7.3: Water Soluble Vitamins

Nine vitamins are considered water soluble, including: vitamin C and all of the B vitamins (Riboflavin, Niacin, Thiamin, B₆, Folate, B₁₂, Pantothenic Acid and Biotin). In contrast to the four Fat-Soluble Vitamins, Water-soluble vitamins dissolve easily in water and, in general, are readily excreted from the body, to the degree that urinary output is a strong predictor of vitamin consumption. Because they are not as readily stored, more consistent intake is important. Many types of water-soluble vitamins are synthesized by bacteria.

- **7.3A: Vitamin B₁ (Thiamine)**
  Thiamine, also known as thiamin or vitamin B1, is a vitamin found in food and used as a dietary supplement. As a supplement it is used to treat and prevent thiamine deficiency and disorders that result from it, including beriberi, Korsakoff's syndrome, and Korsakoff's psychosis. Other uses include maple syrup urine disease and Leigh's disease. It is taken by mouth or by injection.

- **7.3B: Vitamin B₂ (Riboflavin)**
  Riboflavin, also known as vitamin B2, is a vitamin found in food and used as a dietary supplement. As a supplement it is used to prevent and treat riboflavin deficiency and prevent migraines. It may be given by mouth or injection. It is nearly always well tolerated. Normal doses are safe during pregnancy. Riboflavin is in the vitamin B group. It is required by the body for cellular respiration. Food sources include eggs, green vegetables, milk, and meat.

- **7.3C: Vitamin B₃ (Niacin)**
  Niacin, also known as vitamin B3 and nicotinic acid, is an organic compound that is one of the 20 to 80 essential human nutrients. Pharmaceutical and supplemental niacin are primarily used to treat hypercholesterolemia (high cholesterol) and pellagra (niacin deficiency). Insufficient niacin in the diet can cause nausea, skin and mouth lesions, anemia, headaches, and tiredness.

- **7.3D: Vitamin B₅ (Pantothenic acid)**
  Pantothenic acid is a water-soluble vitamin. Pantothenic acid is an essential nutrient. Animals require pantothenic acid to synthesize coenzyme-A), as well as to synthesize and metabolize proteins, carbohydrates,
and fats. The anion is called pantothenate. Pantothentic acid is the amide between pantoic acid and β-alanine. Its name derives from the Greek pantothen, meaning "from everywhere", and small quantities of pantothentic acid are found in nearly every food.

- **7.3E: Vitamin B₆ (Pyridoxine)**
  Vitamin B6 refers to a group of chemically similar compounds which can be interconverted in biological systems. Vitamin B6 is part of the vitamin B group of essential nutrients. Its active form, pyridoxal 5'-phosphate, serves as a coenzyme in some 100 enzyme reactions in amino acid, glucose, and lipid metabolism.

- **7.3F: Vitamin B₇ (Biotin)**
  Biotin is a water-soluble B-vitamin, also called vitamin B7 and formerly known as vitamin H or coenzyme R. It is composed of a ureido ring fused with a tetrahydrothiophene ring. A valeric acid substituent is attached to one of the carbon atoms of the tetrahydrothiophene ring. Biotin is a coenzyme for carboxylase enzymes, involved in the synthesis of fatty acids, isoleucine, and valine, and in gluconeogenesis.

- **7.3G: Vitamin B₉ (Folic acid)**
  Folic acid, another form of which is known as folate, is one of the B vitamins. The recommended daily intake level of folate is 400 micrograms from foods or dietary supplements. Folic acid is used to treat anemia caused by folic acid deficiency. It is also used as a supplement by women during pregnancy to prevent neural tube defects in the baby. Low levels in early pregnancy are believed to be the cause of more than half of babies born with neural tube defects.

- **7.3H: Vitamin B₁₂ (Cobalamin)**
  Vitamin B12 is a water-soluble vitamin that has a key role in the normal functioning of the brain and nervous system, and the formation of red blood cells. It is one of eight B vitamins. It is involved in the metabolism of every cell of the human body, especially affecting DNA synthesis, fatty acid and amino acid metabolism.[1] No fungi, plants, nor animals (including humans) are capable of producing vitamin B12. Only bacteria and archaea have the enzymes needed for its synthesis.

- **7.3I: Vitamin C (Ascorbic acid)**
  Vitamin C, also known as ascorbic acid and L-ascorbic acid, is a vitamin found in food and used as a dietary supplement. As a supplement it is used to treat and prevent scurvy. Evidence does not support use in the general population for the prevention of the common cold.[2][3] It may be taken by mouth or by injection.