OSTEOPOROSIS

Definition

- The loss of bone below the density for mechanical support, lead to increase in bone fragility.

- Can result in devastating physical, psychosocial and consequences, but is overlooked and undertreated

Epidemiology

- Afflict 75 million persons in the united state,europe, and japan and result in more than 1.3 million fracture annauly in the united state

- More common in white and asian and in women than men

Sign and symptom

- Osteoporosis generally does not become clinically apparent until a fracture occurs.
- Two thirds of vertebral fractures are painless, although patients may complain of the resulting stooped posture and loss of height. Typical findings in patients with painful vertebral fractures may include the following:

1) The episode of acute pain may follow a fall or minor trauma.
2) Pain is localized to a specific, identifiable, vertebral level in the midthoracic to lower thoracic or upper lumbar spine.

3)The pain is described variably as sharp, nagging, or dull; movement may exacerbate pain; in some cases, pain radiates to the abdomen.

4) Pain is often accompanied by paravertebral muscle spasms exacerbated by activity and decreased by lying supine.

5) Patients often remain motionless in bed because of fear of exacerbating the pain.

6) Acute pain usually resolves after 4-6 weeks; in the setting of multiple fractures with severe kyphosis, the pain may become chronic.

On physical examination

patients with vertebral compression fractures may demonstrate the following:

- With acute vertebral fractures, point tenderness over the involved vertebra
- Thoracic kyphosis with an exaggerated cervical lordosis (dowager hump)
- Subsequent loss of lumbar lordosis
- A decrease in height of 2-3 cm after each vertebral compression fracture and progressive kyphosis

- Patients who have sustained a hip fracture may experience the following:
- Pain in the groin, posterior buttock, anterior thigh, medial thigh, and/or medial knee during weight-bearing or attempted weight-bearing of the involved extremity
- Diminished hip range of motion (ROM), particularly internal rotation and flexion
- External rotation of the involved hip while in the resting position

Causes of accelerated bone loss during perimenopausal period and seventh decade in men

Reduced bone mass, is the result of various combination of:

- 1.hormone deficiency
- 2.inadequate nutrition
- 3.decreased physical activity
- 4.comorbidity
- 5..effects of drugs used to treat varios medical condition

risk factors

Lifestyle and patient-centric factors that contribute independently to risk of osteoporosis

- 1.Age
- 2.previous fragility fracture
- 3.maternal history of hip fracture
- 4.current smoking
- 5.alcohol intake>=3 drink/day
- 6.falls
- 7.sedentary lifestyle
- 8.major depression

Chronic factors

- 1.anorexia[BMI<=19]
- 2.Collagen metabolism disorders[EDS,MS,OI]
- 3.malabsorption[celiac, CF,Crohn disease, gastric bybass
- 4.Endocrine disease[acromegaly,type1,2DM,HT,HPT,Hypogonadism, hypercortisonism,multiple myeloma,CRD,CLD,COPD,RA,AS,HIV,Immobility]
- 5.Drugs(aromatase inhibitors,Chemotherapy,heparin,glucocorticoid, Depoprovera,PPI,SSRI,AED,Thiazolinediones,tamoxifen]
- 6.Vitamin deficiency
- 7.Hemophilia
- 8.systemic mastocytosis
- 9.Thalassemia
- 10.porphoria

Prevention

- 1.Nutrition
- 2.life style

a.eliminate tobacco use and excessive consumption of alcohol and caffeine

B.balanced diet with adequate ca and vit D

C.regular exercise program]

Exercise[walking ,jogging,stair climbing,dancing..,duration bw30-60min and frequency3-4 times/wk]

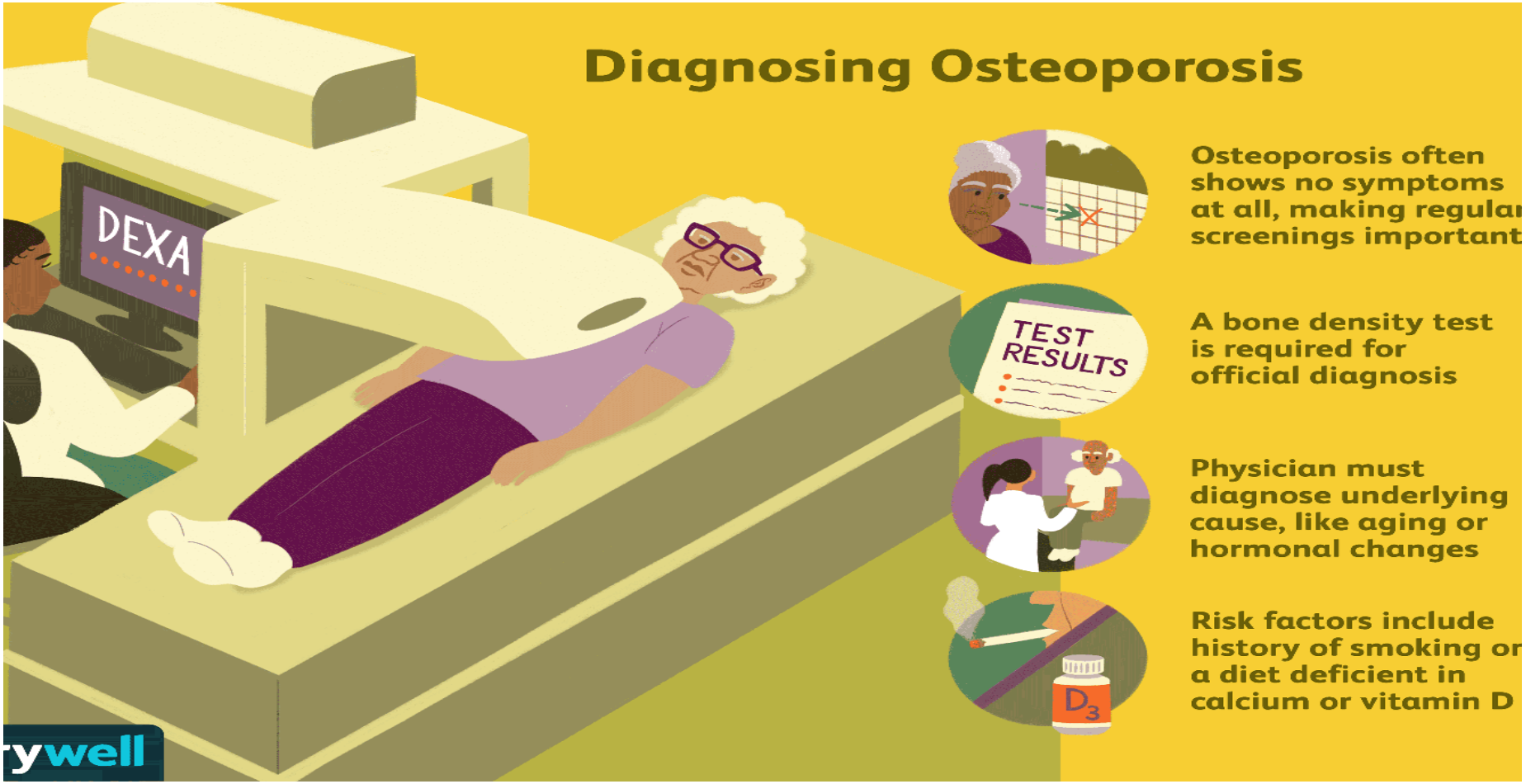
- 3) Supplementing vit D is propaply more important than supplementing ca.
- Ca supplement not demonstrate fracture risk reduction
- Additional ca has been linked to elevated risk of CAD

Baseline test

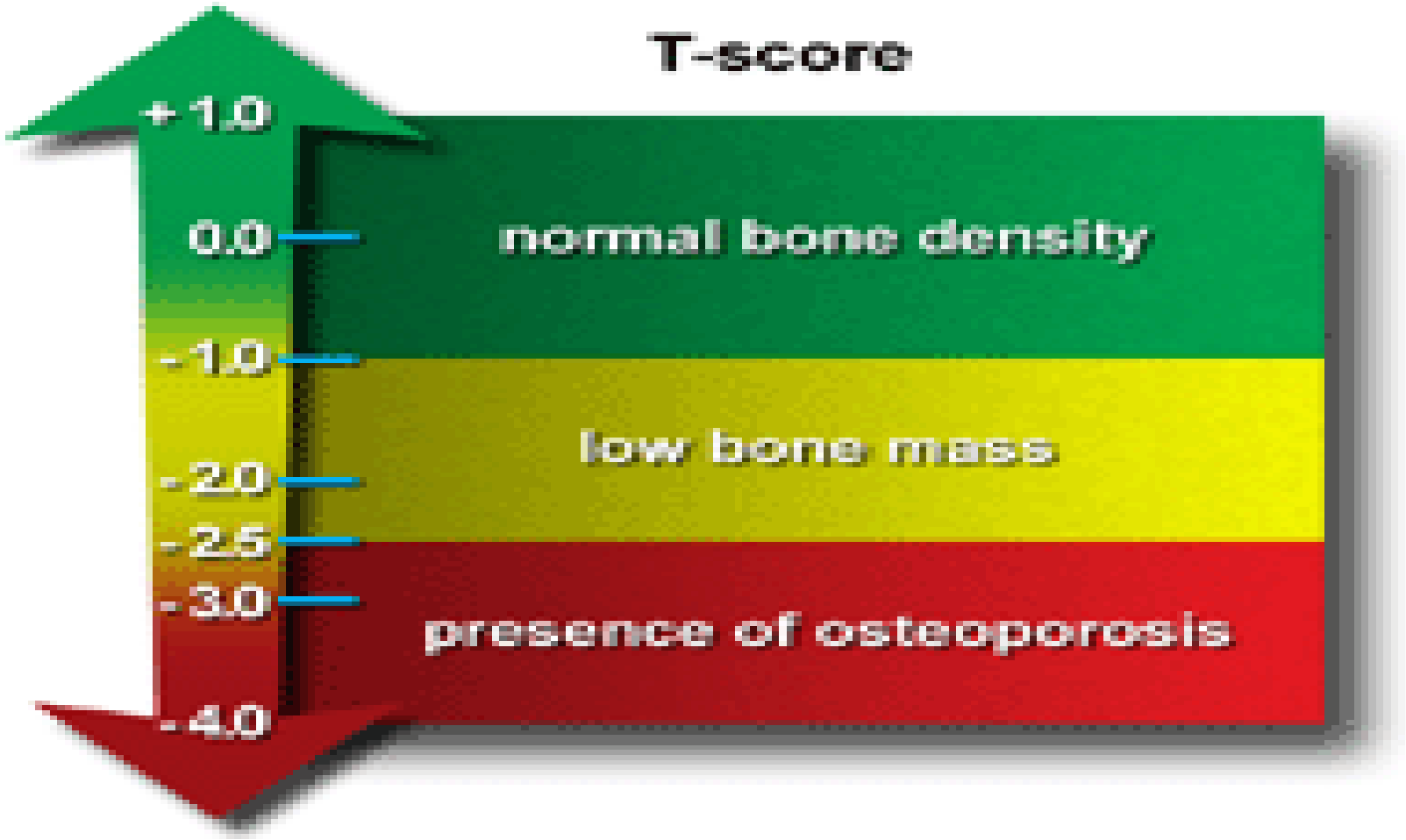
- CBC
- Ca,P,ALP
- PTH
- Creatinine
- Mg
- LFT
- TSH
- 25-Hydroxy vit D

DEX-A

- Is gold standard for assessment of BMD
- During this procedure, tow beams of different energy are directed at the patient, the difference in absorption beams by the pt body is recorded to quantify the amount of bone mineral content
- BMD is computed at lumbar spine(L1-4),femoral neck,hip
- Advantage: higher precision ,minimal radiation exposure and rapid scanning time
- Disadvantage: cost and non portability


Diagnosing Osteoporosis
DEXA
TEST RESULTS
D3
Osteoporosis often shows no symptoms at all, making regular screenings important
A bone density test is required for official diagnosis
Physician must diagnose underlying cause, like aging or hormonal changes
Risk factors include history of smoking or a diet deficient in calcium or vitamin D
ywell

- Bone densitometry reports provide a T score(the number of standard deviations above or below the mean BMD for sex and race matched to youngs control)
- Z score(comparing the pt with a population adjusted for age as well as for sex and race),used in:
- 1.premenopausal women
- 2.men younger than 50yrs
- 3.children


T-score
+1.0
0.0
-1.0
-2.0
-2.5
-3.0
-4.0
normal bone density
low bone mass
presence of osteoporosis

NOF(National osteoporosis foundation)

- NOF Guidline for BMD screening of postmenopausal women
- 1.all women aged 65yrs or older
- 2.younger postmenopausal women with one or more risk factor

A.family history of osteoporosis

B.personal history of low trauma fracture

C. current smoking

D.low body weight<58kg

- 3.other conditions for which BMD testing is appropriate
- A. evidence of osteopenia on x-ray
- B.to monitor response to treatment

TREATMENT

Bisphosphonate

- It is inhibit osteoclast activity,it bind to hydroxyapatite on bone to decrease bone resorption
- It decrease incidence of vertebral fracture
- Aliendronate and risedronate reduce risk of hip fracture by 30-50%
- Advice to take it with 8 oz of water upon awakening, remain upright, avoid food for 30min afterward
- Is rarely described in children except in skeletal fragility(osteogenesis imperfecta and idiopathic juvenile osteoporosis,inflammotory bone condition)

- Use bisphosphonate more than 5 yrs may increase atypical femur fracture risk
- Side effect:

hypocalcemia ,

nausea

esophagitis

photosensitivity

osteonecrosis of the jaw

Table 2. FDA-Approved Treatments for Osteoporosis

Drug (Brand)	Efficacy
Biphosphamates	
Alendronate (Fosamax, Fosamax Plus D, Binosto, generic)	Reduced incidence of spine and hip fractures by 50% and risk of vertebral fractures by approximately 48% over 3 years
Ibandronate (Boniva)	Reduced incidence of vertebral fractures by about 50% over 3 years; reduction in nonvertebral fractures not documented
Risedronate (Actonel, Atelvia, generic)	Reduced incidence of vertebral fractures by about 41%-49% and nonvertebral fractures by about 36% over 3 years
Zoledronic acid (Reclast)	IV infusion. Reduced incidence of vertebral fracture by about 70%, hip fractures by about 41%, and nonvertebral fractures by about 25% over 3 years
Calcitonin (Miacalcin, Fortical)	Intranasal spray or subcutaneous injection. Reduced vertebral fractures by about 30%; has not been shown to reduce the risk of nonvertebral fractures
Hormone Therapy	
Estrogen (Climara, Estrace, Estraderm, Estratab, Ogen, Ortho-Est, Premarin, Vivelle) Hormone (Activella, Femhrt, Premphase, Prempro)	When estrogen and hormone therapies are considered solely for prevention of osteoporosis in women, the FDA recommends that approved non-estrogen treatments should be considered first to reduce the risk of myocardial infarction, stroke, invasive breast cancer, pulmonary emboli, and deep vein thrombosis
Raloxifen (Evista)	Reduced the risk of vertebral fractures by 30%
Teriparatide (Forteo)	Reduced the risk of vertebral fractures by about 65% and non-vertebral fractures by about 53% after about 18 months of therapy.
Denosumab (Prolia)	Reduced the incidence of vertebral fractures by about 68%, hip fractures by about 40%, and nonvertebral fractures by about 20% over 3 years

Based on National Osteoporosis Foundation 2013 Guidelines.[12]

SERM(Raloxifene)

- Partial agonist-antagonist effect on estrogen receptor
- Is selectivly bind to estrogen receptor on bone so inhibit bone resorption
- Give for prevention and treatment
- Decreased risk of vertebral fracture
- Decrease total and LDL cholesterol
- Reduce incidence of invasive breast cancer
- Increase risk of thromboembolic event
- Increase risk of vasomotor symptom

calcitonin

- A hormone directly inhibiting osteoclastic bone resorption
- Used for treatment of osteoporosis in women at least 5 yrs postmenopausal who can not use estrogen
- Reduce incidence of vertebral fracture,prevent trabecular bone loss
- It produce analgesic effect, used in acute osteoporotic fracture
- There is tow form: nasal spray,side effect nasal congestion and rhinitis
- Injectable form have GI side effect

Teriparatide(Forteo)

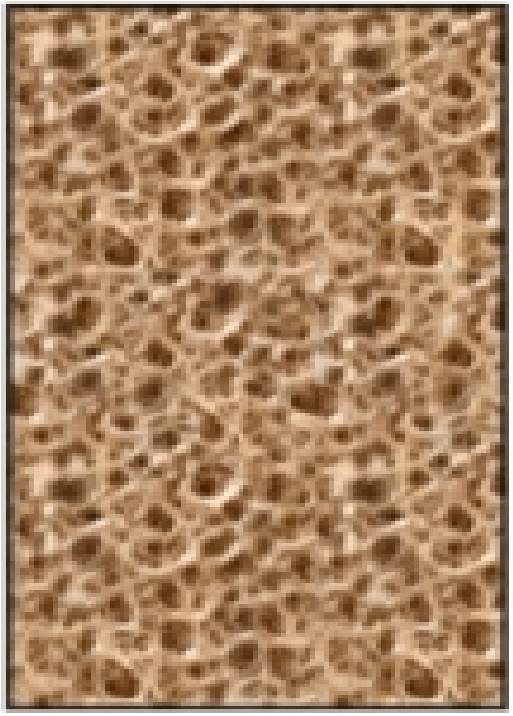
- teriparatide: anabolic agent,indicate for treatment of osteoporosis
- Reduce both vertebral-non vertebral fracture
- Very expensive
- Require daily sc injection(20mic/d)in the thigh or abd
- Its use limited to2 yrs duration
- There is long term effect(hepatotoxicity, reduced HDL, elevated LDL cholesterol)
- There is increase risk of osteosarcoma in animal study
- Contraindicated in children and adolescent with growing bone and pts with paget disease

estrogen

- Used for prevention of osteoporosis
- Additional benefit reduce vasomotor and vaginal atrophic changes
- Threre is risk for coronary heart disease,breast cancer and stroke

THANK YOU

Normal bone matrix



Osteoporosis