**Medical Nutrition Therapy Nutrient – Cadmium**

1. **What is the nutrient?**

Cadmium: This is released into the environment from mining and metal processing operation, burning fuels, making and using phosphate fertilizers, and disposing of metal products. Cadmium usually enters the body by eating or drinking cadmium-contaminated food or water or by breathing cadmium-contaminated air.

1. **What is the RDA/DRI for the nutrient?**

There is no established RDA/DRI for cadmium. Typically, humans consume about 0.0004 mg/kg/day of cadmium. This is about ten times lower than the level of cadmium that causes kidney damage from eating contaminated food.

1. **How is the nutrient metabolized?**

Cadmium is most efficiently absorbed by the lungs, but can also be absorbed in small amounts by the gastrointestinal tract. Once cadmium enters the body, it becomes widely distributed and binds mainly to red blood cells. It then accumulates mostly in the kidneys and liver and induces the production of metallothionein, which binds nearly 80-90% of cadmium in the body. There is little to no metabolism of cadmium by the body, although it is able to bind in small amounts to various macromolecules and proteins. Cadmium is excreted through both urine and feces.

1. **What are food sources of the nutrient?**

Cadmium is most often found in shellfish, liver, and kidney meats. Plants also can absorb cadmium from the soil. However, the amount that they take up from the ground does not provide enough exposure to be of great concern. Smoking cigarettes also drastically increases a person’s inhalation of cadmium.

1. **What disease states alter the nutrients metabolism?**

People with low body store of iron will have increased intestinal absorption of cadmium. Low intake of calcium or protein may also increase cadmium absorption. This could be seen in individuals with PEM or other metabolic stress. An individual with pre-existing kidney or liver disease would also be negatively affected by cadmium exposure. Respiratory complications of smoking cigarettes can also be worsened over time because of the cadmium present in cigarettes. Cadmium exposure from cigarettes increases a person’s cancer risk due to cadmium’s carcinogenic properties.

1. **What are the tests or procedures to assess the nutrient level in the body?**

Urine or blood tests can be used to measure cadmium levels in the body. Tests used to check the health of the liver and kidneys can also be used to indirectly measure the effect of cadmium in the body.

1. **What is the drug –nutrient interactions?**

Because zinc and cadmium often occur together in nature, zinc-containing drugs can often contain levels of cadmium, putting people at risk for prolonged cadmium exposure. Drugs that contain metallothioneins can help protect against cadmium absorption. Individuals who experience negative effects of cadmium may be treated with EDTA. This drug decreases cadmium in the body by urinary excretion.

1. **How is the nutrient measured?**

Cadmium levels can be expressed in micrograms or milligrams, depending on nutrient concentration.

1. **What is the Upper Tolerable Limits?**

There are no defined Upper Tolerable Limits for cadmium. However, breathing 0.01 mg/m3 of cadmium-contaminated air over the long-term can result in chronic lung disease and kidney disease in humans. In addition food or drink exposure to cadmium in amounts greater than 0.05 mg/kg/day can lead to stomach irritation. Long-term food or drink exposure in the amount of 0.005 mg/kg/day is the safest amount, leading to little risk of kidney damage.

**10.What are the physical signs of deficiency?**

Because cadmium has been determined to be a probable or suspected carcinogen by the U.S. Department of Health and Human Services, it is not recommended to seek out exposure to cadmium.

 **11.What are physical signs of toxicity?**

High exposure to cadmium through eating and drinking contaminated foods and beverages can severely irritate the stomach, causing vomiting or diarrhea. Breathing in too much cadmium can also cause damage to the lungs. If a person is exposed to cadmium over a long period of time, they can experience kidney damage. This damage can lead to the formation of kidney stones and affect the bones, which can become painful and debilitating. Eventual renal failure due to chronic oral exposure is characterized by proteinuria. The accumulation of cadmium in the kidney affects renal vitamin D metabolism, leading to osteomalacia and osteoporosis.

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