Genitourinary System

Neoplastic Diseases of the GU Tract

Testicular Cancer

Image Courtesty of de:Benutzer:Hasehttp://commons.wikimedia.org

Testicular Carcinoma

- Clinical Considerations
  - **Most common neoplasm in males 15-35 yo**
  - Risks:
    - Cryptorchidism (increases risk x40!)
    - Also, White > African Asian Americans, (+) FH, (+) Personal Hx
  - 95% are Germ Cell Tumors: *Seminomas and Nonseminomas*

- Signs/Symptoms
  - **Painless testicular mass** or testicular enlargement, R > L side
  - Metastatic Signs
    - Retroperitoneal Nodes → Flank Pain
    - Mediastinum and Lung → cough, chest pain, shortness of breath
    - Brain → Headaches and CNS symptoms

Testicular Carcinoma

- Labs:

	Nonseminomas (65%)	Seminomas (35%)
βHCG	↑↑↑	↑
AFP	↑	***NOT ELEVATED***
LDH	↑	↑

- Imaging
  - **Scrotal ultrasound**
  - Surveillance of mets and staging
    - CT of the abdomen and pelvis
    - CXR or CT of the chest
    - MRI of the brain
- Treatment: ***Radical orchiectomy for everyone***
  - Seminomas: Add XBRT +/- Chemo (cisplatin)
  - Nonseminomas: Surveillance, May add Chemo. **NOT** responsive to XBRT
  - Prognosis excellent **90-95% cure** rate (71% with mets)

Prostate Cancer

2nd Most common CA

2nd most common CA death in U.S. men

1 in 6 men diagnosed in lifetime

Slow growing and RARELY aggressive

Prostate Cancer

- Clinical Considerations
  - Risk Factors: Age, *African American*, Family History
  - 95% are Adenocarcinomas
- Signs/Symptoms
  - **2/3 are ASYMPTOMATIC** when diagnosed
  - 60-70% grow in Peripheral Zone next to rectum
  - 1/3 present with pain, obstructive urinary sx's, erectile dysfunction
  - DRE: **I**ndurated, hard gland, OR discrete nodules
    - 94% Specific. But only 50% Sensitive for CaP
  - Advanced disease: signs/sxs specific to mets
    - METS: Bones (esp axial skeleton), nodes, rectum, and bladder

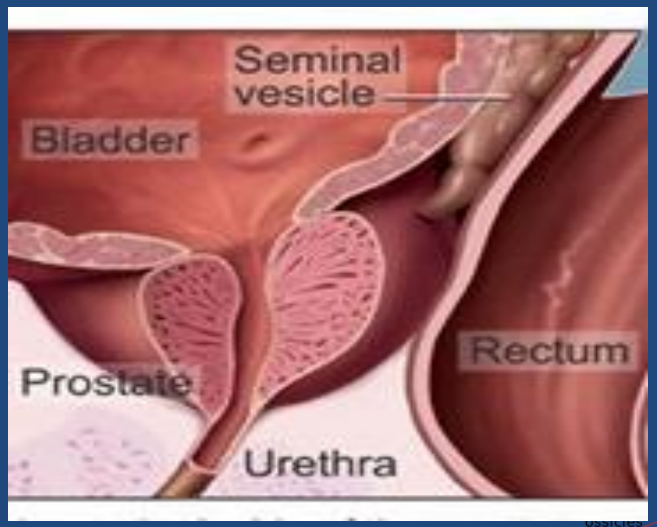

Image Courtesy of
US government agency
National Cancer institute
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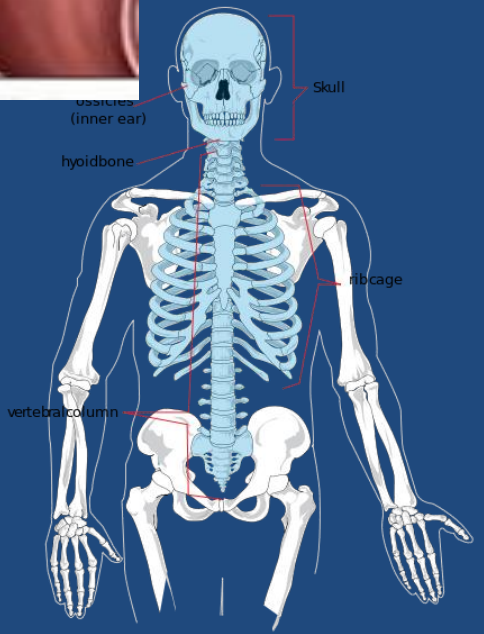

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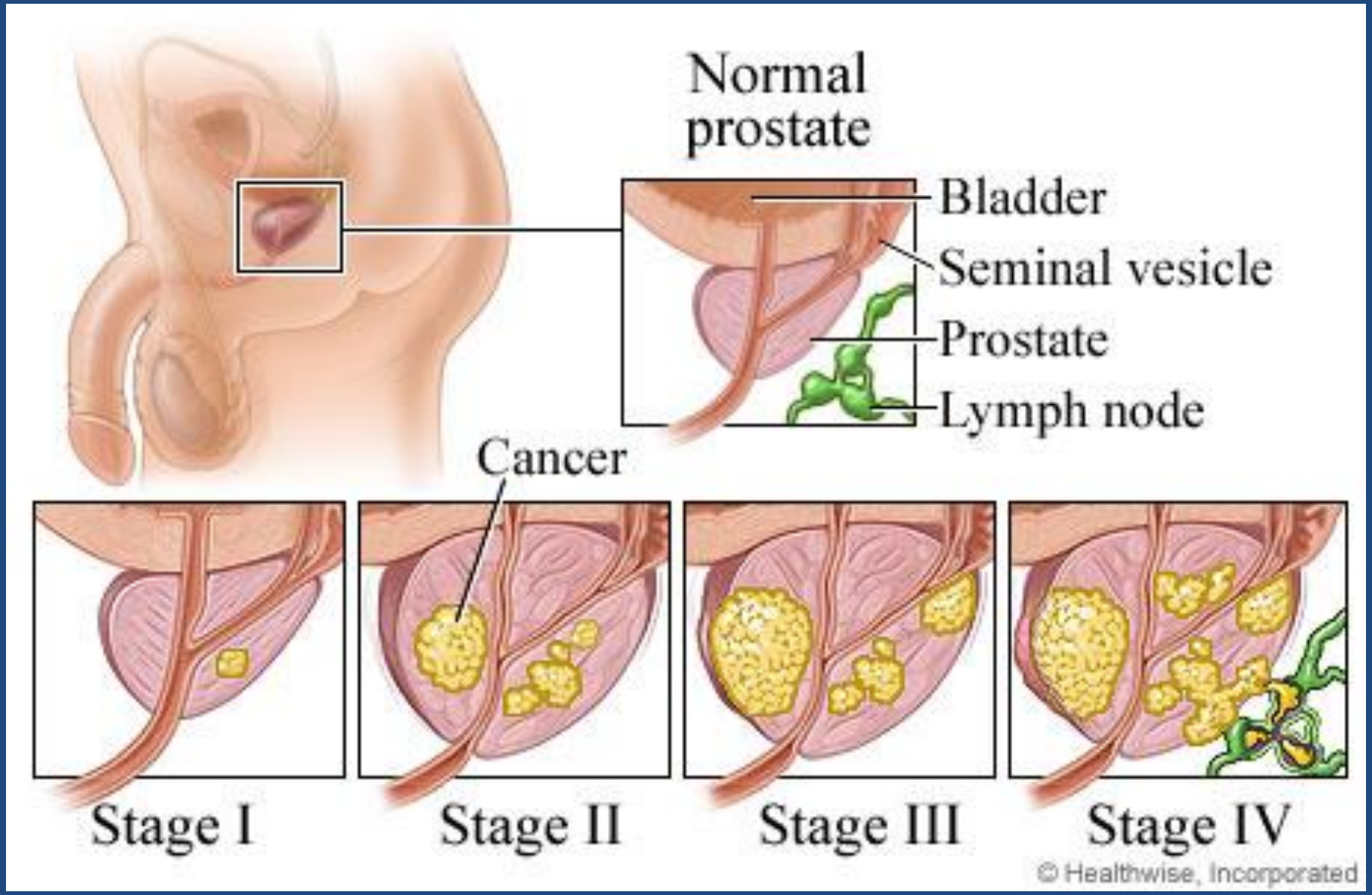
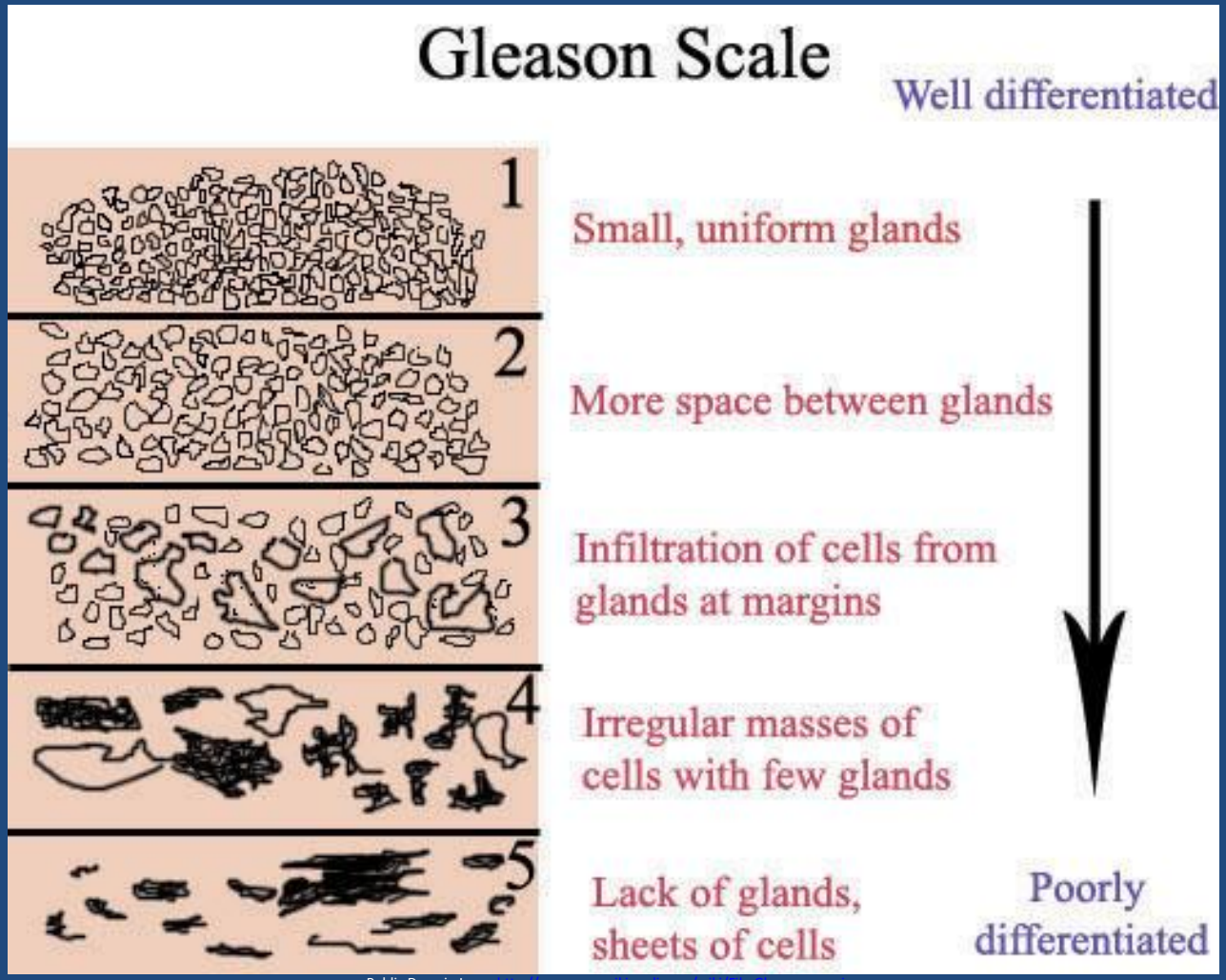


Image Courtesy of Healthwise, Incorporated
http://healthy2u.info

Prostate Cancer

- Labs/Diagnostics
  - PSA >4.0
    - Also elevated with Age, BPH, Prostatitis, DRE, Instrumentation
    - PSA will be reduced by 50% with 5^{α} reductase inhibitors (finasteride for BPH)
    - Good for staging, monitoring, detecting recurrence, BUT NOT screening
    - Newer ways to use PSA: Free vs Bound, Age-Specific PSA reference ranges
      - Free PSA- UNLIKELY to have Prostate Cancer
  - Transrectal US-Guided Biopsy
    - Do for anyone with (+) DRE
  - Gleason Score
    - Evaluates tissue sample
    - Higher score- cells are less differentiated → Poorer Prognosis
  - Tumor Surveillance
    - CT abdomen and pelvis, Bone Scan, MRI

Prostate Cancer



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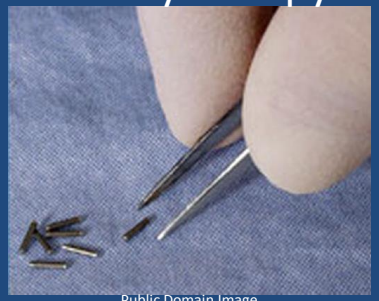
- Staging: TNM system + PSA at time of diagnosis + Gleason Score

Prostate Cancer

- Treatment Options
  - Active Surveillance
  - Radical Prostatectomy
  - Radiation Therapy: XBRT or Brachytherapy
  - Cryotherapy
  - Androgen Deprivation
    - LHRH Agonists: Leuprolide and Goserelin
    - Antiandrogen: Bicalutamide, Megestrol, Ketoconazole
    - Orchiectomy
  - Chemotherapy- Consider if hormone refractory

"Seeds" used for brachytherapy



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- Screening:

LOTS of disagreement… but everyone agrees NO SCREENING <40yo.

Screen earlier only if Risk Factors (Family History or AA)

  - USPSTF: NO screening because risk outweighs benefits
  - ACS: Annual DRE and PSA to men >50 with >10 years left
  - AUA: PSA screening (every 2 years) only in men aged 55 to 69

Bladder Cancer

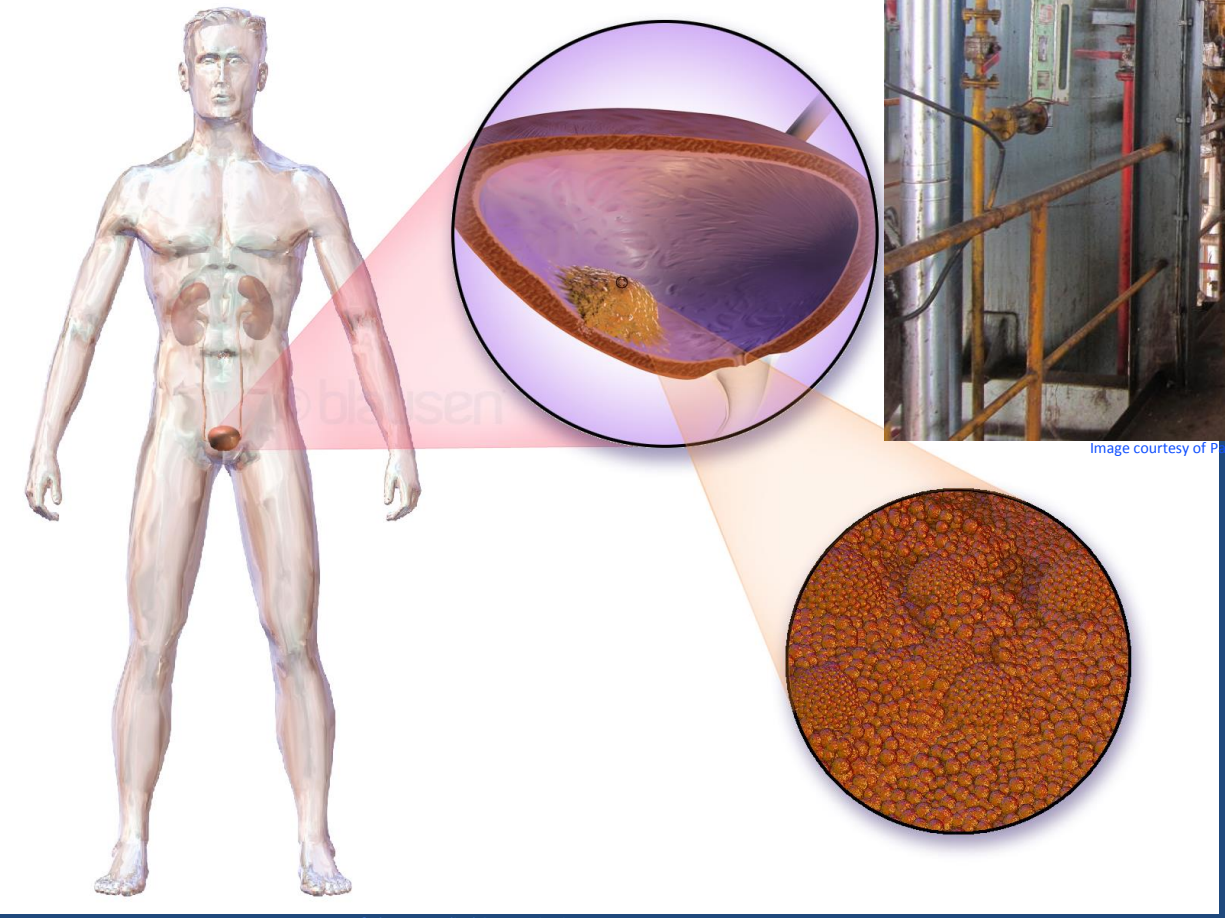


Image courtesy of Blausen Medical Communications, Inc.
http://en.wikipedia.org/wiki/File:Blausen_0082_BladderCancer.png

Image courtesy of Patgin, http://commons.wikimedia.org/wiki/File:Solvent_extraction_plant_.jpg

Image Courtesy of Tomasz Sienicki
http://commons.wikimedia.org

Bladder Cancer

- Clinical Features
  - **SMOKING #1 Risk Factor**. Also: Male (3:1), >40yo
  - Occupational exposures: dyes, solvents, petroleum, leather, printing.
  - 90% of cases are **Transitional Cell Carcinoma** aka Urothelial Cell Carcinomas

- Signs and Symptoms

  Painless hematuria is Bladder Cancer *until proven otherwise.*

  - Irritative voiding symptoms also possible.

- Labs and Imaging:
  - Cystoscopy with Biopsy
  - UA, Urine Cytology

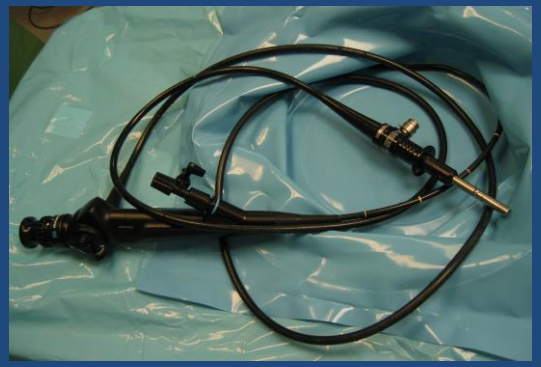


Image Courtesy of Myk Reeve http://en.wikipedia.org

  - CT scan, US, MRI are NOT the best choices to initially evaluate hematuria.

Bladder Cancer

- Treatment
  - Does not invade bladder wall (Ta, T1):
    - Transurethral Resection with Fulguration +/- Intravesical chemo (cisplatin)
  - Invades bladder wall (>T2):
    - Radical Cystectomy + Pelvic Lymphadenectomy +/- chemo and radiation

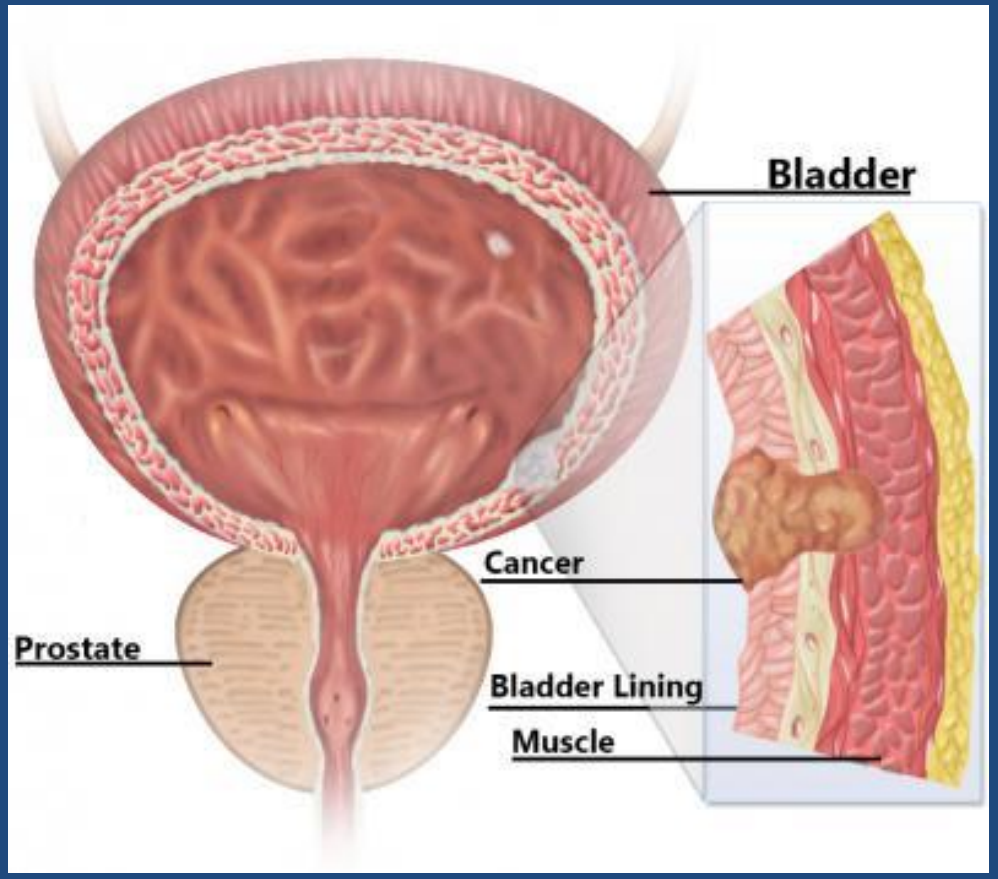


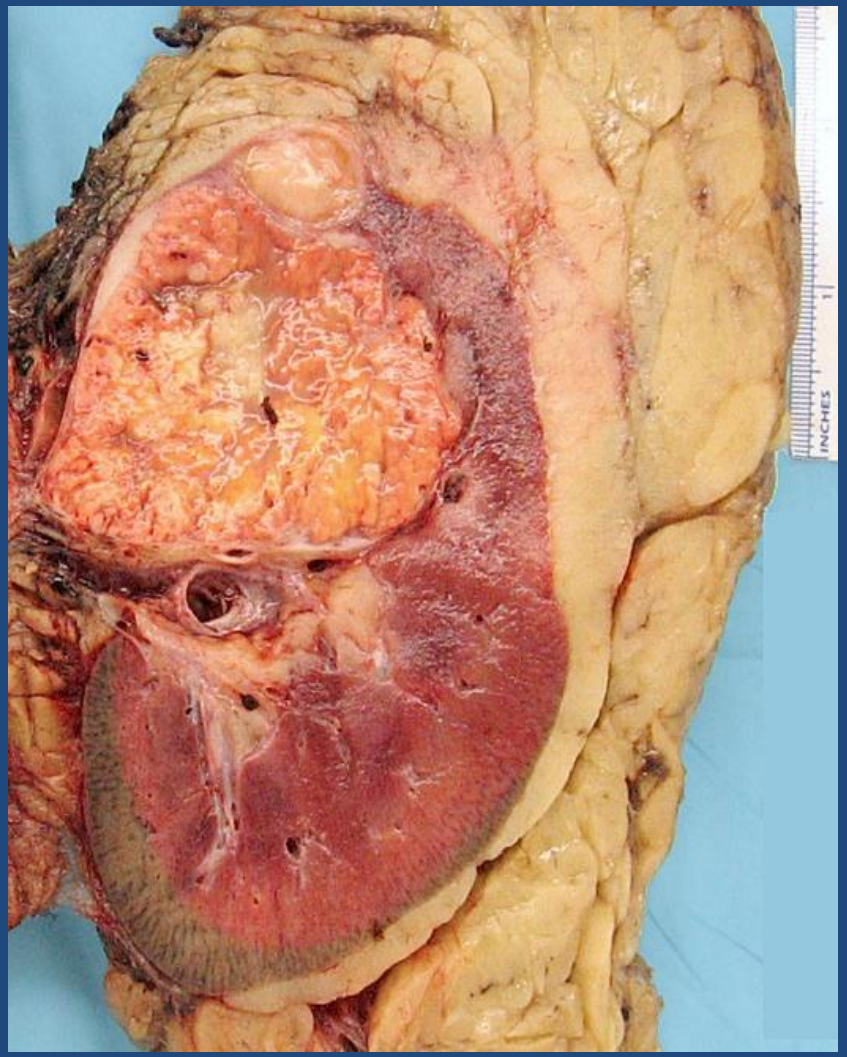
Image courtesy of sciencenewsline.com
Johnathan Bailey of the National Human Genome Research Institute

Renal Cell Carcinoma

- Clinical Features
  - Risk factors: **Smoking,**
    Men (3:1), Obesity, HTN
  - NOT common
    (<3% of all adult cancers)
  - Risk of producing occlusive thrombi in renal vein and IVC
  - 20% will have…

Paraneoplastic Syndromes
(tumor produces ectopic hormones)

- Hypercalcemia
- Erythrocytosis
- HTN
- FUO
- Anemia
- Hepatic dysfunction



Renal Cell Carcinoma

- Signs/Symptoms
  - **Hematuria**: (60%), **Flank pain**/Mass (30%),
  - Sx Mets lungs, bone, brain (30%)

- Diagnostics
  - Imaging: CT scans, metastatic w/u (CXR, bone scan)
  - Labs: UA, Studies for Paraneoplastic Syndromes

- Treatment
  - Radical or partial nephrectomy- effective if localized disease
  - Prognosis: if confined to renal capsule, 5 yr survival of 90-100%
  - If metastatic, palliative care (Rad/Chemo not useful with RCC)

Wilms' Tumor (aka Nephroblastoma)

Cells destined to form the kidneys fail to develop properly.

- Clinical Features
  - Peak Incidence 2-3 yo
  - #1 common solid renal tumor in kids
  - 5% of childhood cancers
- Signs and Symptoms
  - **Palpable Abdominal Mass** (60%)
  - Abdominal pain, hematuria, N/V, anorexia, fever
- Labs and Imaging
  - H/H=Anemia, U/A=Hematuria
  - U/S, CXR and CT Abd (met w/u)
  - **Biopsy is NOT done because could spill the tumor cells**

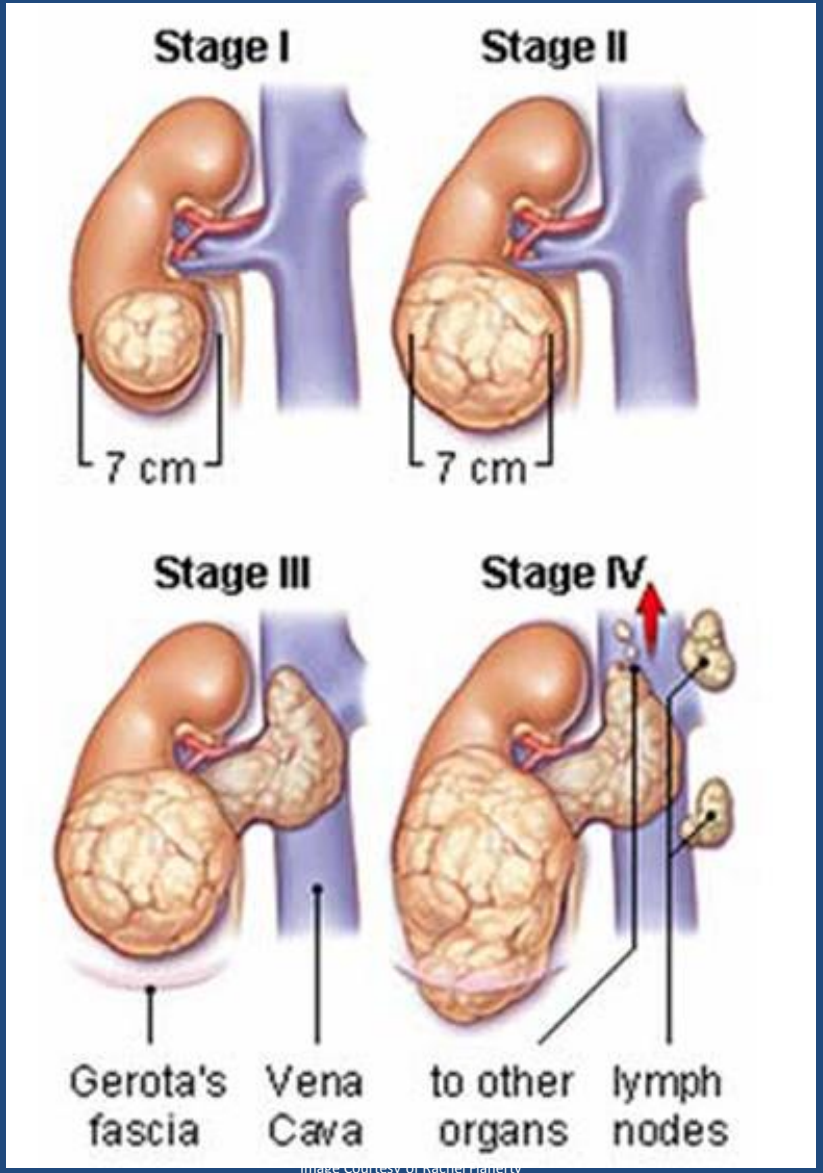


Image courtesy of Rachel Flaherty
http://www.physio-pedia.com

Wilms' Tumor

- Treatment:
  - Surgical resection
  - Nephrectomy
  - Chemotherapy
  - Radiation

- Prognosis depends on histology

85% cases are curable!

Image Courtesy of U.S. Air Force photo/Master Sgt. Lance Cheung
http://en.wikipedia.org

Renal Diseases

Acute Renal Failure (Acute Kidney Injury)

Sudden decrease in renal function (GFR) causes build up of nitrogenous waste

- Clinical Features: Develops over hours-days
  - The Stage or Extent of injury is defined by:
    - ↑ BUN and Creatinine
    - And/or Reduction of urine output
  - Occurs in 5% hospitalized and 30% critical care pts. >5x incr mortality
- Signs/symptoms
  - Oliguria <15ml/hour, change in urine color: can be darker, cola-colored
  - Vague symptoms: N/V, malaise, abdominal pain, itching, fluid retention

Acute Renal Failure (Acute Kidney Injury)

- Diagnostics
  - Labs:
    - BUN/Creatinine
    - Serum Cystatin C (Detects AKI 1-2 days before creatinine)
  - UA: Results vary by cause
  - Imaging/Biopsy may be done depending on suspected cause

- Treatment: First treat underlying cause

- Causes:
  - Prerenal Azotemia
  - Intrinsic Renal Failure
  - Postrenal Azotemia

ARF/AKI

- Prerenal Azotemia (60-70%)
  - Volume Depletion (Dehydration, Burns, GI losses, Hemorrhage)
  - ↓ Circulating Volume (CHF, Cirrhosis w/Ascites, Nephrotic Synd)
  - Impaired Renal Blood Flow (ACEI's, NSAID's, Renal Artery Stenosis)
  - Systemic Vasodilation (Sepsis, Vasodilatory Drugs)
  - Mgt: Treat cause, Maintain Euvolumia, Check Potassium

- Intrinsic Renal Failure (25-40%)
  - *Acute Tubular Necrosis* (Shock, Sepsis, Trauma, Nephrotoxins)
  - *Interstitial Nephritis* (Drugs, pcn, cephalosporins, sulfa, NSAID's)
  - *Glomerulonephritis* (Rapidly Progressive GN (RPGN), Strep, SLE)
  - Mgt: Will be discussed in the next few slides…

- Postrenal Azotemia (5-10%)
  - BPH, Nephrolithiasis, Bladder Outlet Obstruction BILATERALLY
  - Mgt: Catheterization or Stent

Acute Tubular Necrosis

Damage to renal tubules- not necessarily necrosis

The #1 Cause of Acute Renal Failure (80-90%)

- Causes
  - Ischemia (MI, Sepsis, Trauma, Burns)
  - Nephrotoxins:

    Aminogycosides, IV contrast, Rhabdomyolysis, Cyclosporine
  - Sepsis
- Diagnostics
  - U/A : **muddy brown sediment**, Renal tubular epithelial cells and casts= granular casts
  - Labs: Hyperkalemia, High phos, FeNA >1, BUN:Cr < 20:1
- Treatment
  - Prevent Further Kidney Injury: Remove Toxins, Treat Cause
  - Loop Diuretics
  - Low protein diet
  - Correct electrolytes
  - Dialysis if necessary
  - Reversible unless cortical necrosis (rare and assoc with anuria)

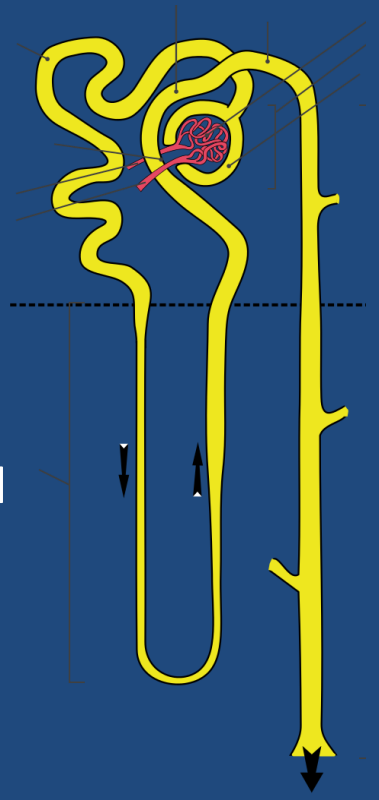


Image Courtesy of Yosi I
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Interstitial Nephritis

Inflammation of renal tubules and interstitium

- Causes
  - Drugs >70% Cases (pcn, cephalosporins, sulfa, NSAID's, Dilantin)
  - Infection (strep, CMV), Immune d/o (sarcoid, SLE)
- Signs/Symptoms
  - Fever, Rash, Arthralgias
- Diagnostics
  - U/A: WBC's, WBC casts, Eosinophils, RBC's, Epithelial Cells, Protein
  - Labs: Will see peripheral blood eosinophilia
- Treatment: Remove Cause
  - Urgent Dialysis needed in 1/3
  - May add Corticosteroids

Glomerulonephritis

Inflammatory lesions of glomerulus from immune complex deposition or development of antibodies against the glomerulus.

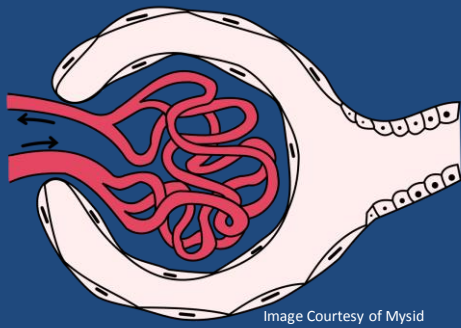
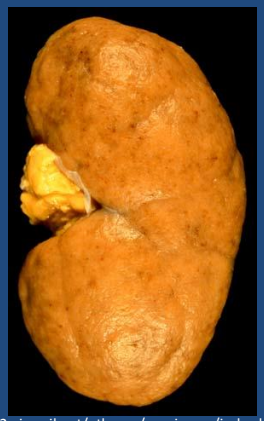


Image Courtesy of Mysid
http://en.wikipedia.org

- Immune Complex Deposition
  - Post-streptococcus GN: (+) ASO Titer, ↑C3
    - Develops 2-6 wks post-impetigo and 1-3 wks post-strep pharyngitis
    - Prognosis good in children, not as good in adults
- IgA Nephropathy aka Berger Disease:
  - Associated with URI symptoms,(H flu), less often gastroenteritis
  - Presents with intermittent hematuria
- Lupus nephritis: Auto-antibody production
  - (+) ANA and ANCA



http;//web2.airmail.net/uthman/specimens/index.html

"Flea-Bitten" appearance Lupus Nephritis

Glomerulonephritis

- Anti-GBM (autoantibodies against basement membrane)
  - **Goodpasture Syndrome** (assoc w/pulmonary hemorrhage)

- Vasculitis
  - Polyangiitis / Granulomatosis with Polyangiitis
  - Formerly known as Wegeners Granulomatosis
    - Effects small and medium sized vessels
  - Assoc w/granuloma formation airway, lung, skin ↑ c-ANCA
  - Associated with URI sx's; ***Rhinitis*** most common first symptom

- Vascular
  - Hemolytic Uremic Syndrome

CLASSIC TRIAD

1. Uremia
2. Low Platelets
3. Hemolytic Anemia

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Glomerulonephritis

- Signs/Symptoms
  - Hematuria, HTN & Edema, esp periorbital and scrotal edema, flank pain
  - Symptoms related to underlying cause

- Diagnostics
  - Renal Biopsy used to confirm cause
  - U/A: **Tea-colored urine with Red Cell Casts**, proteinuria, hematuria
  - Other labs depend on cause: CBC, Complement levels, ASO Titer, anti-GBM antibodies, ANCA, ANA

- Treatment
  - Treat underlying cause
  - PSGN: Low protein, Low sodium diet, manage HTN
    - *Steroids NOT helpful for PSGN*
  - High dose corticosteroids used for other causes of GN
  - Plasma exchange for Goodpasture Disease

ARF/AKI

TYPE	URINE SEDIMENT	FE_{Na}	PROTEINURIA	OTHER ABN
PRERENAL	*Few Hyaline Casts, No Blood, No Protein*	*<1*	*None or Trace*	*BUN:Cr >20:1 CLASSIC!*
INTRINSIC *Acute Tubular Necrosis*	*Epithelial Cells, Muddy Brown Casts, Pigmented Granular Casts*	*>2*	*Trace to Mild*	*↑K+, ↑Phos BUN:Cr<20:1*
INTRINSIC *Acute Interstitial Nephritis*	*WBC's, WBC Casts, Eosinophils, RBC's, Epithelial Cells*	*>1*	*Mild to Moderate*	*Peripheral blood eosinophils*
INTRINSIC *Acute Glomerulo-nephritis*	*Dysmorphic RBC's, RBC Casts in Tea Colored or Smokey Urine*	*<1 Early*	*Moderate to Severe*	
POSTRENAL	*Few Hyaline Casts, Possible RBC, No protein*	*<1 Early >1 Late*	*None or Trace*	*Anuria +/- HTN*

Chronic Renal Failure

Destruction of nephrons leads to progressive decline in kidney function

- Clinical Features
  - Affects 1 in 9 adults
  - 70% late stage CKD due to DM or HTN
  - Most pts with stage 3 CKD die of CVD prior to progression of ESRD

- Signs/Symptoms:
  - #1 HTN, No sxs or vague "not feeling well," ↓ Appetite
  - **Uremic Syndrome:**

    When advanced dz, build up metabolic waste →

    Urinary changes, fatigue, weak, N/V,

    metallic taste, pruritis, edema, SOB

Chronic Renal Failure

- Diagnostics
  - ↑ BUN/Cr, ↑ creat/3 mo, ↓ GFR, anemia, ↑ K, ↑ Phos, ↓ Ca^{2+}, met acidosis
  - UA: proteinuria
  - U/S shows small, echogenic kidneys

- Treatment
  - Dietary restrictions:
    - Protein, salt, water, potassium, phos
  - Dialysis and/or Transplant

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http://en.wikipedia.org

Prevention:

Treat HTN, Use ACEI or ARB to delay progression

Nephrotic Syndrome

Increased permeability of glomerular capillary walls which allow passage of large amounts of protein into urine.

Proteinuria + Hypoalbuminemia + Edema.

- Causes
  - **Primary:**
    - Minimal change dz
    - Focal glomerulosclerosis
    - Membranous nephropathy
    - Membranous proliferative nephropathy (MPGN)
  - **Secondary:** DM, amyloidosis

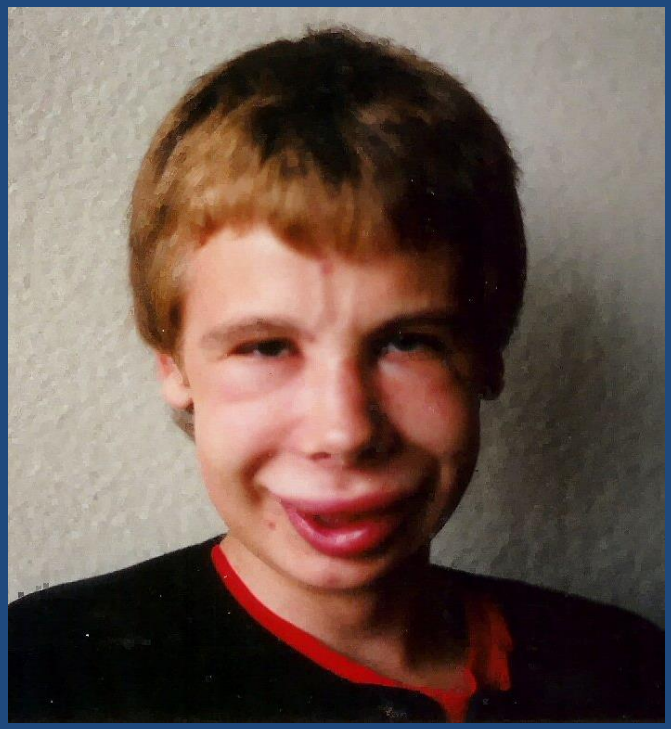

Image Courtesy of CharlesPicavet
https://en.wikipedia.org/wiki/File:Gezichtsoedeem.jpg

- Signs/Symptoms
  - Edema
    - Esp Periorbital and scrotal
    - Also feet and ankles
  - Pleural effusion (SOB)

Nephrotic Syndrome

- Diagnostics
  - **Proteinuria >3gm/day**
    - Oval fat bodies: Lipids are passed into urine
    - Maltese Crosses=
      - Appearance of oval fat bodies under microscope with polarized light

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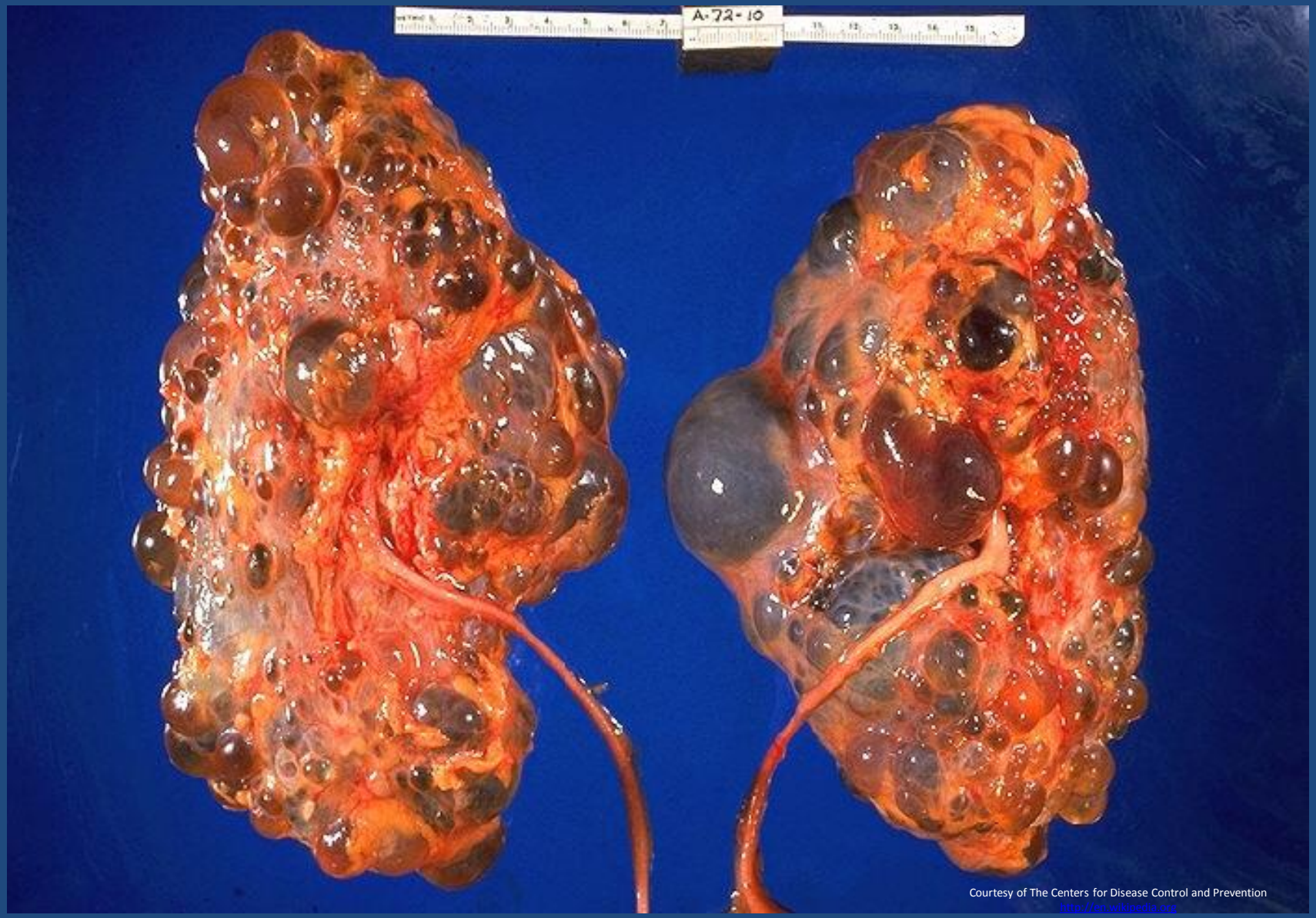
http://en.wikipedia.org

Image Courtesy of Ed Uthman
http:commons.wikimedia.org

  - ↓Albumin, Hyperlipidemia, anemia
  - Renal bx – useful for idiopathic, not necessary in DM and HTN

- Management
  - Diet: Low protein, restrict salt
  - Tx of hyperlipidemia, Tx hypercoaguability
  - Diuretics (thiazide/loop) and ACE inhibitors early on

Polycystic Kidney Disease (ADPKD)



Polycystic Kidney Disease (ADPKD)

Genetic cystic disorder of the kidneys
often resulting in massive enlargement

- Clinical Features
  - Most common hereditary disease in U.S. (Autosomal Dominant)
  - Usually presents age 30's-40's
  - 50% of pts will have ESRD by age 60

- Signs/Symptoms
  - Gross hematuria
  - Abdominal/flank pain
  - Large palpable kidneys
  - HTN
  - UTI's and nephrolithiasis

Polycystic Kidney Disease

- Complications
  - Pain from cyst or pain from rupture
  - Renal infection- suspect with flank pain, fever, and leukocytosis
  - Nephrolithiasis (20%)
  - HTN (50%)- MUST treat aggressively
  - Cerebral aneurysms (10-15% have aneurysms in circle of Willis)
  - MVP (25%)
  - Cysts in liver, pancreas, spleen, ovaries, prostate, colon

- Management
  - Identify and treat complications. Can aspirate cysts or deroof in surgery
  - Aggressively treat HTN
  - Vasopressin receptor antagonist
  - Renal Transplant: cysts do NOT form in transplanted kidney

Renal Artery Stenosis

Narrowing of one or both renal blood vessels

- Suspect when:
  - Onset HTN <20yo or >50 yo
  - HTN resistant to meds
  - Renal bruits
  - Abrupt increase in creatinine after ACE given
- Dx: Renal arteriography
- Tx: Renal artery angioplasty +/- stent, antihypertensives

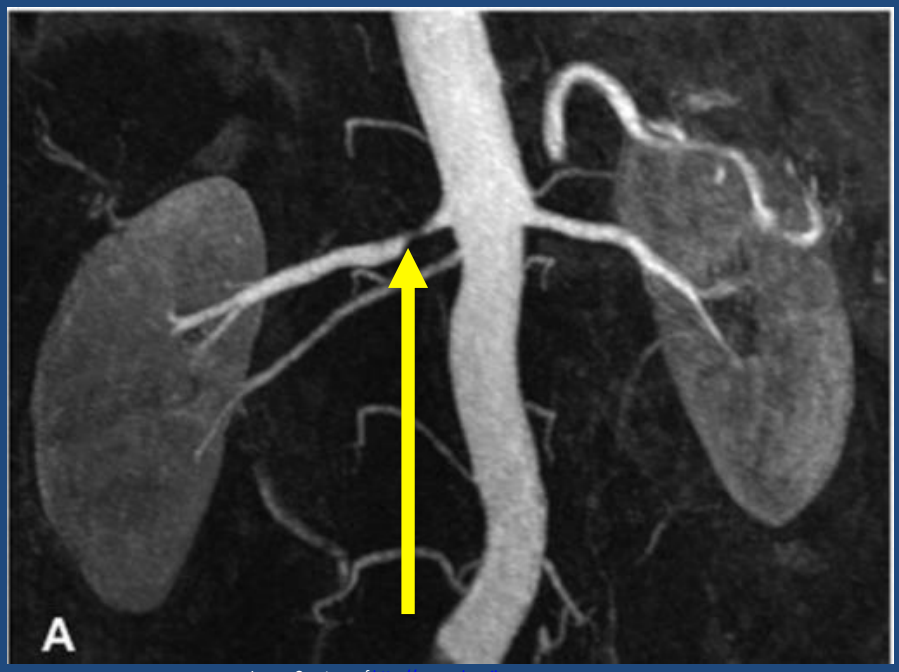


Image Courtesy of http://open.nlm.nih.gov

Renal Vein Thrombosis

Acute or chronic thrombosis of renal vein

- Causes:
  - Children: severe dehydration
  - Adults: infection, ascending thrombosis of vena cava,
- Symptoms:
  - Flank pain and palpable kidney.
  - Nephrotic syndrome if bilateral
- Diagnosis:
  - Renal US, renal venography
- Treatment:
  - Eliminate cause.
  - Anticoagulant or thrombolytic therapy

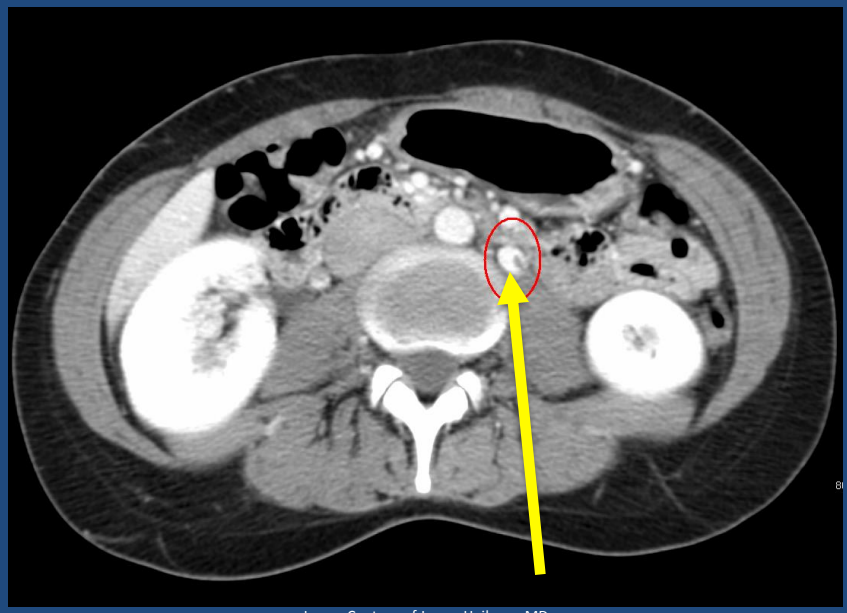
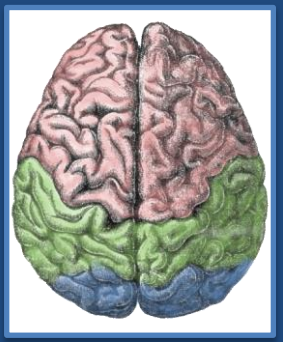


Image Coutesy of James Heilman, MD
http://wikipedia.org

Fluid and Electrolyte Disorders

Hyponatremia: Serum Sodium <135mEq/L

Excess of total body water in relation to total body sodium.



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- Symptoms: Usually asymptomatic until <125mEq/L

  N/V → weakness/lethargy → headache → ↓DTR's → delirium → coma

FIRST determine volume status: Hypo-, Eu- or Hyper-volemic

- **HYPOVOLEMIC:** *Water & Na^+ are lost, ADH causes water retention. Na^+ still low*
  - Causes: Prolonged Vomiting, Diarrhea, Diuretic use, Addisons Disease
  - Sx: Dehydrated
  - UA: Urine Sodium is LOW
  - Tx: Volume replacement- suppresses ADH

- **EUVOLEMIC:** *Kidneys conserving too much water.*
  - Causes: SIADH, Hypothyroidism, psychogenic polydipsia
  - Sx: NO signs of volume overload
  - UA: Urine Sodium HIGH (>20 mEqu/L), unless psychogenic polydipsia
  - Tx: Water Restriction, Correct Underlying Cause

Hyponatremia

- **HYPERVOLEMIC:** ↑↑↑*extracellular water compared with Na^+*
  - Causes: Cirrhosis, CHF, Nephrotic Syndrome, Renal Failure
  - Sx: Edema, volume overload
  - UA: Urine Sodium LOW (<20mEq/L)
  - Tx: Water restriction and diuretics

- **HYPERTONIC:** *Excess extracellular solutes create a gradient so water moves out of cells.*
  - Cause: Most commonly Hyperglycemia.
    - Na is 1.8 higher for every 100 glucose over nl.
      - If glucose is 1100, it is 1000 over nl, or 10x higher than nl
      - Multiply 10x1.8=18, then add 18 to sodium lab value

In severe cases, can give Hypertonic Saline… BUT BE CAREFUL

If correct sodium too rapidly → Central Pontine Myelinolysis

NEVER Correct Na^+ above 125mEq/L

SIADH (Syndrome of Inappropriate Antidiuretic Hormone Secretion)

Continued excretion of (ADH) despite normal or increased plasma volume.

- Causes: There are MANY!
  - **Nervous System Disorders**
    (CVA, trauma, infection, bleed, MS, Guillian Barre)
  - **Neoplasms**
    (Small Cell Lung Cancer, Hodgkin's Lymphoma, Pancreatic CA)
  - **Pulmonary Diseases** (pneumonia ,TB)
  - **Drugs** (SSRI's, NSAID's, Ecstasy, Psychotropics, Chemotherapy)
- Signs/Symptoms: HYPONATREMIA + Sxs of underlying condition
- Diagnosis: It is a diagnosis of exclusion
  - Euvolemic Hyponatremia
  - ↑Urine osm, ↓Plasma osm
  - Thyroid, adrenal, renal, hepatic, cardiac fxn are normal
- Treatment
  - Fluid Restriction, furosemide, Treat Cause

Hypernatremia Serum Sodium >145mEq/L

Relative deficiency of total body water to total body sodium

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- Causes- More common in very young and very old
  - Impaired Thirst Mechanism
  - Lack of access to water
  - Lactulose and Mannitol
  - Diabetes Insipidus
- Signs/Symptoms: **Dehydration**, hyperthermia, delirium, coma
- Treatment: Volume replacement AND Rehydration

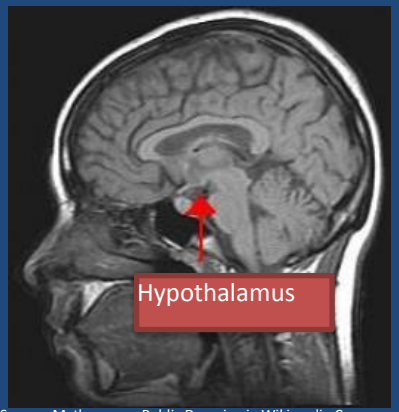
Beware overly rapid correction!

Decrease Serum Sodium by NO MORE than 1meq/L/H

Cerebral edema → neuro impairment

Diabetes Insipidus

Excessive thirst and production of a large amount of diluted urine regardless of how much water is consumed.



Source: Methoxyroxy Public Domain via Wikimedia Commons

- Cause= ADH (vasopressin) dysfunction.
  - Central DI: Problem with production of ADH
    - Ex: Head injury, Infection, Surgery, Tumor
  - Nephrogenic DI: Problem with kidney's response to ADH
    - Ex: Meds (esp Lithium and amphotericin B)
- Diagnosis: Water Deprivation Test (Urine will remain dilute)
- Treatment: Volume Replacement for everyone
  - Central DI: Desmopressin
  - Nephrogenic DI: Treat underlying cause

Hypokalemia

Serum Potassium <3.5=mild, <2.5 severe

- Clinical Features
  - May cause dangerous arrhythmias
  - Causes: Diarrhea (most common), Vomiting, Diuretics esp furosemide, Hyperaldosteronism, Renal Tubular Dz
- Signs/Symptoms
  - Weakness and fatigue (most common), Muscle cramping (severe)
  - Constiption or ileus, polyuria, polydipsia
  - Flaccid paralysis, hyporeflexia, tetany, rhabdo

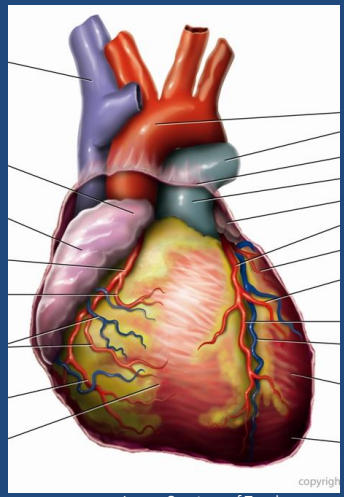


Image Courtesy of Tvanbr
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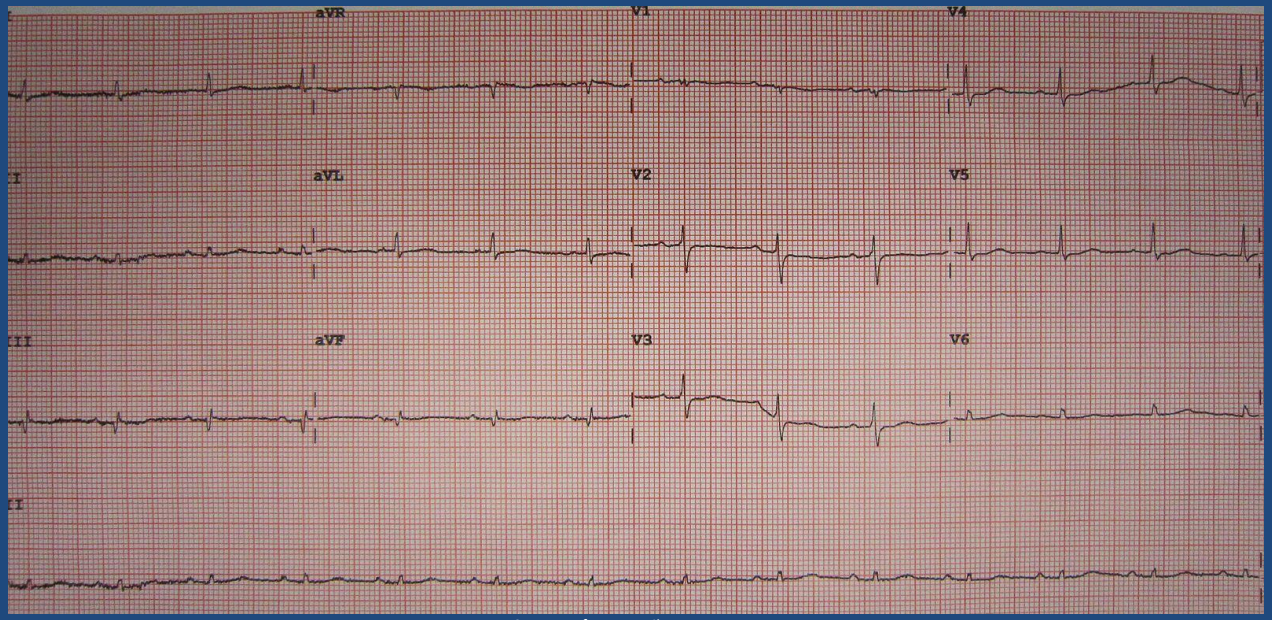
Hypokalemia Serum Potassium <3.5=mild, <2.5 severe

- Diagnostics
  - EKG changes: Flattened or inverted T waves, U waves, freq PVC's



Courtesy of James Heilman, MD
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- Treatment
  - Oral replacement if mild-moderate and if they can tolerate po (40-100mEq/d)
  - Otherwise, IV replacement not to exceed 20mEq/L per hour
    - Must continually monitor EKG and recheck K+ every 3-6 hours

Hyperkalemia

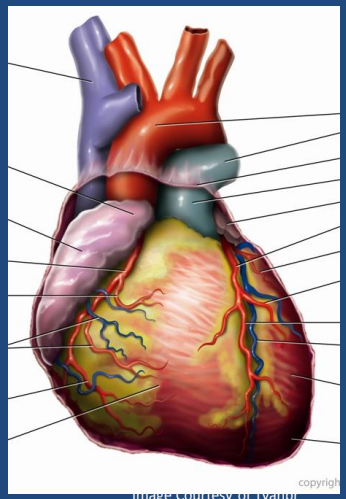
Serum Potassium >5mEq/L, >6.5 severe

- Clinical Features
  - When severe, can be life-threatening

V-Fib → Death

- Causes: #1= Advanced Renal Disease, Hypoaldosteronism,
  - Drugs (spirinolactone, NSAID's, ACE AND ARB's)
  - Burns, Rhabdo
  - Falsely elevated when errors in specimen collection/ processing= Hemolyzed sample

- Signs/Symptoms
  - Muscle weakness.
  - When severe, hyperreflexia → flaccid paralysis



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Hyperkalemia

Serum Potassium >5mEq/L, >6.5 severe

- EKG
  - PEAKED T WAVES → Widened QRS complex → Sine waves → Death

- Treatment
  - Confirm that lab result is real!
  - Treat Cause!

  - 3 TREATMENT GOALS:

1. Stabilize heart:

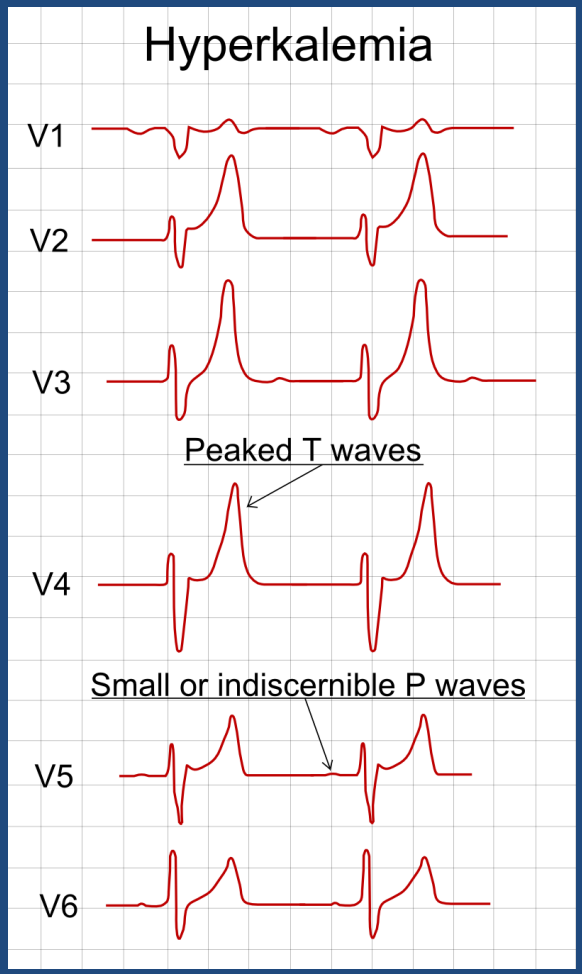
1. Calcium Gluconate

2. Drive K+ back into cells:

1. Insulin + Glucose
2. Albuterol
3. Sodium Bicarb

3. Excrete:

1. Kayexalate and Hemodialysis



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HYPOCALCEMIA: Serum Calcium <8.5mg/dL

Lowers Neuromuscular and CV excitation thresholds→ more sensitive to stimulation

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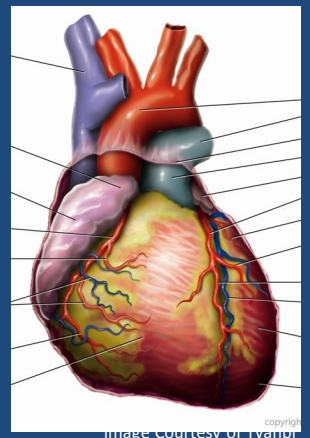
- Causes: #1 CKD, Hypoparathyroidism, Hypoalbuminemia, Vit D Def

- Signs/Symptoms/Diagnostics
  - Most Asx. Muscle cramping, paresthesias, ↑DTR's, confusion, seizures
    - **Chvostek Sign:** Facial muscles contract when tap facial nerve
    - **Trousseau Sign:** Carpal spasm when BP cuff inflated for 3 min.

2 CLASSIC SIGNS

  - EKG: Prolonged QT interval→ Ventricular Arrhythmias



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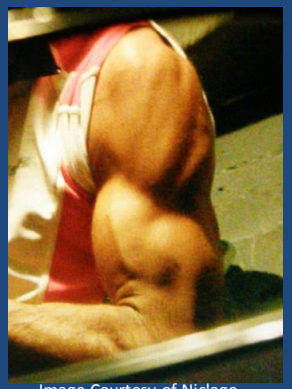
- Treatment: Oral or IV Calcium. Replace Mg as needed



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HYPERCALCEMIA: Serum Calcium >10.5mg/dL

Increases Neuromusc and CV excitation thresholds → less sensitive to stimulation

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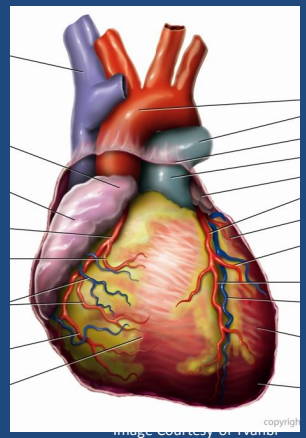
- Causes: 90% **Hyperparathyroidism** and Cancer
  - Renal cell carcinoma, Multiple Myeloma, Lung Cancer-

All produce PTH



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- Signs/Symptoms/Diagnostics
  - Only if >12mg/dL: Anorexia, constipation, polyuria, dehydration, lethargy, coma
  - EKG: Shortened QT intervals

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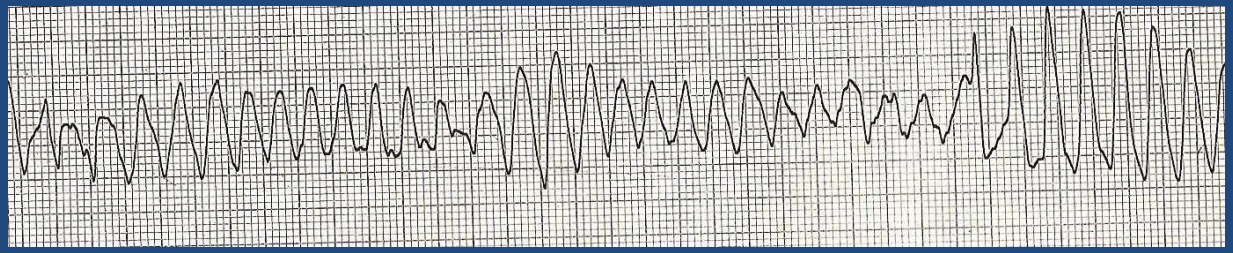
- Treatment: IV fluids and Loop Diuretics

HYPOMAGNESEMIA Serum Magnesium <1.5 mg/dL

- 12% Hospitalized pts and 65% of ICU patients
- Plasma levels does not reflect total body stores

- Causes: Chronic Alcoholism, Chronic Diarrhea, Hypoparathyroidism, Hyperaldosteronism, Diuretics, Malnutrition

- Signs/Symptoms/Diagnostics
  - Lethargy, anorexia, nausea and vomiting, weakness, tetany, seizures
  - May lead to refractory Hypokalemia and Hypocalcemia
  - EKG: Long QT, Arrhythmia (TORSADES)



- Treatment: Oral, IM, or IV Mag
- Hypermagnesemia rarely occurs, except in CKD patients.

Acid/Base Disorders

Acid-Base Basics

Acid-Base balance is coordinated by the lungs and the kidneys which use pCO_2 and HCO_3^- to keep an optimal pH

Goal: maintain plasma pH 7.35-7.45

Assess with simultaneous ABG and metabolic panel

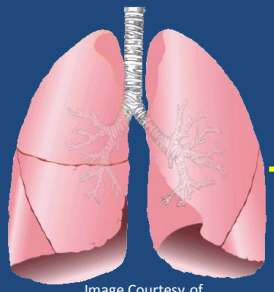
When the pH is too LOW = *ACIDOSIS* (pH<7.35)

pCO_2 is HIGH, HCO_3^- is LOW

When pH is too HIGH = *ALKALOSIS* (pH>7.45)

HCO_3^- is HIGH, pCO_2 is LOW

Acid-Base Basics: Further Identified by Cause



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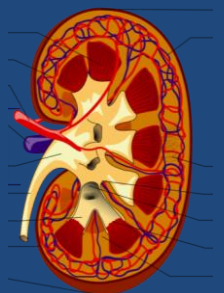
Respiratory: Alterations in pCO_2

Metabolic: Alterations in HCO_3



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Piotr Michal Jaworski
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When one system fails, the other tries to compensate to bring back balance

Mixed: Up to three disorders can occur concurrently

ABG for Dummies

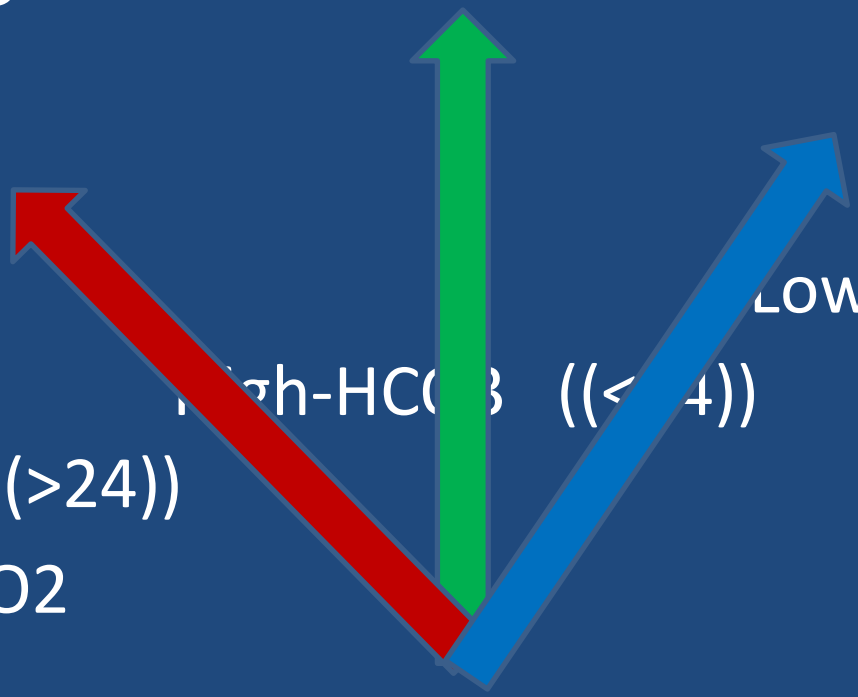
Acid

<7.35

7.40

Base

>7.45



High CO2

((>40))

Low CO2

((<40))

Metabolic Acidosis

LOW HCO_3^- and LOW pH

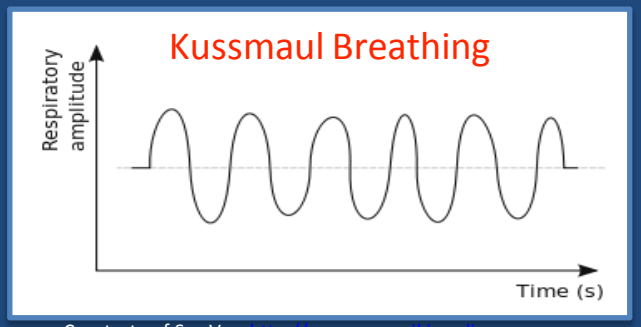
Further classified by high or normal AG (nl=6-12mEq)

AG = Na^+ - (HCO_3^- + Cl^-)

- Causes of elevated AG= "MUDPILES"
  - **M**ethanol,
  - **U**remia,
  - **D**KA,
  - **P**ropylene Glycol,
  - **I**soniazid,
  - **L**actic Acidosis,
  - **E**thanol,
  - **S**alicylates
- Causes of normal AG metabolic acidosis: ↓Bicarb with diarrhea

- Compensation= **Increased ventilation**
  - Other symptoms depend on underlying cause

- Treatment: Fix underlying cause



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Metabolic Alkalosis

HIGH HCO_3^- and HIGH pH

- Causes: Due to loss of H^+ or too much HCO_3^-
  - Vomiting, Aggressive suctioning of gastric contents, diuretics, overcorrection of met acidosis or ingestion of bicarb
- Compensation: **Decreased ventilation** to increase pCO_2
- Other Signs/Symptoms:
  - Associated with low Ca^{2+} and low K^+
    - Hypocalcemia (paresthesias, confusion, coma etc)
    - Hypokalemia (polyuria, polydipsia, weakness etc)
- Treatment:
  - Fix underlying cause and associated metabolic problems
  - IV fluids
  - Very rarely HCl is given when extreme (pH > 7.6)

Respiratory Acidosis

HIGH CO_2 and LOW pH

- Causes: anything that decreases respiration
  - The lungs fail to blow off CO_2 effectively
  - COPD, paralysis of chest from neuromuscular disorders, Narcotic OD

- Compensation: ↑reabsorption of HCO_3^- by kidneys

- Treatment:
  - Fix underlying cause
  - Assist ventilation
  - Try naloxone if all else fails

Respiratory Alkalosis

LOW CO_2 and HIGH pH

- Causes: anything that ↑ resp/blows off too much CO_2
  - Hysterical hyperventilation (most common), salicylate intoxication, PE
- Symptoms:
  - Rapid breathing
  - Lightheadedness
  - Perioral paresthesias
- Compensation: Increased elimination of HCO_3^- by kidneys
- Treatment: Treat underlying cause

Genitourinary Tract Conditions

Nephrolithiasis

Supersaturation of urine with stone-forming salts

causes precipitation of cystals

Major types of stones:

- Calcium: 85%

  Radio-opaque

  (Calcium oxalate, Calcium phosphate)

- Struvite: 15%

  Assoc w/Infections, staghorn

  (Urine pH < 7.2)

  - Abx don't penetrate staghorn so ↑ risk of urosepsis. Surgery indicated

- Uric acid: 8%

  Are radiolucent/not seen on KUB

  (Urine pH < 5.5)

- Cystine: <1%, hereditary condition

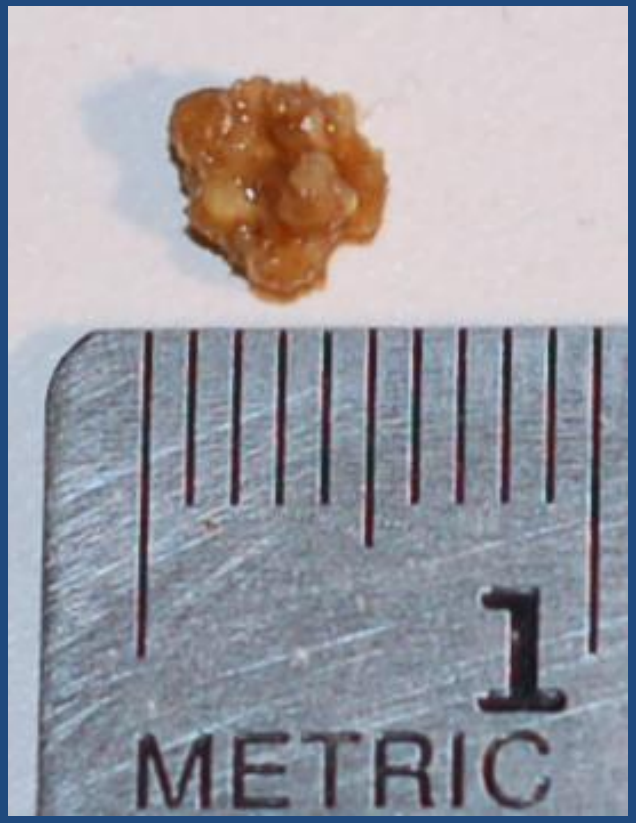

Image Courtesy of RJHall
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Nephrolithiasis

- Clinical Features
  - Males 3:1, usually in 3rd or 4th decade.
  - Risk Factors:
    - Drugs: Antacids, Carbonic Anhydrase Inhibitors, Loop Diuretics, Large Doses Vit C
    - Hyperparathyroidism
    - Diets high in oxalate rich foods:
      - Leafy veggies, nuts, tea, coffee
    - Diets high in purines

- Clinical signs/symptoms
  - SEVERE PAIN, Flank pain often radiates to abdomen or groin (testicle/labia)
  - Hematuria, frequency, urgency, nausea, vomiting

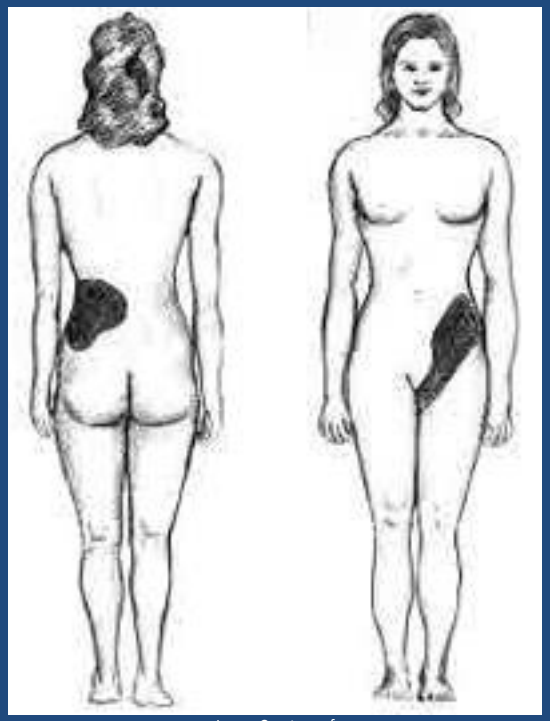


Image Courtesy of
http://kidney.niddk.nih.gov/spanish/pubs/stones_ez/index.htm

Nephrolithiasis

- Diagnostics
  - Imaging: Gold standard **Spiral CT**,
    KUB helps with tracking stones
  - UA and culture, CBC, Electrolytes

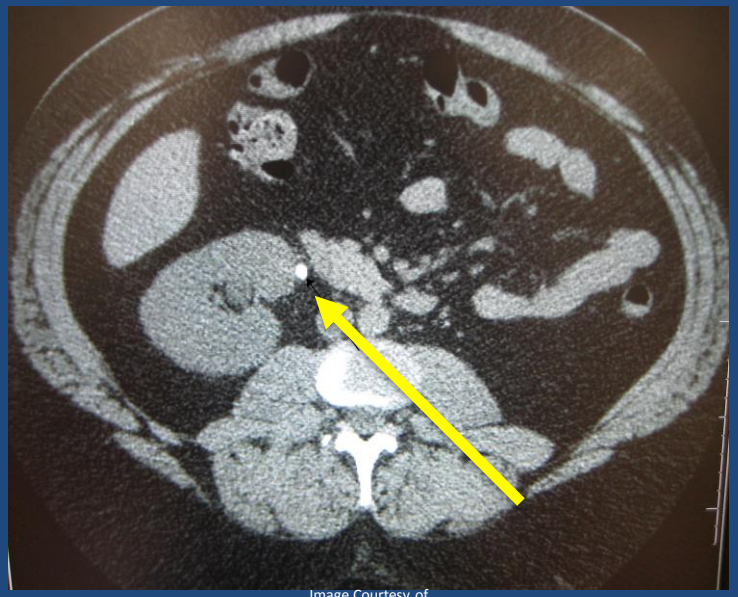
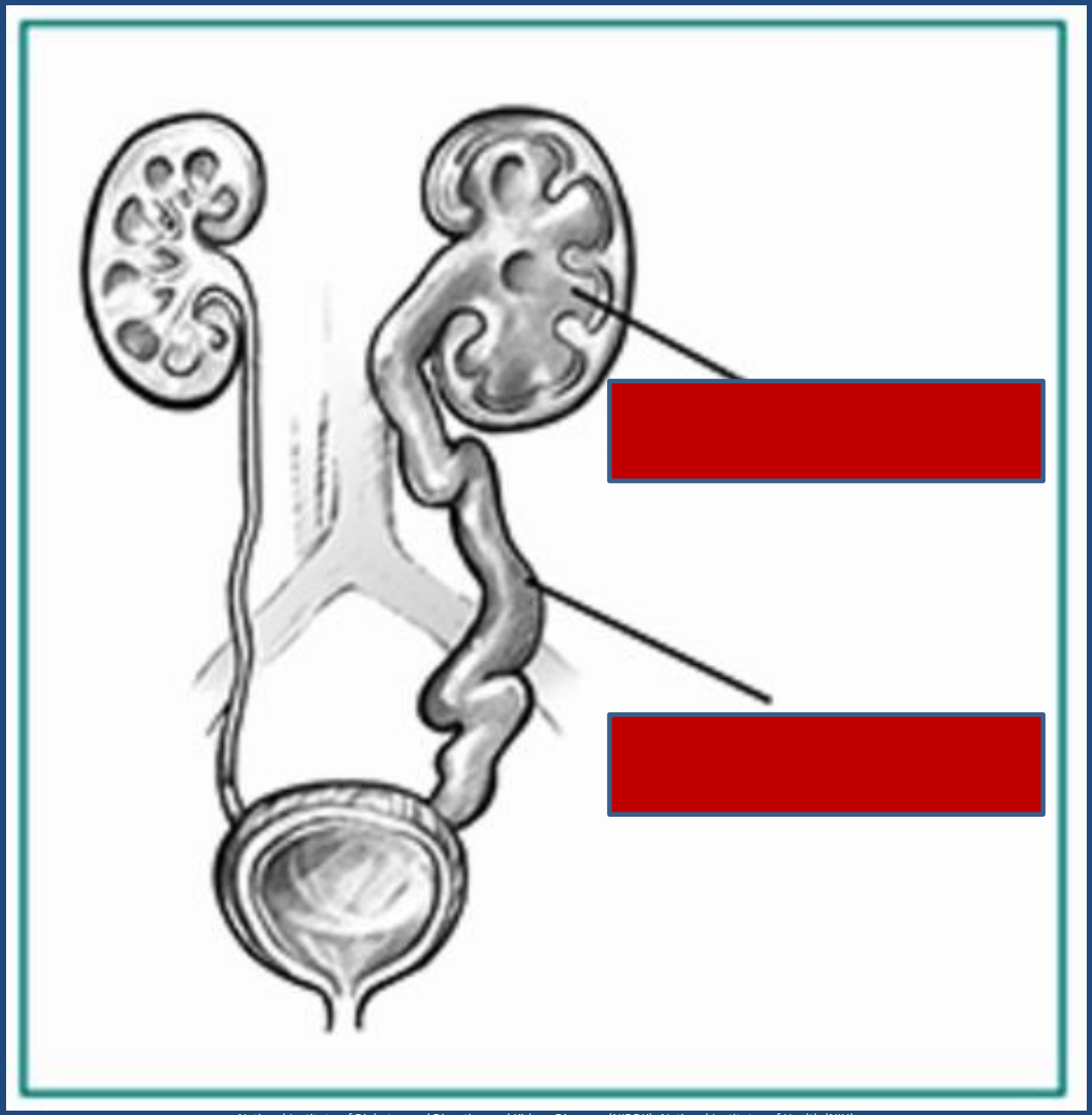


Image Courtesy of
http://openi.nlm.nih.gov

- Treatment:
  - Meds: #1= PAIN CONTROL! (NSAID's are best), α Blocker (Tamulosin)
  - If stone is < 5mm: passable; Give strainer to catch stone for analysis.
  - If stone 5-10mm: Less likely to pass spontaneously
    - If Ureteral – basket ureteroscopy OR laser lithotripsy
    - If Renal – shock-wave lithotripsy
    - If stone >10mm: Will not pass; Admit, u-stent, nephrostomy, lithotripsy

- Prevention: ↑Fluids, Dietary changes, Treat underlying causes



National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK), National Institutes of Health (NIH)
http://kidney.niddk.nih.gov/KUdiseases/pubs/kdictionary/F_K.aspx

Hydronephrosis

Distention of the renal calyces and pelvis of kidney(s) by urine

- Clinical Features
  - It is the result of urinary blockage anywhere along the urinary tract
  - Causes: Congenital (VUR), Nephrolithiasis- esp UPJ Stone, Pregnancy, Large Fibroids, BPH, Neurogenic Bladder
  - If bilateral, increased ureteral pressure will drop GFR
- Sign/Symptoms
  - Pain. Other symptoms related to cause
- Diagnostics
  - UA: Results depends on cause- hematuria, pyruria; Check BUN/Creat
  - US identifies 90%. Can also use IV Urogram or CT
- Treatment: Treat Cause
  - Catheter (If BPH), Meds (Anticholinergic if urogenic bladder)
  - Procedures: **IF INFECTION, NEED EMERGENT STENTING OR NEPHROSTOMY**
    - Stenting, Pyeloplasty, Percutaneous Nephrostomy

Incontinence

Urinary incontinence is NOT inevitable with aging!

Requires a thorough evaluation!

- Women > Men 2:1
- Causes:
  - Pathology OUTSIDE the urinary tract DIAPPERS. Need to rule these out!
    - **D**elirium
    - **I**nfection
    - **A**trophic urethritis
    - **P**harmaceuticals (α & β blockers,diuretics,alcohol,anti-psych,narcotics)
    - **P**sychiatric Illness
    - **E**xcessive urinary output (hyperglycemia, CHF)
    - **R**estricted Mobility
    - **S**tool Impaction
  - Pathology WITHIN the urinary tract

Incontinence

- Stress: Occurs w/↑ abdominal pressure. Dysfunction of urethral sphincter
  - 20% of adult women= Leakage with Cough, Sneeze, Valsalva
  - TX: Kegels, estrogen, surgery (mid-urethral sling 80-90% effective)

- Urge: Overactive Bladder (OAB). Irritable bladder contr/↑Detrusor Activity
  - Most common cause in elderly; causes frequent trips to the bathroom
  - Diagnosis: Voiding diary, urodynamic testing
  - Treatment: Bladder training
    - Oxybutinin (Ditropan XL), Tolterodine (Detrol LA)
    - NEWER QD dosing: Solifenacin (Vesicare), Darifenacin (Enablex)
    - Oxybutinin transdermal patch w/ less dry mouth & constipation

- Overflow : Outlet Obstruction → Distention → Overflow
  - Diagnosis: Measure Post-Void Residual (large)
  - Treatment: Relieve obstruction (Intermittent cath or indwelling Foley)

- Functional: Normal Urodynamics, but immobility or cognitive problems

Benign Prostatic Hyperplasia (BPH)

Enlargement of prostate due to increased number of cells

in transitional zone which surrounds the urethra

- Clinical Features
  - DHT causes hyperplasia, and age increases sensitivity to DHT
  - Growth begins at 30; 50% have BPH by 50; >90% when >80yo

- Signs/Symptoms
  - **Obstructive Symptoms: Hesitancy-** slow, weak stream; dribbling
  - **Irritative Symptoms: Frequency**, dysuria, urgency, nocturia
  - On DRE: smooth, firm, elastic enlargement in men over 50 yo

Benign Prostatic Hyperplasia (BPH)

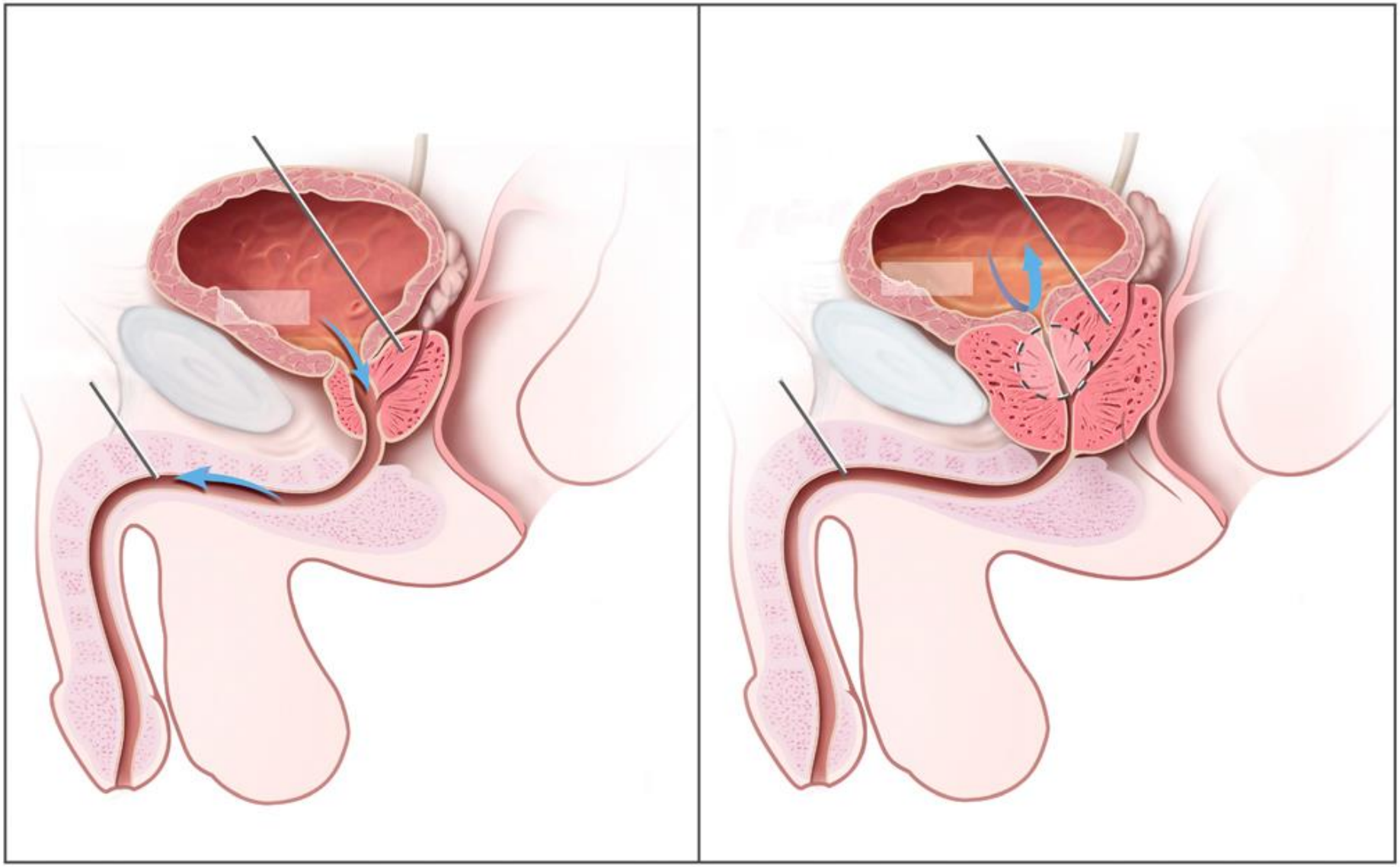


Image Courtesy of BPH.png http://commons.wikipedia.org

Benign Prostatic Hyperplasia (BPH)

- Diagnostics
  - UA, PSA, creatinine, Post Void Residual, Flow rate, Cystoscopy

- Treatment: If few/no symptoms: Watchful Waiting
  - Meds: Can Combine, but will have more side effects
    - α Blockers (tamsulosin, doxazosin, terazosin): Relaxes smooth muscles
    - 5α reductase Inhibitors (finasteride,dutasteride): Blocks formation of DHT
      - Reduces PSA by 50%, so correct PSA by DOUBLING!
  - Surgery: TURP, TUIP, TUNA, TUMT, prostatectomy (if >100gm)

Erectile Dysfunction

Inability to attain or maintain a rigid penile erection

- Clinical Features
  - Happens in >50% men 40-70 yo
  - Epidemiology: psychogenic vs. organic vs. mixed (most common)
  - Causes/Risk Factors
    - Medical Conditions: DM, HTN, Androgen Deficiency, CAD, High chol
    - Surgery: Complication of treatment for prostate CA
    - Drugs: α blockers, β Blockers, diuretics, tobacco, ETOH

- Diagnostics: After a thorough H&P
  - CBC, UA, Lytes, Lipid Panel, Thyroid Panel, Testosterone, Prolactin, FSH/LH.
  - Advanced Testing: Nocturnal Penile Tumescence Test

- Management: #1 Treat underlying cause/limit risk factors
  - Vasoactive Therapy:
    - Oral phosophodiasterase inhibitors (sildenafil)- **NEVER with Nitro!**
    - Hormonal replacement: gel, patch, injectable. Never with ProstateCA
  - Assistive Devices: Vacuum Erection device and Penile Prosthesis

Other Erectile Concerns

- **Priapism**= ***Painful persistent erection lasting >4 hours***
  - May lead to permanent erectile dysfunction and penile necrosis
  - Causes
    - Medical Conditions: Sickle Cell Dz, Leukemia, Multiple Myeloma.
    - Medications: Anti-psychotics, Rarely Sildenafil
    - Illicit Drugs: Cocaine and Ecstasy
  - Treatment
    - Terbutaline. If this fails…
    - Aspiration of corpus cavernosum- Aspirate from 2 or 10 o'clock

- **Peyronie's dz**= ***Fibrotic plaque of Tunica Albuginea*** → ***penile curvature***
  - Cause unclear. Probably repeated trauma
  - Affects men ages 40 - 60 and older
  - Treatment
    - Intraplaque injection of Verapamil or Interferon
    - Surgery to remove plaque- NO guarantee of normal function

Foreskin Conditions

- **Balanitis:** ***Foreskin swollen usually due to smegma/ hygiene***
  - Cause more likely to be fungal in diabetics
  - Treatment
    - Children: no treatment needed
    - Adults: Antibiotic Cream, Steroid Cream, or Antifungal Cream

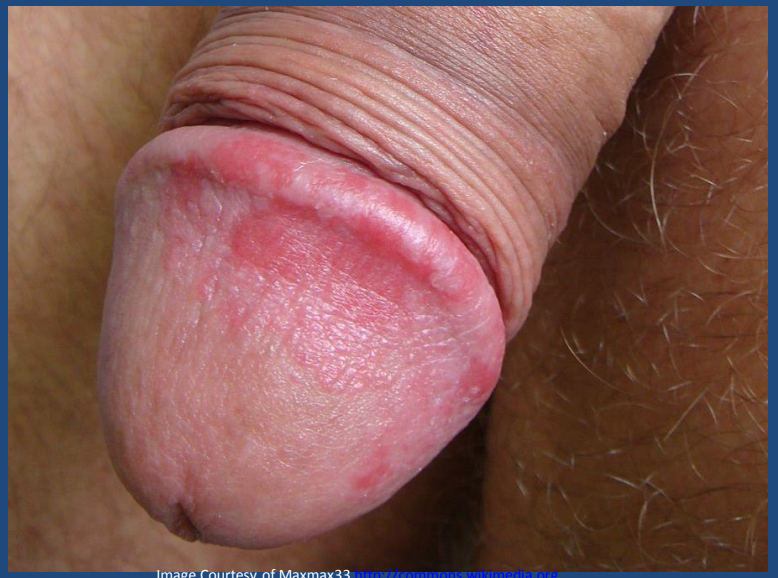


Image Courtesy of Maxmax33 http://commons.wikimedia.org

- **Phimosis:**

  Foreskin is unable to be retracted over the glans penis.

  - Often due to chronic low grade infection.
  - Treatment Options
    - Betamethazone cream
    - Stretching of foreskin
    - Circumcision

Image Courtesy of Just somedude123 http://commons.wikimedia.org

- **Paraphimosis: EMERGENCY!!!**

  Foreskin is trapped in a retracted position.

  - Edema → Compromised Blood Supply→ Necrosis.
  - Pts w/ long-term foley are at risk
  - Treatment
    - Manual reduction or emergent dorsal slit

Image Courtesy of Drvgaikwad http://commons.wikimedia.org

Congenital Abnormalities

- **Hypospadias**: ***Urethra meatus is ventral & proximal to normal position***
  - Repair before the child is 18 months old
  - Hypospadias + Bilateral Cryptorchidism =Sex Hormone Abnormality

- **Chordee**: ***Ventral penile curvature, often associated w/ hypospadias.***
  - Congenital: Something went wrong during penile development
    - Skin was tethered, Fibrosis developed, Disproportionate Anatomy
  - Surgery 6-18 months of age

- **Vesicoureteral Reflux (VUR)**: ***Urine passes retrograde from bladder to kidneys during voiding. Leads to…***

- **Reflux Nephropathy (RN)**: ***Renal scarring assoc w/intrarenal reflux of infected urine***
  - VUR is a result of an incompetent vesicoureteral spincter
    - 30-60% will have Reflux Nephropathy at time of diagnosis
  - Typical patient: Child with recurrent UTI's
  - RN Leads to HTN
  - Test: IVP, Renal US, Radionuclide cystogram, Voiding cystourethrogram
  - Treat: Tx HTN, ACE inhib, Abx and freq urine cx, Surgery for Severe Reflux

Cryptorchidism (translated: "Hidden testicle")

Testicle fails to descend from abdomen into scrotum

- How it happens
  - Normally, descent at 7 mo gestation by Hormones & Gubernaculum
  - Cryptorchidism, testicle gets hung up on its way down (ext inguinal ring)
  - Risks: Prematurity, Low birth wt, Maternal exp to estrogens 1st tri, (+) FH
- Presentation
  - Empty hemiscrotum, absence of scrotal rugae, MOSTLY ON RIGHT
  - Usually unilateral cryptorchidism and is isolated finding
  - Bilateral with hypospadias indicates other sex hormone abnormalities
- Treatment
  - hCG 1500u IM daily x3 days- 25% will descend
  - If not, must be treated surgically by age 1 year
  - ↑↑↑ risk of testicular cancer (40X!) and infertility
- True vs Retractile Cryptorchidism
  - Retractile testis is pulled up into pubic area by cremasteric muscle
  - Testis can be gently brought down into normal appearing scrotum
  - This condition resolves by puberty; no treatment required

Benign Scrotal Masses

Hydrocele: ***An accumulation of serous fluid in membranes around the testicle***

- Benign and Painless Mass
- (+) Transillumination
- No treatment required.

Image Courtesy of http://openi.nlm.nih.gov

Varicocele: ***Varicosities within scrotum that feel like a "bag of worms".***

- May have an achy feeling.
- Increases with Valsalva, Decreases when lying supine.
- Rarely treated unless indicated by infertility.

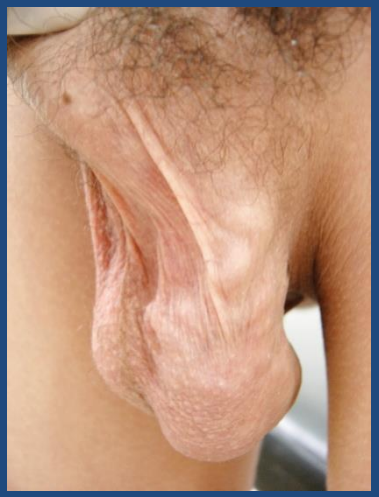


Image Courtesy of http://openi.nlm.nih.gov

Spermatocele: ***Retention cyst of the head of the epididymis***

- Painless, (+) Transillumination
- No treatment; only removed if causing discomfort

Testicular Torsion

Testis rotates on spermatic cord causing vascular occlusion

- Clinical Features
  - Most common 10-20 yo
  - Risk Factor:

    "Bell Clapper" Deformity
- Signs/Symptoms
  - SUDDEN onset of

    SEVERE testicular pain, N/V ,
    high testis, exquisitely tender
  - (-) Prehn's sign=

    NO relief with elevation of testicle
  - (-) Cremasteric Reflex

    NO retraction of ipsilateral testis
    when medial thigh is stroked

Image Courtesy of Lukas Sova
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Testicular Torsion

- Imaging : Doppler US shows ↓ arterial flow in torsion

- Treatment **SURGICAL EMERGENCY!!!**
  - Surgical correction within 4-6 hours to salvage testicular function
  - Bilateral orchiopexy required to correct anatomic predisposition
  - May need to perform…

Manual Detorsion- Turn testicle from

IN TO OUT

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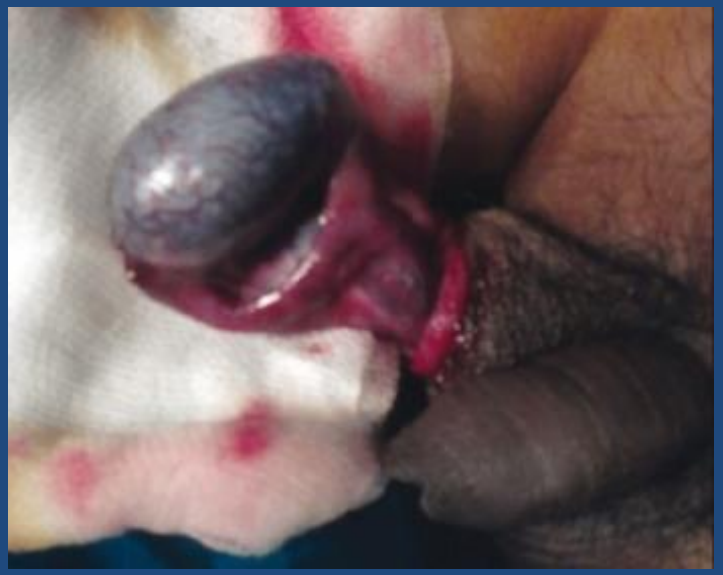

Image Courtesy of http://openi.nlm.nih.gov

- Differential Diagnosis
  - Epididymorchitis: Less acute, (+) Phren's sign, (+) Cremasteric Reflex
  - Torsion of Appendix Testis: #1 cause scrotal pain in kids
    - (+) Blue Dot, Benign

Infectious/ Inflammatory Conditions

Epididymitis

- Clinical Features
  - Most common cause of adult scrotal pain
  - Pathogens vary by age and sexual history
    - <35 yo/sexually active men:
      Usually STD (GC and Chlamydia)
    - Not sexually active, young and older:
      Usually uropathogens (E Coli)
    - If chronic (>6 weeks): Inflammation not infection

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Neisseria Gonorrhea

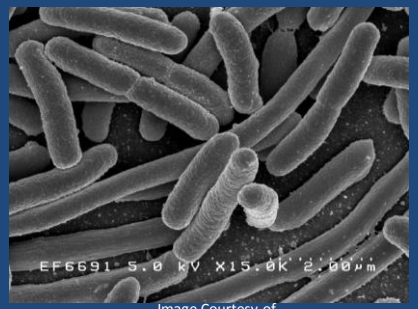


Image Courtesy of
Rocky Mountain Laboratories, NIAID, NIH

E Coli.

Epididymitis

- Signs/Symptoms
  - Gradual, severe, unilateral scrotal pain with tender epididymis
  - Scrotal inflammation, redness, enlargement, and/or reactive Hydrocele
  - Urethral discharge and Irritative voiding symptoms possible
  - (+) Prehn's sign, (+) Cremasteric Reflex

- Diagnostics: **Must do Doppler ultrasound** to rule out torsion

- Labs:
  - UA (WBCs, bacteria)
  - GC/Chlamydia culture
  - CBC (↑WBC's with L shift)

- Tx: Abx if infection, Bed rest, Scrotal elevation/Tight fitting briefs, NSAIDs
  - If STD: Ceftriaxone 250 mg IM + Doxycycline for 10 days. TREAT PARTNER
  - If Uropathogen: Ofloxacin or Levofloxacin

Orchitis

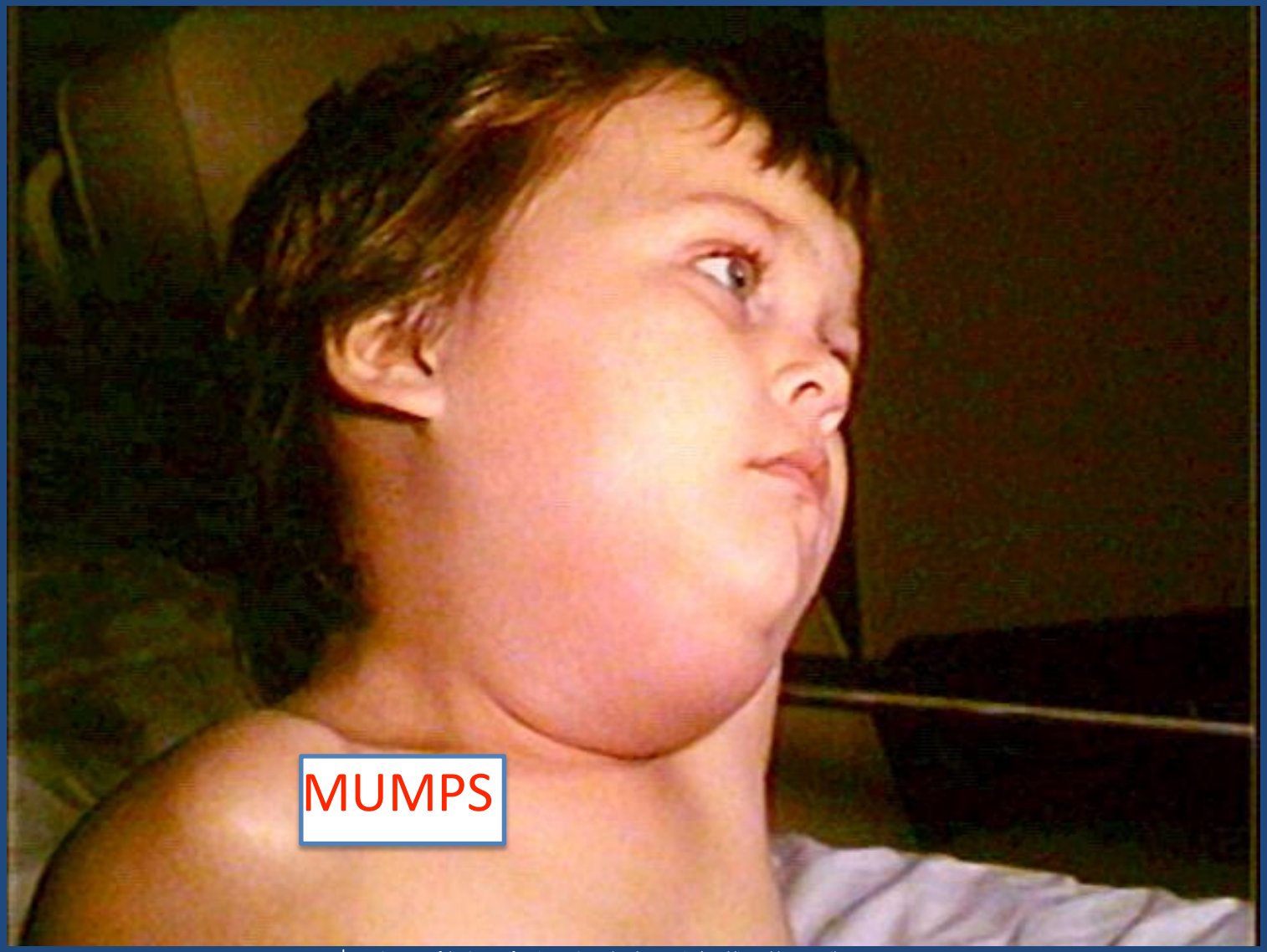
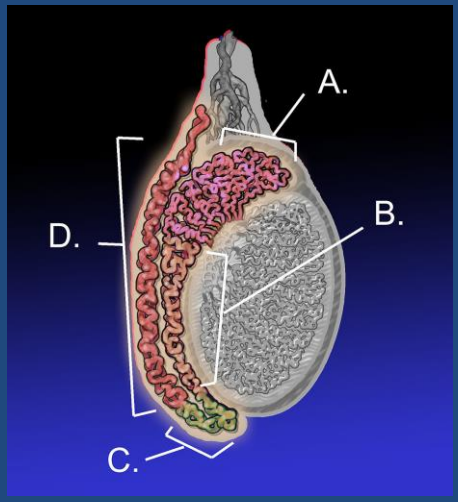


Image Courtesy of the Centers for Disease Control and Prevention's Public Health Image Libraary

Orchitis

- Clinical Features
  - Affects 1/3 males with mumps after puberty
  - Can also be due to spread of epididymitis
- Signs/Symptoms:

  Develop 1 week after onset of parotitis
  - Marked pain and swelling in one or both testicles
  - N/V, fever, Urinary symptoms +/- proteinuria and hematuria
  - Testes are enlarged, tender and indurated
- Treatment
  - Bed Rest, Scrotal Support, Ice, Analgesics
  - Abx of due to epididymitis
- Complications
  - Up to ½ develop testicular atrophy, 20% infertile
  - Abscess and Chronic Epididymitis



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Urethritis

- Causes:
  - Most commonly Infectious (N. Gonorrhoeae & C Trachomatis)
  - Noninfectious Causes: Trauma, Foreign Body, Granulomas
- Signs/Symptoms:
  - Urethral discharge (purulent or mucopurulent), dysuria, or NO sx's
  - Most common: N. gonorrhoeae & C. trachomatis
- Labs:
  - Nucleic acid amplification has supplanted culture- done with urine
  - Urethral swab for Gram stain or PCR
- Tx: Must treat BOTH GC and Chlamydia. Must treat partner!
  - Ceftriaxone 250 mg IM + Doxycycline for 7days OR Azithromycin 1 g PO
- Complications
  - Men: Epididymitis, disseminated gonococcal infection, reactive arthritis
  - Women: PID, ectopic pregnancy, infertility

Cystitis

- Clinical Features
  - Ascending infection, more common in women
  - In men, associated with prostatitis, obstruction, FB, infected stones
  - Most common pathogen: E Coli, sometimes enterococcus

Image Courtesy of Grook Da Oger
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- Signs/Symptoms
  - **Dysuria, frequency, urgency**, hematuria, cloudy, foul smelling urine
  - Low back pain, suprapubic pain, malaise (systemic sx's)

- Labs:
  - "Clean catch" Urinalysis shows pyuria, hematuria, bacteriuria (+ nitrites)
  - Urine C & S may be obtained
  - Imaging and complete urologic work-up needed if recurrent

- Treatment: Abx treatment for 3-7 days. Longer if elderly, DM, pregnancy, men.
  - Abx: TMP/SMX (If <20% resistance locally), Quinolones (esp cipro and levaquin)
    - Also Nitrofurantoin - only active in urinary tract. Best in pregnant.
  - Other treatments: Fluids, Pyridium, Urelle, Prosed

Pyelonephritis

Infectious inflammation of renal parenchyma and renal pelvis

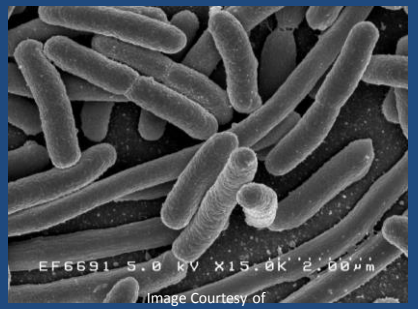
- Clinical Features
  - Pathogens mostly Gram (-): E Coli (most common), Klebsiella, Enterobacter
- Signs/Symptoms
  - Irritative voiding symptoms (+) fever, chills, Flank pain & CVA tenderness, N/V
  - May develop sepsis (20-30% of all cases of sepsis stems from urinary tract!)
- Labs
  - U/A: Nitrites, WBCs, RBCs, **WBC Casts**
  - Urine C & S, CBC (leukocytosis), blood cultures if sepsis is suspected
- Imaging not needed for uncomplicated
  - Ultrasound: ONLY IF suspect obstruction (R/O Hydronephrosis)
  - CT scan: ONLY IF suspect obstructing kidney stone (pus under pressure)
- Treatment: Admit: elderly/ pregnant/ co-mobid/ obstructed/ not tolerating PO
  - IV for 24 hours after fever: Ampicillin plus Aminoglycoside prior to sensitivity
  - Oral abx x 14 days: Quinolone or cipro

Prostatitis

- Classification System
  - Type I: Acute Bacterial Prostatitis
  - Type II: Chronic Bacterial Prostatitis
  - Type III: Chronic Pelvic Pain Syndrome
    - (Inflammatory and Noninflammatory Types)
  - Type IV: Asymptomatic Inflammatory Prostatitis

Acute Bacterial Prostatitis

- Clinical Features
  - Rare, Caused by Gram (-) Rods esp Ecoli from reflux/ascent up urethra



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Rocky Mountain Laboratories, NIAID, NIH

- Signs/Symptoms
  - Appear Toxic, Fever, Chills, Body Aches

DO NOT ATTEMPT DRE BECAUSE MAY CAUSE SEPTICEMIA

- Diagnostics
  - CBC: Leukocytosis with left shift
  - UA: Pyuria, Bacteriuria, +/- Hematuria, (+) urine culture
  - Transrectal US or CT of the pelvis to r/o Abscess

- Treatment:
  - 4-6 weeks of TMP/SMX or a fluoroquinolone. Analgesia, fluids, rest.
  - If septic, hospitalize for IV Abx (ampicillin and aminoglycoside)
    - Can change to oral Abx after 1-2 days

Chronic Bacterial Prostatitis

- Clinical Features
  - Recurrent infection of prostate- Most have hx of ABP
  - Gram (-) Rods= Most common cause, or Gram (+) enterococcus

- Signs/Symptoms: Vary, MILDER than ABP; NO Systemic Sx's
  - Irritative voiding symptoms, Low Back and Perineal Pain
  - Hx UTI's, Sexual Dysfunction
  - DRE varies: normal, boggy, tender

- Diagnostics
  - UA: Normal
  - Expressed Prostatic Secretions (EPS):
    - ↑ WBC's, "Lipid Ladden Macrophages", (+) cultures
  - Two Glass Test: Clean catch urine cx before and after prostatic massage
    - (+) uropathogens AFTER prostatic massage

- Treatment: >50% Relapse
  - TMP/SMZ, Quinolones x6-12weeks, NSAID's, α Blockers, Hot sitz baths

Chronic Nonbacterial Prostatitis (CPPS)

Symptoms of Chronic Bacterial Prostatitis WITHOUT bacterial infection

- Clinical Features
  - Aka Chronic Pelvic Pain Syndrome
  - *Can be inflammatory or noninflammatory*
  - Cause is unknown; it is a diagnosis of exclusion. No hx ABP
- Signs/Symptoms: wax and wane
  - Irritative voiding symptoms, perineal or LBP, pain with ejaculation
  - DRE: Varies; normal, boggy, indurated, tender
- Labs
  - UA: Normal
  - EPS: (+) WBC's if Inflammatory, (-) WBC's if Noninflammatory
  - Two Glass Test: Culture will be (-) for uropathogens
- Treatment
  - α Blockers, NSAID's
  - Try TMP/SMZ x4-6 weeks- 50% report ↓ sx's, although cause NOT bacterial

Asymptomatic Inflammatory Prostatitis

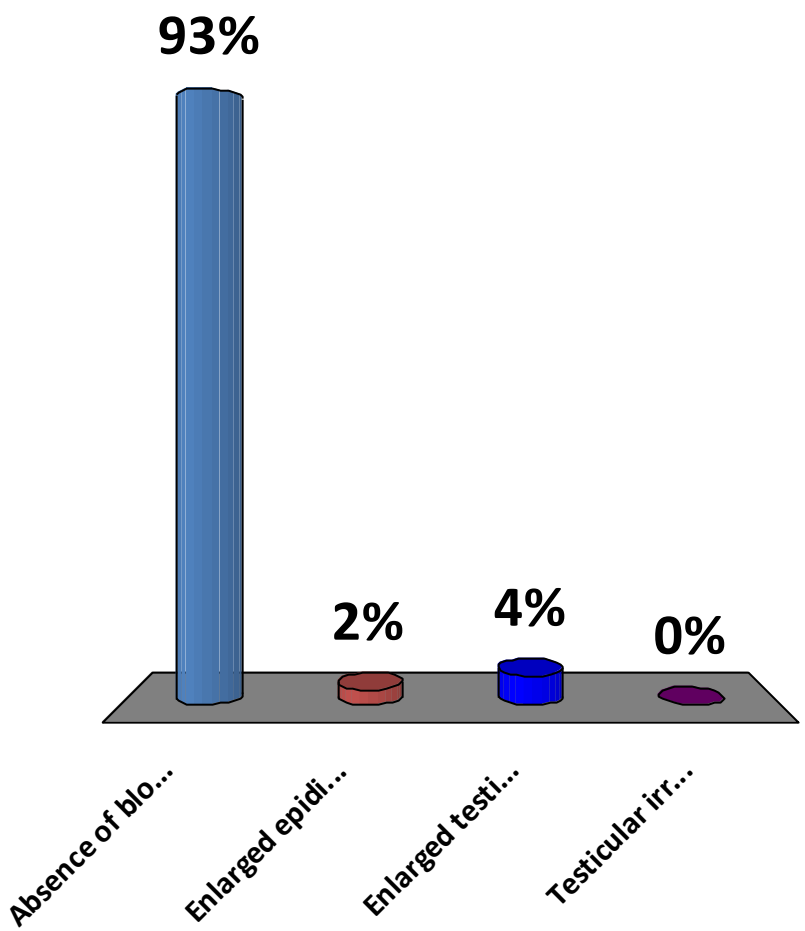
- Found when testing for other conditions; Incidence Unknown bc NO sx's
- Prostate Bx, Infertility Evaluation
- (+) WBC's in prostate fluid
- No treatment necessary

SUMMARY OF PROSTATITIS SYNDROMES

FINDING	ABP	CBP	CPPS (INFLAM)	CPPS (NON-INFLAM)	ASYMP INFLAM PROSTATITIS
FEVER	*(+)*	*(-)*	*(-)*	*(-)*	*(-)*
UA	*(+)*	*(-)*	*(-)*	*(-)*	*(-)*
WBC'S IN EPS	*CONTRA-INDICATED*	*(+)*	*(+)*	*(-)*	*(+)*
TWO GLASS TEST (+) EPS BACTERIA	*CONTRA-INDICATED*	*(+)*	*(-)*	*(-)*	*(-)*

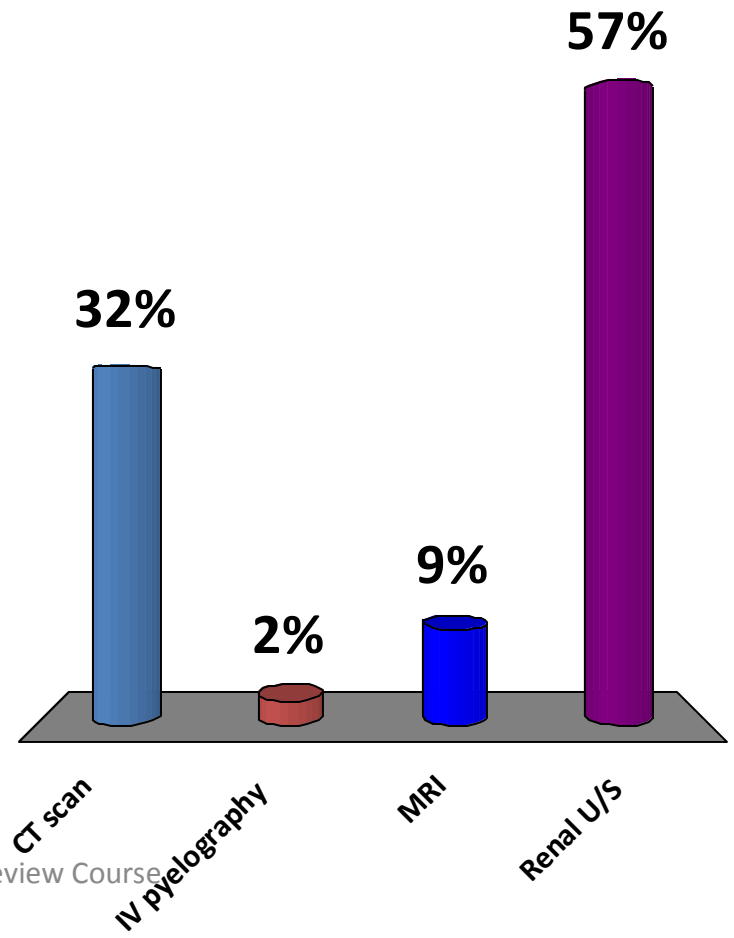
A 22-yr old male presents with acute onset of severe unilateral scrotal pain which began while playing soccer. PE reveals an exquisitely tender left testicle; scrotal elevation does not relieve the pain. What would be the most likely U/S finding?

1. Absence of blood flow with increased size of testis and epididymis
2. Enlarged epididymis w/decreased echogenicity
3. Enlarged testicle w/increased echogenicity and increased blood flow
4. Testicular irregularity w/fracture line noted



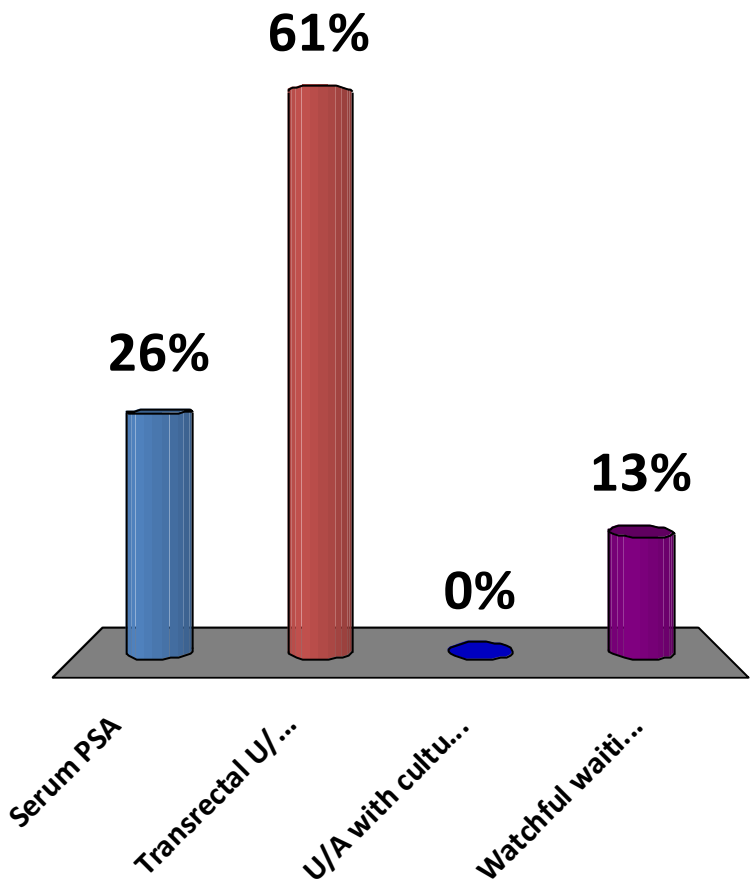
A 31-yr old male with a hx of treatment-resistant HTN presents with sudden, severe R flank pain. His father died of an unknown renal disease in his 50's. PE reveals B/L CVA tenderness and flank masses. U/A shows elevated protein and RBC's. Which imaging would best confirm the most likely diagnosis?

1. CT scan
2. IV pyelography
3. MRI
4. ✓ Renal U/S



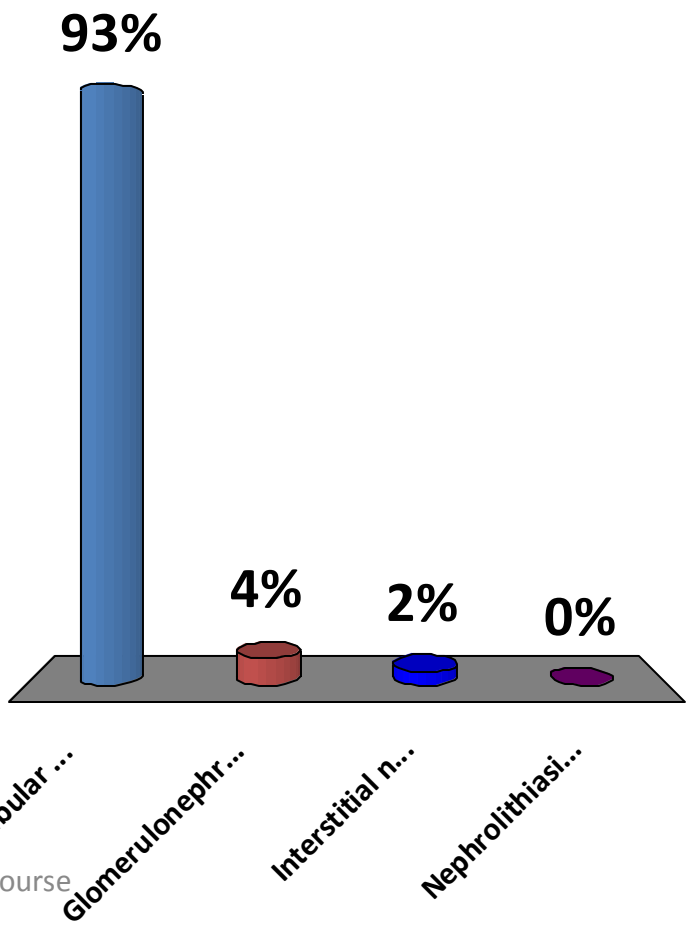
A 52-yr old male presents for his annual PE. He has a hx of well-controlled HTN on b-blockers. DRE reveals a palpable prostate mass. What is the next best step in management?

1. Serum PSA
2. Transrectal U/S-guided biopsy
3. U/A with culture
4. Watchful waiting



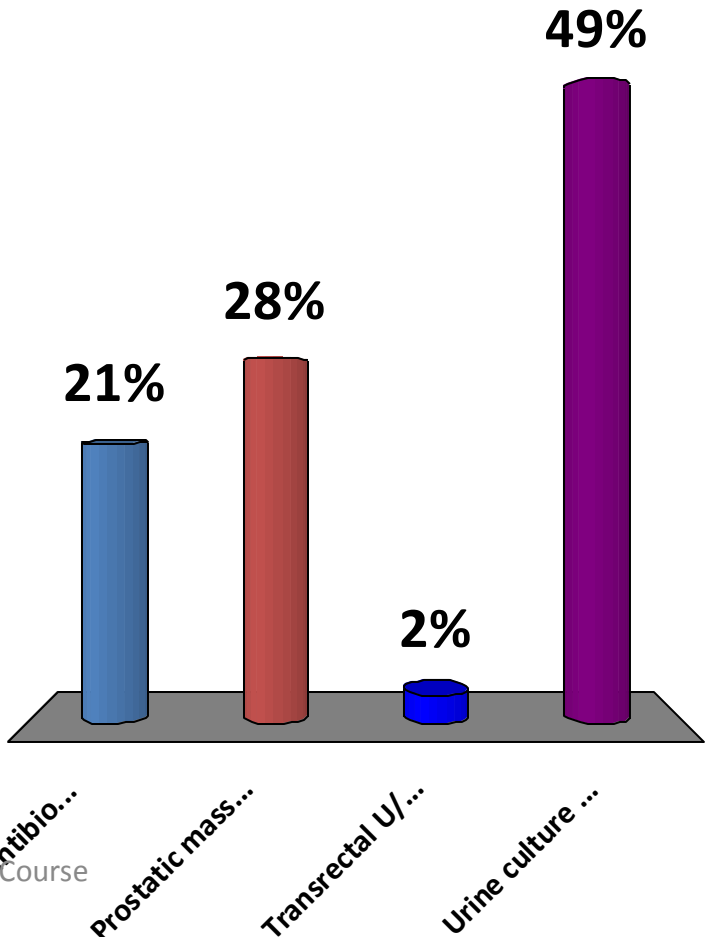
An 80-yr old male is hospitalized for sepsis. While hospitalized he has a sudden increase in serum creatinine, potassium and phosphate levels. U/A reveals muddy, brown sediment. What is the most likely diagnosis?

1. Acute tubular necrosis
2. Glomerulonephritis
3. Interstitial nephritis
4. Nephrolithiasis



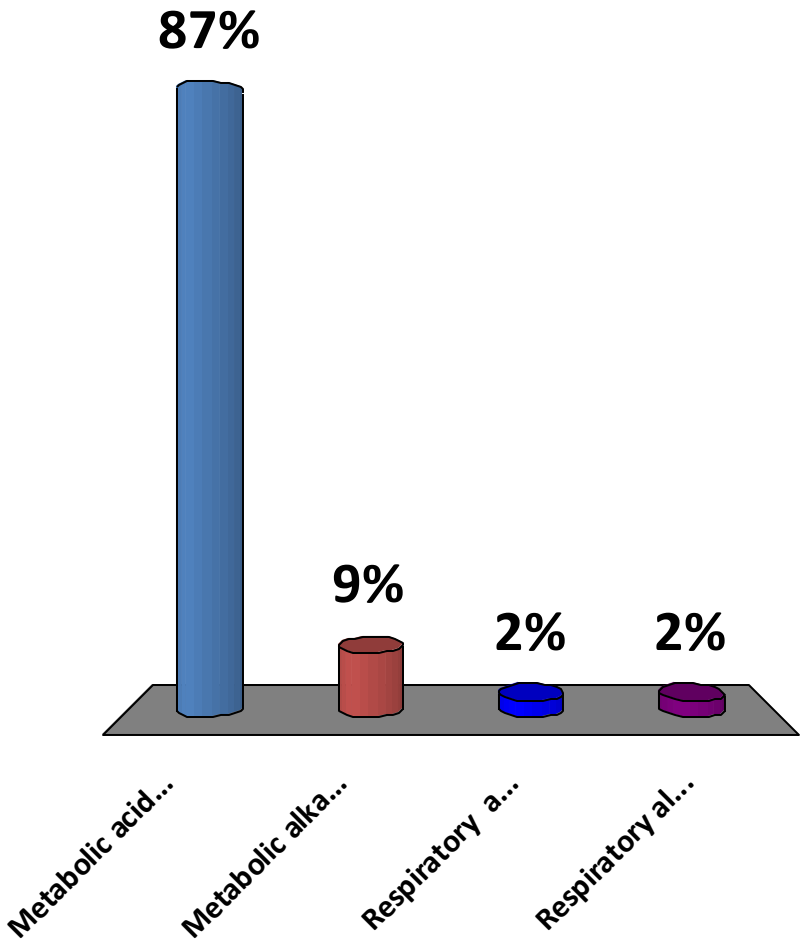
A 62-yr old male on day 5 of ciprofloxacin tx for UTI presents with low back & perineal pain and fever of 101.2F. PE reveals a boggy, tender prostate. U/A shows elevated leukocytes. PSA is elevated and he has leukocytosis with left shift. What would be the next most appropriate step in management?

1. Extend antibiotic tx
2. Prostatic massage & culture
3. ✔ Transrectal U/S
4. Urine culture for antibiotic sensitivity



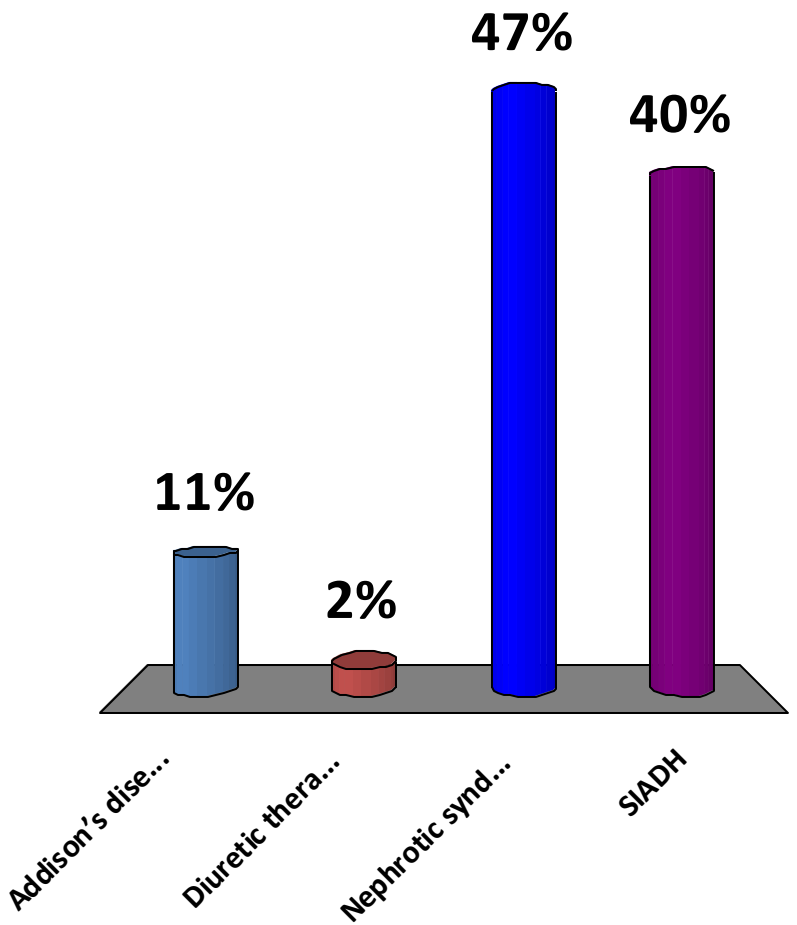
A 19-yr old female returns from vacation in Mexico c/o 4-day history of profuse, watery diarrhea. Labs show low pH, PCO2, and HCO3. What is the most likely acid-base imbalance?

1. Metabolic acidosis
2. Metabolic alkalosis
3. Respiratory acidosis
4. Respiratory alkalosis



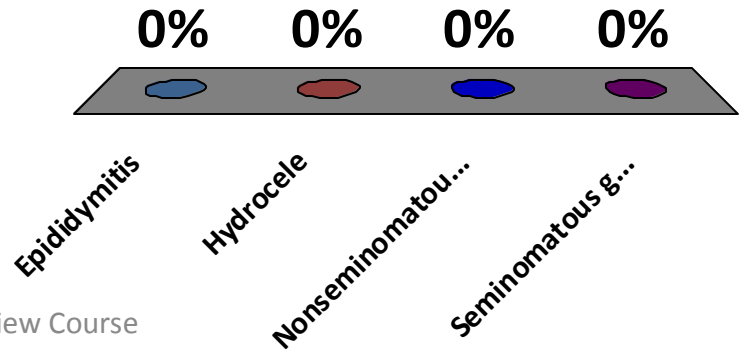
Which of the following is a cause of hypervolemic hyponatremia?

1. Addison's disease
2. Diuretic therapy
3. ✓ Nephrotic syndrome
4. SIADH



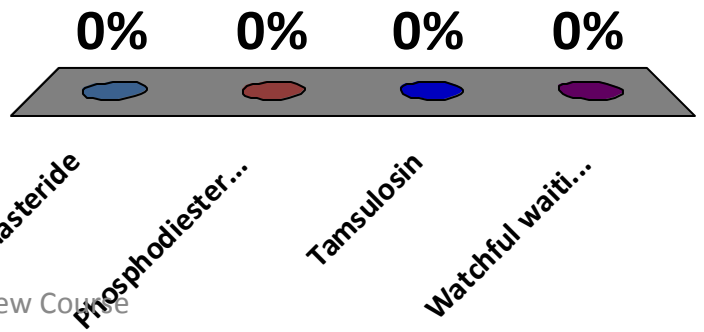
A patient is found to have a testicular mass on PE. U/S shows a solid mass. Beta HCT is 1000 mIU/mL (nl 0-3mIU/ml) and AFP is 30 ng/mL (nl 0-8.3 ng/mL). What is the most likely diagnosis?

1. Epididymitis
2. Hydrocele
3. Nonseminomatous germ cell tumor
4. Seminomatous germ cell tumor



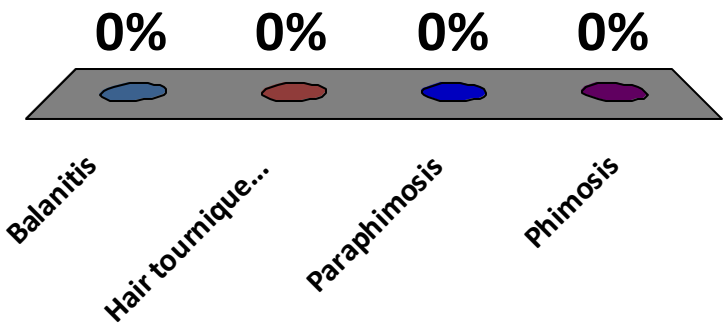
An 80-yr old male has a diffusely enlarged prostate on DRE but denies urinary urgency or frequency. What is the best initial approach to management?

1. Finasteride
2. Phosphodiesterase inhibitor
3. Tamsulosin
4. ✓ Watchful waiting



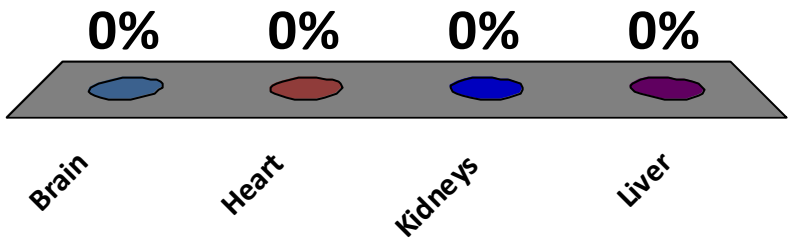
A 2-yr old male presents with retracted foreskin behind the corona that cannot be reduced over the glans penis. The glans appears enlarged and congested. What is the most likely diagnosis?

1. Balanitis
2. Hair tourniquet
3. ✓ Paraphimosis
4. Phimosis



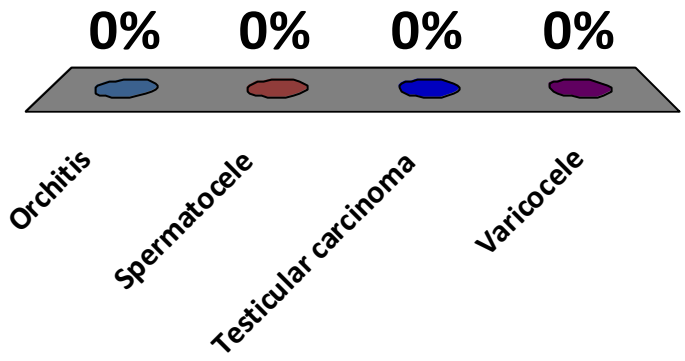
Disorders of sodium primarily affect which organ?

1. Brain
2. Heart
3. Kidneys
4. Liver



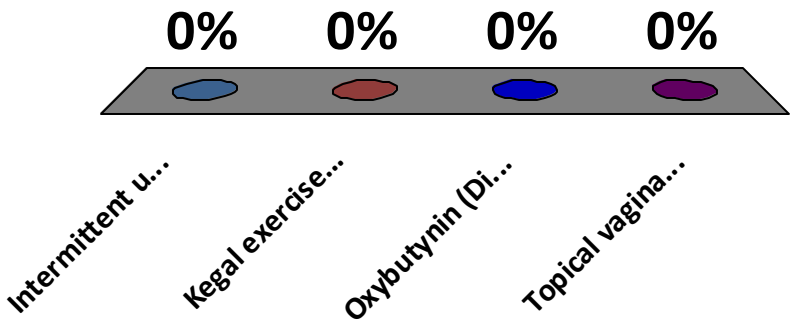
Scrotal U/S reveals a mass that transilluminates. What is the most likely diagnosis?

1. Orchitis
2. ✓ Spermatocele
3. Testicular carcinoma
4. Varicocele



A 73-yr old female presents c/o of urinary urgency, frequency and nocturia. She denies hematuria and dysuria. What is the most appropriate treatment?

1. Intermittent urinary catheterization
2. Kegal exercises
3. ✓ Oxybutynin (Ditropan)
4. Topical vaginal estrogen



A 7-yr old male with a hx of sore throat 2 wks ago awakes with periorbital edema and scrotal swelling. What will most likely be found on U/A?

1. Renal tubular epithelial cells & casts
2. Tea-colored urine with RBC casts
3. WBC casts and eosinophils
4. WBC's, RBC's and elevated nitrite