

## High Dose Intravenous Vitamin C Cancer Treatment Fact Sheet

### Research Summary:

Many Phase I and Phase II clinical trials have shown that high dose ascorbic acid (Vitamin C) administered intravenously (high-dose IVC) in the range of 65g to 100g per session is safe and well tolerated by cancer patients. Ascorbic plasma concentrations of 20mM+ can be safely reached with these IV doses. At this concentration level there are no clinical indications that ascorbic acid (as opposed to injecting dehydroascorbic acid - DHA) is detrimental to the mechanism of action of standard care chemo and radio therapies. On the contrary, when administered in combination with radio and/or chemotherapy, it is observed IVC decreases toxicity from chemo/radiation compared to control arms, increases disease control, and can improve objective response rates. Similar effects have been reported when IVC is used in combination with targeted therapy.

Please consider the latest data available on using high-dose IVC in combination with standard care to mitigate chemo/radio induced adverse effects, and potentially yield synergistic or treatment enhancing effects.

### High-dose IVC contraindications:

Patients must be screened for renal dysfunction and red cell glucose-6-phosphate dehydrogenase deficiency (G6PD). Also not recommended for people with hemochromatosis.

## IVC Pharmacokinetics, Safety, and Tolerability Research:

### **Pharmacokinetic Evaluation of Intravenous Vitamin C: A Classic Pharmacokinetic Study**

June 25, 2022 article published by Springer

Ping Chen, Greg Reed, Joyce Jiang, Yaohui Wang, Jean Sunega, Ruochen Dong, Yan Ma, Anna Esparham, Ryan Ferrell, Mark Levine, Jeanne Drisko & Qi Chen

The study documents and compares the pharmacokinetics of 75g and 100g doses of intravenous vitamin C in healthy volunteers and cancer participants. It was noted IVC up to 100 g elicited no adverse effects or significant physiological/biochemical changes and appears to be safe.

<https://doi.org/10.1007/s40262-022-01142-1>

### **High-Dose Parenteral Ascorbate Enhanced Chemosensitivity of Ovarian Cancer and Reduced Toxicity of Chemotherapy**

February 5, 2014 article published by the journal Science.org

Yan Ma, Julia Chapman, Mark Levine, Kishore Polireddy, Jeanne Drisko, Qi Chen

The authors state high dose intravenous Vitamin C has “an outstanding safety profile” and “its ability to decrease chemotherapy-induced adverse effects should already make it a very valuable addition to chemotherapeutic regimens”.

<https://doi.org/10.1126/scitranslmed.3007154>

### **Broad safety impact of high-dose ascorbic acid and induction chemotherapy for high-risk pancreatic cancer.**

2017 abstract published in the Journal of Clinical Oncology

Howard Bruckner, Azriel Hirschfeld, Daniel Gurell, King Lee

IVC doses of 75-100 grams were well tolerated by 25 stage IV patients with pancreatic cancer. It also reduced toxicity from GFLIP regimen.

[https://ascopubs.org/doi/10.1200/JCO.2017.35.15\\_suppl.e15711](https://ascopubs.org/doi/10.1200/JCO.2017.35.15_suppl.e15711)

## Recent Combination Therapy Research:

### **High-dose intravenous vitamin C, a promising multi-targeting agent in the treatment of cancer**

October 30, 2021 article published by BMC Journal of Experimental & Clinical Cancer Research

Franziska Böttger, Andrea Vallés-Martí, Loraine Cahn, Connie R. Jimenez

Examines 152 studies and trials where medium to high dose IVC was administered to treat cancer. Reviews evidence on the safety and efficacy of IVC as a combination therapy and in a palliative care setting. Discusses the observed anti-cancer mechanisms of action.

<https://doi.org/10.1186/s13046-021-02134-y>

### **Intravenous High-dose Vitamin C in Cancer Therapy**

January 24, 2020 article published by National Cancer Institute

Lewis Cantley, Jihye Yun

Summarizes recent research into safety and tolerability of IVC, and observed mechanisms of action targeting KRAS/BRAF mutant cancers.

<https://www.cancer.gov/research/key-initiatives/ras/ras-central/blog/2020/yun-cantley-vitamin-c>