

Intravenous (IV) Vitamin C Therapy for Cancer

What is Vitamin C?

Vitamin C, also known as ascorbic acid, is a water-soluble vitamin. Vitamin C has anti-oxidant, pro-oxidant, chelating and immunomodulatory activities. It functions as an essential co-factor in various metabolic pathways of the body, and is necessary for the production of collagen (connective tissue). The effects of Vitamin C depend on the dose that is given and the route that it is administered to a patient.

What is IV Vitamin C Therapy?

Intravenous (IV) Vitamin C Therapy involves the administration of Vitamin C directly into the bloodstream. This delivery system is very powerful because it allows the plasma concentration of Vitamin C to reach levels high enough to kill cancer cells. Oral administration of Vitamin C is unable to achieve high enough plasma levels of Vitamin C to kill cancer cells. The National Institutes of Health (NIH) has recently published data demonstrating the anti-cancer effects of Vitamin C (<http://www.nih.gov/news/health/aug2008/niddk-04.htm>).

How Does IV Vitamin C Work?

Vitamin C at high blood concentrations does not work as an anti-oxidant but instead acts as a *pro-oxidant*. When given intravenously, Vitamin C in the blood has been shown to generate the production of hydrogen peroxide that directly kills cancer cells in the early stages of cancer. Normal cells have the ability to neutralize the effects of hydrogen peroxide via catalase whereas cancer cells do not. This mechanism of action is similar to some conventional chemotherapies, but without the toxic side effects. For additional information see these articles: Clinical and Experimental Experiences With Intravenous Vitamin C by Neil H. Riordan et al., and Vitamin C As a Cancer Treatment: State of The Science and Recommendations for Research by Carmen Tamayo and Mary Ann Richardson.

IV Therapy Vitamin C At The Center:

Current intravenous Vitamin C protocols suggest maximum benefit may be obtained from one to two IV infusions per week for 2 months. After reassessment, continued treatment is typically one infusion per month or on an as needed basis depending on the case. Infusion time can range from 1-3 hours in duration depending on the dose. Intravenous access is achieved by placing a small venous catheter into a vein in the animal's front or rear leg. A small dose of Vitamin C is given initially to begin therapy and the Vitamin C dose is increased in subsequent infusions.

Each animal is evaluated as an individual. In general, the dose and dosing interval of IV Vitamin C will vary depending on the type and severity of cancer present, the animals condition, other therapies given and whether the animal will be treated with chemotherapy and radiation therapy at the same time as Vitamin C therapy.

What types of cancer can benefit from high dose intravenous Vitamin C?

IV Vitamin C therapy is a general treatment for most cancers, especially in early cases. Cancer patients most likely to benefit from Vitamin C therapy include those diagnosed with: lymphoma, mast cell tumor, lymphocytic leukemia, bladder cancer, lung cancer, pancreatic cancer and liver cancer. To achieve good clinical results, herbal medicine, and acupuncture may be needed in addition to oral doses of Vitamin C and dietary therapy. For more info please see: Canadian Medical Association Journal: Sebastian J. Padayatty, et al "Intravenously administered vitamin C as cancer therapy: three cases" CMAJ 2006; 174(7): 937-42.

Is IV Vitamin C Therapy Safe?

There are no adverse effects associated with high doses of intravenous vitamin C when properly administered, whether given as a sole therapy or in combination with chemotherapy or radiation. IV Vitamin C is considered by many doctors to be complimentary to chemotherapy and radiation therapy. In human medicine, IV Vitamin C is administered at several different private and public medical centers (see <http://integrativemed.kumc.edu/ivvitaminc.htm>).

Can intravenous Vitamin C be given with chemotherapy or radiation treatments? Does it interfere with or decrease the effectiveness of these conventional therapies?

Yes, IV Vitamin C can be safely given with chemotherapy and radiation therapies. There are studies that indicate that Vitamin C relieves pain, helps protect normal cells, decreases side effects of conventional cancer therapies, encourages remission and promotes a high quality of life. At IVC we believe that integrative cancer therapy (using both types of therapies together) allows the animal to better tolerate conventional cancer therapy in cases where the condition of the animal and the side effects of the drugs or radiation may prevent continued treatment.

At this point in time it does not appear that IV Vitamin C decreases the efficacy of chemotherapy or radiation. Instead, IV Vitamin C appears to promote the effectiveness of chemotherapy or radiation due to its pro-oxidant effects. Please see: **Antioxidants and Other Nutrients do not Interfere with Chemotherapy or Radiation** by Charles B Simone II; Nicole L Simone; Victoria Simone; Charles B Simone, *Alternative Therapies in Health and Medicine*; Jan/Feb 2007; 13, 1; Research Library.

In human medicine, Vitamin C is often given on the same day as chemo or radiation therapy. However, there is still much controversy regarding its use. There are other studies that report Vitamin C and for that matter any anti-oxidant could interfere with conventional cancer cell kill rates. Due to these reports many oncologists are opposed to the use of Vitamin C therapy with conventional chemotherapy drugs or radiation. The decision to treat your pet with IV Vitamin C can only be made by you, and we suggest that you review the current literature on this topic before making a decision.

Clinically, Dr Beebe has found IV Vitamin C to be complimentary to conventional chemotherapy drugs and radiation. It does not appear to interfere with the effects of chemotherapy or radiation, but instead helps promote a high quality of life for cancer patients, induces early remission, and helps the animal better tolerate conventional cancer therapies. In some cases, especially if treated early, patients may become cancer free. However, just as with conventional cancer therapies there is no guarantee of success, and it is difficult to predict the results of IV Vitamin C as each animal is a unique individual and responds independently to treatment.