

Kidney Hormones

Renin	Raises blood pressure as result of angiotensin (local vasoconstriction) and aldosterone
Prostaglandins	Regulate intrarenal blood flow by vasodilation or vasoconstriction
Bradykinins	Increase blood flow (vasodilation) and vascular permeability
Erythropoietin	Stimulates bone marrow to make red blood cells
Vit D	Promotes absorption of calcium in the GI tract

Pyelonephritis

Top renal disease	Inflammation of renal parenchyma and upper urinary tract
S/S	Fever, chills, flank pain
Acute	Bacteria
Chronic	immune disorder
Urosepsis	bacteria in urine
s/s	lower BP, fever, high HR, lower IOC
lead to	septic shock, multisystem failure

Renal Calculi

Causes	Male, high sodium, calcium, protein, genetics, dehydration, immobility, gout, UTI
S/S	depends on size and location - Upper= flank pain Lower = genital/abdominal pain
Calcium stone	60%-80%
Uric Acid Stone	low PH, 10%
Cystine	genetic, 3%
Testing	UA, serum calcium, uric acid, XR, cystoscope

Renal Calculi (cont)

Surgery	Lithotripsy - Shock wave stones < 2cm -Percutaneous Nephrolithotomy - stones > 2 cm under GA
Diet	2 1/2 - 3L /d, low sodium, low calcium
IVP	Intravenous pyelogram to look at kidneys and ureters

AKA Kidney Stones

Urine formation

glomerular filtration	hydrostatic pressure, filters by size
GFR	125mL/m / 180L/d - influenced by BP and volume max 70mmHg
2nd phase	Tubular moves water back to blood, ADH/ALDosterone increases water reabsorption up to 220mg/d
3rd phase	solutes from blood to filter - potassium, iron, keeps homeostasis

UTI

risks	Female, increased age, catheters
S/S	Dysuria, frequency, urgency, pain, hematuria, suprapubic pain
Causes	E. coli
Complications	drug resistance, urethritis, pyelonephritis, renal assess
Urethritis	inflammation of urethra
Cognitive issues	falls, dizzy, lower appetite
teaching points	2-3L/D, Void after intercourse, points

UTI (cont)

Houdini	Hematuria, obstruction, edema, surgery, end of life care, immobile
get urine culture	keep on ice
TX	Antibiotics

Hypo/Hyper

Hyponatremia S/S	Brain damage, seizures, coma
Hyponatremia TX	salt, fluid restriction, IV fluids
Hypernatremia S/S	coma, seizures, delusions, thirst, tachy
Hypernatremia Tx	Increase fluids, decrease sodium,
Hypokalemia S/s	short QT, bradycardia
Hypokalemia tx	ALBUTEROL, DOPAMINE, DIURETICS, ST
Hypomagnesemia S/S	HTN, hyperactivity, tachycardia, chvostek
Hypomagnesemia tx	fall precautions, iv ma sulfate

Kidney Structure

Afferent arteriole	Delivers arterial blood from the branches of the renal artery into the glomerulus	Autoregulation of renal blood flow via vasoconstriction or vasodilation Renin-producing granular cells
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Kidney Structure (cont)

Efferent arteriole	Delivers arterial blood from the glomerulus into the peritubular capillaries or the vasa recta	Autoregulation of renal blood flow via vasoconstriction vasodilation Renin-producing granular cells
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Glomerulus	Capillary loops with thin, semipermeable membrane	Site of glomerular filtration Glomerular filtration occurs when hydrostatic pressure (blood pressure) is greater than opposing forces (tubular filtrate and oncotic pressure)
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Bowman's capsule (BC)	Thin membranous sac surrounding 2/3 of the glomerulus	Collects glomerular filtrate (GF) and funnels it into the tubule
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Proximal convoluted tubule (PCT)	Evolves from and is continuous with Bowman's capsule Specialized cellular lining facilitates tubular reabsorption	Site for reabsorption of sodium, chloride, water, glucose, amino acids, potassium, calcium, bicarbonate, phosphate and urea
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Kidney Structure (cont)

Loop of Henle	Continues from PTC Juxtamedullary nephrons dip deep into the medulla Permeable to water, urea, and sodium chloride	Regulation of water balance
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Collecting ducts	Collect formed urine from several tubules and deliver it into the renal pelvis	heceptor sites for antidiuretic hormone regulation of water balance
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Bladder Cancer

Risk Factors	begins in urothelial cells that line the bladder, men>women, chronic inflammation, carcinogens
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Manifestations	hematuria, frequent/painful urination, back pain
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TX	Chemo, radiation, surgery
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Surgeries	cystectomy, urinary diversion
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neobladder	no external pouch
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continent	stoma hidden in. umbilicus
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complications	bleeding, clots, infection
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Acute renal failure

common in hospitalized patients

oliguria, prerenal	HTN, lower CU, hypovolemia
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ABG interpretation

Normal	PH: 7.35 PaCO2: 35-45 HCO3: 22-26
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Metabolic Acidosis	Low pH LOW HCO3
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Metabolic Alkalosis	High pH High HCO3
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Respiratory Acidosis	Low Ph High. PaCO2
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Respiratory Alkalosis	High PH Low PAco2
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Causes of Nephrotic Syndrome

Primary Glomerular Disease	Membranous proliferative glomerulonephritis, Primary nephrotic syndrome, Focal glomerulonephritis, Inherited nephrotic disease
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Multisystem Disease	Lupus
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Allergens	Bee Sting
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Infection	Strep
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Neoplasms	Leukemia
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Drugs	Penicillin, NSAID
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Acute Glomerulonephritis

inflammation	3rd cause of kidney failure
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cause	great b strep, autoimmune - lupus, good pastures
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S/S	HTN, decrease output, decrease GFR, edema, proteinuria, hematuria, dysuria
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medications	ABX, diuretics, plasmapheresis, protein restricted diet
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Benign Prostatic Hyperplasia

noncancerous enlargement of prostate

S/S Difficulty urinating, bladder outlet obstruction (BOO)

DX rectal exam, prostate specific antigen

PSA elevates if prostate cancer

medications Finasteride, dutasteride, tamsulosin

surgeries TUIP, go home with foley

Finasteride women don't touch, reduces size

Tamsulosin flowback

TUIP incision into prostate to relieve compression and make urine flow easier

CBI continuous bladder irrigation prevents blood clots

TURP due to prostate irrigation - lower BP, Sodium and Hgb

Prostate Cancer

slow growing malignant tumor

risk African American, 50 years+

characteristics slow growing, asymptomatic, can metastasize to lymph nodes, bone, rectum, bladder

DX curable early detection, PSA levels, rectal exam

TX external radiation, prostatectomy, ABX

teaching points symptoms go away 34-48hrs, don't quit ABX

Urine Retention

<400ml Oliguric

TX kiegels, scheduled bathroom, Bethanechol

Cause anticholinergics

Medications

Cymbalta depression, neuropathic pain

oxybutynin decrease muscle spasms in bladder

Tolterodine overactive bladder

darifenacin treats symptoms of overactive bladder

Trospium overactive bladder

Salifencin neurogenic overactivity

PKA

common genetic disorder cysts

autosomal dominate appears age 30-40

s/s HTN, obstruction, hematuria, pain

DX UA, blood.bacteria, radiographic

TX dialysis

labs anemia, increases BUN, Creatinine, NA, K, HR, lower CA, fever