytic uraemic syndrome, thrombotic thrombocytopenic purpura, systemic sclerosis, sickle cell disease)

Vascular disease

Hypertensive nephrosclerosis (common in black Africans)
Renovascular disease
Small and medium-sized vessel vasculitis

Tubulointerstitial disease

Tubulointerstitial nephritis – idiopathic, due to drugs (especially nephrotoxic analgesics), immunologically mediated
Reflux nephropathy
Tuberculosis
Schistosomiasis
Nephrocalcinosis
Multiple myeloma (myeloma kidney)
Balkan nephropathy
Renal papillary necrosis (diabetes, sickle cell disease and trait, analgesic nephropathy)
Chinese herb nephropathy

Urinary tract obstruction

Calculus disease
Prostatic disease
Pelvic tumours
Retroperitoneal fibrosis
Schistosomiasis

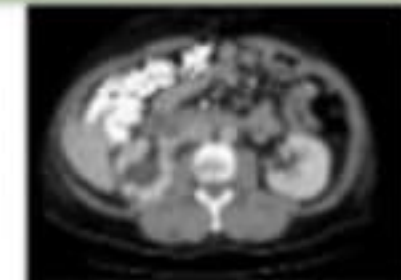
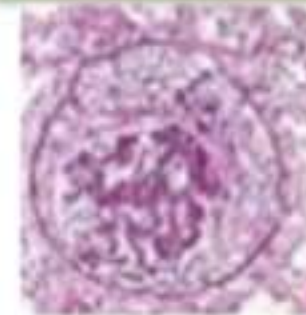
Causes of CKD - EGYPT



DM
Hypertension



Chronic glomerulonephritis
Chronic pyelonephritis



CVD and its related risk factors
(e.g. obesity, smoking)

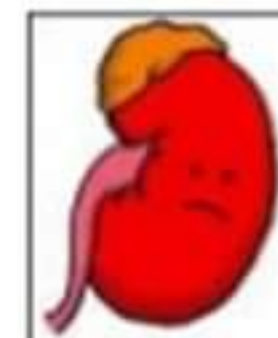
Renal stones &
Obstructive uropathy



Analgesics abuse



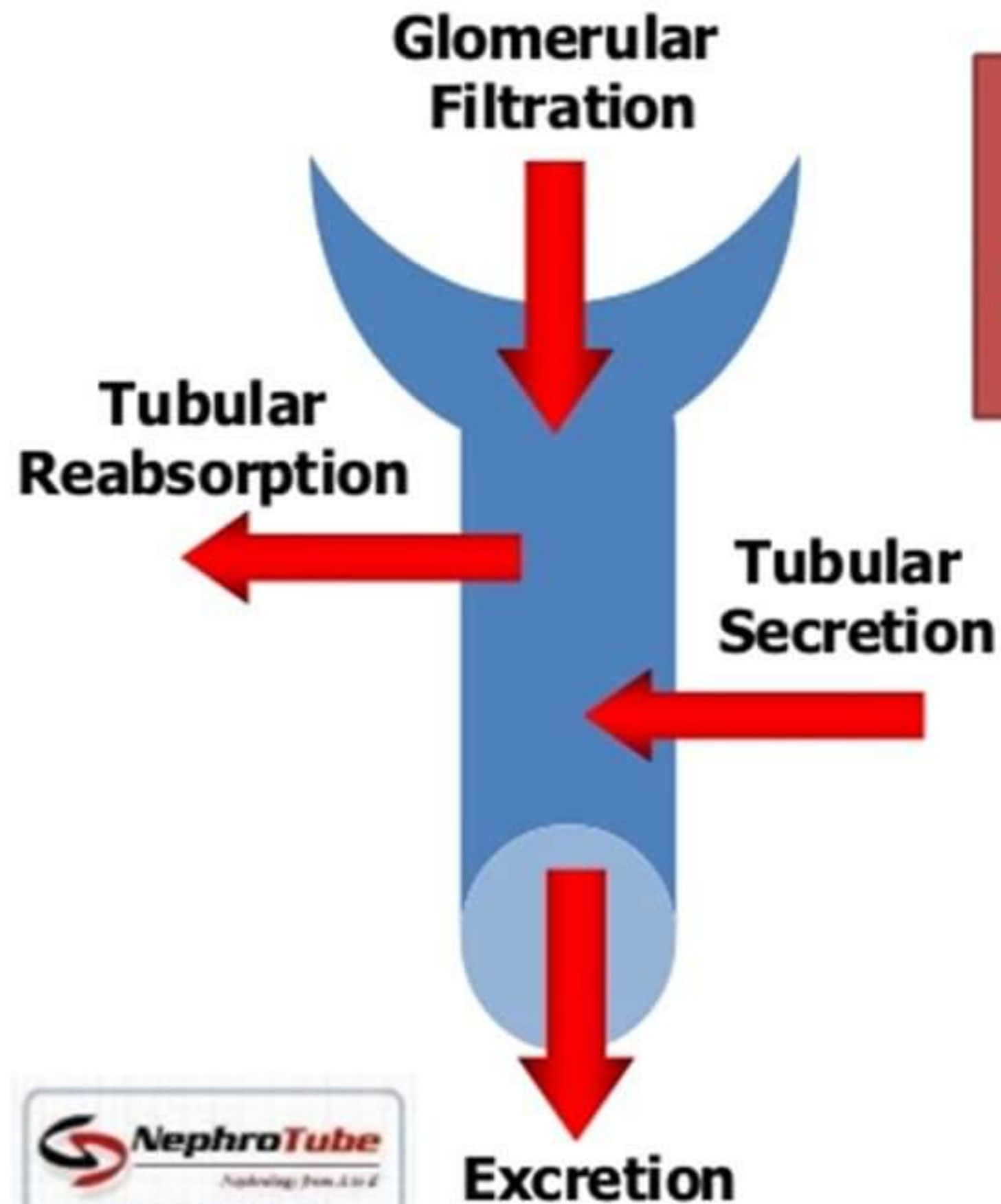
APKD



AKI

CKD Classification

What is GFR?

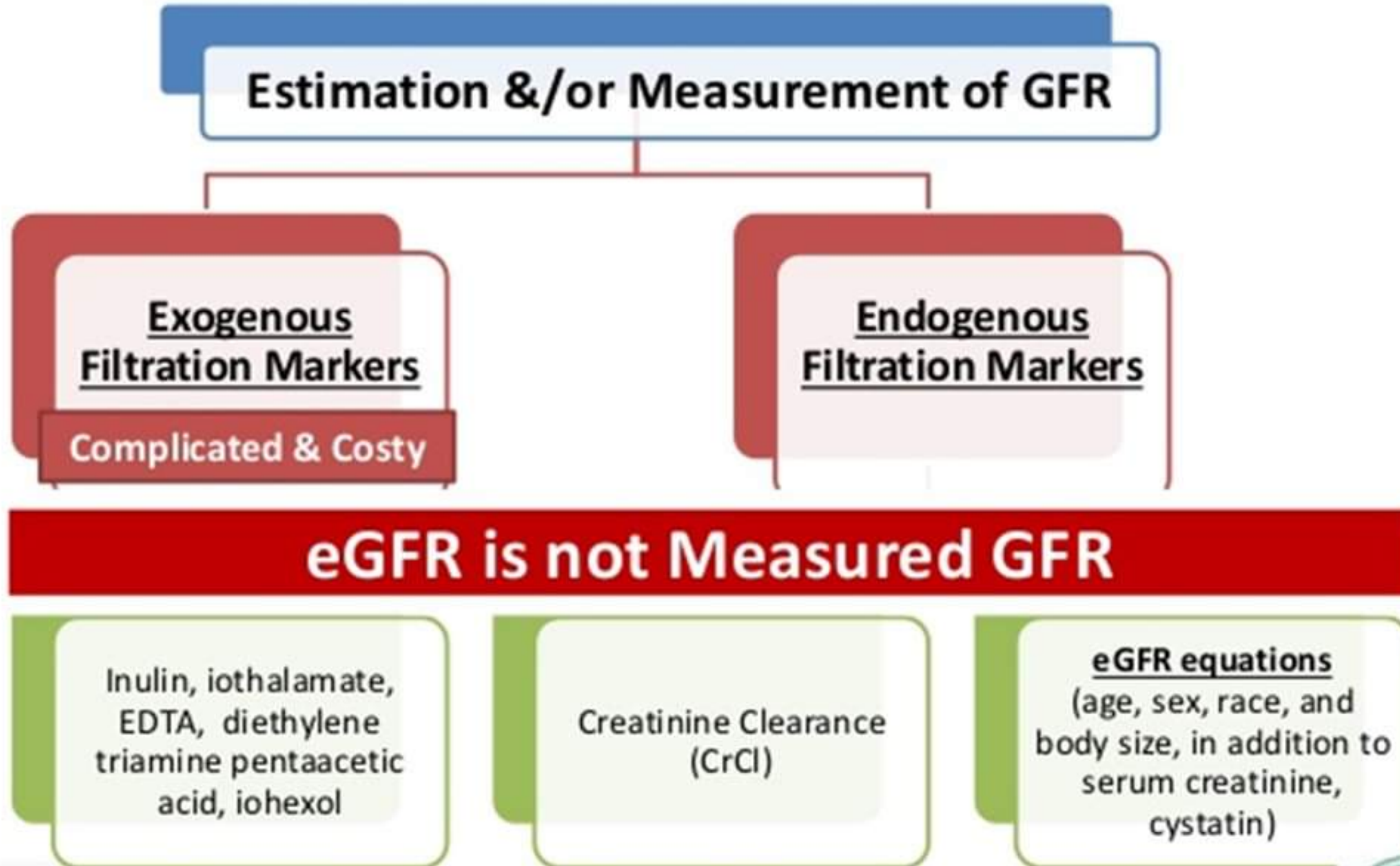


GFR:

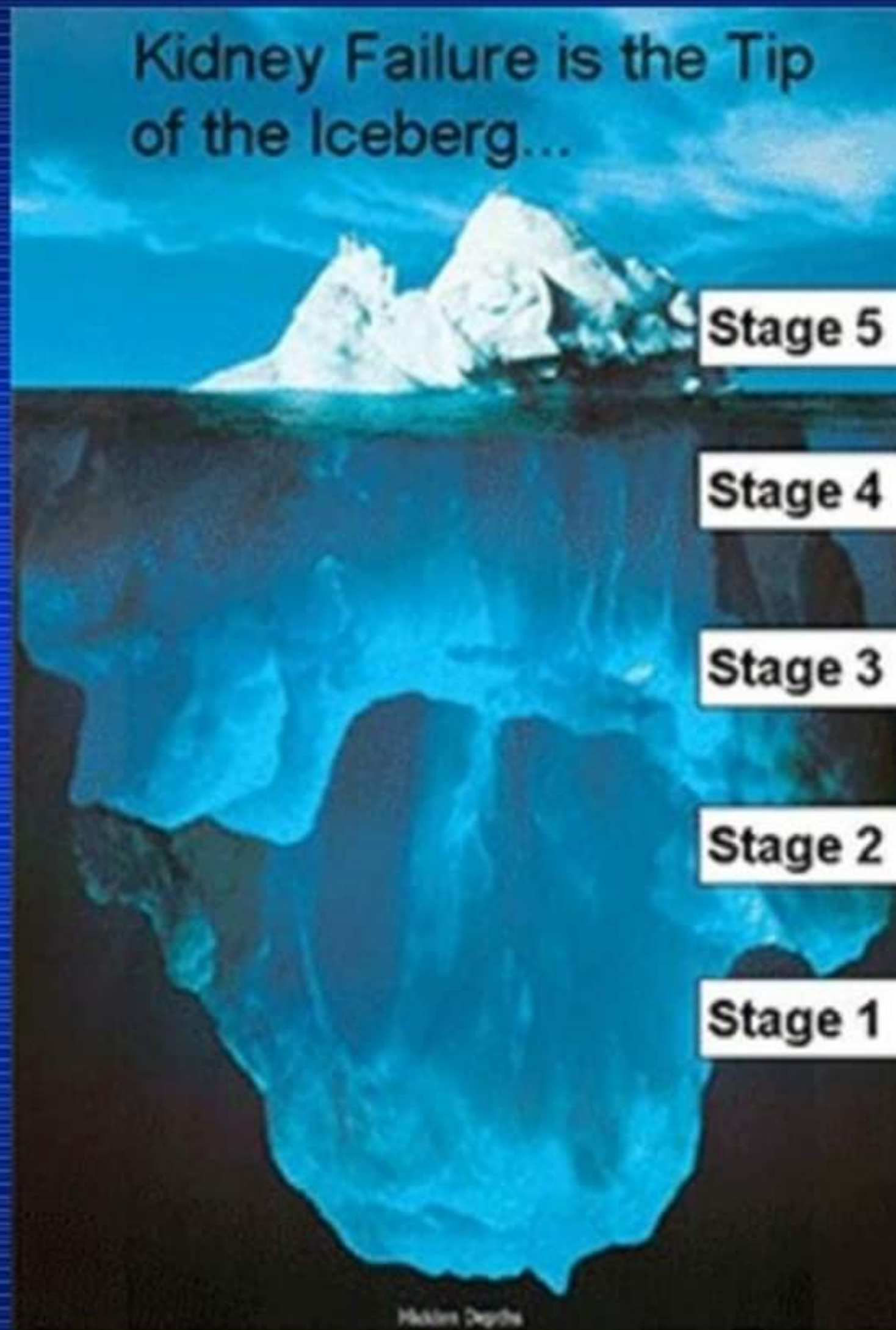
The quantity of glomerular filtrate formed in all nephrons of both kidneys / min.

CKD Classification

How GFR is Estimated or Measured?



Kidney Failure is the Tip of the Iceberg...



The Five Stages of Chronic Kidney Disease

	Kidney Function	Description
Stage 1	Kidney damage and more than 90%	Normal or High Function
Stage 2	Kidney damage and 60 to 89%	Mildly Decreased Function
Stage 3a	45-59%	Mildly to Moderately Decreased Function
Stage 3b	30-44%	Moderately to Severely Decreased
Stage 4	15 to 29%	Severely Decreased Function
Stage 5	Less than 15%	Kidney Failure

Adapted from the KDIGO Clinical Practice Guidelines for the Evaluation and Management of Chronic Kidney Disease: *Kidney Int Suppl.* 2013; 3:1-163.

How does CKD present?

Asymptomatic Disease



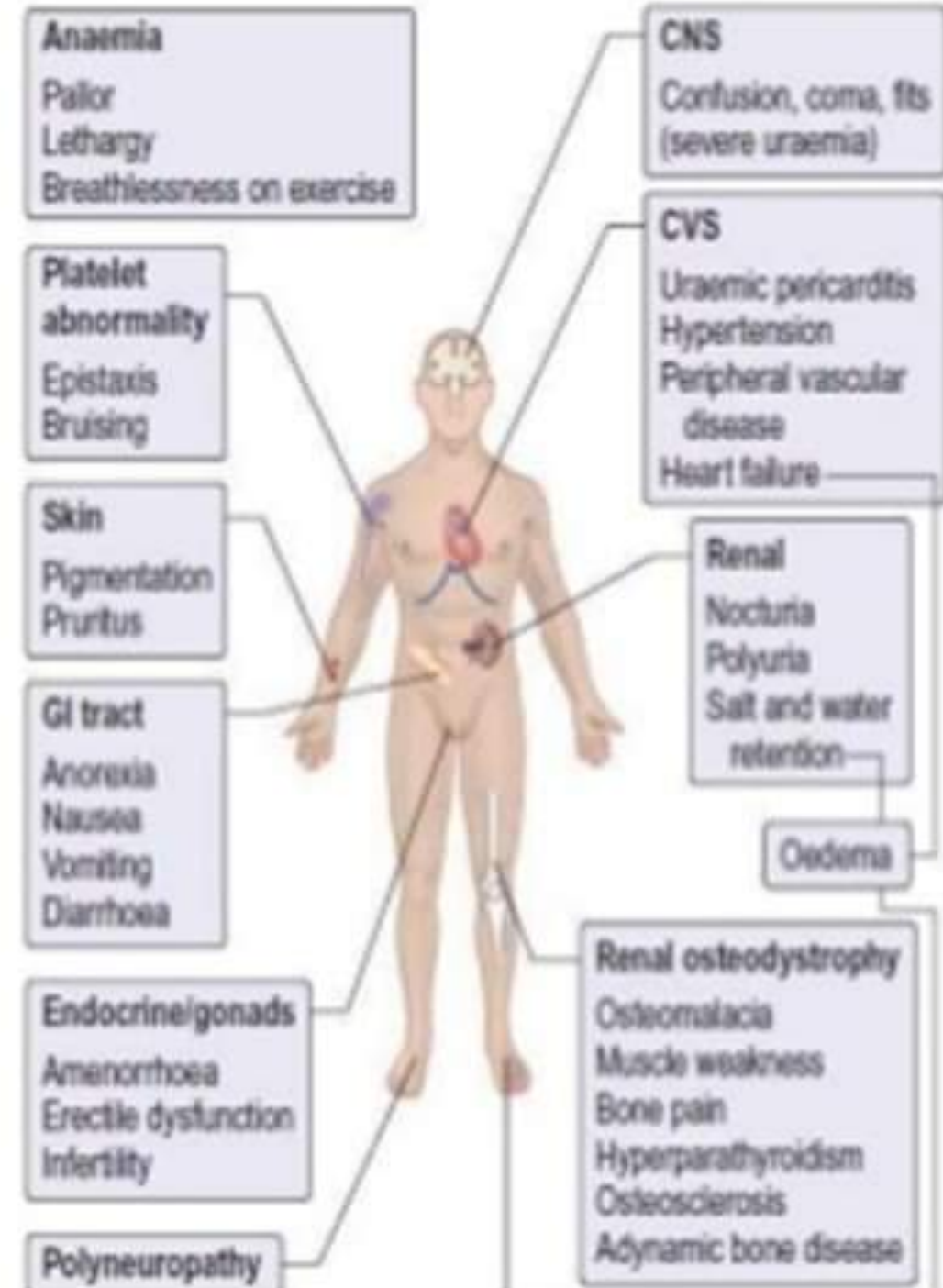
Especially early despite the accumulation of harmful metabolites

Incidental finding of urine abnormalities or raised creatinine

Is there a role for CKD Screening Programs?

Whom to screen?

Non Specific S&S



Manifestations of chronic renal failure

– Renal failure is a multisystem disease

System	Effect	Cause
Body fluids	Polyuria	Metabolic acidosis
	Metabolic acidosis	Reduced H ⁺ excretion
	Abnormal levels of Na ⁺ , K ⁺ , Ca ²⁺ , PO ₄ ⁻	Loss of tubular function
Hematologic	Anemia, excess bleeding	Impaired erythropoietin
Cardiovascular	Hypertension, edema	Activation of renin–angiotensin system
Gastrointestinal tract	Anorexia, nausea	Accumulation of metabolic wastes
Neurologic	Uremic encephalopathy	Accumulation of ammonia and nitrogenous waste
Musculoskeletal	Muscle and bone weakness (“Renal Osteodystrophy”)	Loss of calcium and minerals

Normal kidney on ultrasound



Management of
CKD Complications

Prevention of
CKD Progression

CKD Management

CKD Complications & Management

Anemia



Mineral and bone disorder (MBD)



Cardiovascular disease



Acidosis ↓ pH

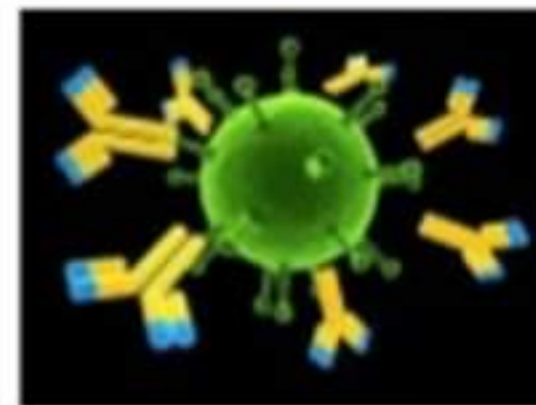
Drug Dosing



Malnutrition



Infection & Immunization



Anemia in CKD – Management

Step 1: Iron Therapy

When to start?



TSAT is $\leq 30\%$

ferritin ≤ 500 ng/ml

Anemia in CKD – Management

General Steps

Step 1:
Iron Status & Initial
Evaluation

Step 2:
ESA Therapy

CKD Complications & Management

Mineral and bone disorder (MBD)



Mineral & Bone Disorder (MBD)

General Definition



Table 1 | KDIGO classification of CKD-MBD and renal osteodystrophy

Definition of CKD-MBD

A systemic disorder of mineral and bone metabolism due to CKD manifested by either one or a combination of the following:

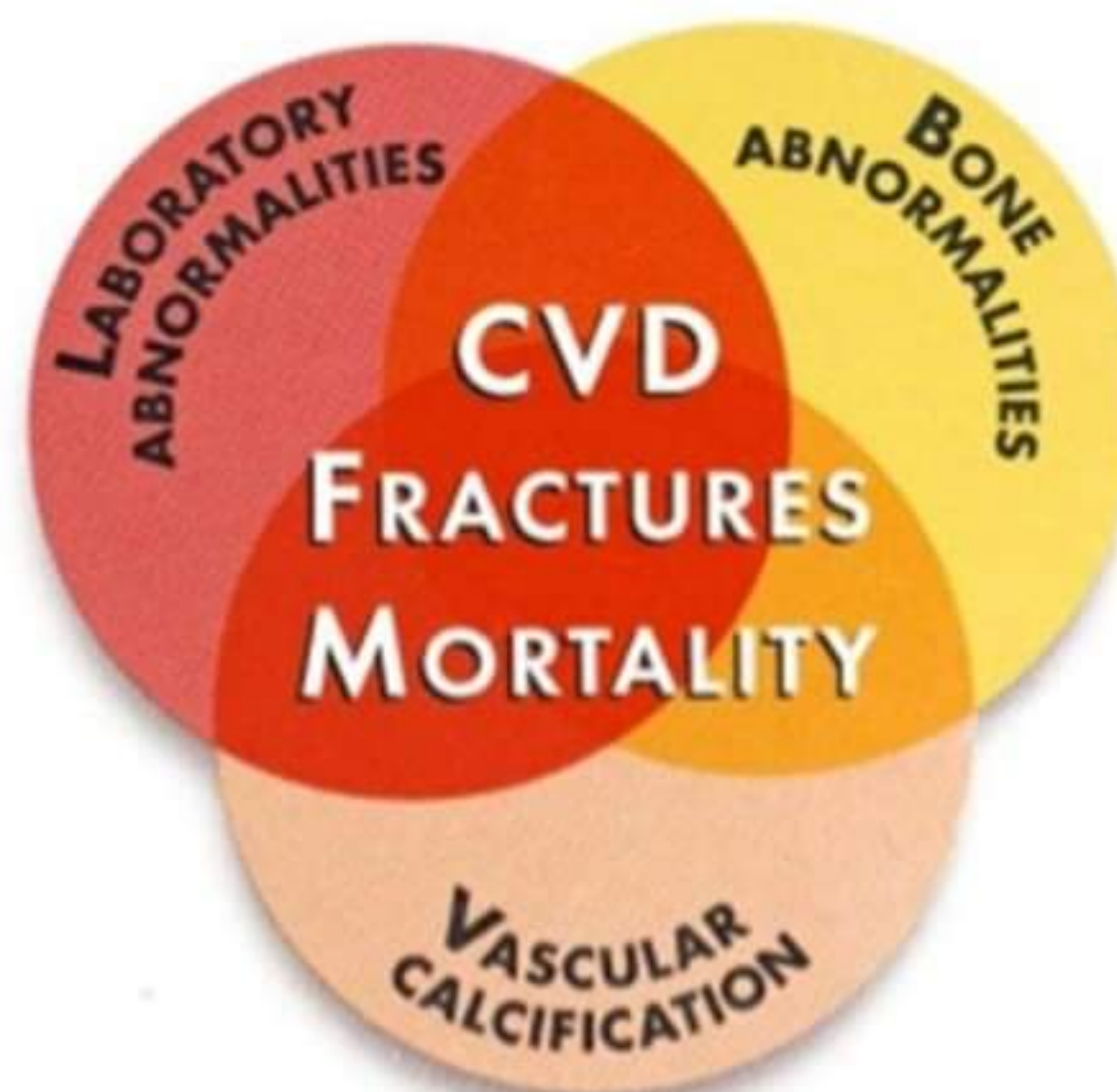
- Abnormalities of calcium, phosphorus, PTH, or vitamin D metabolism.
- Abnormalities in bone turnover, mineralization, volume, linear growth, or strength.
- Vascular or other soft-tissue calcification.



Definition of renal osteodystrophy

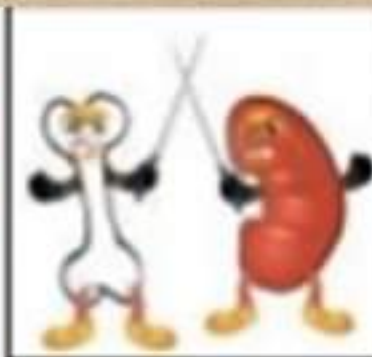
- Renal osteodystrophy is an alteration of bone morphology in patients with CKD.
- It is one measure of the skeletal component of the systemic disorder of CKD-MBD that is quantifiable by histomorphometry of bone biopsy.

Mineral and bone disorder (MBD)

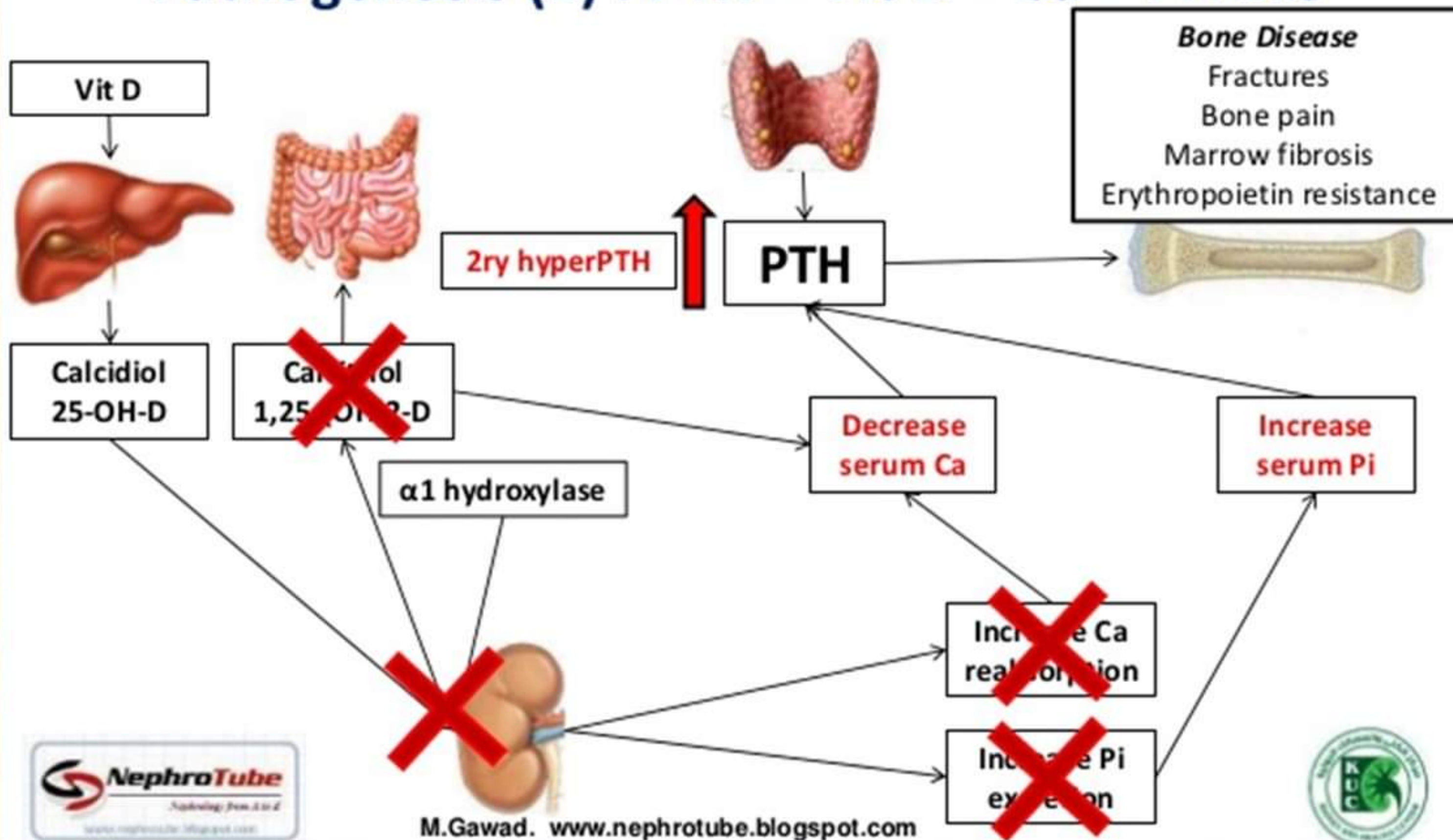


Mineral & Bone Disorder (MBD)

Lab Abnormalities

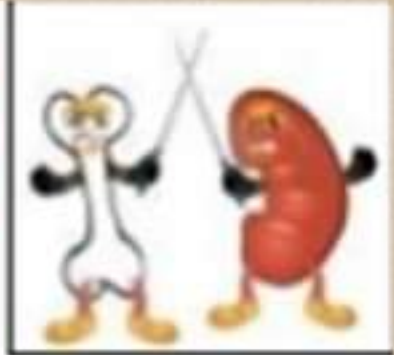


Pathogenesis (1) : PTH – Vit D – Ca – Pi Axis

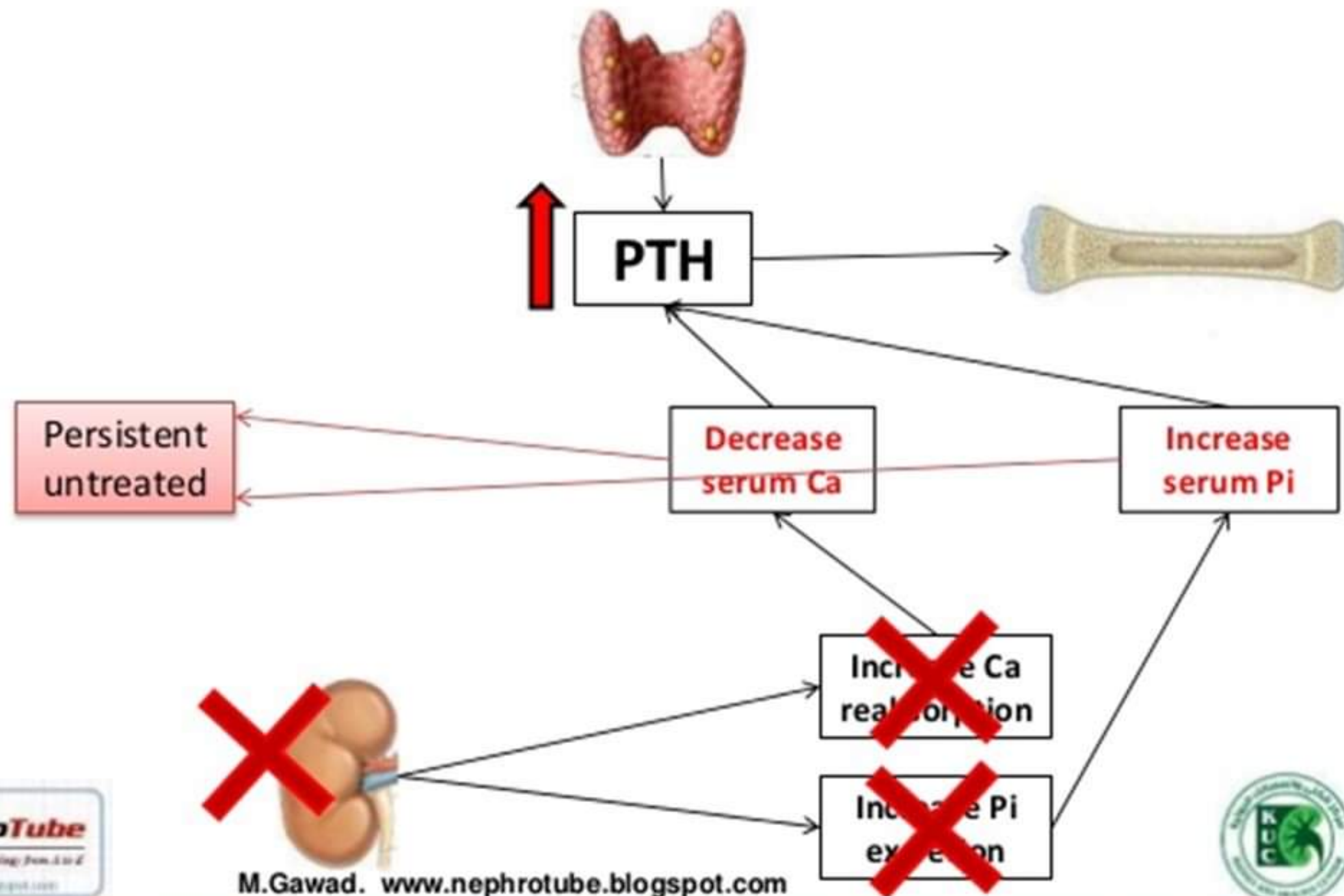


Mineral & Bone Disorder (MBD)

Lab Abnormalities



Pathogenesis (1) : Tertiary Hyperparathyroidism



Mineral & Bone Disorder (MBD)

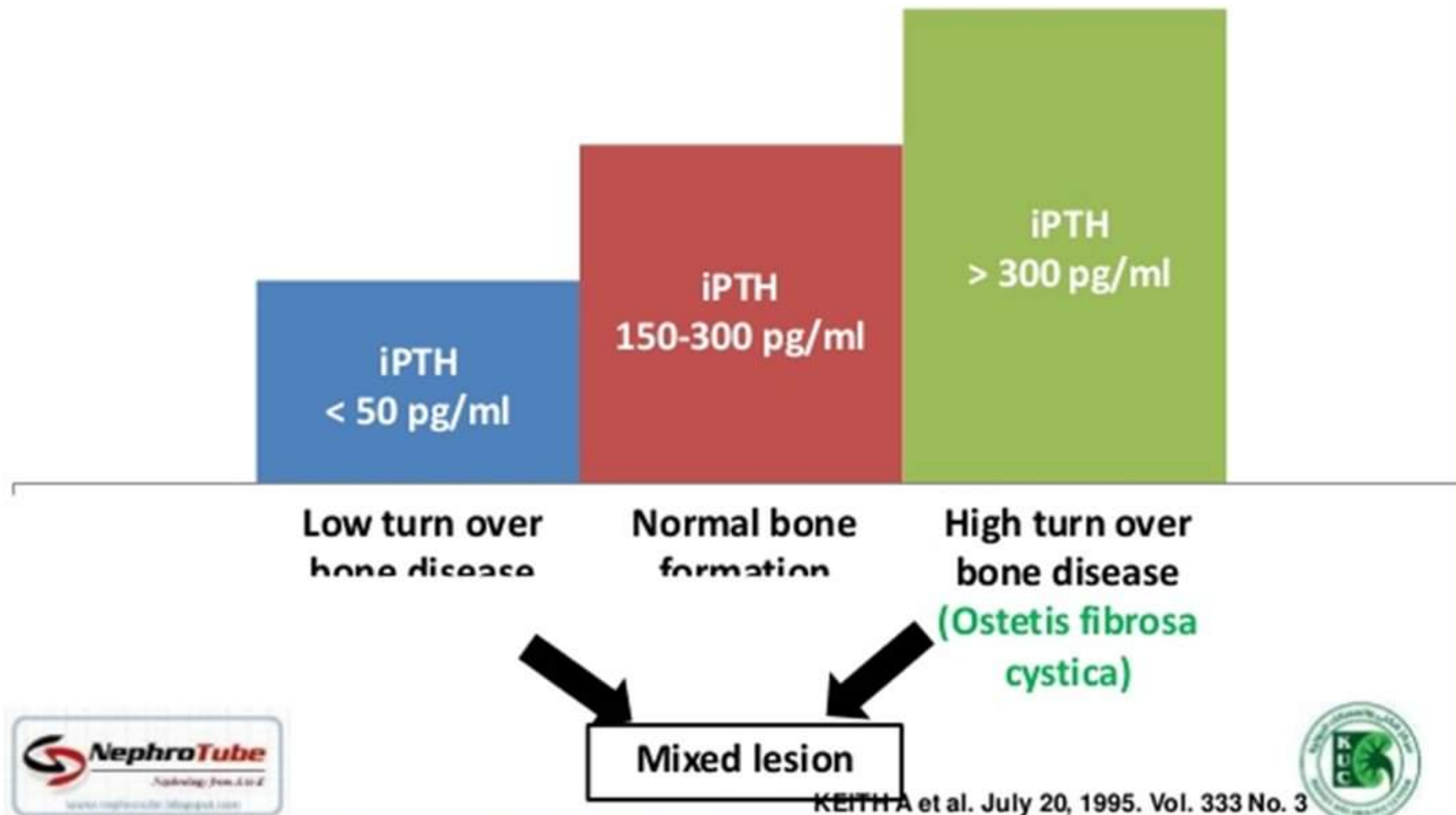
Lab Abnormalities



	PTH	Ca	Pi	ALK Phosphatase
Secondary Hyperparathyroidism	↑	↓	↑	↑
Tertiary Hyperparathyroidism	↑↑↑	↑	↑↑	↑

Mineral & Bone Disorder (MBD)

Bone Abnormalities – Renal Osteodystrophy Spectrum

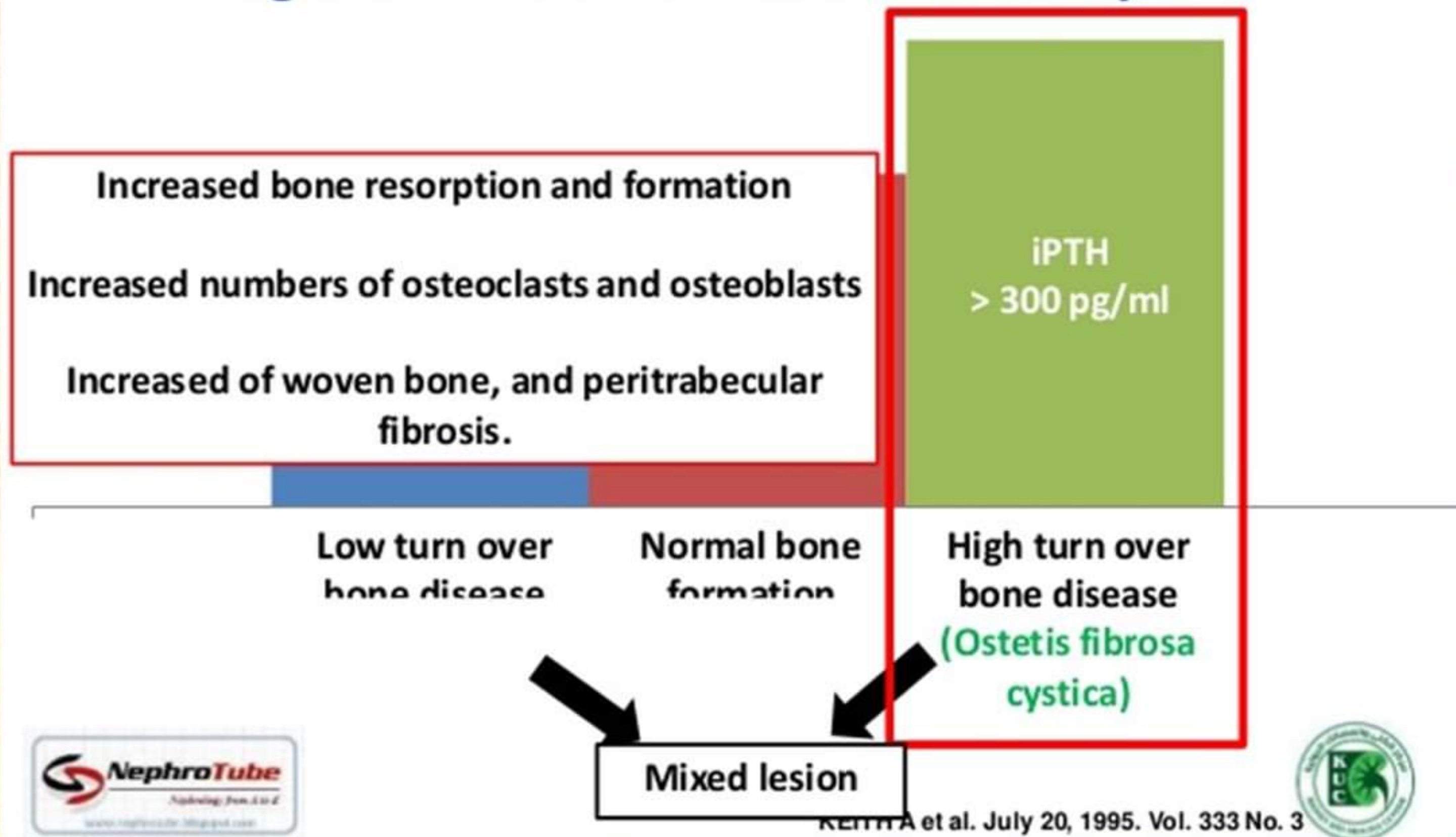


Mineral & Bone Disorder (MBD)



Bone Abnormalities – Renal Osteodystrophy

High turn over - Osteitis Fibrosa Cystica



Mineral & Bone Disorder (MBD)



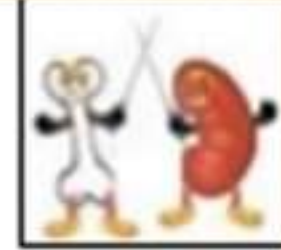
Bone Abnormalities – Renal Osteodystrophy

High turn over - Osteitis Fibrosa Cystica



Mineral & Bone Disorder (MBD)

Management – Drugs Used



1- Phosphate binders.

2- Vit D and Vit D analogues.

3- Cinacalcet.

Mineral & Bone Disorder (MBD) Management



Indications for Parathyroidectomy

- Severe hyperparathyroidism
 - With persistent hyperphosphatemia
 - Unresponsive to calcitriol and calcium
 - With hypercalcemia
 - In renal transplantation candidate
 - With evidence of metastatic calcification
- Calciophylaxis with evidence of hyperparathyroidism
- Severe pruritus, only if additional evidence of hyperparathyroidism

How to prevent CKD progression?

Glycemic control

BP control &
Proteinuria

Diet

Hyperuricemia

Hyperlipidemia

Prevention of
CKD Progression



TIMING THE INITIATION OF RRT

Dialysis be initiated when one or more of the following are present:

- serositis, pericarditis
- acidbase or electrolyte abnormalities
- Pruritus
- Inability to control volume status or blood pressure
- a progressive deterioration in nutritional status refractory to dietary intervention
- cognitive impairment

TIMING THE INITIATION OF RRT

- Living donor preemptive renal transplantation in adults
- GFR is <20 ml/min/1.73 m²,
- evidence of progressive and irreversible CKD over the preceding 6-12 months

