Benign prostatic hypertrophy
- LUTS → dx w/ DRE, U/A
  - Complications: bladder distention / urinary obstruction, UTIs, renal insufficiency
  - Treatment:
    - alpha-adrenergic blockers (Tamsulosin = Flomax, prazosin, terazosin)
    - 5-alpha reductase inhibitors (Finasteride)
    - TURP, prostatectomy, anticholinergics
- BPH, benign prostatic hypertrophy, benign prostatic obstruction
- Prostatic growth –
  - pubertal – prostate starts growing, about doubles in size
  - post-pubertal – around age 25, second growth phase, continues through lifetime
- Impingement on the urethra
- Etiology: questionable
- Risk Factors: *age, FH, obesity, cardiac disease, Type II DM, lack of exercise, ED
- Sx: frequency, urgency, difficulty initiating stream, weak/interrupted stream, dribbling, nocturia, urinary retention, incontinence, pain, changes in urine
- Complications: acute urinary retention, chronic urinary retention, hematuria, UTIs, bladder or renal dysfunction, bladder stones
- Diagnostic testing: U/A, PSA (?), urodynamic testing, cystoscopy, transrectal U/S, biopsy
- Tx: lifestyle changes (restrict fluids, caffeine, alcohol), medications (saw palmetto OTC supplement), minimally invasive procedures, surgery

Incontinence (Women)
- Very common, especially in pregnancy
- Risk factors
  - Obesity → strongest risk factor (threefold increase), weight reduction is associated with improvement
  - Parity → increased parity is a risk for incontinence and pelvic organ prolapse
  - Vaginal delivery
  - Family history
  - Age → 38% of women >80
  - Ethnicity/race → may be higher in white women
  - Other → smoking, caffeine, DM, stroke, depression, fecal incontinence, vaginal atrophy, HRT, genitourinary surgery

Stress Incontinence → leakage of urine that occurs with increased intra-abdominal pressure (sneezing, laughing)
- Most common type in younger women (age 45-49 most common)
- Can be caused by insufficient support of the pelvic floor muscles (urethral hypermobility), or intrinsic sphincteric deficiency
- Tx → after pelvic floor PT, and other initial tx
  - Pessaries
  - Meds → duloxetine (SNRI)
  - Mechanical devices, surgery

Urgency Incontinence → urge to void immediately right before or during involuntary leakage (the amount can range quite a bit), also termed “overactive bladder”, frequent small voids, can’t make it to the bathroom in time
- Most common in older women and may be associated with detrusor overactivity leading to involuntary contractions during bladder filling
- Found in 21% of elderly women
- Tx →
  - Antimuscarinics, mirabegron, acupuncture, botox, tibial nerve stimulation, sacral neuromodulation, surgery

Mixed → both stress and urgency combined

Overflow Incontinence → often presents with continuous urinary leakage or dribbling in the setting of incomplete bladder emptying
- Can cause weak or intermittent urinary stream, hesitancy, frequency, and nacturia
- When the bladder is very full, stress leakage can occur similar to stress/urge incontinence
- Caused by detrusor underactivity or bladder outlet obstruction
- Painless loss of urine if detrusor, urine stream can occur with changes in position
- Obstruction → may need to strain to pass urine
- Evaluation → classify the type, always evaluate for UTI, medication reconciliation, voiding diaries, physical exam (atrophy, POP), cytology looking for malignancy, bladder stress test
- Tx →
  - Outlet obstruction may need surgery (POP etc)
  - Detrusor → limited therapy
- Other contributing factors
  - Vaginal atrophy, urethral diverticula (structural), neurologic causes, alcohol intake, caffeine, stool impaction, functional incontinence (decreased mobility), cognitive impairment

Functional Incontinence
- Signs & symptoms → inability to toilet due to cognitive impairment, physical disabilities, psychological problem, or environmental barriers
- Management → Decrease use of sedatives, alcohol, and anticholinergics, reschedule meds to not act during sleeping hours, easy access to commode or urinal -Easy-to-remove clothing -Scheduled or prompted toileting
### Erectile Dysfunction

**Causes**
- Usually neurovascular, and may be an early marker of vascular disease – HTN
- Dyslipidemia
- Smoking, hyperglycemia
- Penis curvature, diabetic neuropathy, MS
- Low testosterone
- It is normal for men to have slowly decreased erection hardness and longer refractory periods in between orgasms as they age

**Workup**
- Ask if pt is having normal erections, if not then it is an organic issue, if yes then it is a psychogenic issue
- Early morning testosterone with free testosterone
- Lipids, FBG, Prolactin if there is nipple discharge

**Management**
- Helpful book “The New Male Sexuality”
- Refer for surgical options: inflatable prosthesis, balloon dilation, vein ligation
- Smoking cessation has greatest effect when patient is younger with mild symptoms

**Pharmacologic Therapy**
- **Phosphodiesterase type 5 inhibitors**
  - Interfere with cGMP breakdown, continued dilate of inflowing blood vessels
  - Sildenafil, tadalafil, vardenafil
  - First line agents
  - May need 6-8 tries before they work
  - AEs → loss of blue-green color vision, hypotension
  - Contraindications → concomitant nitrates, severe CV disease
- **Alprostadil injection**
  - Prostaglandin penile injection
  - Not a good initial treatment
  - Issues of fibrosis
  - Painful
  - Contraindicated in sickle cell

### Hydrocele

- Fluid filled sac around testis
- Can be around one testis or both
- Typically, not dangerous
- Common in newborn boys
- Main reason that people get treated is that it is unsightly and can be uncomfortable
- Can be caused by epididymitis
- Rarely, testicular cancer can cause it
- Can be red, painful, swollen
  - Patient may complain of pain or pressure
- Diagnosis
  - History, PE with transillumination
- Only treat them when they are painful or embarrassing, or decreasing the supply of blood to the penis
  - You can do needle aspiration, but that increases the risk of needing surgery later

### Varicocele
- Varicose veins around spermatic cord, feels like a bag of worms
- Varicocele can increase the temperature to the testicle which may impeded spermatogenesis
- Happen in about 15% of boys, but a very small number will have bad effects (rarely causes testicular growth retardation)
- Important in the infertility work up
- About 40% of men who are infertile have a varicocele
- Not typically a big pain, just uncomfortable
- Increase with sitting, standing, physical exertion
- Get worse over the course of a day and are relieved by lying flat
- Typically, we just give analgesics for pain, percutaneous embolization can embolize vein to make it go away
- If it is not painful, and you are not worried about fertility, no need to do anything

### Nephro/uro lithiasis

- Types of stones (in order): calcium oxalate, struvite, uric acid, xanthine, cystine
- **Signs/Symptoms:**
  - Colicky flank pain, back/groin pain, urinary frequency, dysuria, hematuria, N/V
- **Diagnosis:**
  - Non-contrast CT scan (size, location), US (hydronephrosis)
  - 4-5mm has ~50% chance of passing (~3wks), >6mm unlikely to pass w/out intervention
- **Treatment**
  - Tx if <10mm: NSAIDs + opioids, straining urine, alpha blockers (Flomax/Tamsulosin)
  - Tx if >10mm: urology consult for ESWL (shock wave lithotripsy) or ureterorenoscopy
Bladder cancer

- Not as common in women (probably because women were not in the manufacturing workforce 20-30 yrs ago)
- Prognostically worse in women
- Very common → 6% of all malignancies in men
- Highest rates in New England

Risk Factors
- Males 3-4x increased incidence, Age >50 (median age is 68), Tobacco → 2-5x relative risk
- Occupational exposure to aromatic amines (dyes, rubber, aluminum, diesel fumes)
- Schistosomiasis!

Pathology
- Bladder = lower tract and accounts for 90%
- Upper tract tumors (renal pelvis > ureter) = 5-7%
- 92% urothelial carcinoma (transitional cell carcinoma), 5% squamous cell
- In areas with schistosomiasis → 75% squamous pathology

Tumor types
- Papillary tumor (Ta) → “cauliflower hanging” (good prognosis)
- Carcinoma in situ (CIS) → Flatter tumor, leads towards a more invasive cancer

Bladder cancer staging
- Muscle invasive bladder cancer is the only one that has metastatic potential (causes mortality)
- Most bladder cancer can be cured without taking out the bladder → T2-T3 is the cutoff for bladder removal
- Almost all invasive tumors (T1 or greater) are high grade

Bladder cancer diagnosis
- Symptoms: Hematuria → most common, Voiding symptoms → dysuria, frequency, urgency, Pain → usually indicates advanced disease
- Imaging: Cystoscopy, Urine cytology, Upper tract imaging, IVP (intravenous pyelogram)
  - CT urography → 80% accurate in detecting locally advanced disease, NOT sensitive for nodal involvement (false negative rate = 68%, false positive rate = 16%)
- Once diagnosis of cancer is made, complete staging with CT of the abdomen & pelvis, CXR, and bone scan if indicated
- Do bone scan if bone pain or elevated alkaline phosphatase
- Urokinase in urine = enzyme that breaks down a clot, helps with differential

Management of bladder cancer that is not muscle invasive
- TURBT (Transurethral Resection of Bladder Tumor) → goal is to resect all visible tumor and sample muscle
- IV BCG → Tuberculum bacillus into bladder to get an immune response (first immunotherapy for cancer), stimulates lymphocytes to do immune surveillance for cancer
  - Usually given weekly for 6 weeks, effective at delaying recurrence, unclear impact on progression or survival
- Both require rigorous surveillance with cystoscopy and urine cytology at 3 month intervals

Management of muscle invasive bladder cancer
- Standard treatment is radical cystectomy
- Very extensive pelvic surgery (both GU and GI) → Up to 10 hrs, high morbidity
- Ilium is used to create a reservoir to collect urine, very long recovery

Standard of care in treatment for metastatic bladder cancer and options for second-line treatment
- Adjuvant chemotherapy (after surgery)
  - About 60% of patients would relapse from surgery alone
  - Many patients say no though because they are worn out from the surgery
- Neoadjuvant Chemotherapy
  - Early administration of systemic chemo
  - Allows assessment of the chemotherapeutic responsiveness of the primary tumor
  - May end up downstaging and making a tumor resectable!
  - Maximal delivery of chemo (no disruption of vascular beds by surgery/XRT)
  - But it is based on clinical staging which is inaccurate*

Bladder preservation
- Option for a certain set of patients, no randomized data vs. radical cystectomy
- Consider in patients who refuse a cystectomy or those unfit for surgery
- Optimal candidate → no mass on EUA, no ureteral obstruction, small solitary tumor, visibly complete TURBT, no disease in the prostate or pelvic urethra, 1/3 of patients survive with an intact bladder
- Second-line chemotherapy
  - No agent or combination is approved for patients who fail first-line cisplatin-based chemotherapy (no survival benefit even shown)
Testicular cancer

• Most common cancer in men ages 20-35, incidence is rising in western countries since the mid 20th centuries, risk is less in AAs

• Risk factors
  - Cryptorchidism → Relative risk between 10-50 times normal, 25% of patients with a history of cryptorchidism that develop testicular cancer will do so in the contralateral testes
    ▪ Early orchioplexy (<2yo) should be performed, the likelihood of cancer is lowered the earlier you do it
    ▪ Orchietomy should be performed in post-puberty patients with cryptorchidism
  - Prior testicular cancer, testicular intraepithelial neoplasia, family history
    ▪ Suspected → inguinal hernia, infertility, prenatal DES exposure, low birth weight, testicular trauma/atrophy

• Personal history
  - Rarely bilateral, but there is a 2.7% lifetime risk of a second primary testes cancer, patients should do self-exam

• Clinical presentation
  - Painless mass or swelling of the gonad (50%) → delay in diagnosis
  - Scrotal pain (30-40%) → can be misdiagnosed as epididymitis
    ▪ DD: epididymitis, torsion, inguinal hernia, trauma, orchitis (mumps), cellulitis, malignancy
  - Signs or symptoms from metastatic disease (20%) → back pain, retroperitoneal lymphnodes
  - Gynecomastia (5%) → tumor secretes something that mimics prolactin

• Testicular Carcinoma Pathology
  - Classic seminoma → Most common tumor of the testes (related to cryptorchidism)
    ▪ 35-55% of testicular cancers, occurs at an older average age than NSGCT
    ▪ Rare in children, can occur in older men
    ▪ Excellent overall prognosis, very responsive to chemo and radiation
  - NSGCT (non-seminoma) → many different histological subtypes
    ▪ Embryonal carcinoma
      ▪ Second most frequent element in germ cell tumors after seminoma
      ▪ Age 20-35 (rare in kids), can produce AFP & bHCG
      ▪ Can manifest aggressive behavior and is a poor prognostic feature in early stage disease
    ▪ Yolk sac tumor
      ▪ Can occur in kids and adults, produces AFP
    ▪ Choriocarcinoma
      ▪ Produces LARGE amounts of bHCG
      ▪ Has the highest potential for mets (mostly brain mets)
      ▪ Causes HALF the testicular cancer deaths, but also the most infrequent element in tumors
    ▪ Teratoma
      ▪ 20-30% of NSGCT consist of teratoma elements (but only 3-4% are pure teratomas)
      ▪ Does not usually excrete bHCG or AFP

• Diagnostic Evaluation
  - PE, testicular ultrasound, CAT scanning, serum LDH
  - Tumor markers (AFP & bHCG)
    ▪ Seminoma → only bHCG (but not all)
    ▪ Embryonal → both

• TNMS staging
  - Stage 1: no lymph node or mets
  - Stage 2: regional lymph nodes without mets
  - Stage 3: mets or lymph node involvement that is S2-3

• Treatment controversies
  - Seminoma management
    ▪ Clinical stage 1-2B → orchietomy plus radiation to the subdiaphragmatic lymphnodes
    ▪ Clinical stage 2C-3 → orchietomy plus chemo
  - Nonseminoma management
    ▪ Orchietomy and RPLND (retroperitoneal lymph node dissection) or orchietomy plus chemo
  - Avoiding RPLND in stage 1A/1B
    ▪ Need to risk stratify, patients at low risk of relapse can be observed closely while others can get a short dose of chemo to prevent relapse
  - Risk factors for relapse
    ▪ Embryonal elements of tumor
    ▪ Lack of yolk sac elements
    ▪ Vascular or lymph invasion
    ▪ Spermaticord invasion, scrotal/tunica vaginalis invasion
### Prostate Cancer

- **Risk factors:**
  - Known: age, ethnicity (2x more common in white men, but more aggressive at seen at younger age in African Americans), FH (2-3x increased risk in pts with primary relative with prostate cancer <70)

- **Diagnosis**
  - PSA – products by cells lining prostate, liquefies seminal fluid → Good for **monitoring response to treatment**, → Get baseline PSA, monitor levels
  - Digital Rectal Exam → Low specificity & sensitivity

- **Pathology**
  - Adenocarcinoma: 95%

- **Staging of Prostate Cancer**
  - PSA
  - DRE
  - Gleason Score
    - Grade 1 (most differentiated) through Grade 5 (least differentiated)
    - Score = 6-10 (sum)
    - Looking at glandular pattern, at primary architecture and secondary patterns (graded 1-5)

- **Primary Therapy: Early Stage Disease**
  - Prostatectomy – open vs. robot-assisted laparoscopic, External beam radiation, Brachytherapy, Cryosurgery

Active surveillance – appropriate for low risk pts (PSA <10mg/dl, T1c or T2a dz, Gleason 6, no more than 3 biopsy cores positive, no more than 50% of any one core positive)

<table>
<thead>
<tr>
<th>Renal</th>
<th>Wilms Tumor</th>
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<tbody>
<tr>
<td><strong>Epididymitis</strong></td>
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<tr>
<td>→ unilateral testicular pain, dysuria, freq &amp; urgency, fever, + Prehn’s sign</td>
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<tr>
<td>o Can be infectious or non-infectious (prolonged sitting, vigorous exercise)</td>
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<tr>
<td>o Dx: CBC, UA, urethral cx &amp; gram stain → <em>chlamydia</em>, <em>gonorrhea, E. coli, pseudomonas</em></td>
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<tr>
<td>o Tx: ice, elevation, NSAIDs</td>
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<tr>
<td>&lt;35yo: ceftriaxone 250mg IM x1 + doxycycline 100mg PO BID x10d</td>
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<tr>
<td>&gt;35yo: ofloxacin 300mg PO BID x10d OR levofloxacin 500mg PO QD x10d</td>
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</tbody>
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| **Glomerulonephritis** |
| inflammation of glomeruli, can be acute or chronic |
| o **Nephrotic syndrome**: proteinuria >3.5g/d, edema, HLD, hypoalbunemia, lipid casts |
| ▪ Minimal change dz, focal segmental GN, membranous nephropathy |
| o **Nephritic syndrome**: proteinuria <3g/d, hematuria, RBC casts, oliguria, HTN |
| ▪ Post-strep glomerulonephritis, IgA nephropathy, Henoch-Schonlein purpura, Goodpasture’s dz, vasculitis disorders |

| **Hematuria** |
| → urine dipstick is heme positive, and urine microscopy shows ≥3 RBC/hpf |
| o Painful: ureterolithiasis, trauma, UTI |
| o Painless: BPH, bladder cancer, GU tumor, medications |
| o Signs of glomerular etiology: albuminuria, hypoalbuminemia, elevated Serum Cr, dysmorphic RBCs, RBC casts, new/worsening HTN or edema |

### Acute/chronic renal failure

**Acute Renal Failure** = decline in kidney function with ↑ BUN & Cr

- **Pre-renal azotemia** (FENa <1%) = hypovolemia / dehydration / hypoperfusion → decreased PO intake, hypoperfusion from sepsis, hemorrhage, surgery, low CO
  - o → rapid volume replacement, correct cause of hypoperfusion
- **Renal azotemia** = glomerulonephritis, interstitial nephritis, tubular necrosis, thrombosis, nephrotoxic agents (contrast dye, ACEIs, PCN, NSAIDs)
  - o → increase urine flow, remove toxic agent, dialysis may be indicated
- **Postrenal azotemia** = obstructive → stones, abd or pelvic mass, enlarged prostate w/ severe urinary retention, urethral strictures → US, catheter until obstruction relieved, may require surgical decompression
### Prostatitis
- Most common due to E. coli, constitutional sx + LUTS, pyuria, bacteriuria, elevated PSA
  - Do a urine gram stain & culture, tx empirically with Bactrim or FQ
- **Acute Bacterial Prostatitis**
  - **Etiology:** gram negative rods (E. coli, pseudomonas), sometimes gram + enterococci
  - **S/Sx:** PAIN, fever, irritative voiding symptoms
    - obstruction indicates more serious infx
    - FEVER, TENDERNESS if severe
    - Any pt with back pain should have this on their differential
  - Usually infects via ascending route (urethra to prostatic ducts)
  - **Lab evaluation:** leukocytosis, pyuria, bacteruria, +/- hematuria, urine culture
  - **DDx:** pyelonephritis, epididymitis, diverticulitis, urinary retention from BOO
  - **Treatment:** abx, NO catheterization, f/u culture and exam of secretions
  - **Prognosis:** good!
  - **Referrals:** urinary retention, chronic prostatitis (Admissions if sepsis, surgical drainage)

- **Chronic Bacterial Prostatitis**
  - **Etiology:** gram negative rods, can be questionable
  - **S/Sx:** asymptomatic, irritative voiding sx, perineal or suprapubic discomfort, low back pain, hx UTIs
    - Prostate may feel normal, boggy, indurated
  - **Lab eval:** U/A, prostatic secretions → culture, sometimes pelvic radiology
    - >10 WBCs/HPF (esp. macrophages) is consistent with chronic prostatitis
  - **DDx:** chronic urethritis, cystitis, anal disease
  - **Tx:** antibiotics (given 6-12wks), NSAIDs, hot sitz baths
  - **Prognosis:** difficult to cure
  - **Referrals:** for persistent symptoms

### Cystitis
- **Risk factors:** sex, spermicide, diaphragms, DM, h/o recurrent UTIs, recent abx, Agents: usually E. coli or Staph saprophyticus, also Proteus, Klebsiella, enterococci
- **Symptoms**
  - Lower UTI: dysuria with muscle spasm, frequency with small vol, urgency, suprapubic pain, ± hematuria
  - Upper UTI: lower symptoms + fever > 100.4, flank pain, CVA tenderness, nausea, vomiting
  - Elderly may have AMS only
- **Work up**
  - Uncomplicated = healthy young nonpregnant female → proceed to empiric treatment
  - Complicated = UA with microscopy (look for pyuria, bacteriuria, varying hematuria), culture, wet prep - Hematuria will not be present in cervicitis or urethritis but is common in UTI
- **Treatment**
  - Uncomplicated: 3-5 days of Bactrim or FQ if more severe symptoms, Septra alternative if local E. coli resistance is not > 20%
  - Complicated: home treatment with 7-14 days of FQ or Septra OK as long as there is no n/v, otherwise send to ED for inpatient treatment
- **Prevention**
  - Cranberry juice -Short-term phenazopyridine for dysuria
  - Consider prophylaxis for women with > 2 UTIs in last 6 mo or > 3 UTIs in last year: clean UA followed by 6 months of Septra, nitrofurantoin, cefaclor, cephalaxin, or FQ
  - Postmenopausal women may benefit from vaginal estrogen cream

### UTI/Pyelonephritis
- **Symptoms:**
  - Dysuria, frequency, urgency +/- hematuria, suprapubic pain
  - Pyelo = UTI sx + fever, chills, flank pain, CVA tenderness, N/V
- **Diagnosis:**
  - UA → pyuria (>10 WBC/hpf), bacteriuria, leukocyte esterase (reflects pyuria), nitrates (reflect Enterobacteria)
- **Treatment**
  - Cipro → 500mg BID x 3-7d (1 week for elderly, complicated)
  - Bactrim (TMP-SMX) → one double strength tablet [160/800 mg] BID x3-7d
  - Macrobid (Nitrofurantoin) = 100mg PO BID x5-7d
- **Yeast infection** → Diflucan 150mg PO 1x dose (Fluconazole)
- **Pyelo** → do urine cx & susceptibility testing to determine best regimen
  - Empiric = FQ i.e. Cipro 500 BID x7d or Levo 750mg once daily x 5-7d
- **Urethritis** → discharge & dysuria, typically d/t gonorrhea, chlamydia, or trich, dx with gram stain
  - Treatment: ceftriaxone (G), doxy (C), flagyl (T)
**Nephrotic Syndrome**
- Proteinuria > 3.5 g/24 hr
- Hyperlipidemia
- Hypercoagulability (renal vein thrombosis)
- Fatty casts
- Pitting edema
- Minimal change disease: children, preceded by URI, rx: steroids
- Focal segmental glomerulosclerosis: African-Americans, HIV/IVDA
- Membranous nephropathy: Caucasians, HBV, HCV, SLE, gold, penicillamine, malignancy
- Type 1 MPGN: HBV, HCV
- Type 2 MPGN: ↓ C3
- Diabetic glomerulonephropathy
- Nephrotic syndrome is characterized by the triad of hypoalbuminemia, hyperlipidemia, and proteinuria greater than 3 grams/24 hours. Symptoms include dependent edema that can become generalized, ascites, and pulmonary edema. One third of adults with nephrotic syndrome have an underlying systemic disease such as diabetes mellitus, systemic lupus erythematosus, or amyloidosis, as opposed to one of many primary renal diseases.

**Nephritic Syndrome**
- AKA glomerulonephritis
- Protein AND hematuria (RBC casts), also azotemia and oliguria
- Proteinuria < 3.5 g/24 hr

**Renal Cell Carcinoma**
- Most common risk factor: smoking
- Epithelial cells of proximal convoluted tubule
- Flank pain + flank mass + hematuria
- Nephrectomy

**Testicular Torsion**
- Bimodal: < 1-year-old, puberty
- Increased risk: undescended testicle, Bell-Clapper deformity
- Sudden onset of unilateral pain during sleep or exercise
- Left > right
- Absent cremasteric reflex
- Doppler ultrasound
- Immediate urologic consultation
- Manual detorsion (medial to lateral/opening a book) if delays expected
- Prehn’s sign negative (relief with elevation of testes – positive in epididymitis)

**Polycystic kidney disease**
- Autosomal dominant
- Bilateral cysts → progressive renal failure
- Flank pain
- Hematuria
- HTN → berry aneurysm, intracerebral hemorrhage
- BP control: ACEIs, ARBs
- Definitive rx: kidney transplantation