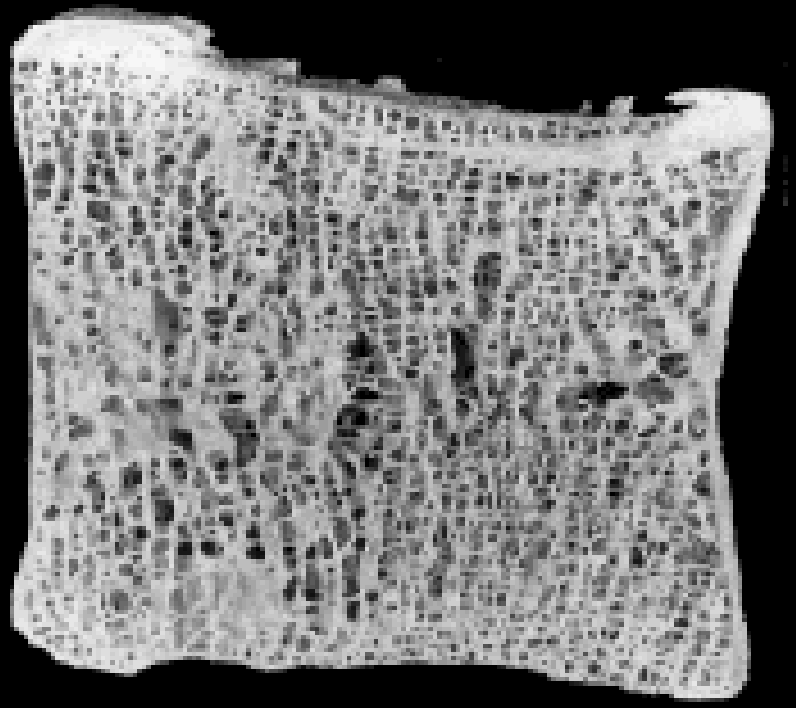
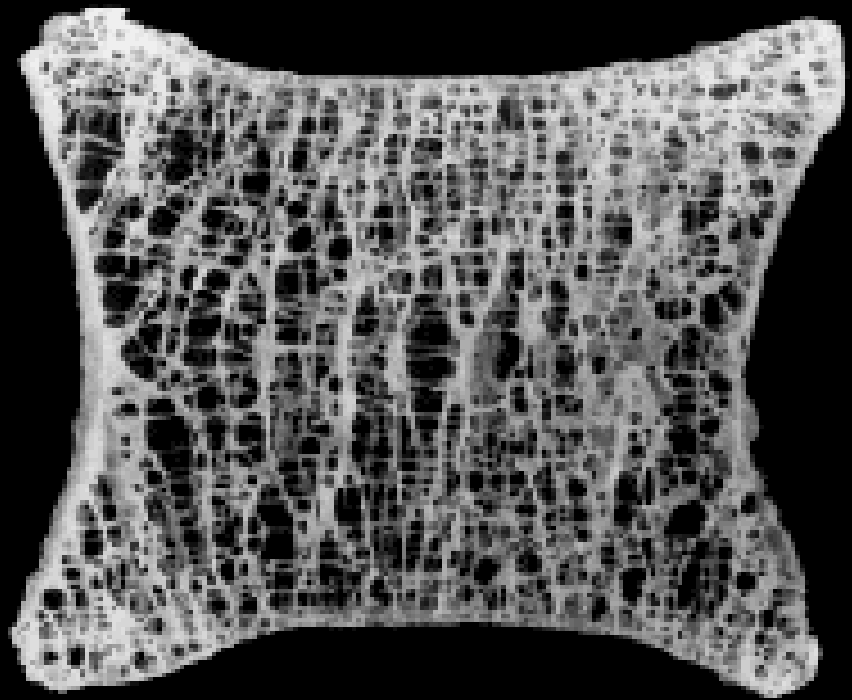
Secondary Osteoporosis

- Endocrine diseases
- Gastrointestinal disorders
- Hematologic diseases
- Rheumatological diseases
- Drug-induced osteoporosis
- other causes…

Christoph Henzen luzerner kantonsspital

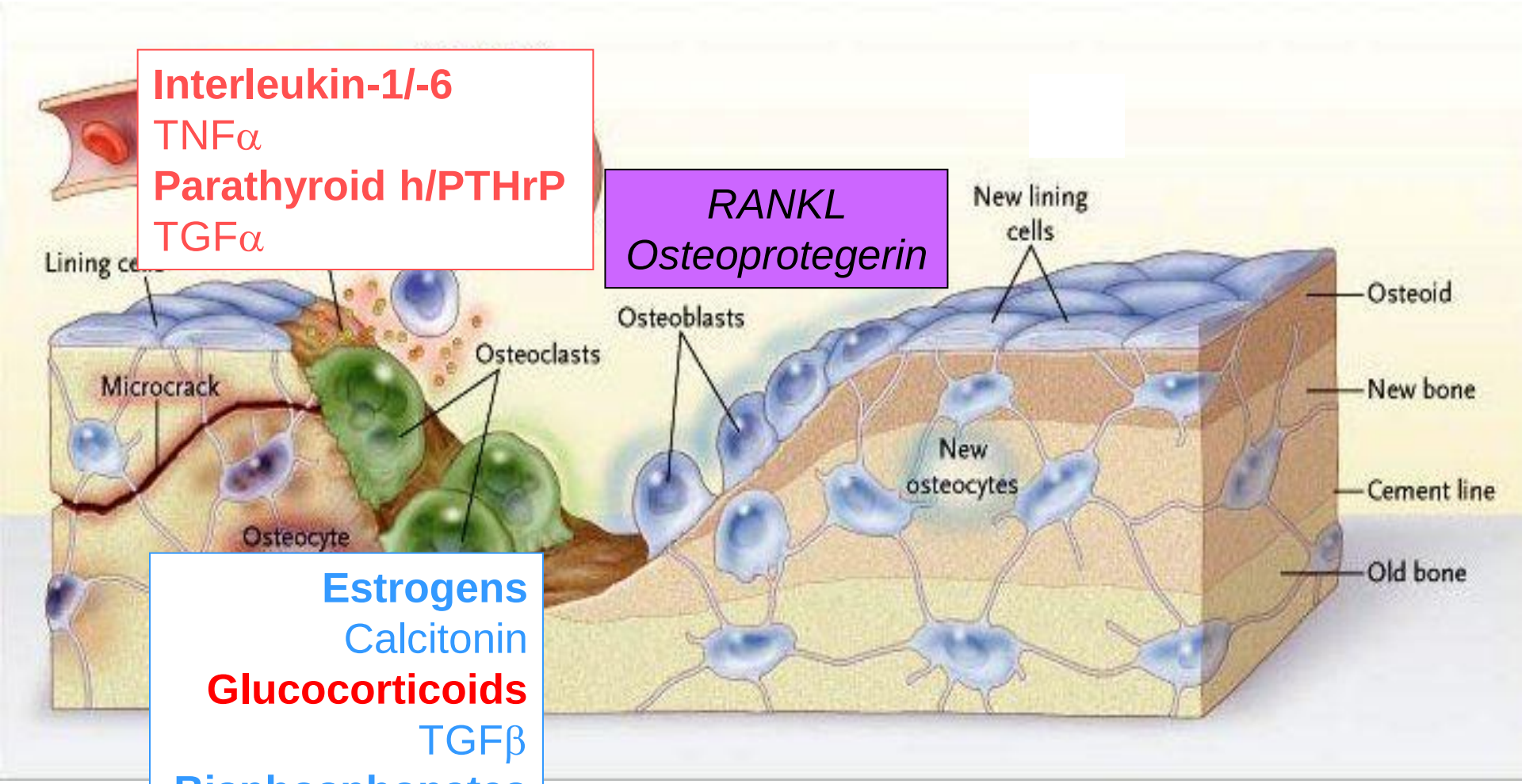




„... a systemic skeletal disease with reduced bone mass ***and*** impaired micro-architecture of the bone tissue leading to increased fragility and fracture risk."

Consensus Conf 1993

Bone remodeling
Bone formation and resorption



Seeman E&Delmas PD, NEJM 2006;354;2250-

Radiological Dx

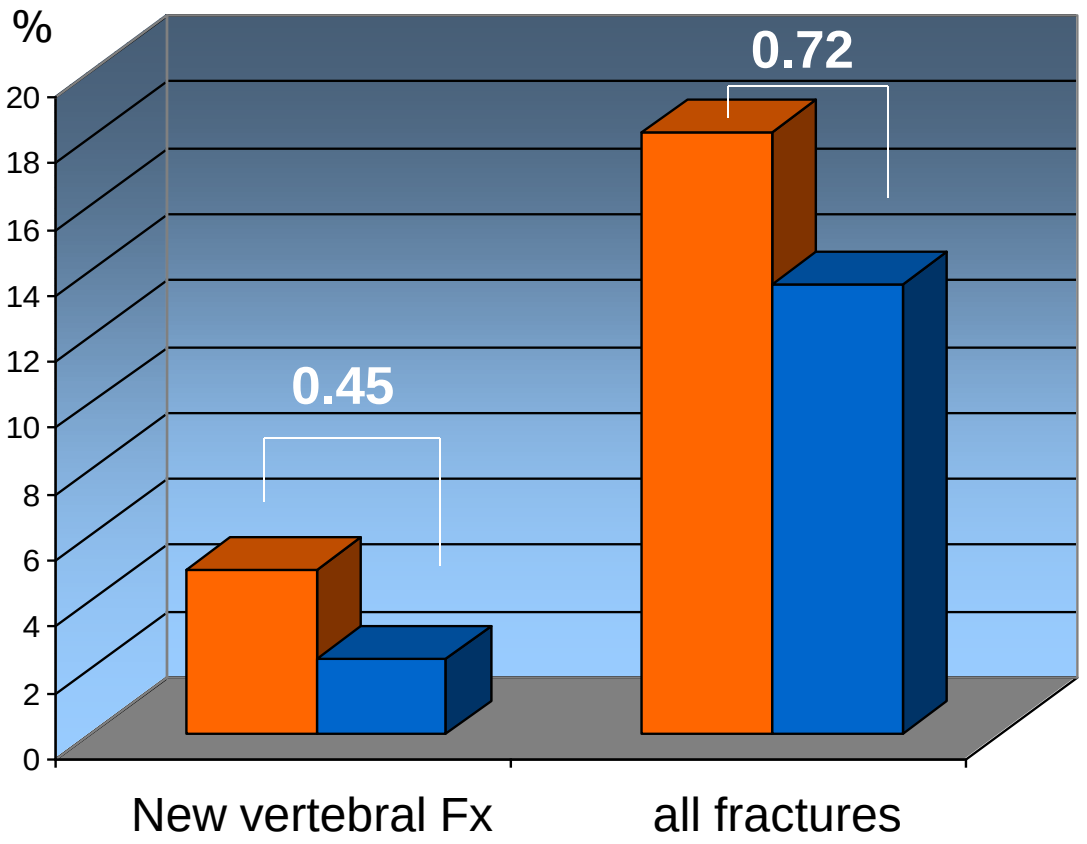
Vertebral body-Fx
= -20%/4mm

FIT

Lancet 1996;348;1545-

2027 women 55-81y over 3 years

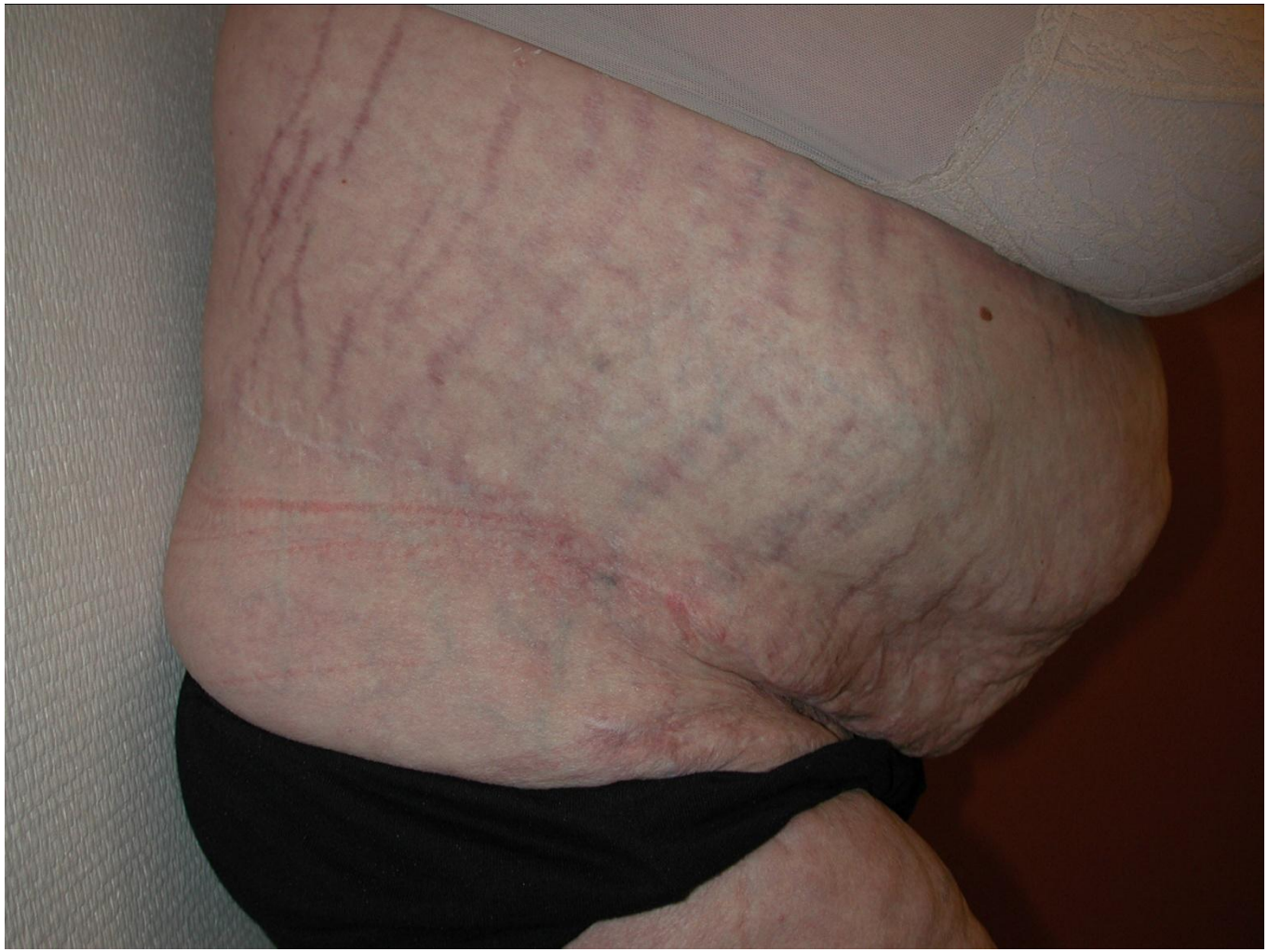
Placebo *vs* **Alendronat 10mg**



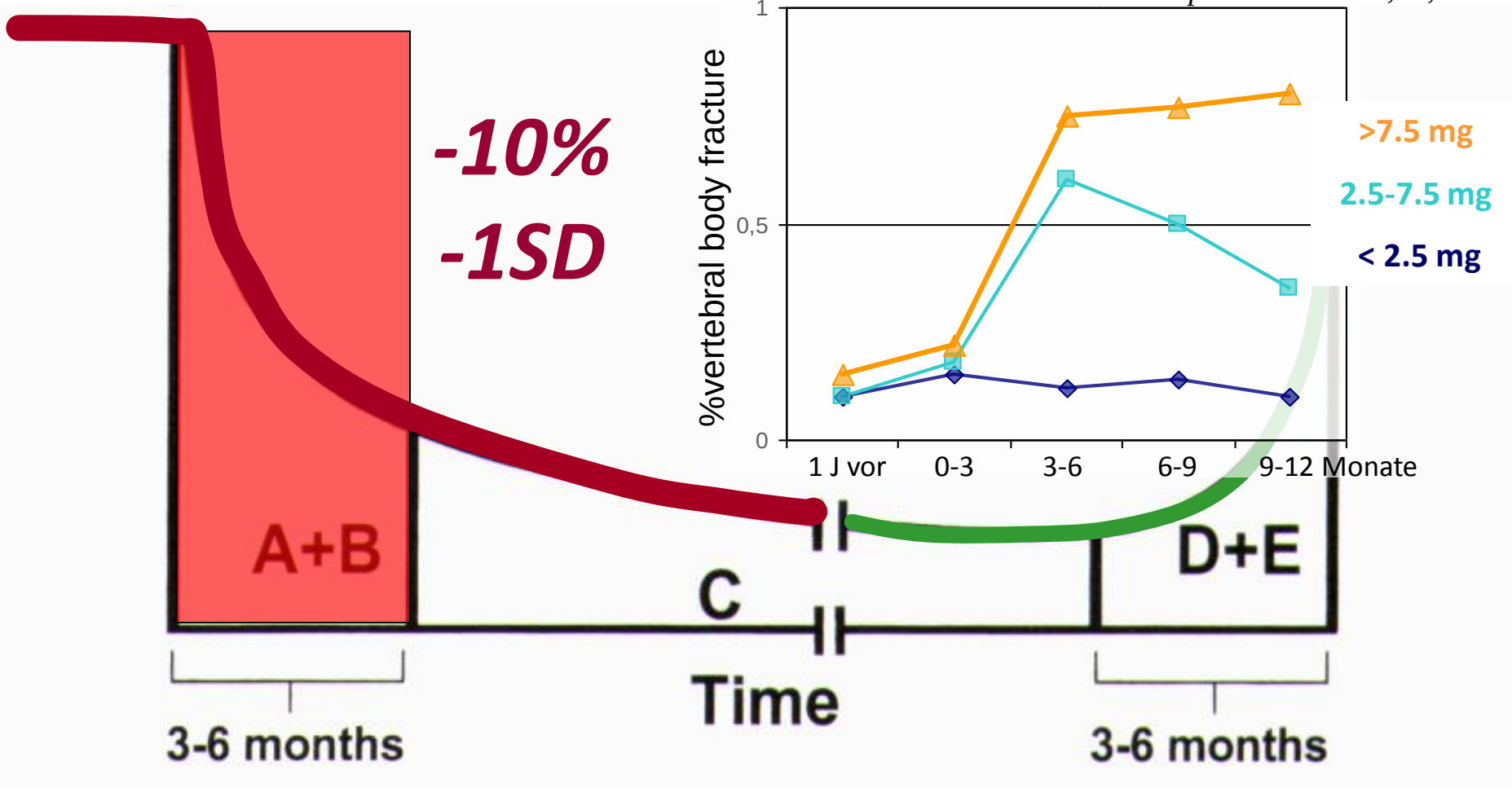
Summary

1. Bone strength is determined by bone density and architecture.
2. Bone formation < resorption = osteoporosis
3. Estimation of fracture risk = DXA *and* risk factors
4. Secondary causes in up to 30% of female and 60% of male osteoporosis.
5. Bisphosphonates reduce fracture risk by 25% to 50%.

Glucocorticoid-induced osteoporosis (GIOP) and myopathy



Loss of bone mineral density under treatment with glucocorticoids



Osteoporosis Int 2002;13;650-

J Bone Min Res 2000;15;1645-
Ann Rheum Dis 2005;64;176-

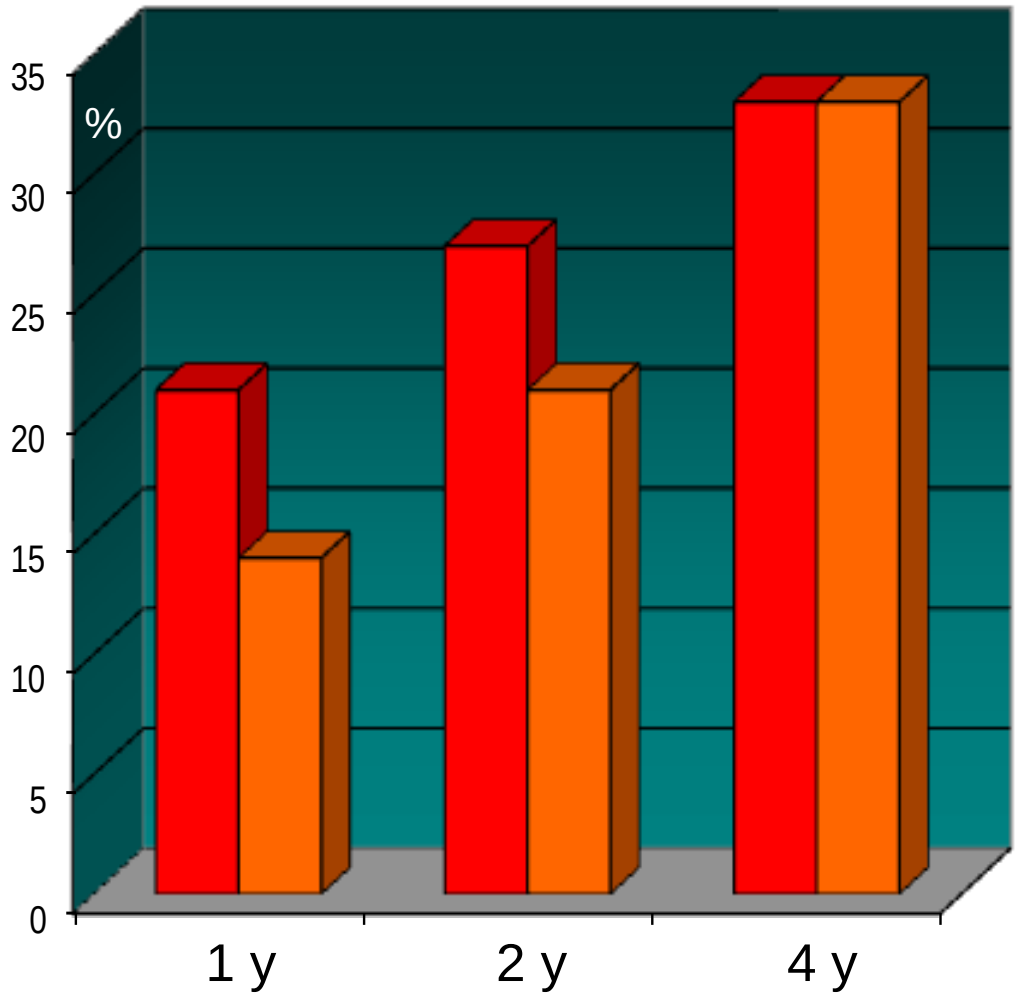
Frequency and predictors of osteoporotic fractures after transplantation *Lancet 2001;357;342-*

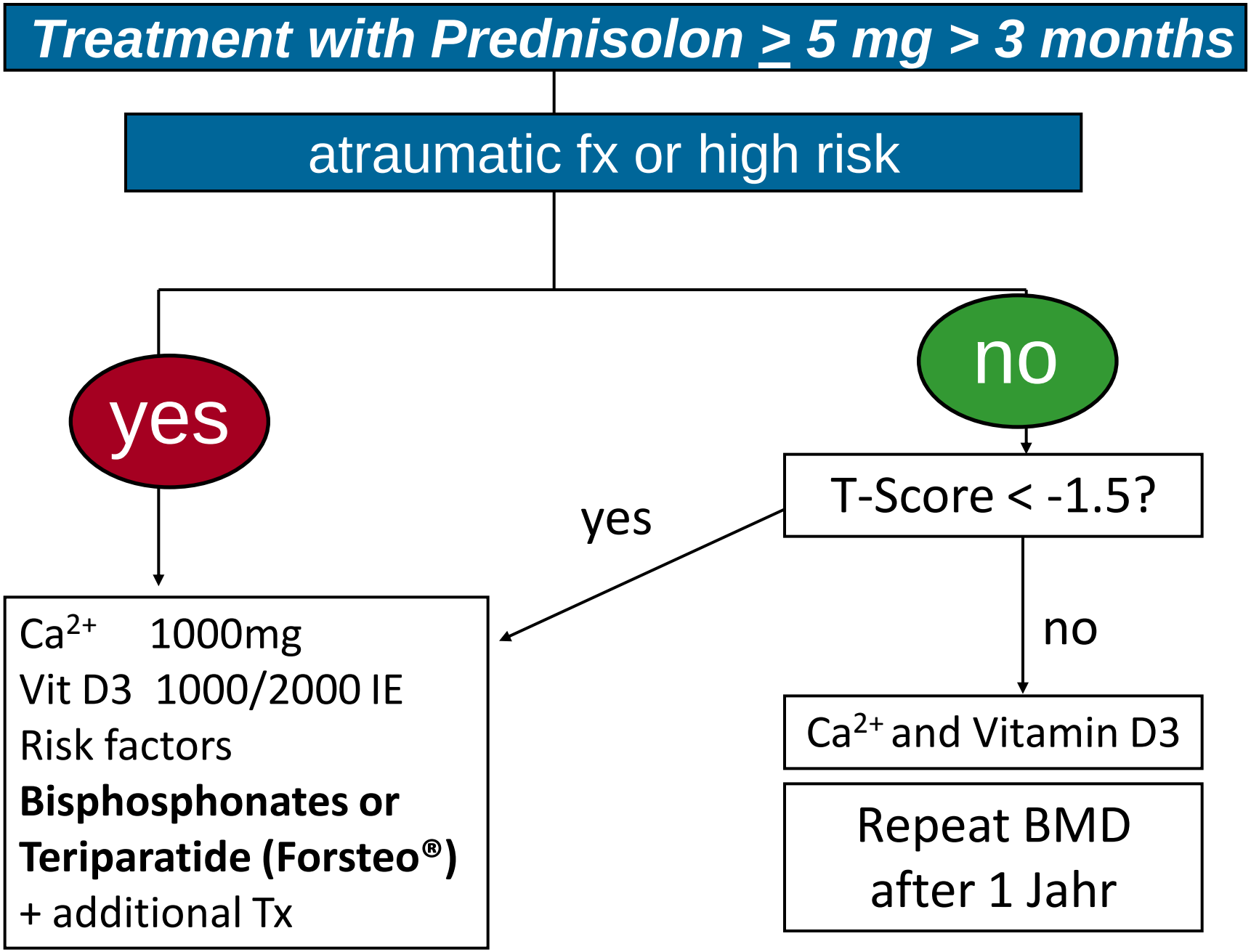
235 Organ-Tx →
105 heart transpl.
130 liver transpl.

Osteoporotic fractures 1, 2 and 4 years after transplantation

Risk factors:
Age 1.71/5y
BMD 1.97/SD
Vert Fx **6.07**

„...a neglected problem...“ *P Delmas*




Treatment with Prednisolon ≥ 5 mg > 3 months
atraumatic fx or high risk
yes
no
T-Score < -1.5?
yes
no
Ca2+ 1000mg
Vit D3 1000/2000 IE
Risk factors
Bisphosphonates or Teriparatide (Forsteo®)
+ additional Tx
Ca2+ and Vitamin D3
Repeat BMD after 1 Jahr

Summary

1. 50% of patients on long-term glucocorticoids will suffer fragility fractures.
2. 10% of bone is lost in the first 6 months of GC treatment.
3. Preventive pharmacological treatment is indicated when there are fragility fractures or T-Score <1.5.
4. GC-induced myopathy and avascular necrosis.

Drug-induced osteoporosis

Glucocorticoids

Aromatase inhibitors (Arimidex®, Femara®)

GnRH agonists (Zoladex®)

Cyclosporine A

Thiazolidinediones (Avandia®, Actos®)

Anticonvulsants (Depakine®, Phenytoin)

Heparine

Antidepressants (SSRI)

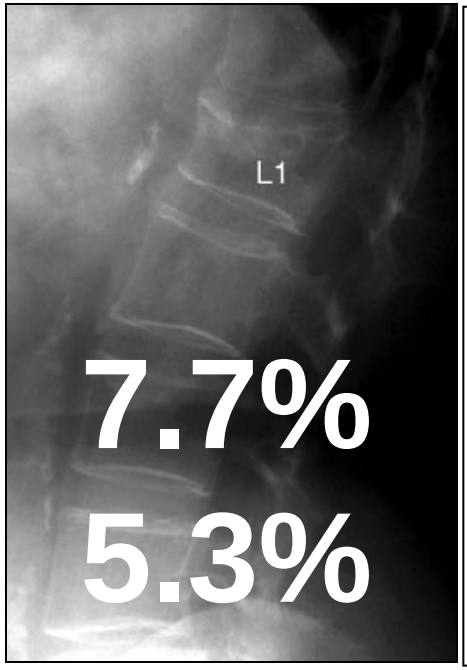
PPI (Omeprazol, Pantoprazol)

…

→ Admitted because of „deterioration of general health“

→ 1999 femoral neck fracture, 2003 myocardial infarction, 2005 pneumonia

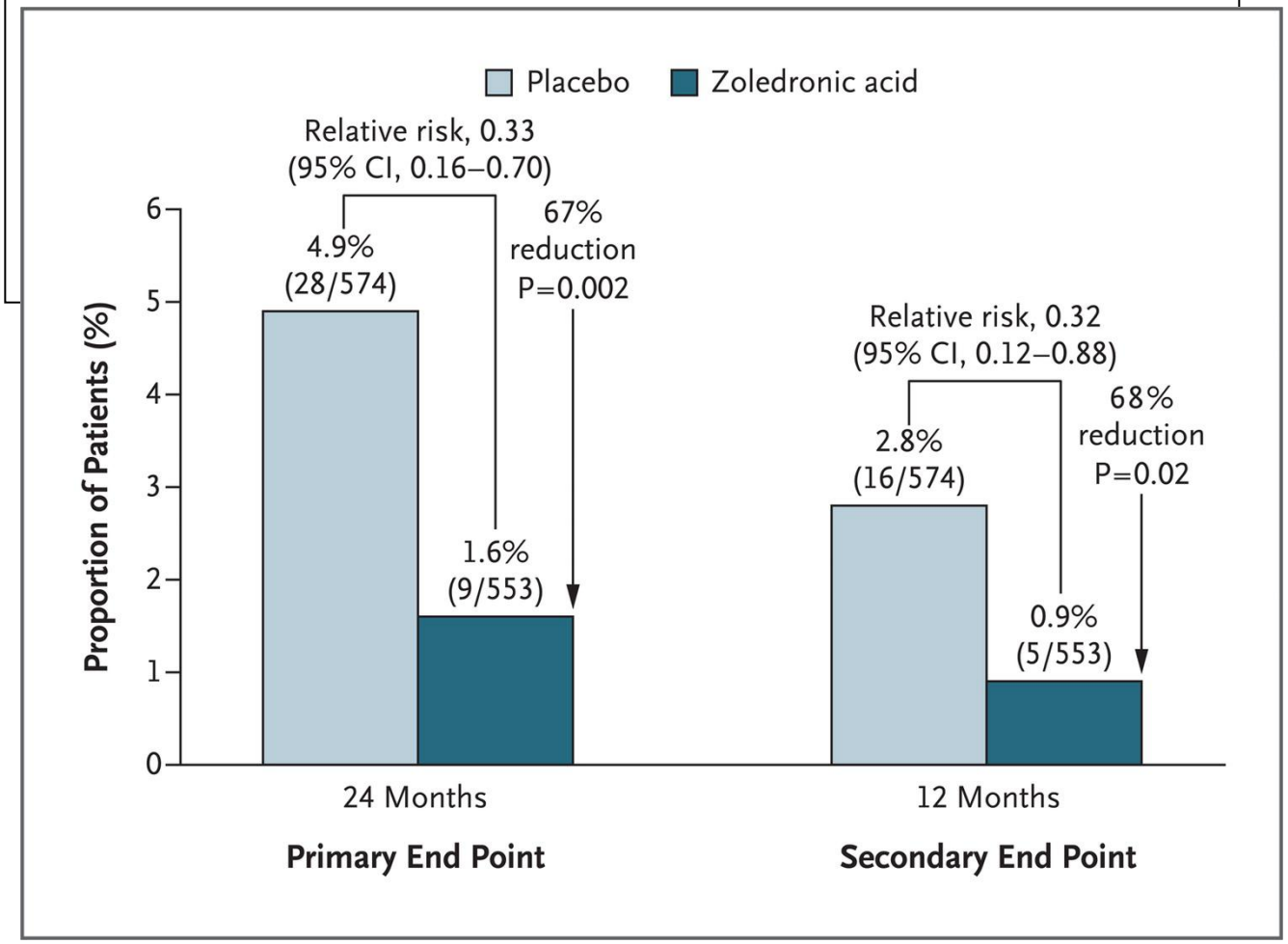
→ BP 134/76, P 88/min, 167cm (-12cm), 75 kg, no body hair, gynecomastia +/+, testicular volumen <3ml



Prevalent vertebral deformities predict hip fractures and new vertebral deformities

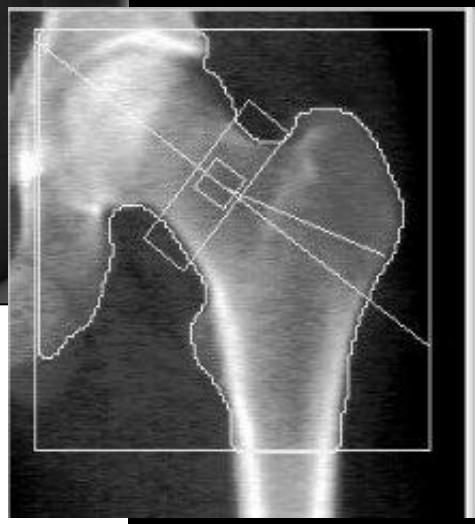
Black et al, J Bone Miner Res 1999;5;821
Panneman MJM et al, Osteoporos Int 2004;15;120

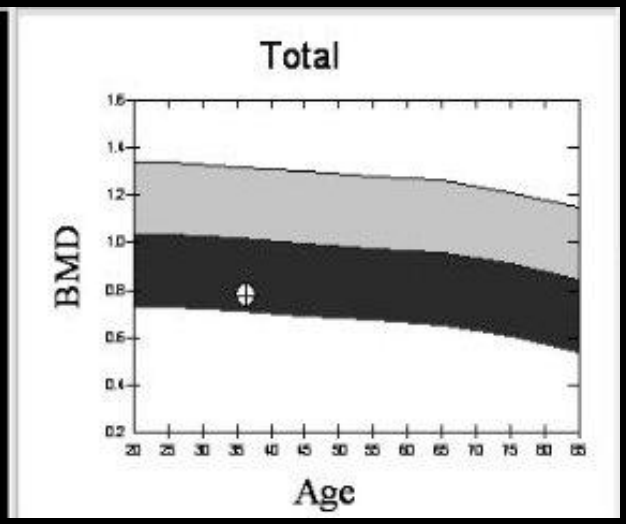
1199 males with hypogonadism and osteoporosis

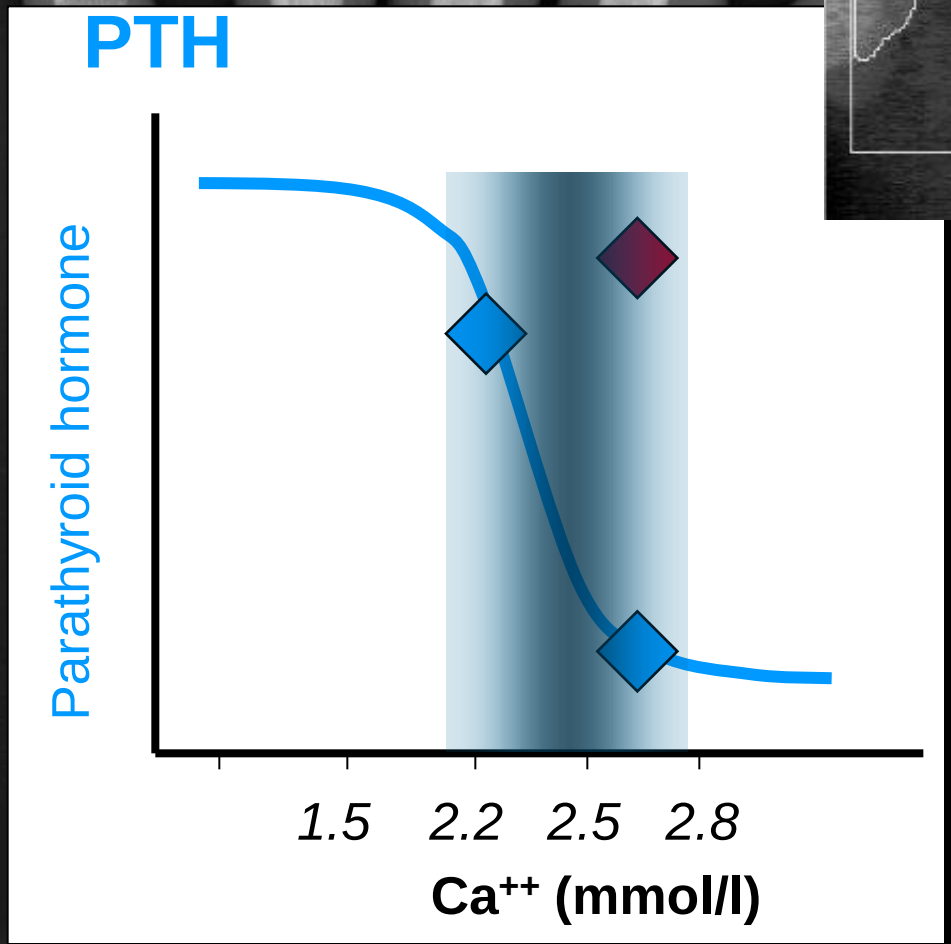


Boonen S et al. N Engl J Med 2012;367:1714-

Osteopenia/porosis of cortical bone







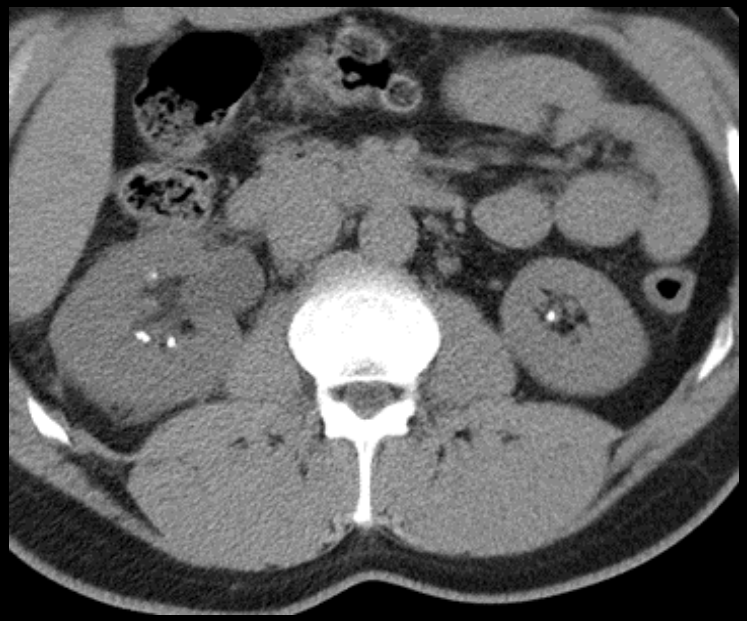
Mr S.W., 1976

Fatigue, diffuse Arthralgias

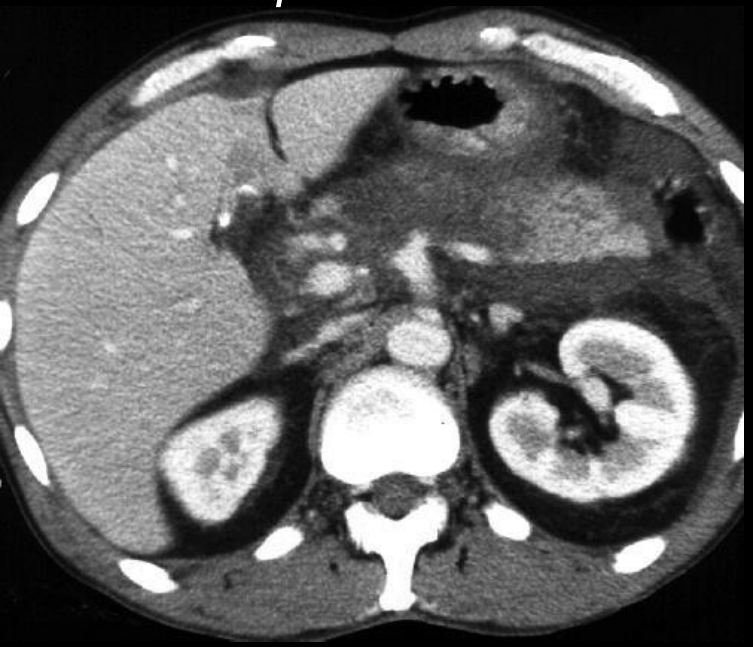
Ca^{2+} 2.69 (N 2.1 - 2.6)

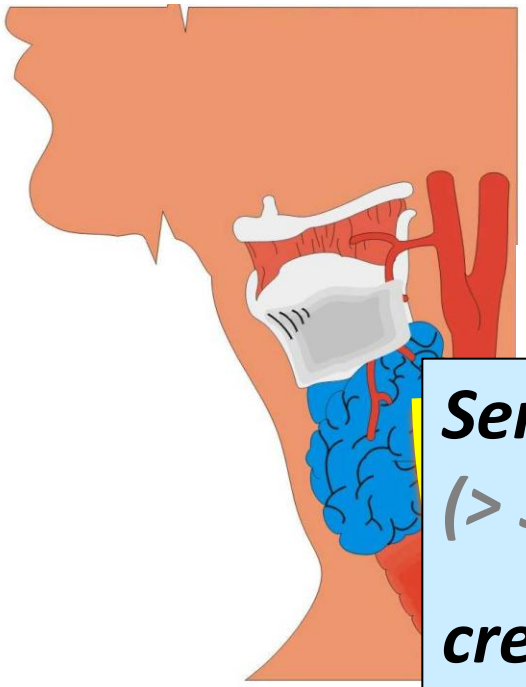
Phosph 0.7 (N 0.9 - 1.5)

PTH 59 *(N 13 - 65)*



nephrolithiasis 15%
acute pancreatitis 5%





Calcium

Serum calcium >0.25 mmol/l (>1mg/dl) UNL
(> 3 mmol/l [>12mg/dl])

creatinine clearance < 60 ml/min
reduced creatinine clearence > 30%

T-score < -2.5 SD (or previous fracture)

age < 50 y

hypercalciuria > 100 mmol/24h
hypercalcaemic crisis

JCEM 2009;94:335-

Phosphate ▼ HCO_3^-

Mrs W. O., 1952

Diabetes mellitus type 1
Early menopause 38 y

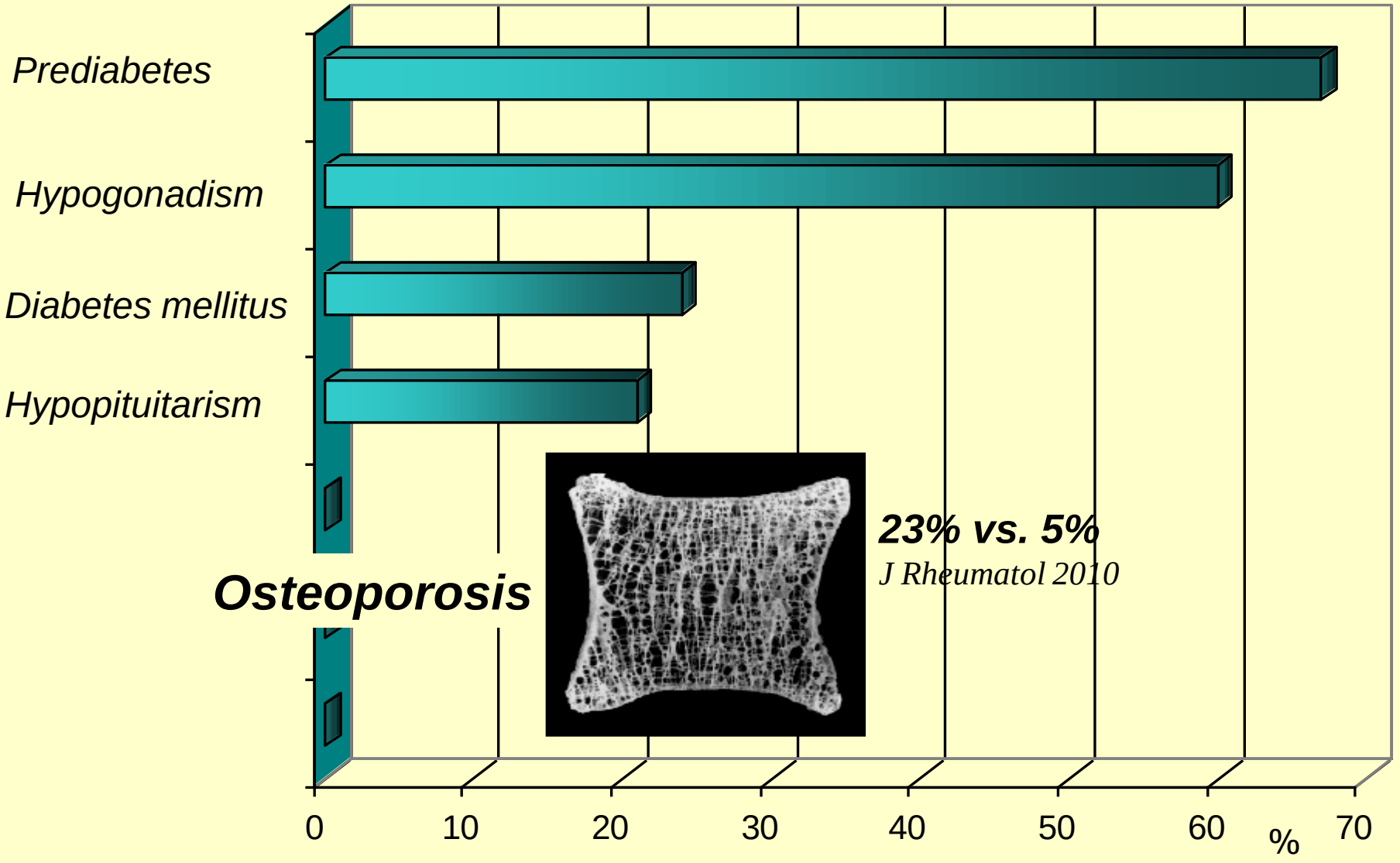
Diffuse arthralgias, particularly of finger joints

FSH	< 0.1 IU/l
Estradiol	< 180 pmol/l
TSH	1.2 mU/l
fT4	5.6 pmol/l
Cortisol	191 nmol/l

ALAT: 88 U/l (n <40)
ferritin: 567 mcg/l (n 30-300)
transferrin saturation: 54%
HFE: homozygous C282Y

Hemochromatosis and endocrine diseases

Transfusion 2010, Thyorid 2008, J Endocr Invest 1999, Acta Clin 1999, Osteop Int 1996, JCEM 1993, Ann Int Med 1989.



Mrs T.H., 1951

Laboratory findings:

HbA1c	**9.7%**	*(3.0-6.0)*
Calcium	2.26	*(2.1-2.7)*
Ferritin	**7**	*(30-300)*
sTR	**5.9**	
TSH	2.5	*(0.2-4.2)*
Hb		*-1*
MCV		*8-*

T-Score (femoral): **-3.1**

Polyglandular autoimmune syndrome

PGAS type I

AIRE chrs 21
candidiasis
hypoparathyroidism

PGAS type II

HLA-DR associated
"pansteroid" cell
antibodies (Schmidt)

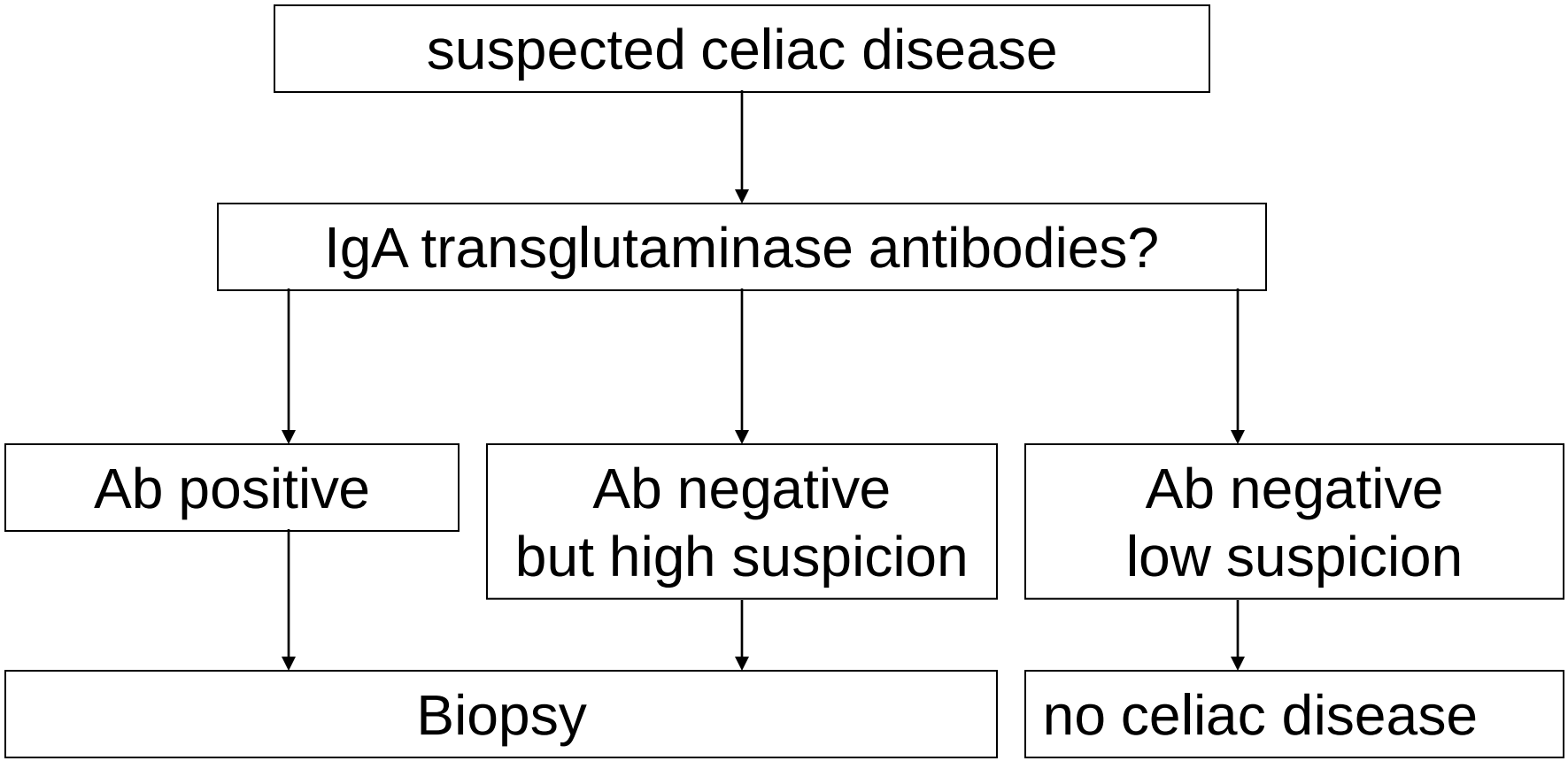
PGAS type III

associated with rA,
myasthenia, celiac
disease, pbc…

Clinical findings

Iron deficiency, folic acid deficiency
Diarrhea, "irritable bowel syndrome", aphthous stomatitis
Osteoporosis / osteomalacia, arthralgia
Chronic fatigue syndrome, depression
Vitamin K deficiency, thrombocytosis, "transaminitis"
Recurrent miscarriages, infertility (4-8%)
Polyneuropathy, ataxia, "unexplained" neurological findings…

Celiac disease: diagnosis



positive biopsy and negative Ab
→ differential diagnosis!
→ IgA deficiency?

Celiac disease: treatment

Gluten-free diet

No wheat, rye and barley (oat) gluten
avoid lactose (at baseline)
supplementation of iron, folic acid and calcium
CAVE "gluten contamination"
no beer
wine, spirits and liquor permitted
(malabsorption: parenteral medication!)

Summary

1. Common cause of osteoporosis I: hypogonadism (e.g. Klinefelter 1:500)
2. Common cause of osteoporosis II: hyperparathyroidism (of cortical bone)
3. Common cause of osteoporosis III: hemochromatosis (beaks)
4. Common cause of osteoporosis IV: malabsorption syndromes (celiac disease, IBD, after gastric-bypass surgery…)

Summary II

5. Rare causes of osteoporosis:
   osteogenesis imperfecta (blue sclerae),
   multiple myeloma, mastocytosis…