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Nutrition

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Scurvy: Vitamin C (Ascorbic Acid) Deficiency

Scurvy is a disease that in recorded history is estimated to have killed more victims, caused more diseases and shortened the human life span more than any other single factor. (Stone) The disease is much less prevalent in modern times, however, only a couple hundred years ago it was a pandemic that was not understood and primarily affected sailors making very long journeys across the oceans.

The history of scurvy and the search for a cure is an interesting one, in which James Lind, a Scottish naval surgeon, is generally given the credit. During Lind's days in the 1700's, scurvy was referred to as "the plaque of the sea" because anytime a crew would take long voyages, many of them would develop scurvy and often die before they returned home. It was reported that Magellan once lost more than 80 percent of his crew to the disease, and the Royal Navy lost more people per year to scurvy than to enemy combat. (Lamb) For whatever reason, physicians of the time were unwilling to come aboard ships to study scurvy where it primarily occurred, so the disease went untreated for many years. Finally, James Lind decided he would fill this gap by performing experiments on his ship and observing facts instead of basing decisions of other practices of the time, such as religious healings. Lind developed an experiment that was one of the first ever controlled experiments of its kind.

While serving aboard the HMS Salisbury in 1747, he took 12 men all in the same general stage of scurvy and isolated them from the rest of the crew, putting two men per room. He chose six different remedies to give the six groups of men. The six remedies he chose were based on practices that were already used during that time to attempt to treat scurvy. They were: a quart of cider daily; 25 gutts of elixir vitriol three times a day; two spoonfuls of vinegar three times a day; half a pint of seawater daily; a mix of nutmeg, mustard and garlic three times a day; and two oranges and a lemon daily. "The most sudden and visible good effects", Lind reported, "were perceived from the use of oranges and lemons; one of those who had taken them being at the end of six days fit for duty ... The other was the best recovered of any in his condition; and being now deemed pretty well, was appointed nurse to the rest of the sick." (Milne, Chalmers) Although Lind didn't know exactly what was curing the sailors, he found a crucial link. It would later become evident that the foods Lind had found to cure scurvy all had high amounts of ascorbic acid, or Vitamin C.

Scurvy is a disease caused by the lack of, or insufficient amounts of ascorbic acid. It is considered a nutritional disease by most, because simply eating a proper amount of vitamin C in your diet will offset and prevent the affects of scurvy. However, there are people that believe that it should be classified as a genetic defect instead. They think it should be classified as a genetic defect because humans lack the ability to synthesize ascorbic acid, unlike most mammals. This inability to synthesize ascorbic acid comes because humans lack the liver enzyme L-Gulonolactone oxidase (GLO). This enzyme is the last enzyme in a series of four which converts blood sugar, glucose, into ascorbic acid in the mammalian liver. (Stone) The only other mammals that are missing this same

enzyme are the guinea pigs and most monkeys. Because we are missing this critical enzyme to convert glucose into ascorbic acid we must take in a proper amount in our diets.

Ascorbic acid plays many roles in the body. It is required for synthesis of collagen, which is a protein that plays a huge role in giving great amounts of tensile strength to cartilage, ligaments and bones. Collagen is also in our skin, lack of collagen leads to wrinkles. Ascorbic acid is related to neurotransmitters in the nervous system, and even plays a role in hormone production. It also assists in the conversion of cholesterol to bile, which is used by the digestive system to emulsify fats. Without ascorbic acid present to convert cholesterol to bile, one may suffer from high cholesterol. Ascorbic acid also increases the absorption of iron by the body. Iron is an important part of hemoglobin which carries oxygen in the bloodstream to cells that need it. Another very important role of ascorbic acid is as an antioxidant to protect the body against free radicals which destroy the bodies' cells. (Whitney, Rolfes)

Ascorbic acid also promotes healthy cell development, and promotes tissue growth and repair. It plays an important role in healthy gums, and it protects against infection by keeping the immune system strong.

For all of these reasons a lack of ascorbic acid in the diet is not a good thing. Some signs and symptoms of scurvy are spongy gums which bleed easily, pinpoint hemorrhaging causing bruises which is caused by weakened blood vessels. Edema is also common with scurvy, which is the retention of water by the body. This leads to general weakness, lack of energy and painful joints. One of the terrible things about scurvy is that a lack of ascorbic acid weakens the immune system. With a weak immune system

you are susceptible to many other infectious agents that your body could have otherwise handled easily. Many people who have died of scurvy may have not died from the scurvy itself, but from infectious diseases they got while their immune system was weakened.

Treatment of scurvy is a very simple one. Return ascorbic acid into the diet and within a few weeks the patient will be almost completely cured depending on the severity. For adults an ascorbic acid pill will be given generally for one week with a dosage of 100-200 mg. After that week the patient can ingest the recommended dietary allowance (RDA) amount of 45-60 mg, for adults, of ascorbic acid to prevent future onset of scurvy. (Goebel, MD)

Prevention of scurvy is also a very simple one. All one has to do is eat a diet sufficient in ascorbic acid. For infants this amount is 30-40 mg per day, for adults it is 45-60 mg per day, and for pregnant and lactating mothers it is anywhere from 70-95 mg per day. (Goebel, MD) Many people will take vitamin supplements in order to get the amount of vitamins they feel they need. However, if one is eating a nutritionally sound diet with a variety of food groups, you can be sure you are getting enough ascorbic acid. Some foods that are particularly high in ascorbic acid are citrus fruits, such as oranges and lemons, berries, cantaloupe, broccoli, spinach and tomatoes. Because vitamin C is a water-soluble vitamin, people do not have to be too worried about overdosing on it because it can be easily excreted by the body. (Whitney, Rolfes)

Even though preventing scurvy is very simple to do with a nutritionally sound diet, there are many people, even today, that are deficient of vitamin C. Just because they are deficient of vitamin C does not mean that they will show signs of scurvy. The

deficiency has to occur for a fairly long period of time before physical abnormalities occur, such as a few weeks. In most cases, people may be deficient of vitamin C for only a few days at a time, which is not long enough for side effects such as bleeding gums to occur. There are also certain groups of people who are more susceptible to vitamin C deficiencies. For example, studies have shown that African Americans are more prone to vitamin C deficiencies. Also prone to deficiencies are those who smoke, while Mexican Americans have a lower than average risk of becoming vitamin C deficient. Studies have shown that 18% of US adults consumed less than 30 mg per day of vitamin C, which is under the recommended dietary allowance. The same study shows that 14% of male and 20% of females 13 to 18 years old consume less than 30 mg per day of vitamin C. These people are all at risk of scurvy. (Hampl, Taylor, Johnston)

Scurvy is much less of a threat today than it was just a few centuries ago. In the 1700's thousands of people died from this deficiency and they did not have the science or understanding to prevent it. Today, scurvy is much less prevalent in modern societies, but this does not mean that there are not cases of scurvy, even in the United States. But thanks to the advancement of science we can now diagnosis scurvy very easily and a simple change in diet, and possibly a simple vitamin C pill, is all it will take to cure it.