VALUE OF MINERALS FOR HUMAN BODY

Prof. Subas Chandra Dinda

Introduction:

Minerals are inorganic substances required by the body in small amounts for a variety of functions such as formation of bones and teeth; as essential constituents of body fluids, blood and tissues; as components of enzymatic systems and for normal functioning of nervous system.

Some minerals are needed in larger amounts than others, e.g. calcium, phosphorus, magnesium, sodium, potassium and chloride. Others are required in smaller quantities and are sometimes called trace elements or minerals, e.g. iron, zinc, iodine, manganese, selenium and copper, etc. Despite being required in smaller amounts, trace minerals are equally important than those of other minerals. Eating a varied diet will help ensure an adequate supply of most minerals for healthy people.

The body requires different amounts of each mineral because each mineral has a different set of functions. Requirements vary according to age, sex and physiological state (for example pregnancy). The Department of Health has published recommendations in the form of Dietary Reference Values (DRVs) for minerals for different groups of healthy people. The Reference Nutrient Intake (RNI) is the amount of a nutrient that will satisfy the needs of practically all the population (i.e. 97.5%); in other words it is usually not necessary to exceed the RNI. But certain groups of people may have higher requirements for specific minerals, e.g. women particularly because of loss of iron during their menstruation periods may need extra iron, and during high risk of osteoporosis extra calcium (and vitamin D) is sometimes recommended by doctors. In such cases, supplements may be useful but should not replace a varied and healthy diet.

Roles in Biological Process:

Dietary element	RDA (mg)	UL (mg)	Category/Value in body constitution	Deficiency & disease	Excess & disease	Dietary sources
Calcium	1200	2500	Needed for muscle, heart and digestive system health, builds bone, supports synthesis and function of blood cells	Hypocalcaemia	Hypercalcaemia	Eggs, canned fish with bones (salmon, sardines), green leafy vegetables, nuts, seeds.

Sodium	1500	2300	A systemic electrolyte and is essential in coregulatingATP with potassium	Hyponatremia	Hypernatremia	Table salt (sodium chloride, the main source), sea vegetables, milk, and spinach.
Potassium	4700	4700	A systemic electrolyte and is essential in coregulatingATP with sodium	Hypokalemia	Hyperkalemia	Sweet potato, tomato, potato, beans, lentils, dairy products, seafood, banana, prune, carrot, orange.
Phosphorus	700	4000	A component of bones, cells, in energy processing, in DNA and ATP (as phosphate)	Hypophosphatemia	Hyperphosphatemia	Red meat, dairy foods, fish, poultry, bread, rice, oats
Magnesium	420	350	Required for processing ATP and for bones	Hypomagnesemia	Hypermagnesemia	Spinach, legumes, nuts, seeds, whole grains, peanut butter, avocado
Chloride	2300	3600	Needed for production of hydrochloric acid in the stomach and in cellular pump functions	Hypochloremia	Hyperchloremia	Table salt (sodium chloride)
Trace Elements						
Iron	18	45	Required for many proteins and enzymes, notably hemoglobin formation	Iron deficiency**a nemia**	Iron overload results haemochromatosis	Meat, seafood, nuts, beans, dark chocolate
Zinc	11	40	Pervasive and required for	Zinc deficiency	Zinc toxicity	Grains, dairy products

Manganese	2.3	11	A cofactor in enzyme functions	Manganese deficiency	Manganism	Grains, legumes, seeds, nuts, leafy vegetables, tea, coffee
Copper	0.9	10	Required component of many redox enzymes, including cytochrome c oxidase	Copper deficiency	Copper toxicity	Liver, seafood, oysters, nuts, seeds; some: whole grains, legumes
Iodine	0.15	1.1	Required for synthesis of thyroid hormones, thyroxine and triiodothyronine	Iodine deficiencycauses Thyroidism leads to **goiter**	Iodism / Hyperthyroidism	Seaweed (kelp or kombu), grains, eggs, iodized salt
Chromium	0.035	0.035	Involved in glucose and lipid metabolism, although its mechanisms of action in the body	Chromium deficiency	Chromium toxicity	Whole grain products
Selenium	0.055	0.4	Essential to activity of antioxidant enzymes like glutathione peroxidase	Selenium deficiency	Selenosis	Brazil nuts, seafoods, organ meats, meats, grains, dairy products, eggs
Molybdenum	0.045	2	Essential for enzymes likeoxidasesxanthine oxidase, aldehyde oxidase, and sulfite oxidase	Molybdenum deficiency	Molybdenum toxicity	Legumes, whole grains, nuts

[Abbreviations: RDA = Recommended Dietary Allowance; UL = Tolerable upper intake level; ATP = Adenosine Tri Phosphate; DNA = Deoxyribo Nucleic Acid; Figures shown are for adults age 31-50, male or female neither pregnant nor lactating]

Phosphorus

Magnesium

Potassium & Iron

Iron

Calcium

Zinc & Copper

Chromium & Selenium

Manganese

Sodium & Iodine

[Fig: Sources of Trace Elements/Minerals]

Dietary nutrition:

Dietitians may recommend that minerals are best supplied by ingesting specific foods rich with the chemical element(s) of interest. The elements may be naturally present in the food (e.g., calcium in dairy milk) or added to the food (e.g., orange juice fortified with calcium; iodized salt fortified with iodine). Dietary supplements can be formulated to contain several different chemical elements (as compounds), a combination of vitamins and/or other chemical compounds, or a single element (as a compound or mixture of compounds), such as calcium (calcium carbonate, calcium citrate) or magnesium (magnesium oxide), or iron (ferrous sulfate, iron bis-glycinate).

Suggestion: Eat healthy foods and be healthy!

References:

- *M.A. Zoroddu; J. Aashet; G. Crisponi; S. Medici; M. Peana; V.M. Nurchi (June 2019).* "The essential metals for humans: a brief overview". *Journal of Inorganic*

Biochemistry. 195: 120–129. doi:10.1016/j.jinorgbio.2019.03.013. PMID 30939379.

- *Berdanier, Carolyn D.; Dwyer, Johanna T.; Heber, David (19 April 2016).* Handbook of Nutrition and Food, Third Edition. *CRC Press. pp. 211–224.* ISBN 978-1-4665-0572-8. Retrieved 3 July 2016.
- "Phosphorus in diet". *MedlinePlus, National Library of Medicine, US National Institutes of Health. 2 December 2016.* Retrieved 24 December 2016.
- Chromium. IN: Dietary Reference Intakes for Vitamin A, Vitamin K, Arsenic, Boron, Chromium, Chromium, Iodine, Iron, Manganese, Molybdenum, Nickel, Silicon, Vanadium, and Chromium. Institute of Medicine (US) Panel on Micronutrients. National Academy Press. 2001, PP.197-223.
- "Selenium—Fact Sheet for Health Professionals". *National Institutes of Health. 2016.* https://ods.od.nih.gov/factsheets/Selenium-HealthProfessional/
- *M.A. Zoroddu; J. Aashet; G. Crisponi; S. Medici; M. Peana; V.M. Nurchi (2019).* "The essential metals for humans: a brief overview". *Journal of Inorganic Biochemistry. 195: 120–129.* doi:10.1016/j.jinorgbio.2019.03.013. PMID 30939379
- https://www.nutrition.org.uk/nutritionscience/nutrients-food-and-ingredients/minerals-and-trace-elements.html
- https://en.wikipedia.org/wiki/Mineral_(nutrient)

■

Professor of Pharmacy,TeerthankerMahaveer University, Moradabad, U.P. - 244001, India.
Ph.:+918249036854
E-mail: subasdinda@gmail.com

WORLD POPULATION DAY

World Population Day is observed on July 11 every year, which seeks to raise awareness of global population issues. The event was established by the Governing Council of the United Nations Development Programme in 1989. World Population Day aims to create awareness on various population issues such as the importance of family planning, gender equality, poverty, maternal health and human rights.

As per Worldometers real time world statistics, the world population has reached 7,700,000,000 on year 2019. Population plays a vital role in the development of a nation. A low population means sufficient resources for everyone and better socio-economic conditions of a nation. A large population means large human resources for working in industries and service sectors to raise Gross Domestic Products. But a balance between the two is required so that the nation can have sufficient natural resources for all its citizens and there is no dearth of human resources to work for the development of the nation.