Vitamin E Deficiency

Vitamin E is a fat-soluble vitamin that functions biologically as an antioxidant. Important biologic functions of this vitamin, which includes the compounds tocopherols and tocotrienols, include protecting the cell membranes of erythrocytes and neurons from free radical damage. Deficiencies in vitamin E can be caused by fat malabsorptive disorders, which include cystic fibrosis, Whipple's disease, and celiac disease, among others. Deficiency of this vitamin leads to hemolytic anemia. In addition, neuronal dysfunction manifests in the posterior column and spinocerebellar tract as ataxia and sensory changes. Deficiency can also lead to myopathies, impaired immune response, hyperkeratosis and acanthosis nigricans.



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Mechanism

Antioxidant

Anteater-shield Eating Oxygen-molecules

Vitamin E functions as an antioxidant, disabling the production of free radicals in the body. As this vitamin is fat-soluble, reduced free radicals bound to vitamin E are incorporated into cell membranes, which protects them from further oxidative damage or reactivity.

Protects Erythrocytes

Protecting Red Blood Cells

While vitamin E does not play a role in erythropoiesis, or red blood cell production, it is vital to their protection. Red blood cells are particularly prone to lipid peroxidation, since they carry oxygen (which easily undergo oxidative stress) to the tissues. Vitamin E works to prevent lipid peroxidation, protecting them from damage and hemolysis.

Protects from Free Radical Damage

Shielding Free Radicals from Free Radical Monster

Vitamin E functions as an antioxidant, disabling the production of free radicals in the body. It functions as a peroxyl radical scavenger, reacting with free radicals to form a tocopheryl radical. As this vitamin is fat-soluble, reduced free radicals bound to vitamin E are incorporated into cell membranes, which protects them from further oxidative damage or reactivity.

Deficiency Signs and Symptoms

Hemolytic Anemia

Hemolyzing-RBCs from Anemone

Red blood cells are particularly prone to lipid peroxidation, since they carry oxygen (which easily undergo oxidative stress) to the tissues. Vitamin E works to prevent lipid peroxidation, protecting them from damage and hemolysis. Thus, deficiency of vitamin E deficiency can result in hemolytic anemia.

Posterior Column

Post-terrier

Vitamin E deficiency can also lead to spinal cord damage as a result of excess oxidative stress. The posterior column is the white matter tract on the dorsomedial side of the spinal cord. This tract contains ascending fibers important for fine touch, vibration, pressure and proprioception. In cases of vitamin E deficiency, these sensations can be affected, leading to peripheral sensory defects.

Spinocerebellar Tract

Silver-cerebellum-bell

Vitamin E deficiency can lead to spinal cord damage as a result of excess oxidative stress. The spinocerebellar tract contains fibers that begin in the spinal cord and terminate in the ipsilateral cerebellum, conveying information about limb and joint position. Vitamin E associated spinocerebellar tract damage characteristically presents with ataxia.

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