| | Dysostosis | dysplasia |
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| causes | -Abnormal condensation & migration of mesenchyme<br>•Genetic abnormalities of homeobox genes, cytokines and its receptors | Disorganized bone & cartilage<br>•Gene mutations that control development and remodeling |
| examples | –Aplasia(lack of synthesis)<br>–Supernumerary digit (extra or additional digits)<br>–Syndactyly (no apoptosis of tissue inbetween fingers so eventually fusion of more than one finger together)<br>-craniosynostosis(abnormality in bone sutures formation) | -achondroplasia(dwarfism)<br>-thanatophoric(lethal form of dwarfism)<br>-OI(osteogenesis imperfecta)<br>-osteopetrosis(marble bone disease) |
| Gentic mutations | In group of genes | Specific genetic mutation in Single gene |

| **disease** | **Description and features** | **causes** | **diagnosis** | **treatment** |
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| Achondroplasia (dwarfism)>>dysplasia | - most common form of dwarfism | Gene mutation in FGFR3 | -normal life span(no impact on longevity)<br>-normal IQ<br>-normal reproductive status | No treatment |
| THANATOPHORIC DYSPLASIA | -Most common lethal form of dwarfism<br>-thanatophoric (death bearing=so Die at birth or shortly after)<br>-sever muscloskeletal abnormalities>>the ribs and chest very badly formed and abnormal>>compress over heart and lung so respiratory insufficiency | FGFR3 mutations (different from Achondroplasia ) | | Eventually death , no treatment |
| OI )>>dysplasia | - Most common inherited disorders of connective tissue | deficiency of type I collagen synthesis | Too little bone; fragility | No cure, its supportive therapy<br>-good diet |

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| | -brittle bone diseae<br>-its group of disease: Type 2 (lethal) and type I (relatively normal life)<br>-inherited in autosomal dominant manner | | •Blue sclera; hearing loss; teeth abnormalities | -exercise<br>-no alcohol or caffeine or smoking |
| OSTEOPETROSIS )>>dysplasia | Marble bone disease "stone bone"<br>- (group of disorders)<br>-rare<br>- Fractures may developed<br>-the BM is completely replaced by osteoid so and leukopenia in severe forms | Impaired osteoclast function: reduced bone resorption leading to diffuse sclerosis | X-ray shows diffuse whitening of bones | |
| Metabolic disorders | Osteopenia: decreased bone mass<br>Osteoporosis: severe osteopenia<br>**Related to osteoporosis:**<br>**Vertebral fractures**<br>**•Femur and pelvic fractures: immobility, PEs, pneumonia** | Osteoporosis is a multi-factorial disease ,the factors Could be:<br>1-Genatic factors<br>2-Nutretion<br>3-Physical activity<br>4-Aging<br>5-Menopause:<br>-low estrogen<br>-high IL-1,IL-6 ,TNF levels<br>-high expression of RANK , RANK-L<br>-high osteoclastic activity | special imaging technique, bone mineral density (BMD scan) | -prevention and early detection is much more important than treatment<br>-Exercise<br>•Calcium & vitamin D<br>•Bisphosphonates : reduce osteoclast activity and induce its apoptosis<br>•Denosumab: anti-RANKL; blocking osteoclast activation<br>•Hormones (estrogen): risking DVT and stroke |
| Rickets | In children<br>-characterize by: Decreased mineralization of bone, unmineralized matrix and Increase risk of fractures | Vitamin D deficiency or abnormal metabolism of vitamin D | | |

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|---|---|---|---|---|
| osteomalacia | In adults characterize by: Decreased mineralization of bone, unmineralized matrix and Increase risk of fractures | Vitamin D deficiency or abnormal metabolism of vitamin D | | |

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| paget | Increased badly formed bone structure.<br>•has 3 phases (lytic, mixed, sclerotic)<br>Axial skeleton more affected (prox. Femur)<br>•Most are mild and asymptomatic (pain)<br>•Pain: microfractures or nerve compression<br>•Leontiasis ossea (lion face); platybasia (invagination of skull base); secondary osteoarthritis; fractures; osteosarcoma (1%) | Genetic and environmental factors<br>•gentic:50% of familial Paget and 10% of sporadic have SQSTM1 gene mutations (+RANK & -OPG)<br>•enviromental:Viruses (measles and RNA viruses) | x-ray; high serum Alk Phosphatase, Normal Ca and PO4 | |

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