Tumor	Type	Location	Target group	Histologic/ radiographic appearance	Clinical features	Treatment	Genetic mutation	notes
Osteoid osteoma	Bone forming/ Benign	Femur & tibia	Common among Young men	<2cm Nidus with surrounding bone reaction	Severe nocturnal pain (PGE2)	Radiofrequency ablation or surgery pain is revealed with aspirin & NSAIDS	-	-
Osteo blastoma	Bone forming/ Benign	Posterior vertebrae	-	No rim of bone reaction	Pain unresponsive to aspirin	curetting	-	-
Osteosarcoma	Bone forming/ Malignant	Metaphysis of long bones (distal femur & proximal tibia)	75% adolescents, Another peak in older (secondary). Males> females (1.6:1)	Large destructive and infiltrative lesions with codman triangle	Progressive pain or fractures	Multimodality approach 1.Neoadjuvant chemotherapy 2. Surgery 3.Chemotherapy 5 year survival reaches 60-70%	Mutations in RB gene, TP53 gene, CDKN2A (p16&p14), MDM2 & CDK2	Excluding hematopoietic malignancies; it is the most common primary malignant tumor of bone
Osteochondroma	Cartilage forming/ Benign	Metaphysis of long bones	-	cartilage-capped tumor that is attached to the underlying skeleton by a bony stalk, Histological appearance is that of normal bone, cartilage, and bone marrow.	slow-growing masses, which can be painful if they impinge on a nerve or if the bony stalk is fractured.		MHE is associated with mutations in either the EXT1 or the EXT2 gene.	About 85% are solitary. The remainder are seen as part of the multiple hereditary exostoses syndrome (MHE). It is rarely transformed to chondrosarcoma (3-5%), more common in MHE.

Tumor	Type	Location	Target group	Histologic/ radiographic appearance	Clinical features	Treatment	Genetic mutation	notes
Chondroma	Cartilage forming/ Benign	medullary cavity (medullary enchondroma) or on the cortical surface (cortical chondroma). solitary metaphyseal lesions of the tubular bones of the hand and feet	20-50 years	it appears as normal cartilage. radiographic features consist of a circumscribed lucency with central irregular calcifications, a sclerotic rim, and an intact cortex.	-	-	mutations in IDH1 & IDH2 genes	Ollier disease and Maffuci syndrome are disorder characterized by multiple enchondromas. Maffuci syndrome is also associated with other rare tumors (multiple enchondromas + skin hemangiomatosis).
Chondrosarcoma	Cartilage forming/ malignant	commonly arise in the axial skeleton, especially in the pelvis, shoulder and the ribs	40-50 years. It affects men twice as frequently as women (2:1).	Under X-ray it appears as Codman triangle. radiography: soap bubble appearance. Histologically: abnormal malignant cartilage.	-	surgical treatment +/- chemotherapy & radiotherapy	Multiple genes can be involved including EXT, IDH1, IDH2, COL2A1 and CDKN2A.	It's about half as common as osteosarcoma. It is the third most common bone tumor. Prognosis depends on the grade: Grade 1: excellent, Grade 3: bad
Ewing sarcoma (PNET)	Unknown origin/ malignant	Diaphysis of long bone	80% are younger than 20 years	Small blue round cells with small amounts of clear cytoplasm (large nucleus, small cytoplasm).	-	neoadjuvant chemotherapy followed by surgical excision with or without radiation.	t(11;22)(q24;q12) mutation generates an aberrant transcription factor through fusion of the EWSR1 gene with the FLI1 gene.	-2nd most common sarcoma of bone after osteosarcoma. -With chemotherapy, 5-year survival of 75% and long-term cure in 50% of patients is possible

Tumor	Type	Location	Target group	Histologic/ radiographic appearance	Clinical features	Treatment	Genetic mutation	notes
Giant cell tumor of bone	Unknown origin/ benign	epiphyses of long bones, most commonly the distal femur and proximal tibia	adults	multinucleated osteoclast-type giant cells histologically	-	curetting	-	-The neoplastic cells express high levels of RANKL. -Rare malignant behavior (mostly benign, 90% don't metastasize but 5-10% can metastasize to the lung).
Aneurysmal bone cyst (ABC)	Unknown origin/ benign	metaphysis of long bones.	adults		blood-filled cystic spaces. Pain and swelling are common	-	-	Some argue that ABC is not a true neoplasm (probably caused by a hidden trauma).

Lesions simulating primary neoplasms	Type	Location	Target group	Histologic/ radiographic appearance	Clinical features	Treatment	Genetic mutation	notes
Nonossifying fibroma	Benign lesion, likely reactive	metaphysis of the distal femur and proximal tibia (long bones).	-	Histologically: bland fibroblastic proliferation.	May resolve spontaneously.	-	-	Other names: fibrous cortical defect (FCD) & metaphyseal fibrous defect (MFD)
Fibrous dysplasia	developmental abnormality of bone genesis	-	-	McCune-Albright syndrome has a Chinese letters appearance	The lesions arise during skeletal development and appear in several distinctive but sometimes overlapping clinical patterns : a. Monostotic: involvement of a single bone. b. Polyostotic: involvement of multiple bones. c. Mazabraud syndrome: fibrous dysplasia and soft tissue myxoma. d.McCune-Albright syndrome: polyostotic fibrous dysplasia, café-au-lait skin pigmentations (brownish pigmentation), and endocrine abnormalities, especially precocious puberty (early).	-	mutations in GNAS1 gene	This mutation promotes cellular proliferation by increasing cellular levels of cAMP (cAMP mediated osteoblast differentiation).