	Administration	Action	Uses	Adverse Effects	Notes
GH deficiency or Growth Impairment Drugs:					
Recombinant human GH			*idiopathic short statures. *GH deficiency in adults. *Wasting in HIV patients. *Short bowel syndrome.	In children (are relatively rare): 1. Increase in intracranial pressure in children (pseudotumor cerebri). 2. Slipped capital femoral epiphysis 3. Progression of scoliosis 4. Hypothyroidism. 5. Hyperglycemia. In adults (more than children): 1. Peripheral edema, myalgia, arthralgia (handsandwrists). 2. Carpal tunnel syndrome. 3. Increased activity of cytochrome P450 enzymes 4. Proliferative retinopathy. 5. **Contraindicated** in patients with active malignancies 6. Use in critically ill patients increases mortality	
Mecasermin	subcutaneously		children with growth failure who have severe IGF-I deficiency that is not responsive to exogenous GH.	1. Hypoglycemia (this is the most important) 2. Increased intracranial pressure. 3. Adeno tonsillar hypertrophy (idiopathic) 4. Elevation of liver enzymes	-Recombinant (rhIGF-I) that has a short half-life. *Mecasermin rinfabate: -A complex of rhIGF-I and rhIGFBP-3. -Has a longer half-life
GH Excess Drugs:					
Octreotide	subcutaneously	Somatostatin analog	1. Tumors 2. Diarrhea 3. Esophageal varices	1.Hyperglycemia 2.Pain at site of injection. 3.GIT symptoms 4. Vitamin B12 deficiency 5. Biliary sludge and gall stones 5. Sinus bradycardia	has a half life of 80 mins. It's 45 times more potent than somatostatin in inhibiting GH release but only twice as potent in reducing insulin secretion.
Pegvisomant		GH Receptor Antagonist	Acromegaly (It's used if a patient has preexisting bradycardia or GI problems or Vit B12 deficiency, definitely)	1. increased GH levels and possible somatotropes adenoma. 2. Elevation of liver enzymes.	-Structure: PEG derivative of mutant GH
Bromocriptine		D2 agonist			- An add on drug
Prolactin Excess Drugs:					
D2 agonists:			1. Hyperprolactinemia 2. Suppression of physiologic lactation 3. Acromegaly. 4. Parkinsonism.	1. Nausea, vomiting, headache, fatigue and lightheadedness 2. Orthostatic hypotension. 3.. Psychiatric manifestations even at low doses 4. Erythromelalgia 5. Pulmonary infiltrates with chronic high dose therapy. 6. Stroke or coronary thrombosis in postpartum women taking bromocriptine to suppress postpartum lactation.	No apparent increase in spontaneous abortion or congenital malformations if given during pregnancy for macroadenomas.

	Half life	Administration	Site of administration	Class
Bromocriptine (The oldest)	**7 hours**	**Three times daily**	**Orally or vaginally**	**Ergot derivative**
Cabergoline	**65 hours**	**Twice weekly**	**Orally or vaginally**	**Ergot derivative**
Quinaglolide	**20 hours**	**Once daily**	**Orally or vaginally**	**NonErgot**

Hyperparathyroidism Drugs:

Hormonal	Teriparatide	Subcutaneous, daily	Recombinant PTH -It stimulates normal bone formation and reduces incidence of fractures.	1. Osteoporosis that isn't caused by hyperparathyrodism. 2. In sports, as it decreases incidence of fractures and increase bone deposition.		Treatment regimen: Requires adequate intake of calcium and Vit D.
Non-hormonal	Bisphosphonates	Orally, take the drug with a full glass of water and remain upright for 30 minutes given 2 hours before eating	Pyrophosphate analog that increase bone mineral density and reduce the risk of fractures in the hip, spine and other locations	1. Hypercalcemia associated with malignancy. 2. Paget's disease. 3. Osteoporosis.	1. Gastric and esophageal irritation that we the patient had to take the drug with a full glass of water and remain upright for 30 minutes. 2. High doses produce mineralization defect. 3. High doses cause renal deterioration and osteonecrosis of the jaw. 4. Over-suppression of bone turnover may cause subtrochanteric femur fractures in patients on long-term treatment (1-2%) **Contraindications:** 1. Decreased renal function. 2. Esophageal motility disorders. 3. Peptic ulcer disease.	
	Denosumab	Subcutaneously Twice yearly	Monoclonal antibody that binds to RANKL	1. Hormonal dependent cancers 2. To prevent metastasis 3. Postmenopausal osteoporosis	drug appears to be well tolerated but main concerns are: 1. Increased risk of infection because some immune cells express RANKL. 2. Transient hypocalcemia, especially in patients with marked bone loss or compromised calcium regulatory mechanisms, including chronic kidney disease and vitamin D deficiency as they will have limited sources for calcium.	Drawbacks: • immunosuppressive - rare. • expensive unlike Bisphosphonates
	Calcimemetics (Cinacalcet)		Activates the (CaSR) in the parathyroid gland, which blocks PTH secretion.	Secondary hyperparathyrodism in chronic kidney diseases and parathyroid carcinoma.		
	CaSR Antagonist			Hypoparathyrodism induced osteoporosis		
	Plicamycin (Mithramycin)	Pliamycin Is an anticancer drug that was used to reduce osteoclasts and their activity In Osteoporosis but it's cytotoxic and no longer used due the availability of others options for treatment. (They were given 1/10 of the cancer dose).				
	Thiazides	Thiazides are anti-hypertensive diuretic that Increases water and sodium excretion at the proximal tubules and also Increases calcium reabsorption and that' why It can be used for osteoporosis.				
	Strontium Ranelate		highly effective in increasing bone density (highest nonhormonal in effectiveness) and decrease fractures in the spine and hip.		1. Increases the risk of thrombosis by 3-4%. 2. Increases arrhythmias and the possibilities of tachycardia and tachypnea.	Unlike bisphosphonates, denosumab, or teriparatide, this drug increases bone formation markers while inhibiting bone resorption markers.

Secondary Hormonal	Calcitonin			lower serum calcium and phosphate by actions on bone and kidney.	*Paget disease (second or third line.) *Hypercalcemia (not the first line.) *Osteoporosis (not the first line.)		*Because of human calcitonin short half-life, Salmon calcitonin has a longer half- life of 40–50 minutes and is used *It increases bone mass and reduces spine fractures, but is less effective than bisphosphonates and teriparatide.
	SERMS	Tamoxifen		Effect on receptors: *Breast (-) *Bone (+) *Endometrium (+)	It's used for 5 years after the treatment of breast cancer in a patient so we prevent the reoccurrence of breast cancer as it's an antagonist there, it also strengthens bones and increases their density.	Increases the risk of endometrial cancer so 5 years are optimal	
		Raloxifene		Effect on receptors: *Breast (-) *Bone (+) *Endometrium (-)			*Doesn't prevent hot flushes *Drawbacks for its usage: - It is not as effective as estrogen in increasing bone density. - Raloxifene may protect against spine fractures but not those of the hip (bisphosphonates and teriparatide protect against both).

Saba Alfayoumi