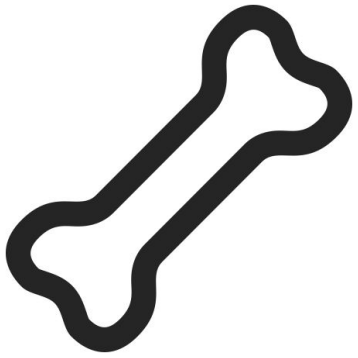


OSTEOPOROSIS

PROF. ALJOHRA ALQUAIZ

BARAAH SAEED ALQARNI

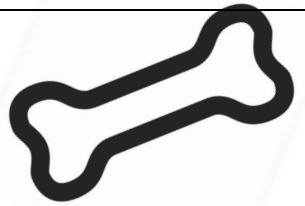
SHIMAA ALDUAIJI

AHLAM SALLAM

SARAH SAUD JULAIDAN

OBJECTIVES

- **Definition of Osteoporosis and Osteomalacia / Rickets**
- **Highlight dangers of Vitamin D deficiency**
- **Prevalence of Osteoporosis in Saudi Arabia and worldwide**
- **Factors leading to Osteoporosis and Vitamin D deficiency**
- **Common fractures with osteoporosis**



OBJECTIVES

- **Vitamin D and Comorbidities**
- **Diagnosis through:**
  - X- Ray
  - Role of DXA and how to interpret Normal, Osteopenia [Grades] and Osteoporosis
  - Biochemistry
- **Management: (Osteopenia and Osteoporosis)**
  - Prevention and advice
  - Role of Vitamin D and Calcium
  - Role of medications, such as Alendronate, … to treat osteoporosis

QUESTIONS

1-patient result of DXA was 1 SD what is the diagnosis :

a. normal.
b. Osteopenia.
c. Osteoporosis .
d. I can not tell .

QUESTIONS

2- all the answers are comorbidities associated with vitamin D deficiency except ?

a. DM
b. HTN
c. hepatitis
d. MS

QUESTIONS

3- fracture risk assessment tool (FRAX) has not been validated for :

A. patients currently or previously treated with pharmacotherapy for osteoporosis.
B. patients on Oral glucocorticoids >5 mg/d of prednisone for >3 months (ever) .
C. postmenopausal women and men ≥50 yr of age.

QUESTIONS

4-According to the Guidelines from the American Association of Clinical Endocrinologists what is the first line treatment?

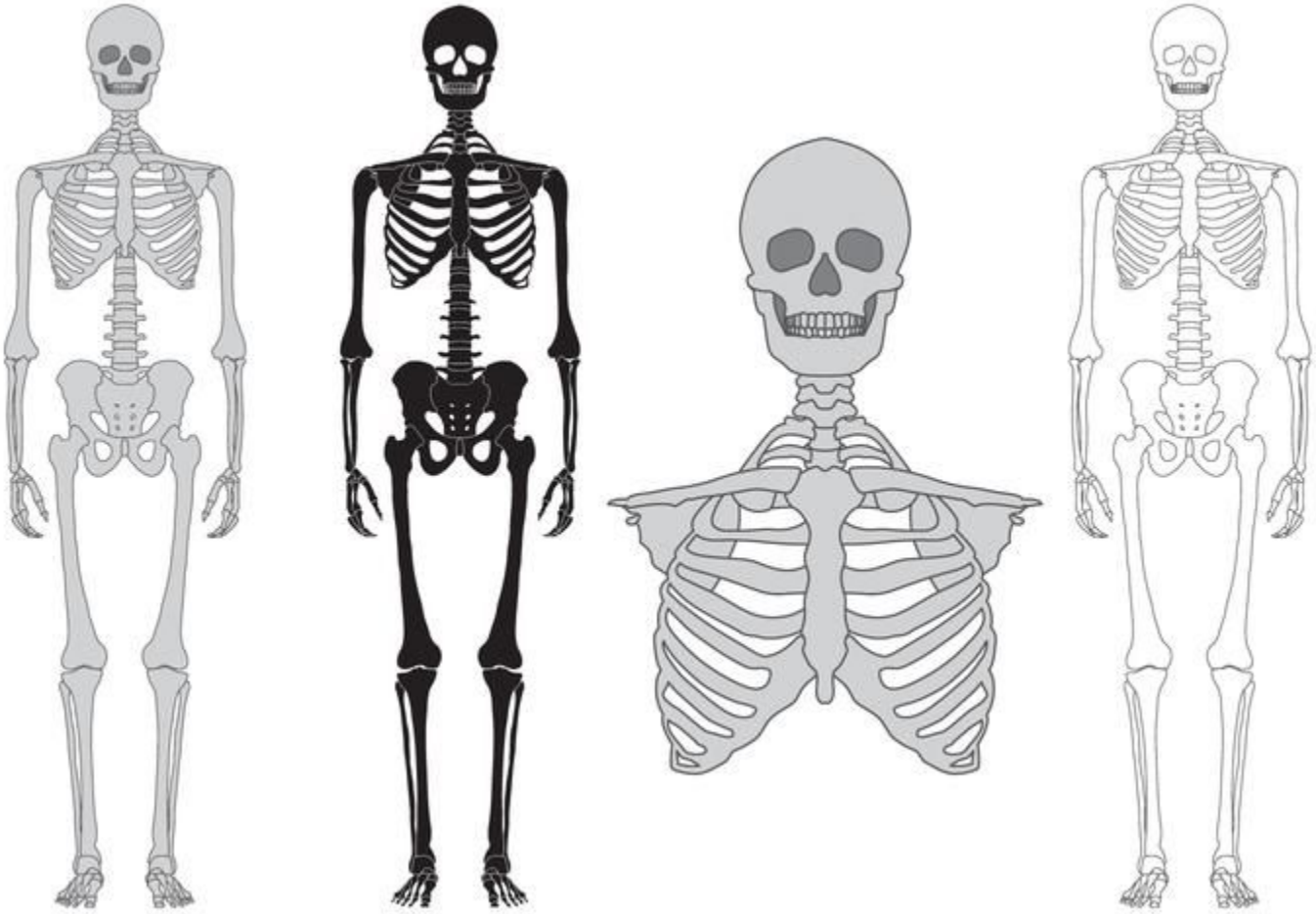
A. Ibandronate
B. Calcitonin
C. Alendronate
D. Raloxifene

QUESTIONS

5-A Deficient mineralization of bone and occurs after the closure of the growth plates is?

A. osteoporosis
B. osteopenia
C. osteomalacia
D. rickets

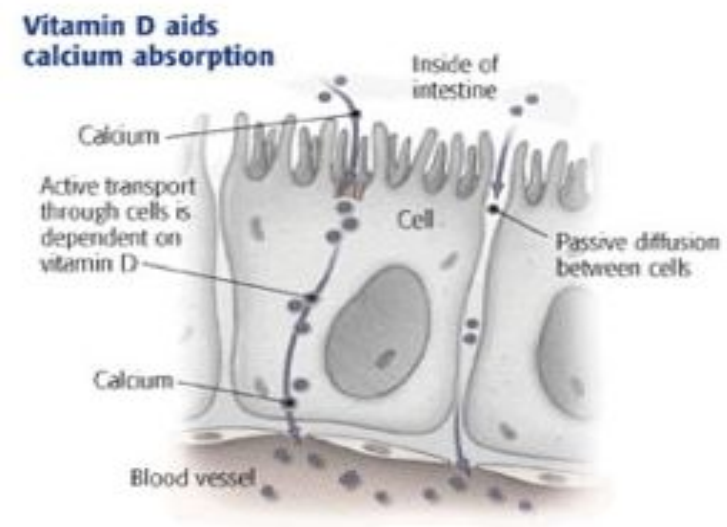
BONES?

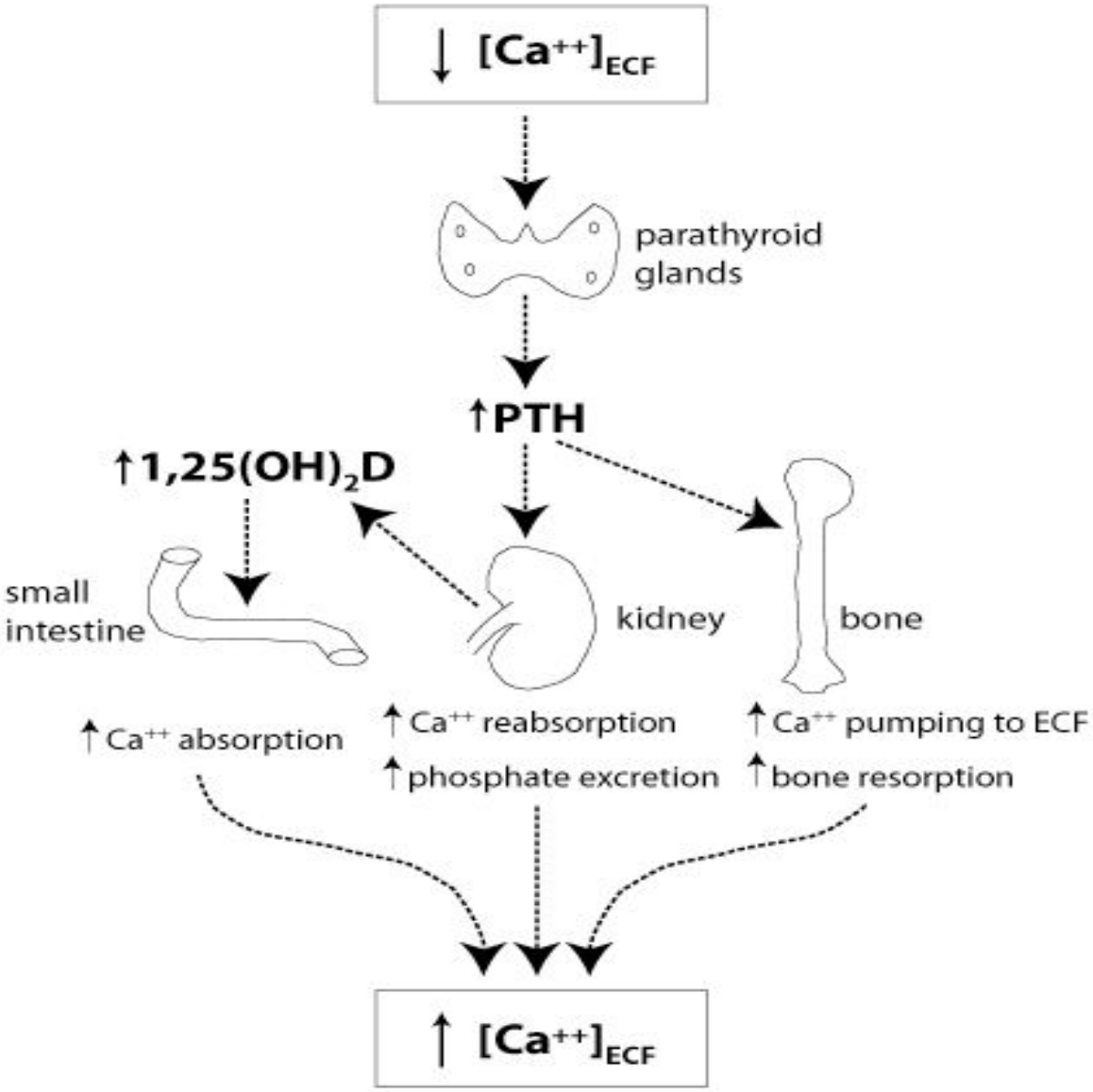


Ca : building block of bones

Vitamin D : Help in absorbing Ca.

They work together to maintain your bones health.



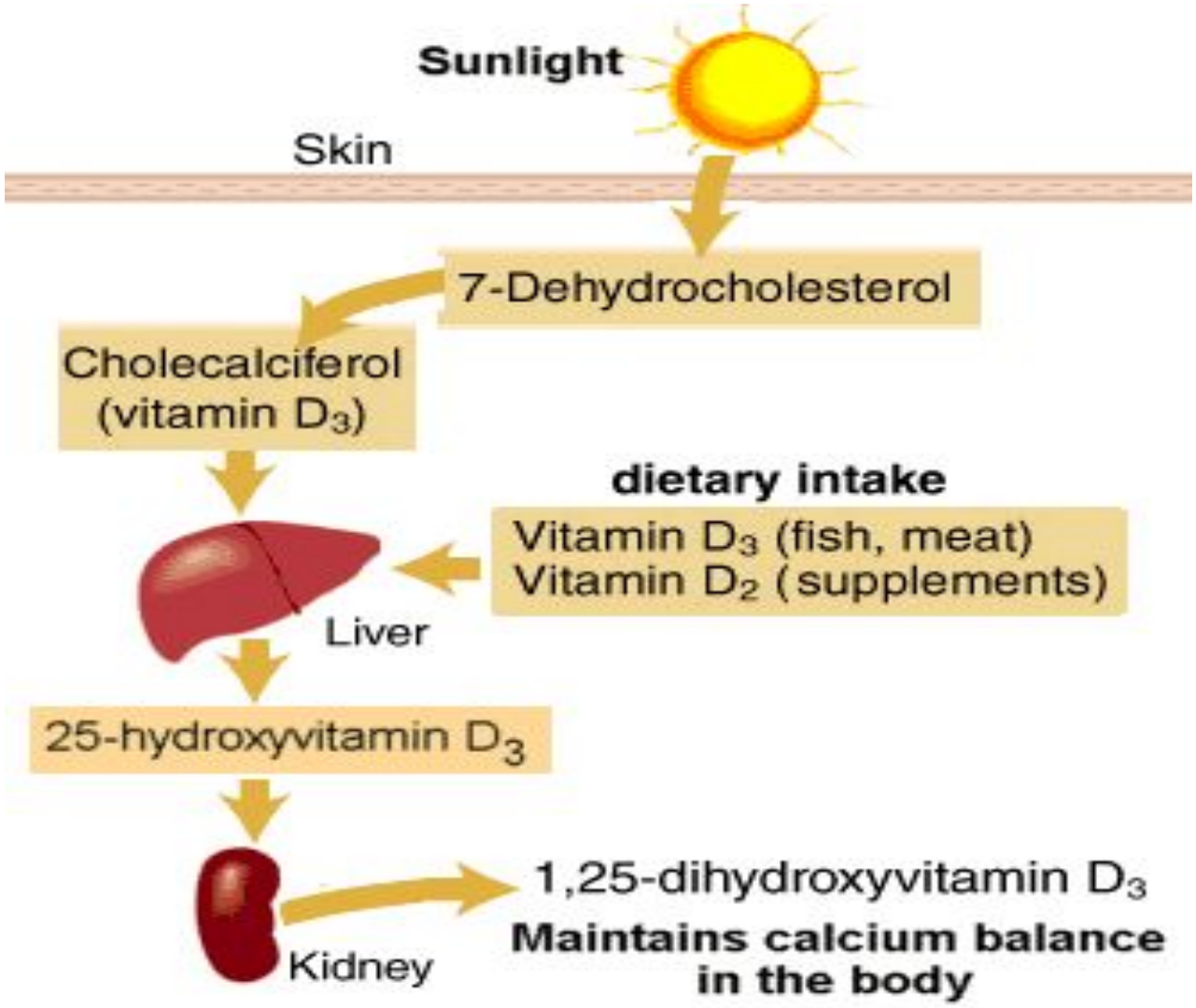

↓ [Ca++]ECF
parathyroid glands
↑PTH
↑1,25(OH)2D
small intestine
kidney
bone
↑ Ca++ absorption
↑ Ca++ reabsorption
↑ phosphate excretion
↑ Ca++ pumping to ECF
↑ bone resorption
↑ [Ca++]ECF

Vitamin D: A group of fat-soluble sterol compounds that includes ergocalciferol (vitamin D2) and cholecalciferol (vitamin D3).

These compounds are ingested from plant and animal sources; cholecalciferol is also formed in skin on exposure to ultraviolet light.

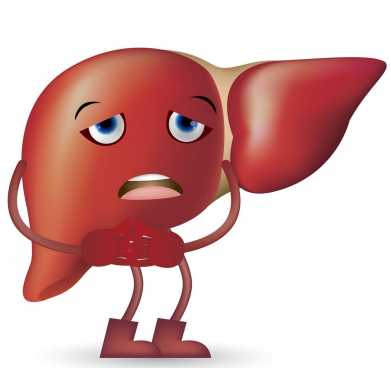
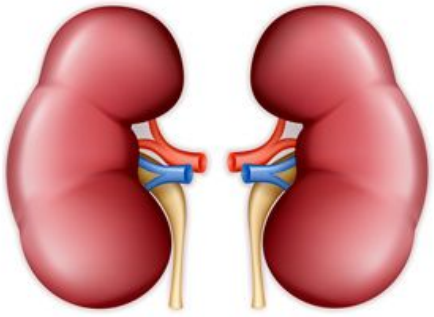
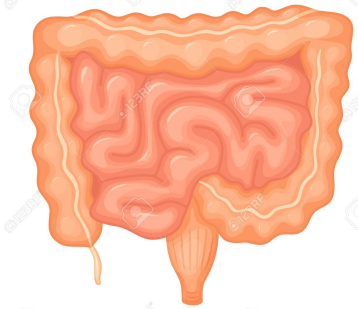
When activated in the liver and then the kidney, vitamin D promotes calcium absorption and bone mass.

A 25(OH)D level of approximately 30 ng/ml (75 nmol/L) is considered by many to be optimal.


Sunlight
Skin
7-Dehydrocholesterol
Cholecalciferol
(vitamin D_3)
dietary intake
Vitamin D_3 (fish, meat)
Vitamin D_2 (supplements)
Liver
25-hydroxyvitamin D_3
Kidney
1,25-dihydroxyvitamin D_3
Maintains calcium balance
in the body

Causes of vitamin D deficiency:

- Inadequate exposure to sunlight.
- Fat malabsorption.
- Chronic liver disease.
- Renal failure.

Prevalence of vitamin D deficiency:

The prevalence of vitamin D deficiency depends upon the definition used (<20 or <30 ng/mL [50 or 75 nmol/L]).

The prevalence of low vitamin D levels may be increasing globally In a review of vitamin D levels in different regions of the world, vitamin D levels below 30ng/mL (75 nmol/L) were prevalent in every region studied, and low vitamin D levels (<10 ng/mL [25 nmol/L]) were more common in South Asia and the Middle East than in other regions .

CONSEQUENCES OF VITAMIN D DEFICIENCY

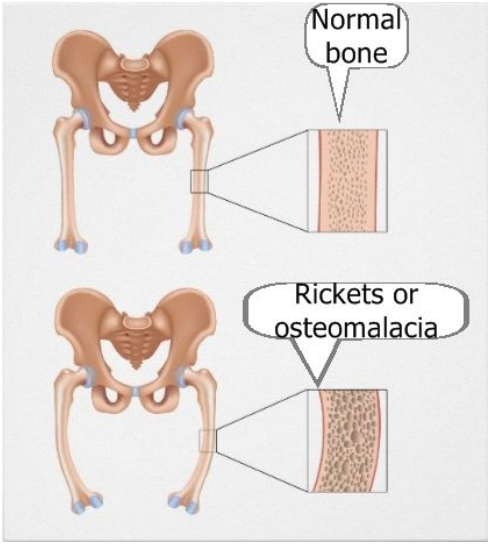
- Rickets
- Osteomalacia
- Osteoporosis

Osteomalacia :

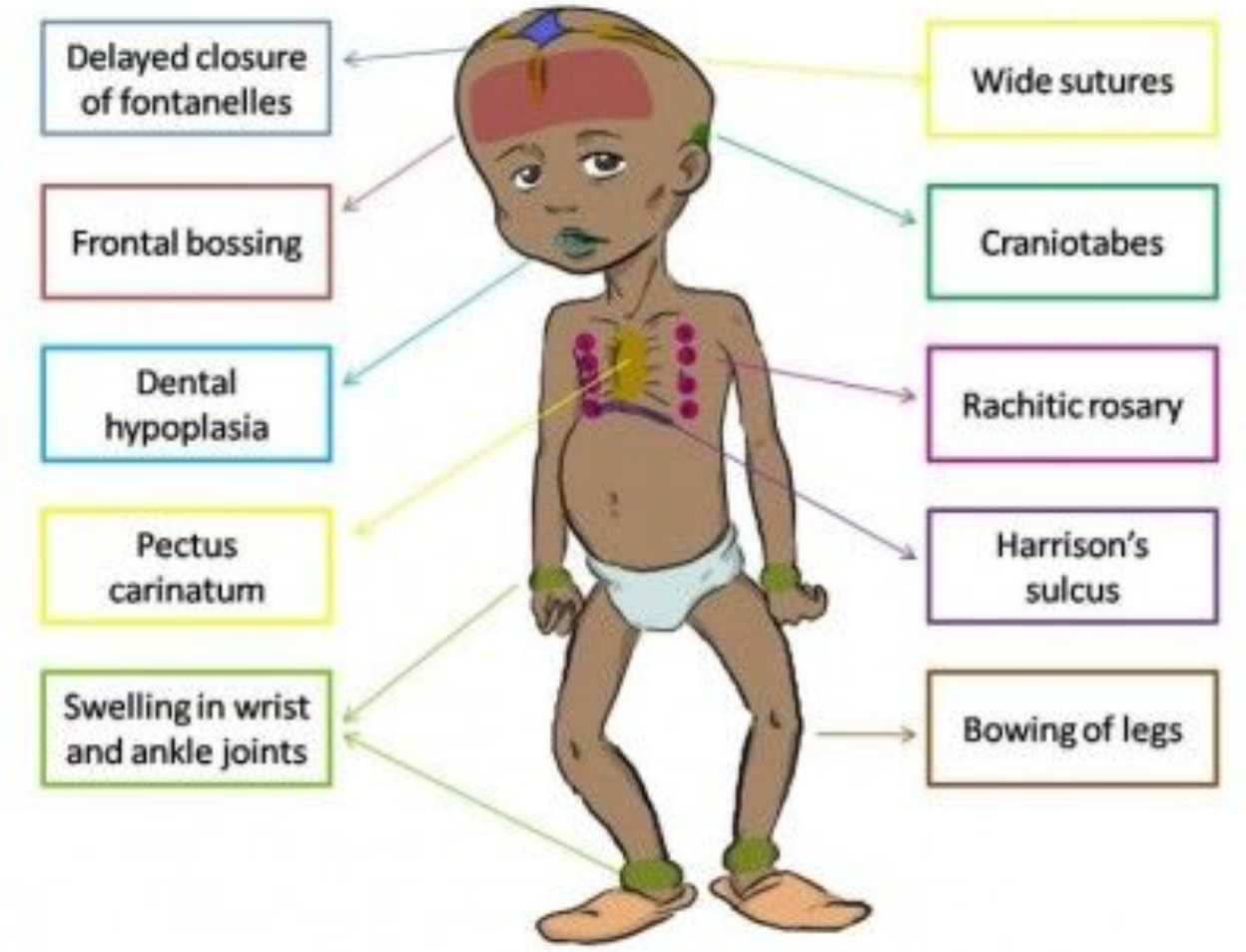
Deficient mineralization of bone and occurs after the closure of the growth plates (in adulthood).

Rickets :

Deficient mineralization of bone and cartilage and occurs before the closure of the growth plates (in childhood) resulting in bow legs.



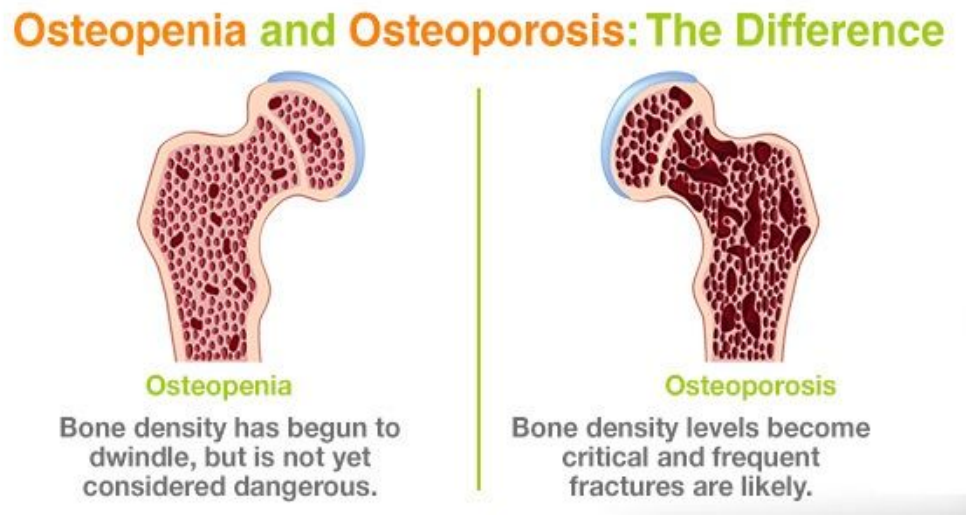
10 important clinical features in Rickets



Osteoporosis :

-Which literally means porous bone, is a disease in which the density and quality of bone are reduced.

-A chronic, progressive disease characterized by low bone mass, microarchitectural deterioration of bone tissue and decreased bone strength, bone fragility and a consequent increase in fracture risk mostly due to hormonal or calcium or vitamin D deficiency despite the normal mineralization.



signs and symptoms

- **Back pain, caused by a fractured or collapsed vertebra**
- **Loss of height over time**
- **A stooped posture**
- **A bone fracture that occurs much more easily than expected**

TYPES:

Primary osteoporosis:

- most common type of osteoporosis.
- Disease of post-menopausal women and elderly men

Secondary osteoporosis:

- same symptoms as primary osteoporosis.

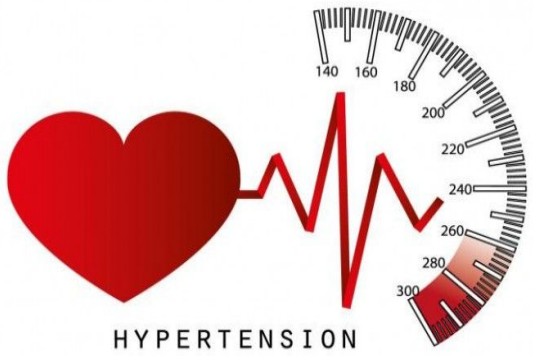
causes: drug-induced or disorders such as hyperthyroidism, renal disease or chronic obstructive pulmonary disease..also steroid use, immobilization, hyperthyroidism, Vit D deficiency.

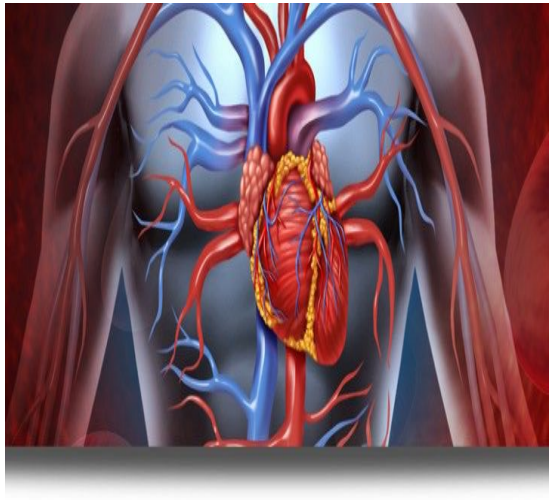
PREVALENCE OF OSTEOPOROSIS

- **Worldwide, it is estimated that 200 million people have osteoporosis.**
- **In the United States in 2010 about 8 million women and one to 2 million men had osteoporosis.**
- **In the developed world, 2% to 8% of males and 9% to 38% of females are affected**
- **There are 8.9 million fractures worldwide per year due to osteoporosis.**
- **USA spends an estimated 19 billion USD annually for related healthcare costs.**

- **In Saudi Arabia, osteoporosis is already a serious issue a report in the eastern region of Saudi Arabia indicates an incidence of postmenopausal osteoporosis (PMO) of 30 percent to 40 percent, with over 60 percent of postmenopausal women already having some degree of osteopenia.**

VITAMIN (D) AND COMORBIDITIES





- Cardiovascular System
- Hypertension
- Obesity
- Diabetes
- Cancer
- MS

DIAGNOSIS THROUGH:

X- RAY
ROLE OF DXA AND HOW TO INTERPRET NORMAL, OSTEOPENIA [GRADES] AND OSTEOPOROSIS
BIOCHEMISTRY

X- RAY

Indications for Imaging

- All women age 70 and older and all men age 80 and older if BMD T-score at the spine, total hip or femoral neck is < -1.0.

-Women age 65 to 69 and men age 70 to 79 if BMD T-score at the spine, total hip or femoral neck is < -1.5

- Postmenopausal women and men age 50 and older with specific risk factors:

- **Low trauma fracture during adulthood (age 50)**
- **Historical height loss of 1.5 inches or more (4 cm)**
- **Prospective height loss of 0.8 inches or more (2 cm)**
- **Recent or ongoing long term glucocorticoid treatment**

DEXA SCAN (DUAL X-RAY ABSORPTIOMETRY)

A bone density test is the only test that can diagnose osteoporosis before a broken bone occurs. This test helps to estimate the density of your bones and your chance of breaking a bone.

BONE MINERAL DENSITY (BMD)

BMD can be also expressed as a T-score and a Z-score, which represent the number of standard deviations (SDs) with respect to a reference average value.

INDICATIONS FOR BMD TESTING

1. **Women age 65 and older and men age 70 and older, regardless of clinical risk factors**
2. **Postmenopausal women, women in the menopausal transition and men age 50 to 69 with clinical risk factors for fracture**
3. **Adults who have a fracture after age 50**
4. **Adults with a condition (e.g., rheumatoid arthritis) or taking a medication (e.g., glucocorticoids in a daily dose ≥ 5 mg prednisone or equivalent for ≥ three months) associated with low bone mass or bone loss**

Definitions of normal bone density, osteopenia, and osteoporosis

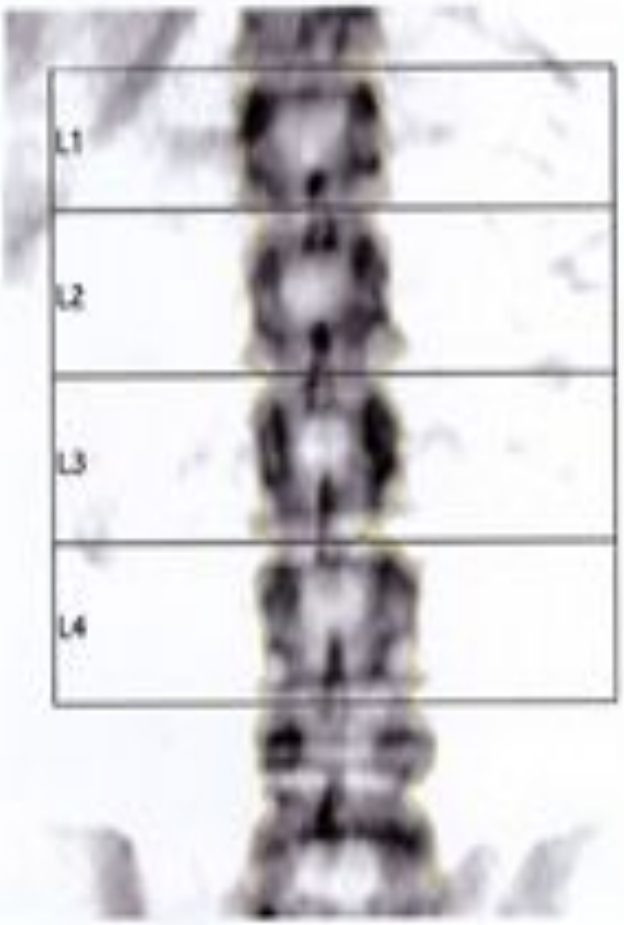
T-score	Bone density
-1.0 and above	-**Normal bone density** -Bone density that is between 0 and 1 SD below the mean is considered to be normal. This may be reported as a T-score of +1 to −1. Treatment is not usually recommended for people with normal bone density, although preventive measures (eg, calcium supplements, weight bearing exercise) are recommended to prevent osteopenia and osteoporosis.
Between −1 and −2.5	**Osteopenia-** -Bone density that is between 1 and 2.5 SD below the mean is called osteopenia. A person with osteopenia does not yet have osteoporosis but is at risk of developing it if not treated.
−2.5 or less	**Osteoporosis-** **-**Osteoporosis is defined as a BMD 2.5 or more SD below the mean of normal young women. The lower the bone density, the greater the risk of fracture.

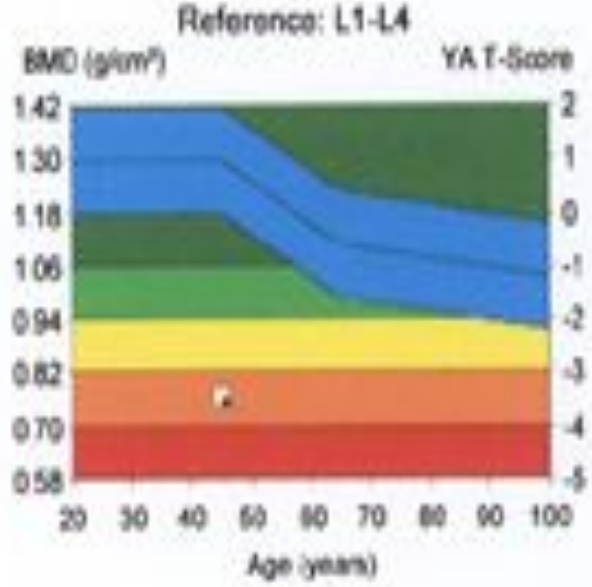
Z SCORE

The Z-score shows the difference between the patient's BMD and the mean BMD of age- and gender-matched controls.

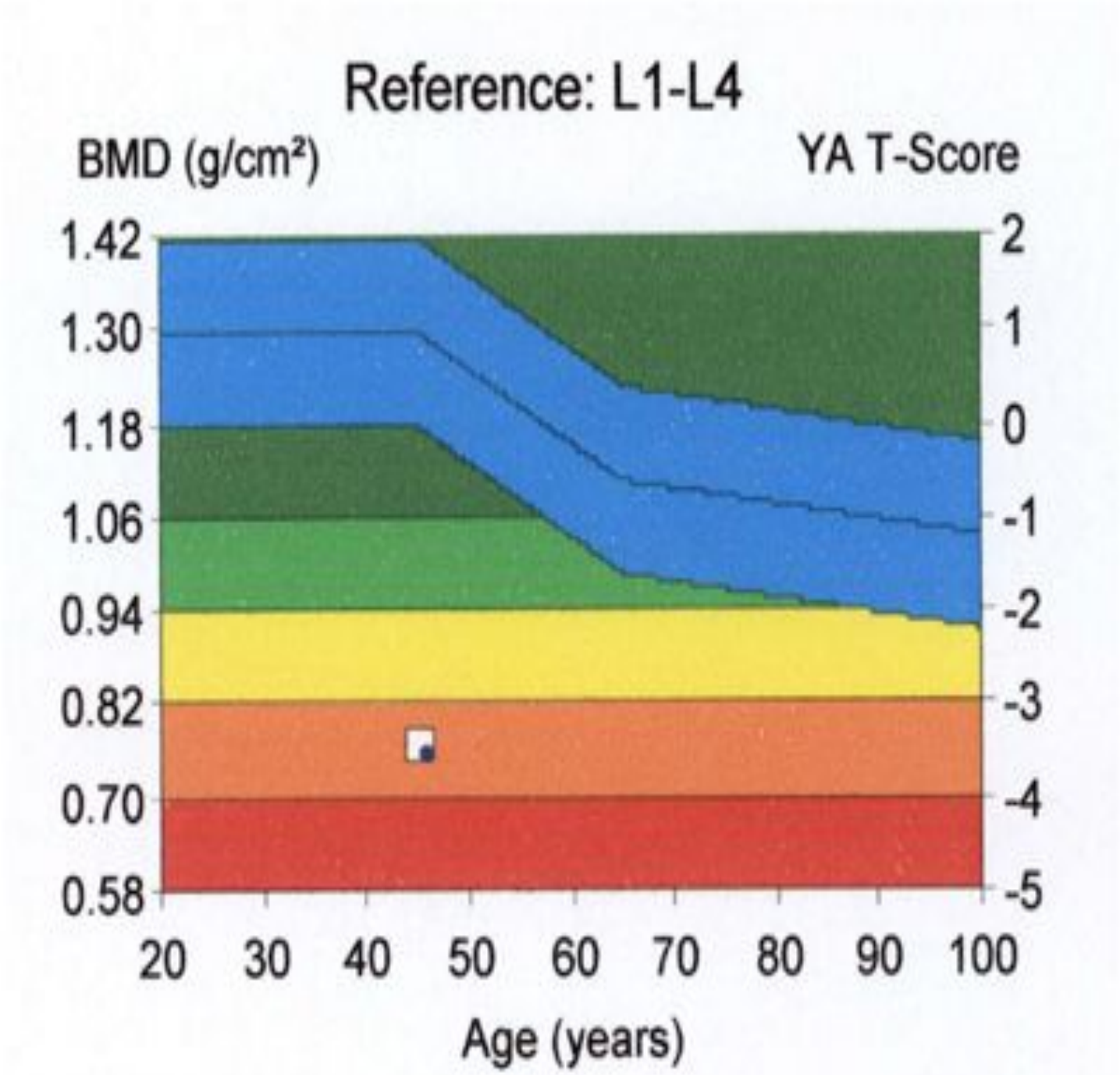
If the Z-score is -2.0 or lower, the result is "below the expected range for age."

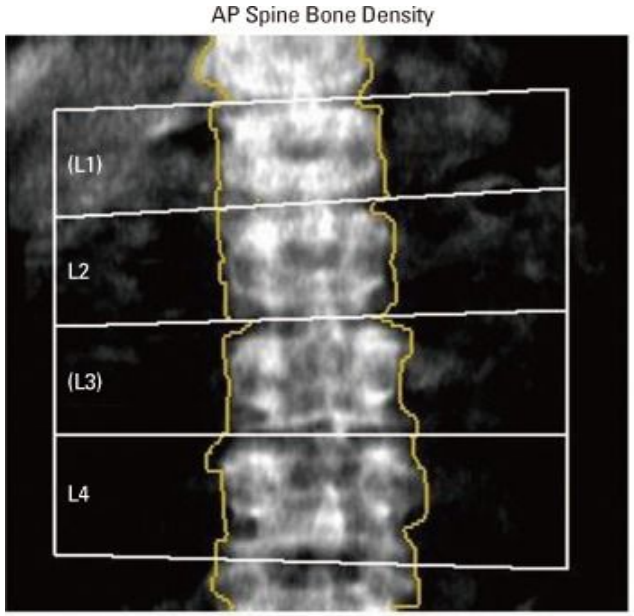
If the Z score is above -2.0, the result is defined as "within the expected range for age."

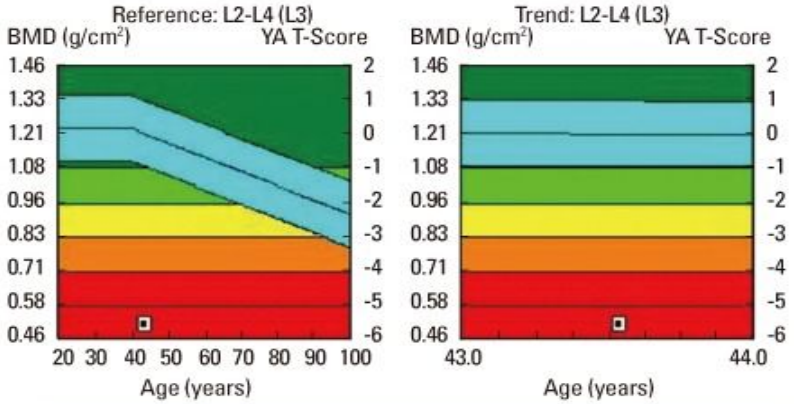




Region	BMD [1] (g/cm²)	Young-Adult [2] T-Score	Age-Matched [3] Z-Score
L1-L4	0.765	-3.5	-4.4

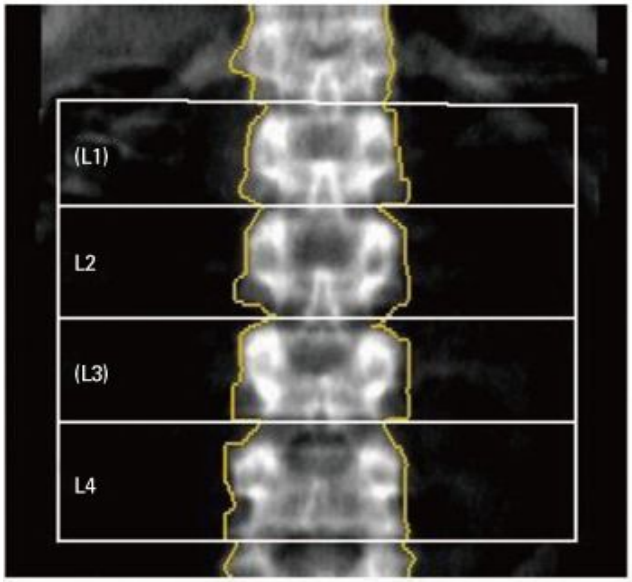

Reference: L1-L4
BMD (g/cm²)
YA T-Score
1.42
1.30
1.18
1.06
0.94
0.82
0.70
0.58
2
1
0
-1
-2
-3
-4
-5
20
30
40
50
60
70
80
90
100
Age (years)

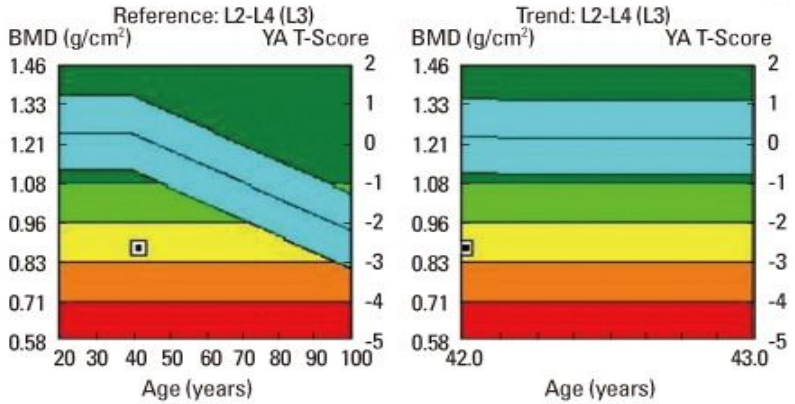




Region	BMD[1] (g/cm²)	Young-Adult[2] (%)	T-BCore	Age-Matched[3] (%)	Z-BCore
L1	0.611	55	-4.2	55	-4.2
L2	0.505	42	-5.7	42	-5.8
L3	0.530	45	-5.4	45	-5.4
L4	0.512	45	-5.4	45	-5.4
L2-L4 (L3)	0.509	44	-5.6	44	-5.6

A





Region	BMD[1] (g/cm²)	Young-Adult[2] (%)	T-BCore	Age-Matched[3] (%)	Z-BCore
L1	0.970	87	-1.2	85	-1.4
L2	0.892	74	-2.5	73	-2.8
L3	0.957	80	-2.0	78	-2.2
L4	0.855	72	-2.7	71	-2.9
L2-L4 (L3)	0.872	73	-2.7	72	-2.9

B

IS HAVING A LOW BONE DENSITY OR OSTEOPENIA MEANS YOU WILL GET OSTEOPOROSIS?

NO, IT IS NOT

It means you have a greater chance of developing osteoporosis if you lose bone in the future.

Consider the Following Diagnostic Studies for Secondary Causes of Osteoporosis

- **Blood or Serum**
- **Complete blood count (CBC)**
- **Chemistry levels (Calcium, renal function, phosphorus and magnesium)**
- **Liver function tests**
- **Thyroid-stimulating hormone (TSH) +/- free T4**
- **25(OH)D**
- **Parathyroid hormone (PTH)**
- **Total testosterone and gonadotropin in younger men**
- **Biochemical marker tests, such as NTX and CTX**

CASE 1

Sarah a fifty-five-year-old women presented to your clinic asking for BMD. On taking history there was no risk factors for osteoporosis. Her weight was 63.5 kg and her height was 165.1 cm.Would you do DXA for this lady?

BMD was done for her T- scores were -2.5

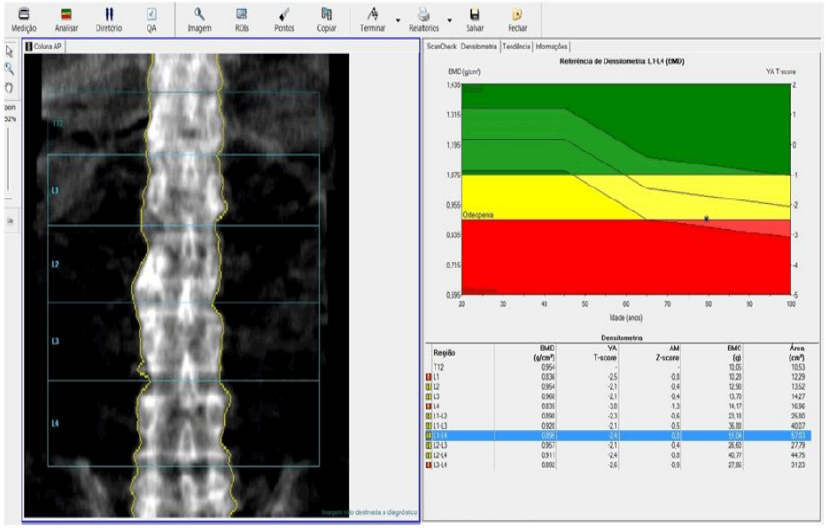


Figure 1: First DXA scan performed in 2014. This is a 79 years old male patient. The BMD at L1-L4 was 0.895 g/cm2 and T-score was -2.4 (calculated with a female reference database).

CASE 2

68 years old women, otherwise healthy with no medical problems seeking your advice regarding bone health. She smokes water pipe regularly and she isn't taking any treatment. PE negative, BMI 24 kg/m2 Her BMD T-scores -2 How treated with osteoporosis therapy, the treatment have no effect to the patient, <u>what do you think the cause</u>?

- **When we do more investigation?**
  - Parathyroid hormone 100 ng/L
  - Vitamin D 50 nmol/L
- **What you will do ?**

PTH Normal: **10-65** ng/L.
Vitamin D Normal: (75 nmol/L) or greater

FACTOR LEADING TO OSTEOPOROSIS:

Uncontrollable Risk Factors

- Being over age 50.
- Being female.
- Menopause.
- Family history of osteoporosis.
- Low body weight/being small and thin.
- Broken bones or height loss.

Controllable Risk Factors

- Lack of calcium and/or vitamin.
- Inactive lifestyle or lack of exercise.
- Smoking or tobacco use.
- Alcohol abuse.
- Eating disorders,such as anorexia nervosa.
- Hormonal imbalances. Examples include low estrogen or testosterone, and high thyroid levels.
- Long-term use of certain medicines

COMMON FRACTURE IN OSTEOPOROSIS

Table 1: Estimated number of osteoporotic fractures by site, in men and women aged 50 years or more in 2000, by WHO region

	Expected number of fractures by site (thousands)				All osteoporotic fractures	
WHO region	Hip	Spine	Proximal humerus	Forearm	No.	%
Africa	8	12	6	16	75	0.8
Americas	311	214	111	248	1 406	15.7
South-East Asia	221	253	121	306	1 562	17.4
Europe	620	490	250	574	3 119	34.8
Eastern Mediterranean	35	43	21	52	261	2.9
Western Pacific[a]	432	405	197	464	2 536	28.6
Total	1 672	1 416	706	1 660	8 959	100

FRACTURE RISK ASSESSMENT (FRAX)

***FRAX :** was developed to calculate the 10-year probability of a hip fracture and the 10-year probability of a major osteoporotic fracture (defined as clinical vertebral, hip, forearm or proximal humerus fracture).

*cost-effective, from the societal perspective, to treat with pharmacologic agents.

NATIONAL OSTEOPOROSIS FOUNDATION (NOF) conclusion that it is cost-effective to treat individuals :

- Vertebral fracture (clinical or asymptomatic) or hip fracture
- Hip DXA (femoral neck or total hip) or lumbar spine T-score ≤ -2.5
- Low bone mass (osteopenia) 10-year probability of a hip fracture ≥3% or 10-year probability of any major osteoporosis-related fracture ≥20%

TABLE 3: Risk Factors Included in the WHO Fracture Risk Assessment Model

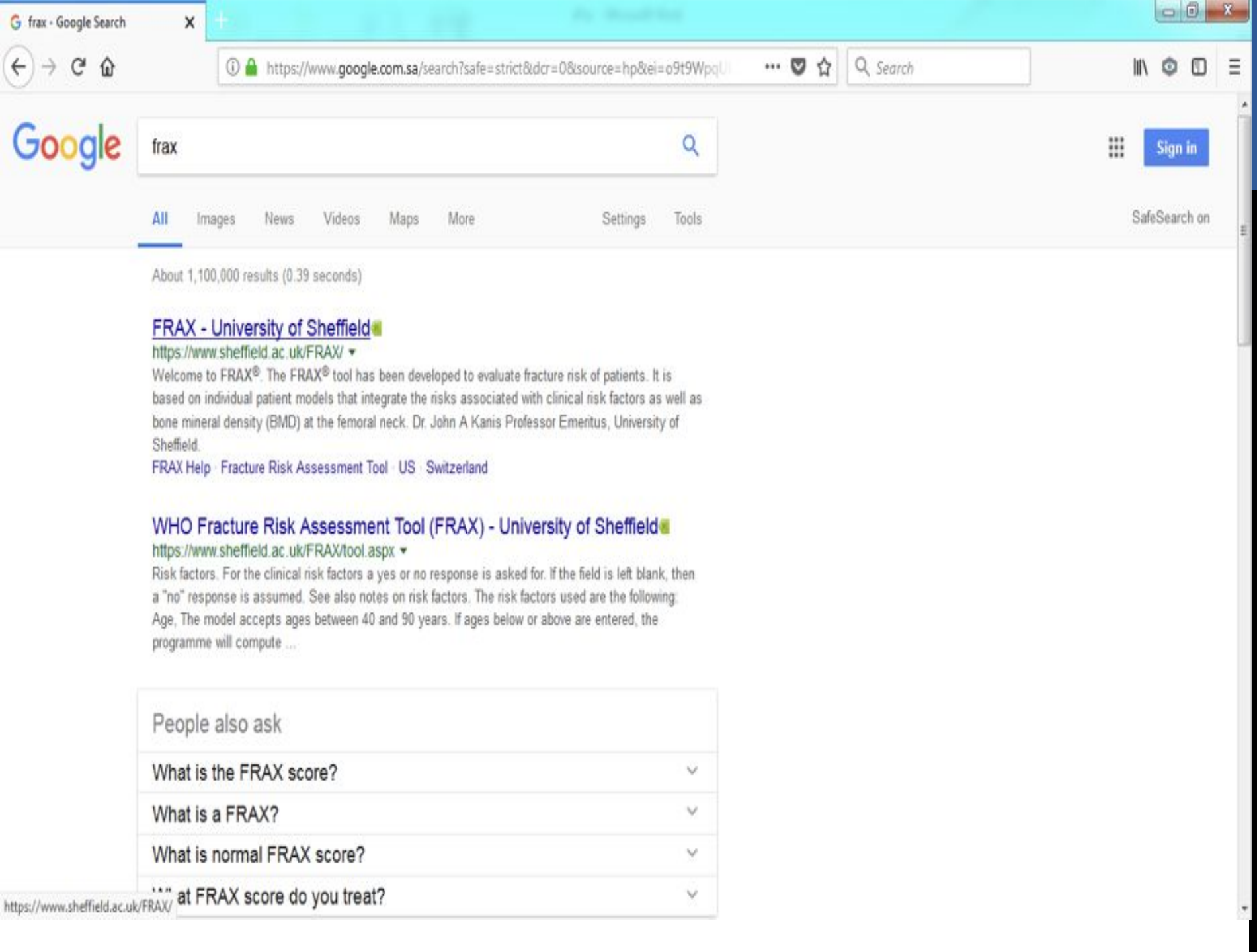
Clinical Risk Factors Included in the FRAX Tool	
Current age	Rheumatoid arthritis
Gender	Secondary causes of osteoporosis: Type1 (insulin dependent) diabetes, osteogenesis imperfecta in adults, untreated long-standing hyperthyroidism, hypogonadism or premature menopause (<45 years), chronic malnutrition or malabsorption and chronic liver disease
A prior osteoporotic fracture (including clinical and asymptomatic vertebral fractures)	Parental history of hip fracture
Femoral neck BMD	Current smoking
Low body mass index (BMI, kg/m^2)	Alcohol intake (3 or more drinks/d)
Oral glucocorticoids $\geq$5 mg/d of prednisone for >3 months (ever)	

From WHO Technical Report [11]

CLINICIAN'S GUIDE TO PREVENTION AND TREATMENT OF OSTEOPOROSIS:

- **FRAX → is intended for postmenopausal women and men age 50 and older; it is not intended for use in younger adults or children.**
- **FRAX → tool has not been validated in patients currently or previously treated with pharmacotherapy for osteoporosis → In such patients, clinical judgment must be exercised in interpreting Patients who have been off osteoporosis medications for one to two years or more might be considered untreated.**
- **FRAX→ can be calculated with either femoral neck BMD or total hip BMD, but, when available, femoral neck BMD is preferred. The use of BMD from non-hip sites is not recommended.**

***use of glucocorticoids, have been considered indications for treatment by themselves.**
The American College of Rheumatology in this circumstance, treatment should be considered even if the ten-year fracture probability calculated with FRAX is <3% for a hip fracture or <20% for a major osteoporosis- related fracture.


frax - Google Search
https://www.google.com.sa/search?safe=strict&dcr=0&source=hp&ei=o9t9W
Search
Google
frax
Sign in
All
Images
News
Videos
Maps
More
Settings
Tools
SafeSearch on
About 1,100,000 results (0.39 seconds)
FRAX - University of Sheffield
https://www.sheffield.ac.uk/FRAX/
Welcome to FRAX®. The FRAX® tool has been developed to evaluate fracture risk of patients. It is based on individual patient models that integrate the risks associated with clinical risk factors as well as bone mineral density (BMD) at the femoral neck. Dr. John A Kanis Professor Emeritus, University of Sheffield.
FRAX Help · Fracture Risk Assessment Tool · US · Switzerland
WHO Fracture Risk Assessment Tool (FRAX) - University of Sheffield
https://www.sheffield.ac.uk/FRAX/tool.aspx
Risk factors. For the clinical risk factors a yes or no response is asked for. If the field is left blank, then a "no" response is assumed. See also notes on risk factors. The risk factors used are the following: Age, The model accepts ages between 40 and 90 years. If ages below or above are entered, the programme will compute ...
People also ask
What is the FRAX score?
What is a FRAX?
What is normal FRAX score?
at FRAX score do you treat?
https://www.sheffield.ac.uk/FRAX/

University of Sheffield (GB) | https://www.sheffield.ac.uk/FRAX/

Search

FRAX® Fracture Risk Assessment Tool

Home | Calculation Tool | Paper Charts | FAQ | References | English

- Asia
- Europe
- Middle East & Africa
- North America
- Latin America
- Oceania

- Abu Dhabi
- Iran
- Jordan
- Kuwait
- Lebanon
- Morocco
- Palestine
- Tunisia

Welcome to FRA

The FRAX® tool has been deve
patient models that integrate
mineral density (BMD) at the fe

Dr. John A Kanis
Professor Emeritus,
University of Sheffield

The FRAX® models have beer
based cohorts from Europe, N
their most sophisticated form,
and is available on this site. Se
on the number of risk facto
downloaded for office use.

The FRAX® algorithms give the 10-year probability of fracture. The output is a 10-year probability of hip fracture and the 10-year probability of a major osteoporotic fracture (clinical spine, forearm, hip or shoulder fracture).

FRAX Desktop Application

Click here to view the applications available

Web Version 4.0

View Release Notes

Links

www.iofbonehealth.org

www.nof.org

www.jpof.or.jp

www.esceo.org

FRAX available as iPhone App

Clarification

X/tool.aspx?country=67

FIRST CASE:

Sarah a fifty-five-year-old women presented to your clinic asking for BMD . On taking history there was no risk factors for osteoporosis. Her weight was 63.5 kg and her height was 165.1 cm. BMD was done for her T- scores were -2.5 Her FRAX showed the following:

Should she be treated or not?

University of Sheffield (GB) | https://www.sheffield.ac.uk/FRAX/tool.a 90% Search

FRAX® Fracture Risk Assessment Tool

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Calculation Tool

Please answer the questions below to calculate the ten year probability of fracture with BMD.

Country: Abu Dhabi Name/ID: About the risk factors

Questionnaire:

1. Age (between 40 and 90 years) or Date of Birth
   Age: 55 Date of Birth: Y: M: D:
2. Sex — Male / Female
3. Weight (kg) 63.5
4. Height (cm) 165.1
5. Previous Fracture — No / Yes
6. Parent Fractured Hip — No / Yes
7. Current Smoking — No / Yes
8. Glucocorticoids — No / Yes
9. Rheumatoid arthritis — No / Yes
10. Secondary osteoporosis — No / Yes
11. Alcohol 3 or more units/day — No / Yes
12. Femoral neck BMD (g/cm²)

Select BMD -2.5

Clear | Calculate

BMI: 23.3
The ten year probability of fracture (%)

without BMD

Major osteoporotic	2.4
Hip Fracture	0.3

Print tool and information

Weight Conversion

Pounds → kg Convert

Height Conversion

Inches → cm Convert

00004313
Individuals with fracture risk assessed since 1st June 2011

SECOND CASE:

68 years old women, otherwise healthy with no medical problems seeking your advice regarding bone health. She smokes water pipe regularly and she isn't taking any treatment PE negative, BMI 24 kg/m2 and routine blood work normal Her BMD T-scores -2

How would you proceed with this lady?

PREVENTION

- Diet
- sun exposure
- reduce Alcohol
- Weight bearing Exercise
- smoking cessation
- Medications: Glucocorticoid , Heparin and antiepileptic drugs.
- Intake of cola is associated with low BMD in women
- high coffee consumption was associated with a small reduction in bone density that did not translate into an increased risk of fracture.

PROPHYLACTIC BISPHOSPHONATE THERAPY

Who is treated with ‡ 5 mg/day of prednisolone for three months or more and their T-score is less than -1.0 .

even if the FRAX is <3% for a hip fracture or <20% for a major osteoporosis related fracture.

GLUCOCORTICOID- INDUCED OSTEOPOROSIS

Guidelines from the American College of Rheumatology :

1. **Categorization of patients by fracture risk.**
2. **initiation of treatment with agents including alendronate, risedronate, zoledronic acid, and teriparatide.**
3. **the identification and treatment of potentially treatable underlying causes of osteoporosis such as hyperparathyroidism and hyperthyroidism.**
4. **Surgical care in selected patients may include vertebroplasty and kyphoplasty.**

TREATMENT

Guidelines from the American Association of Clinical Endocrinologists:

1. **First-line agents: Alendronate, risedronate, zoledronic acid, denosumab.**
2. **Second-line agent: Ibandronate.**
3. **Second- or third-line agent: Raloxifene.**
4. **Last-line agent: Calcitonin.**
5. **Treatment for patients with very high fracture risk or in whom bisphosphonate therapy has failed: teriparatide.**

TREATMENT

- **Diet:**

protein, calories, calcium and vitamin D, minerals.

- **Alcohol:**

increase risk of fracture, falling, poor nutrition.

- **Weight bearing Exercise :**

It improves the bone mass ,maintain bone density, increased muscle strength and decrease the risk of fall.

It is recommended to exercise for at least 30 minutes, three times per week.

- **Smoking:**

speeds bone loss.

- **Avoid falling to avoid fracture.**

TREATMENT

treartment	Vitamin d	Calcium
When it considered law	• 20 ng/mL.	• calcium level : 8.2 mg/dL (2.05 mmol/L) • ionized calcium : 4.4 mg/dL (1.1 mmol/L)
Administration	•men >70 and post menopausal: 800 international units daily. • •premenopausal women or younger men with osteoporosis: 600 international units daily.	• Premenopausal and men: • 1000 mg of calcium per day. • Postmenopausal : • 1200 mg per day.
Adverse effects	• levels greater than 150 ng/mL is toxic. • fatigue, nausea, vomiting, and weakness, hypercalcemia.	• dose should not exceed 2000 mg. • constipation, anorexia, nausea, vomiting ‹confusion‹ kidney stones, cardiovascular disease and stroke.

VITAMIN D

High prevalence of vitamin D deficiency in patients with osteoporosis, especially those with hip fractures, even in patients taking osteoporosis medications.

VITAMIN D

Vitamin D deficiency may be treated with 50,000 IU of vitamin D2 or vitamin D3 once a week.

The equivalent daily dose (7,000 iu vitamin d2 or vitamin d3) for 8-12 weeks to achieve a 25(oh)d blood level of approximately 30 ng/ml.

This regimen should be followed by maintenance therapy of 1,500–2,000 iu/d.

Or whatever dose is needed to maintain the target blood level.

SOURCES OF VITAMIN D AND CA

Table 15.8 Approximate vitamin D content of common foods*

Food	Serving	Vitamin D (micrograms)
Margarine	10g (1/2oz)	0.8
Eggs	1 size 3	1.1
Cheese	60g (2oz)	0.2
Milk	0.15L (1/4 pint)	0.05
Butter	10g (1/2oz)	0.1
Fortified cereals	30g (1oz)	0.5
Herring	100g (3 1/2oz)	16.5
Mackerel	100g (3 1/2oz)	8
Sardines	100g (3 1/2oz)	7.5
Tinned tuna	100g (3 1/2oz)	4
Tinned salmon	100g (3 1/2oz)	12.5
Kipper	100g (3 1/2oz)	13.5

*Recommended daily intakes: birth to 50y—5 micrograms; 50 to 70y—10 micrograms; >70y—15 micrograms

Table 15.9 Approximate calcium content of common foods**

Food	Serving	Calcium (mg)
Whole milk	0.2L (1/3 pint)	220
Semi-skimmed milk	0.2L (1/3 pint)	230
Hard cheese	30g (1oz)	190
Cottage cheese	115g (4oz)	80
Low-fat yoghurt	150g (5oz)	225
Sardines (including bones)	60g (2oz)	310
Brown or white bread	3 large slices	100
Wholemeal bread	3 large slices	55
Baked beans	115g (4oz)	60
Boiled cabbage	115g (4oz)	40

**Recommended daily intakes: birth to 6mo—210mg; 7mo to 1y—270mg; 1 to 3y—500mg; 4 to 8y—800mg; 9 to 18y—1300mg; 19 to 50y—1,000mg; >50y—1,200mg.

SOURCES OF MAGNESIUM COPPER ZINC

Researchers have found that osteoporotic females had low levels of minerals

zinc

Copper

magnesium

TREATMENT

Proteins:

- important in osteoporotic fracture.
- Low protein supplementation intake (< 0.8 g/kg body weight/day).
- tends to increase muscle strength, and reduces medical complications, rehabilitation and hospital stay.

HORMONAL THERAPY

Treatment	Estrogen-progestin therapy	selective estrogen receptor modulators (Raloxifene)	Testosterone
Action	• protection against postmenopausal bone loss. • reduced hip and vertebral fracture risk by 34 percent.	• protection against postmenopausal bone loss. • reduced hip and vertebral fracture risk by 34 percent. • decrease the risk of breast cancer.	• preventing future severe bone loss and associated skeletal morbidity especially those with Klinefelter syndrome.
Side effects	increases the risk : • coronary artery disease. • breast cancer. • stroke. • blood clots.	• Increase the risk of uterine cancer. • Hot flashes. • increase risk of blood clots.	deep vein thrombosis.

estrogen is not recommended for the treatment or prevention of osteoporosis in postmenopausal women

TREATMENT

Bisphosphonates:

- slow the breakdown and removal of bone
- taken first thing in the morning on an empty stomach and the Patients should remain upright for at least 30 minutes after taking any oral bisphosphonate to minimize the risk of reflux.
- Side effect: avascular necrosis or osteonecrosis in cases of invasive dental work
- Should not be taken in cases of:

1. esophagus disorders.
2. severe kidney disease.
3. Pregnancy.

BISPHOSPHONATES

- **Atypical femoral fracture with Prolonged bisphosphonate treatment >5y (over suppression of bone turnover and bone fragility).**

- **Acute sub-trochanteric or mid-shaft femoral fractures are most common.**

- **To prevent this a 'drug holiday' of 1–5y has been proposed for low-risk.**

BISPHOSPHONATES

Treatment	Alendronate	Risedronate
action	• reduces vertebral and hip fractures. • decreases the loss of height associated with vertebral fractures.	• reduces the risk of both vertebral and hip fractures.
Administration	• pill taken once per day.10 mg once per week. 70 mg	• once per day. 5mg • once per week.35 mg • or once per month.

BISPHOSPHONATES

Treatment	Zoledronic	Ibandronate
action	• improve bone density. • decrease the risk of spine and hip fractures. • decrease the risk recurrent fractures in high-risk patients with recent hip fracture.	• reduces the risk of bone loss and spine fractures. • there is no proof that it reduces the risk of hip fractures.
Administration	• A once-yearly, intravenous dose for 15 minute. • Hydration and pre-treated with acetaminophen. • To decrease the risk of arthralgia, headache, myalgia, fever.	• pills taken once per day or once per month. • injection into a vein once every three months.

Treatment

Treatment	Denosumab	Parathyroid hormone	Calcitonin
action	• Monoclonal antibody that decrease osteoclast. • activation and decrease bone resorption. • used when: 1. bisphosphonates are Contraindicated (CKD). 2. not tolerated. 3. severe osteoporosis.	• stimulate bone formation. • severe osteoporosis for two years. • builds spine bone density and reduce spine fracture risk. • Third-line in postmenopausal. • second-line for men with past history of fragility fracture if other treatments are not tolerated/ineffective.	• helps to regulate calcium concentrations in the body. • used as analgesic due to its pain relieving effect in cases of acute onset of pain.
Administration	• injection under the skin once every six months. • Does is 60mg	• daily injection. • Maximum duration of use is 18 months	• Nasal administration is preferred due to ease of use and because the injections tend to cause more nausea and flushing.
Side effects	skin infections (cellulitis) ,eczema and mild transient lowering of blood calcium levels.	• not recommended for premenopausal. • Expensive. • arthralgia, pain, and rhinitis.	rhinitis, epistaxis and allergic reactions in nasal administration , inflammation at injection site, flushing of face ,neck, hands and feet.

TREATMENT

- **Strontium ranelate No longer recommended due to:**

1. **concerns regarding skin/hypersensitivity reactions.**
2. **increase risk of venous thromboembolism and CVD.**

- **May still benefit:**

- **In high risk of fracture, who have no history of CVD and are intolerant of other medication.**
-
- **Patients taking strontium ranelate should be:**

- **regularly screened to exclude CVD.**

TREATMENT

- **Osteoporosis in men Currently only bisphosphonates and teriparatide are recommended for treatment of osteoporosis in men.**

- **No pharmacologic therapy should be considered indefinite in duration. All non-bisphosphonate medications produce temporary effects that wane upon discontinuation. If these treatments are stopped, benefits rapidly disappear.**

QUESTIONS

1-patient result of DXA was 1 SD what is the diagnosis :

a. normal.
b. Osteopenia.
c. Osteoporosis .
d. I can not tell .

QUESTIONS

2- all the answers are comorbidities associated with vitamin D deficiency except ?

a. DM
b. HTN
c. hepatitis
d. MS

QUESTIONS

3- fracture risk assessment tool (FRAX) has not been validated for :

A. patients currently or previously treated with pharmacotherapy for osteoporosis.
B. patients on Oral glucocorticoids >5 mg/d of prednisone for >3 months (ever) .
C. postmenopausal women and men ≥50 yr of age.

QUESTIONS

4-According to the Guidelines from the American Association of Clinical Endocrinologists what is the first line treatment?

A. Ibandronate
B. Calcitonin
C. Alendronate
D. Raloxifene

QUESTIONS

5-A Deficient mineralization of bone and occurs after the closure of the growth plates (in adulthood) is?

A. osteoporosis
B. osteopenia
C. osteomalacia
D. rickets

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ROLE OF CALCIUM

mainly calcium in the body is found in the bones and teeth.

Taking calcium reduces bone loss and decreases the risk of fracturing the vertebrae.

Consuming calcium during childhood can lead to higher bone mass in adulthood. This increase in bone density can reduce the risk of fractures later in life.

Calcium and vitamin D supplements may help prevent tooth loss in older adults.

ROLE OF VITAMIN D

Vitamin D decreases bone loss and lowers the risk of fracture, especially in older men and women. Along with calcium, vitamin D also helps to prevent and treat osteoporosis.

To absorb calcium efficiently, an adequate amount of vitamin D must be present.

VITAMIN DEFICIENCY DURING PREGNANCY

increased risk for preeclampsia.

severe maternal vitamin D deficiency can lead to rickets in the developing fetus.

less severe vitamin D deficiencies in utero may affect immune function and bone development from birth through adulthood

A correlation has been found between obesity and vitamin D levels

Low birth weight has been associated with low maternal vitamin D levels.

increased risk for multiple sclerosis in the developing fetus.

Asthma may also be a sequela of low levels of vitamin D in pregnant women.

Autism is another condition with a higher incidence in this population.