

An anatomical illustration of the human urogenital system. It shows the kidneys, ureters, bladder, and reproductive organs in a stylized, semi-transparent manner. The background is a light pink and white color scheme.

# Urologic System Disorders

# Clinical Medicine Flashcards

- Clinical Clues to Diagnosis
- Pathophysiology

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- Acute Renal Failure
- Benign Prostatic Hyperplasia
- Bladder Cancer
- Chronic Renal Failure
- Epididymitis
- Glomerulonephritis
- Hydronephrosis
- Nephrotic Syndrome
- Overactive Bladder
- Polycystic Kidney Disease
- Prostate Cancer

- Pyelonephritis
- Renal Artery Stenosis
- Renal Calculus
- Rhabdomyolysis
- Urethritis
- Urinary Tract Infection

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# Acute Renal Failure

- Azotemia, anuria, or oliguria.
- Precipitated by severe hypotension, use of diagnostic contrast dyes, or structural damage to nephrons.
- Elevated  $K^+$  and decreased  $Na^+$  in serum.
- Elevated creatinine and BUN.

## Pathophysiology

- Acute damage to nephrons associated with severe hypotension, use of contrast dyes, or damage to skeletal muscle fibers that accumulate in the nephron tubules.
- Three stages: The oliguric stage (less than 400 mL/24 hr), lasting 2 weeks (better prognosis) to several months (poor prognosis). The diuretic phase, characterized by a normal output of low-quality urine lasting up to a month. The recovery phase, which may last up to 1 year. The quality of urine in this phase improves, but full recovery is not guaranteed.
- Prerenal conditions are those that decrease perfusion of the kidneys. Intrarenal failure includes incidents that damage the nephrons.
- Postrenal failure is caused by obstruction, resulting in hydronephrosis.

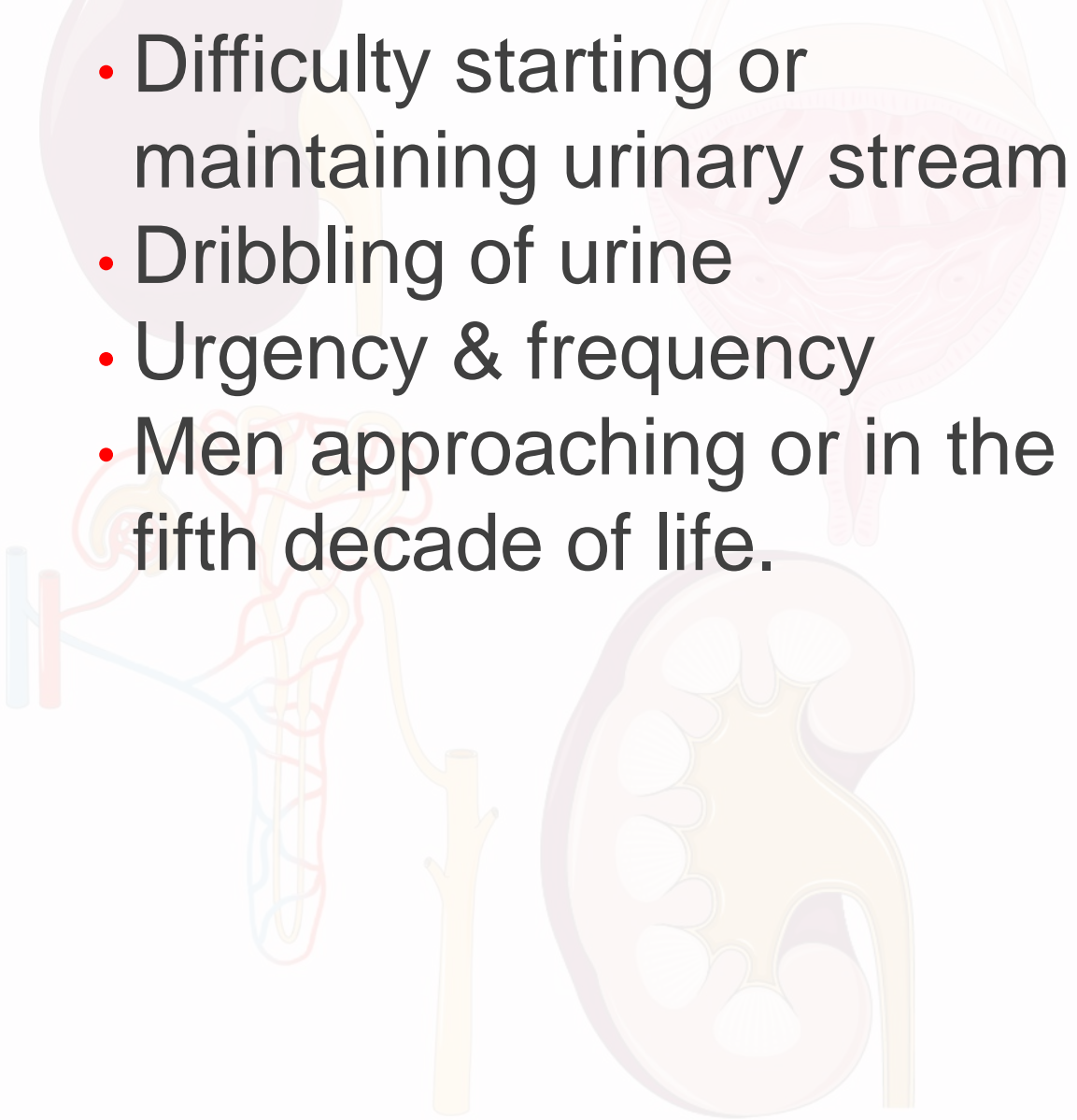
## 2

## Benign Prostatic Hyperplasia

- Difficulty starting or maintaining urinary stream
- Dribbling of urine
- Urgency & frequency
- Men approaching or in the fifth decade of life.

### Pathophysiology

- Enlargement of glandular tissue in the periurethral area of the prostate under the influence of testosterone, particularly DHT.
- Estrogen is also implicated, as it makes the gland more susceptible to DHT.
- The prostatic urethra narrows as the prostate gland enlarges, causing partial, or eventually total, obstruction of urine outflow from the bladder.



## 3

# Bladder Cancer

- Painless hematuria
- Pelvic pain
- Lower back discomfort
- Changes in voiding patterns.



## Pathophysiology

- More common in middle-aged males than in females.
- Strong association with cigarette smoking.
- Exposure to industrial pollutants (e.g., aniline dyes).
- The tumor-node-metastasis (TNM) method of staging the cancer determines prognosis and treatment.
- Over time, dysplastic changes occur in the urothelium. With chronic irritation, these areas of dysplasia are replaced by malignant cells. The cells may form small cancers that remain in the urothelium or may become invasive and metastatic to the liver, lungs, and bones.



## 4

# Chronic Renal Failure

- History of
  - Diabetic nephropathy,
  - Hypertension,
  - Glomerulonephritis, or
  - An autoimmune disease (systemic lupus erythematosus [SLE])

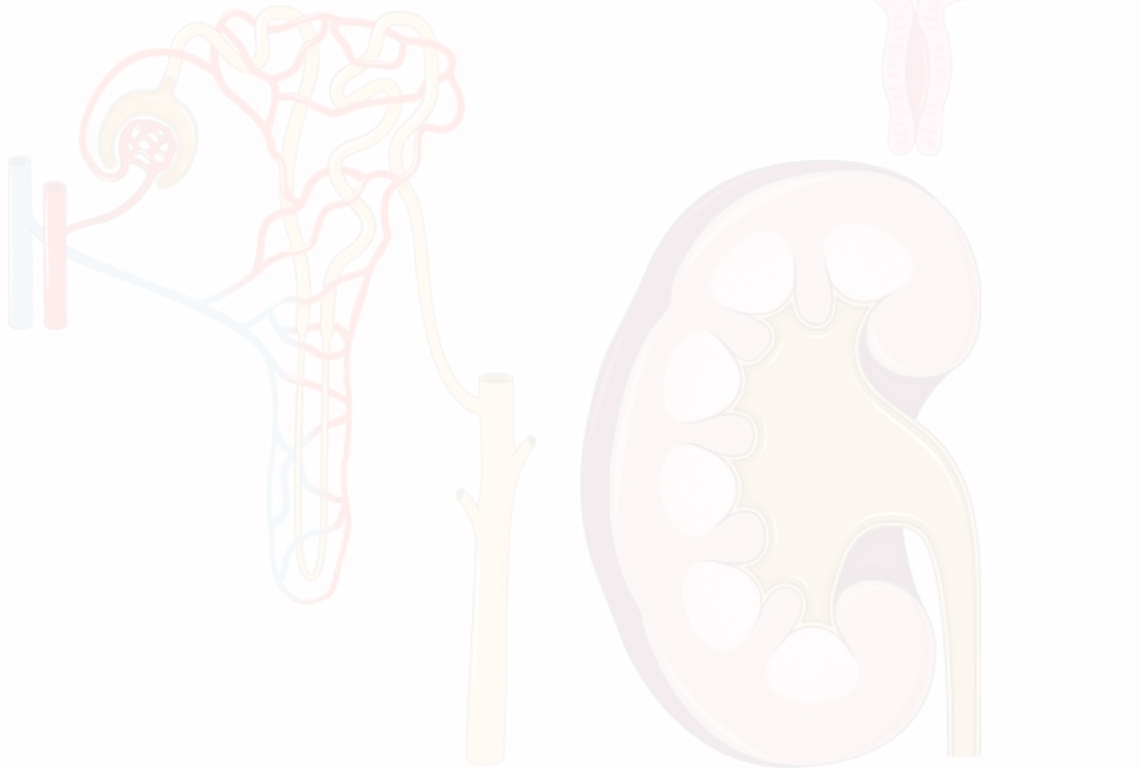
## Pathophysiology

- Gradual destruction of the nephrons and reduction of GFR. Acute renal failure, diabetic nephropathy, and hypertension are the most common causes, but abnormalities of the kidney, autoimmune disorders, and chronic infection or cancer are also causes.

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# Epididymitis

- Painful inflammation of the back of the testes.
- The scrotum is erythematous



## Pathophysiology

- Infection and inflammation of the epididymis, the tube along the back side of the testes in which sperm mature and are stored, can be the result of several events.
- In older men, regurgitation of urine from excessive bladder pressure when trying to urinate in the presence of an enlarged prostate can force urine into the vas deferens to the epididymis, causing infections with bacteria such as *Escherichia coli*.
- Infections with sexually transmitted organisms occur with frequency in young, sexually active males.
- Congenital structural abnormalities in young children predispose them to infection.
- Trauma results from excessive pressure exerted on the epididymis.

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# Glomerulonephritis

- Hypertension
- Oliguria
- Smoky, frothy urine
- Urinalysis shows RBCs casts, and protein.

## Pathophysiology

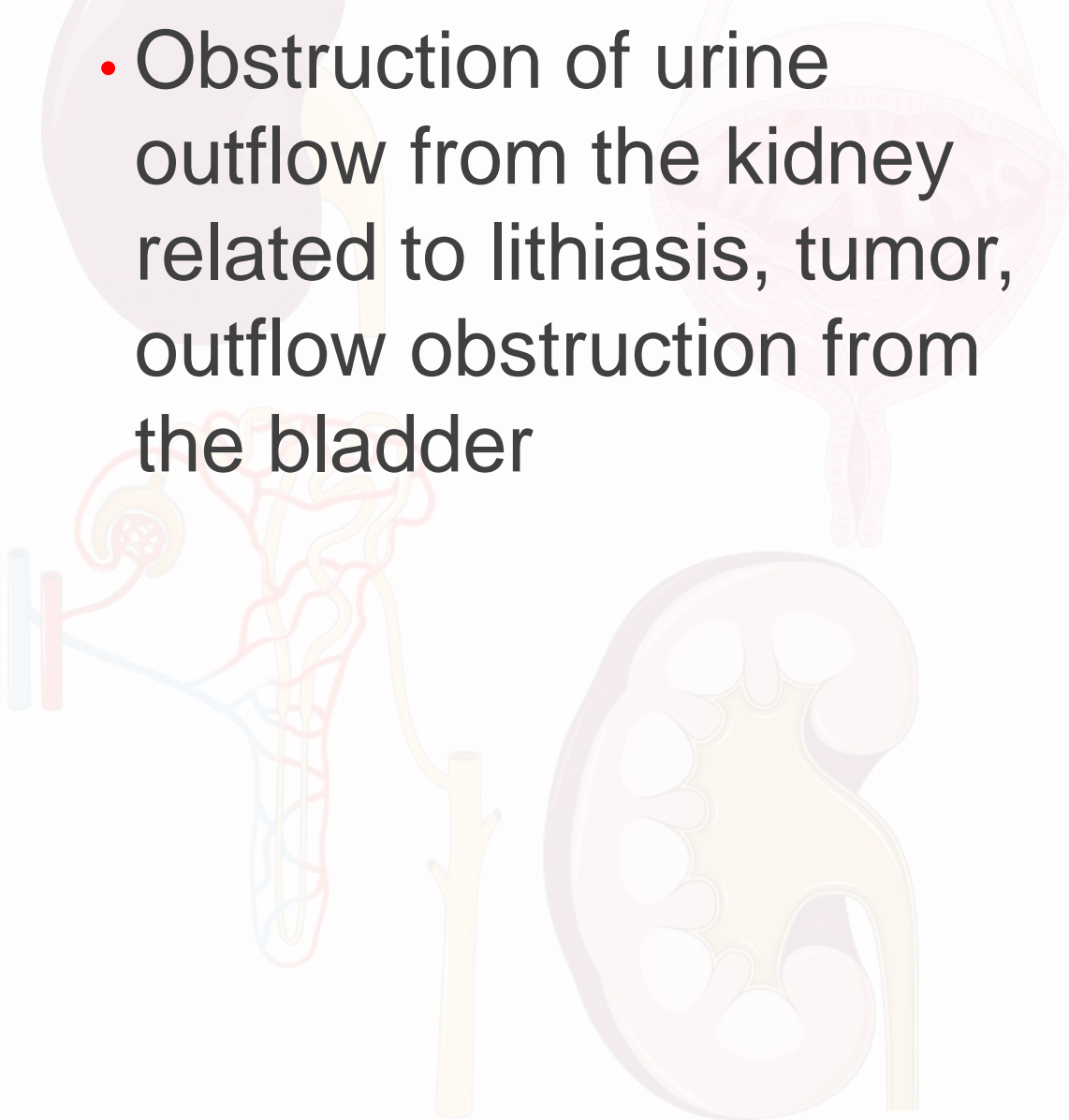
- The glomerulus is formed from tufts of arteriolar capillaries fed by an afferent arteriole and drained by an efferent arteriole that have thin basement membrane composed of a proteinous matrix and a layer of epithelial cells with footlike outpouches. Blood plasma is forced through these thin structures by a pressure gradient into Bowman's capsule and the renal tubule.
- A number of toxins, diseases, and organisms can cause inflammation and damage to this basement membrane.
- In poststreptococcal infection, antigens are deposited in the basement membrane of the glomerulus. When antigen/antibody complexes form, the immune system destroys them, setting up large areas of inflammation and damage to surrounding structures.



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# Hydronephrosis

- Obstruction of urine outflow from the kidney related to lithiasis, tumor, outflow obstruction from the bladder



## Pathophysiology

- Unilateral or bilateral swelling of the renal capsule from regurgitant urine related to outflow obstruction. Because the renal capsule is fibrous, internal functional structures (nephrons) are destroyed.
- Causes may include renal system lithiasis; tumors of the kidneys, ureters, or bladder; enlargement of the prostate; or stricture of the urethra.
- May occur with continuous bladder irrigation (CBI) if a clot obstructs outflow of irrigant and urine or with an obstructed Foley catheter.

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# Nephrotic Syndrome

- Elevated LDL cholesterol and triglyceride
- Proteinuria, frothy urine from protein and lipids,
- Decreased immunoglobulins lost in urine.
- Massive edema.

## Pathophysiology

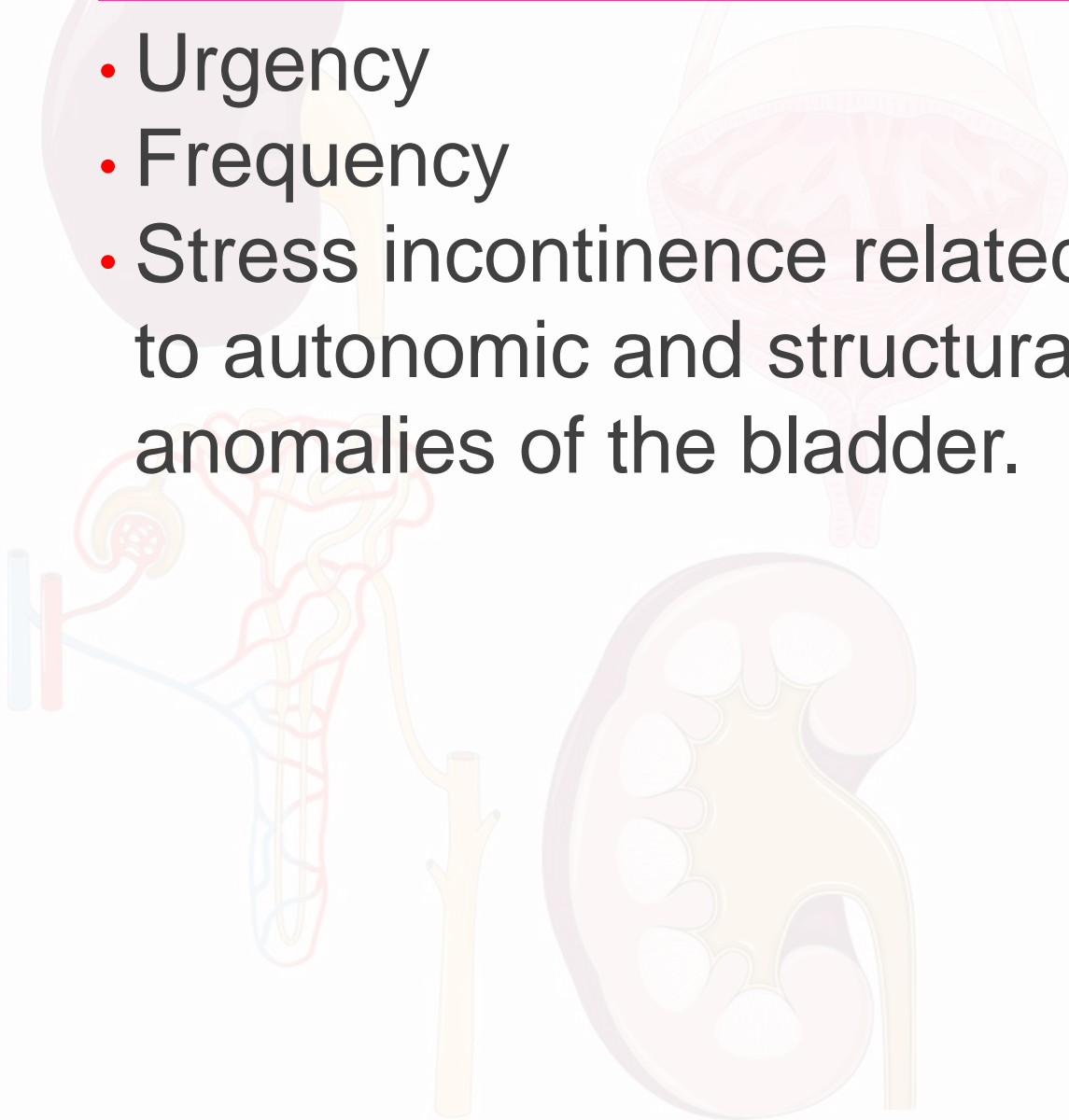
- Nephrotic syndrome is an umbrella term encompassing disorders that result from glomerular damage. Damage to the basement membrane results in loss of blood components that would otherwise remain in circulation.
- Large amounts of protein and immunoglobulins are lost in the urine. Hyperlipidemia and hypertriglyceridemia occur as the liver responds to the low protein levels. Triglycerides and LDL are also lost in the urine, to some extent adding to the frothy appearance.
- Protein loss causes loss of intravascular fluid into the interstitial spaces, but low glomerular filtration rate still results in hypertension.

# Overactive Bladder

- Urgency
- Frequency
- Stress incontinence related to autonomic and structural anomalies of the bladder.

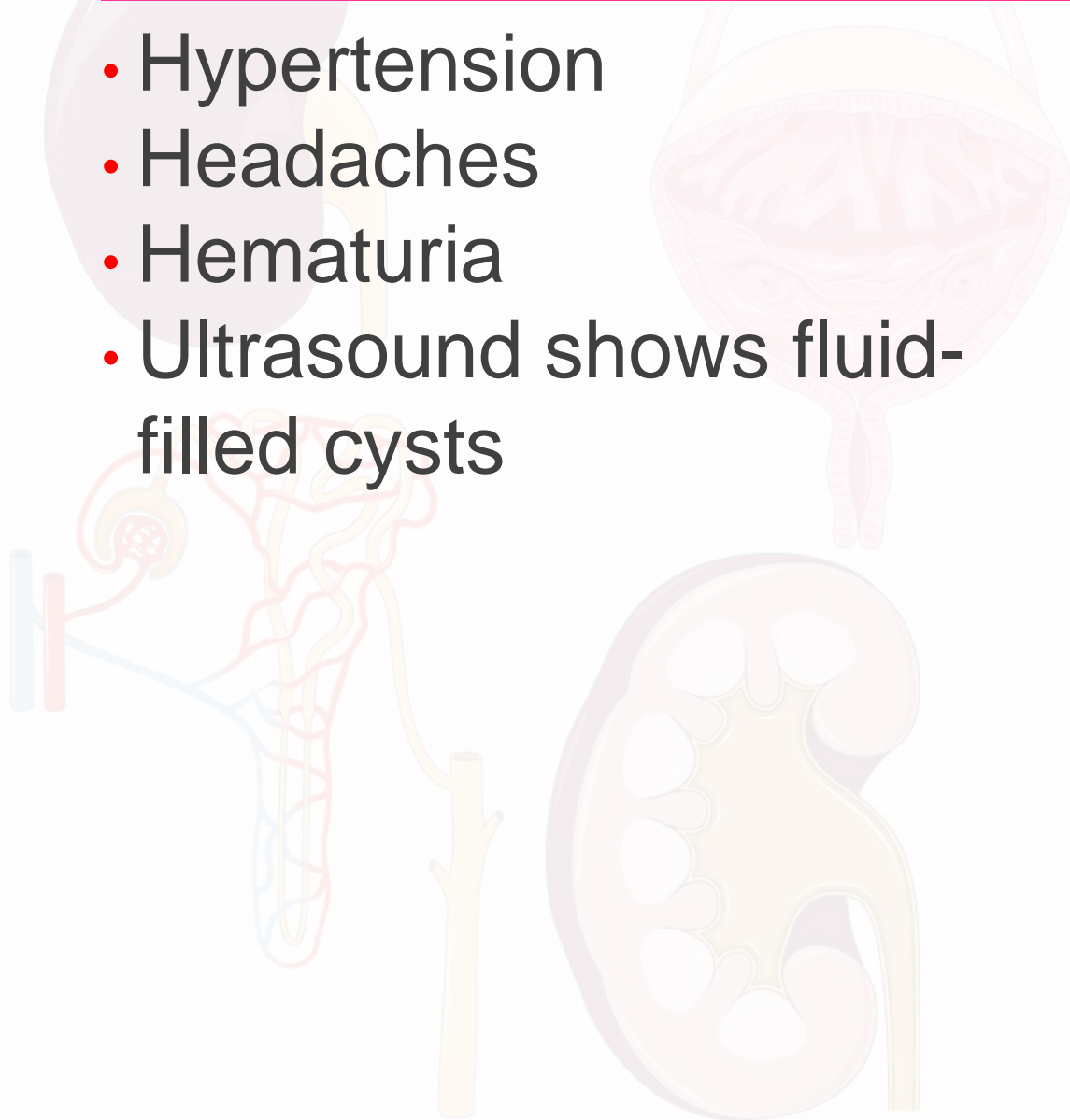
## Pathophysiology

- Overactive bladder is thought to be caused by excessive parasympathetic impulses to the detrusor muscle of the bladder, initiating the micturition response.
- Also, structural anomalies resulting from pelvic relaxation syndrome decrease the angle of the bladder, causing undue pressure on the neck of the bladder and abnormal stretch of the transitional cells, which again triggers the micturition response.
- Neurogenic causes may include chronic neurologic illnesses (e.g., multiple sclerosis) that unintentionally stimulate motor function and the micturition reflex arc, making the bladder more active.



# 10 Polycystic Kidney Disease

- Hypertension
- Headaches
- Hematuria
- Ultrasound shows fluid-filled cysts

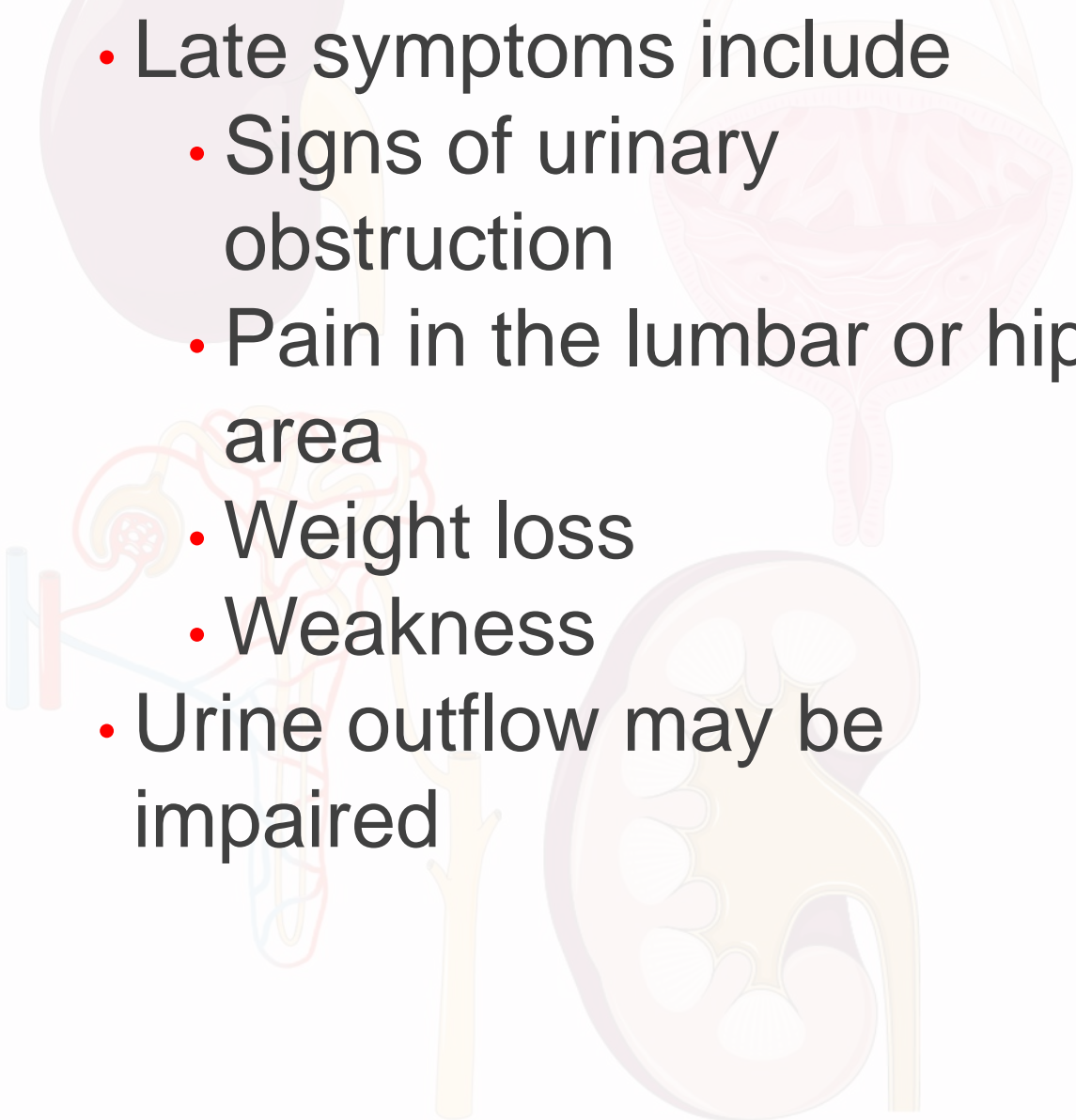


## Pathophysiology

- Hereditary disorder causing cystic formation in the cortex or medulla of the kidney.
- Cysts may develop from pressure buildup in the tubules and can progress to the entire kidney.
- Glomerular filtration rate (GFR) decreases.
- Stasis of fluid in the cysts predisposes to repeated urinary tract infection (UTI).
- Persons with this hereditary disease are at high risk for aneurysms in the brain and diverticulosis related to body system formation during the embryonic period.

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# Prostate Cancer

- Late symptoms include
    - Signs of urinary obstruction
    - Pain in the lumbar or hip area
    - Weight loss
    - Weakness
  - Urine outflow may be impaired
- 

## Pathophysiology

- Prostatic glandular cells mutate and grow under the influence of testosterone and DHT.
- Prostate cancer late in life is usually slow growing (↓ testosterone levels).
- Metastatic spread into other urinary and reproductive structures is through lymph and blood vessels.
- The TNM system is used to grade the cancer and make a prognosis.



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# Pyelonephritis

- Chills
- Fever
- Tenderness over the costovertebral angle
- Dysuria
- Elevated WBC



## Pathophysiology

- Usually an ascending urinary tract infection (UTI) caused by a failure of the “washout” mechanism of urine and protective mucin gel. Causative agents are usually *Escherichia coli* and, to a lesser extent, *Staphylococcus aureus*.
- Kidney pelvis structures may be damaged by ongoing infection, leading to nephron damage and renal failure.

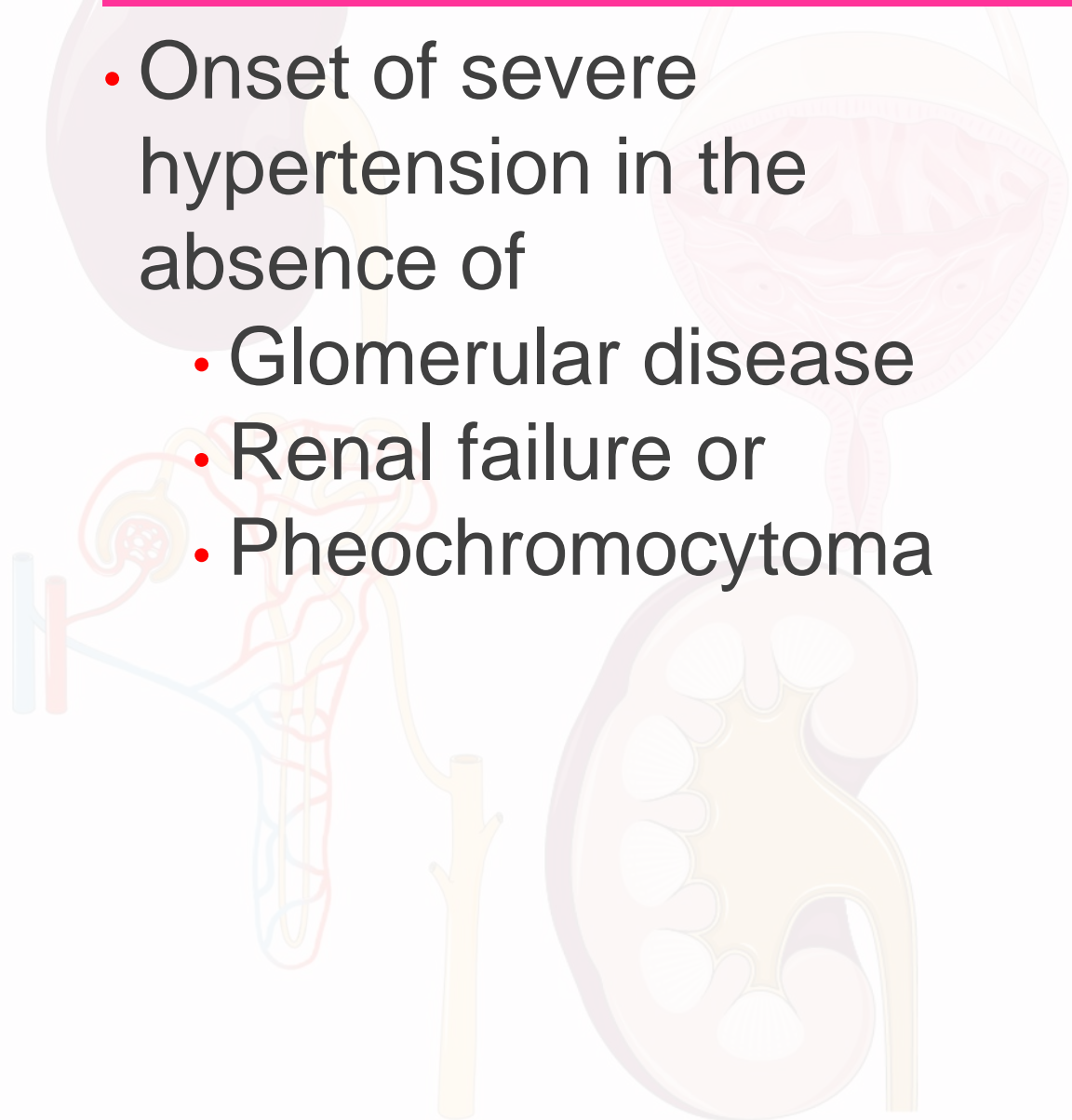
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# Renal Artery Stenosis

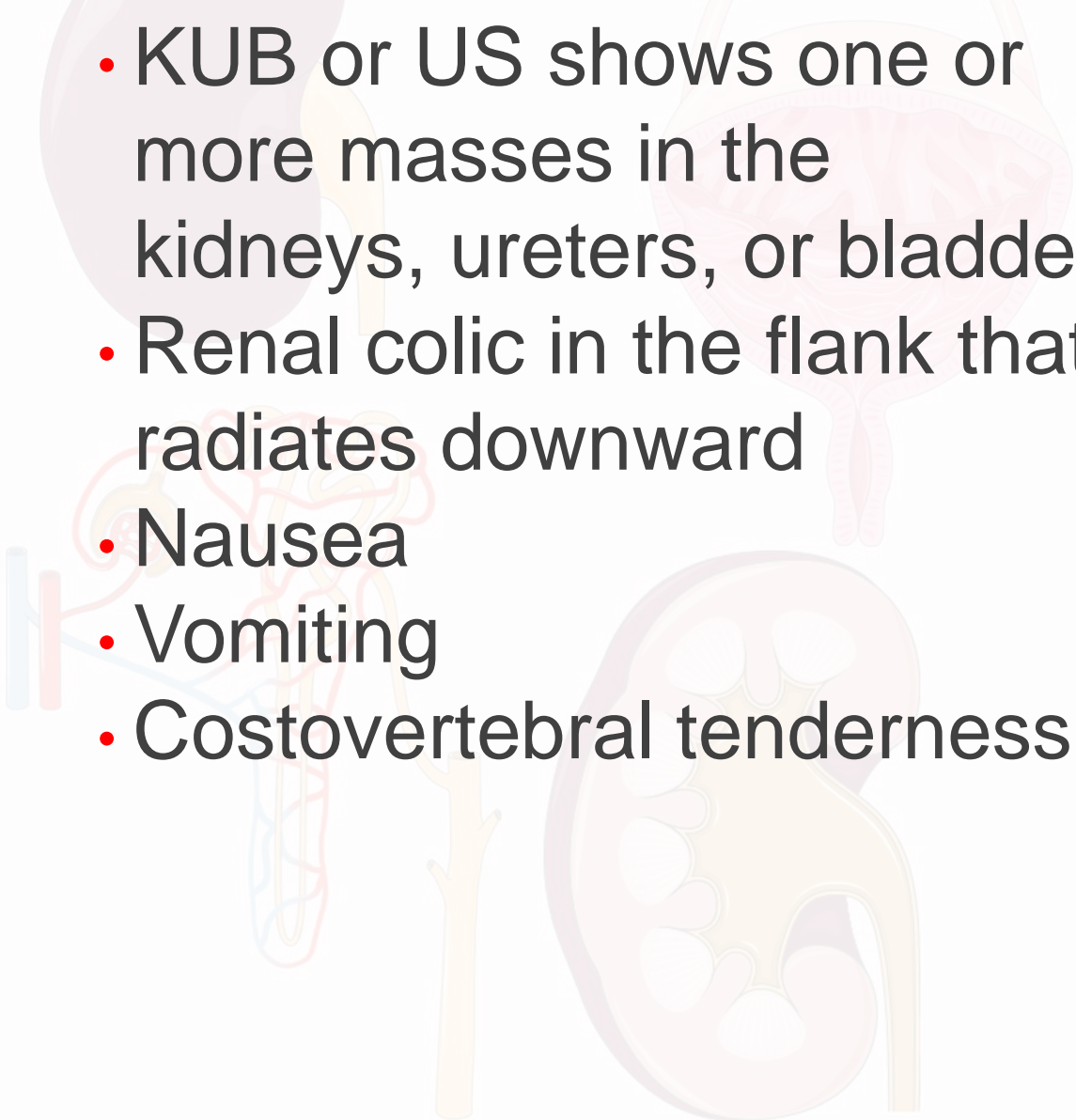
- Onset of severe hypertension in the absence of
  - Glomerular disease
  - Renal failure or
  - Pheochromocytoma

## Pathophysiology

- Hypertension occurs when the renal artery becomes narrowed and incapable of transmitting blood to the kidney. The response is activation of the renin-angiotensin-aldosterone mechanism to increase vasoconstriction, further increasing the blood pressure.
- Young women usually develop renal stenosis from fibromuscular dysplasia; older adults develop it from chronic atherosclerotic disease.



# Renal Calculus

- KUB or US shows one or more masses in the kidneys, ureters, or bladder
  - Renal colic in the flank that radiates downward
  - Nausea
  - Vomiting
  - Costovertebral tenderness
- 

## Pathophysiology

- Men are affected more than women, and stone formation is usually unilateral. Once stones have formed, repeated formation is likely.
- Irritation of the epithelial cells that line the tubules.
- Dehydration causes more solute to be present in the urine.
- Persons prone to stone formation may lack inhibitor proteins and stones may recur.
- Small stones (<5 mm) usually are passed in the urine.

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# Rhabdomyolysis

- Azotemia
- Edema
- Hypertension
- Hematuria
- Arrhythmias
- Common causative drugs are cholesterol lowering agents

## Pathophysiology

- Results from crush injuries (compartment syndrome), the toxic effect of drugs or chemicals on skeletal muscle, extremes of exertion, sepsis, shock, electric shock, and severe hyponatremia.
- Lipid-lowering drugs (e.g., statins, niacin, and/or fibrates) are among the commonly prescribed drugs that cause damage to skeletal muscle fibers that are released into the bloodstream and accumulate in renal tubules.

# Urethritis

- Dysuria, blood in the urine or ejaculate in a male.
- Discharge from the urethra.
- History of unprotected sex
- In women, pelvic pain

## Pathophysiology

- More common in men but can occur in women; also characterized by inflammation and colonization of the urethra by *Escherichia coli*, *Neisseria gonorrhoeae*, *Chlamydia trachomatis*, herpes simplex, or cytomegalovirus.
- Infectious agents may ascend and affect the prostate and infiltrate the lymph nodes in the groin area. In women, these agents can ascend to infect the pelvic area and may be a cause of infertility.



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# Urinary Tract Infection

- Urinary frequency
- Urgency
- Dysuria
- Bacterial count of  $>100,000/\text{mL}$  of urine

## Pathophysiology

- Occurs more frequently in women because of anatomy and age-related structural changes.
- UTIs can also occur as a result of obstructive disease, invasive therapies, and incontinence issues.
- Most UTIs (95%) are caused by contamination and ascension in the urethra by normal flora from the rectum.
- Causative agents are *Escherichia coli*; *Staphylococcus saprophyticus*; and to a lesser extent *Klebsiella* species, *Proteus mirabilis*, *Staphylococcus aureus*, and *Pseudomonas aeruginosa*.
- The normal mucin-surface glycosaminoglycans are overwhelmed and bacteria become adherent to bladder surfaces.
- Soap in bathwater causes UTIs in children.