

Ca

Presence	<p>in blood = 10 mg Mem diffusible: 40% Pr-bound Mem Non-diffusible: 10% anion-bound (cplx) & 50% free (ionized) in organs = 1300 g (<u>99% bones, 1% IC-SER, 0.1% interstitial</u>)</p>
Pr binding	<p>-mostly albumin (minute amount to globulin) -highly dependent on pH (the higher pH, the more it binds) Resp. alkalosis causes significant binding of Ca to albumin, dropping the level of ionized form in the blood</p>
Fun	<p>-Ca salts: structural block (bones) -Ca ions: essential in IC & EC for: Neuromuscular AP hormones release enz regulation Blood coagulation second messengers</p>
Sources	-milk -dairies -fish
Daily requirement	<p>-pregnant, lactating & post-menopause: 30 -non-pregnant: 15-25</p>
Absorption site	<p>-duod. (actively) -SI (facilitated diffusion "down its normal conc gradient")</p>
Pathies	<p>-plasma Ca <9 mg: tetany (muscles invol. Spasms) -plasma Ca >11 mg: renal stones</p>

Phosphate

is	a mineral
fun	<p>-essential for ATP synthesis & cAMP 2ndM -highly regulates Ca</p>
plasma conc	4 mg
forms	50% ionized (diffusible) - 50% Pr-bound (non-diffusible)

Bone		
Cells	-osteoblasts: bone formers -osteocytes: osteoblasts trapped in a calcified matrix -osteoclasts: bone destructors (originated from monocytes)	
Ions amount	-Ca(99%) -phosphate -C -Mg -Na -H2O(9%)	
Plasma Ca & phosphate regulation	Non-hormonal	-very Rapid -alters small conc changes using free Ca
	Hormonal	-used for long term regulations or major alters -hormones used: PTH, calcitonin & vit D
	Organic matrix	Salts
%	30%	70%
ability	tensile (stretch)	Compressional (strength)
blocks	-95% collagen -5% ground (ECF & proteoglycans)	-Mg, Na, K, C (0.1%) -Ca & phosphates (99%) Present as hydroxyapatite crystals -amorphous (1%) Is exchangeable form of Ca. VIP for Rapid regulation of free Ca in ECF "its always equilized with ECF Ca".

Vit D	
Aka	1,25 dihydroxycholecalciferol
Fun	-SI: inc Ca & phos. Absorption by inc Ca binding Pr -renal: inc Ca & phos. Reabsorption -bones: stimulate osteoclasts (causes hypercalcemia) -immunity: stimulate differentiation
Intake	-small doses: stimulates SI absorption & bone mineralization (stronger) -large doses: stimulates PTH action & osteoclasts (weaker bones)
Biochem	sun transforms <u>7-dehydrocholesterol</u> under the skin to <u>cholecalciferol(Vit D3)</u> , which goes to the liver and it transforms it to <u>25-hydroxyvitamine D3</u> , which goes to the kidney and it uses 1 alpha hydroxylase to make <u>1,25 dihydroxyvitamine D3</u> which is usable
Regulation	-by: Ca ions, prolactin & PTH All stimulate renal <u>1-alpha hydroxylase</u>

