Treatment of Osteoporosis

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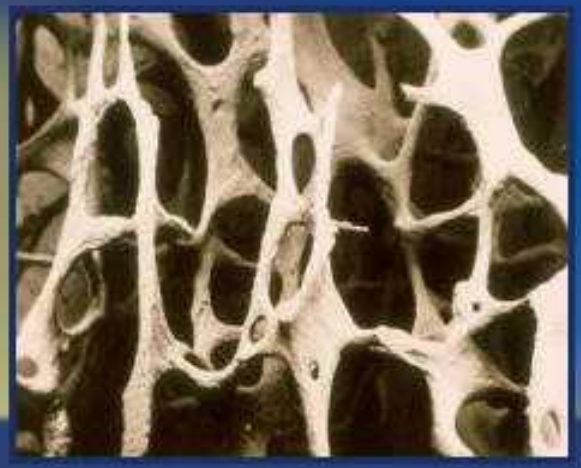
Definition of Osteoporosis

A disease characterized by low bone mass and micro-architectural deterioration of bone tissue leading to enhanced bone fragility and a consequent increase in fracture risk.

World Health Organization (WHO), 1993

Normal bone



Osteoporosis

Therapy Update

Actions	Antiresorption	Formation
Cell effect	Osteoclast	Osteoblast
Bone Effect	Stabilisation	Increase
Target	High turnover	Low turnover
Agents	Estrogen	Vitamin D
	Calcitonin	Fluoride
	SERMs	Anabolic Steroids
	Bishosphonates	PTH and PTH_{RP}
		Growth hormone

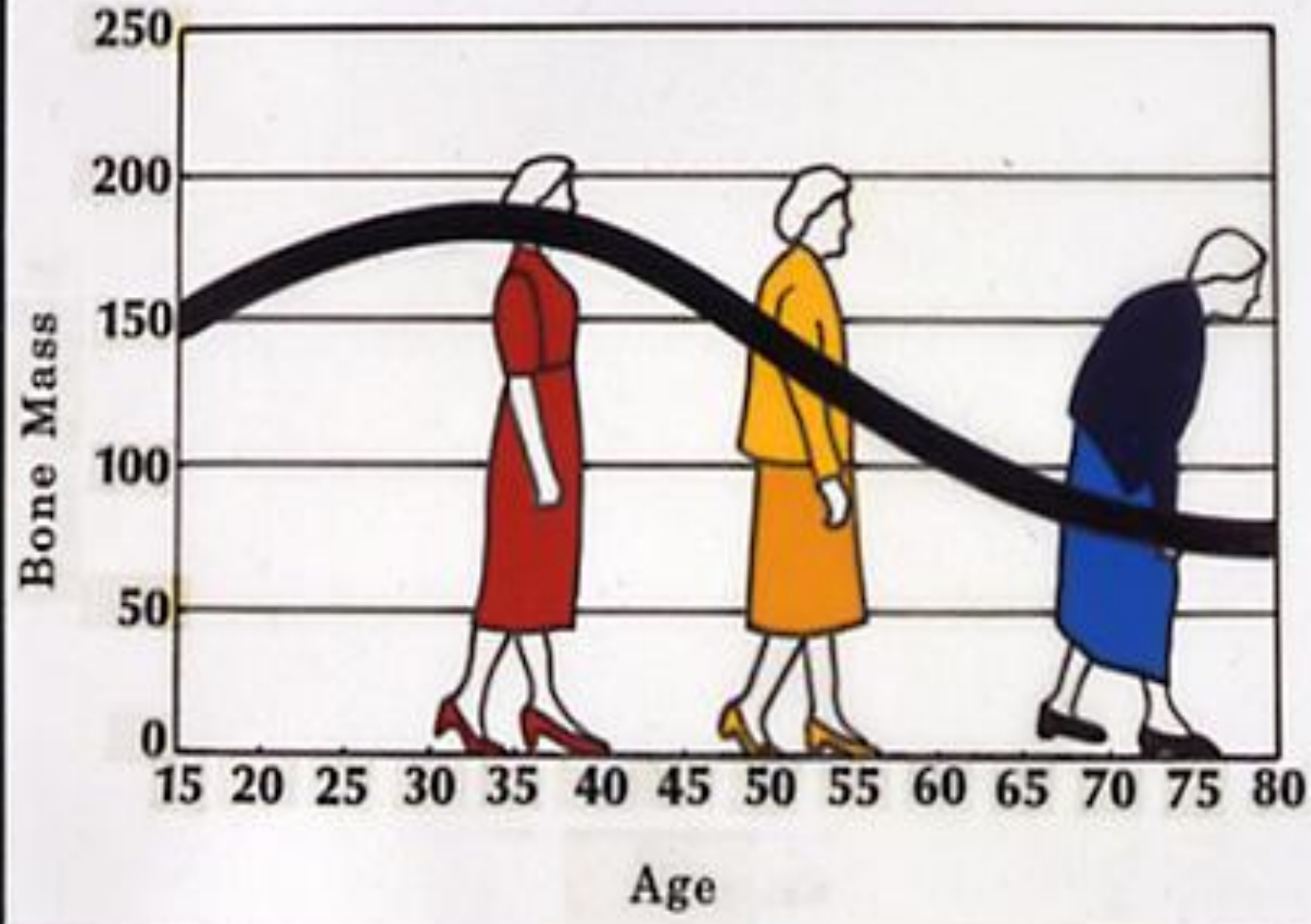
- Strontium Ranelate
- Physical Activity
- Calcium
- Hip Protectors
- Balloon Kyphoplasty

RISK FACTORS : CONTROL

YES NO

- Smoking
- Alcohol
- Avoidance of dairy products
- Lack of exercise
- Caffeine
- Too many carbonated (“soft”) drinks
- High protein diet
- PO_4
- Childless

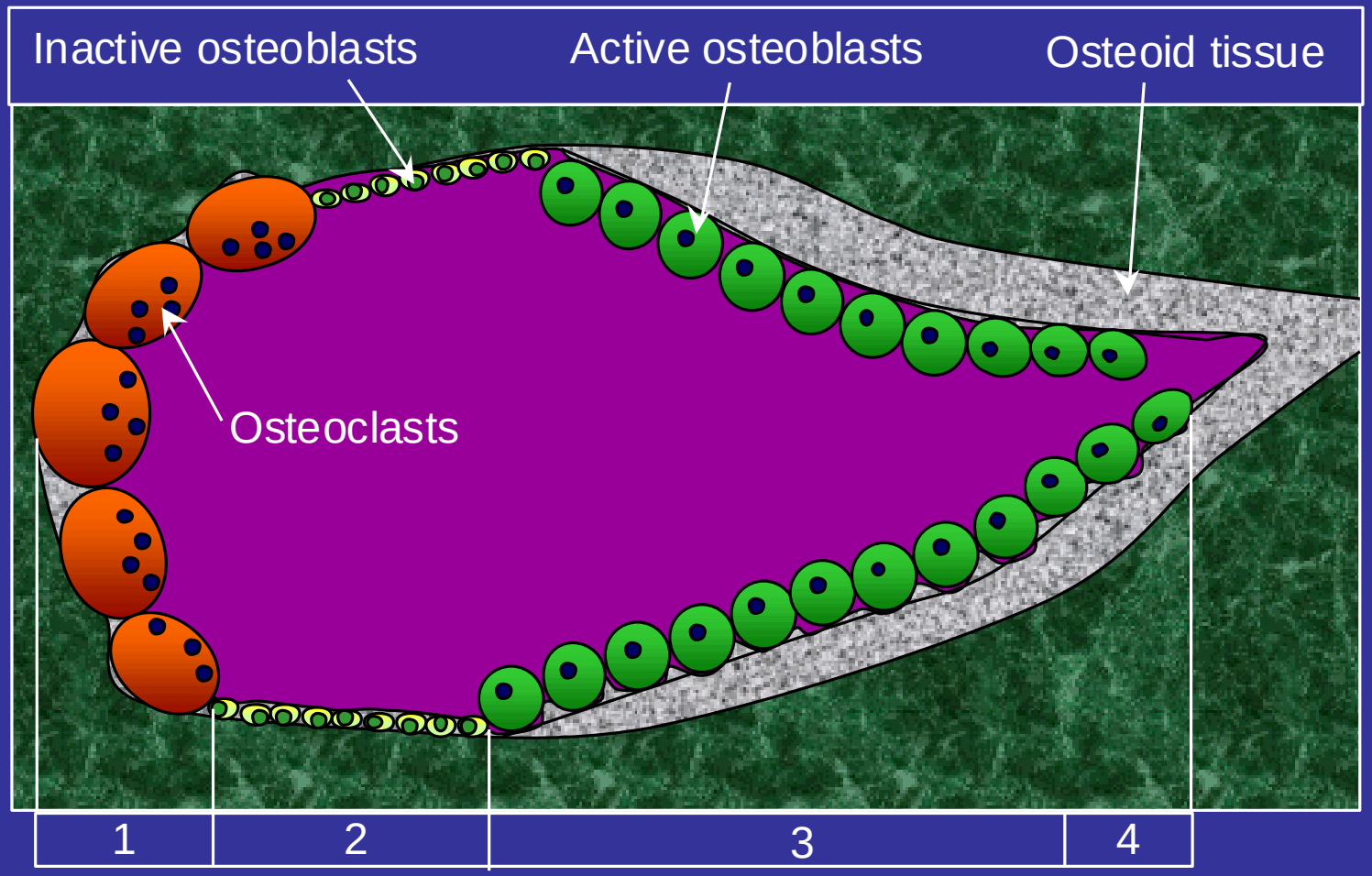
2 or more YES


250
200
150
100
50
0
Bone Mass
15 20 25 30 35 40 45 50 55 60 65 70 75 80
Age

ETIOLOGY

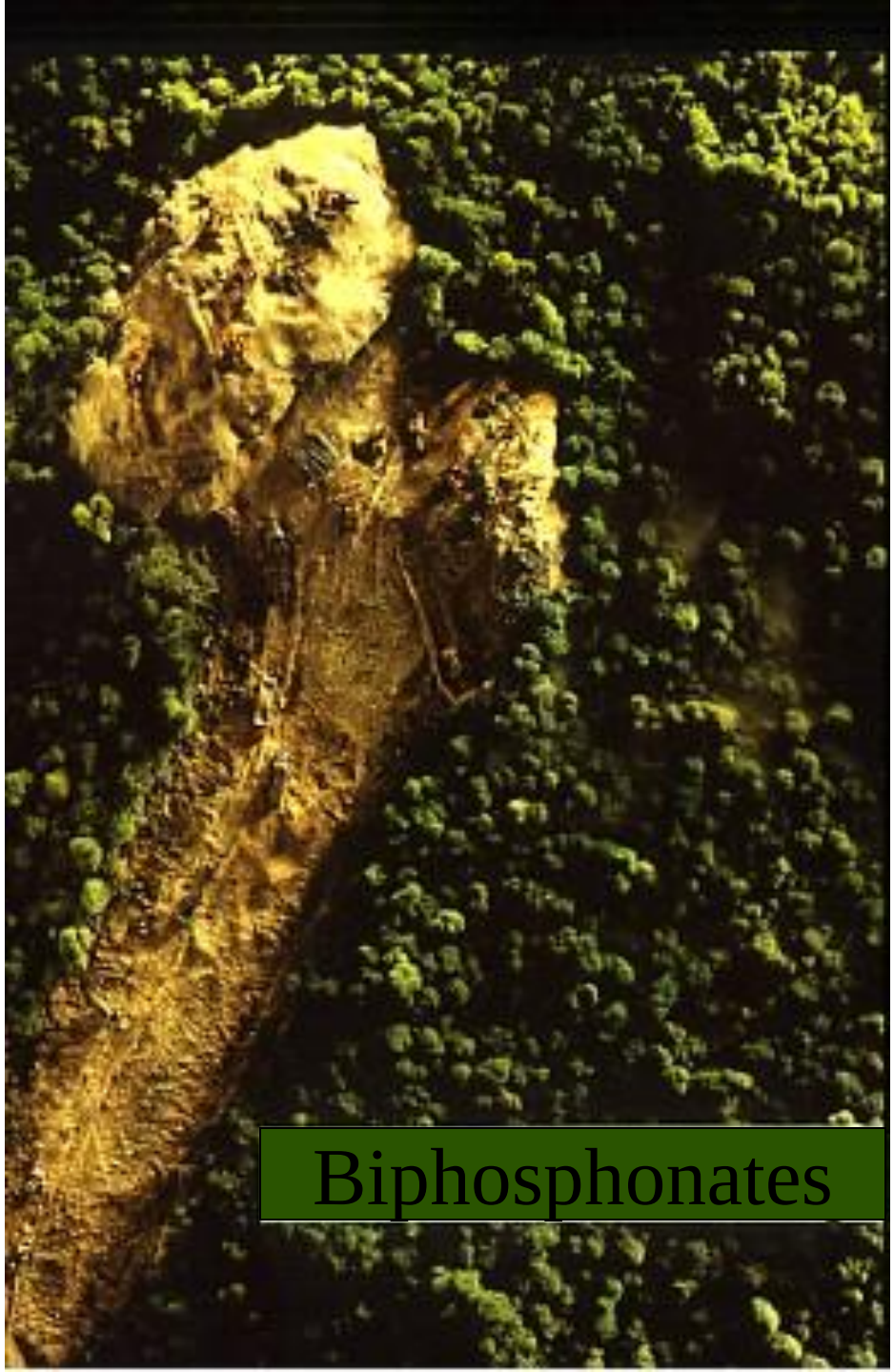
Age 1% loss / yr

E 50-65 yr → Trab bone loss 2-3%



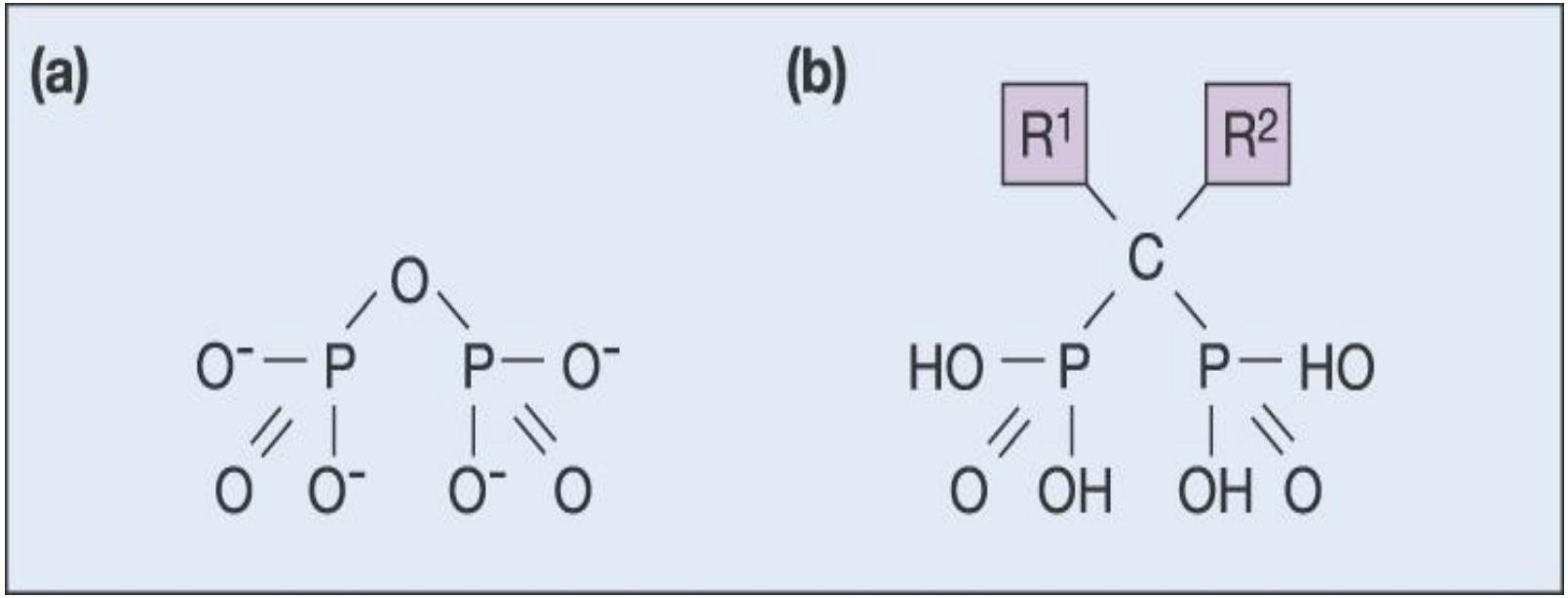
Sahara

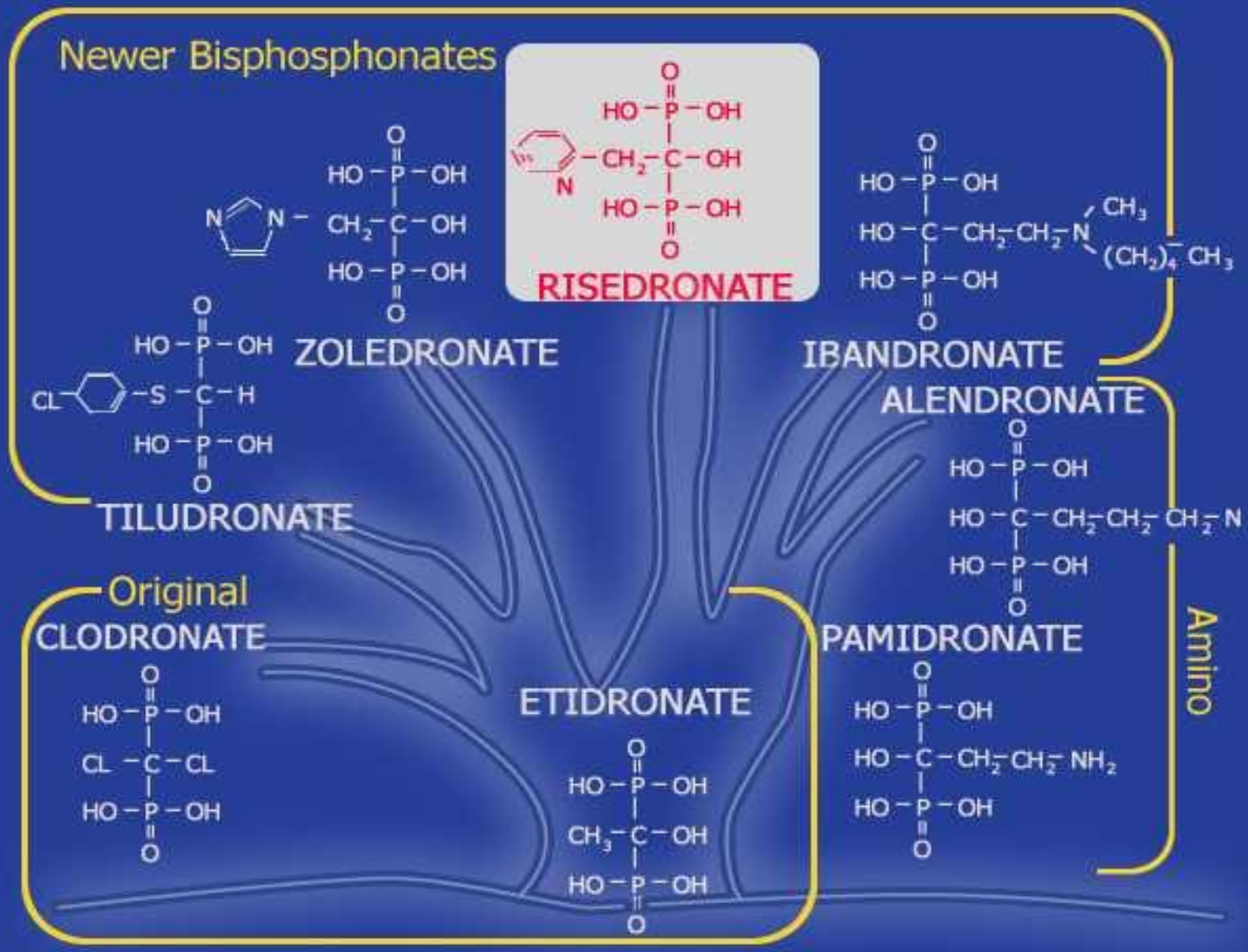

Precision
Accuracy



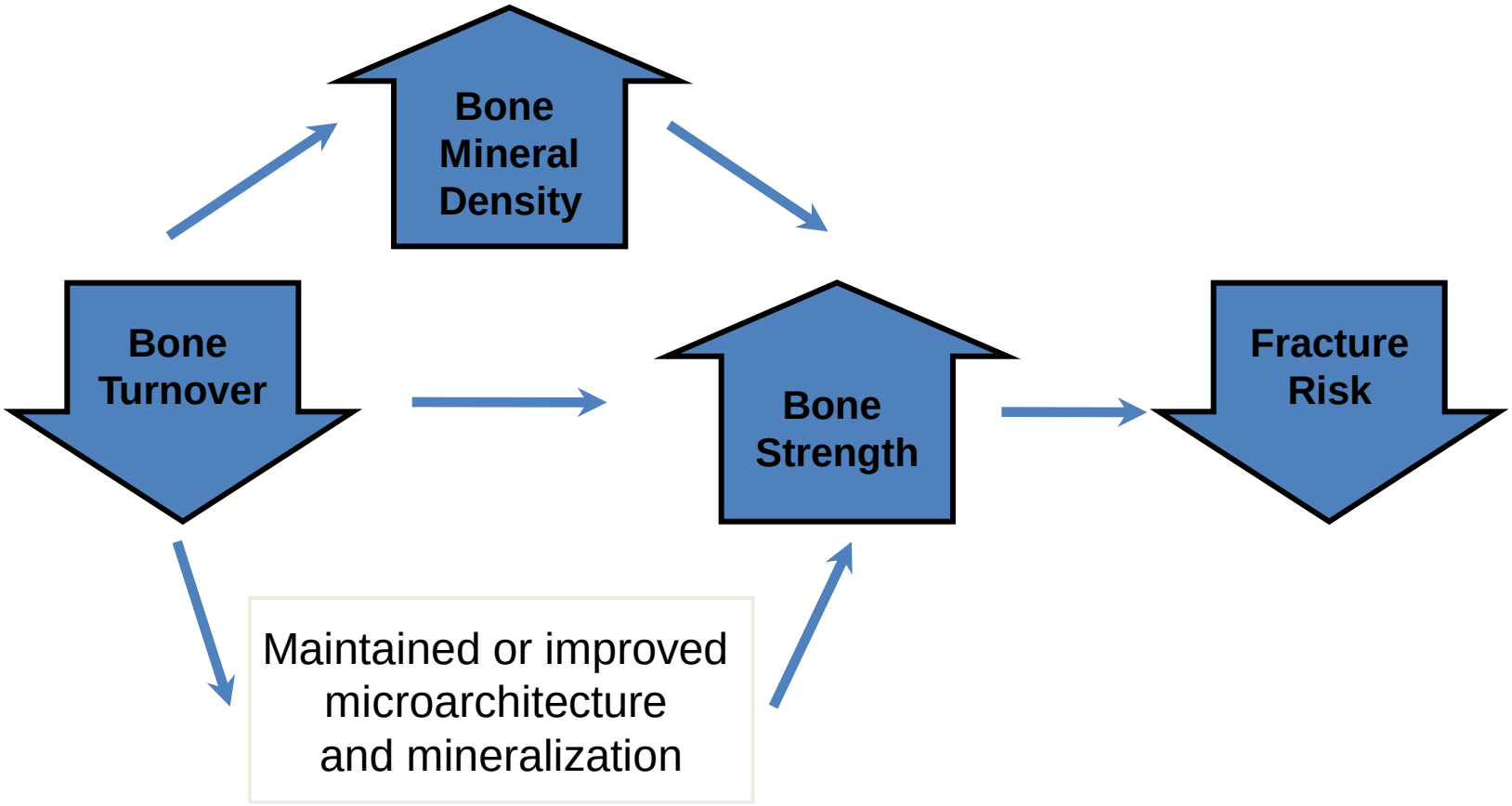
Biphosphonates

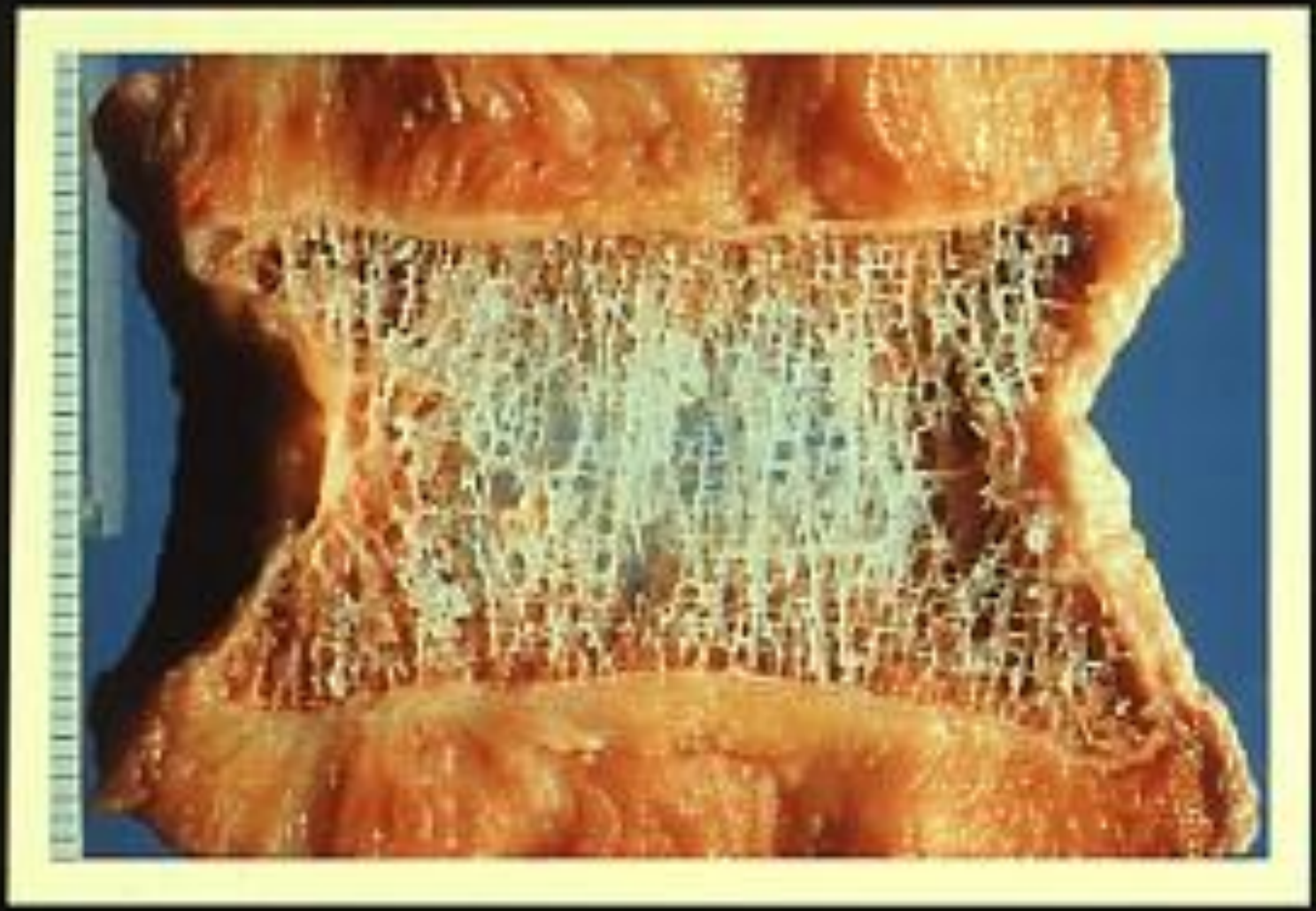
General structure of pyrophosphate and bisphosphonates

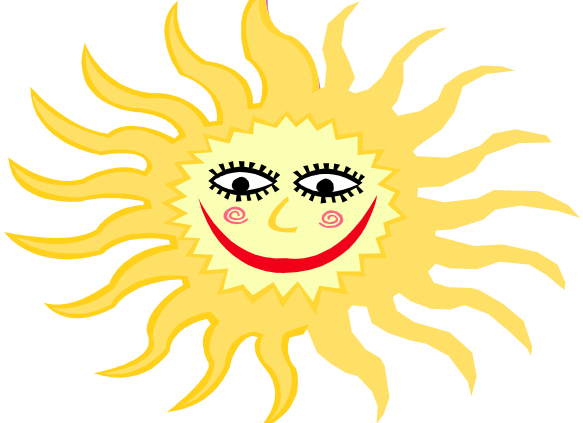



Newer Bisphosphonates
RISEDRONATE
ZOLEDRONATE
IBANDRONATE
ALENDRONATE
TILUDRONATE
PAMIDRONATE
Amino
Original
CLODRONATE
ETIDRONATE

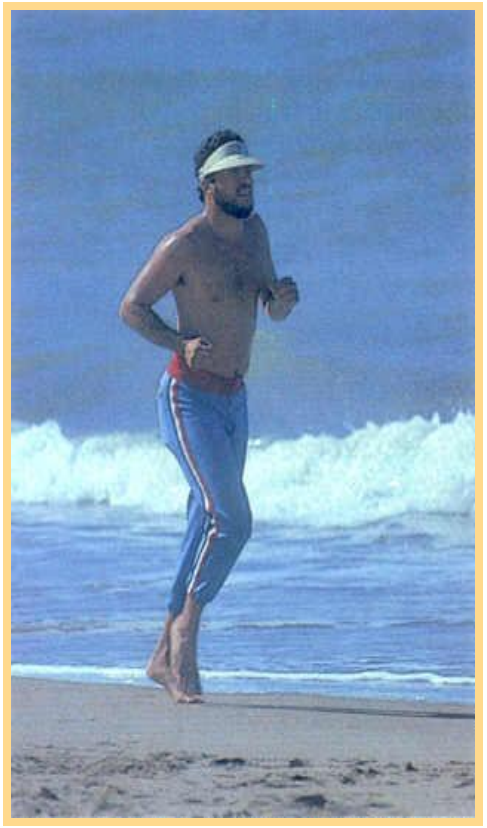
How Bisphosphonates Work in Osteoporosis

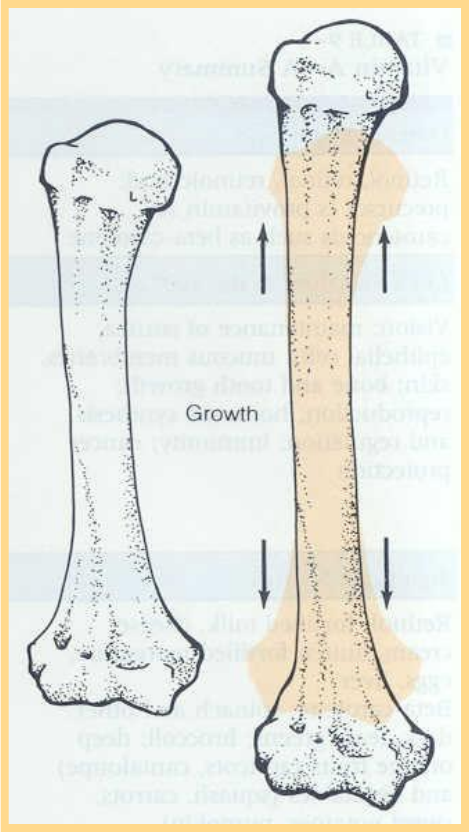


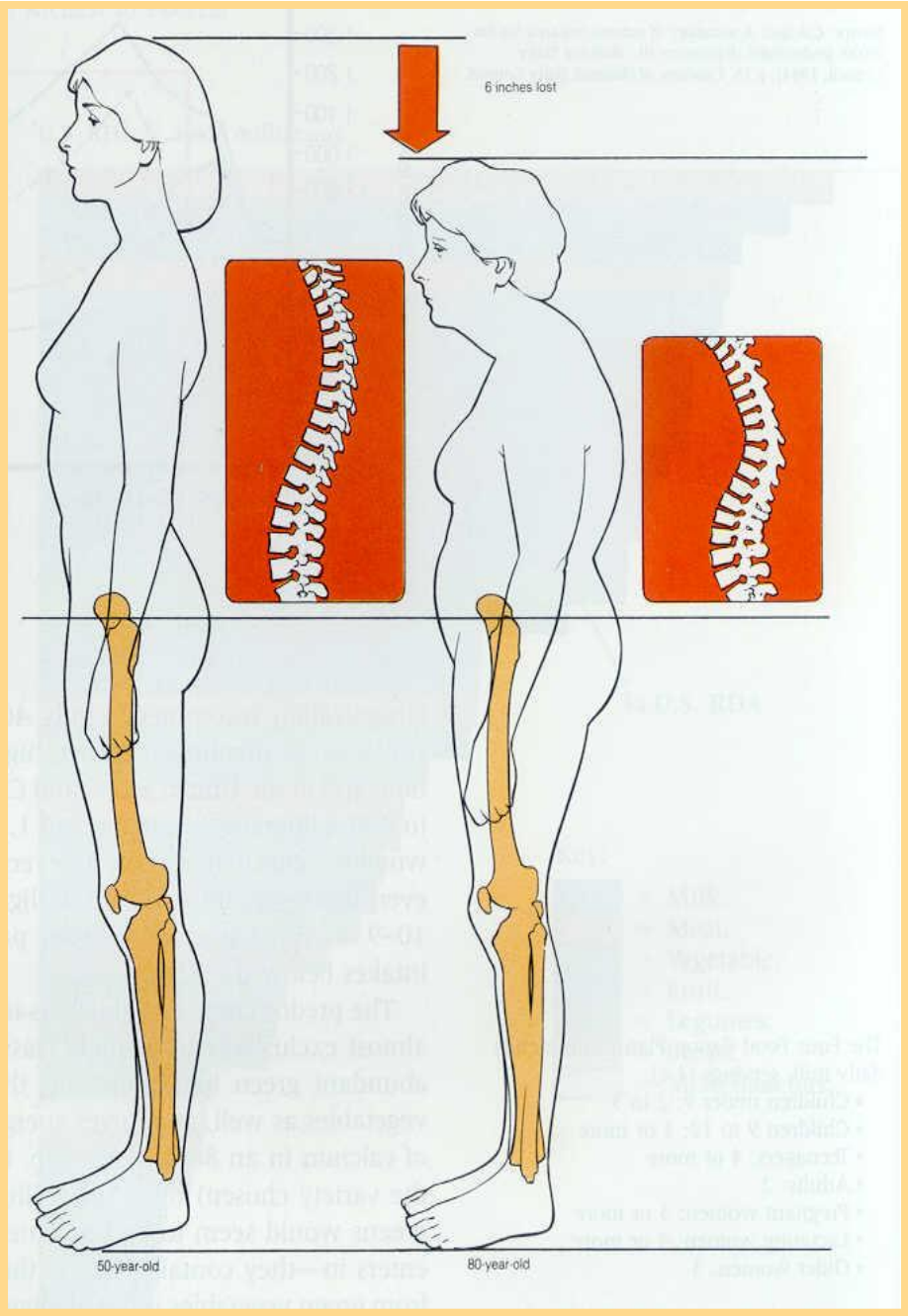




Vitamin D

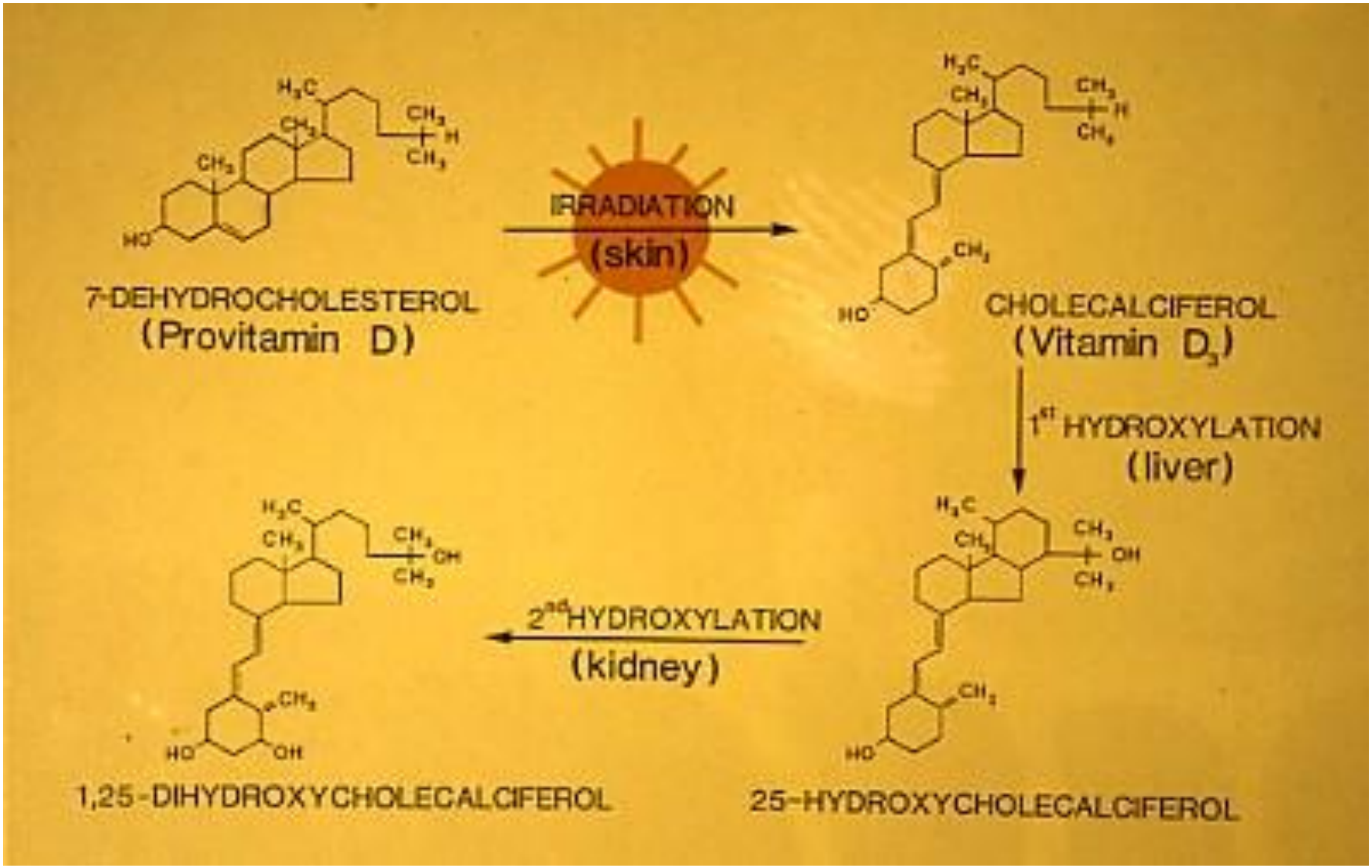


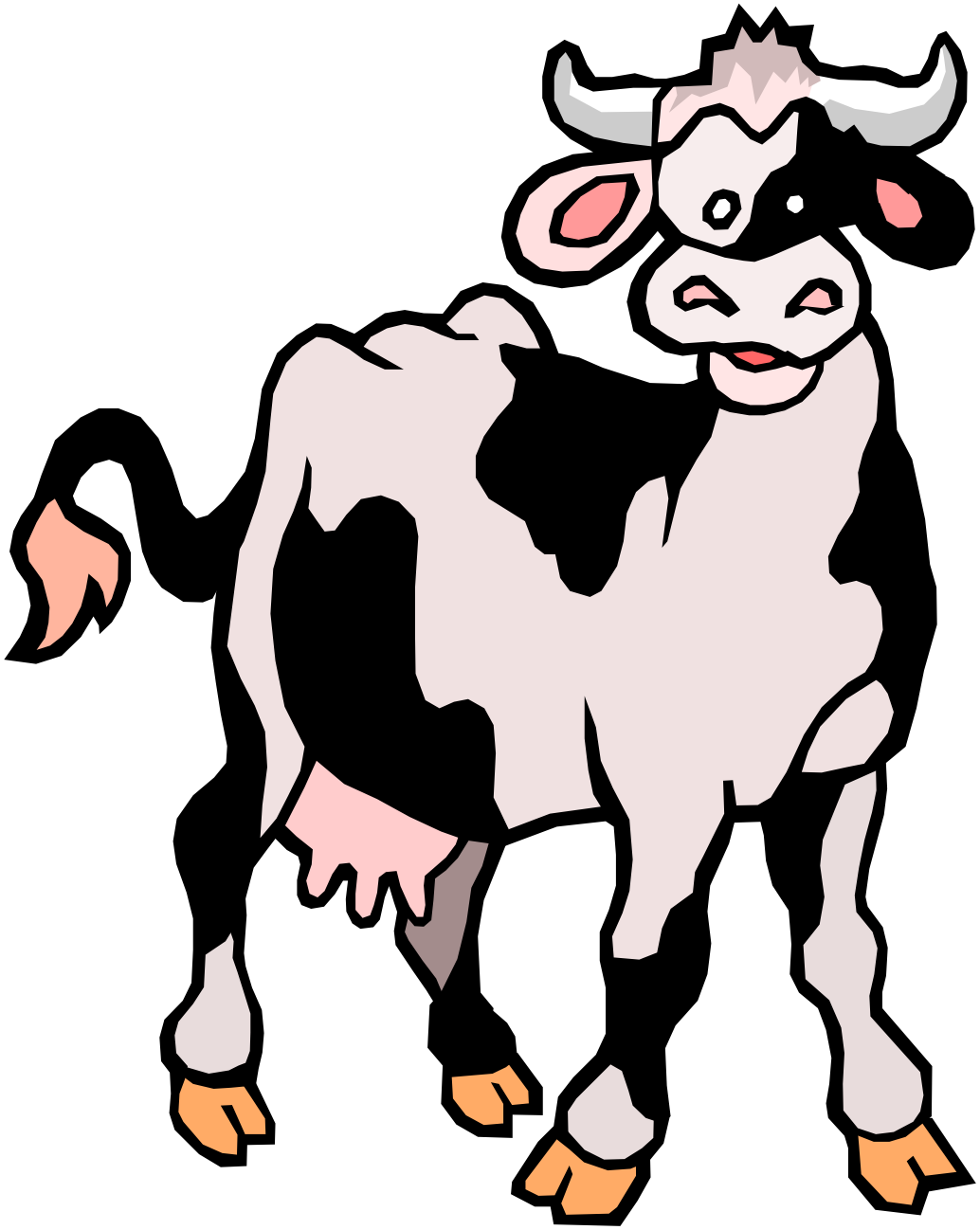




HOLICK'S DATA RECOMMENDS

Hands, arms and faces suberythermal doses of sunlight 10-15 min. two or three times weekly.


7-DEHYDROCHOLESTEROL
(Provitamin D)
IRRADIATION
(skin)
CHOLECALCIFEROL
(Vitamin D3)
1st HYDROXYLATION
(liver)
25-HYDROXYCHOLECALCIFEROL
2nd HYDROXYLATION
(kidney)
1,25-DIHYDROXYCHOLECALCIFEROL



Calcium


Calcium
Sandoz
Citrical
Citrate
300
Ca-C 100
Sandoz
MITE

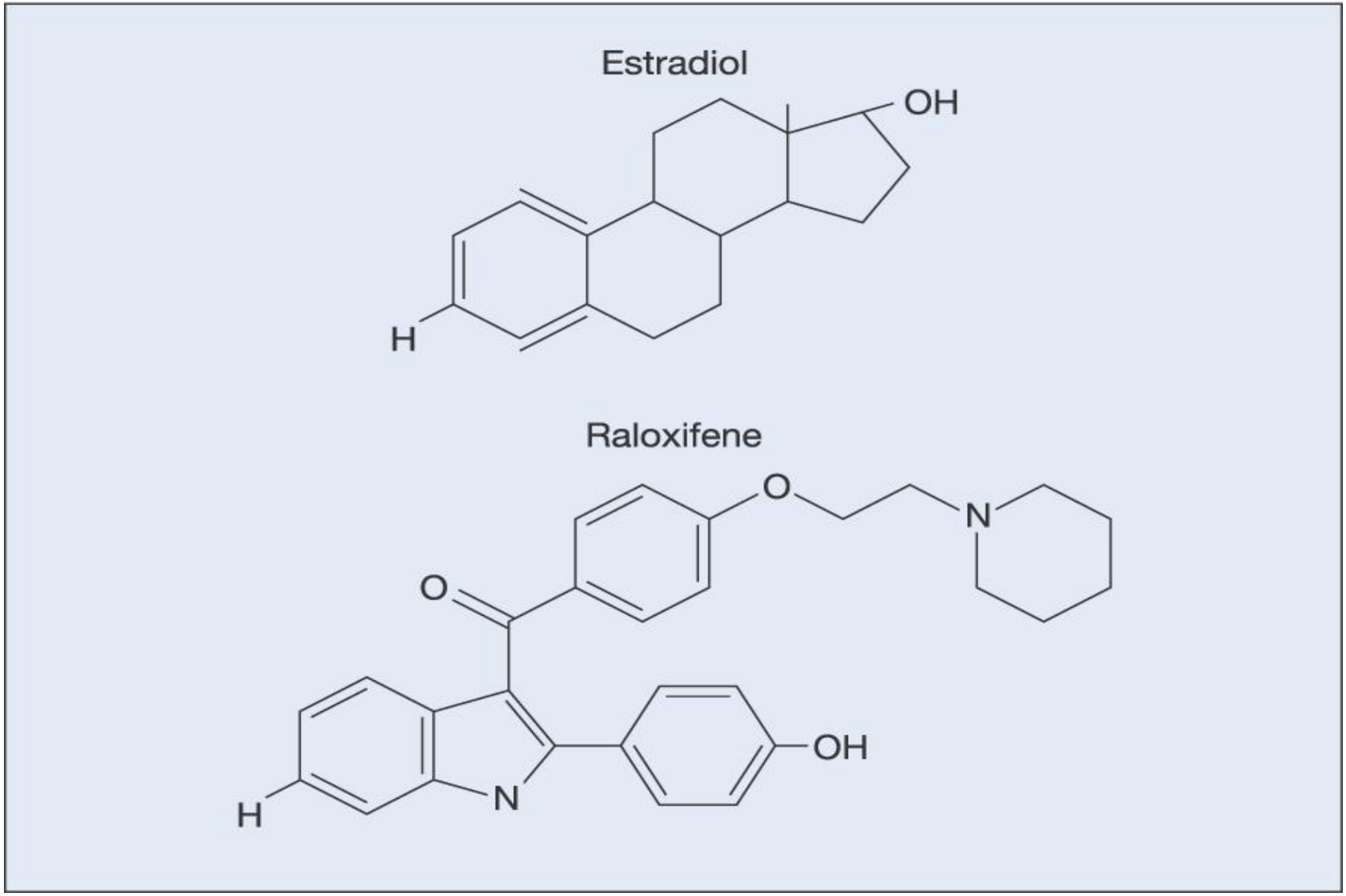
DAILY CALCIUM REQUIREMENTS

Age	Daily / mg
• 1-9	800
• 10-18	1200
• 19-menopause	1000
• Pregnancy	1200 - 1500
• Breast feeding	1200 - 1500
• Men	1000

CALCIUM SUPPLEMENTATION

	% Ca
Calcium Carbonate	40
Calcium Sulphate	36
Calcium Phosphate	30
Calcium Lactate	18
Calcium Gluconate	9
Calcium Malate	30

Structure of estradiol and raloxifene

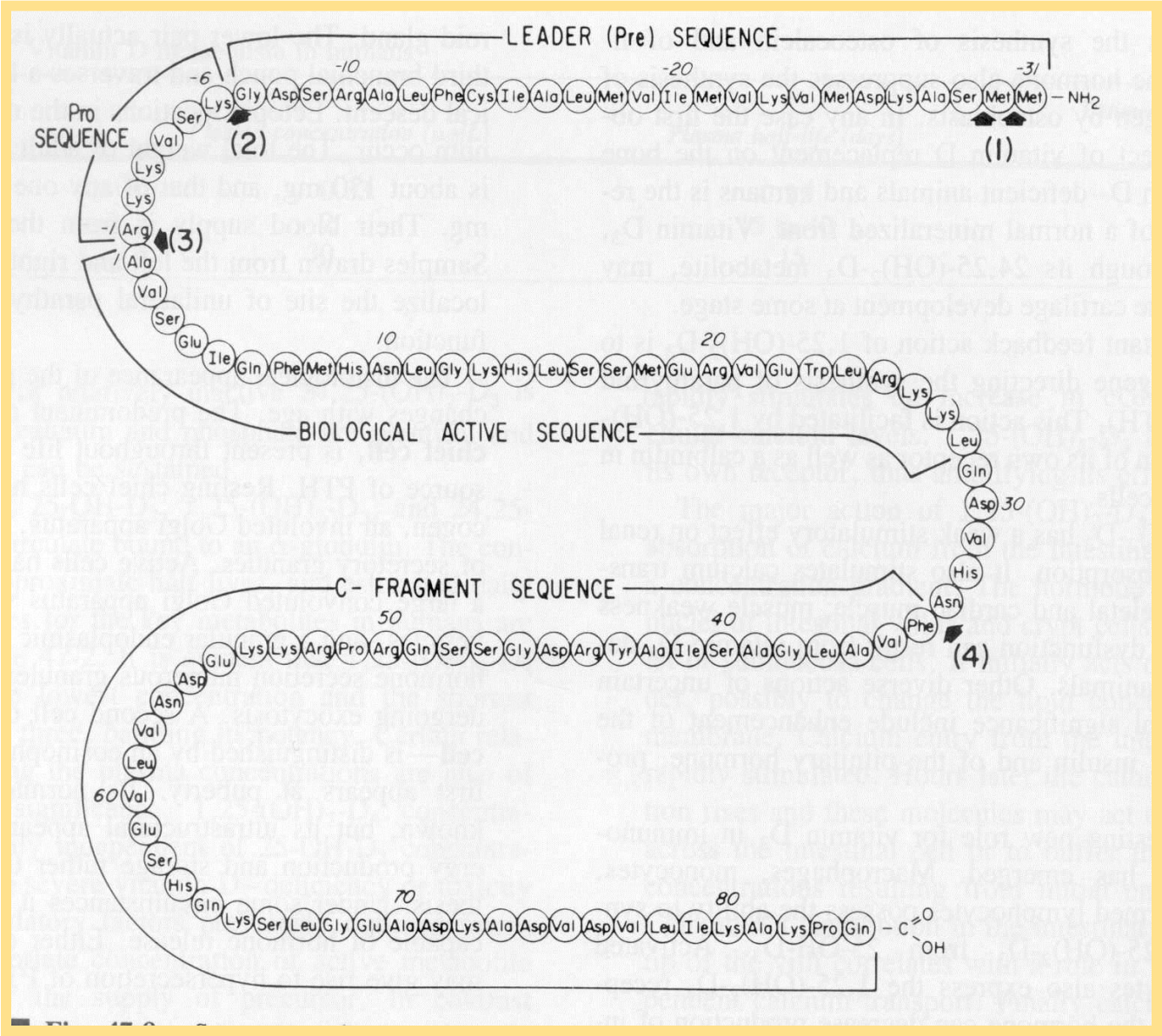


The Seven Dwarves of Menopause

Itchy, Bitchy, Sweaty, Sleepy, Bloated, Forgetful & Psycho

Anabolic Steroids

Parathyroid Hormone

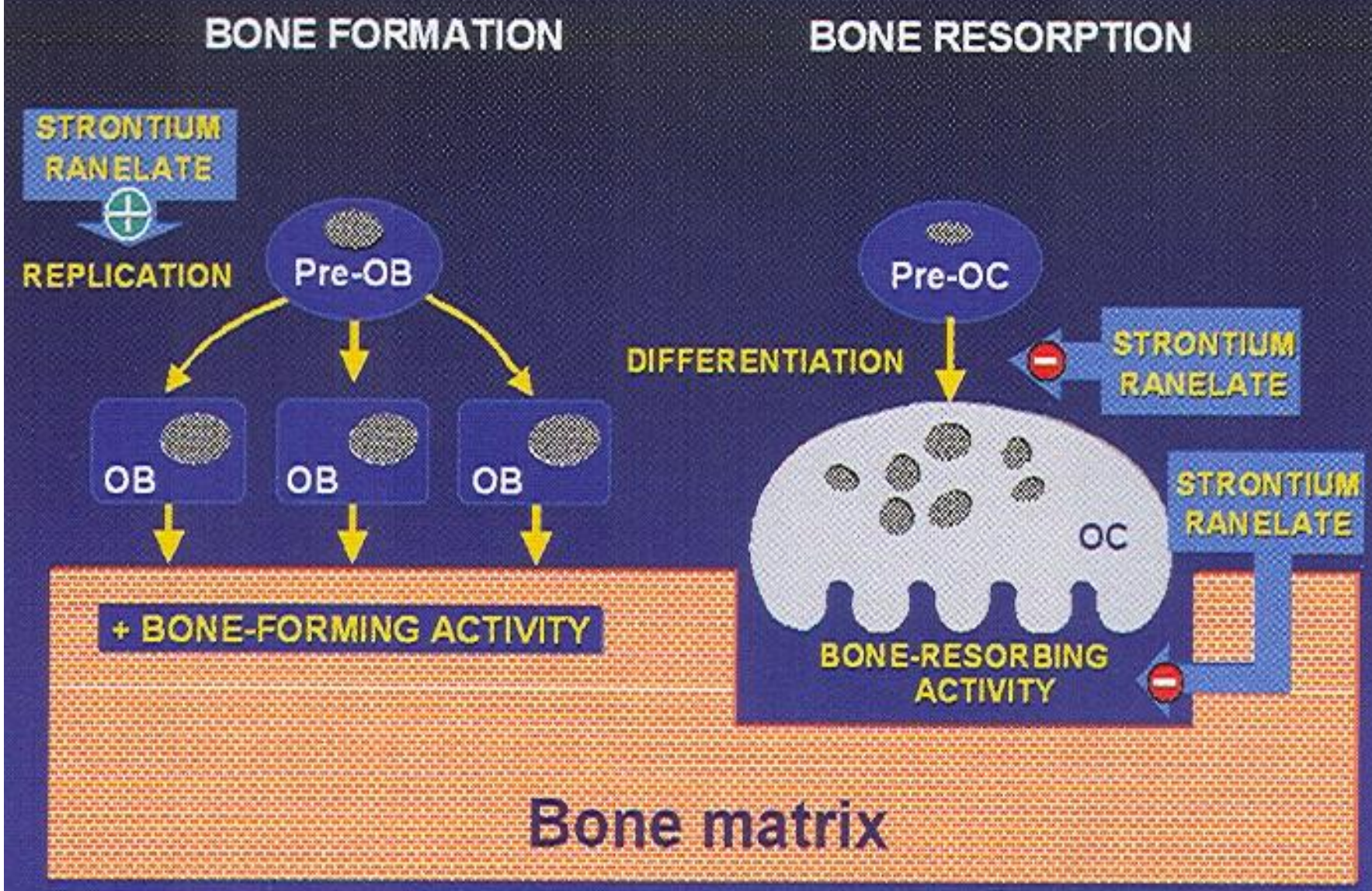



Calcitonin

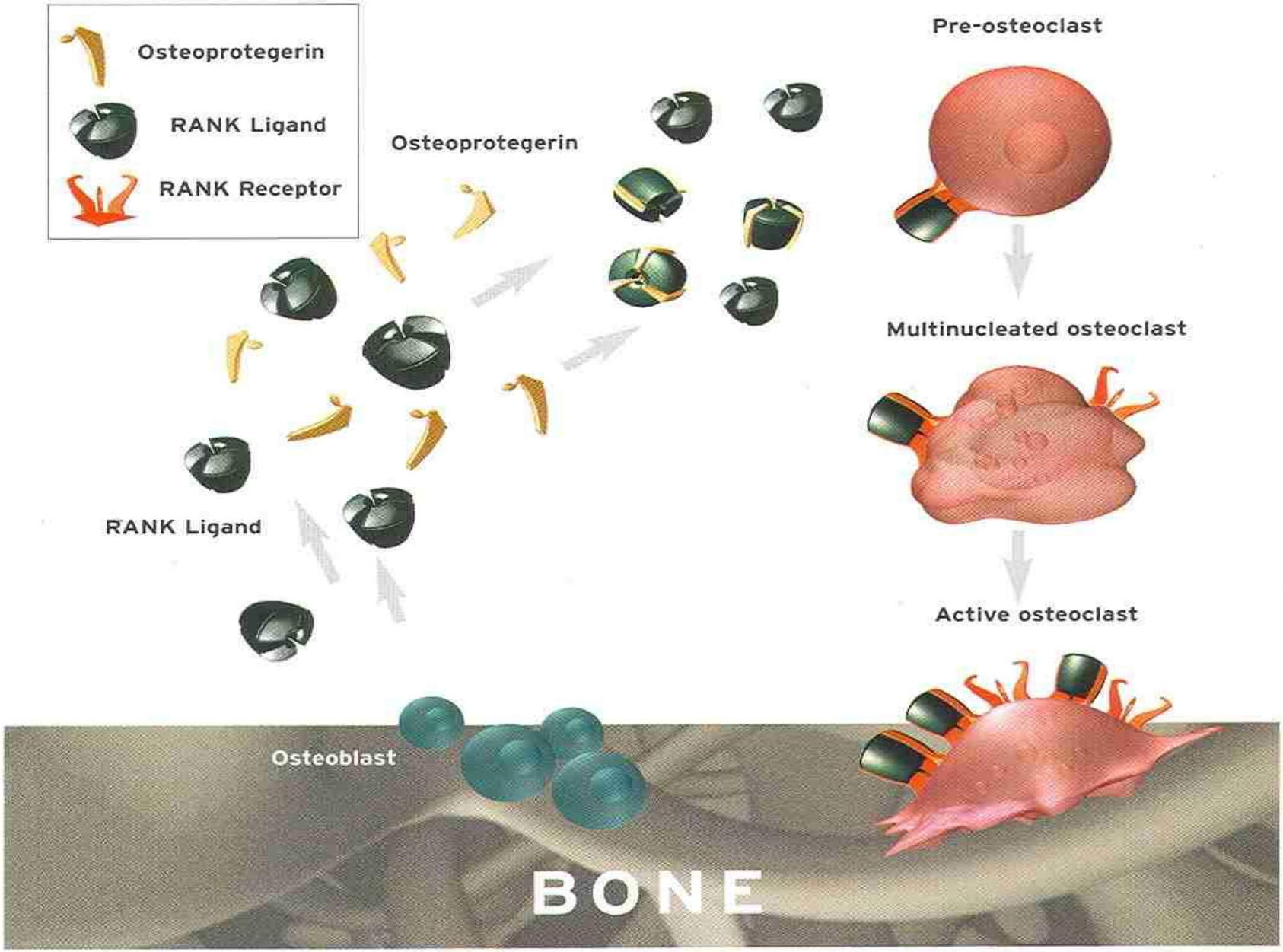
Strontium ranelate

5-[bis(carboxymethyl)amino]-2-carboxy-4-cyano-3 thiopheneacetic acid distrontium salt.

A dual mode of action on bone metabolism

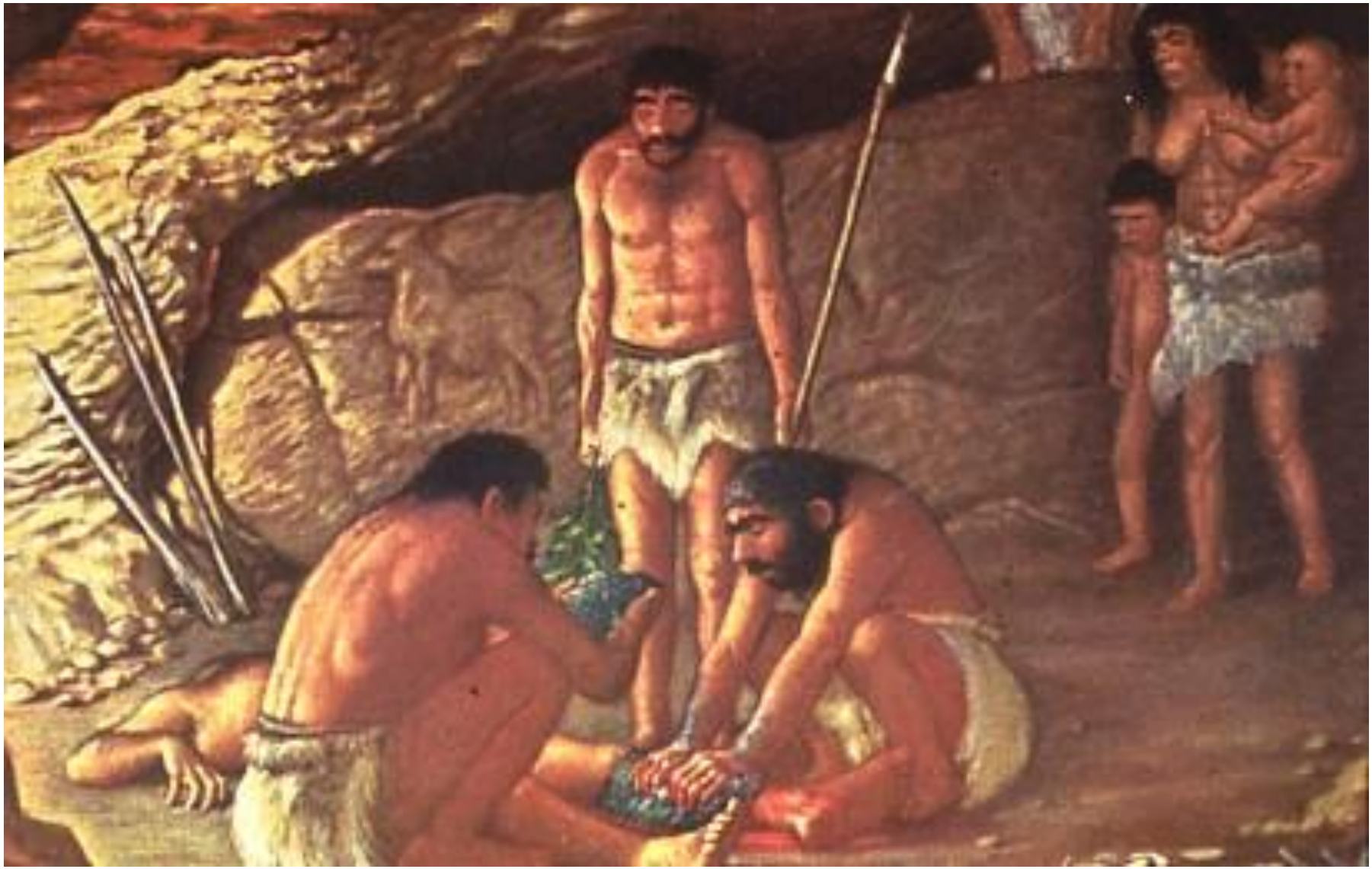


From Marie PJ, Ammann P, Boivin G, Rey C. *Calcif Tiss Int.* 2001;69:121-129.


Osteoprotegerin
RANK Ligand
RANK Receptor
Osteoprotegerin
RANK Ligand
Pre-osteoclast
Multinucleated osteoclast
Active osteoclast
Osteoblast
BONE

PHYSICAL ACTIVITY

Weight bearing exercise

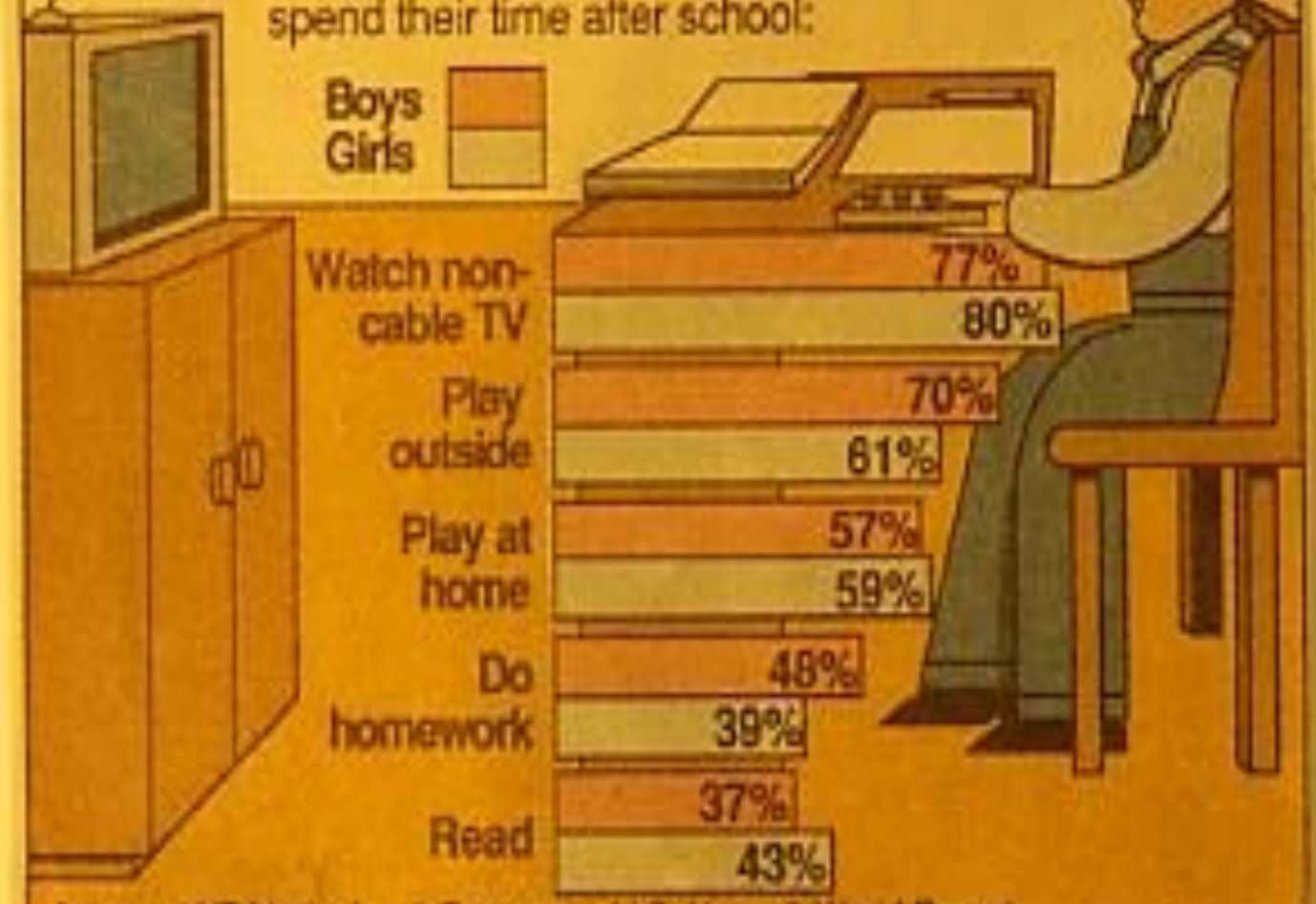


USA SNAPSHOTS

A look at statistics that shape the nation

After school activities

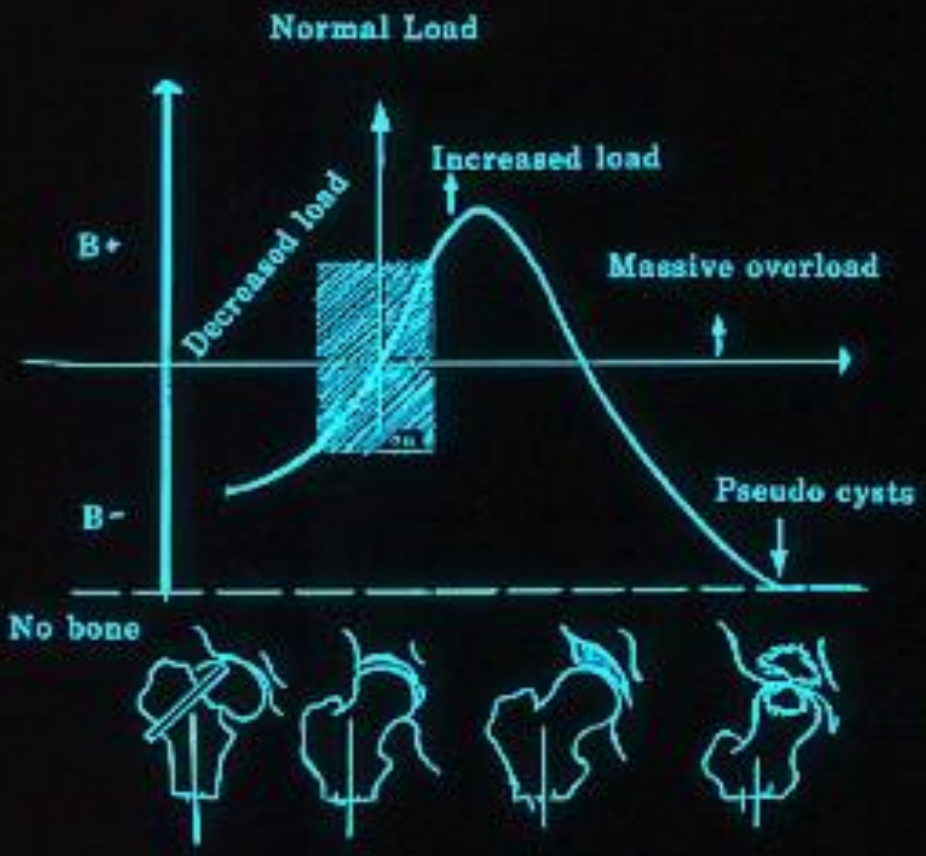
Top ways children ages 6 through 8 say they spend their time after school:



Source: M/E Marketing & Research, *U.S. News & World Report*

By Marcy Eckroth Mullins, USA TODAY

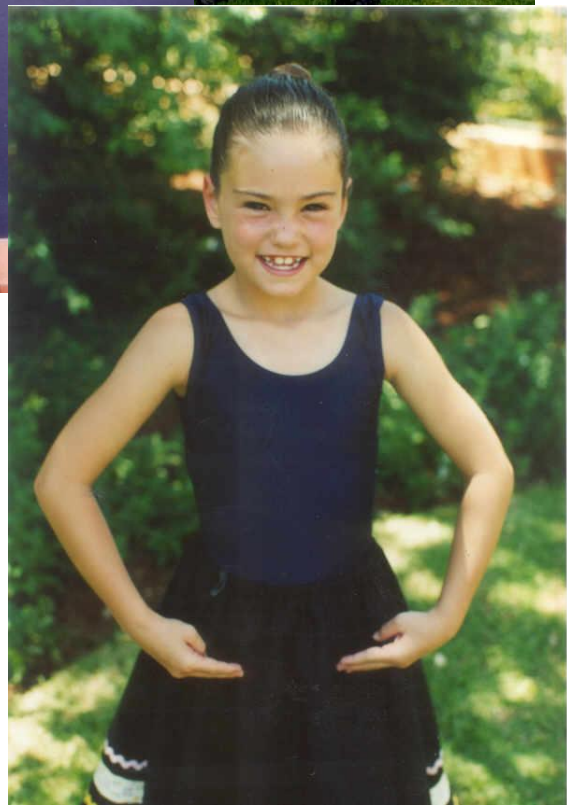
BONE APPOSITION AND DEMOLITION ARE DUE TO STRESS ELICITED BY FUNCTION





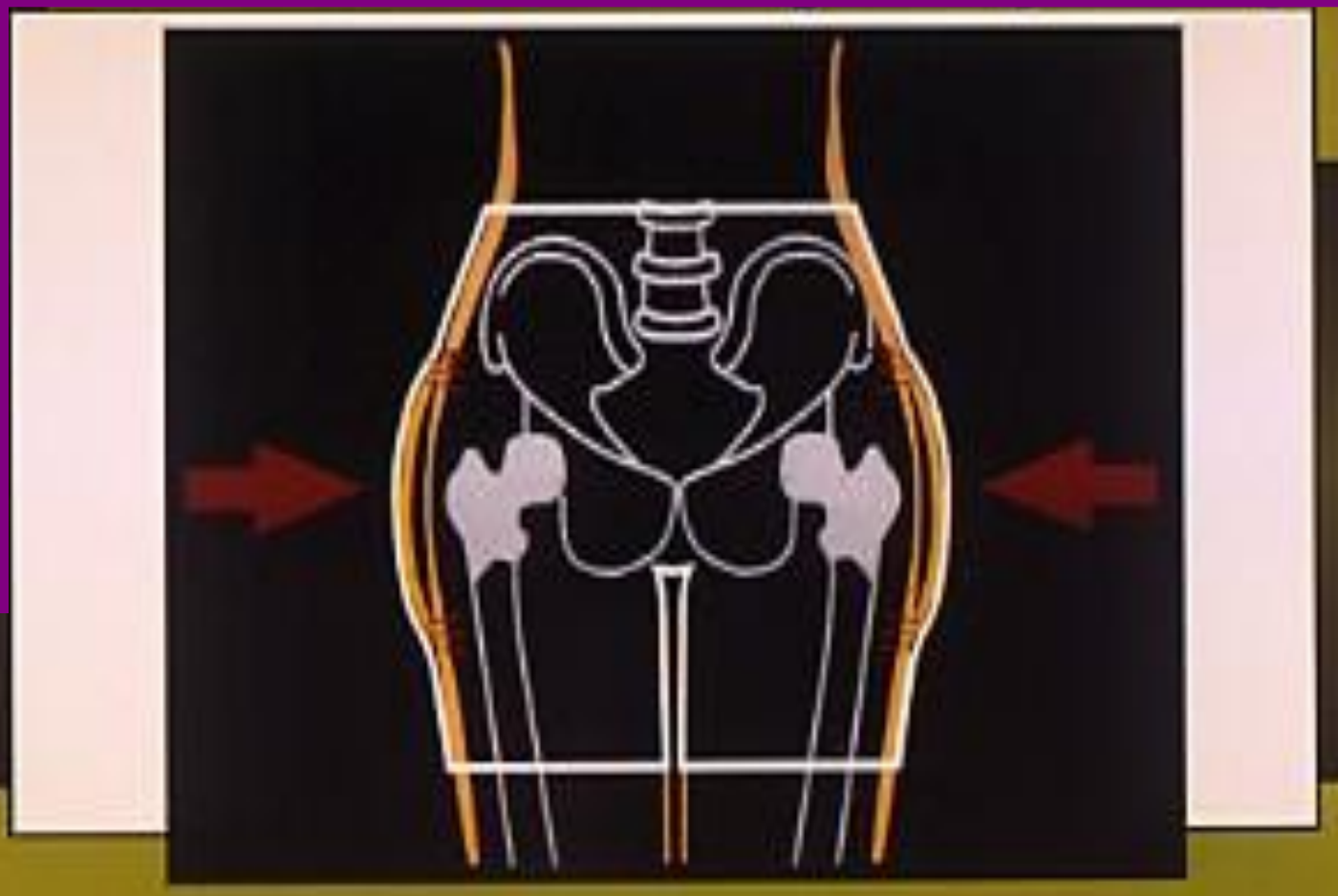




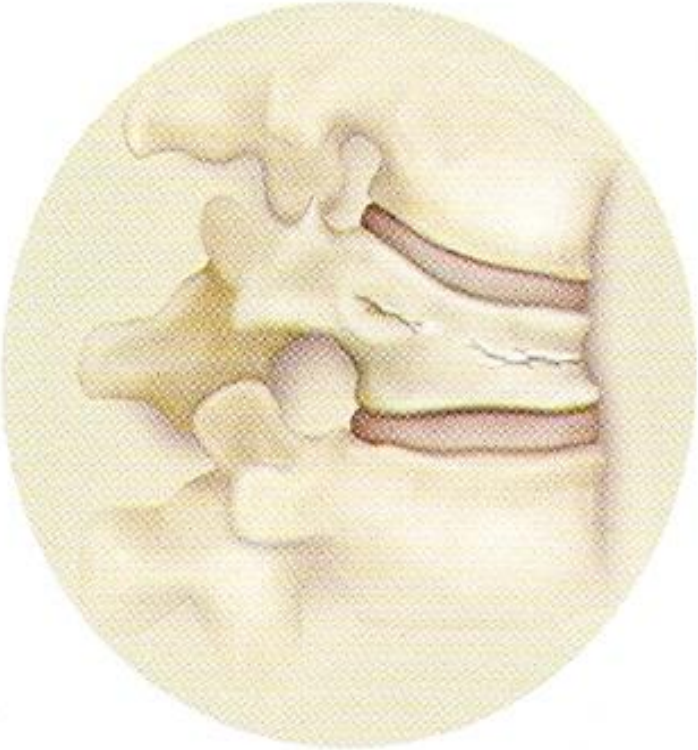


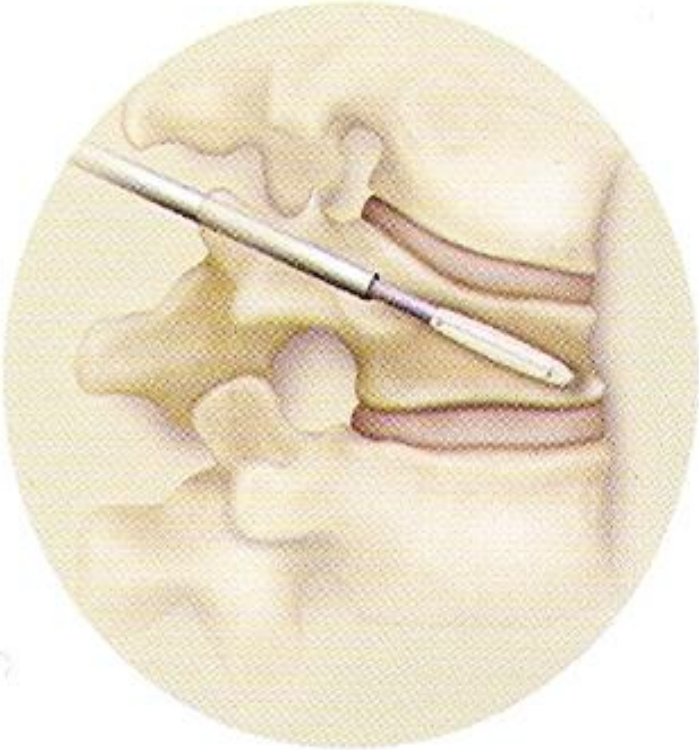
GROWTH HORMONE

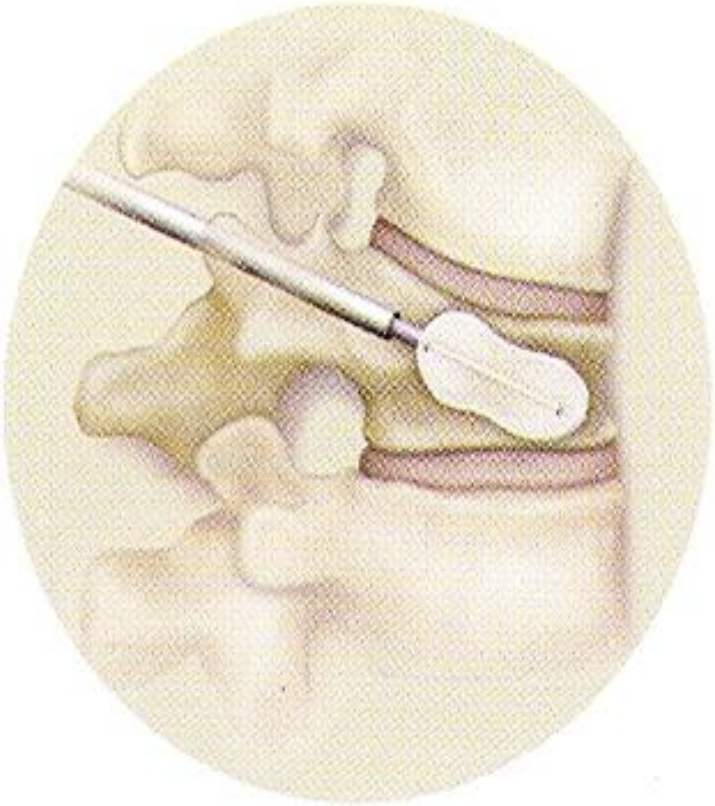
External hip protectors are designed with a view to dispersing the weight of a blow from the neck of the femur during a fall or impact to the hip.

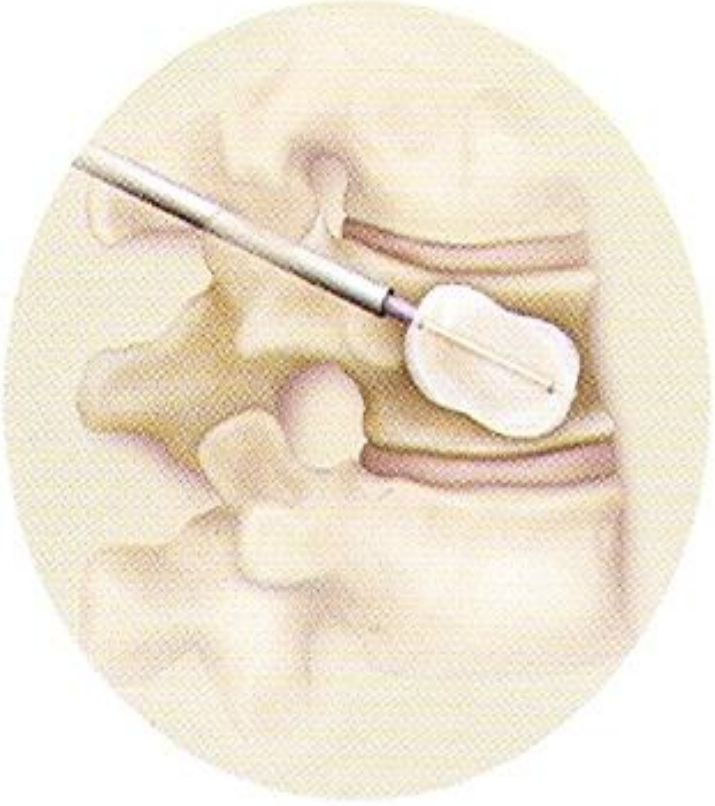


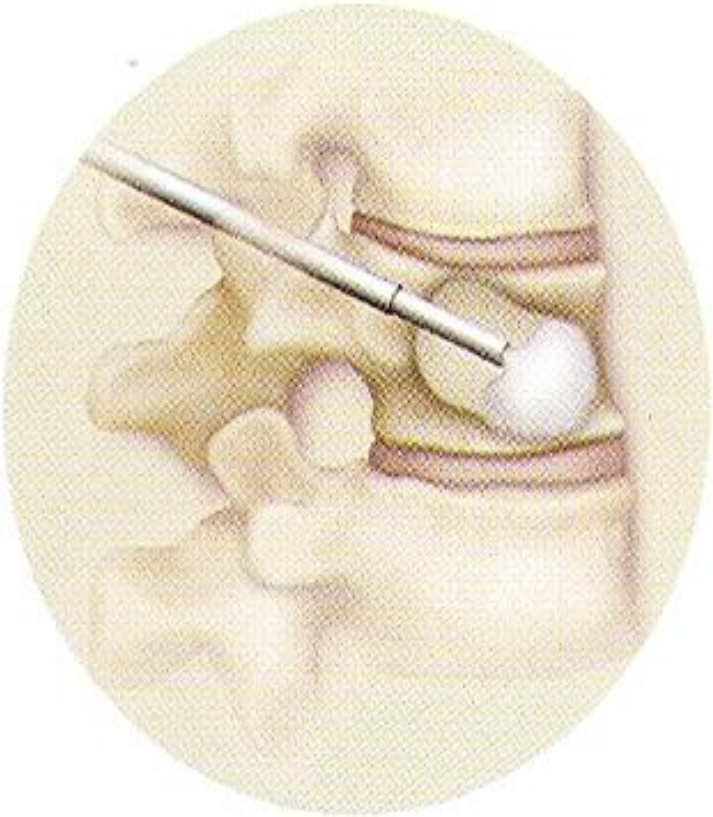
The hard but flexible shells of the protectors cover and protect the neck of the femur. The design of the shell respects the principles of blow dispersion and absorption which, combined with a larger contact surface, means that the shock of a blow is transferred from the shell to the softer tissue surrounding the neck of the femur.

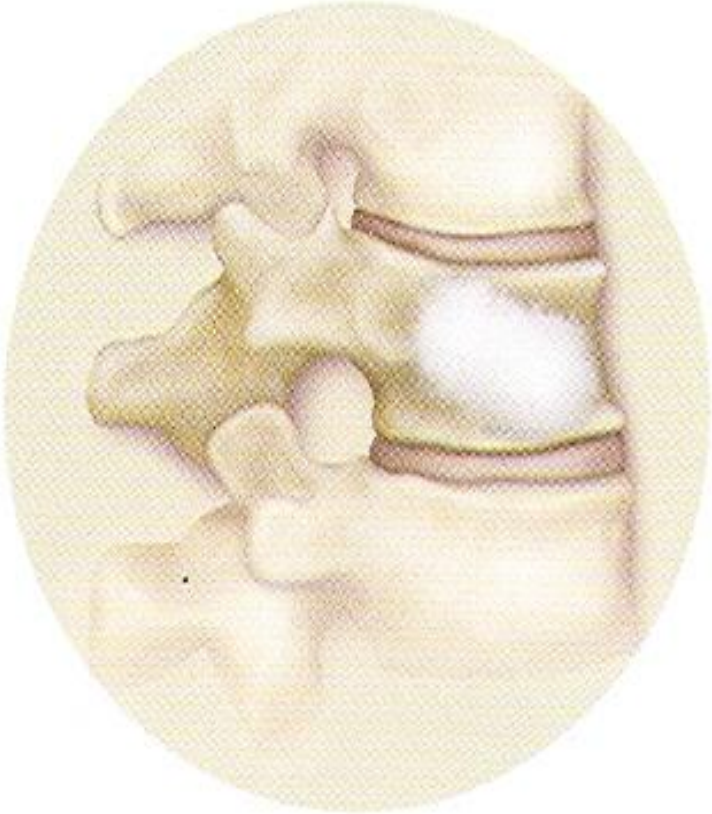













Birthday Boy, they say our bodies are
over 70% water...