



Diets with modifications

Diets with mineral modification

Diets with vitamin modification

Diets with water modification

without water there is no life, it is involved in:
digestion, absorption and excretion
transport and elimination
body temperature regulation
osmotic balance and pH
cell shape and lubricating fluids.

Water balance

total water intake → from food and beverages
available water = intake + macronutrient oxidation

Water losses
renal losses: ↑protein and mineral intake + diabetes / diuretics → more urine
cutaneous and pulmonary losses: body temperature and environment
gastrointestinal losses: diarrhoea and vomiting → altered thirst sensation (thirst = small dehydration)

Water intoxication

drinking more than the maximum renal excretion (0.7-1.1 L/hour)

causes hyponatremia and possible cerebral edema

Dehydration

Types
by amount: mild 1-2%bw, moderate 3-5%, high 6-8%, severe 9-11%. over 11% → incompatible with life
by speed of loss: if it is sudden it has more severe symptoms
by lost solute/water ratio: isotonic, hypertonic (↑water lost) or hypotonic (↑minerals lost)

adequate water intake: ~1ml/kcal/day

adjust more water in children, athletes (1L per lost kg), pregnant and breastfeeding women and elderly

Vitamin B6 deficiency

Vitamin B6 (pyridoxal phosphate) → amino acid metabolism

Rare in modern countries, Causes:
cereal-based food → glucoside (non-absorbable)
chronic alcoholism → ↓phosphorylation ↑dephosphorylation
treatment with various drugs
chronic haemodialysis

1.3-1.7mg/day♂ 1.3-1.5mg/day♀
→ liver, legumes, nuts and banana

thermal process losses up to 50%.

Megaloblastic anaemia

decrease in DNA synthesis

Cobalamin deficiency

blood cell formation and folate metabolism

Causes:
- insufficient intake (vegans)
- gastric disturbances (non IF)
- intestinal disturbances (non-separation of proteins)
- interactions with drugs and alcohol

stage 1: reserves exist, serum depletion
stage 2: tissue depletion, metabolic pathways not altered
stage 3: insufficient tissue deposition → reduced DNA synthesis and erythrocyte ↓folate
stage 4: metabolic disturbances → clinical damage. corrected with 5µg

bacterial synthesis, only in animal sources: viscera, egg yolk, salmon, meat, dairy products...

Folate deficiency

structure of pteroylglutamic acid (folic acid)

Causes:
- insufficient intake: age
- high requirements: pregnancy
- decreased intestinal absorption
- metabolic disturbances: alcohol and vitamin B12 deficiency

- stage 1: no cellular depletion but serum depletion, no metabolic alterations
- stage 2: erythrocyte folate decrease
- stage 3: impaired erythropoiesis, not enough DNA
- stage 4: megaloblasts macrovalocytes and reduced haemoglobin

monoglutamates 90% → direct absorption
polyglutamates 50% → to be hydrolysed

almost everywhere, mainly in veggies and legumes

copper deficiency

enzyme intermediate

problems: deficit or excess (Wilson)

fructose and Zn lower Cu absorption → real problem: low intakes

NO copper → no Fe transitions (no hemoglobin, no ferritin, no erythrocytes)
Copper is the guy that changes the electrons when needed

EFSA → 1.3mg/day♀ and 1.6mg/day♂. Oysters and molluscs, nuts, cereals...

Iron deficiency anaemia

decrease in haemoglobin quantity

4 successive stages:
1. ↓Fe
2. ↓Fe, ↓ferritin reserves
3. ↓Red blood cell production
4. ↓haemoglobin = ANEMIA

Causes:
- you don't **eat** enough iron (vegetarian, vegan, no red meat).
- you **need more** (at certain stages of life)
- you **lose** too much **blood** (menstruation, haemorrhage, infections)

from the 12mg ingested, only 1mg is actually absorbed

change the **diet**: liver, legumes + vitamin C, avoid anti-nutrients that reduce absorption and be careful with antacids and antibiotics. Iron **supplements** and **fortification** of foods with iron (flours, salts, cereals).

Diets with mineral modification

low sodium diet

hypertension: >160/95
normotension: <140/90
borderline hypertension: in between the above 2
added-risk hypertension: >130/85

it affects the heart, the brain and the kidneys

90-95% idiopathic. Correlated with sodium

EFSA → limit of 2,4 g of Na⁺/day ≈ 5g of salt

Swap Salt for spices and condiments. Eat K⁺ rich foods

Lower weight, exercise, limit alcohol and lower coffee & tea consumption

Calcium intake modification

most abundant mineral in the human body

renal lithiasis

4% of population. males over 30 y/o

- calcium oxalate 70% + calcium phosphate 6%.
- uric acid 7%.
- struvite 5%.
- cystine 2%.

Crystallisation processes:
1. **solute** saturation of the urine (hypercalciuria)
2. ↓ crystallisation **inhibitors**
3. changes in **pH** (acidity → corrosion of crystals)

↑oxalates ↑proteins ↑vit.C ↑Ca
↓citrates ↓Mg → kidney stones

Solution: ↑water ↓weight
~proteins ↓NaCl ↑citrate ↑Mg
↓stress ↓oxalates <100mg/day.
↓Ca only in phosphocalcic alone
↓Purines in uric acid lithiasis.
↓P & ↓Mg in struvite lithiasis.

osteoporosis

↓mineralisation
↓bone volume

types:
- primary type 1 → low estrogen
- primary type 2 → age
- secondary → disease or drug treatments
- idiopathic → unknown origin

acute pain, hip fractures and bone deformities

body weight and composition, Ca/P ratio 0.5, vitamin D3, vitamin K (mineralisation), high protein diet and Na (Ca lost in urine) and fluoride (fluorohydroxyapatite)

Adequate calcium intake throughout life → trying to compensate in old age is not helpful

Increase Mg intake and do physical exercise (cardio + strength + mobility movements)

rickets and osteomalacia

↓bone mineralisation

rickets in children
osteomalacia in adults

slowed new matrix formation

primary causes: ↓ vitamin D intake or decreased skin synthesis

secondary causes: problems of absorption or metabolism of vitamin D