



# Intravenous Vitamin C (IVC) in Cancer Care: Patient Resource

## What is IVC?

High doses of vitamin C are given via an intravenous (IV) drip. The IV route allows much higher levels of vitamin C to circulate in the blood than is possible to achieve through oral supplementation alone, as the body cannot absorb very much vitamin C when it is taken by mouth.

## What is IVC used for?

In cancer care, people use it as it may:

- Support quality of life
- Reduce cancer-treatment related side effects including fatigue, nausea, and lack of appetite
- Improve treatment outcomes or slow cancer progression

IVC is not to be used as a cure for cancer. IVC should not be considered an alternative for chemotherapy or any other cancer treatments.

## Does IVC work?

There are several small clinical trials of IVC in people with cancer, and several other studies known as observational studies and case reports have been published. The research is still considered preliminary as most studies have been small and didn't include a "placebo" group. Most studies have used IVC for people receiving chemotherapy, and a few have studied it with radiation therapy, androgen deprivation therapy, or on its own.

Results from these studies show that IVC is generally safe and well tolerated, with minimal and mild side effects. Many but not all studies have found benefit for quality of life or symptom management alongside cancer treatments such as chemotherapy. Symptoms that have been improved with IVC include fatigue, pain, nausea, and appetite loss. There is promising early research for IVC used with standard treatments on cancer outcomes including tumor response and survival in some types of cancer. In particular, there may be benefit for cancer outcomes in patients with advanced pancreatic, ovarian, and certain types of colorectal and lung cancer. More research is needed.

IVC is still considered an experimental treatment and we are not yet certain if it will help people live longer or live better, but there is enough evidence to suggest it may provide benefit and it is reasonable for some people with cancer to consider.

## How does IVC work?

The main ways in which high dose IVC is thought to exert its action include: (1) hydrogen peroxide ( $H_2O_2$ ) generation creating oxidative stress, (2) enzyme cofactor activities, and (3) antiangiogenic (interfere with tumour blood vessel formation) and anti-inflammatory actions.

The generation of hydrogen peroxide has been considered the primary action of IVC. At high blood concentrations,  $H_2O_2$  is produced which is toxic to cancer cells but is non-toxic to healthy cells. Healthy cells contain enzymes to break down the  $H_2O_2$ , and also tend to have less  $H_2O_2$  around them due to differences in the environment around cancer cells compared to

healthy cells. This H<sub>2</sub>O<sub>2</sub> generation is often referred to as the “pro-oxidant” effect of high dose IVC.

Other ways vitamin C works is by its involvement in many reactions and structures in the body including collagen formation and enzyme reactions that may affect how cancer grows and spreads. Lastly, vitamin C may lower inflammation and interfere with tumour blood vessel formation, which could favourably impact cancer development and progression. There is also some evidence that IVC may support immune function by increasing certain types of white blood cells.

### **Is IVC safe?**

IVC has a very good safety profile. However, like all therapies there are certain times where IVC may not be safe. IVC should not be administered to patients with kidney failure, or those with a deficiency of the G6PD enzyme. IVC should be used cautiously in people with a history of kidney stone formation, insulin-dependent diabetes, iron storage diseases, fluid overload conditions, or those on warfarin. Please speak to a knowledgeable healthcare provider to discuss whether you are a good candidate for IVC therapy.

### **What are the side effects of IVC?**

Side effects are generally mild and uncommon in most patients. Side effects may include: thirst, dry mouth, increased urination, elevated blood pressure, diarrhea, nausea, fatigue, weakness, headache, dizziness, injection site discomfort and vein irritation, swelling, and loss of appetite. A full list of reported side effects can be found in our health care provider monograph.

### **What is the recommended dose, frequency, and length of use of IVC?**

Dosing of IVC in research studies varies. Data shows that doses up to 1.5g/kg of body weight are safe in a professionally monitored environment. Most common dosing used is around 1g/kg of body weight (e.g., 75g for a 75kg adult).

Treatments are generally administered 1 to 3 times per week, and are typically administered over the course of a few weeks up to several months. Therapy may be continued longer-term depending on an individual’s health, reasons for use, experience with the treatment, and discussion with their healthcare provider. Each treatment lasts between 1 and 3 hours, depending on the dose.

### **Where can I get more information?**

For more detailed information including references you can read the companion healthcare professional IVC monograph which can be found on the website: <https://thechi.ca/research/>. Please consult with a health care provider such as a naturopathic doctor, medical doctor, or nurse practitioner who is experienced in the use of IVC.

### **Disclaimer**

This monograph provides a summary of available evidence and neither advocates for nor against the use of a particular therapy. Every effort is made to ensure the information included in this monograph is accurate at the time it is published. Prior to using a new therapy or product, always consult a licensed health care provider. The information in this monograph should not be interpreted as medical advice nor should it replace the advice of a qualified health care provider.