

# Osteoporosis therapy

Osteoporosis therapy depends on the cause. The basis is to provide adequate calcium intake.

Therapy relies on several routes of repair of bone composition. Proper diet and exercise, vitamin D and calcium supplementation should be ensured; osteoresorption can be prevented or osteosynthesis promoted from pharmacological methods.

## Non-pharmacological treatment

- Proper nutrition:
  - enough protein
  - enough calcium (100 g hard cheese equivalent to approximately 830 mg calcium, i.e. about half the recommended daily dose)
- Sufficient exercise to rebuild bones
- Stay in the sun (Vitamin D formation, protective creams only appropriately)



Difference in bone in normal bone and osteoporosis.

## Supplementation

Often, dietary calcium intake is inadequate and eating habits cannot be adjusted. The question of supplementation and the possible method of administration of calcium is discussed and practices differ in different workplaces. The recommended daily dose of calcium is 1200-1,500 mg.

Insufficient sunbathing lacks vitamin D and is naturally deficient with old age. The recommended daily dose is 800-1200 international units. The blood level of vitamin D should be 50-75nmol/l.

## Osteoresorption prevention

### Biophosphonates

Bisphosphonates are first-line therapies.

- *alendronate*: 70 mg p.o. 1× per week
- *risendronate*: 150 mg p.o. 1× per week
- *ibandronate*: 150 mg p.o. 1× monthly nebo 3 mg i.v. 1× per 3 months
- *zoledronate*: 5 mg i.v. 1× per year, can be used with an advantage in osteoporosis caused by corticotherapy or in osteoporosis in men
- other: pamidronate

They reduce both resorption and bone formation by having a protective effect on the alkaline crystalline structure of hydroxyapatite. Modern studies suggest that chronic bisphosphonate therapy stops the progression of postmenopausal osteoporosis and reduces the incidence of secondary fractures. Since these substances are highly irritating to the lining of the esophagus, they must be swallowed with plenty of water and patients must avoid situations that increase the likelihood of esophageal reflux.

**⚠ In the event of a fracture, bisphosphonates should be discontinued for 3 months as they prolong bone muscle formation and increase the incidence of joints!**

The effect of bisphosphonates is documented in studies: FIT , VERT, MOBILE.

### Estrogens

Estrogens prevent or delay bone loss in postmenopausal women. The mechanism of action probably involves several ways: inhibition of parathyroid hormone-induced bone resorption (inhibition of osteoclast activity). Estrogens are the most effective therapy for preventing osteoporosis in postmenopausal women. Combined preparations with progestins are used .

### Estrogen tissue activity modulator

This is just one formulation, **tibolone**. It is associated with a higher risk of stroke.

### Estrogen receptor modulators

This is mainly the **raloxifene** formulation. It's a second-choice drug. It is associated with a higher risk of thromboembolism, with hot flushes among the side effects.

## Biological treatment

The monoclonal antibody **denosumab** is an antibody of the IgG<sub>2</sub> class against RANK ligand. It prevents osteoblasts from activating osteoclasts. It is administered subcutaneously 1x per 6 months. The effect is documented in the DEFEND and FREEDOM studies.

## Fluoride ions

The appropriate concentration of fluoride ions in drinking water or toothpaste has a well-documented ability to reduce tooth decay. Chronic treatment, especially in high concentrations, may increase bone synthesis. *Acute fluoride toxicity* (usually caused by swallowing rat poison) is manifested by gastrointestinal + neurological symptoms. *Chronic toxicosis* (fluorosis) is characterised by the formation of ectopically localised newly formed bone or exostoses.

## Support of osteosynthesis

### Calcitonin

Salmon calcitonin was administered intranasally. Withdrawn from the market in the Czech Republic and the whole EU for prevailing risks over treatment benefits.<sup>[1]</sup>

### Parathyroid hormone derivatives

With the correct dosing schedule, parathyroid hormone derivative teriparatide does not act osteoresorptively (or only weakly - there is no such activation of osteoclasts via RANK ligand) but osteosthetically by activating osteoblasts. It is given once a day for a maximum of 24 months. It is used in osteoporosis caused by corticotherapy and in osteoporosis in men. The regulation is subject to the approval of the Indicative Panel. The effect of teriparatide is documented in an FPT studies.

## References

### Related articles

- Calcium
- Vitamin D
- Osteoporosis
- Osteomalacia
- Metabolic osteopathy

### Literature

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- MARTÍNKOVÁ, Jiřina, Stanislav MIČUDA a Jolana ČERMÁKOVÁ. *Vybrané kapitoly z klinické farmakologie pro bakalářské studium : Terapie osteoporózy* [online]. ©2001. [cit. 2010-07-09]. <<https://www.lfhk.cuni.cz/farmakol/predn/bak/kapitoly/hormony/osteoporoza-bak.doc/>>.

1. <http://www.sukl.cz/kalcitonin-omezeni-indikaci-pro-pouziti?highlightWords=kalcitonin>