

Diagnosis and Treatment of Osteoporosis

Department of Endocrinology and Metabolism

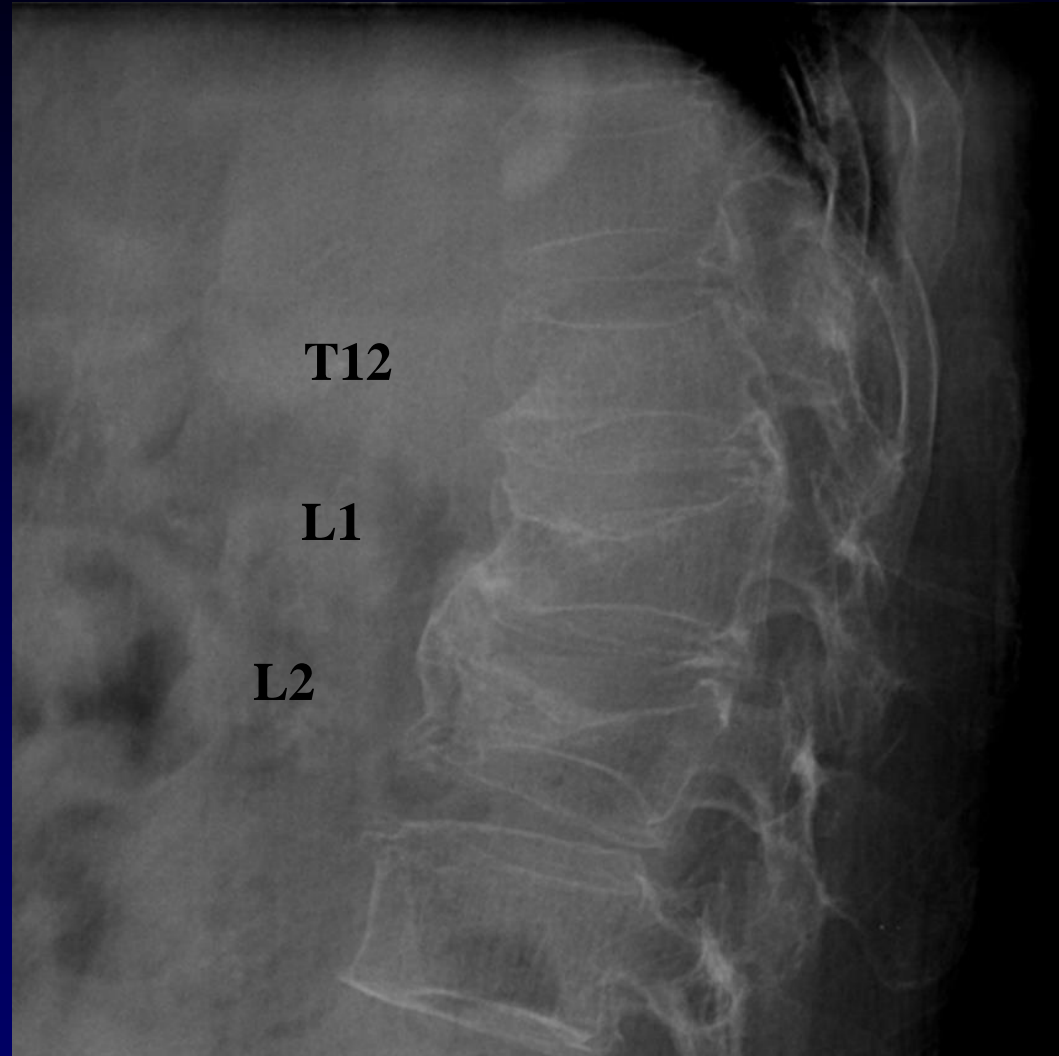
Ajou University School of Medicine

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WCIM, COEX, Seoul, 27Oct2014

Case 1

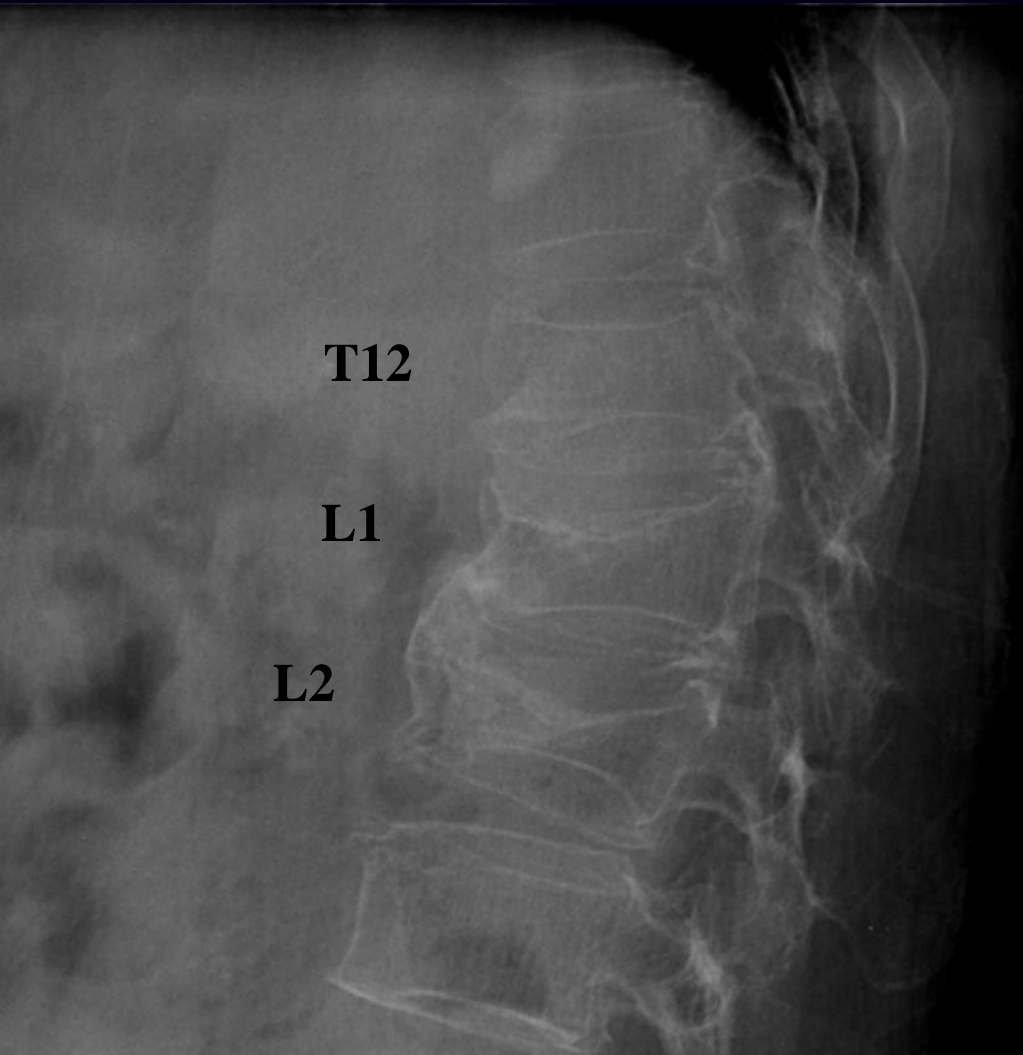
**71-year old
woman
Back pain
Emergency Room
Plain X-ray**



What is the most effective method to detect recent fracture in spine?

- 1) Bone Mineral Density (BMD, DXA spine)**
- 2) Ultrasonography (US, spine)**
- 3) Computed Tomography (CT, spine)**
- 4) Magnetic Resonance Imaging (MRI, spine)**
- 5) Positron Emission Tomography (PET, FDG spine)**

T12, L1, L2 Fractures



Plain X-ray



MRI T2WI

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Diagnosis of Osteoporosis and Fracture

- **Simple Method : Plain X-ray (Osteopenia and Fracture)**
- **Quantitative Method : Bone Mineral Density (Osteoporosis)**
- **Supportive Methods : Bone scan, MRI, CT (Fracture)**
- **Biochemical Methods : Bone turnover markers (Osteoporosis)**
- **Metabolic Bone Diseases and Rare Bone Diseases : Bone Biopsy (Differential Diagnosis and Confirm)**

Case 2

52-year old Woman
Low Bone Mineral Density
Out-patient Clinic
Fracture history (-)
Menopause : 1 year ago

Height 158cm
Weight 45kg
Blood Pressure 115/75mmHg
Pulse Rate 76/min

Bone Mineral Density (BMD)

Spine L1-4 T-score -1.8, Z-score -1.6

Femur total T-score -1.3, Z-score -1.2

T-L spine X-ray : Fracture (-)

Routine Lab. : normal range

What is the most appropriate medication?

- 1) Calcium and Vitamin D (Ca + D)**
- 2) Estrogen and Progesterone (HRT)**
- 3) Selective Estrogen Receptor Modulator (SERM)**
- 4) Bisphosphonate (BP)**
- 5) Parathyroid hormone (PTH)**

Medical Treatments (in Korea)

Anti-resorptives

1. Bisphosphonates
2. SERM
3. Estrogen
4. Vitamin D
5. Calcitonin
6. Ipriflavone
7. Calcium
8. Denosumab (RANKL antibody)
9. Cathepsin K inhibitors

Formation Stimulants

1. Androgen
2. Fluoride
3. Vitamin K
4. Parathyroid hormone
5. Strontium
6. Anti-sclerostin antibody

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- 1) **Calcium and Vitamin D (Ca + D)**
- 2) **Estrogen and Progesterone (HRT)**
- 3) **Selective Estrogen Receptor Modulator (SERM)**
- 4) **Bisphosphonate (BP)**
- 5) **Parathyroid hormone (PTH)**

Case 3

74-year old woman
Sustained wound after teeth
extraction for 10 weeks
Out-patient Clinic
Type 2 DM
Postmenopausal Osteoporosis



Patient had been taking 6 years of Osteoporosis Medication. What is the most possible drug for this condition?

- 1) Estrogen and Progesterone (HRT)**
- 2) Selective Estrogen Receptor Modulator (SERM)**
- 3) Calcitonin (CT)**
- 4) Parathyroid hormone (PTH)**
- 5) Bisphosphonate (BP)**

Adverse Effects of Bisphosphonates

- Gastrointestinal disturbance (Erosion, Ulcer)
- Acute Phase Reaction (Flu-like illness)
- Hypocalcemia
- Ocular complication (Conjunctivitis, Uveitis)
- **Osteonecrosis of the Jaw (ONJ)**
- **Atypical Femur Fracture**

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- 1) Estrogen and Progesterone (HRT)
- 2) Selective Estrogen Receptor Modulator (SERM)
- 3) Calcitonin (CT)
- 4) Parathyroid hormone (PTH)
- 5) **Bisphosphonate (BP)**

Case 4

43-year old woman

Low Bone Mineral Density

Out-patient Clinic

Fracture history (-)

LNMP : 1 month ago

Height 162cm

Weight 45kg

Blood Pressure 115/75mmHg

Pulse Rate 68/min

Bone Mineral Density (BMD)

Spine L1-4 T-score -2.7, Z-score -1.3

Femur total T-score -2.2, Z-score -1.1

T-L spine X-ray : no fracture

Routine Lab. : normal range

What is the most appropriate medication?

- 1) Calcium and Vitamin D (Ca + D)**
- 2) Estrogen and Progesterone (HRT)**
- 3) Selective Estrogen Receptor Modulator (SERM)**
- 4) Parathyroid hormone (PTH)**
- 5) Bisphosphonate (BP)**

Premenopausal Osteoporosis

- **Calcium and Vitamin D : usual risk (not high risk)**
- **Estrogen : premature ovarian failure**
- **SERM : not a candidate**
- **PTH : short-term (no evidence)**
- **Bisphosphonate : not a good candidate (fetal risk)**

Bone Mineral Density (BMD)

Spine L1-4 T-score -2.7, Z-score -1.3

Femur total T-score -2.2, Z-score -1.1

T-L spine X-ray : no fracture

Routine Lab. : normal range

Case 4

43-year old woman

Low Bone Mineral Density

Out-patient Clinic

Fracture history (-)

LNMP : 1 month ago

Height 162cm

Weight 45kg

Blood Pressure 115/75mmHg

Pulse Rate 68/min

Bone Mineral Density (BMD)

Spine L1-4 T-score -2.7, Z-score -1.3

Femur total T-score -2.2, Z-score -1.1

T-L spine X-ray : no fracture

Routine Lab. : normal range

What is the most appropriate medication?

- 1) Calcium and Vitamin D (Ca + D)**
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Case 5

55-year old man

Low Bone Mineral Density

Out-patient Clinic

Fracture history (-)

Medication history (-)

Height 173cm

Weight 65kg

Blood Pressure 125/85mmHg

Pulse Rate 78/min

Bone Mineral Density (BMD)

Spine L1-4 T-score -2.8, Z-score -2.3

Femur total T-score -2.4, Z-score -2.1

T-L spine X-ray : Genant Grade 1 (mild degree) T12 compression fracture

What is the most common laboratory abnormality expected in this patient as Korean?

- 1) Serum Testosterone**
- 2) Serum Cortisol, ACTH**
- 3) Serum TSH and Free T4**
- 4) Serum Prolactin and GH**
- 5) Serum 25OHD and PTH**

Laboratory Evaluation for Male Osteoporosis as Secondary Causes

Additional laboratory tests if indicated

Initial laboratory tests

- Complete chemistry profile
(including alkaline phosphatase)
- Complete blood count
- Calcium, phosphorus
- 25 hydroxyvitamin D
- Testosterone
- Urinary calcium excretion

- 24 hour urine for free cortisol
- FSH, LH
- Prolactin
- Magnesium
- 1,25 dihydroxyvitamin D
- Intact PTH
- TSH
- Celiac screen
- Serum protein electrophoresis/urine protein electrophoresis
- Erythrocyte sedimentation rate
- Rheumatoid factor
- Ferritin and carotene levels
- Iron and total iron binding capacity
- Serum tryptase and histamine levels
- Homocysteine
- Skin biopsy for connective tissue disorders
- COL1A genetic testing for osteogenesis imperfecta
- Serum and urine markers of bone turnover

Case 5

55-year old man

Low Bone Mineral Density

Out-patient Clinic

Fracture history (-)

Medication history (-)

Height 173cm

Weight 65kg

Blood Pressure 125/85mmHg

Pulse Rate 78/min

What is the most common laboratory abnormality expected in this patient as Korean?

- 1) Serum Testosterone**
- 2) Serum Cortisol, ACTH**
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- 4) Serum Prolactin and GH**
- 5) Serum 25OHD and PTH**

What is the most common laboratory abnormality expected in this patient as Korean?

- 1) Serum Testosterone, LH**
- 2) Serum Cortisol, ACTH**
- 3) Serum TSH and Free T4**
- 4) Serum Prolactin and GH**
- 5) Serum 25OHD and PTH**