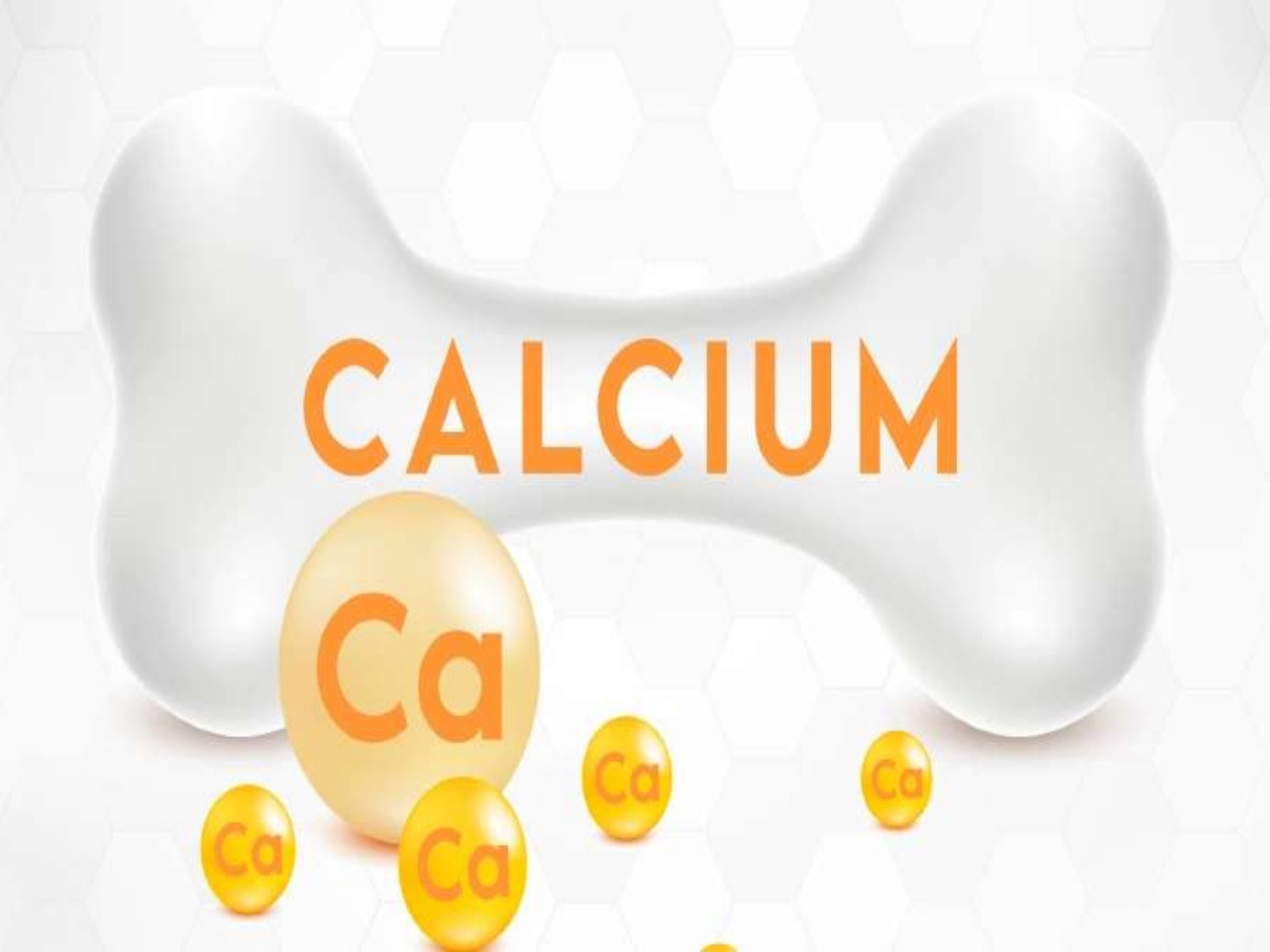
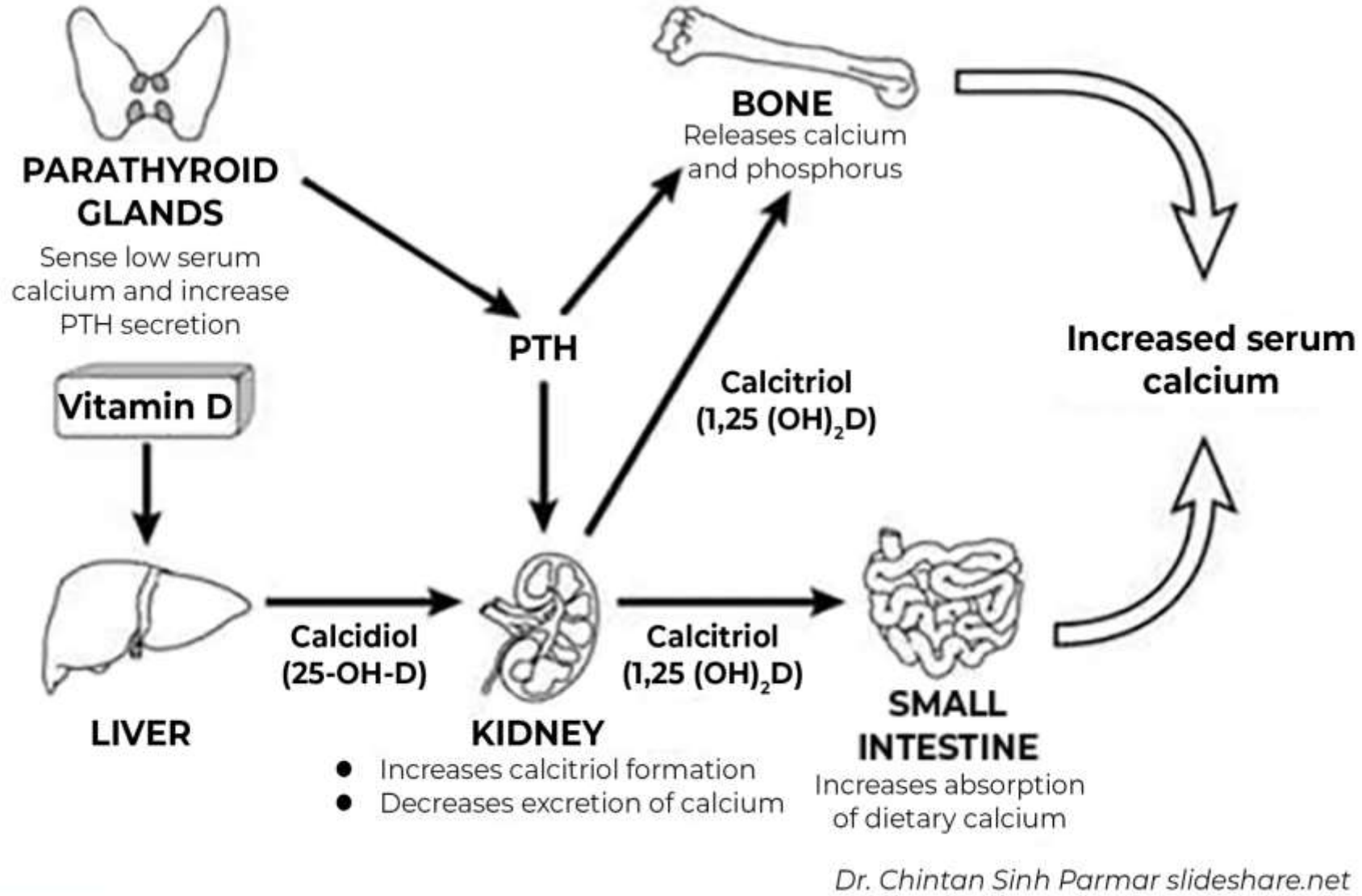
- Presentation by Dr. A.B. Chitra


CALCIUM
Ca
Ca
Ca
Ca
Ca

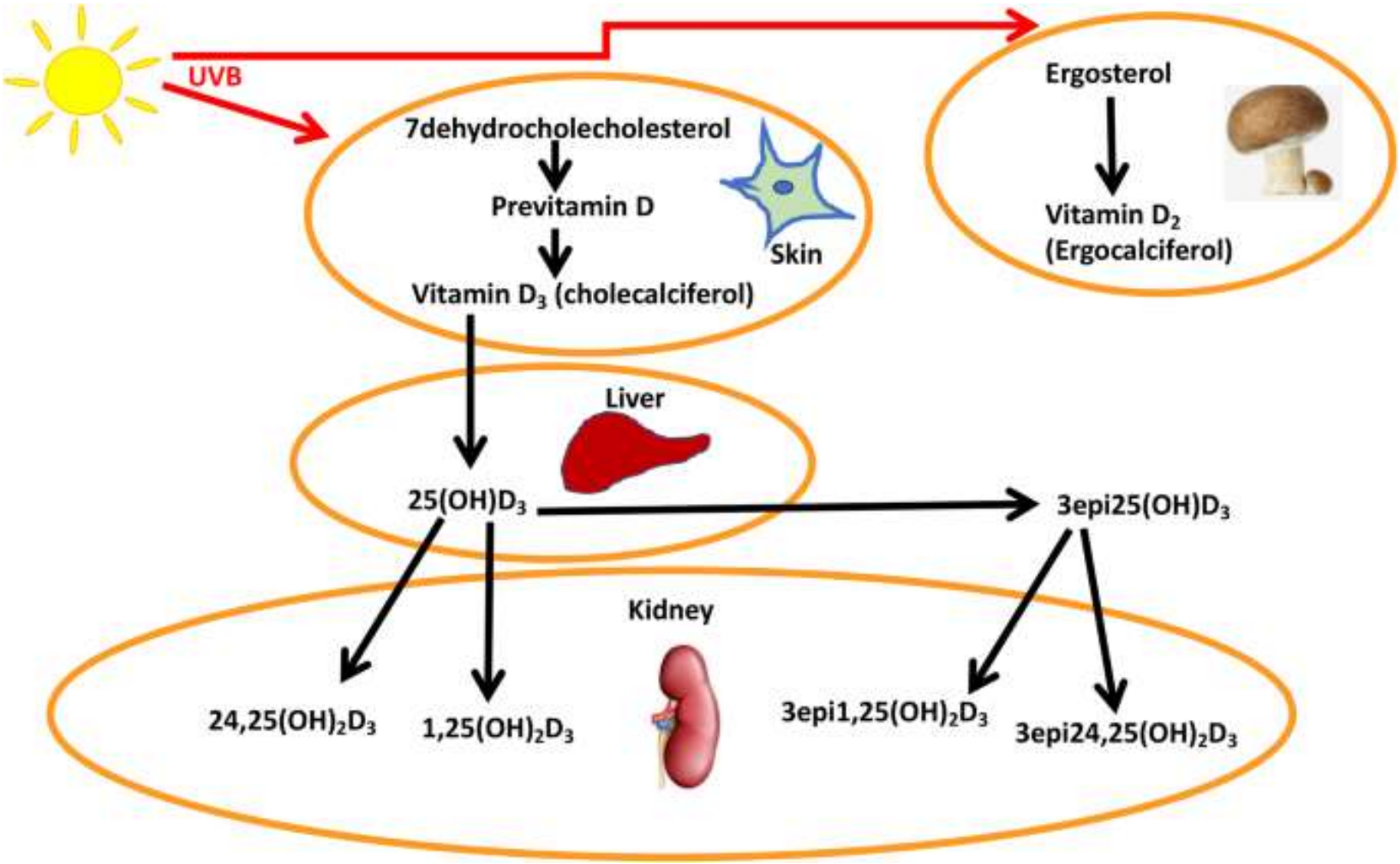
MICRONUTRIENTS IN BONE HEALTH

- Calcium
- Vitamin D
- K2
- Magnesium
- Phosphorus
- Selenium
- Boron
- Zinc
- Fluoride
- Protein

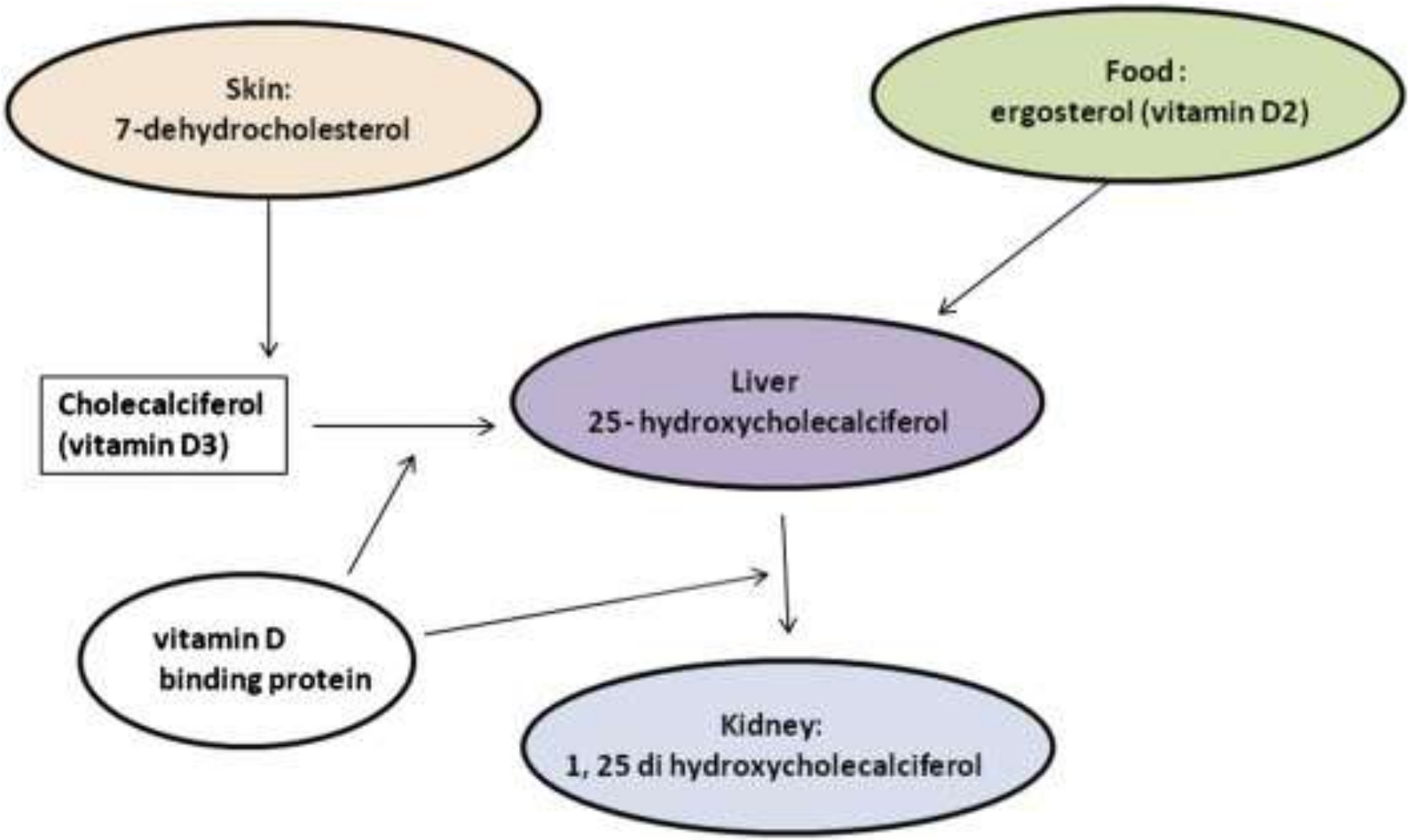
Calcium Metabolism



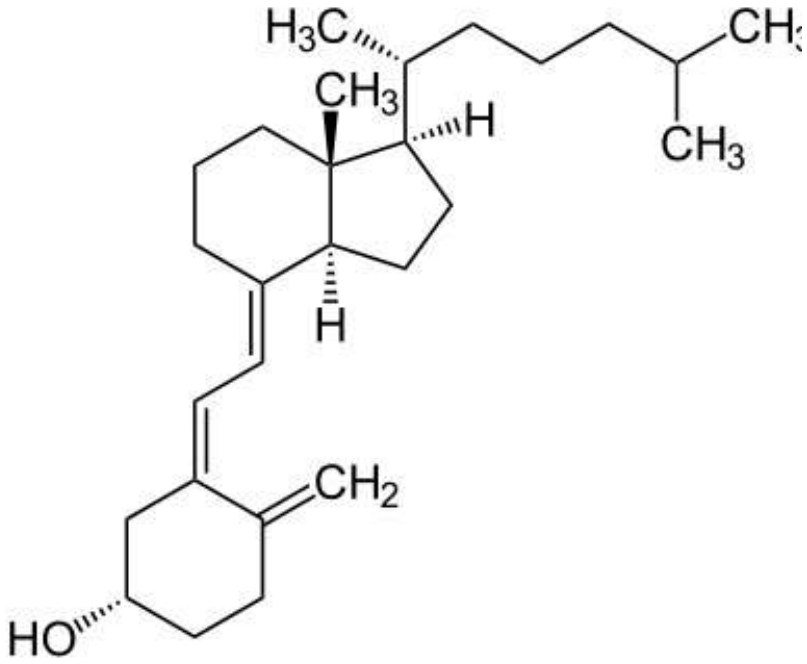
Vitamin D Metabolism

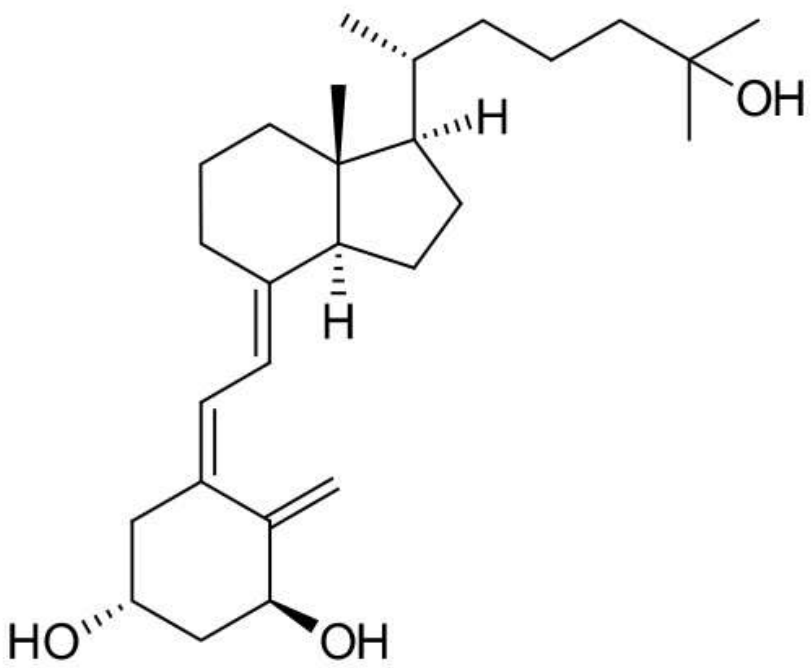


The RDA for adults is between 1,000-2,000 IU daily


Skin:
7-dehydrocholesterol
Food :
ergosterol (vitamin D2)
Cholecalciferol
(vitamin D3)
Liver
25- hydroxycholecalciferol
vitamin D
binding protein
Kidney:
1, 25 di hydroxycholecalciferol

What is the Difference Between Cholecalciferol and Calcitriol





CHOLECALCIFEROL

VERSUS

CALCITRIOL

Visit www.PEDIAA.com

CHOLECALCIFEROL	CALCITRIOL
One of the D vitamins, a sterol essential for the deposition of calcium in bones and formed by the action of sunlight on dehydrocholesterol in the skin	The active form of vitamin D, normally made in the kidney
Skin produces cholecalciferol	Kidney produces calcitriol
Cholecalciferol is vitamin D3	The active form of vitamin D
Function: To convert into calcifediol in the liver	Fucntion: To act as a hormone which increases the blood calcium level
Deficiency can cause rickets	Deficiency can cause hypocalcaemia

Calcitriol (Rocaltrol) is a strong form of **vitamin D** used to raise calcium levels. It's commonly used in people with kidney and parathyroid problems.

- Very short half life of few hours.
- Thousand times potent than D3.

Calcitriol is used in **patients with kidney disease who can't make enough out of active Vitamin D supplements**.

This medication is also used to prevent and treat certain types of calcium/phosphorus/parathyroid problems that can happen with long-term kidney dialysis or hypoparathyroidism.

Different forms of Calcium

- Calcium carbonate (40% elemental calcium)
- Calcium citrate (21% elemental calcium)
- Calcium gluconate (9% elemental calcium)
- Calcium lactate (13% elemental calcium)
- Calcium Hydroxide
- Calcium Threonate L

Calcium Citrate equally absorbed with or without food and better tolerated with those having malabsorbtion syndrome, IBD, or with low stomach acid.

Drugs interfere with calcium absorption

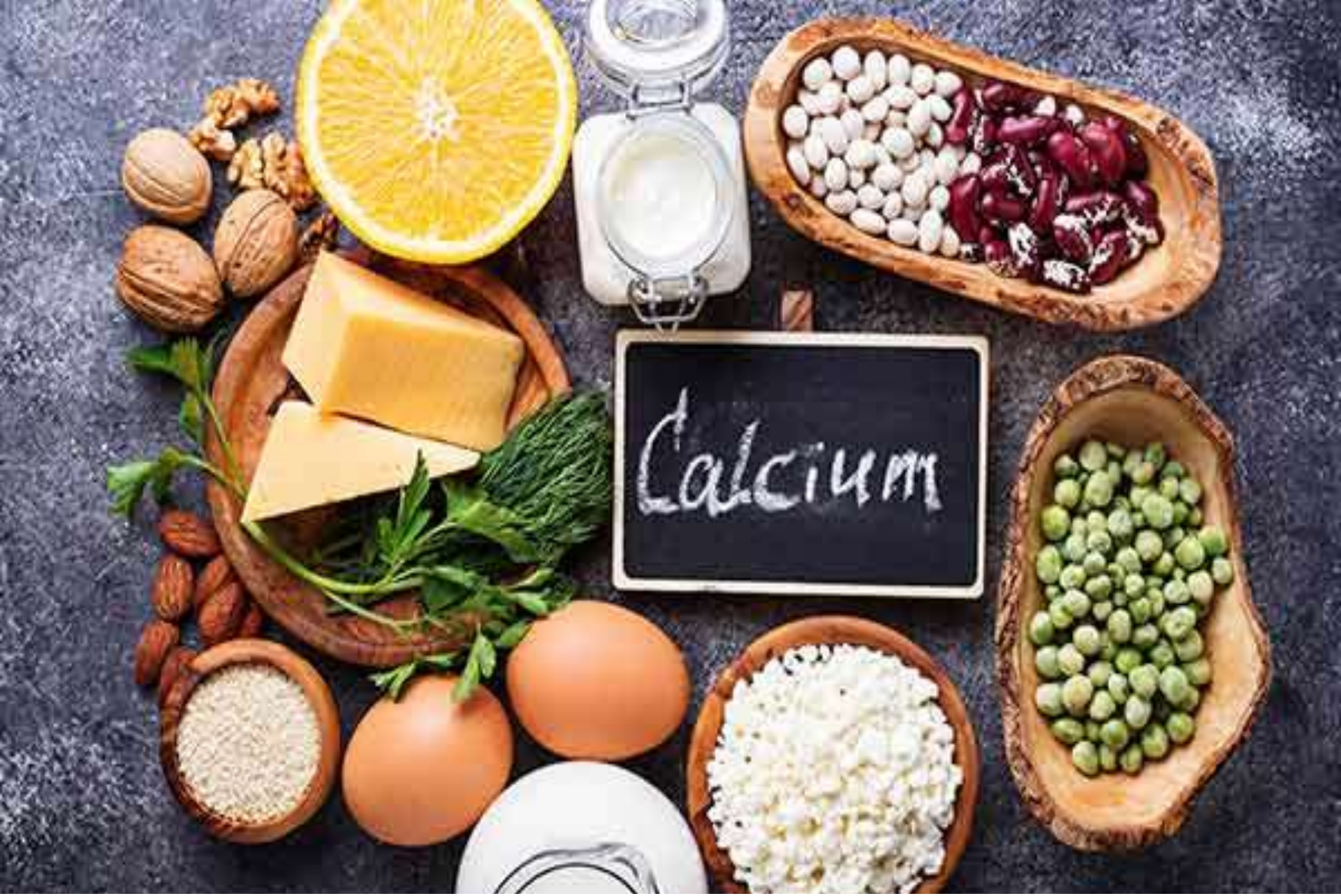
- Thiazide Diuretics
- Calcium Channel blockers
- Iron
- Zinc and Magnesium
- Antibiotics

Increase

- Estrogen
- Bisphosphonate
- Vitamin D3

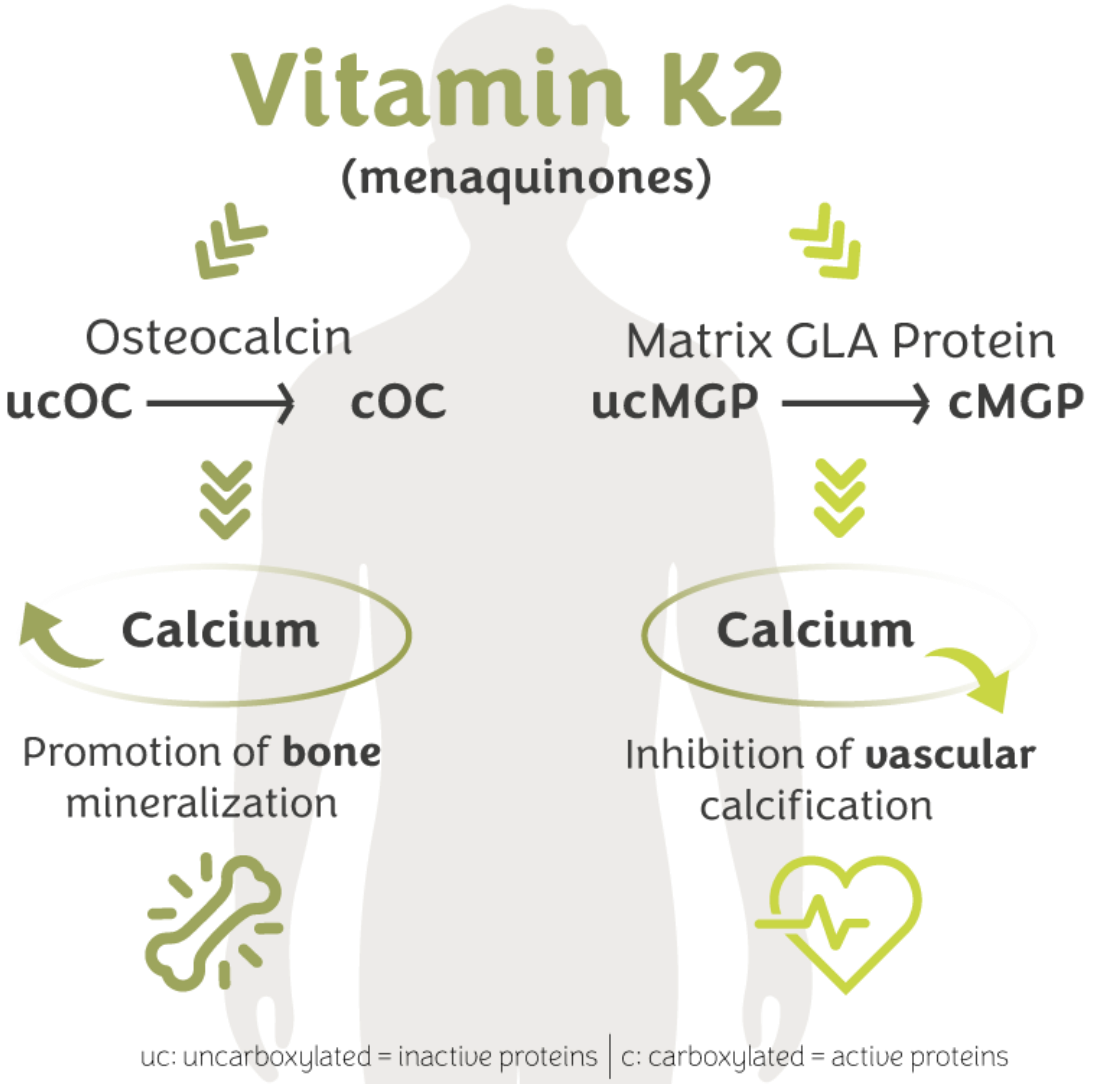
Timing of consumption

Morning or Afternoon (Movement helps to transfer calcium to target issues).



The RDA for adults is between 1,000-1,200 mg daily

3. K2



The RDA for adults is about 100 mcg daily


K2

4. Magnesium

The RDA for adults is between 300-320 mg per day

Cereals and Pseudocereals

Amaranth flour
Barley flour
Buckwheat
Millet
Oat flour
PopcornKernels

Legumes

Azuki beans
Borlotti
Chickpea
Kidney beans
Lentils

Seeds and Nuts

Cocoa bean powder, high cocoa-chocholate

Pumpkin/ Squash

Almonds, Hazelnuts, Peanuts, Pistachos,Walnuts

Fruits

30 g dried banana or apricot/*die* provides 30 mg of Mg likewise one portion of avocado purea

Baby Food

3-6 mg /100 g
25 mg/day (1-6 monthes)
Infant /follow on formulae
powder: 7,3-8 mg/ 100 g
liquid: 42-50 mg/100 g

Drinks

High Mg water
(50-120 mg / L)

Dietary Supplements

Inorganic	Organic
Mg Oxide	Mg Citrate
Mg Chloride	Mg Malate
Mg Sulfate	Mg Pidolate
	Mg Taurate

Factors increasing bioavailability

Not refining/ nor processing food

Fermentable fiber (e.g. inulin, resistant starch)

Peptides from casein or whey

Vitamin D

Vitamin B6

Hard magnesium-rich water

Factors decreasing bioavailability

Refining /processing Food

High phosphorus to magnesium *ratio*

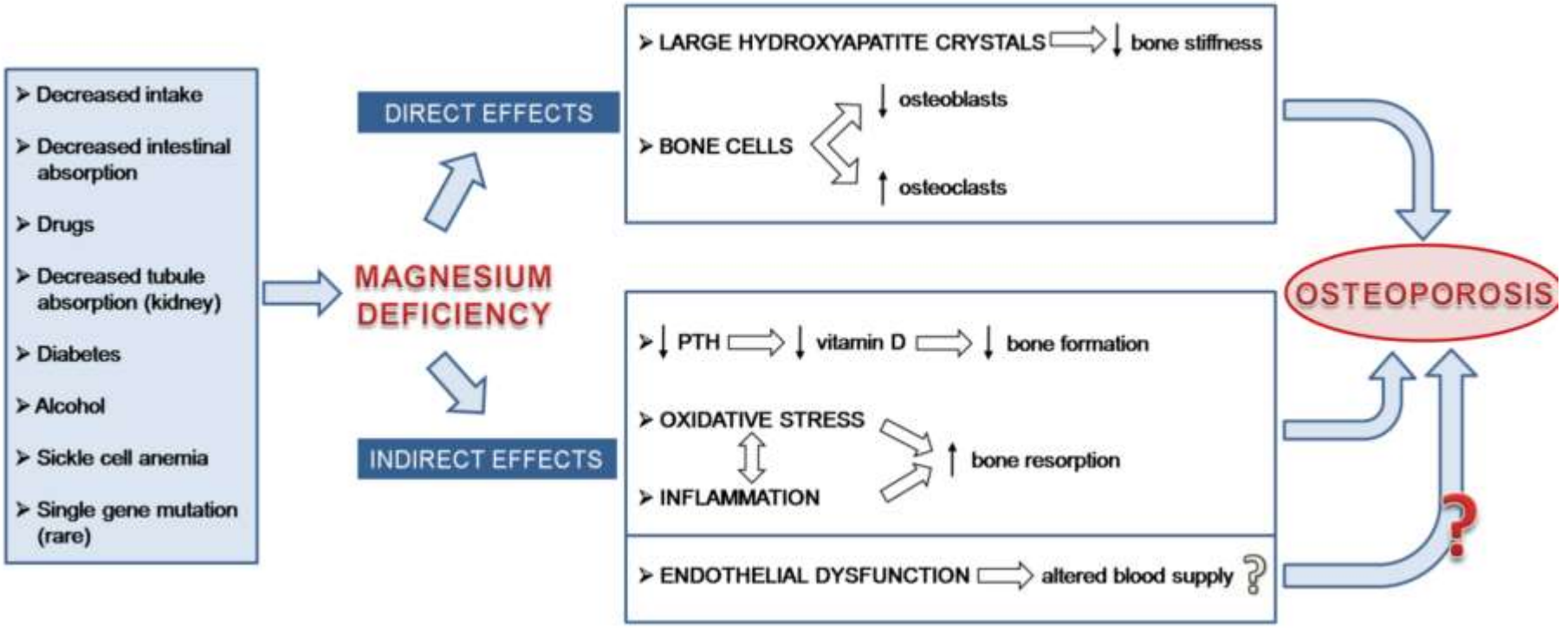
Very high calcium intakes

Dietary aluminium

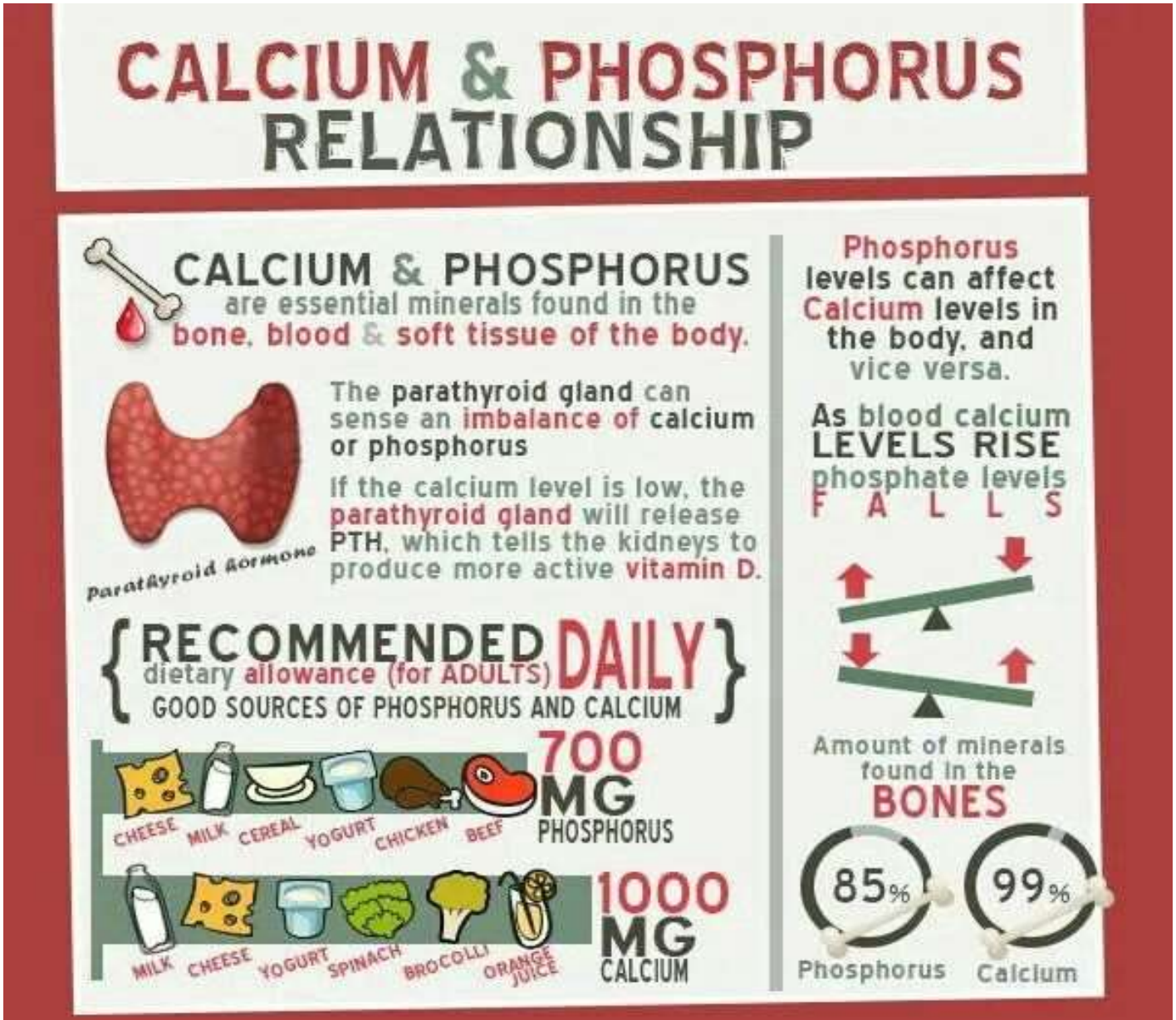
A low protein intake (< 30 g/die)

Alcohol, soft drinks and coffee

Some drugs (e.g diuretics)

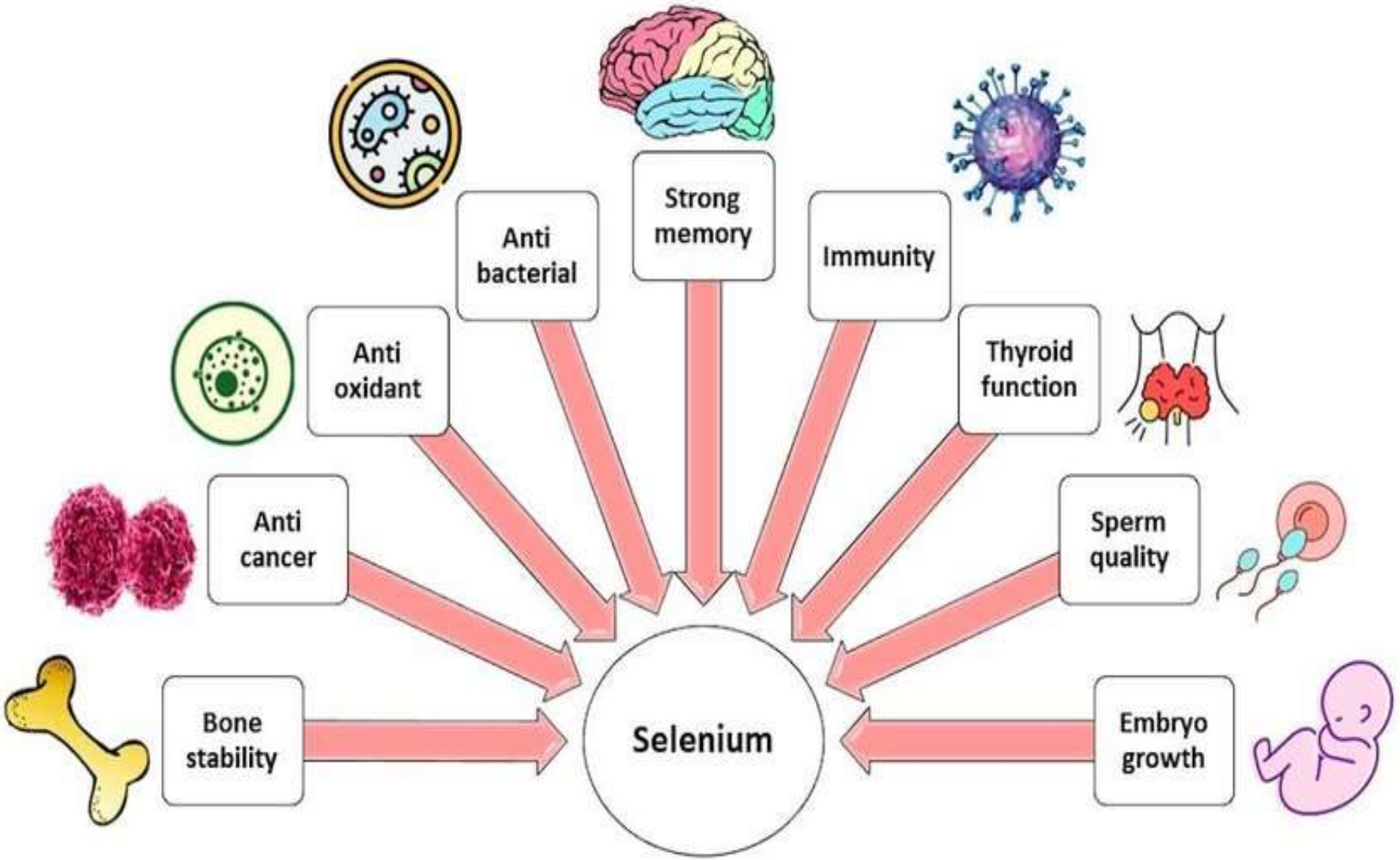

Decreased intake
Decreased intestinal absorption
Drugs
Decreased tubule absorption (kidney)
Diabetes
Alcohol
Sickle cell anemia
Single gene mutation (rare)
MAGNESIUM DEFICIENCY
DIRECT EFFECTS
INDIRECT EFFECTS
LARGE HYDROXYAPATITE CRYSTALS
bone stiffness
BONE CELLS
osteoblasts
osteoclasts
PTH
vitamin D
bone formation
OXIDATIVE STRESS
INFLAMMATION
bone resorption
ENDOTHELIAL DYSFUNCTION
altered blood supply
OSTEOPOROSIS

5. Phosphorus



The RDA for adults is between 500 – 700 mg daily

6. Selenium



The RDA for adults is between 55-65 mcg daily

Too Low in Selenium

- Increased risk of Type II Diabetes
- Increased risk of Cancer of the Ovary and Bladder
- Increased risk of Cardiovascular Disease
- Increased Overall Mortality
- Increased Cognitive Decline

Too High in Selenium

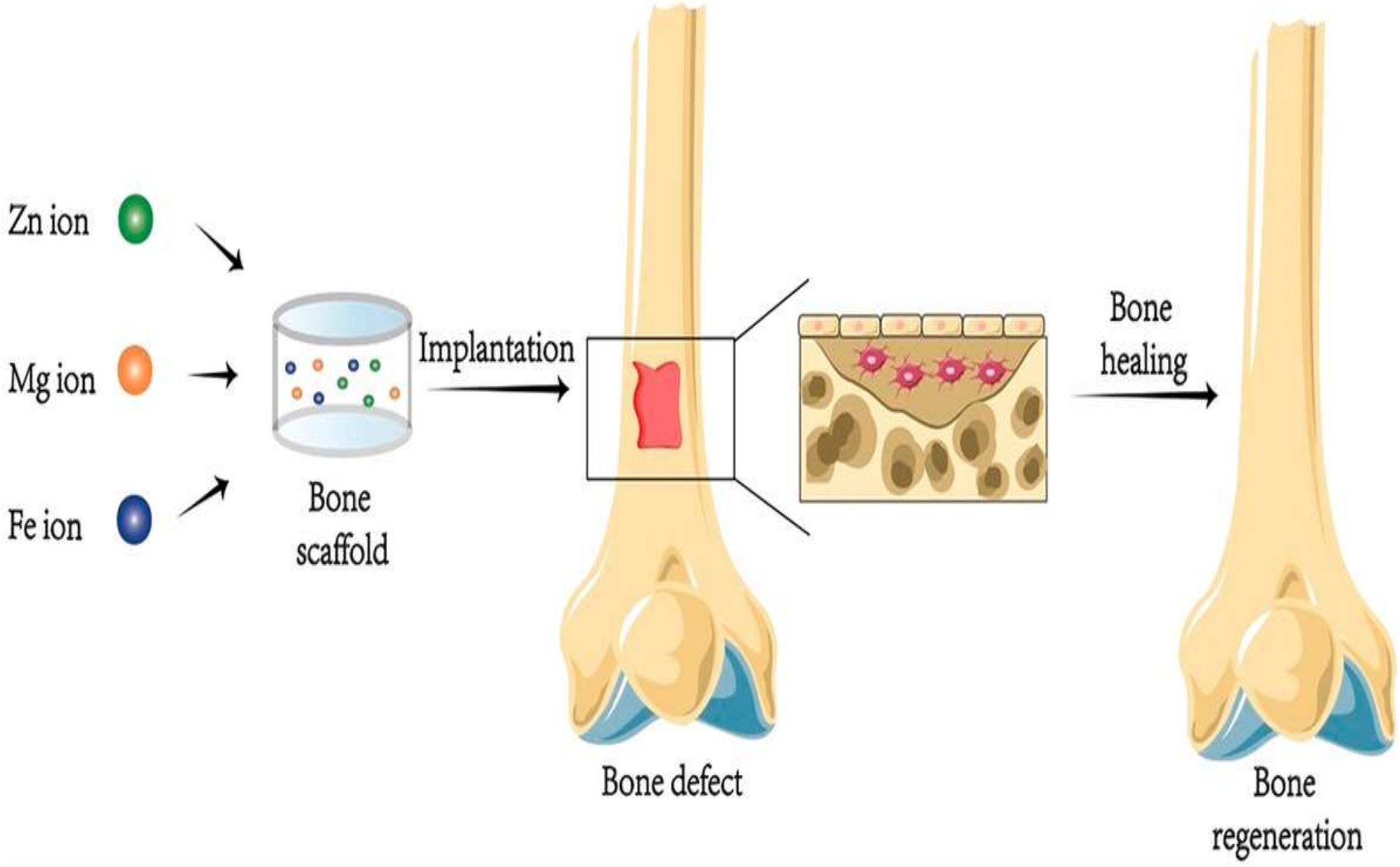
- Increased risk of Type II Diabetes
- Increased risk of Bladder Cancer
- Increased risk of Peripheral Artery Disease
- Increased Mortality from Cancer and from Cardiovascular Disease
- Increased Bone Mass Loss

Boron in Bone Health

- As Boric acid in body fluids and blood.
- Improves magnesium absorption and helps in Vitamin D utilization.
- Antioxidant properties prevent athero sclerosis.

The RDA for adults is between 1-3mg daily

8. Zinc



The RDA for adults is between 8-11mg daily

9. Protein

High dietary protein on bone

Known positive effects

- Supplys amino acids for bone matrix collagen synthesis
- ↑ Serum IGF-1 → Increase bone formation
- ↓ Serum PTH → Decrease bone resorption and ↑ intestinal Ca absorption

Other Factors
Ca
vitamin D
Fruits & vegetables
Types of protein

Known negative effects

- Acid production from metabolism of sulfur amino acids

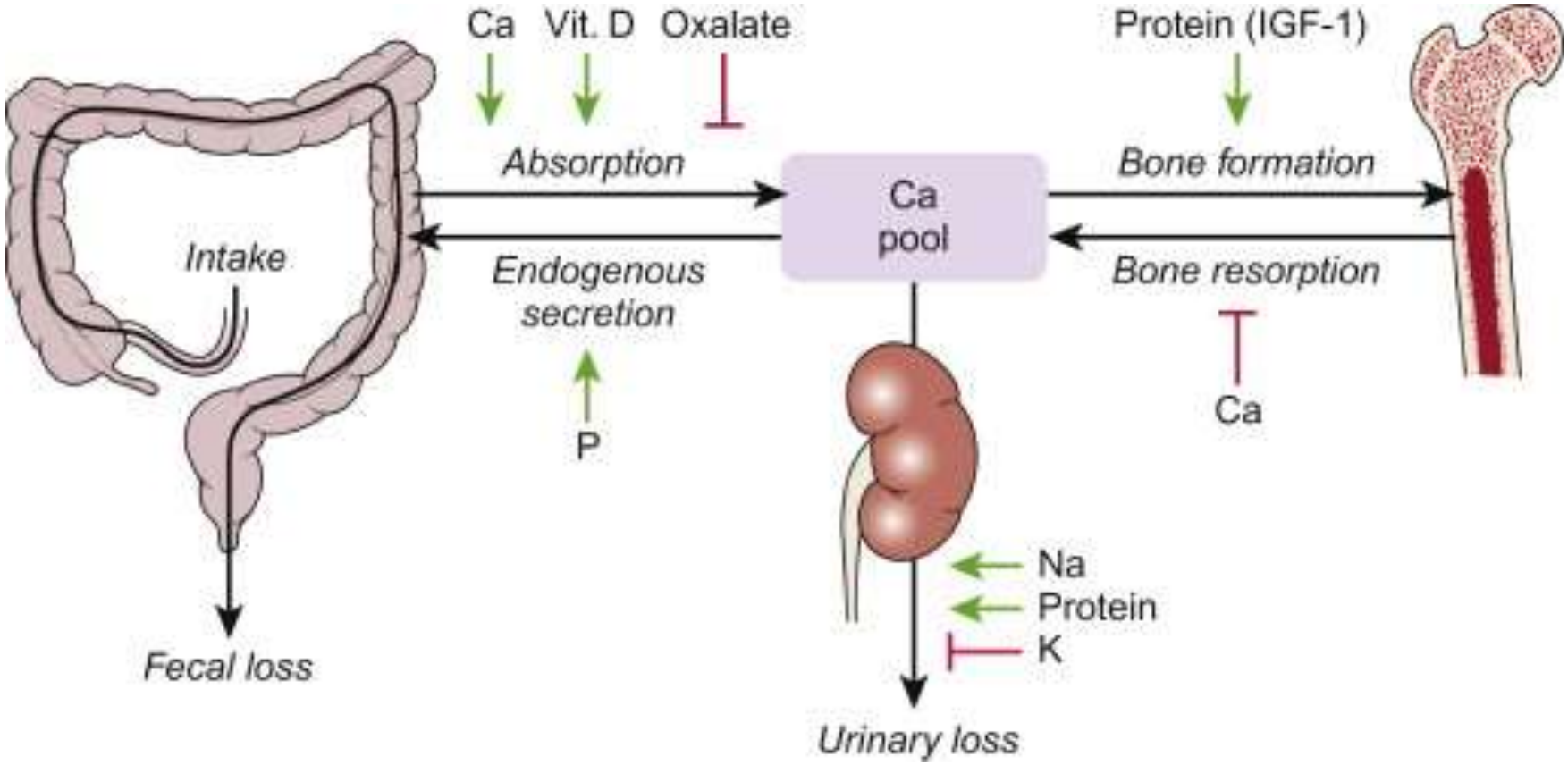
↓ Renal reabsorb Ca

↓ Osteoblast activity and ↑ Osteoclast activity

↑ Urinary Ca excretion

Calcium homeostasis and bone health

The RDA for adults is 0.8g per Kg per day


Ca
Vit. D
Oxalate
Protein (IGF-1)
Absorption
Bone formation
Intake
Ca pool
Endogenous secretion
Bone resorption
P
Ca
Na
Protein
K
Fecal loss
Urinary loss

10. Fluoride

FLUORIDE

Oregon State University
Linus Pauling Institute

MAIN FUNCTIONS

- Structural component of bones and teeth
- Prevents dental cavities by:
  - » Promoting tooth mineralization
  - » Inhibiting the activity of acid-producing bacteria that cause tooth decay

GOOD SOURCES

Water

- Fluoridated Water, 1 cup (8 ounces), 0.2-0.3 mg

Tea

- Black Tea, 1 cup (8 ounces), 0.2-0.5 mg

mg = milligrams

DAILY RECOMMENDATION

4 mg	3 mg
Men	Women

SPECIAL NOTES

- Dental products are also a source of fluoride.
- Claims that fluoride increases the risk of several chronic diseases are not supported by extensive scientific research.

The RDA for adults is between 3-4mg per day

Supplements to be avoided at bed time

1. **Vitamin B**
2. **Multivitamins and energy herbs**
3. **Vitamin D**
4. **Calcium**
5. **Vitamin C**
6. **Zinc**

PROTECT YOUR BONES WITH

GOOD NUTRITION

Eat calcium-rich foods

Limit caffeine intake

Get enough vitamin D

Eat foods high in Vitamin K

Get sufficient potassium and magnesium

Conclusion

- Prescribe 1 drug at a time
- No Combinations
- Concentrate on drug interactions
- Minimal or Optimal dosage only

Choose the right calcium (Calcium Citrate) and
onnect with Vitamin D3 / Calcitriol
oprescribe with K2 / Mg
arried(NOT) over by