Let's Excel Together

CANADIAN ACADEMY OF SPORTS NUTRITION

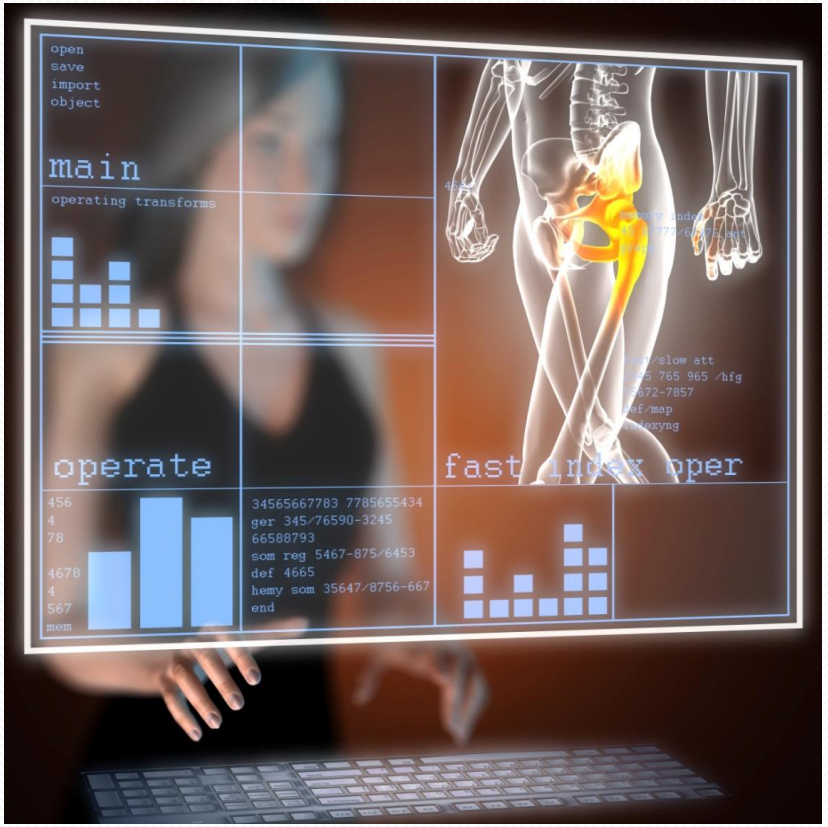
# Lecture 32:

# Osteoporosis & Diet

## Copyright Protection:

# Osteoporosis:

- is the most common metabolic disease of the bones.
- is age-related bone loss.
- is characterized by decreased bone density and bone strength.



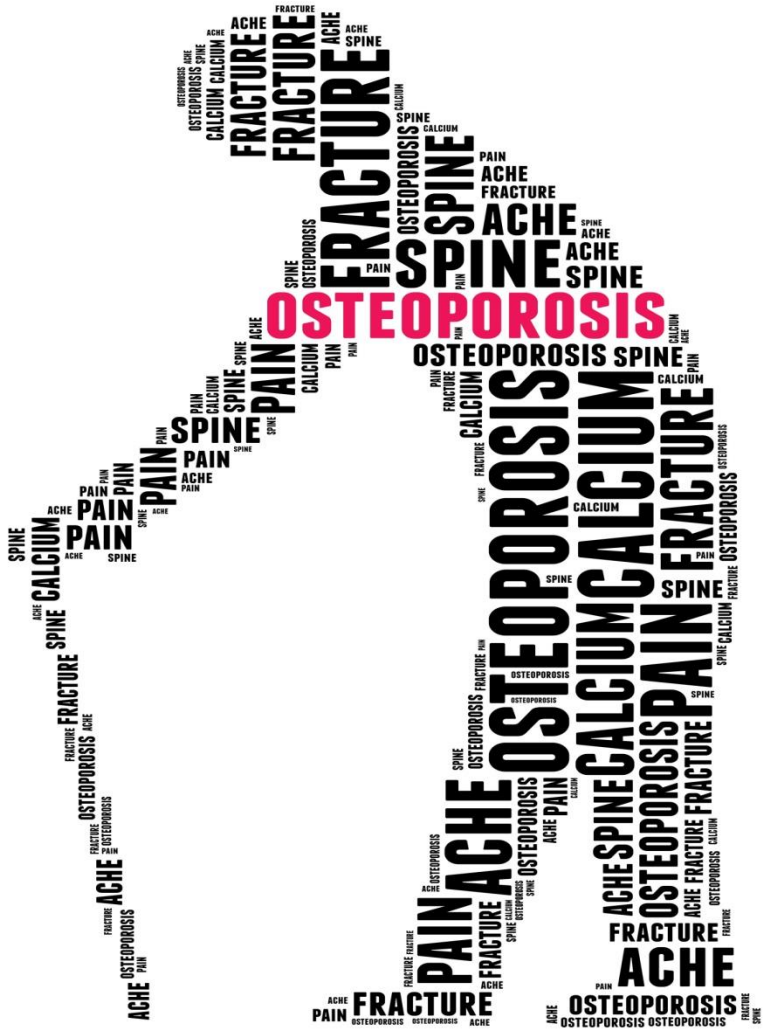
# Composition of Normal Bone:

- **A) Organic matrix:**
- **Cells.**
- **Type I collagen (90% of bone protein).**
- **Glycoproteins.**
- **Proteoglycans.**
- **B) Inorganic matrix:**
- **Calcium.**
- **Magnesium, potassium, chloride, sodium and fluoride.**

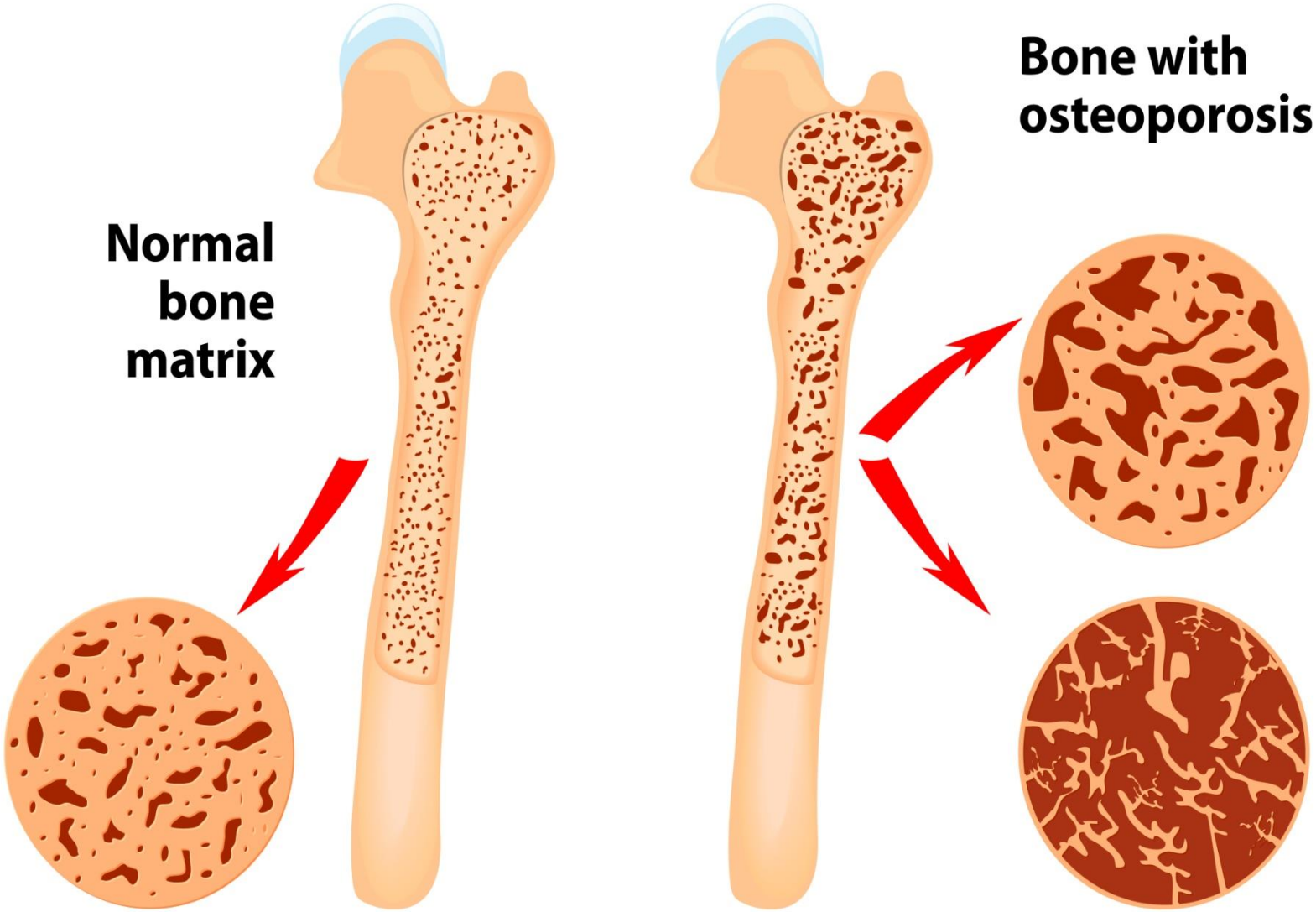
## Three types of bone cells:

1. **Osteoblast:** mineralization and bone formation.
2. **Osteocyte:** mature osteoblast.
3. **Osteoclast:** bone resorption (breakdown and degradation).

- The underlying cause of osteoporosis is an imbalance between **bone formation** (which decreases) and **bone resorption** (which increases).



# Osteoporosis



# Classification:

1. **Osteoporosis Type I (postmenopausal):**

- **-in women within 15 years of menopause.**
- **-mostly loss of trabecular bones (ribs, vertebras, pelvis, ends of long bones)**

2. **Osteoporosis Type II (senile):**

- **-men and women age over 75**
- **-loss of cortical and trabecular bones.**

# Causes of Osteoporosis:

- Genetic factors.
- Race (ethnicity).
- Hormonal changes.
- Lack of exercise.
- Old age.
- Nutritional factors.

# Secondary Osteoporosis:

**Secondary to other causes:**

- **Anorexia nervosa**
- **Low function thyroid**
- **Hyperactive thyroid**
- **Mal absorption**
- **Leukemia**
- **Immobility**
- **Rheumatoid arthritis**
- **Medications (anti-epilepsy, excessive alcohol, corticosteroids, heparin, chemotherapeutic agents, lithium, aromatase inhibitors, and aluminum)**

# Signs and Symptoms:

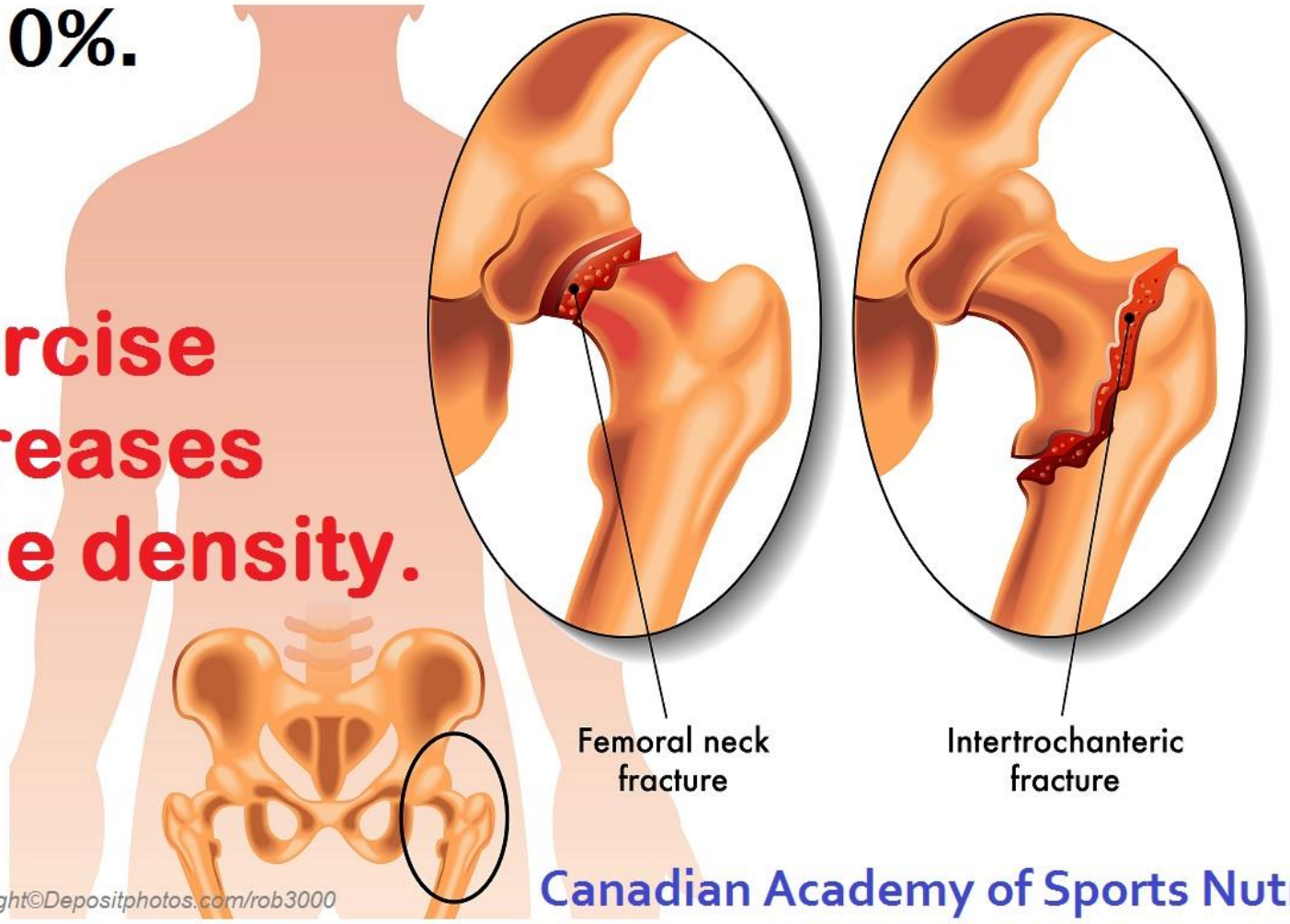
**Osteoporosis has usually no symptoms unless fractures happen.**

**Fractures might occur with minimal stresses (sneezing, coughing, bending, and even lifting a light object).**

**Osteoporosis has nothing to do with bone cancers.**

# For every 1% decrease in bone density, the risk of stress fractures increases by 10%.

**Exercise increases bone density.**



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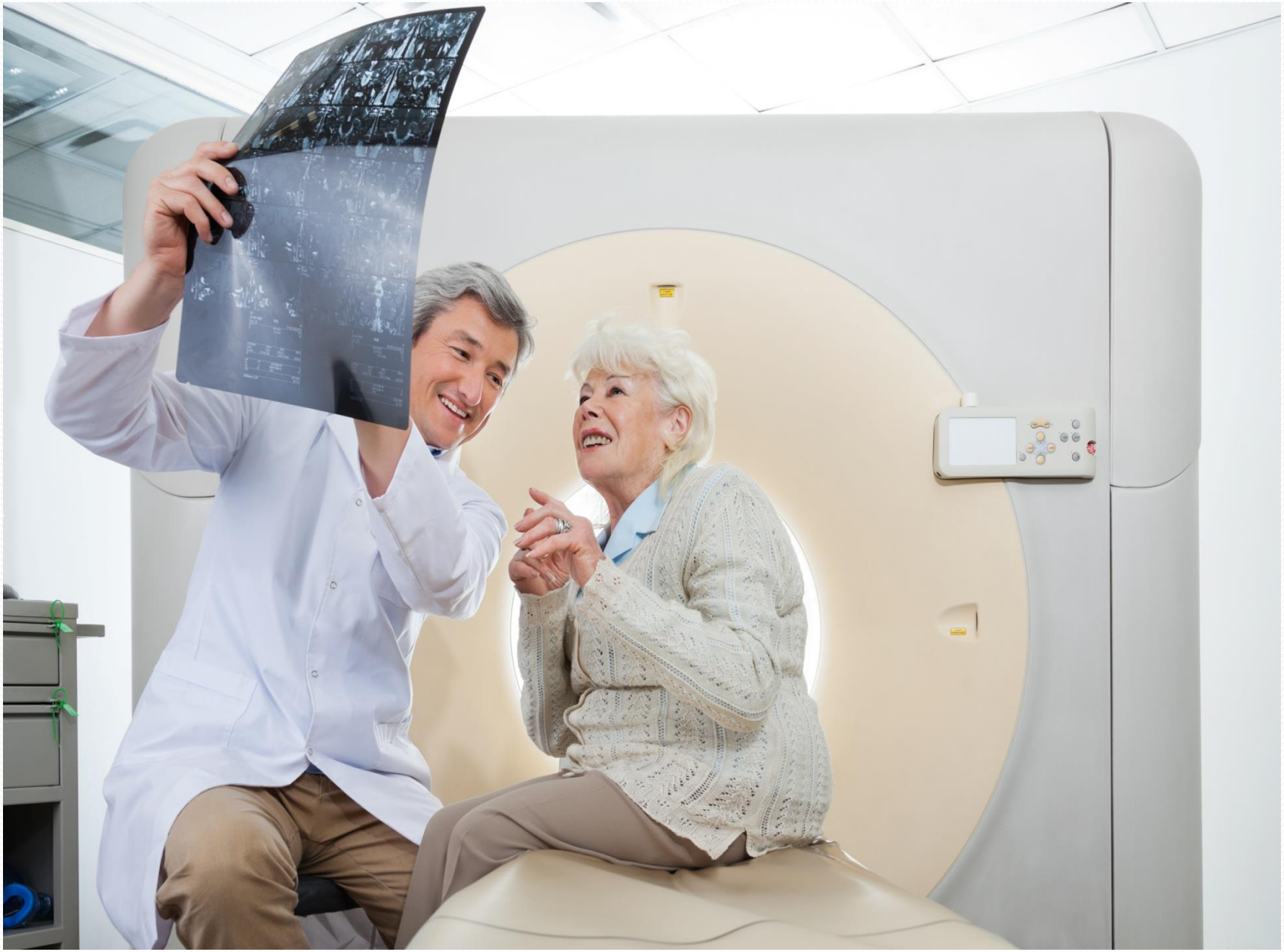
# Diagnosis:

1) Radiography (X – Ray)
2) CT Scan
3) Bone Scan (the best way)
4) UCT (urine calcium test)



# Life Style Changes to Improve Bone Density:

**Six important changes in life style to increase bone density are:**

1) **Exercise.**
2) **Alcohol.**
3) **Salt**
4) **Caffeine**
5) **Protein**
6) **Boron**

# Exercise

- **Weight bearing exercises are the bests!**

- Walk
- Lunges
- Farmer walks.
- Dead lift.
- Squat.
- Using dumbbells.

# Alcohol

- **Excessive drink makes the bones weaker.**
- **1-2 drinks/day has minimal effect on the bones.**
- **One drink equals to:**

**A) 12 oz or 375 ml of beer**

**B) 5 oz or 156 ml of wine**

# Sodium

- **Daily need for sodium is 2 – 3 grams.**
- **Excessive sodium intake increases calcium excretion in urine.**
- **Table salt is sodium chloride (Nacl).**
- **One teaspoon (5 gr) of table salt gives about 2.5 gr sodium.**

# Caffeine

- **300 – 400 mg of Caffeine a day has minimal effect on the bones.**

- **Drinking coffee *more than 3 cups* a day makes the bones weaker through calcium loss via kidneys and intestines.**

# Protein

- **Excessive protein intake increases calcium loss through the kidneys.**
- **Maximum protein allowed: 2 gr/kg/day.**

Sources of Protein.

# Boron

**This mineral:**

- **Increases the absorption of calcium, magnesium and vitamin D.**
- **Enhances the production of estrogen and testosterone.**

**Food sources:**

- **Dried prune.**
- **Parsley.**
- **Raisins.**
- **Almonds.**
- **Peanuts.**

**Food supplement:**

- **Pill form, 3 mg.**

# Food and Food Supplementations:

**The three key nutrients to increase bone density are vitamin D, Calcium, and vitamin K2.**

**Choose nutraceauticals versus usual food supplements if possible.**

# Vitamin D:

- **Sun:** 30 minutes exposure to sun is enough to make about 10,000 IUs vitamin D.

- **Food supplement:** 1 pill provides 1000 IU.
- **Foods:**

  **Catfish:** 100 gr provides 425 IU.

  **Salmon:** 100 gr provides 360 IU.

**Recommended daily amount of Vitamin D is about 600 IU for adults (in Canada).**

# Calcium

- **Food sources:** **Dairy products and some green leafy vegetables (spinach, chard, rhubarb).**

  ***One cup of milk provides about 300 mg calcium.***

  ***One cup of yogurt gives about 400 mg calcium.***

- **Rate of absorption is 25- 35%.**

- **Cow milk has the lowest rate of absorption.**
- **Daily need: 1000 mg**

# Calcium Supplements:

| Type of Calcium | Rate of Absorption |
| --- | --- |
| Carbonate | 40% |
| Citrate | 21% |
| Lactate | 13% |
| Gluconate | 9% |

# Vitamin K2

- **Has a key role in calcium metabolism.**

- **Subtypes:**

**- *MK4:* can be made by human body, and is found in meats, eggs, and dairy products.**

**- *MK7:* is made by bacteria during fermentation, and is found in fermented soybeans.**

# How does vitamin K2 work?

# Homework:

- 1) Describe the lifestyle changes required to apply to increase bone density.
- 2) Describe the differences between primary and secondary osteoporosis.