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MSS
Musculoskeletal System

Pathology

Doctor 2018 | Medicine | JU

Done by
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Contributed In The Scientific Correction
Lujain&Lujain

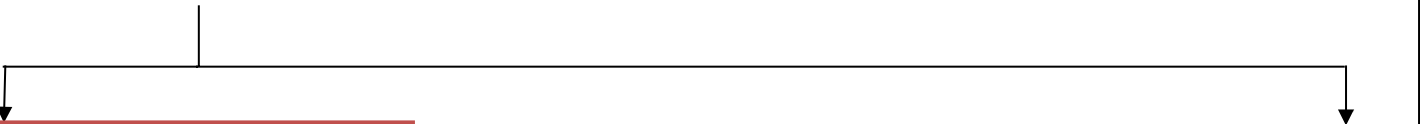### Contributed In The Grammatical Correction
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METABOLIC DISORDERS:

Osteopenia: decreased bone mass (1-2.5 SD below the mean).

Osteoporosis: severe osteopenia; > than 2.5 SD below the mean with increase risk for fractures

Osteoporosis could be :

PRIMARY OSTEOPOROSIS(Generalized)

*Much more common

*associated with :

senile(aging)

postmenopausal

Osteoporosis is a multi-factorial disease ,the factors

Could be:

1-Genatic factors :some people are more OR less susceptible

to osteoporosis depending on their genes .

2-Nutretion :low intake of dairy products containing calcium

Also low vitamin D levels and sun exposure.

3-Physical activity: it can prevent osteoporosis to a big extent

4-Aging

5-Menopause

SECONDARY OSTEOPOROSIS

*Much less common

*less serious

*easily treatable

Associated with:

Hyperthyroidism (cause systemic osteoporosis)

Malnutrition (low intake of calcium from dairy products)

Steroids (administration of corticosteroids)

Also after **fractures** where bone gets weaker , and in this case osteoporosis is localized

NOW ,how do aging and menopause contribute to osteoporosis ?
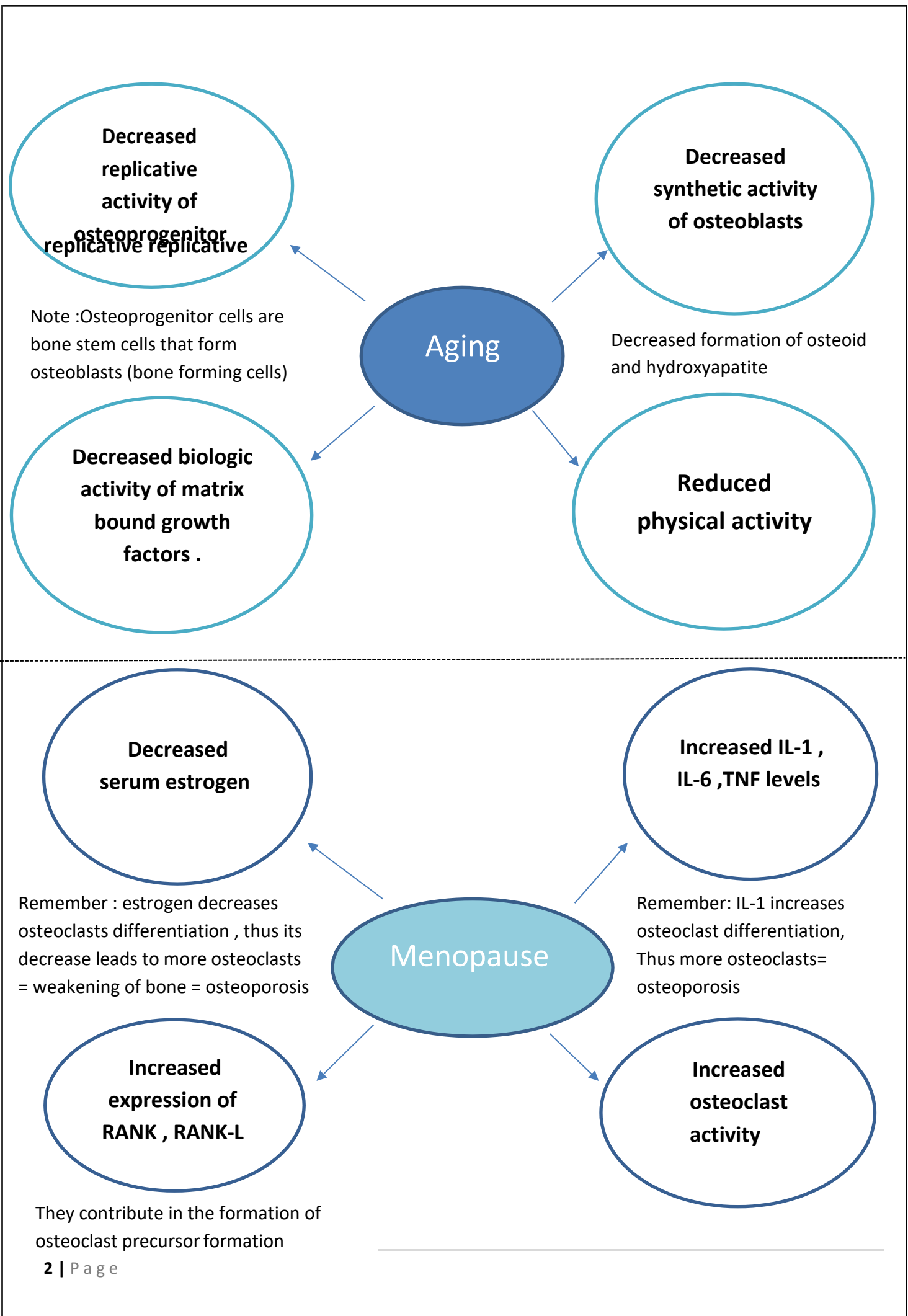
Aging

Decreased replicative activity of osteoprogenitor replicative replicative

Note : Osteoprogenitor cells are bone stem cells that form osteoblasts (bone forming cells)

Decreased synthetic activity of osteoblasts

Decreased formation of osteoid and hydroxyapatite

Decreased biologic activity of matrix bound growth factors .

Reduced physical activity

Menopause

Decreased serum estrogen

Remember : estrogen decreases osteoclasts differentiation , thus its decrease leads to more osteoclasts = weakening of bone = osteoporosis

Increased IL-1 , IL-6 ,TNF levels

Remember: IL-1 increases osteoclast differentiation, Thus more osteoclasts= osteoporosis
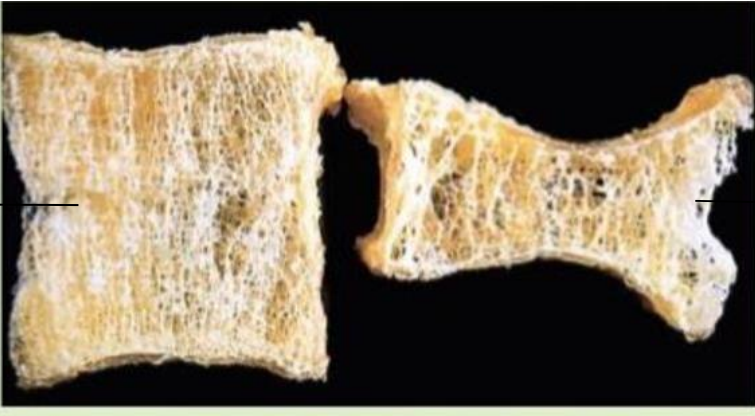
Increased expression of RANK , RANK-L

They contribute in the formation of osteoclast precursor formation

Increased osteoclast activity

A normal vertebral body

A very bad **osteoporosis case** , with compression fractures , especially in vertebral bodies due to the weight put on them

(very common in osteoporosis)

FIG. 21.6 Osteoporotic vertebral body *(right)* shortened by compression fractur..
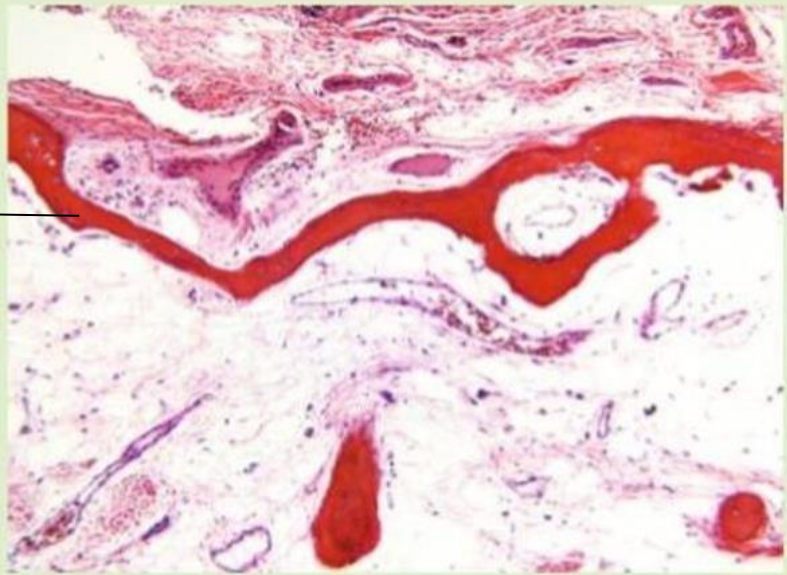
Trabeculae

Containing osteoid and hydroxyapatite

FIG. 21.7 In advanced osteoporosis, both the trabecular bone of the medulla *(b..*

The red portion is the bone trabeculae, the quantity of them is much lower than normal

+ the thickness of trabeculae is very thin in osteoporosis .

OSTEOPOROSIS CLINICALLY:

There are many severe outcomes that can be developed from osteoporosis :

1-Vertebral fractures (as shown in the picture above)

2- variable fractures

3- Femur and Pelvic fractures (it's a very serious situation and it is associated with a number of diseases) what are they??

Femur and Pelvic fractures can result in:

* immobility

*PE (pulmonary embolism) due to DVT=Deep Venous Thrombosis , where a thrombosis in one vein of the body(formed from prolonged bed rest) would travel to reach the pulmonary vein and block it , thus causing death in some cases and its called "the silent killer"

* pneumonia (40-50K death/yr in USA) : due to the long stay in the hospital = hospital pneumonia = caused by: ex: pseudomonas ,klebsiella …

Diagnosis

special imaging technique, bone mineral density (BMD scan) , dual energy X-ray absorptiometry (DXA or DEXA scan) or bone densitometry

examples:

** If the bone density readings of a patient were -1.5 below SD what would the diagnosis be ?

> The patient would most probably have
> **osteopenia**

** if the bone density readings of a patient were – 2.7 SD what would the diagnosis be?

> The patient would most probably have
> **Osteoporosis**

** if the bone density was -2.3 …………….   →   Osteopenia

** if bone density was +2.5 …………….   →   There is no problem in the bone

The rule is:

Osteopenia : (1-2.5)SD in minus = below the mean
(mean=normal)

Osteoporosis : >2.5 SD in minus = below the mean

PREVENTION AND TREATMENT:

Exercise •

Calcium & vitamin D •

Bisphosphonates: reduce osteoclast activity and induce its apoptosis •

Denosumab: anti-RANKL; blocking osteoclast activation • (blocks RANK-L)

Hormones (estrogen): =HRT (Hormonal Replacement Therapy)

 risking DVT and **stroke**

Thus, usually estrogen is combined with another hormone to reduce the side effects such as progesterone .

this will not only help in osteoporosis treatment , but also it helps in decreasing menopausal symptoms .

(Prevention is more important than treatment)**

و ُفِيبتُلك ﷲِ من شقــوق الـضيق فرجاً . . . . . . فــا طمـئـن