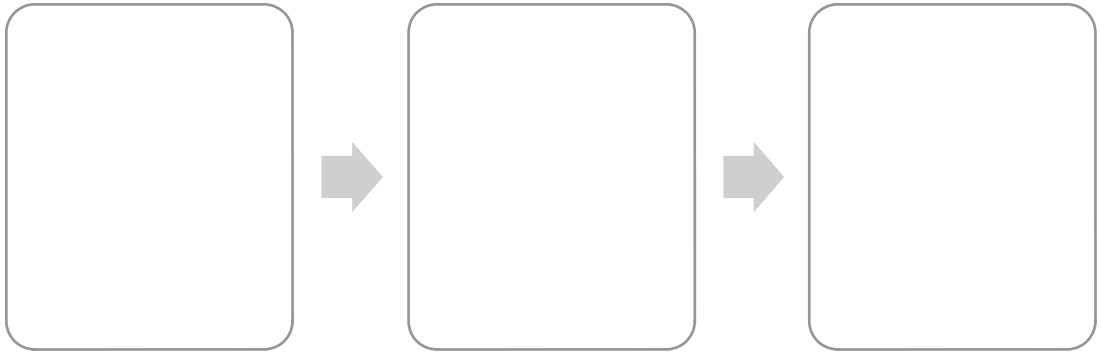
	Osteomyelitis	Bone Cancer
	direct/indirect/extension acute: < 1 month chronic: >1 month; failed tx for acute *staph most common	Males > females Mets > Primary tumor Mets = fx
Patho	-Patho invasion (direct or indirect) -Tissue inflammation -Edema (from pus = ↑ pain) -↓ blood flow to bone (↓ O2) -Bone necrosis (sequestrum) -Involucrum (around sequestrum) -Sinus tract → cutaneous drainage	Osteosarcoma: most common; extremely malignant; long bones Chondrosarcoma: 2nd most common; cartilage; pelvis, femur, humerus; slower to mets Ewing's: most malignant; femur & tibia → early mets to lung M. Myeloma: plasma, WBC; gradual and cumulative effect; affects active marrow
Signs & Symptoms	Acute: systemic & local s/sx (fever, sweats, chills, N, malaise) (bone pain ↑ activity, swelling, tenderness, warmth, ↓ ROM, sinus tract *late, fracture *late) Chronic: systemic ↓, local ↑	Osteosarcoma: pain, tenderness, swelling, enlargement, ↓ ROM Chondrosarcoma: dull pain, edema Ewing's: progressive local pain, swelling, palpable mass, ↑ size M. Myeloma: back pain, patho. fx's, weakness, vague bone pain
Complications	Deformities, fractures, sepsis, chronic infection, ↓ ROM, amputation	-Mets -Mets tumors – patho. fx's
Diagnostics	-Cultures -MRI / CT → extent, soft tissue -Bone scan → 24-72 hr of onset -↑WBC, ESR (chronic), CRP (acute)	Osteosarcoma: XR; CT; MRI – sunburst; bone scan; bx; ↑ Ca & Alk Phos *similar for others Ewing's: XR; CT; MRI – periosteal elevation M. Myeloma: bone marrow aspiration; ↑ Ca, gamma globulin, proteinuria, ↓ RBC,
Prevention	-asepsis -antibiotics → prophylactically	
Treatment	-IV abx (cx's first) ; 4-6 wks or 3-6 months -chronic- oral abx -limit ROM; immobilize -surgery: I&D, sequestectomy, abx beads/spacers -irrigate with abx -saucerization -wound vac -hyperbaric O2 therapy -drsg changes -amputation	Osteosarcoma: Rad/Chemo & amputation → limb salvage surgery more common now Prevent mets to lungs! Chondrosarcoma: wide resection, occasional rad (↓ response to chemo and rad r/t ↓ blood supply) Ewing's: radiation; may do resection, amp & chemo Metastatic tumors: radiation M. Myeloma: chemo, palliative rad
Other		Limb Salvage Sx: graft or prosthesis; may need expandable prosthesis- adjust Hypercalcemia: > 11 = ↑; > 15 = cardiac dysrhythmias; tx = NS, Lasix, monitor <3

	males > females LE: PVD UE: trauma Other: infections, tumors, crushing wounds, deformities, war injuries, pain unrelieved by other tx's
	goal : preserve most distal level that will heal; try to preserve joint level determined by circulation & presence of infection not all are candidates energy expenditure: more than non amputees; for LE's- energy expenditure ↑ with level of amputation
	disarticulation: through a joint Syme's: disartic. of foot with removal of both malleoli BKA AKA: ↑ energy ependiture Hemipelvectomy: hip Forequarter: shoulder
	Open: infection; antibiotics; soft compression drsg; 2nd sx for skin flaps; skin traction Closed: allows for WB; no infection; flap sutured over end of stump; myoplastic (bone severed at least 5 cm proximal to muscle and muscle sutured to the bone or opposing muscle)
	Immediate: contact rigid drsg - cast; prevents swelling; creates socket for prosthesis pylon - adjustable rigid temporary extension; PWB **advantages: beter adjustment; early mobility** **disadvantages: infection risk** Delayed: infection, older adults, AKA or below the elbow compression drsg- reduce swelling and begins molding for prosthesis temporary prosthesis after sutures removed (2-3 wks); FWB on permanent prosthesis by 3 months
	educate pre-op aching, tingling, shooting, stabbing ? severed nerves time frame varies- immediate or 2-3 months later; may ↓ with recovery or last for years mirror therapy: replacing sensory feedback
	hemorrhage, infection, thrombophlebitis, PNA, deformities / contractures **prevent deformities**: do not elevate past 24 hrs; prone exercises; avoid prolonged; ROM & strengthening; keep legs together
	insect daily if open areas - may need prosthesis adjustment clean daily with warm water & soap - no ETOH oil or lotion unless cleared by MD Sock: synthetic cotton or wool, over stump before prosthesis, no wrinkles, wash daily if prosthetic tight = elevate stump; notify MD if too loose = will shrink as heals, notify prosthetist wear during day to help mold stump; wipe inside daily - do not immerse in water continue exercises, join support groups

	Osteoporosis	Osteomalacia	Paget's
	-Chronic progressive: porous bone, low bone mass, structural deterioration -Risk for fx's -Females > males -Primary vs. Secondary -bone reabsorption exceeds bone deposition	- Vit D deficiency -Softening & deformity of bones 2° to insufficient minerals -Bones become abnormally soft -↓ vit d = ↓ ca absorption	-chronic disease -more in men; unknown etiology -excessive reabsorption and excessive/abnormal replacement -soft, enlarged, deformed bones -spine, femur, skull, pelvic, tibia
Risk Factors	<u>Uncontrollable:</u> Female, small stature, fair complexion, family h/o, age, estrogen loss, testosterone loss, corticosteroids, anything that affects Ca absorption or ↑ urinary elimination of Ca <u>Controllable:</u> ETOH, smoking, caffeine, carbonated drinks, sedentary lifestyle, poor calcium intake	-Poor absorption -Lack of sunlight exposure- sunscreen -Chronic diarrhea -Pregnancy -Kidney disease -Inadequate intake -Obesity -Drug therapy	-men -family history
Signs & Symptoms	Late: fx's – may be 1st sign; vertebral fx most common Back pain, loss of height, kyphosis, protruding abd and breathing issues with postural changes	-Persistent skeletal pain; difficulty walking or rising from chair -Progressive weakening, wt. loss, progressive spine deformities, extremity deformities -Fractures - delayed bone healing	-asymptomatic – earlier stages -skeletal pain- mild to severe -fatigue- early -varus- early -Waddling gait - early
Diagnostics	Bone Mineral Density: -Quantitative US -DXA – uses t-score, calculates total body Ca concentration	- ↓ ca & phos; ↑ alk phos -XR → demineralization and deformity -**Looser's Transformation Zones** – ribbons of decalcification in bone	-↑ alk phos -XR – curved bone & thickened cortex -bone scan – shows ↑ uptake in affected areas
Complications	FRACTURES	DEFORMITIES	FRACTURES, osteosarcoma, fibrosarcoma, SC compression, **CRANIUM THICKENS**
Prevention	-Adequate Ca intake (& Vit D!) -Proper nutrition -Exercises -Prevent Fractures: safety measures -Estrogen replacement therapy after menopause -Stop smoking, limit ETOH		
Medications / Treatments	-Calcitonin: ↓ bone loss; ↓ pain with fx -Bisphosphonates: tx and prevention; take first thing in AM, remain upright, GI s/fx -SERMs: prevention and tx; mimics estrogen without stimulating production, less harmful side effects -Parathyroid Hormone: stimulate bone formation; s/fx leg cramps, dizziness -Ca+ supplements – full glass of water, elemental -Treat vertebral fx's	-↑ Vit D, Ca+, & phosphorus -supplements, diet	-Treat s/sx, correct deformities -analgesics, NSAIDS -bisphosphonates -calcitonin -radiation → pain -surgery → fx, pain



Stage I Early	• No destructive changes on x-ray, possible x-ray evidence of osteoporosis, synovitis occurring
Stage II Moderate	• X-ray evidence of osteoporosis, with or without slight bone or cartilage destruction • No joint deformities, some ↓ ROM • Adjacent muscle atrophy • Possible presence of extra-articular soft tissue lesions • Pannus formation ➔ into joint capsule
Stage III Severe	• X-ray evidence of cartilage and bone destruction in addition to osteoporosis • Joint deformity • Extensive muscle atrophy • Possible presence of extra-articular soft tissue lesions
Stage IV Terminal	• Fibrous tissue replaces pannus or bony ankylosis – fibrous tissue calcification • Criteria of stage III • **Total joint immobilization**

Rheumatoid Nodules **later, can develop in heart & lungs → pleurisy, pleural effusions, pericarditis, pericardial effusion, cardiomyopathy*	• Firm, nontender, granuloma-type masses • Over the extensor surfaces of joints (fingers and elbows) • Base of the spine and back of the head → older adults • Develop insidiously • Can persist or regress spontaneously • Not removed; can ulcerate like PU's • Cataracts & vision loss if in sclera
Sjögren Syndrome	• Diminished lacrimal and salivary gland secretion • *Can occur alone or in conjunction with arthritic conditions
Felty Syndrome	• Occurs with severe, nodule-forming RA splenomegaly • Low WBC

ARTHROSCOPY	**SYNOVECTOMY**	**OSTEOTOMY**	**DEBRIDEMENT**	**ARTHRODESIS**	**ARTHROTOMY**	**ARTHROPLASTY**
-Endoscope – visualization -dx, bx, tx -Tourniquet - ↓ blood flow, ↑ visual field	-removal of synovial membrane -helps prevent further damage -cannot remove entire synovium; regenerates -helps improve: ROM, pain, WB	-changing bone alignment by cutting bone -corrects: deformity, pain, WB	-removes debris: osteophytes, loose bodies	-surgical fusion = NO ROM -last resort! -removes cartilage, adds bone grafts	-joint exploration (opening) -tenotomy-cutting tendon -tendon transfer-helps to improve function	-reconstruction/ replacement of joint -relieves pain, ↑ ROM, corrects deformity -OA, RA, avascular necrosis, deformities, dislocations -Tourniquet - ↓ blood flow, ↑ visual field
-assess: bleeding, infection, neurovascular, pain, DVT -ice, WB -outpatient -PT/devices	-can be done during another procedure type ie: scope, plasty	-post-op care similar to ORIF → wires, screws, plates, bone grafts	-seen with scope	-immobilize until healing – no WB x 3 months -wrist, ankle, lumbar spine *(spinal fusions are able to ambulate)*	-can be done as another procedure -same assessments	-hemi vs. total, uni -contraindications: infection, inflammation, OP, unstable pt Total: cement vs. uncemented; combo -DVT, infection, loosening, dislocation, fat emboli- 4th day post-op

PRE-OP	**POST-OP**	**TKR**	**THR**	**TSR**
-identify risks factors (ie infection) -treat infections! -teaching! Post-op expectations, medications to stop -labs!	-positioning -PT, exercises, devices -drsg/drain care -NV checks *-assess: bleeding, infection, NV, pain, DVT* -autotransfusion -blood transfusions -medications!	-patella, femoral component, tibial tray with tibial bearing component -peri-op: tourniquet, positioning, trial implants, medications (TXA, nerve block, abx), EBL	-femoral and acetabular components -peri-op: positioning, trial implants, medications (TXA, abx), EBL	-most complex -candidates: good bone density, good muscle strength -humeral components & glenoid -peri-op: positioning, trial implants, medications (TXA, abx, nerve block), EBL
		-post-op: *-assess: bleeding, infection, NV, pain, DVT* -avoid flexion & hyperextension -Drsg/Drain care -CPM → ROM -ambulation, exercises, devices, WB -anesthesia precautions -pain management: ice, meds, positioning -discharge instructions!	-post-op: -loosening, infection, dislocation *-assess: bleeding, infection, NV, pain, DVT* -hip precautions! (posterior) No flexion > 90°, no adduction, no extreme internal or external rotation -anesthesia precautions -abduction pillow, devices/tools -Drsg/Drain care -ambulation, WB, exercises -pain management: ice, meds, positioning -discharge instructions: 4-6 wks -dislocation: ant (ext rot, abduction) post (int rot, adduction)	-post-op: -positioning! Equipment, ROM limitations *-assess: bleeding, infection, NV, pain, DVT* -Drsg/Drain care -pain management: ice, meds, positioning -anesthesia precautions -infection, loosening, dislocation, wrong size, nerve damage

	-DMARDs, BRMs -Surgery→ deformities or correct ankylosis	-conjunctivitis-opthalmic steroids		- ↓ formation: allopurinol, febuxostat, losartan	cytotoxic meds (Imuran, methotrexate) -dialysis/transplant	colchicine, steroids, immunosuppressant's, ppi's/antacids, antiHTN's (ACE, CCB, ARBs) -PT
NI	-prevent flexion deformities -deep breathing/chest expansion	-recover in 2-16 wks -1/2 have recurring attacks (why??) -most recover fully, others continue with chronic synovitis leading to disability	-any bacteria can cause an infection in an immune-compromised pt! -ROM after infection subsides -2 wks or 4-6 wks for abx to work	-caution *ASA & diuretics* -subsides 2-10 days tx or untx -treat pain! -chronic → joint deformity -kidney stones, CKD, HTN, ↑triglycerides	-rest, **avoid sun**, emotional support, decrease possible precipitating factors, fever before exacerbation, skin care, follow-up!, **make sure they can take their medications!**	-CKD (ACE, transplants) -Lung disease- cause of death -no specific tx