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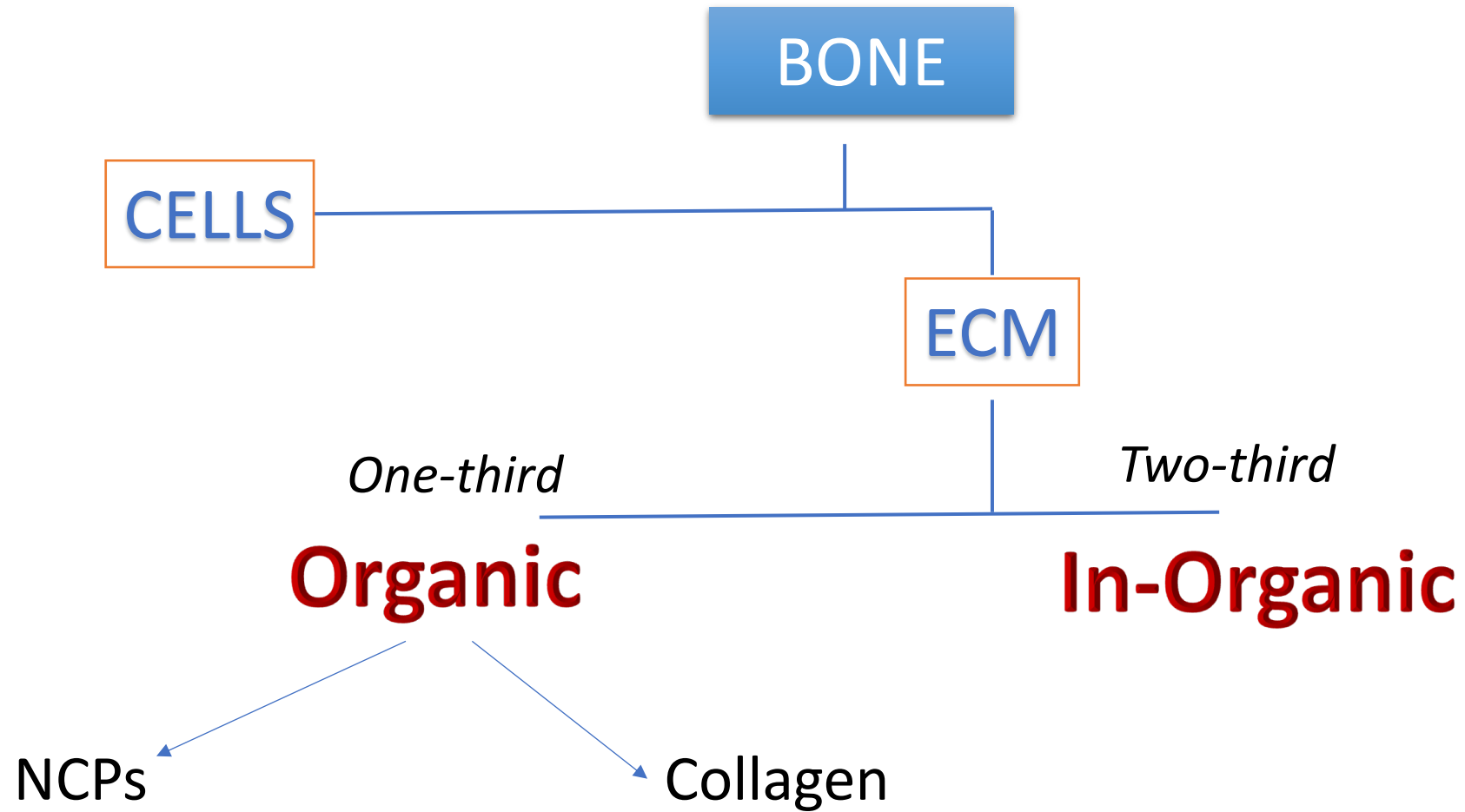
*Consultant at CGHS Wing and CIO, Safdarjung  
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# OSTEOPOROSIS

A 48 years female comes with a report showing deficient Vitamin D levels.  
Likely diagnosis:

- A. Osteoporosis
- B. Osteomalacia
- C. Can be Both
- D. Information is insufficient to diagnose either



OSTEOPOROSIS

OSTEOMALACIA

Normal

O.Matrix

Mineral

Osteoporosis

O.Matrix

Mineral

Normal

O.Matrix

Mineral

Osteomalacia

O.Matrix

Mineral

# CLASSIFICATION

**Generalized**

**Primary**

Type I (Post menopausal): approximately 2–3% of the total bone is lost per year, mainly trabecular bone

Type II (Senile): Bone loss is from both cortical and trabecular bone and is approximately 0.5–1%/ year

**Secondary**

DRUGS

DISEASES

HORMONES

**Localized**

# Q. Critical steroid dose that leads to Osteoporosis

- A. > 5 mg Prednisolone/ day for 6 weeks
- B. > 7.5 mg Prednisolone/ day for 2 months
- C. > 5 mg Prednisolone/ day for 6 weeks
- D. > 7.5 mg Prednisolone/ day for 3 months



# RISK FACTORS



**Modifiable**

Diet and Nutrition

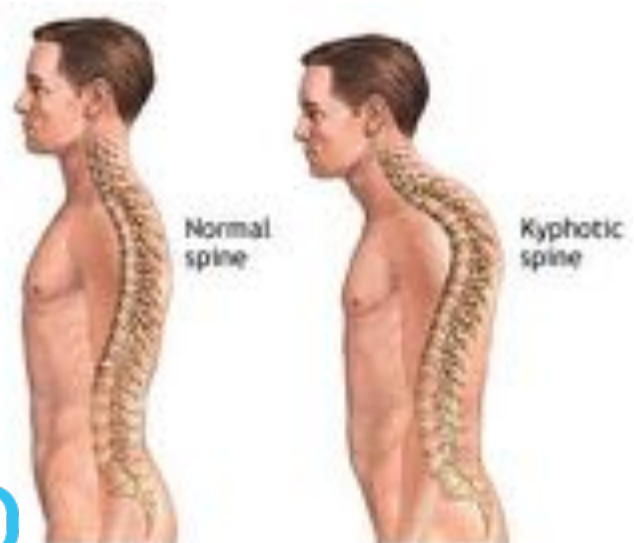
Activity level

Estrogen status

BMI



**Non-modifiable**



True for Osteoporotic fractures is all **EXCEPT**

- A. Stress fractures
- B. Insufficiency fractures
- C. Fragility fractures
- D. Pathological fractures

**Table 2.13:** The relation between bone quality and bone load in producing various types of fractures

<i>Type</i>	<i>Bone quality</i>	<i>Load</i>
Traumatic	Normal	Single large
Fatigue (stress)	Normal	Repetitive
Insufficiency (stress)	Abnormal (metabolic)	Minimal
Pathological	Abnormal (tumor)	Minimal

# DIAGNOSIS

Blood parameters

X rays

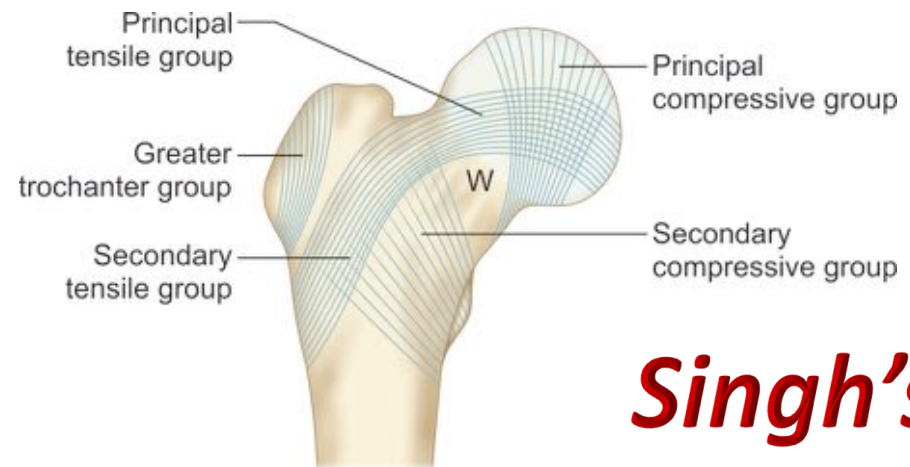
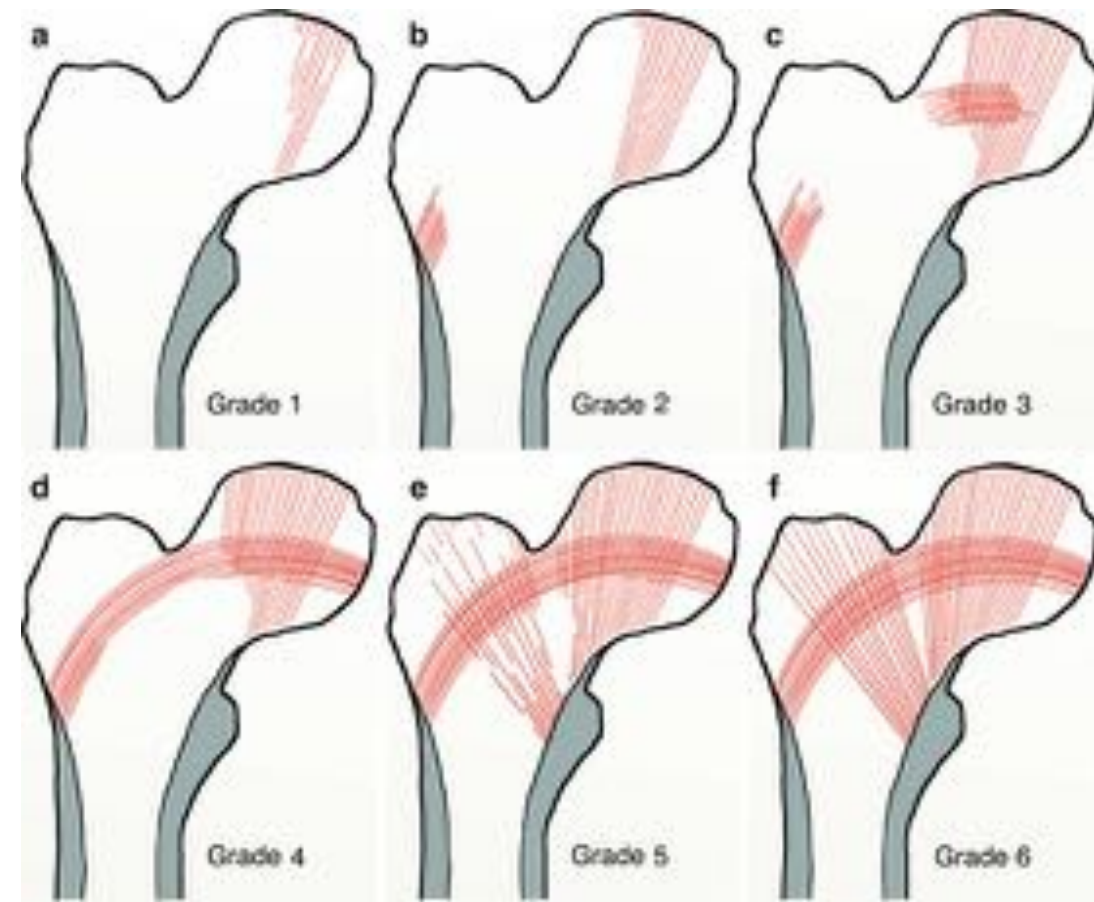
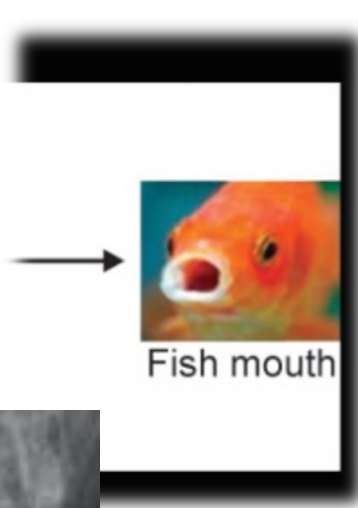
*Spine*

*Hip and Pelvis*

Quantitative CT scan

Single Photon Absorptiometry

**DEXA Scan**



***Singh's Index***



# DEXA SCAN

*Indication*

WHO

Which of the following parameter can be reliably evaluated from DEXA Scan *apart from BMD*?

- A. Bone mass
- B. Fat content in body
- C. Body mass index
- D. Detect a stress fracture



# TREATMENT

**Table 15.3:** Calcium preparations

<i>Salt</i>	<i>Elemental calcium (%)</i>	<i>Solubility</i>
Calcium carbonate	40	Insoluble
Tricalcium phosphate	39	Insoluble
Calcium citrate	21	Soluble
Calcium lactate	18	Soluble
Calcium gluconate	9	Soluble

**Table 15.4:** Recommended calcium intake

<i>Age</i>	<i>Elemental calcium (mg/day)</i>
Infants	400-600
1-10 years	800-1,200
Adolescents	1,200-1,500
Adults: men	1,200-1,500
Women 19-24 years	1,200-1,500
25-50 years	1,000
>50 years	1,500
Pregnant and lactating	1,500



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ORTHO

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VITAMIN D

CALCIUM

Q. 62 years post menopausal female presented with questions regarding her new diagnosis of Osteoporosis. She has a fall 6 months back when she was bed ridden for 2 months and even put on warfarin. She has recovered but was diagnosed with osteoporosis then. Her DEXA has T score value of -2.6. Her past history includes Achlasia cardia for which she gets dilatations as needed. She is a known diabetic but well controlled. Her RFT, LFT, HbA1c, Vit D are WNL. Drug you will prefer to manage her osteoporosis?

- A. Zoledronic acid
- B. Alendronate
- C. Raloxifene
- D. Calcitonin
- E. HRT

# Long term Bisphosphonate use

AFFs were first described by Odvina and colleagues in 2005

The American Society for Bone and Mineral Research (ASBMR) task force **gave definition** in 2010 (Shane et al.)

Revised in 2013: *To distinguish from ordinary osteoporotic femur fractures*

## Major and Minor Criteria

### Rx

Weight bearing should be limited for patients with incomplete fractures

Management includes intramedullary nailing for complete fractures + Alternative medications + Teriparatide, an anabolic agent, for all cases

## Atypical Femoral Fractures



# AFFs

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To satisfy the case definition of AFF, the fracture must be located along the femoral diaphysis from just distal to the lesser trochanter to just proximal to the supracondylar flare.

In addition, at least four of five Major Features must be present. None of the Minor Features is required but have sometimes been associated with these fractures.

## Major features<sup>a</sup>

The fracture is associated with minimal or no trauma, as in a fall from a standing height or less

The fracture line originates at the lateral cortex and is substantially transverse in its orientation, although it may become oblique as it progresses medially across the femur

Complete fractures extend through both cortices and may be associated with a medial spike; incomplete fractures involve only the lateral cortex

The fracture is noncomminuted or minimally comminuted

Localized periosteal or endosteal thickening of the lateral cortex is present at the fracture site ("beaking" or "flaring")

## Minor features

Generalized increase in cortical thickness of the femoral diaphyses

Unilateral or bilateral prodromal symptoms such as dull or aching pain in the groin or thigh

Bilateral incomplete or complete femoral diaphysis fractures

Delayed fracture healing

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# Looser's Zones



## SERMs

Bone; Lipid- Agonist

Breast; Uterus- Antagonist

## Anabolic steroids

## Strontium

## HRT

Estrogen: 0.625 mg/ day

Progesterone: 5 mg/ day

# DOC in Post menopausal osteoporosis?

HRT

A. Bisphosphonates

B. Strontium

C. HRT

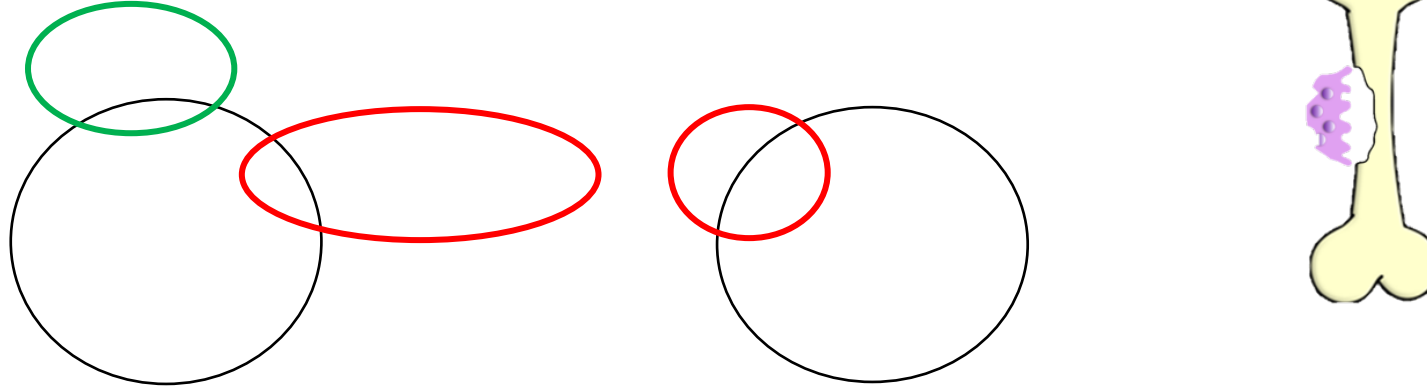
D. Teriperatide

MC side effects: Breast tenderness and headaches

Other Side effects: endometrial cancer, thromboembolic phenomena and risk of getting cholecystitis, increased risk of breast cancer (doubtful, not proven).

Adding progestin seemingly decreases this risk. Women receiving combination therapy can get withdrawal bleeding.

# BISPHOSPHONATE RESISTANCE

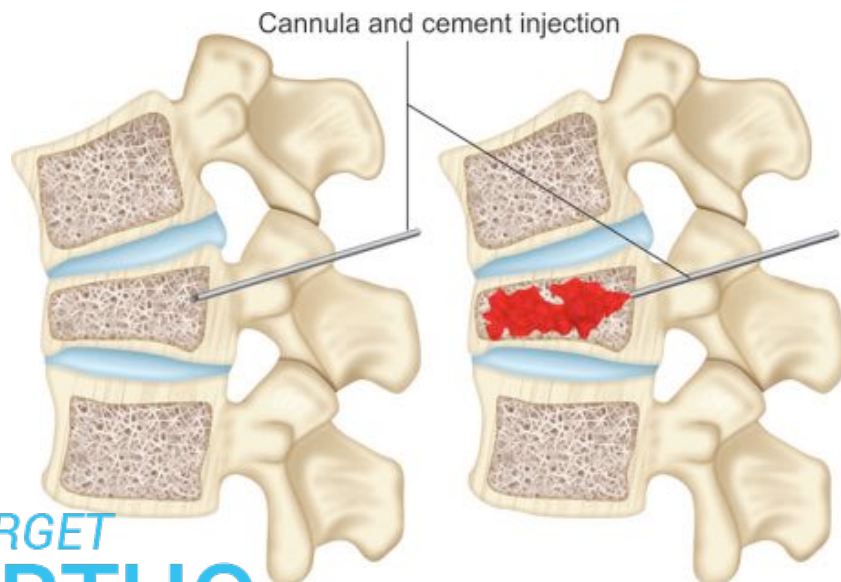




Q. Which of the following drugs is not associated with **Osteonecrosis of Jaw** as a complication?

- A. Zolendronic Acid
- B. Denozumab
- C. Bevacizumab
- D. None of the above

# SURGICAL TREATMENT



## Original Indications

TOP UPs

VERTEBROPLASTY

DENOZUMAB

### ***Some newer drugs IN LINE for osteoporosis:***

—*Cathepsin-K inhibitors*: Odanacatib is a once weekly oral treatment for osteoporosis. It inhibits cathepsin-K, a cysteine protease expressed in osteoclasts which degrades type 1 collagen (not yet approved by FDA, phase 3 trial completed)

—*Monoclonal antibody to sclerostin (Romosozumab)*: Sclerostin, an osteocyte-secreted protein, negatively regulates osteoblasts and inhibits bone formation through the LRP5/Wnt signaling pathway. Romosozumab has shown promising results in phase 2 trials.

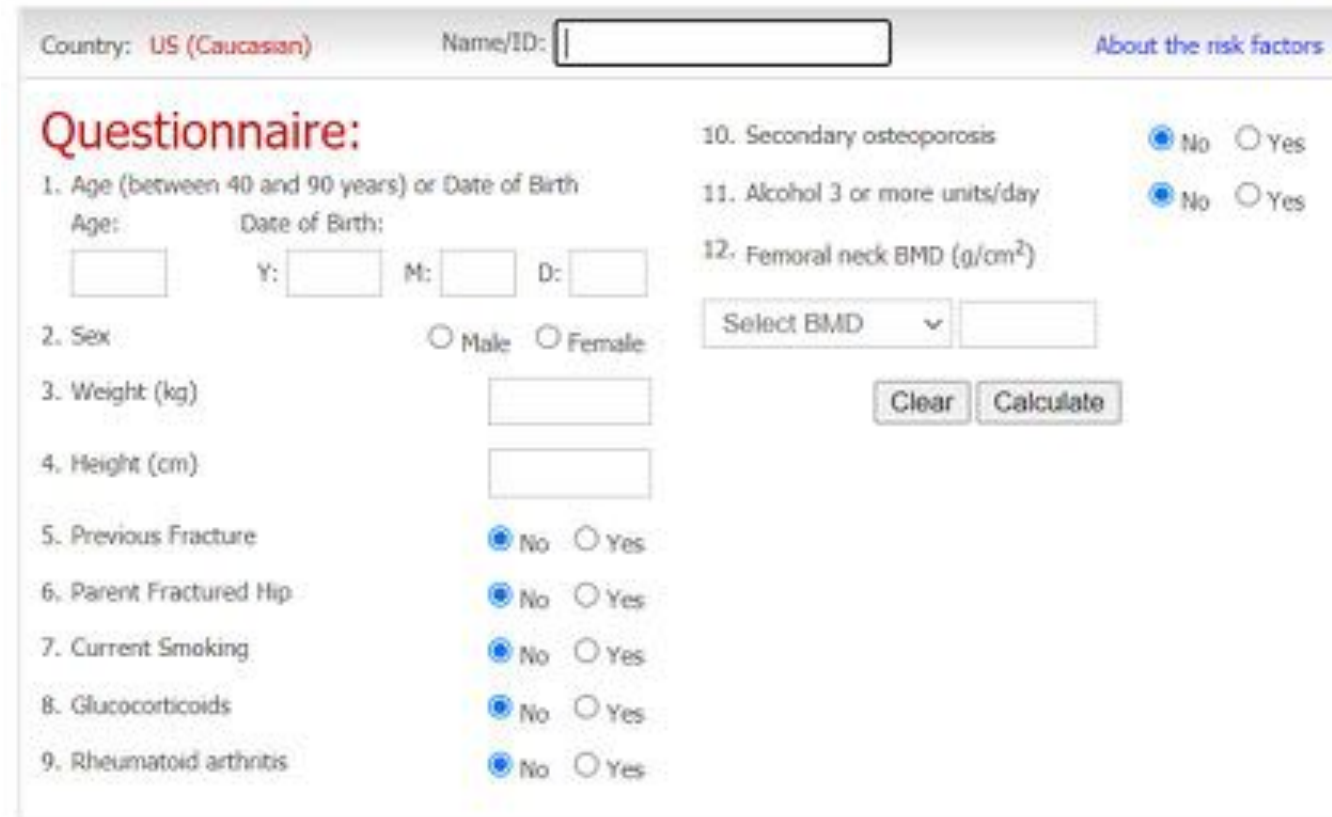
# FRAX TOOL Fracture Risk Assessment Tool

The University of Sheffield launched the FRAX tool in 2008

It was developed from studying population-based cohorts from Europe, North America, Asia and Australia

It's an openly available fracture risk calculator used to estimate the probability of an individual sustaining an osteoporotic fracture over next 10 years.

It is based on assessment of some important clinical risk factors and BMD (T-score) at femoral neck.



The screenshot shows the FRAX tool questionnaire interface. At the top, there are fields for 'Country: US (Caucasian)' and 'Name/ID:'. A link 'About the risk factors' is in the top right. The main section is titled 'Questionnaire:'. It contains 12 numbered questions. Questions 1-9 are on the left, and questions 10-12 are on the right. Each question has radio buttons for 'No' (selected) and 'Yes'. Question 12 includes a 'Select BMD' dropdown menu and a text input field. At the bottom right, there are 'Clear' and 'Calculate' buttons.

Country: US (Caucasian) Name/ID:

About the risk factors

**Questionnaire:**

1. Age (between 40 and 90 years) or Date of Birth  
Age:  Date of Birth: Y:  M:  D:

2. Sex ☐ Male ☐ Female

3. Weight (kg)

4. Height (cm)

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/cm<sup>2</sup>)  
Select BMD

Clear Calculate

Is fracture healing in osteoporosis normal?





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