

# Intravenous vitamin c and metabolic correction as adjuvant therapy for prostate cancer: A case report

## Abstract

Cancer of the prostate gland is the second cause of cancer related deaths of males in the United States. Prostate cancer is the most common cancer in males of America. Also, in Puerto Rico cancer is the leading cause of death. This is a case of a 75-year-old patient with a diagnosis of prostatic adenocarcinoma with bone metastasis. The patient arrived with difficult walking, disorientation, dementia, pain through the body and distressed mood. Symptoms resolved after four weeks of treatment with high doses of high intravenous vitamin C infusions, a paleo diet and dietary supplements as part of a metabolic correction protocol. Vitamin C studies have showed its cytotoxic and anti-metastatic action on malignant cell lines by its action as a pro-oxidant agent. Based on the outcomes obtained of this clinical case, we recommend to continue studying the role of intravenous infusion of vitamin C, altogether with a paleo diet and nutritional supplementation (metabolic correction), as a possible co-adjuvant treatment for prostate cancer.

**Keywords:** prostate cancer, bone metastases, cancer case report, prostate-specific antigen, prostatic carcinoma, stromal cells

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## Introduction

Cancer of the prostate gland is the second cause of cancer related deaths of males in the United States.<sup>1</sup> Based on the American Cancer Society data in the 2011 prostate cancer is the most common cancer in males of America.<sup>1</sup> Based on the National Cancer Institute of the United States the number of new cases of prostate cancer was 129.4 per 100,000 men per year and the number of deaths was 20.7 per 100,000 men per year.<sup>2</sup> The American Cancer Society's estimates for prostate cancer in the United States for 2016 are about 180,890 new cases of prostate cancer and about 26,120 deaths from prostate cancer.<sup>3</sup> Based on the Puerto Rico Central Cancer Registry and CDC data, for 2007 to 2011, the most common cancer among Puerto Rican men was prostate cancer.<sup>4</sup>

Prostate cancer can often be early detected, before symptoms arise, by testing the amount of prostate-specific antigen (PSA) in a man's blood. PSA is a marker for prostatic adenocarcinoma that is frequently used in a clinical practice. Prostatic carcinoma can be suspected when elevated levels of PSA are found in the blood. Once cancer of the prostate gland occurs, the cancerous cells are usually stimulated to more rapid growth by testosterone and are inhibited by removal of both testes so that testosterone cannot be formed.<sup>5</sup> If the growth is not inhibited the prostate cancer often embolize through the paravertebral plexus because its proximity to the vertebral column, and this pathway is involved in the frequent vertebral metastases of carcinomas.<sup>1</sup>

The estimation of the survivals of prostate cancer depends on how advanced is the disease. In the case of the local and regional stage the relative 5-year survival rate is nearly 100 percent.<sup>6</sup> On the other hand in the case of distant stage, that includes cancers that have spread (metastasis) to bones, lymph nodes or other organs, the relative 5-year survival rate is about 28 percent.<sup>6</sup> In the specific case of bone metastasis, which is the major metastases of prostate cancer, the average survival rate is 24 to 36 months (depend of whether it was detected early).<sup>6</sup> Patients with early metastasis detection and a proper treatment and therapy may survive for at least 3 years.<sup>6</sup>

Prostatic cancer is metastatic in 35% of cases, can spread everywhere in the body but have a marked predilection for bony spread, principally to the vertebral column, hips and pelvis.<sup>7</sup> Multiple factors account for the recurrence of bone metastases as for example the presence of immobilized growth factors on bony matrix and adhesive molecules expressed in marrow stromal cells as well as production of PSA.<sup>3,7</sup> These factors are implicated in the preferential homing of prostate cancer cells to the bones in 90% of metastatic cases.<sup>3</sup>

In all types of cancer we recommend nutritional supplementation and a healthy paleo diet to improve the quality of life of the patients. Some studies show the specific role of ascorbic acid (AA, vitamin C), in cancer patients. Vitamin C is a hydrophilic agent that in high doses may act as pro-oxidant.<sup>8</sup> Studies of AA have demonstrated its cytotoxic and anti-metastatic action on malignant cell lines<sup>8</sup> by its action as a pro-oxidant agent. One of the antitumor mechanisms studied by which AA attack tumor cells is by its extracellular conversion to dehydroascorbic acid, which generates hydrogen peroxide, an active cytotoxic agent<sup>9</sup> that initiates membrane lipid peroxidation of tumor cells. To achieve highly elevated plasma levels, high doses of AA must be administered intravenously to attain higher bioavailability as it bypasses the tight control of the gut. Some studies recommend that AA intravenous infusions should be greater than 60g to reach a concentration of 24mM or more in plasma to achieve an antitumor toxicity.<sup>9</sup> Once AA is in plasma it can work with oxygen to generate the hydrogen peroxide, and this hydrogen peroxide may further generate additional reactive species that can damage the cell membranes of malignant cells.<sup>10</sup> These reactive oxidative agents that are formed are very effective in killing cancerous cells because, unlike normal healthy cells, cancer cells have a deficient catalase and glutathione peroxidase enzyme activity. In addition, this pro-oxidant action may promote apoptosis of malignant cells, and also it has been suggested that AA can regulate gene expression and cell differentiation.<sup>11</sup> Also, low levels of AA have been reported in cancer patients<sup>10</sup> and this is critical because it is an important cofactor for optimum functioning of the immune system cells and the formation of collagen.<sup>10</sup>

## Case report

This is a case of a 75-year-old male patient with a diagnosis of prostatic adenocarcinoma of acute evolution. The patient refused any chemotherapeutic, hormonal or radiation treatment. The patient arrived with difficulty walking, disorientation, dementia, pain throughout the body and a distressed mood. In November 2013 the body bone scan show an extensive metastatic cancer disease involving the skull, facial bones, shoulders, clavicular bones bilaterally, scapular bones bilaterally, sternum, all of the ribs, the entire spine, pelvic structures bilaterally, humeral bones bilaterally, the femoral bones bilaterally, the left tibia and small area in the right tibia.

The patient was treated with high doses of intravenous vitamin C and B complex. At the beginning of the treatment 50g of Vitamin C was given twice a week (2 weeks) after that 75g three times per week which continued for a year. 2cc in 250 ringer lactate of B-complex mixture was given days in-between vitamin C therapy to prevent interfering with Vitamin C anti-cancer mechanism, this was given for one month. The patient began a Paleolithic Diet that consisted of organic fruits (berries), vegetables, nuts, Grass-fed meat, Free-range poultry and Wild-caught fish. This diet excluded processed food and sugar. The patient was given a nutritional supplementation protocol (metabolic correction therapy) consisting of a high potency multivitamin and mineral, CoQ10 100 mg tid, R-alpha lipoic acid 300 mg bid, Acetyl L Carnitine 500 mg bid, Magnesium Citrate 500 mg bid, Omega-3's 1 g tid, Mixed phospholipids 100 mg qd, Vitamin D3 10,000 IU qd. Patient symptoms of pain and distress, resolved after four weeks of treatment. The patient began to walk without the walking stick and showed good judgment. No adverse or negative secondary effects of treatment were reported.

At the beginning of the visits the PSA levels were so high that could not be assessed in blood tests. After six months of receiving the treatment with vitamin C, B complex, the Paleolithic diet and the metabolic correction protocol, the assessment of the PSA was possible. This was good news because this means that the PSA levels were reduced. The PSA approximately one year later was 1,400ng/mL, and then 4 months later was 1,000ng/mL. Two years later after been treated, the PSA level was 27.066 ng/mL showing a huge decrease.

In April 2015 a Bone Scan Spect was order and the impression was still indicative of extensive metastatic bone disease. Although the Bone Scan showed extensive metastases; same as the one done in 2013, but with a big difference of a vastly improved quality of life. The patient had been living without pain, with much more energy, and had been able to perform daily activities and light exercises, despite having been in a late stage of cancer disease. An important note that the patient improved urinary flow, was walking without any difficulty and thinking clearly.

## Discussion

Vitamin C (AA) has been studied for over 50 years for its wide variety of functions and effectiveness fighting health problems. A vast number of publications confirm that AA possess many therapeutic benefits for cancer patients as improving the quality of life, reducing pain, increasing energy, increasing appetite, and reducing complications of the disease, among other benefits.<sup>12</sup> Dr. William J. Mc Cormick,<sup>13</sup> presented the role of AA as a potent chemotherapeutic agent when is given in massive doses intravenously, and also mentioned that this effect results from its chemical action as a reducing or oxidizing agent.<sup>13</sup> Later Cameron & Pauling,<sup>14</sup> published the results of a clinical study that indicated the treatment of patients with

terminal cancer with about 10g of AA per day increased their survival time.<sup>14</sup> Also, Cameron & Pauling,<sup>14</sup> mention that larger amounts than 10g/day might have greater effect and that the addition of AA to patients with cancer in early stages may substantially increase the life expectancy.<sup>11,14</sup>

One of the greatest advantages of AA is its similar molecular structure with glucose. Normally, cancer cells have an increased requirement for glucose, and therefore there is an increase in glucose transporters in cancer cell membranes. This action enhances and favors the entrance of AA into the cancer cell and facilitates the action of ascorbate as a selective, nontoxic chemotherapeutic agent that slows tumor growth.<sup>10</sup> Oxygen is of great importance to the ascorbate-induced cytotoxic action on cancer cell proliferation by interfering with anaerobic glucose fermentation to lactate, a common energy mechanism of malignant cells.<sup>12</sup> Also, oxygen is necessary to the conversion of AA to dehydroascorbic acid to generate hydrogen peroxide that reduces cellular levels of thiols and can initiate membrane lipid peroxidation of cancer cells.<sup>12</sup> Then we should have in mind that the level of tissue oxygenation may limit the anticancer activity of AA, and for that reason is highly recommended a hyperbaric chamber as part of the therapeutic protocol to increase oxygen availability.

As mentioned previously, the common energy mechanism of cancer cells is fermentation and the product is lactate. When the body becomes acidic by dropping below pH 7.0, due the presence of lactate, oxygen is driven out of the body thereby favoring carcinogenesis.<sup>11</sup> This is because the extracellular acidity can increase the invasive spread of cancer cells, while protecting them from immune attack and from many cytotoxic agents that are mildly basic.<sup>15</sup> When there is adequate mineral consumption in the diet, the blood supplies the crucial minerals required to maintain an alkaline pH. The Paleolithic diet is recommended to cancer patients at the clinic since this dietary approach is high in organic vegetables and protein, which helps increase anticancer phytonutrient content, increases dietary fiber intake, and reduces total carbohydrate intake, all of which could help reduce cancer risk and promote the healthy state.<sup>16</sup> Manipulation of the extracellular and/or intracellular pH of tumor may have considerable potential in cancer therapy.<sup>15</sup>

Deficiency or insufficiency of vitamins and minerals can lead to mitochondrial impairment, DNA damage, and other physiological disturbances.<sup>17</sup> For this reason, altogether with a paleo diet and vitamin C infusions, is highly recommended give to cancer patients intravenously infusion of B complex for a period of time. Recent studies with B-complex vitamin supplementation demonstrated its important role as cofactors that promote enzymatic activity, involved in the energy-producing metabolic pathways of macronutrients. Also, B vitamins have been demonstrated its association with the improvement of intermediary metabolism, cognitive function and the maintenance of cellular and bone health.<sup>18</sup>

Over the years more and more studies have been published that confirms the effectiveness of Vitamin C as a non-toxic chemotherapeutic agent.<sup>13,19</sup> Based on the presented clinical case and the positive outcomes obtained, we recommend to continue studying the role of intravenous infusion of vitamin C, altogether with a paleo die and a metabolic correction protocol, as a possible co-adjuvant treatment for cancer in any stage.<sup>20</sup>

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## Conflicts of interest

The authors declare no conflicts of interest.

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