**Vitamin/Mineral Functions**

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| **Vitamin/Mineral** | **Function** |
| Vitamin A\* | Critical component of vision proteins, changes shape with light (how you see) |
| Vitamin B1 (Thiamin) | Co-enzyme for transmission of nerve impulses |
| Vitamin B2 (Riboflavin) | Co-enzyme for metabolism; enhances other B vitamins |
| Vitamin B3 (Niacin)\* | Co-enzyme for metabolism, synthesis of fat and cholesterol; skin and gut health |
| Folate\* | DNA and red blood cell formation; neural tube formation in fetuses |
| Vitamin B6 | Co-enzyme for metabolism, especially proteins |
| Vitamin B12\* | Co-enzyme for synthesis of new cells, especially red blood cells; activates folate |
| Vitamin C\* | Co-enzyme for collagen formation; antioxidant; make white blood cells |
| Vitamin D\* | Regulate absorption and blood levels of calcium and phosphorous |
| Vitamin E | Antioxidant, especially for cell membranes and LDL |
| Vitamin K | Synthesis of blood clotting factors |
| Sodium\* | Electrolyte; regulate body water and blood pressure |
| Potassium\* | Electrolyte; muscle contraction and nerve impulses |
| Calcium\* | Forms bones and teeth; muscle contraction and nerve impulses |
| Phosphorous\* | Forms bones and teeth, as well as cell membranes |
| Magnesium | Helps metabolism enzymes function |
| Chloride | Electrolyte; acid-base balance |
| Iron\* | Transport oxygen as part of hemoglobin |
| Zinc | DNA and RNA synthesis; wound healing; taste acuity |
| Fluoride\* | Strengthen tooth enamel |
| Iodine\* | Component of thyroid hormone (for metabolism) |

\* Has an associated disease you need to know.

**Vitamin/Mineral Diseases**

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| **Disease** | **Vitamin/Mineral** | **Too much/little** | **Reason** |
| Scurvy | Vitamin C | Too little | Vitmain C is necessary for connective tissue formation (collagen) – scurvy symptoms are related to lack of these tissues (sores, bleeding gums) |
| Hypertension | Sodium | Too much | Sodium is an electrolyte – it controls where water goes. Too much sodium in blood = too much water = high blood pressure |
| Hypervitaminosis A | Vitamin A | Too much | Vitamin A is fat-soluble and primarily stored in liver. Vitamin A can accumulate in liver, damaging it and reducing its functions 🡪 nausea, vomiting, dec. appetite. Also related to bone turnover – will decrease bone density 🡪 osteoporosis and too much calcium in blood (muscle weakness/arythmia). Vitamin A is necessary for rhodopsin function in rods 🡪 too much also blurs vision. |
| Night blindness | Vitamin A | Too little | Vitamin A is necessary for rhodopsin function in rods, which respond to less light than cones. W/o A, rhodopsin doesn’t respond to light, a particular problem in low light. |
| Osteoporosis | Calcium/Vit D  (Vit A/Ph) | Too little (Too much) | Not enough Ca to strengthen bones – lose mass and become smaller/brittle. Either not enough in diet, low Vit D to absorb/incorporate it, or too much Vit A/Ph leaching it from bones. |
| Rickets (kids) /osteomalacia (adults) | Vitamin D | Too little | Vitamin D stimulates absorption of Ca and Ph, regulates blood Ca levels. W/o enough D, not enough Ca/Ph absorbed to build/maintain bones. Ca leached from bones to provide enough for other functions. Weak, bowed bones. |
| Pellagra | Niacin (B3) | Too little | Niacin necessary for skin and digestive cells, obtaining energy from food. Low niacin leads to skin inflammation (low skin health), diarrhea (digestive cell malfunction), and dementia (not enough energy for brain cells). |
| Anemia | Iron  Folate/B12 | Too little | B12 and folate necessary to form healthy RBCs. Low B12/folate = RBCs that can carry O2 well.  (low folate = macrocytic, low B12/intrinsic factor = pernicious)  Iron is necessary to bind O2 in hemoglobin. Low iron 🡪 less active hemoglobin/myoglobin 🡪 carry less O2  Anemia = weakness from not enough O2 to perform cell respiration for energy |
| Neural tube defects | Folate | Too little | Folate is vital for DNA synthesis/creation of new cells. Low folate disrupts new cell formation, in particular in neural tube (one of early major development events) 🡪 deficient brain/spinal cord development. |
| Hyperkalemia | Potassium | Too much | Potassium is necessary for muscle contraction and nerve impulses. Too much changes/deregulates heart beats/contractions. |
| Dental caries | Fluoride | Too little | Fluoride strengthens enamel on teeth. Without enamel, bacteria/acids can take hold and erode teeth. |
| Goiter | Iodine | Too little | Iodine is necessary for thyroid hormone synthesis. TH is necessary for metabolism regulation (fast/slow). W/o enough iodine, the thyroid gland can’t make TH and then enlarges to compensate 🡪 goiter is enlarged thyroid (lump at neck). |