OICC
OTTAWA INTEGRATIVE CANCER CENTRE

CCIO
CENTRE DE CANCÉROLOGIE INTÉGRATIVE D'OTTAWA

Patient Resource: DCA (Dichloroacetate) Therapy

What is Dichloroacetate (DCA)?

Dichloroacetate sodium ("DCA") is a by-product of water chlorination and an "off-label," investigational drug that has been used in the treatment of some metabolic diseases, including diabetes and certain heart conditions, for many years. Most recently, it has been studied as a potential therapy for cancer treatment as a single agent and in combination with other drugs. Although DCA is a promising therapy, there is limited scientific proof of its effectiveness. According to the College of Physicians and Surgeons of Canada, DCA is an unproven treatment for cancer and is not within the usual and customary practice of medicine in the province of Ontario.

What is it used for?

In the context of cancer, DCA is most commonly prescribed to:

- *Reduce tumour size and tumour markers*
- *Prevent angiogenesis (blood vessel formation)*
- *Improve long-term outcome*
- *Reduce cancer related symptoms*
- *Manage pain*
- *Aid in palliation*

At the OICC, DCA is considered in situations where there is little benefit provided by conventional therapy or in situations where there are few or no other options available for care. Often, but not always, DCA is provided in conjunction with intravenous vitamin C therapy.

How does DCA work?

We are only beginning to understand how DCA might work in the treatment of cancer and additional research is needed. It seems that DCA works by altering the unique metabolic features of cancer cells. Unlike normal cells which rely heavily upon oxygen for energy production, cancer cells get their energy from large amounts of glucose in a dysfunctional way. Normal cells derive most of their energy using oxygen in the mitochondria of the cell (the "battery" of the cell). The mitochondria is also responsible for causing apoptosis (cellular death) in abnormal cells. The mitochondria of cancer cells, however, are often shut down, allowing these cells to avoid apoptosis and continue to grow and spread. DCA works by changing the cellular metabolism of cancer cells back to a reliance on oxygen, which reignites the mitochondria and leads to apoptosis in cancerous cells. The selective properties of DCA allow for the targeting of cancerous cells while healthy cells remain unharmed.

Does DCA work?

DCA is relatively new as an anti-cancer agent, and research has primarily been conducted in cell and animal models. Although human studies are limited, a few small preliminary studies show promising effects in reducing tumour size. Several cell and animal studies have looked at DCA in combination with standard care. The majority of these studies also show that DCA in combination with chemotherapy, radiation, or phototherapy can have a greater effect on reducing tumour size and decreasing tumour growth rate, across a variety of cancer cell lines, than when either agent is used alone. Given the promising results of cell and animal studies, more human studies are needed.

What are the side effects of DCA?

Side effects are typically mild and can include transient peripheral neuropathy, fatigue, confusion, memory loss, sedation, tremors, hallucination, agitation, depression, heartburn (oral), and nausea (oral).

Is DCA safe?

Caution should be used when administering DCA to patients with compromised liver function. DCA should not be used in combination with certain medications with known neurological side effects such as cannabinoids and benzodiazepines. Due to lack of research in select patient populations, DCA should not be taken by pregnant or lactating women or couples trying to conceive. Because of the possible accentuation of chemotherapies when administered in combination with DCA, there may be an increased risk of tumour lysis syndrome (TLS). TLS is most common in individuals being treated for leukemia and lymphoma or in cases of rapid tumour cell death as is commonly seen with large tumours.

What is the recommended dose of DCA?

At the OICC, patients are started at a dose of 20mg/kg intravenously twice weekly, and slowly increased up to a therapeutic dose of between 50 mg/kg and 80 mg/kg per session. IV DCA is immediately followed by intravenous alpha lipoic acid (ALA) and a B vitamin complex. Oral DCA is started at 15 mg/kg daily, taken for 14 days followed by a week-long break. All patients undergoing DCA therapy are advised to take oral ALA, acetyl-L-carnitine, and a B complex supplement.

As DCA is an off-label prescription drug, patients are required to be seen by the OICC physician and to sign a consent form prior to the initiation of DCA therapy.