

# Approach to Chronic Kidney Disease

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تأليف

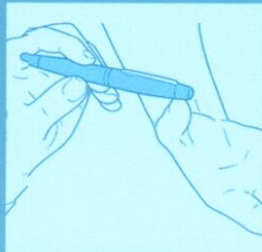
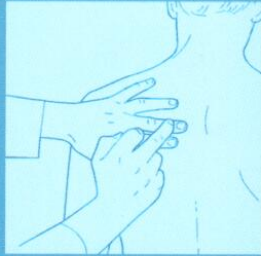
نيكولاس ج. تالي سيمون أوكونر

# كتاب الفحص

# الإكلينيكي الجيبي

ترجمة

أ.د. جمال بن صالح الوكيل



جامعة الملك سعود

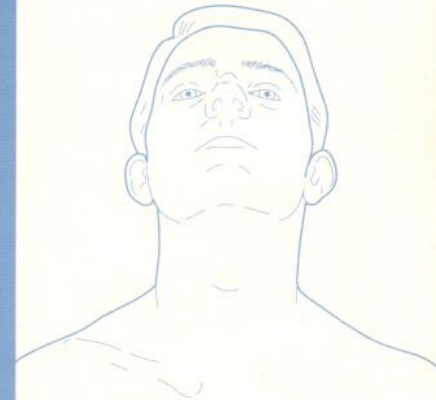
النشر العلمي والمطابع



NICHOLAS J TALLEY  
SIMON O'CONNOR

# POCKET CLINICAL EXAMINATION

SECOND EDITION



# Chronic Kidney Disease

## Objective

- Epidemiology of CKD
  - Definition of CKD
  - Classification
  - Symptoms, signs and complications
  - Management of CKD

What is the prevalence of chronic kidney disease?

- a. From 1 % to 3 %
- b. From 10% to 16%
- c. From 5 % to 8%
- d. Age dependent

# Prevalence of CKD

- CKD in aged  $\geq 20$  yrs is  $>10\%$  - $18\%$
- global CKD prevalence of  $11-16\%$
- The prevalence of CKD increases with age:
- 4% at age 29-39 y
- 47% at age  $>70$  y
- The majority of cases are stage 3
- mortality in patients with CKD was 56% greater than that in patients without CKD.
- For patients with stages 4-5 CKD, the adjusted mortality rate is 76% greater.
- The 5-year survival rate for a patient undergoing long-term dialysis in the United States is approximately 35%

# Patients in replacement therapy in SA in 2016

Tx. Pts 2016 8538

Total HD Pts. 2016 16315

In 2016, Peritoneal Dialysis a total of 1,372 patients

Total No 26225 pt

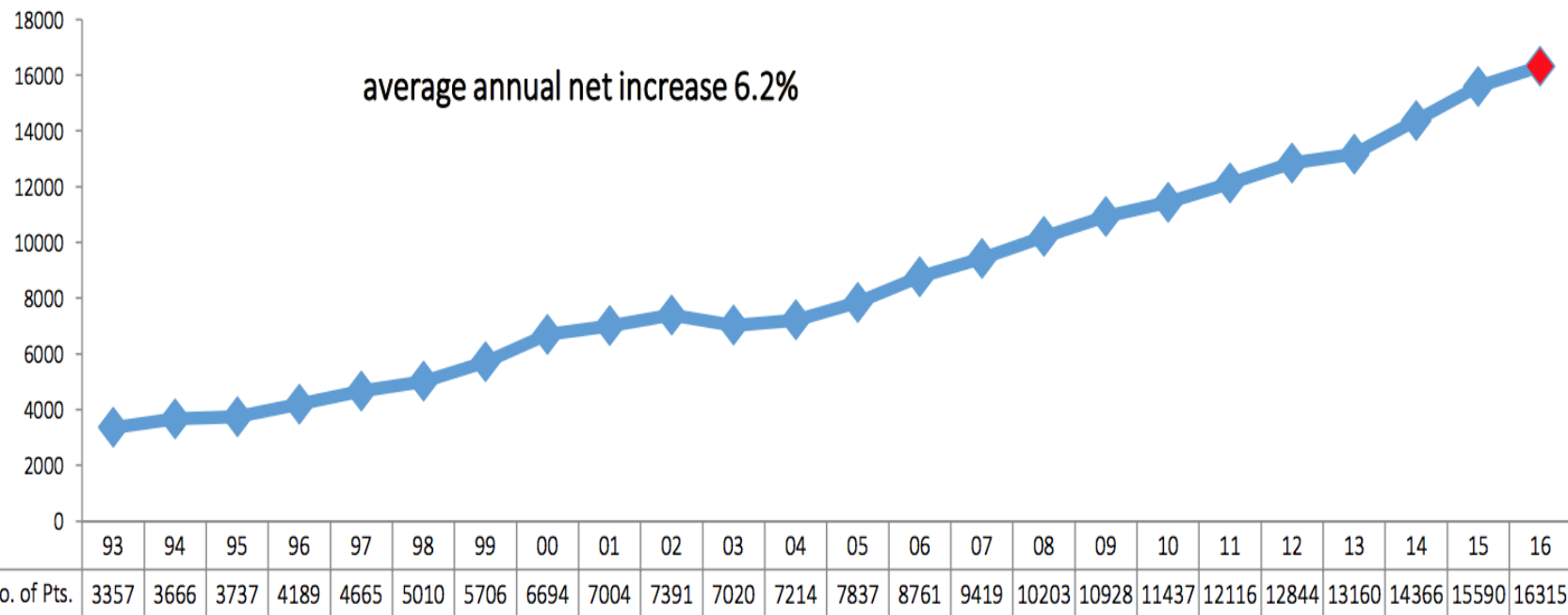
2016 HD Pts. Died 1658

New Pts. in 2016 4150

mean total cost of dialysis per patient per year was 46,332 USD (173,784 SR)

Total 1,215,056,700 SR

4.7% increase in new hemodialysis patients. in 2016



**Figure 4.1.3. Dialysis population net annual increase 1993-2016**

Dialysis

CKD





# Case Study

55 yrs. old man with previous history of DM & hypertension and CKD came to emergency with repeated nausea & vomiting for 4 weeks. Last week investigation showed his Na 132, K 6.1, urea 28 mmol/L & S Cr 380  $\mu$ mol/L. The nurse recorded that his vital signs are:

- BP – 190/105 mmHg
- Pulse rate – 50 beats/min

What will your approach be for this case?

# History

- History of major complain
- History of present illness
  - { Site ,Onset , Duration, character, course, frequency, severity, radiation, aggravating, reliving factors ,response to treatment,,associated symptoms , constitutional symptoms, effect and impact ,symtems of system involve(15) }
  - **History of uremia**
  - Systemic review
  - History of hypertension(cause, duration, control, medication, complication)
  - Diabetes Mellitus(type, duration, control, medication, complication)

# History of uremia

Manifestations of uremia (**Azotemia**) in end-stage renal disease (ESRD),

- ↓ appetite
- History of weight loss in 6 months
- Nausea and vomiting
- Fatigue ,tiredness
- Itchiness
- Leg cramp
- Decrease concentration
- Fluid overload
- Pericarditis
- History of urinary symptom

# History

- Systemic review
- Past Medical illness+ hospitalization
- Surgical
- Medication
- Family
- Social
- Allergy+ medication side effect

# Examination

# Examination

- Posture
- Look ill
- BMI – 25 kg/m<sup>2</sup>
- BP - 185/80 mmHg sitting both arm
- Pulse rate – 50 beats/min
- Breathing rate, pattern
- Pale
- Edema
- Mouth
- Itching marks
- Hand examination



# Cardiovascular examination

- JVP – 4cm
- S1 + S2 + S3
- ESM grade II at apex
- No pericardial rub

# Chest examination

- Scratch mark in the back
- Right side – stony dullness
- ↓TVF in right side
- Bilateral basal crepitation with vesicular breath
- ↓breathing sound at right side
- ↓ Voice Sounds at right side



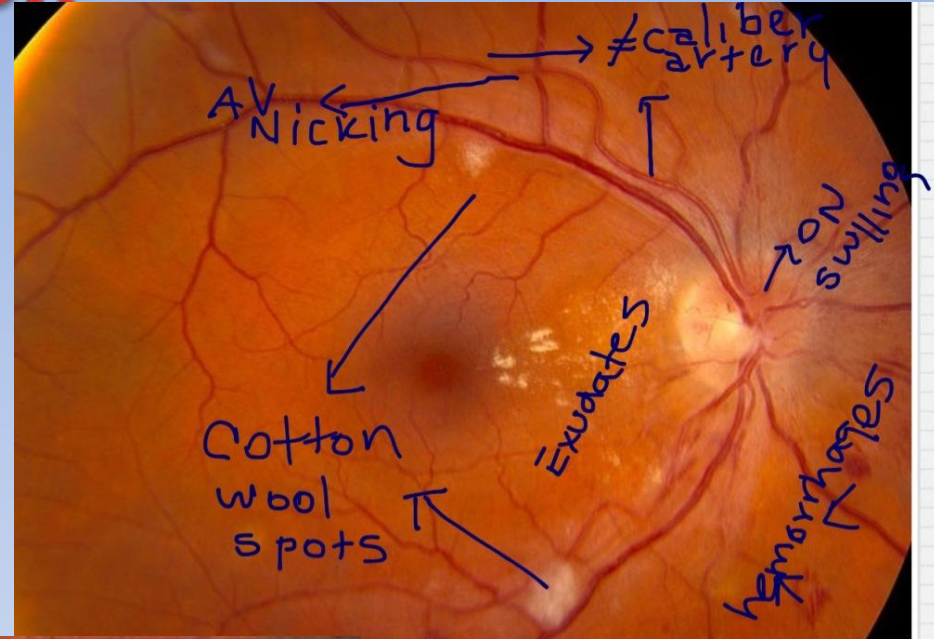
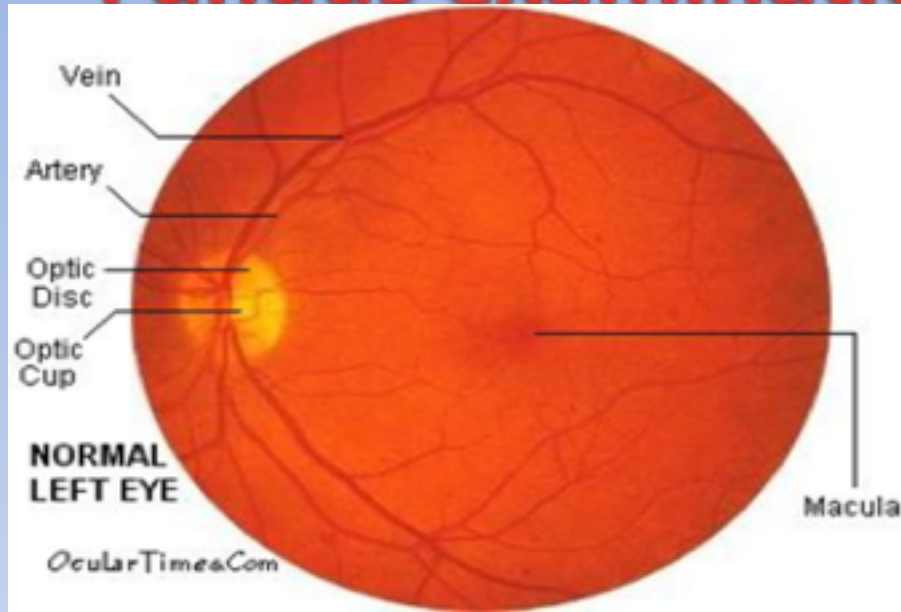
# Abdominal examination

- Scratch mark
- No organogaly
- Epigastric tenderness
- No aortic or renal bruits
- No suprapubic mass
- No shifting dullness

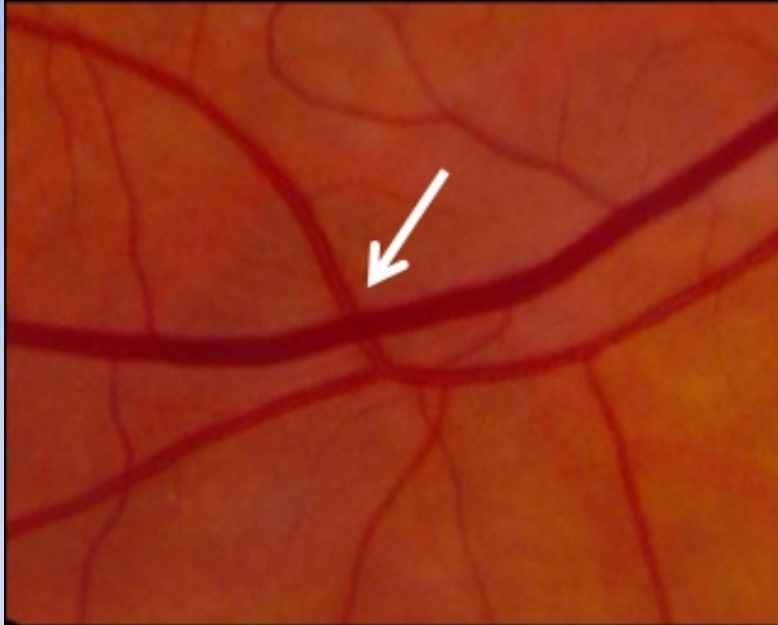
# CNS

- Drowsiness
- Fundus examination > diabetic retinopathy
- No asthtraxis
- Normal power
- Decrease Touch Sensation and vibration & sensation in both legs
- Normal Coordination

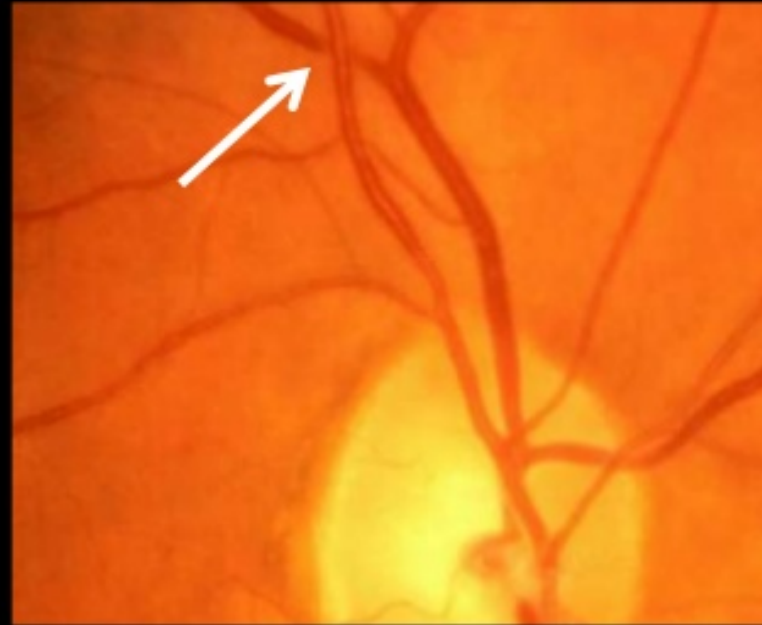
# Fundus examination



## Grade 2

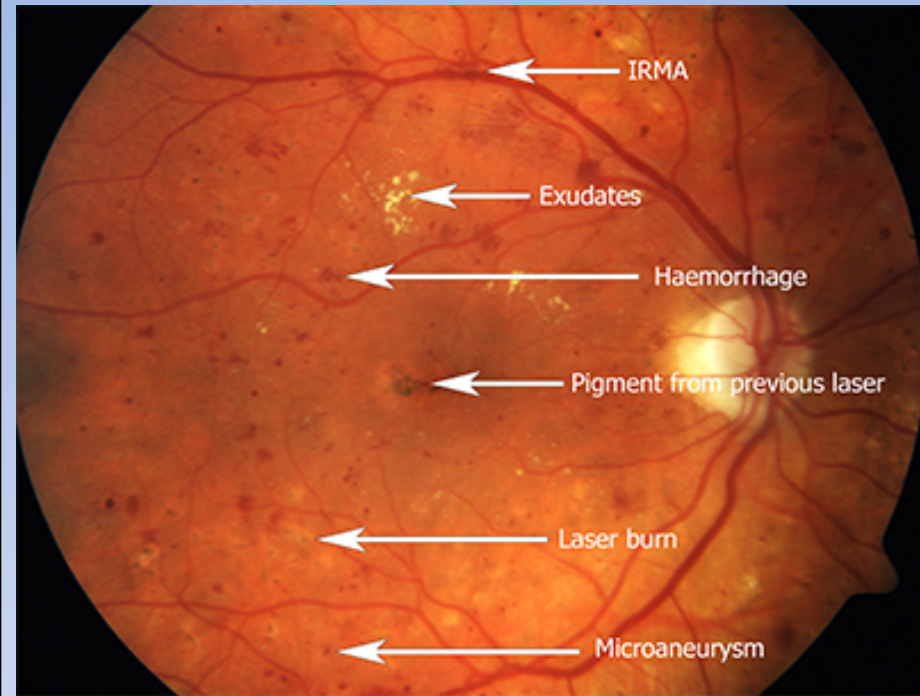


Normal

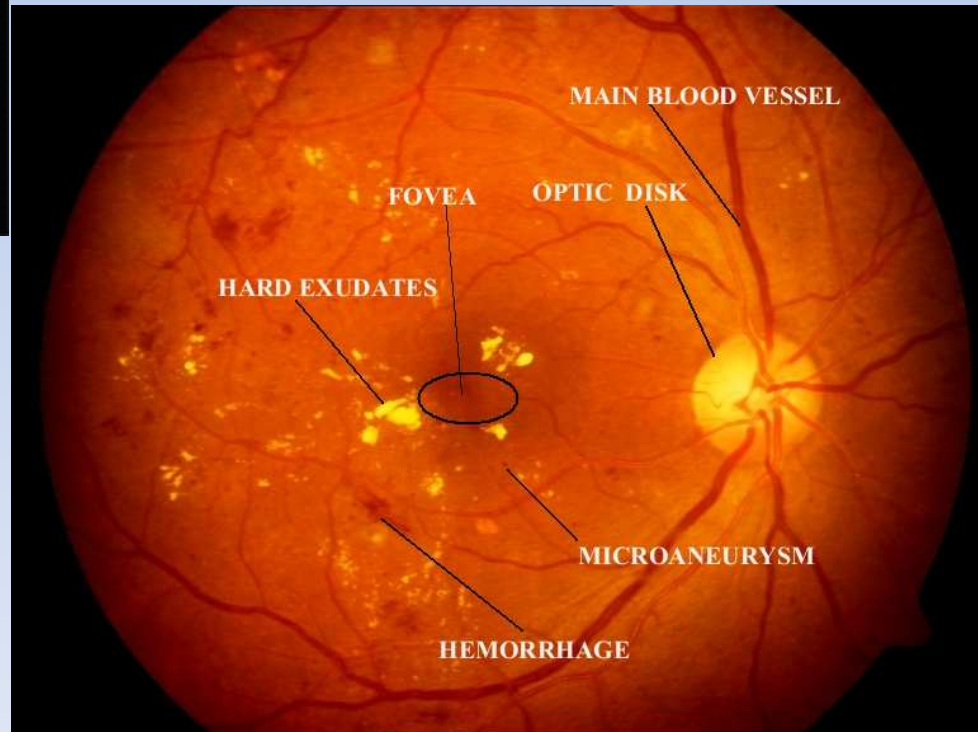


AV nipping

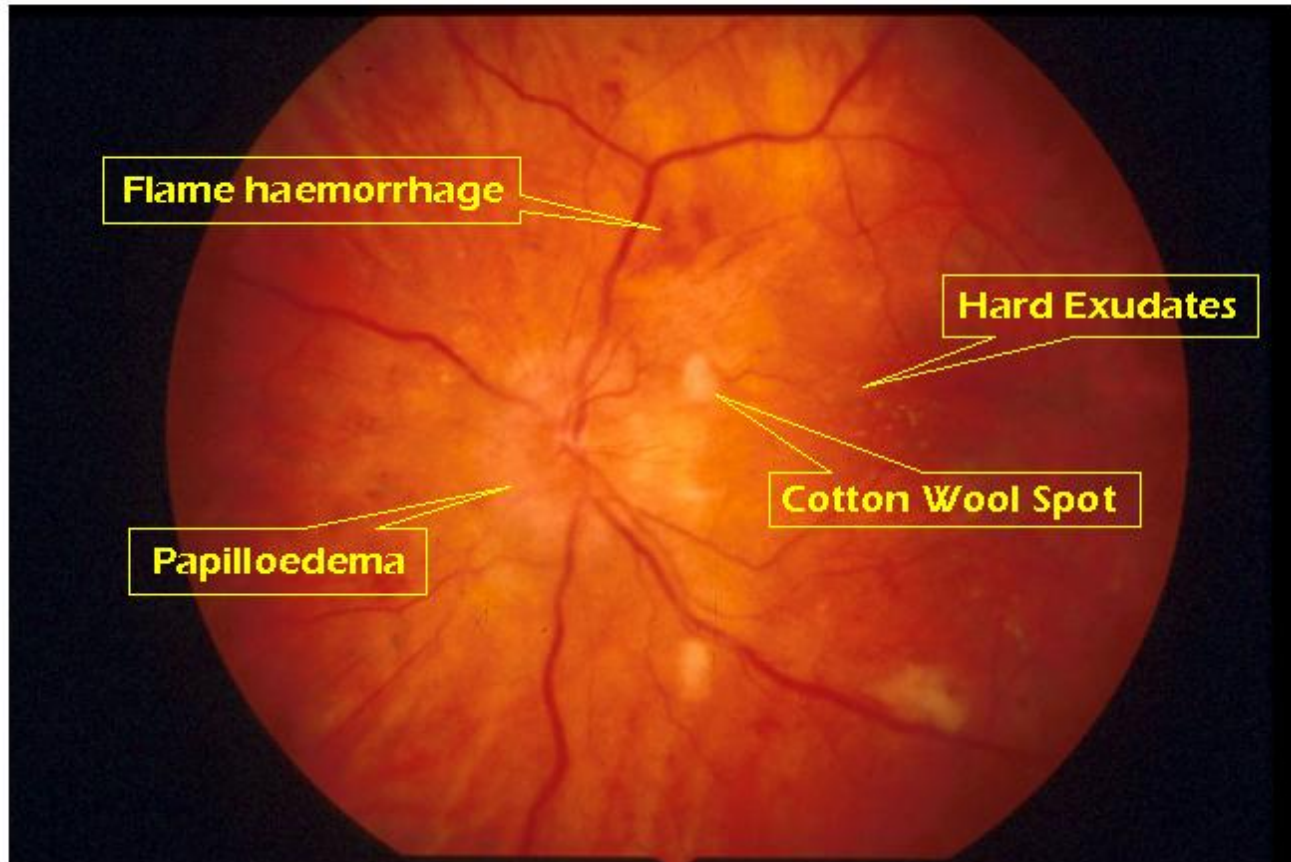
# Diabetic Retinopathy



Intraretinal micro vascular abnormalities (IRMA)



## Hypertensive Retinopathy - Grade 4



# Clinical Diagnosis

# Clinical Diagnosis

- CKD due to DM and HTN
- Possible AKI
- Nausea & vomiting possible due uremia
- Diabetic retinopathy
- Hypertension urgency(grade3)
- Anemia
- Functional murmur
- Itching
- Right pleural effusion
- Fluid overload with pulmonary edema
- Bradycardia
- Diabetic peripheral neuropathy



# European Society of Nephrology Classification of Blood Pressure Levels

Category	Systolic blood pressure (mmHg)	Diastolic blood pressure (mmHg)
Optimal blood pressure	<120	<80
Normal blood pressure	<130	<85
High-normal blood pressure	130-139	85-89
<b>Grade 1 hypertension (mild)</b>	<b>140-159</b>	<b>90-99</b>
Grade 2 hypertension (moderate)	160-179	100-109
Grade 3 hypertension (severe)	>/= 180	>/= 110
Isolated systolic hypertension	>140	<90

## Categories of BP in Adults\*

BP Category	SBP		DBP
Normal	<120 mm Hg	and	<80 mm Hg
Elevated	120–129 mm Hg	and	<80 mm Hg
<b>Hypertension</b>			
Stage 1	130–139 mm Hg	or	80–89 mm Hg
Stage 2	≥140 mm Hg	or	≥90 mm Hg

\*Individuals with SBP and DBP in 2 categories should be designated to the higher BP category.

BP indicates blood pressure (based on an average of ≥2 careful readings obtained on ≥2 occasions, as detailed in DBP, diastolic blood pressure; and SBP systolic blood pressure).

# Highlights

FROM THE 2017 GUIDELINE FOR THE PREVENTION, DETECTION, EVALUATION AND MANAGEMENT OF HIGH BLOOD PRESSURE IN ADULTS

A Report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines

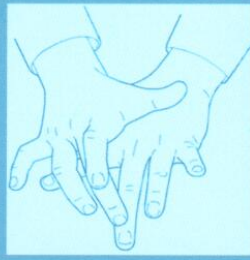
**New blood pressure targets and treatment recommendations:** For years, hypertension was classified as a blood pressure (BP) reading of 140/90 mm Hg or higher, but the updated guideline classifies hypertension as a BP reading of 130/80 mm Hg or higher. The updated guideline also provides new treatment recommendations, which include lifestyle changes as well as BP-lowering medications, as shown in Table 1.

TABLE 1. Classification of BP

BP Category	Systolic BP		Diastolic BP	Treatment or Follow-up
Normal	<120 mm Hg	and	<80 mm Hg	Evaluate yearly; encourage healthy lifestyle changes to maintain normal BP
Elevated	120-129 mm Hg	and	<80 mm Hg	Recommend healthy lifestyle changes and reassess in 3-6 months
Hypertension: stage 1	130-139 mm Hg	or	80-89 mm Hg	<p>Assess the 10-year risk for heart disease and stroke using the <a href="#">atherosclerotic cardiovascular disease (ASCVD) risk calculator</a></p> <ul style="list-style-type: none"> <li>• If risk is less than 10%, start with healthy lifestyle recommendations and reassess in 3-6 months</li> <li>• If risk is greater than 10% or the patient has known clinical cardiovascular disease (CVD), diabetes mellitus, or chronic kidney disease, recommend lifestyle changes and BP-lowering medication (1 medication); reassess in 1 month for effectiveness of medication therapy               <ul style="list-style-type: none"> <li>– If goal is met after 1 month, reassess in 3-6 months</li> <li>– If goal is not met after 1 month, consider different medication or titration</li> <li>– Continue monthly follow-up until control is achieved</li> </ul> </li> </ul>
Hypertension: stage 2	≥140 mm Hg	or	≥90 mm Hg	<p>Recommend healthy lifestyle changes and BP-lowering medication (2 medications of different classes); reassess in 1 month for effectiveness</p> <ul style="list-style-type: none"> <li>• If goal is met after 1 month, reassess in 3-6 months</li> <li>• If goal is not met after 1 month, consider different medications or titration</li> <li>• Continue monthly follow-up until control is achieved</li> </ul>

TABLE 2. Hypertensive Crises: Emergencies and Urgencies (See Section 11.2 of 2017 Hypertension Guideline)

Hypertensive Crises	Systolic BP		Diastolic BP	Treatment or Follow-up
Hypertensive urgency	>180 mm Hg	and/or	>120 mm Hg	Many of these patients are noncompliant with antihypertensive therapy and do not have clinical or laboratory evidence of new or worsening target organ damage; reinstitute or intensify antihypertensive drug therapy, and treat anxiety as applicable
Hypertensive emergency	>180 mm Hg + target organ damage	and/or	>120 mm Hg + target organ damage	Admit patient to an intensive care unit for continuous monitoring of BP and parenteral administration of an appropriate agent in those with new/progressive or worsening target organ damage (see Tables 19 and 20 in the 2017 Hypertension Guideline)



تأليف

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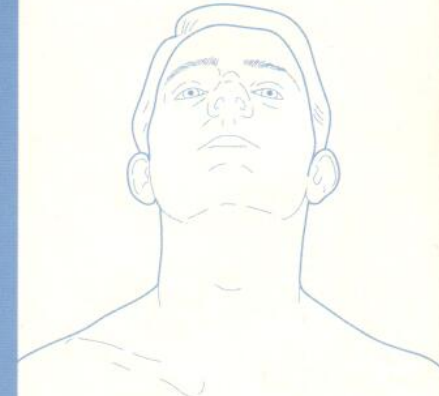
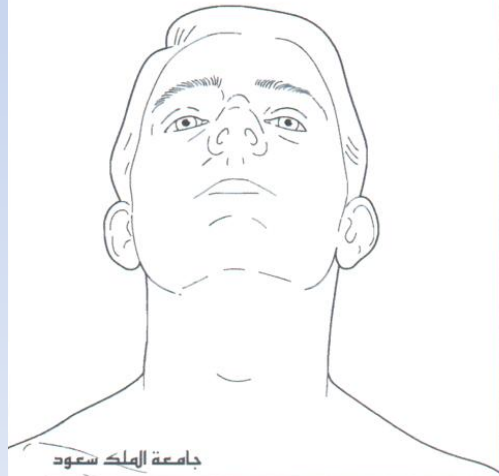
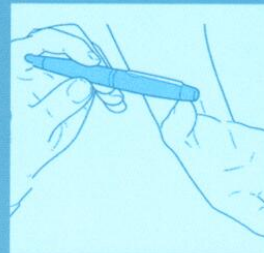
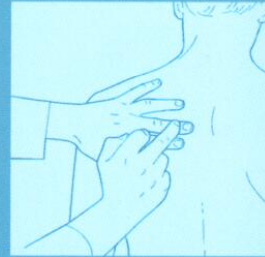
# كتاب الفحص الإكلينيكي الجيبي

# POCKET CLINICAL EXAMINATION

ترجمة

أ.د. جمال بن صالح الوكيل

SECOND EDITION



جامعة الملك سعود

النشر العلمي والمطابع



حدود الاحتشاء

الاستسقاء البطني - الصعوبة للتنفث

التسمع

أموات الأضواء

التفقد والبيجمات

الاحتكاكات

المسقة (الرجة)

الأعضاء التناسلية

الفقد البيضاوية

نوبات الصلوات (المريض يرقص)

الساقط

التكدمات

الوتومات

العلامات المعوية (الكحول)

أخرى

فحص السقيم

عين (ناسور أو طفوات أو دم أو مخاط) ثم تم بالجلس الكتل

تخيل البول (الصقراء)

فحص الجهاز القلبي الوعائي (تضخم عضلة القلب أو قصور القلب)

جدول درجة حرارة (العدوى).

## الجهاز البولي التناسلي (الشكل رقم ١٠،٤)

١- اجعل المريض يستلقي على السرير بينما تقوم بالمعاينة العامة الاعتيادية.

لاحظ بصورة خاصة حالة المريض العقلية وما إذا كان شاحب البشرة بالإضافة إلى حالة التروية. لاحظ أيضاً ما إذا كان المريض في حالة فواق أو فرط في التهوية (علامات ممكنة للقصور الكلوي renal failure).

٢- التقط يدي المريض. انظر لهبسا ولاحظ الأظفار بحثاً عن ايضاح الأظفار leuconychia أو وجود الخطوط البيضاء أقيية التي قد تحدث في حالات نقص الألبومين hyponalbuminemia (مثلاً في حالات المتلازمة الكلوية Anephrotic syndrome).

٣- افحص الرسغين والذراعين بحثاً عن مناطق وصول الأوعية الدموية ثم قم بتقييم سالكية الناسور الشرياني الوريدي arteriovenous fistula وذلك بحسبها للكشف عن وجود اليرير fibril. واطلب من المريض أن يمد يديه ولاحظ وجود الارتعاش الخافق asterias. بعد ذلك افحص الفراخين بحثاً عن وجود عقيدات تحت الجلد subcutaneous nodules (مثلاً: ترسبات فورسفات الكالسيوم calcium phosphate deposits) أو تكدم hruising أو تصبغ pigmentation أو علامات خدش الجلد scratch marks (قصور الكلى المزمن).

٤- بعد ذلك اتقل لفحص الوجه. ابدأ بفحص العينين بحثاً عن فقر الدم anaemia (قصور الكلى المزمن). ثم افحص القم للجفاف dryness (التجفاف dehydration) أو وجود تقن fetor (في حالة يوريمية uraemia). أيضاً لاحظ وجود أي طفح وعائي vasculitic rash على الوجه أو أي ندبات على الرقبة (مثلاً: بسبب عملية جراحية للغدد جارة الدرقية parathyroid surgery).



وضعية الاستلقاء (وسادة واحدة)

الشكل رقم (١٠،٤). الجهاز البولي التناسلي.

المعاينة العامة

الحالة العقلية

نفاق وفرط التهوية (حماض acidosis)

تشنج عضلات الحجاب الحاجز

التهاب

عوز فيتامين ب١٢ (مرض بيرنارد شو) أو عوز فيتامين ب١٢ (مرض بيرنارد شو)

التهاب

الإلتهاب - التهابات الإلتهاب أو حطوطها بزيادة أو نقصان في خلايا الدم البيضاء (التهاب الالتهابي)

عوز فيتامين ب١٢ وعائية vascular disease

الإلتهاب الحاد

اعتلال عصبي neuropathy

التهاب

تكدّم

تصبغ

علامات خدش الجلد

اعتلال عضلي myopathy

الوجه

العينان - فقر الدم أو اليرقان أو اعتلال القرنية الشريطي

القدم - الجفاف أو التقرحات أو النتن

طفح جلدي (التهاب الأوعية الدموية vasculitis)

البطن

ندبات - نتيجة للتنقية الدموية dialysis أو عمليات جراحية

الكلى - الكلى المزروعة transplant kidney

المثانة bladder

الكبد

العقد اللمفاوية

استسقاء البطن ascites

الألغاط bruits

فحص المستقيم (تضخم البروستاتا prostatomegaly أو نزيف)

الظهر

الإبهام

تشنج عضلات الحجاب الحاجز

التهاب

التهاب

التهاب - التهاب البنكرياس pancreatitis أو قصور القلب heart failure

التهاب - التهاب الكلى nephritis أو عدوى أو حصوة

التهاب - التهاب الكلى nephritis أو عدوى أو حصوة

التهاب - التهاب الكلى nephritis أو عدوى أو حصوة

التكدم

التصبغ

علامات خدش الجلد

اعتلال عصبي

منفذ للأوعية vascular access

تحليل البول urine analysis

الكثافة النوعية specific gravity وتركيز الأيونات البيكربوناتي pH

السكر - مرض السكري diabetes mellitus

الدم - التهاب الكلى nephritis أو عدوى أو حصوة

البروتين - التهاب الكلى

أخرى

ضغط الدم - في وضع الاستلقاء وليس الوقوف

تنظير القاع العين fundoscopy - التغيرات بسبب مرض السكر أو فرط ضغط الدم

٥- اطلب من المريض أن يستلقي مستوياً وافحص البطن. اجث عن التندبات الدالة على ديال صفاقي peritoneal dialysis أو عمليات سابقة وتشمل زراعة الكلى.

بعد ذلك افحص الكبد والطحال (تضخمها قد يحدث في حالات مرض تعدد الكيسات polycystic disease). قم بالجلس أيضاً بحثاً عن وجود تضخم بالكلى وذلك

عن طريق النهز ballotement. بعدها قم بالجلس بحثاً عن وجود أم الدم في الأبهري

# Investigation



Which of the following is important for investigation of this patient ?

- Na&k
- Urine osmolality
- Bleeding time
- Calcitonin & parathyroid hormones
- Kidney Biosy



# Investigation

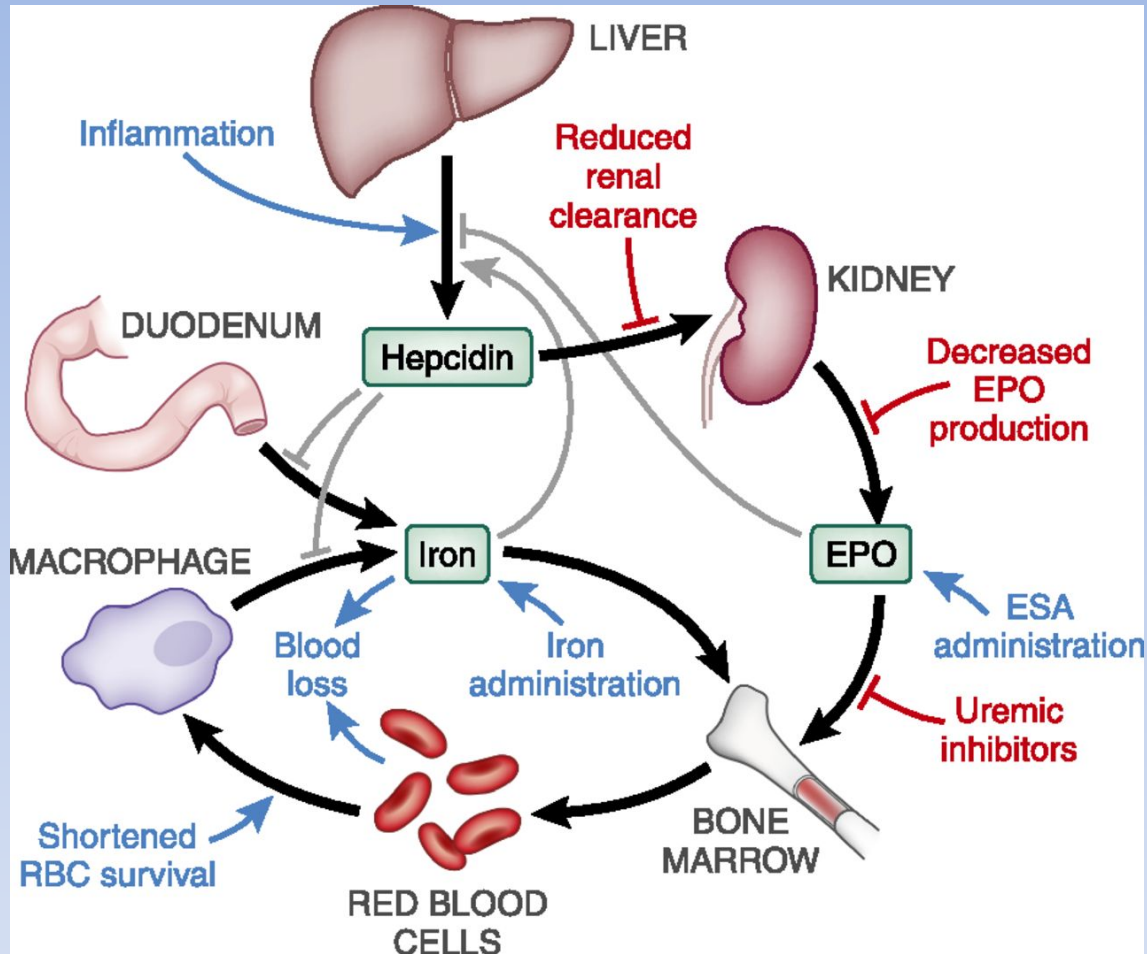
- **CBC**

- Hemoglobin – 85g/L
- RBCs 3500000/L
- WBC – 5,000/L
- Platelet – 120,000/L
- MCV – 82 fL

- **Biochemistry (Repeated)**

- NA – 136 mmol/L
- K – 6.4 mmol/L?
- Cr – 320  $\mu$ mol/L- eGFR = 18 ml/min ?
- Urea – 24 mmol/L

# Anemia in CKD



In chronic diseases, high **hepcidin** production inhibits iron release from macrophages and intestinal absorption of iron. This consequently induces an **anemic** condition.

# Investigation

- **CBC**

- Hemoglobin – 85g/L
- RBCs 3500000/L
- WBC – 5,000/L
- Platelet – 120,000/L
- MCV – 82 fL

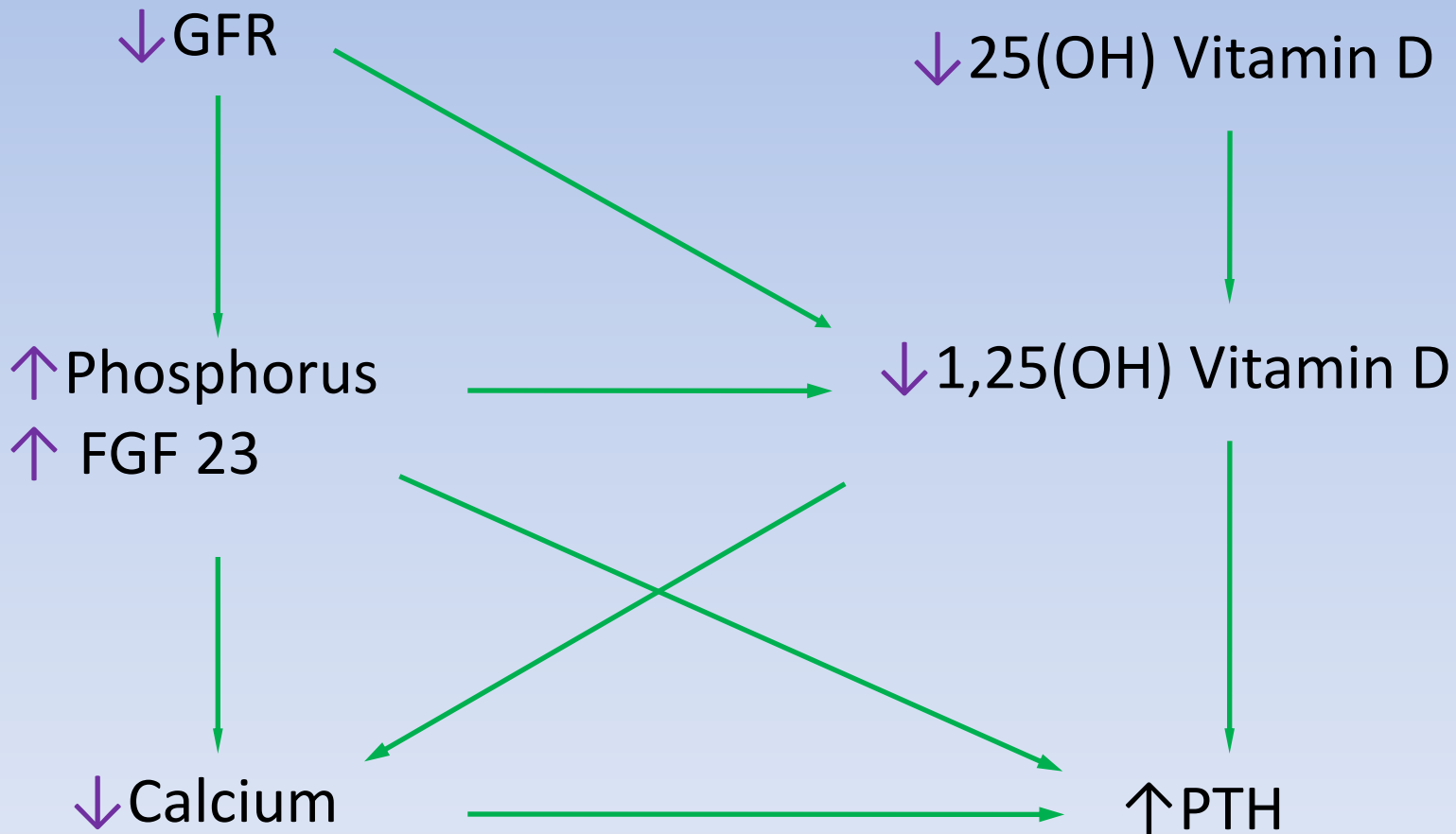
- **Biochemistry (Repeated)**

- NA – 136 mmol/L
- K – 6.4 mmol/L?
- Cr – 320  $\mu$ mol/L- eGFR = 18 ml/min ?
- Urea – 24 mmol/L

# Investigation

- Albumin – 29 g/L
- Uric acid - 690 mmol/L ??
- Bicarbonate 14 mmol/L ??
- Chloride 102 mmol/L
- Ca – 1.9 mmol/L
- PO<sub>4</sub> – 3.9 mmol/L( **N= 1.12 to 1.45**mmol/L)

# Mineral abnormalities of Chronic Kidney Disease (CKD)



# Investigations

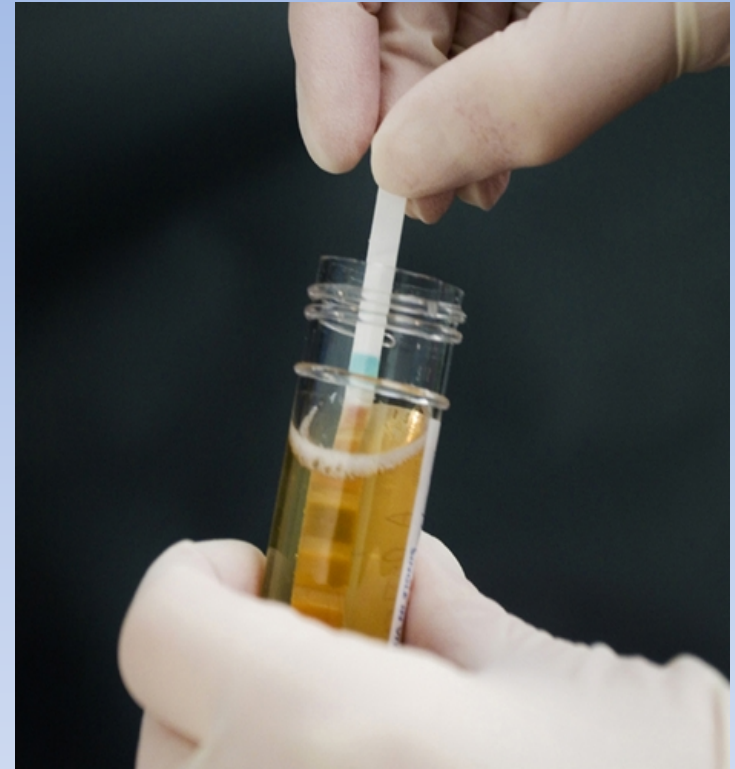
## ❖ Urine Analysis

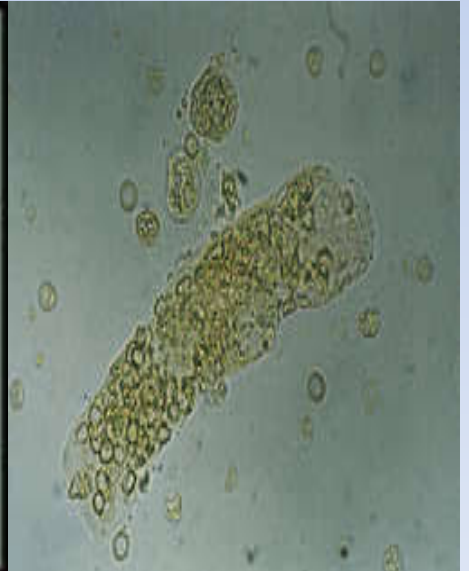
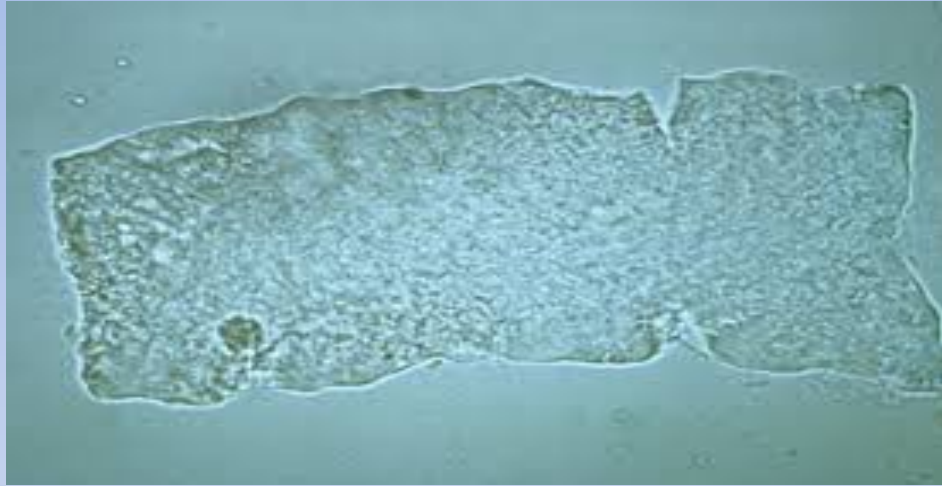
- pH - 6
- Urine RBC = negative
- WBC – 5 cu/L
- Protein = ++ve
- Specific gravity-1010 (Isosthenuria)
- Broad waxy cast

## ❖ Urine albumin creatinine ratio

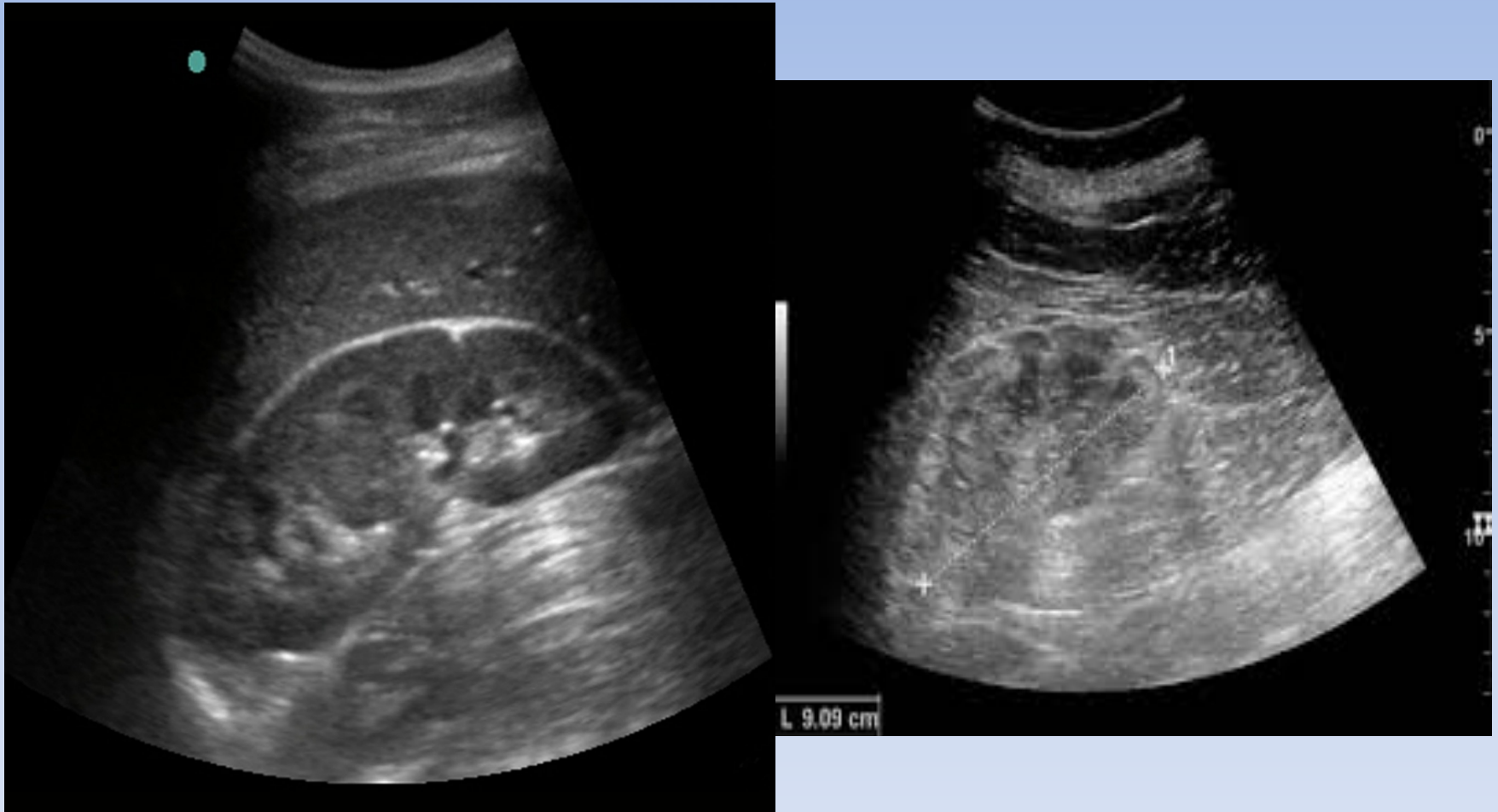
## ❖ 24 hour urine collection

- Creatinine clearance
- Proteinuria





# Investigation



- Normal size kidneys – 12 cm
- Normal Echogenicity



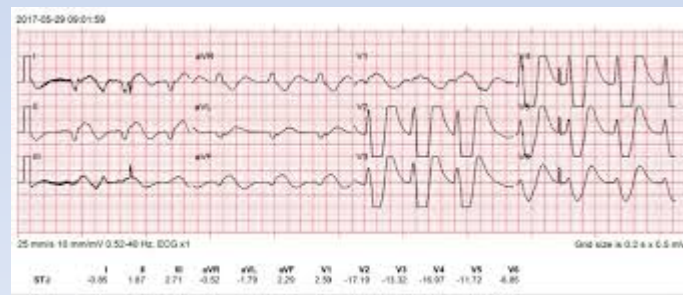
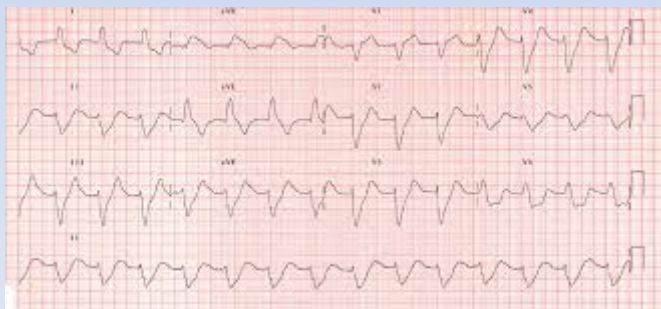
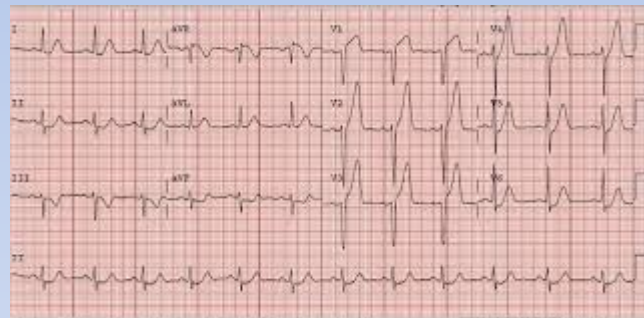
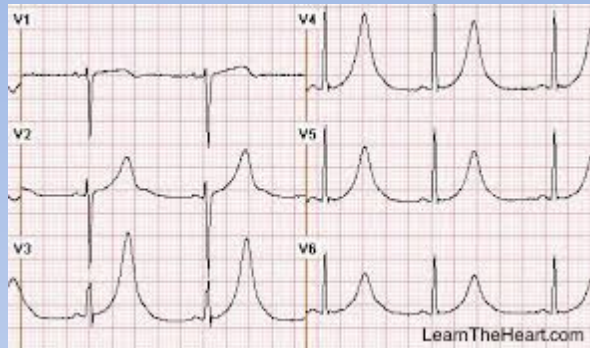


# Diagnosis

- CKD
  - cause possible hypertension & DM Nephropathy
  - stage G 4 (eGFR 18 ml/min)
- A +3
- Hyperkalemia
- Metabolic acidosis –high anion gap
- Anemia
- Hypocalcemia
- Hyperphosphatemia
- Hyperuricemia
- Diabetic Neuropathy and Retinopathy

In this patient which one of follow is initial of treatment???

- Treatment of hypertension
- Treatment of pleural effusion
- Treat acidosis
- Do ECG
- Treat Hyperuricemia



**Table 1.** Emergency management of acute hyperkalemia<sup>a</sup>

Medication	Response type	Onset of action	Duration of action	Mechanism of action	Expected decrease in potassium level
Calcium gluconate	rapid	1–2 min	30–60 min	Protect cardiomyocytes	0.5–1.5 mEq/L
Glucose + insulin	intermediate	10–20 min	2–6 hours	Shift potassium intracellularly	0.5–1.5 mEq/L (dose dependent)
Beta-agonists	intermediate	3–5 min	1–4 hours	Shift potassium intracellularly	
Sodium bicarbonate (only in patients with metabolic acidosis, bicarbonate < 22mEq/L)	intermediate	30–60 min	2–6 hours	Shift potassium intracellularly (questionable effect)	
Exchange resin	delayed	2–6 hours	4–6 hours	Elimination of potassium from the body	
Furosemide	delayed	5–30 min	2–6 hours	Elimination of potassium from the body	
Hemodialysis	delayed	immediate		Elimination of potassium from the body	1mmol/L in the first 60 min and total of 2mmol/l by 180 min

<sup>a</sup>Synthesized from Sood et al. (9), Weisberg (10), Mandelberg et al. (11), Zender et al. (12), Khanna et al. (13), and Pancu et al. (14).

# chronic disease can be diagnosed ?

- a. If the patient have ultrasound shows scaring in the kidney should not consider chronic kidney disease.
- b. If patient have proteinuria but normal serum Cr should not consider chronic kidney disease
- c. If the patient have **high serum creatinine** and normal ultrasound you should not consider chronic kidney disease.
- d. If the patient have proteinuria and hematuria with low eGFR you should consider chronic kidney disease



*Kidney International Supplements* 2017 7, 1-59DOI: (10.1016/j.kisu.2017.04.001)

*Kidney International Supplements* 2017 7, 1-59DOI: (10.1016/j.kisu.2017.04.001)

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Kidney damage

Structural abnormalities

**Structural abnormalities detected by imaging**

Abnormalities detected by histology  
History of kidney transplantation

Functional abnormalities

Albuminuria  
Electrolyte and other abnormalities  
Urine sediment abnormalities  
tubular disorders

GFR < 60 ml/min/1.73 m<sup>2</sup>

for ≥3 months



## Staging of chronic kidney disease depend on ?

- a. Measurement of serum creatinine
- b. Measurement creatinine clearance
- c. Estimated GFR
- d. Urine albumin creatinine ratio
- e. Causes of chronic kidney disease

## KDIGO recommendation -classified based on:(CGA)

- Cause
- **Stage of CKD** (GFR category)
- Albuminuria category

Cause of Renal Failure	N	%
Diabetic Nephropathy	6535	40%
Hypertensive Nephropathy	6211	38%
Unknown Etiology	1100	7%
Primary Tubulo Interstitial Disease	491	3%
Obstructive Uropathy	339	2%
Hereditary Renal Disease	279	2%
Congenital Malformation	271	1.6%
Vasculitis	215	1%
Primary Glumerular Disease	128	1%
Pregnancy Related	73	0.4%
Others	673	4%
<b>Total</b>	<b>16,315</b>	<b>100%</b>

**Table 4.8. Causes of end-stage renal disease in HD patients 2016**

## KDIGO recommendation -classified based on:(CGA)

- Cause
- **Stage of CKD** (GFR category)
- Albuminuria category

# CKD Classification

## Estimation and Measurement of GFR

Estimate and/or  
Measure GFR

Filtration Markers  
(Endogenous)

Creatinine  
Clearance (CrCl)

Cystatin C

Polypeptide  
chain of 120 amino acids

eGFR equations

eCKD- EPI cr

eCKD-EPI-cyc

[Chronic Kidney Disease Epidemiology  
Collaboration \(CKD-EPI\)](#)

[Modification of Diet in Renal Disease \(MDRD\)  
Study equation](#)

## Calculators



National **Kidney** Foundation™

### **CKD-EPI Creatinine Equation**

Preferred method

### **MDRD Study Equation**

### **CKD-EPI Cystatin and Creatinine 2012 Equation**

### **Cockcroft-Gault Formula**

### **Revised Bedside Schwartz Formula**

For ages 1 - 17

# CKD – EPI Calculation



National **Kidney** Foundation™

Press Here for Clinical Use and Formula

S<sub>Cr</sub>:

mg/dL

Age:

years

Gender:

Male

Female

Race:

Black

Other

eGFR:

Clear All

mL/min/1.73 m<sup>2</sup>

Calculators CKD-EPI



National Kidney Foundation™

Press Here for Clinical Use and Formula

S<sub>cr</sub>: 100 umol/L

Age: 65 years

Gender: Male Female

Race: Black Other

eGFR: 68 mL/min/1.73 m<sup>2</sup> Clear All

Calculators CKD-EPI



National Kidney Foundation™

Press Here for Clinical Use and Formula

S<sub>cr</sub>: 100 umol/L

Age: 65 years

Gender: Male Female

Race: Black Other

eGFR: 51 mL/min/1.73 m<sup>2</sup> Clear All





National Kidney Foundation™

Press Here for Clinical Use and Formula

S<sub>Cr</sub>:

250

umol/L

Age:

52

years

Gender:

Male

Female

Race:

Black

Other

eGFR:

18

Clear All

mL/min/1.73 m<sup>2</sup>



Calculators



About GFR



About CKD

# Staging

. The stages of CKD are classified as follows

- **Stage 1:** Kidney damage with normal or increased GFR ( $>90$  mL/min/1.73 m<sup>2</sup>) **Normal or high**
- **Stage 2:** Mild reduction in GFR (60-89 mL/min/1.73 m<sup>2</sup>) Mildly decreased\*
- **Stage 3a:** Moderate reduction in GFR (45-59 mL/min/1.73 m<sup>2</sup>)
- **Stage 3b:** Moderate reduction in GFR (30-44 mL/min/1.73 m<sup>2</sup>)
- **Stage 4:** Severe reduction in GFR (15-29 mL/min/1.73 m<sup>2</sup>)
- **Stage 5:** Kidney failure (GFR  $< 15$  mL/min/1.73 m<sup>2</sup> or dialysis)
  - **The majority of cases are stage 3**

# Stage 1

Stage 1 and stage 2 CKD, reduced GFR alone does not clinch the diagnosis, except :

- Albuminuria (albumin excretion  $>30$  mg/24 hr or albumin: creatinine ratio  $>30$  mg/g [ $>3$  mg/mmol])
  - Urine sediment abnormalities
  - Electrolyte and other abnormalities due to tubular disorders
  - Histologic abnormalities
  - Structural abnormalities detected by imaging
  - History of kidney transplantation in such cases
- 
- **The majority of cases are stage 1&2 asymptomatic**

# **KDIGO recommendation -classified based on:(CGA)**

- Cause
- Stage of CKD (GFR category)
- Albuminuria category

# Albuminuria categories as follows:

\*note that where albuminuria measurement is not available, urine reagent strip results can be substituted

## Albuminuria categories in CKD

Category	AER (mg/24 hours)	ACR (mg/mmol)	ACR (mg/g)	TERMS
		approximate	equivalent	
A1	< 30	<3	<30	Normal to mildly increased
A2	30-300	3-30	30-300	Moderately increased*
A3	>300	>30	>300	Severely increased**

\*Relative to young adult level

\*\* Including nephrotic syndrome (albumin excretion usually > 2200 mg/24 hours [ACR .2220/g; >220 mg/mmol])<sup>1</sup>

CKD prognosis according to the GFR and albuminuria: KDIGO 2012

Albuminuria categories, description and range

A1

A2

A3

Normal or mild increase

Moderate increase

Severe increase

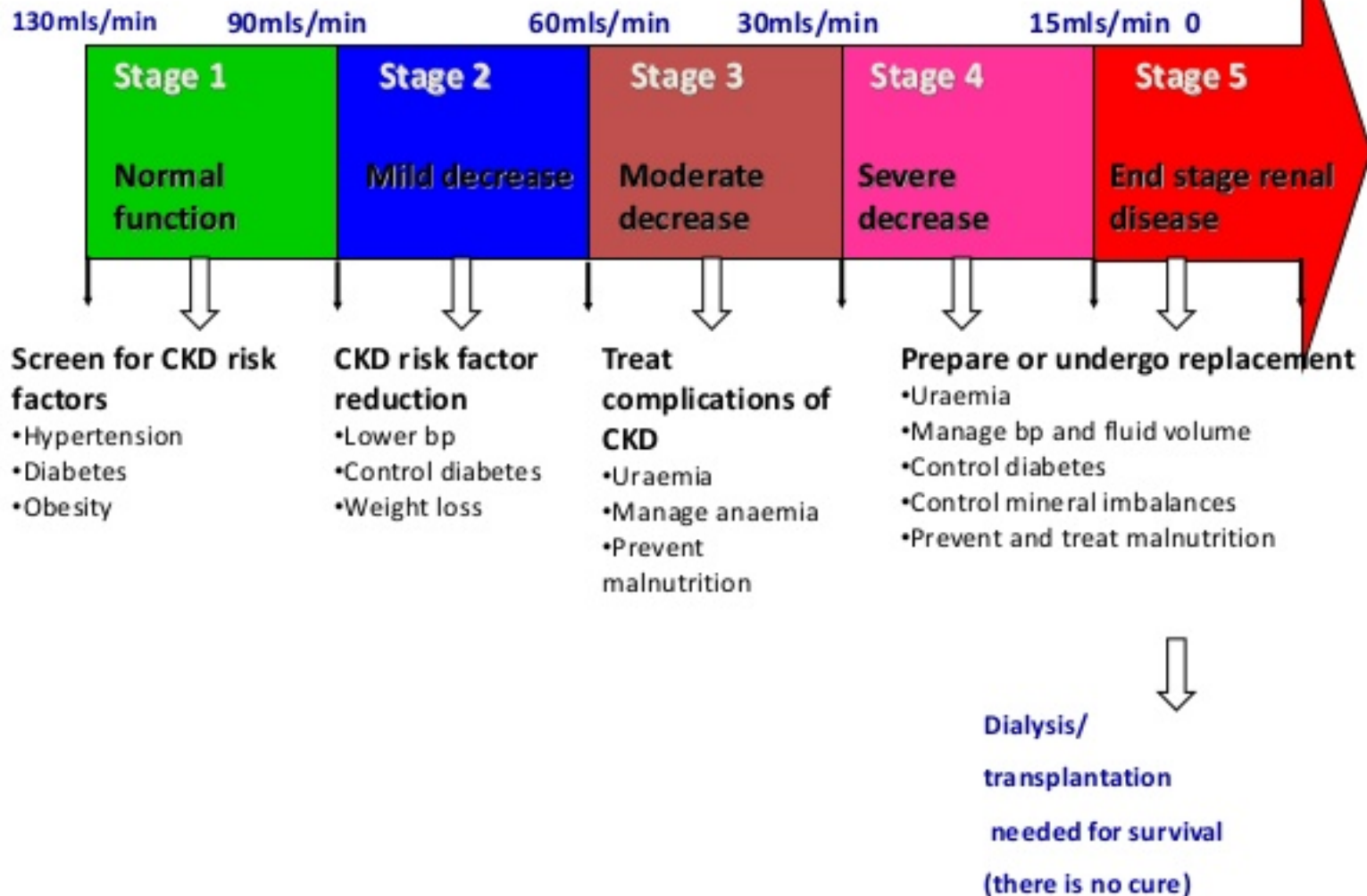
< 30mg/g  
< 3mg/mmol

30-299mg/g  
3-29mg/mmol

≥ 300mg/g  
≥30 mg/mmol

GFR categories, description and range (ml/min/1,73 m <sup>2</sup> )	G1	Normal or high	> 90			
	G2	Slight decrease	60-89			
	G3a	Mild-moderate decrease	45-59			
	G3b	Moderate-severe decrease	30-44			
	G4	Severe decrease	15-29			
	G5	Renal failure	< 15			

# Stages of Renal Disease



# IN The stage of chronic kidney disease which one of following is correct ?

- a. If 65 y male patient who has serum creatinine 120  $\mu\text{mol/L}$  for 12 weeks should consider CKD
- b. If the patient have hematuria and high serum creatinine should be diagnosed with chronic kidney disease
- c. If the patient have eGFR less than 60  $\text{ml/min}$  should be considered kidney disease
- d. Pt with hypertension and eGFR 75  $\text{ml/min}$  should be consider CKD

eGFR = 55  $\text{ml/min/1.73m}^2$



# Risk Factors CKD

# Risk Factors CKD

Diabetes Mellitus 30%

Hypertension 25%

Old age 50%

Low GFR  
AKI

Obesity

Cardiovascular  
disease

NSAID

Family History

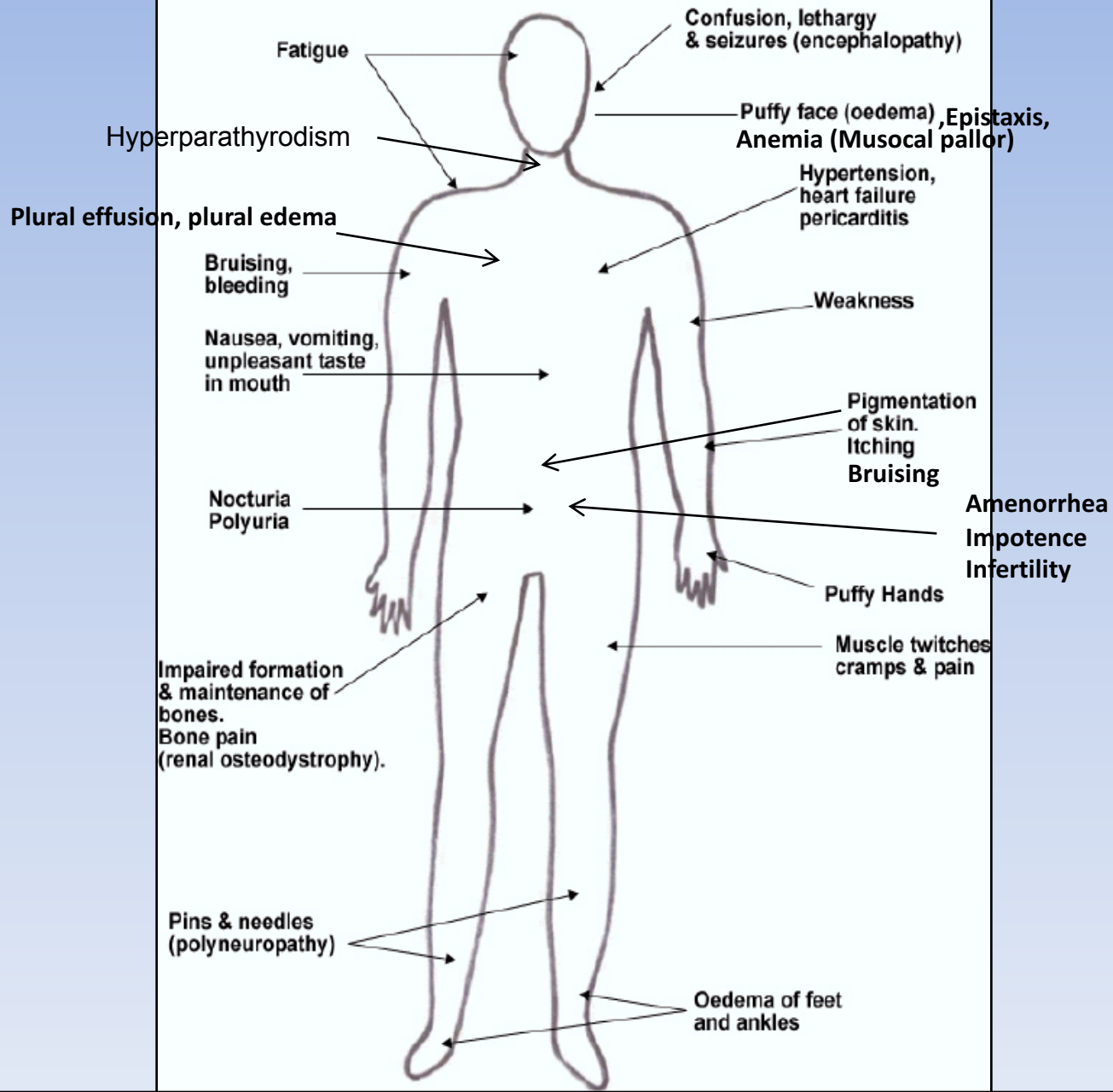
Smoking

# Regarding the symptoms of chronic kidney disease

- a. Patient can be advance renal failure and asymptomatic
- b. Symptoms usually starts in stage 1
- c. Symptoms most commonly appear in stage 3
- d. Stage 5 usually indicate to start dialysis

# Signs and Symptoms

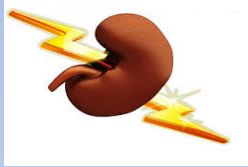
## SYMPTOMS & SIGNS OF CHRONIC KIDNEY DISEASE



# Complications of CKD

Recognized as the 9<sup>th</sup> leading cause of death in the United States

## AKI

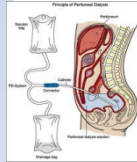


### Cardiovascular Disease

- Acute coronary syndrome
- Heart failure
- Heart rhythm disturbances



## ESRD

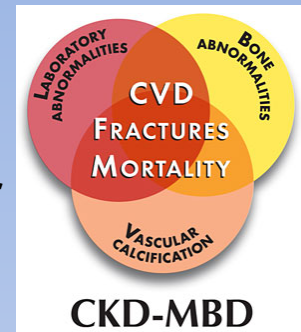


## Acidosis

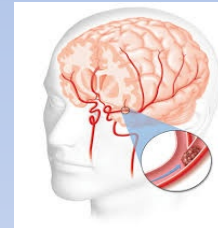


## pH

## Mineral and Bone Disorder



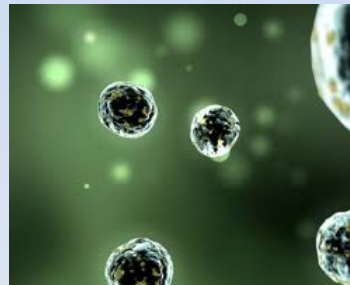
## Stroke



## Anemia



## Infection

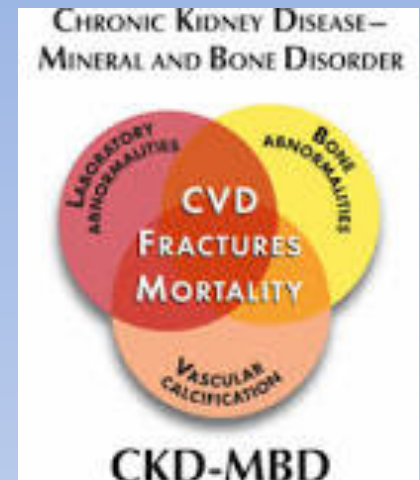


## Drug Dosing

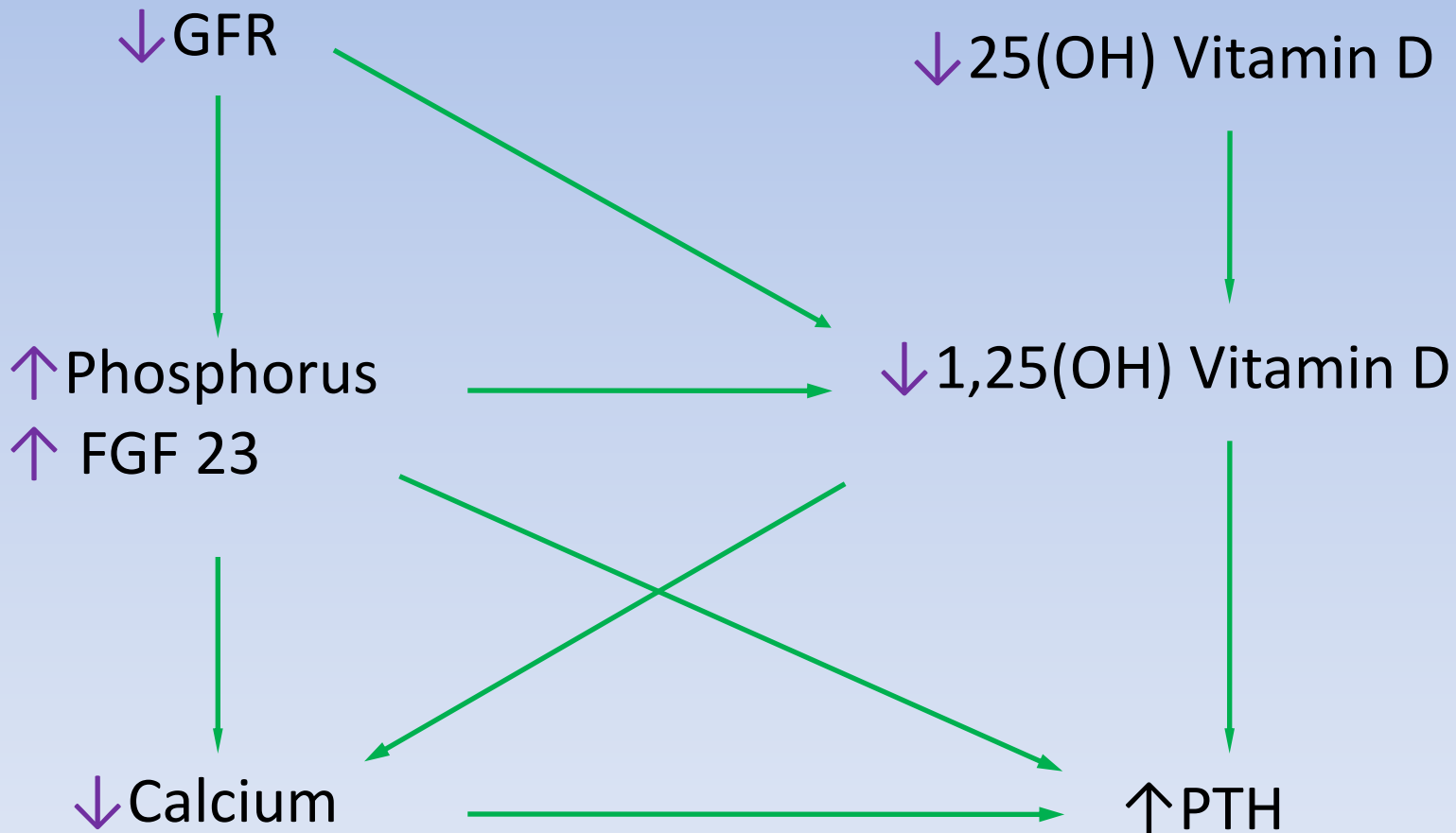


# CKD MBD indicate

- a. Change in calcium & phosphate & parathyroid hormone, Vit D
- b. change in the bone metabolize and mineral
- c. Indicate change in the extra skeletal calcification and vascular, valvular calcification



# Mineral abnormalities of Chronic Kidney Disease (CKD)



# Renal osteodystrophy

- high bone turnover disease related to secondary hyperparathyroidism (referred to as osteitis fibrosa cystica),
- low turnover disease (referred to as adynamic bone disease),
- osteomalacia (low turnover disease accompanied by undermineralized bone tissue)
- mixed disease where features of both high and low bone turnover disease are present





- osteitis fibrosa cystica),



AP radiograph of the hand in a 66-year-old woman with primary hyperparathyroidism owing to parathyroid adenoma shows subperiosteal bone resorption ( arrows) along the radial aspect of 2nd, 3rd, and 4th middle phalanges.

Warning: Not for diagnostic use



# Diagnosis of CKD

Basic Laboratory studies used in the diagnosis of CKD can include the following:

- Complete blood count (CBC)
- Biochemistries (Na, K, Urea, Cr,  $\text{HCO}_3$ , Ca,  $\text{PO}_3$ , Uric, Albumin, Alk ph)
- Urinalysis
- 24 hour urine collection Creatinine clearance and proteinuria
- Urine albumin:creatinine ratio
- Glucose
- Lipid profile:
  - increased risk of cardiovascular disease

# Diagnosis of CKD

## *Laboratory studies used in the diagnosis the cause of CKD*

- *HbA1c*
- *ANA*
- *HBsAg*
- *HCV.*
- *C<sub>3</sub>,C<sub>4</sub>*

## *Investigation used in the diagnosis the complications of CKD*

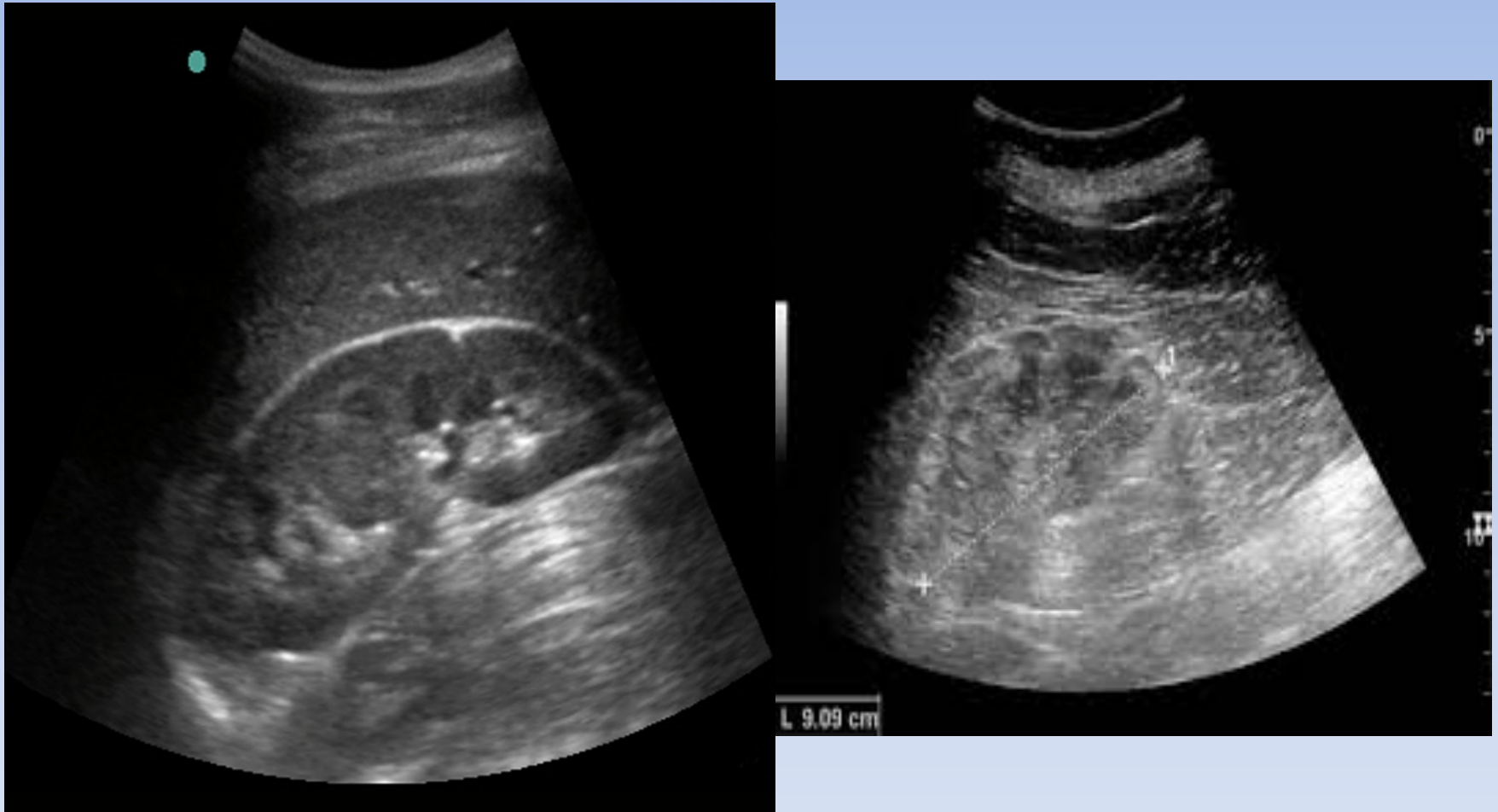
- *PTH*
- *VIT D<sub>3</sub>*
- *ECH*
- *ECG*

— Renal Biopsy

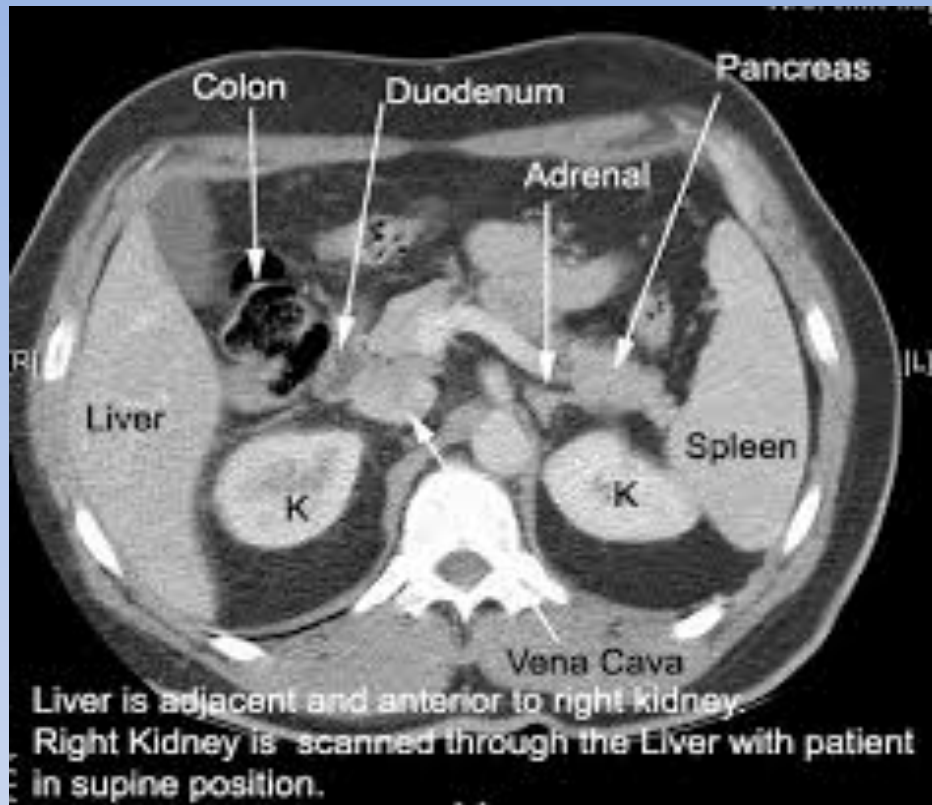
# CT, MRI, and Radionuclide Scans

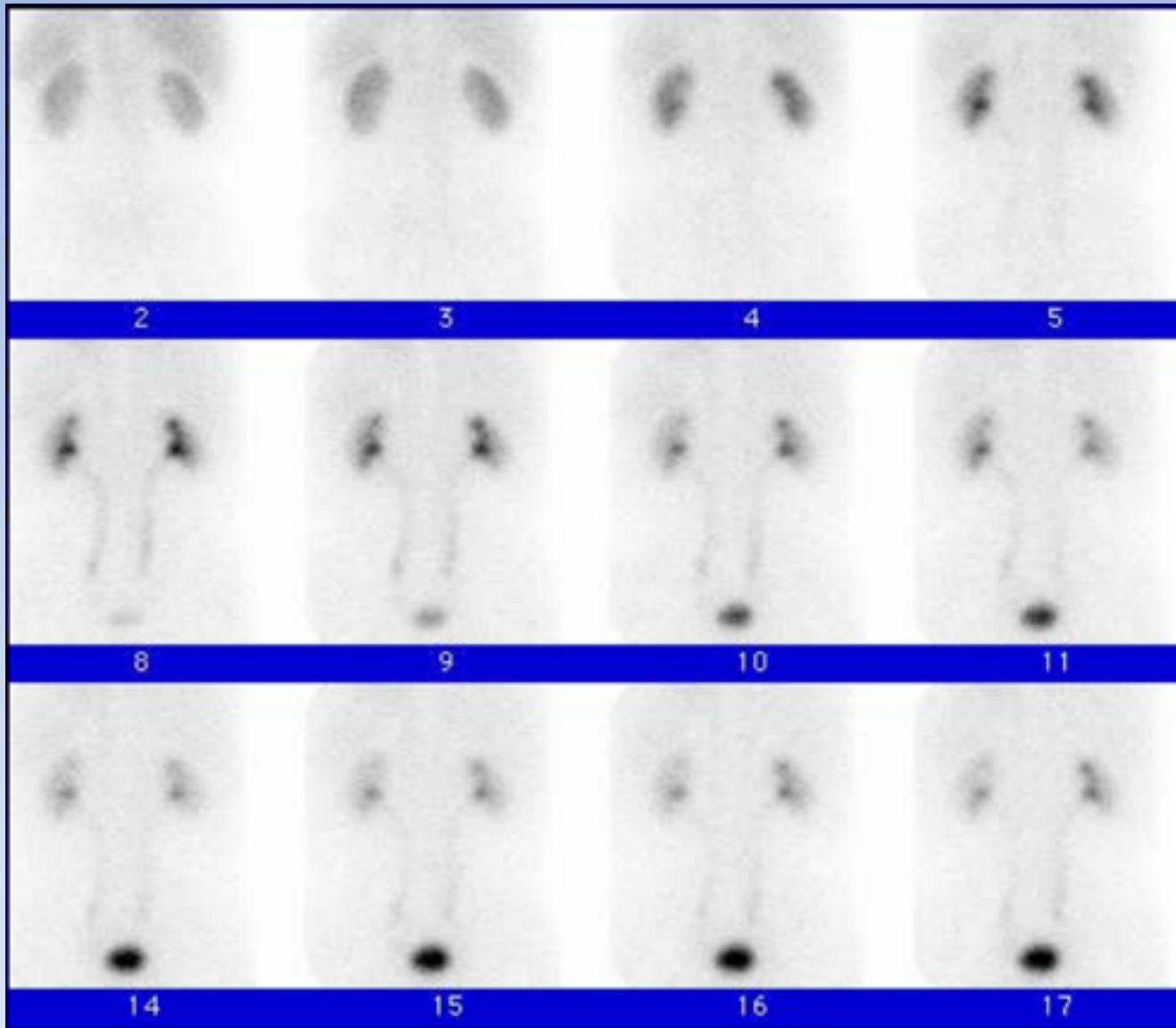
- Renal Ultrasonography : initial imaging
- CT, MRI: Intravenous (IV) should be avoided
- Radionuclide Scans: quantitates differential renal contribution to total glomerular filtration rate (GFR)

# Investigation



- Normal size kidneys – 12 cm
- Normal Echogenicity







# Diagnosis of CKD

- Different
  - ✓ Acute Kidney Injury form
  - ✓ CKD
- Reversible factors

**Differentiating between acute and chronic kidney disease**

# Treatment of chronic kidney disease??

- a. The treatment usually able to cure chronic kidney disease
- b. Its slow progressive of chronic kidney disease
- c. It include treatment of hypertension and reduce proteinuria
- d. Acidosis should be treated in chronic kidney disease

# Management of CKD

- The medical care should:
  - Prevent CKD
  - Treatment of the underlying condition
  - Delaying or halting the progression of CKD
  - Treating the complications
  - Timely planning for long-term for RRT

# Risk Factors CKD

Diabetes Mellitus 30%

Hypertension 25%

Old age 50%

Low GFR  
AKI

Obesity

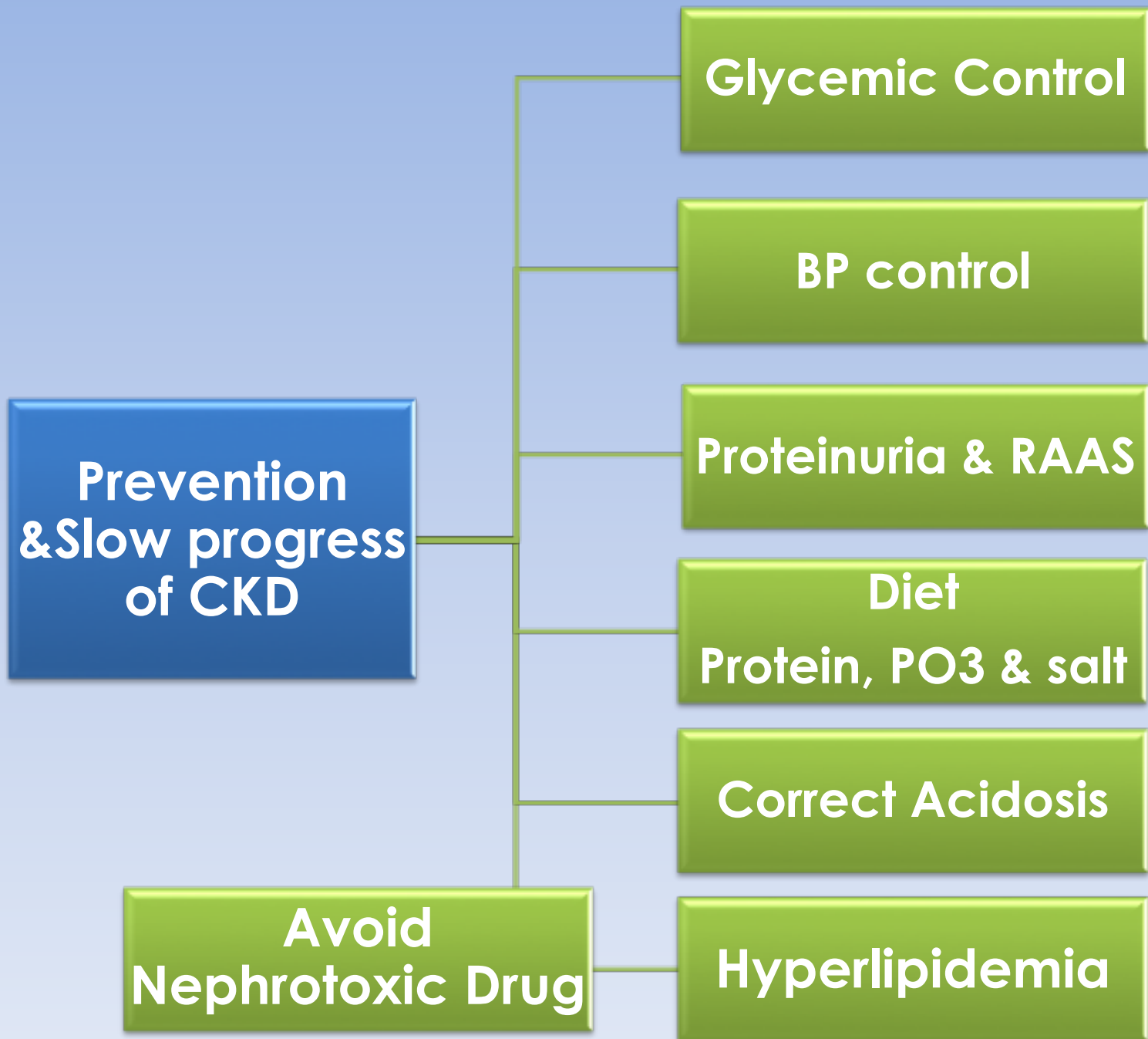
Cardiovascular  
disease

NSAID

Family History

Smoking

Prevention of  
CKD  
Early screen



# Target Blood Pressure in CKD

$\leq 130/80$

## Diabetics and Non-diabetics

Albuminuria	Target BP	Drug of choice
A1 <30 mg/d	$\leq 130/80$	CBC, Diuretic, RAAS
A2 >30 mg/d	$\leq 130/80$	ARB or ACE-I

**No B-blocker**

# Renal Diet

- Low salt diet – 3 g/day
- Low potassium diet
  - (2g-2.5 g), half of normal intake
- Low protein diet - 0.6 to 0.8 g/kg per day
- Low phosphorous diet – 800 – 1000 mg/day
- Water intake – daily water intake 1.5-2 L
- Restricted Magnesium

# Treatment of Complications

- **Volume overload:**
  - restrict SALT
  - loop diuretics
- **Metabolic acidosis:**
  - oral alkali supplementation



# Treatment of Complications

- **Anemia**: *hemoglobin level* ↓10 g/dL –  
check iron -iron Tablet or IV  
erythropoiesis-stimulating agents (ESAs)
  - ✓ epoetin alfa
  - ✓ darbepoetin alfa
  - ✓ Methoxy polyethylene glycol-epoetin beta(Mircera)
- **Hyperkalemia**
  - ✓ Low K Diet
  - ✓ Resonium Ca ,Na resonium
  - ✓ Patiromer
  - ✓ Zirconium Cyclosilicate
- **Hyperphosphatemia**
  - ✓ dietary phosphate restriction
  - ✓ dietary phosphate binders (Ca Carbonate, Ca Acetate, Sovlomie, lanthium)
- **Hypocalcemia**
  - ✓ calcium supplements with or without calcitriol
- **Hyperparathyroidism**
  - ✓ Calcitriol
  - ✓ vitamin D analogs

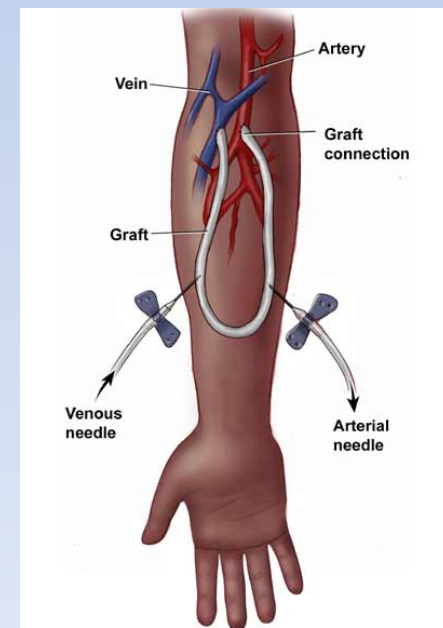
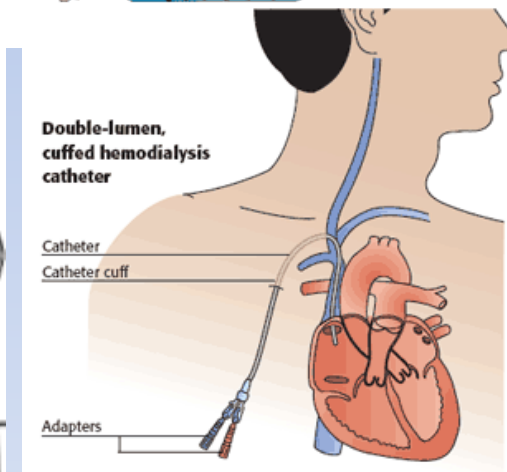
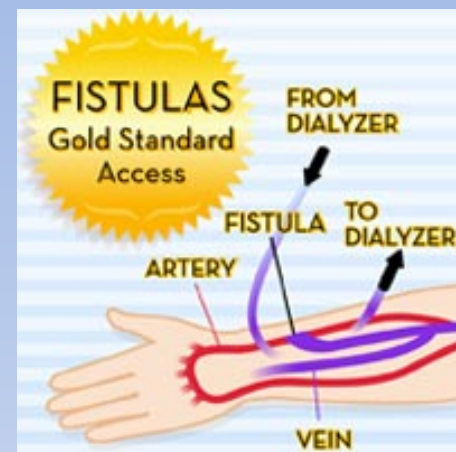
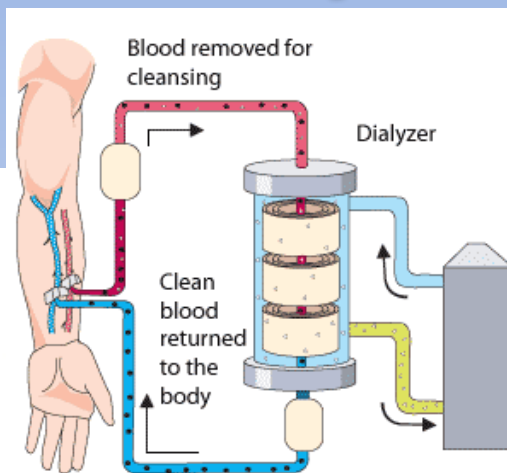
# Treatment of Complications

- **Uremic manifestations:**
  - Long-term renal replacement therapy
    - ✓ hemodialysis
    - ✓ peritoneal dialysis
    - ✓ renal transplantation

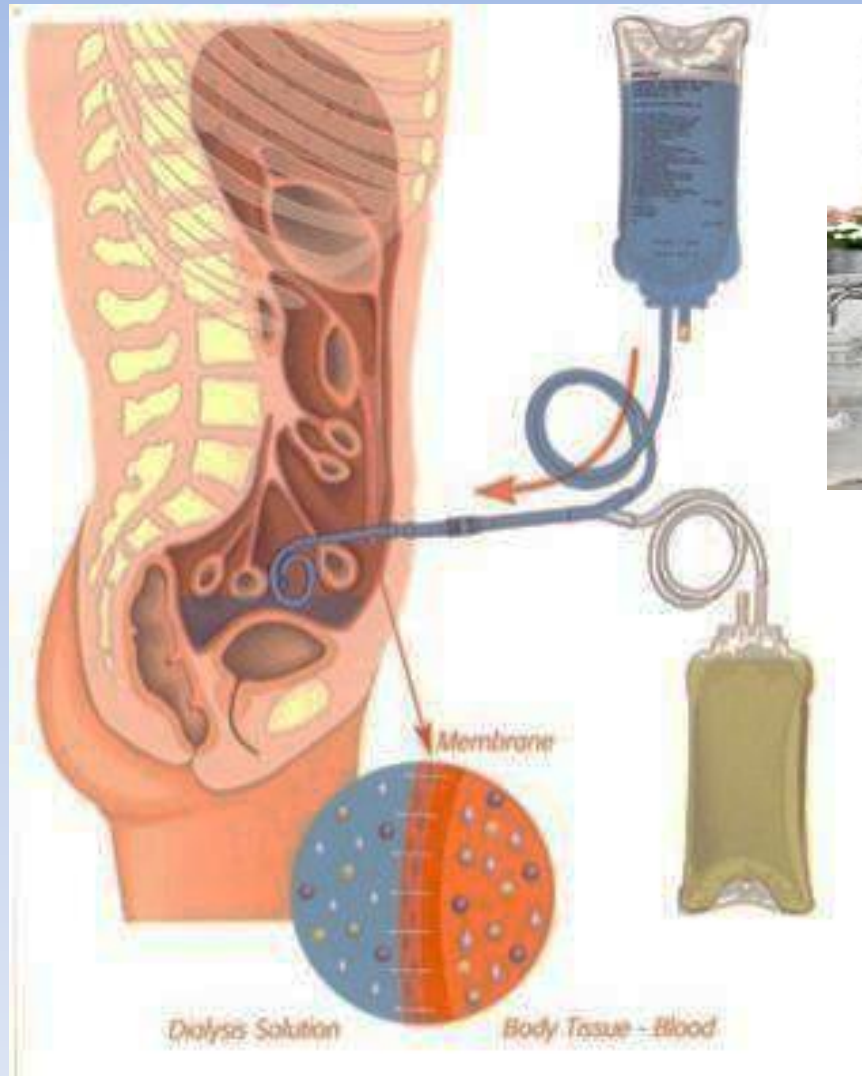
# Indications for renal replacement therapy

- Severe metabolic acidosis
- Hyperkalemia
- Intractable volume overload
- Pericarditis
- Uremic Symptoms
  - ✓ Encephalopathy
  - ✓ Failure to thrive and malnutrition
  - ✓ Peripheral neuropathy
  - ✓ Intractable gastrointestinal symptoms
- In asymptomatic patients
  - ✓ GFR of 5-8 mL/min/1.73 m<sup>2</sup>

# Hemodialysis



# Peritoneal Dialysis

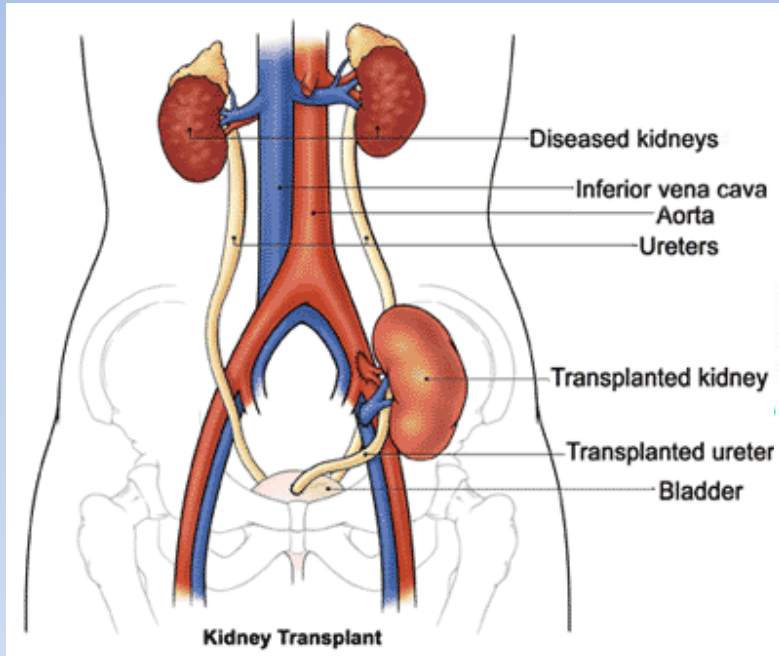


# Renal Transplantation

Living related donors (LRD)

Living unrelated donors (LURD)

deceased organ donors

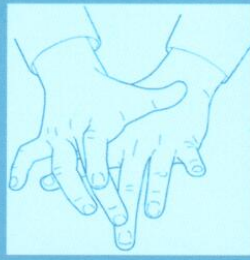


Renal Transplant  
Rejection & infection



Renal Transplant  
Medication

✓ Better quality of life, less mortality, can be before HD



تأليف

نيكولاس ج. تالي سيمون أوكونر



NICHOLAS J TALLEY  
SIMON O'CONNOR

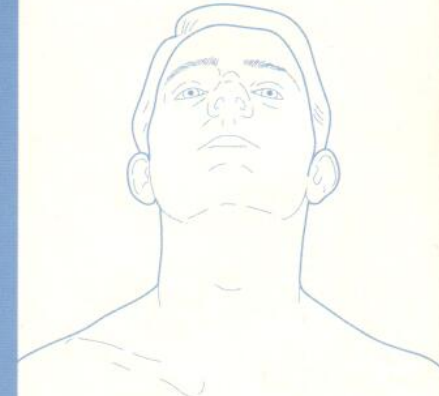
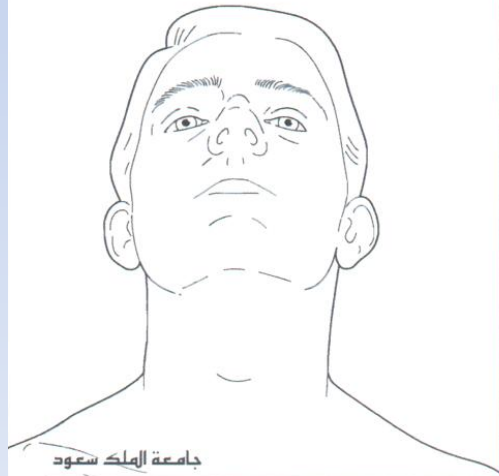
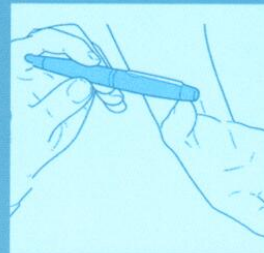
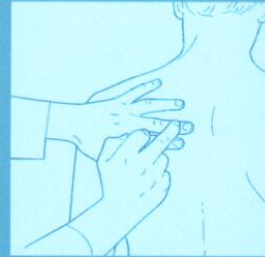
# كتاب الفحص الإكلينيكي الجيبي

# POCKET CLINICAL EXAMINATION

ترجمة

أ.د. جمال بن صالح الوكيل

SECOND EDITION



جامعة الملك سعود

النشر العلمي والمطابع



