MICROMINERALS

MINERAL	FUNCTION/S	DEFICIENCY/S	TOXICITY/S	SOURCES
Chromium (Cr)	▪ Chromium is bound to transferrin and transported to the liver. From there, it is dispersed throughout the body, where it is found in minute amounts in the blood and tissues ▪ help to maintain normal glucose metabolism ▪ assists in growth ▪ involved in protein transport ▪ helps in the breakdown of glycogen and lipids	▪ impaired growth ▪ elevated blood cholesterol and triglycerides ▪ fatty deposits in the arteries ▪ decreased sperm count/infertility ▪ reduction in lifespan/Aging ▪ Atherosclerosis ▪ Cataracts ▪ decreased glucose tolerance ▪ increased plaque in aorta ▪ increased cholesterol formation in the liver ▪ deterioration of growth	▪ Excessive amounts can result in allergic and eczematous dermatitis and can damage the liver and kidneys ▪ GI hemorrhage ▪ lung/esophagus cancer ▪ skin ulcers	▪ Meat ▪ Clams ▪ Corn oil ▪ Whole grain cereals ▪ Brewer's yeast

MINERAL	FUNCTION/S	DEFICIENCY/S	TOXICITY/S	SOURCES
Cobalt (Co)	▪ integral part of Vitamin B12	▪ include those of a Vitamin B12 deficiency	▪ Excesive amounts can cause anorexia ▪ nausea and vomiting ▪ goiter ▪ heart/nerve/kidney damage ▪ polycythemia; increase no. of RBC ▪ hyperplasia of the bone marrow	▪ Liver ▪ Kidney ▪ Oysters ▪ Clams ▪ Lean beef ▪ Veal ▪ Poultry ▪ Salt water fish ▪ Milk

MINERAL	FUNCTION/S	DEFICIENCY/S	TOXICITY/S	SOURCES
Copper (Cu)	▪ necessary for the conversion of iron to hemoglobin ▪ necessary in improving energy and alertness ▪ assists in the utilization of Vitamin C, reaching the bloodstream within fifteen minutes after ingestion ▪ assists the amino acid, tyrosine, to work as a pigmenting factor for skin and hair ▪ when bound to such substances as zinc and ceruloplasmin, copper becomes an important blood antioxidant preventing polyunsaturated fats from turning rancid in the body, thereby limiting the production of free radicals	▪ hypocupremia ▪ ceruloplasmin ▪ hypoproteneimia ▪ responsible for anemia ▪ low white blood cells ▪ bone density loss ▪ lung damage as a result of emphasema ▪ Menkes' syndrome is an inherited defect in copper absorptionin young men leads to a significant lowering of HDL in the blood, increasing the risk of heart disease ▪ Proposed as copper is involved in carcinogenesis, not by direct mechanism, but by antagonizing selenium ▪ red blood cell rupture ▪ difficulty in breathing ▪ faulty nerve development ▪ decreased sense of taste ▪ eczema/ skin sores, ▪ abnormal skin/hair pigmentation.	▪ Wilson's disease ▪ abdominal pain ▪ enlargement of liver/spleen ▪ cirrhosis of liver ▪ increased blood pressure ▪ increased fat in feces ▪ insomnia ▪ jaundice ▪ emotional agitation ▪ decreased zinc to brain.	▪ Oysters ▪ Cocoa ▪ Nuts ▪ Cherries ▪ Mushroom ▪ Whole grain cereals ▪ Leafy vegetables ▪ Eggs ▪ Muscle meat ▪ Fish ▪ Poultry ▪ Beans ▪ Peas ▪ Fresh fruits

MINERAL	FUNCTION/S	DEFICIENCY/S	TOXICITY/S	SOURCES
Fluorine (F)	▪ prevent cavities ▪ crystals of fluoroapatite can replace some of the calcium phosphate crystals of hydroxyapatite that are normally deposited during tooth formation and that it may replace some of the carbonate normally found in teeth ▪ effective in treatment of osteoporosis	▪ dental caries	▪ mottling of teeth or dental fluorosis ▪ crippling skeletal fluorosis ▪ pitting of permanent teeth ▪ late dentition ▪ projecting bone growth of spine ▪ arthritis ▪ abnormal white blood cells ▪ muscle pain/tendon strain ▪ deterioration of heart muscle ▪ weak pulse ▪ varicose veins ▪ lesions in GI tract ▪ nausea ▪ abdominal cramps	▪ Water ▪ Tea ▪ Coffee ▪ Seafood

MINERAL	FUNCTION/S	DEFICIENCY/S	TOXICITY/S	SOURCES
Iodine (I)	▪ Participation in the synthesis of thyroxin ▪ Reduction of goiter ▪ fibrocystitis has been relieved with treatments of elemental iodine ▪ break up stubborn mucus in persistent coughing	▪ cold feet ▪ goiter ▪ fatigue ▪ eczema ▪ dry/brittle hair ▪ arrested physical and mental development ▪ deafness ▪ muteness ▪ cretinism; a congenital form of mental retardation ▪ myxedema	▪ thyrotoxicosis ▪ fatigue ▪ headaches ▪ weight gain ▪ dry skin ▪ acne ▪ sensitivities to cold ▪ thin/brittle nails ▪ rapid pulse ▪ irregular menstrual bleeding ▪ increased salivation ▪ over activity of the thyroid gland	▪ Seafood ▪ Seaweeds ▪ Iodized salt

MINERAL	FUNCTION/S	DEFICIENCY/S	TOXICITY/S	SOURCES
Iron (Fe)	▪ main constituent of hemoglobin ▪ assists in transporting oxygen from the lungs to cells throughout the body ▪ helps store oxygen for future use ▪ In the liver and muscle tissue, it is stored as ferritin and hemosiderin. ▪ Iron promotes resistance to disease ▪ aids in growth ▪ necessary for the metabolism of B vitamins ▪ Hemoglobin accounts for most of a child's iron and is recycled and reused as blood cells are being replaced about every 120 days	▪ Anemia ▪ increased menses ▪ nosebleeds ▪ headaches ▪ decreased immunity ▪ thinning hair ▪ dry scaling lips ▪ muscle weakness ▪ fatigue/ depression ▪ dizziness ▪ bodily weakness ▪ difficulty swallowing ▪ thin nails with edges turning upwards ▪ intestinal diseases ▪ continuous diarrhea ▪ constipation ▪ overall itching	▪ hemosiderosis ▪ hemochromatosis ▪ bronzed skin ▪ dizziness ▪ decreased weight ▪ headaches ▪ shortness of breath ▪ fatigue ▪ increased urination ▪ internal inflammations	▪ Meat ▪ Fish ▪ Poultry ▪ Legumes ▪ Dried fruits ▪ Whole grains ▪ Liver ▪ Seafood ▪ Egg yolk ▪ Green Leafy Vegetables

MINERAL	FUNCTION/S	DEFICIENCY/S	TOXICITY/S	SOURCES
Molybdenum (Mo)	▪ aids in the metabolism of carbohydrates, fats, nitrogen, and copper ▪ a constituent of enzymes involved in the metabolism of sulfur and purines and in the transfer of electrons for the oxidation/reduction process ▪ a component of the enzymes xanthine oxidase, aldehyde oxidase, sulfite oxidase, and nitrate reductase ▪ convert such purines, as caffeine, to uric acid, and, by taking more than 10 mg. per day, it can progress to gout or kidney stones, complete with joint pain	▪ anemia ▪ fatigue ▪ decreased urine formation ▪ increased fatty acid oxidation ▪ reduced life expectancy ▪ tachycardia (increased heart rate) ▪ visual problems ▪ male impotence ▪ mouth and gum disorders ▪ cancer	▪ copper deficiency ▪ gout ▪ bone disease ▪ diarrhea ▪ anemia ▪ decreased growth	▪ hard tap water ▪ milk ▪ beans ▪ dark green leafy vegetables ▪ whole grains ▪ legumes ▪ lean meat ▪ poultry