

A photograph of two hands shaking, symbolizing agreement or partnership. The hands are positioned horizontally across the middle of the slide, with the fingers interlaced in a firm grip. The background is a light, neutral color.

**BISPHOSPHONATES' ADMISSION IN  
TRAUMA MANAGEMENT AS THE WAY  
OF BONE HEALING OPTIMIZATION**


Andrei K. Borisov,  
Postgraduate Research Fellow,  
Traumatology and Orthopaedics  
Department,  
VSMU

# Abstract

1. At least 25 of all fractures end in nonunion[1]
2. Worsening of nutrition and sedentary lifestyle almost doubled average time of bone healing[1]
3. High-energy trauma is one of the most important factor of primary invalidity[3]
4. Development of transport system leads to prevalence of high-energy traumas in structure of traumatism[3]
5. The problem of osteoporosis in Traumatology and Orthopaedics demands a complex [2]
6. Expenses for treatment of trauma outcomes overload financial resources of healthcare system ( 1<sup>st</sup> place among causes of primary invalidity in patients with long bones' fractures)[3]

1. Применение физических факторов для оптимизации костной регенерации (обзор литературы) // Л.Б. Резник, К.Ю. Рожков, С.А. Ерофеев, Г.Г. Дзюба, Д.В. Котов // Гений ортопедии. – 2015. – № 1. – С. 89-95.
2. *Аллахвердиев А.С.* Проблемы лечения пострадавших с переломами шейки бедренной кости (литературный обзор) // *А.С. Аллахвердиев, Ю.П. Солдатов* // Гений ортопедии. – 2016. – № 1. – С. 90-95
3. Определение оптимальной хирургической тактики при переломах длинных костей с учетом объективных методов оценки тяжести политравмы (обзор литературы) // Лапшин Д.В., Березка Н.И., Литовченко В.А., Горячий Е.В. // Травма. – 2014. – Т. 15, № 3. – С. 121-124.

# Socio- economical aspect of traumatism.

A photograph of a patient lying in a hospital bed, completely encased in a white plaster cast. The patient's head is also wrapped in white bandages. They are lying on their back with their arms and legs extended, held in place by metal traction devices. The bed has blue linens. In the background, there are some medical supplies and a small plant on a table.

В 2015 г. In Russia **2.150.530** people called for help because of bone fractures. 70% of them are work-employed people

**1.120.424** cases of delayed bone healing and pseudarthrosis

**Average expenses for treatment of traumatological patients per year: from 20.645.088.000 RUB. to 111.827.560.000 RUB.**

In the last years the severity of traumas significantly increased. It requires long-term immobilization of the patient as well as difficult and complex surgical operations.



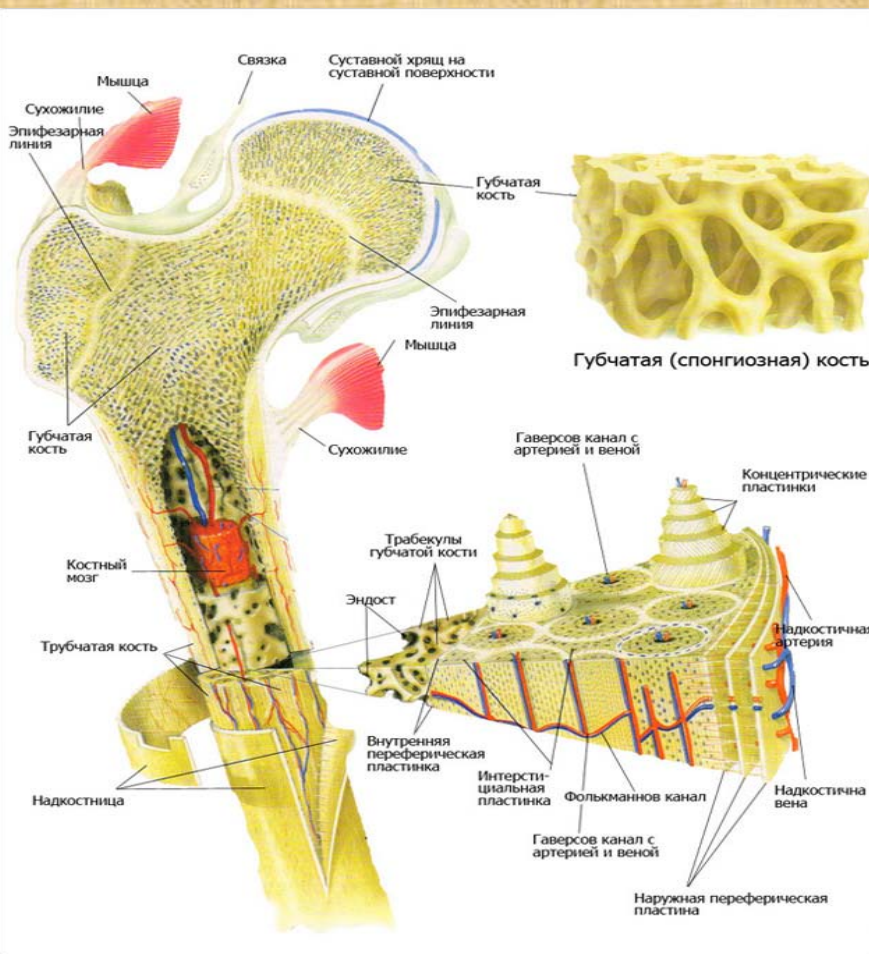
# Trauma, fracture, wide and hi-energetic contusion of bone and collateral tissues



Forms a zone of primary necrosis and the zone of molecular commotion with oedema of microcircular endothelium, reology malfunction, secondary necrosis, scar tissue leading to malfunction of medium-calibred vessels via narrowing, slowing of venous blood flow.

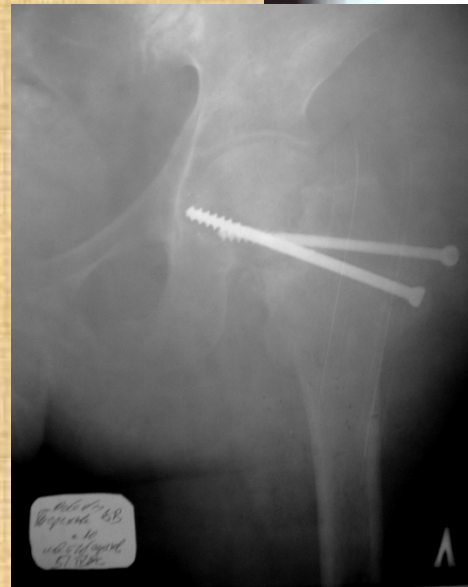


Trophic malfunctions, amplifying of perifractural resorption, delayed bone healing, infection, nonunionworsening scar-forming process with arterial narrowing, pseudarthrosis.



***For fractured bones' consolidation, osteoinduction and healing a good microcirculation is NECESSARY!***

**Secondary osteoporosis**– high-energetic, multiple, combined trauma, traumatic disease. Long-term immobilization, malfunction of different systems of organs.

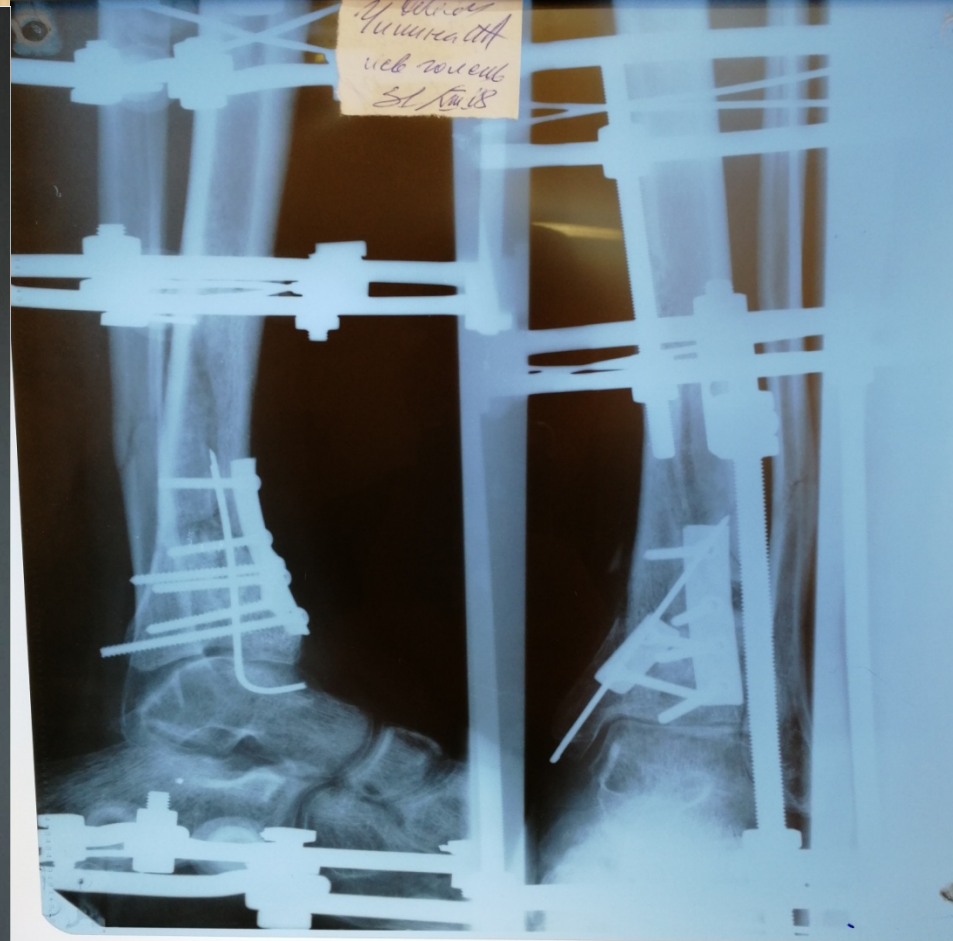
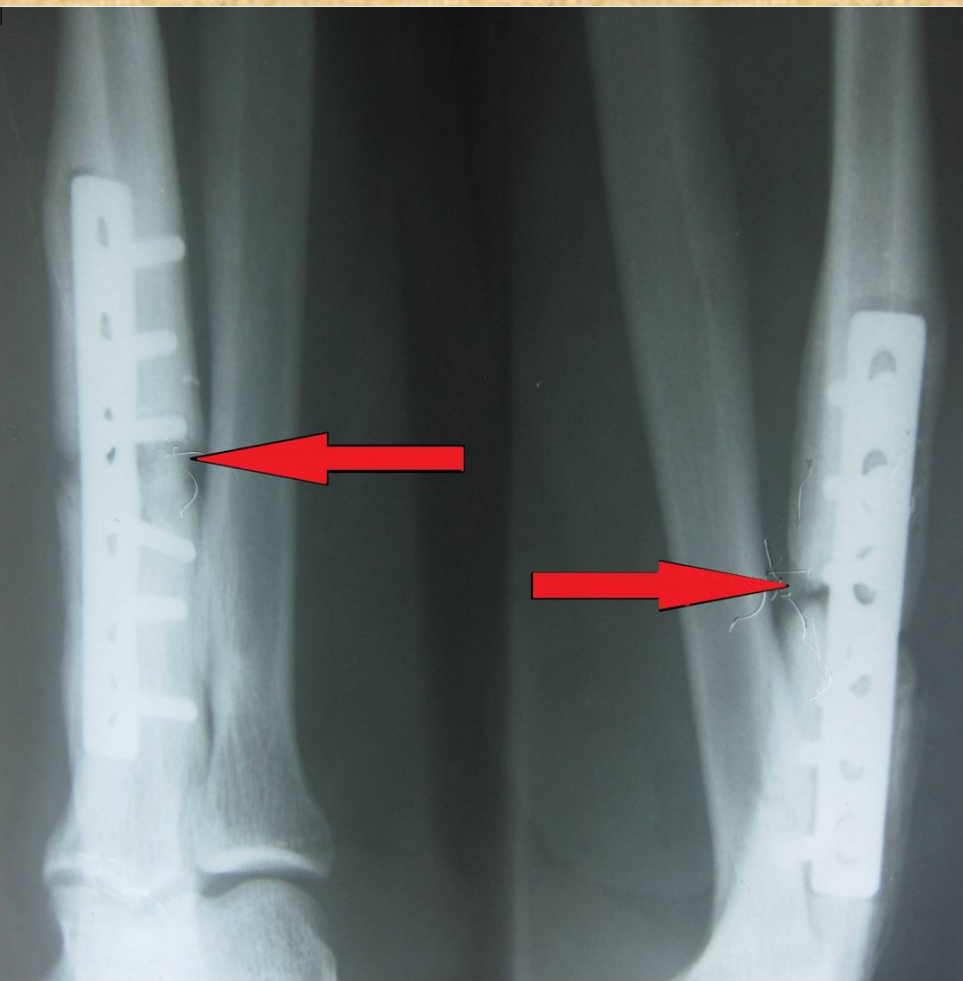


# Perifractal resorption- friend or foe?

What to do?

**Early functional effort- loss of fixation and nonunion as the result**

**Long-term immobilization with the development of secondary osteoporosis (the reason of apparatus assembling)**



# The Goal of the Research:

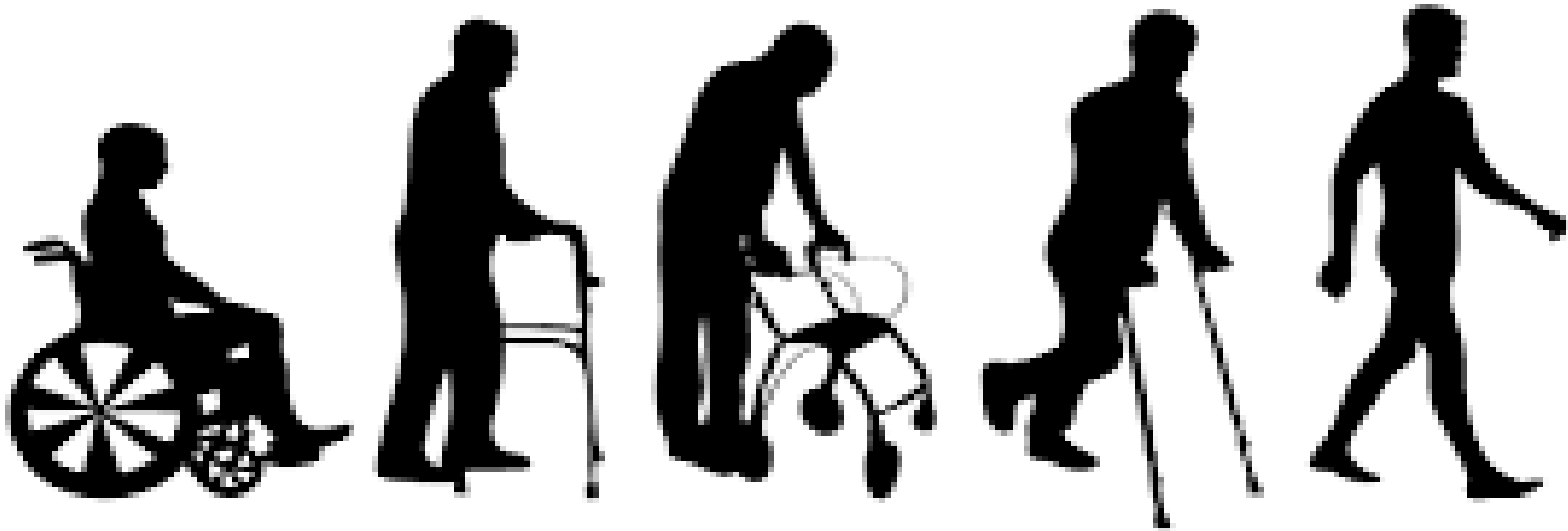
- Find out the effectivity of high-energy traumas treatment via alendronic acid combined with osteosintesis under the control of laboratory markers of bone resorption and X-ray examination



# Materials and methods

- The volume of the Research- 40 patients with long bone fractures who had passed through surgical treatment in Orthopaedic departments in the city of Voronezh
- All patients were separated I 2 groups- those who were taking alenronated and those who weren't

# Results



# Laboratory tests

| Criterion<br>( <u>исходные</u><br><u>данные</u> ) | Core group<br>n=20 | Control group<br>n=20 |
|---|--------------------|-----------------------|
| $\beta$ - CrossLaps                               | 0,715 $\pm$ 0,2    | 0,69 $\pm$ 0,15       |
| Osteocalcin                                       | 20,20 $\pm$ 11,2   | 22 $\pm$ 10,8         |

# Laboratory tests

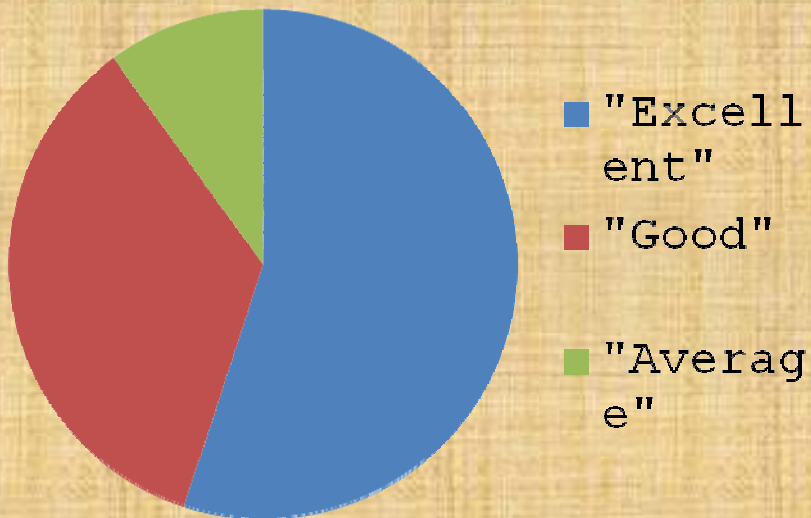
| Criterion<br>( <u>через 1 месяц</u> ) | Core group<br>n=20 | Control group<br>n=20 |
|---------------------------------------|--------------------|-----------------------|
| $\beta$ - CrossLaps                   | 0,76 $\pm$ 0,05    | 0,932 $\pm$ 0,045     |
| Osteocalcin                           | 31,12 $\pm$ 8,2    | 24,11 $\pm$ 9,1       |

# Laboratory tests

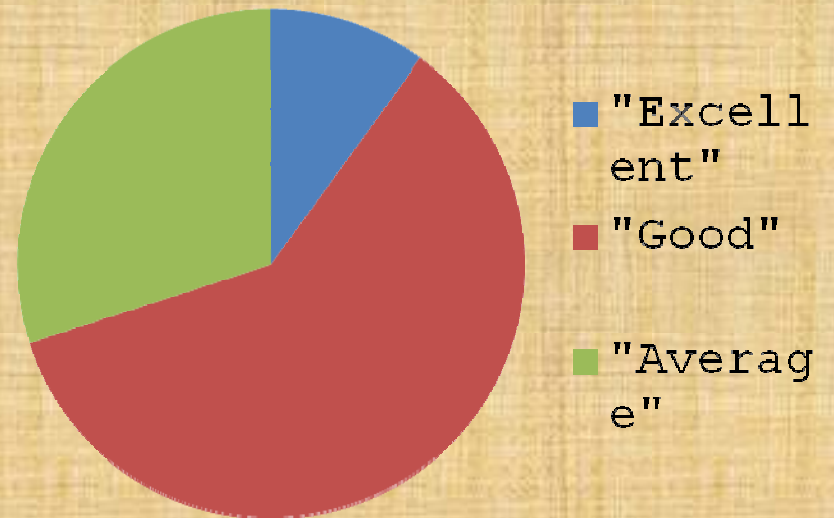
| Criterion<br>( <u>через 3 месяца</u> ) | Core group<br>n=20 | Control group<br>n=20 |
|--|--------------------|-----------------------|
| $\beta$ - CrossLaps                    | 0,529 $\pm$ 0,08   | 0,617 $\pm$ 0,04      |
| Osteocalcin                            | 28,3 $\pm$ 7,3     | 22,2 $\pm$ 5,1        |

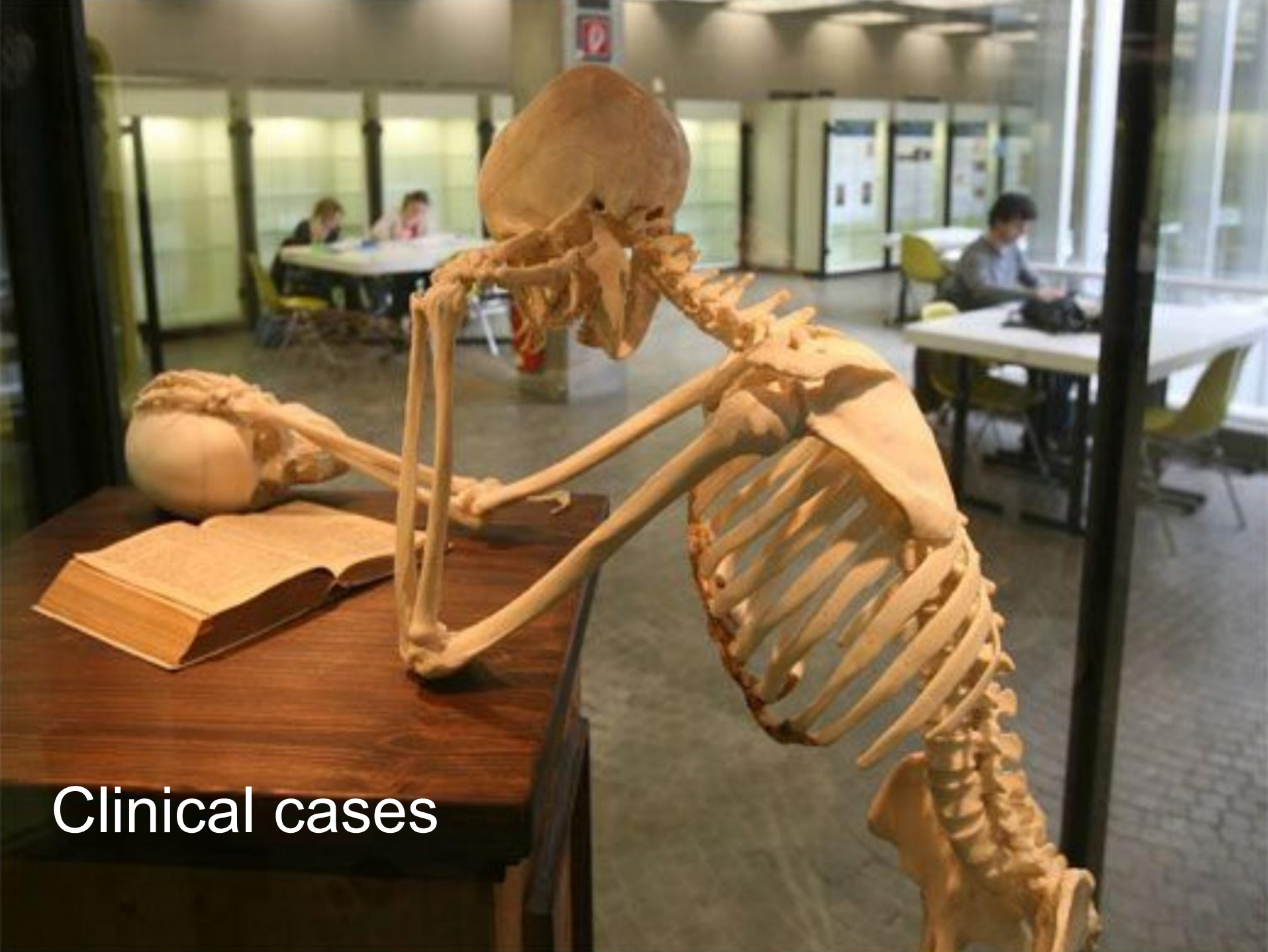
# Results estimate

Core group



Control group





Clinical cases

**Patient K, 47 years, case № 1354 (h/energy trauma, consequent trauma)**  
**We used: Alendronate 70 mg per os 1 per week in 6 months**  
**+ calcium+D3 1 pill 2 times a day**





**Patient N. 18 years, case №  
12314.**

**Hip diaphysal fracture in car  
accident**



**We used: Alendronate 70  
mg per os 1 per week in 6  
months  
+ calcium+D3 1 pill 2  
times a day**

X-rays in 1 months, 3 months, 6 months after discharge from hospital



# Conclusions

- 1) The problem of osteoporosis in Traumatology and Orthopaedics remains very sharp, and negatively inflicts the process of bone healing
- 2) Perifractural resorption, which is very active during osteoporotic process, is important factor, that decreases chance for the success of bone healing
- 3) The problem of osteoporosis remains actual despite age and sex differences
- 4) The combined admission of alendronic acid combined with calcium-D3 complex contributes to the formation of bone regenerate of good bio-mechanical qualities and elevates the results of the fracture consolidation.
- 5) The new, rheumo-orthopaedic approach for bone fracture treatment is required to be adopted, especially in difficult clinical cases.

***Thank You for  
attention!***

