EVIDENCE BASE FOR HIGH DOSE VITAMIN C
IN THE TREATMENT OF CANCER

This is a collection of published papers in peer-reviewed journals, to support this approach:

1. **Clinical and Experimental Experiences With Intravenous Vitamin C** ***Neil Riordan, PA-C, Hugh D.Riordan, M.D., Joseph P. Casciari, Ph.D****. Bio-communications Research Institute, 3100 N. Hillside Ave, Wichita, Kansas. 67219.*

2. **Intravenously Administered Vitamin C as Cancer Therapy: Three Cases.** ***Sebastian J Paddayatty, Hugh D Riordan, Stephen M Hewitt, Arie Katz, L John Hoffer, Mark Levine****. CMAJ: March 28, 2006: 174(7) 937*

3. **Intravenous Ascorbate as a Tumour Cytotoxic Chemotherapeutic Agent.** ***N.H. Riordan, H.D. Riordan, X Meng, Y. Li and J. A Jackson.*** *Project RECNAC, Bio-communications Research Institute, 3100 N. Hillside Ave, Wichita, Kansas. 67219 USA. (Correspondence to NHR) Medical Hypotheses (1995) 4-1, 207-21*

4. **Intravenous Ascorbate as a Chemotherapeutic and Biologic Response Modifying Agent** *Bio-communications Research Institute, 3100 N. Hillside Ave, Wichita, Kansas. 67219 USA. Brightspot for Health.*

Many High Dose Intravenous Vitamin C trials are happening in the United States at the moment. These are some details.

5. **Evaluation of Intravenous Ascorbic Acid** Kansas University, Kansas City, Kansas, and Thomas Jefferson University Philedelphia, Pennsylvania. This phase 1 study will be conducted in 2 parts to examine safety and pharmacokinetics of escalating doses of intravenous ascorbic acid (AA) first in healthy volunteers followed by evaluation in oncology subjects. The study will be conducted in the Programme in Integrative Medicine Infusion Clinic at the University of Kansas Medical Centre in conjunction with the Programme in Integrative Medicine, Kansas Cancer Research Institute, Department of Pharmacy, Department of Medical Oncology, the Division of Surgical Oncology and with consultants from the NIH and FDA.

6. **Vitamin C as an Anti-cancer Drug** Copenhagen University Hospital at Herlev, Denmark:

   Can high dose, intravenous Vitamin C prolong life for patients with metastatic prostate cancer?

   Prostate cancer is the most common cancer (excluding skin cancer) in men in Denmark and the United States. When metastatic disease is present cure is no longer possible. The main treatment at this stage is castration, either surgical or medical, ending the patients testosterone production and causing a temporary regression in disease activity.

   Eventually, the cancer will progress, usually within 2 years from the castration, with a more aggressive course and a survival of 2-3 years.

   The current treatment option for the patients, who have undergone castration and have disease progression, is chemotherapy with only limited gaisn in quality of life and survival.

   This clinical study is a phase 2 study to evaluate the effects of high dose intravenous Vitamin C in subjects with early castration resistant prostate cancer.

7. **Assessing the Efficacy and Safety of Intravenous Vitamin C in Combination with Standard Chemotherapy** Thomas Jefferson University, Philidelphia, Pennsylvania

   The investigators recently completed a phase 1 study of intravenous ascorbic acid (IV AA) plus standard chemotherapy (gemcitabine and erlotinib) in patients with metastatic pancreatic cancer. The investigators determined that the target ceiling dosage of 100 grams of ascorbic acid is safe with given with the chemotherapy. This phase 2 trial is an initial test of efficacy of the 100 gram dose of ascorbic acid, which will be given with the same standard chemotherapy. This open label study will recruit up to 35 subjects with metastatic pancreatic cancer who will receive ascorbic acid combined with gemcitabine and erlotinib as front-line treatment. The phase 1 data suggests that ascorbic acid when given in combination with gemcitabine and erlotinib may result in some tumour response, and the goad of this study is to better evaluate the response and confirm initial safety data.

8. **Trial of Chemotherapy Plus Intravenous Vitamin C in Patients With Advanced Cancer for Whom Chemotherapy Alone is Only Marginally Effective.**

   Concurrent administration of intravenous vitamin C (ascorbic acid, 1.5.g/kg, infused two or three times weekly) together with certain cytotoxic chemotherapy regimens could prove to be an effective treatment for some patients with advanced malignancies for whom existing chemotherapy is usually ineffective. The primary objectives of this study are to identify a

tolerable and safe dose of intravenous vitamin C when administered during cytotoxic chemotherapy while attempting to empirically identify specific vitamin C chemotherapy regimens for which the clinical response is unusually favourable after a minimum of 2 months of therapy, as determined by CT scan and biomarkers, when appropriate.

9. **Clinical Trial of High-Dose Vitamin C for Advanced Pancreatic Cancer**
   Holden Comprehensive Cancer Center at the University of Iowa, Iowa City, Iowa.

   This is a phase II study. It is designed to provide information about if high dose ascorbate (vitamin C) increases survival for pancreatic cancer patients. The hypothesis is that vitamin C is well tolerated and increases cancer treatment effectiveness, lengthening survival time for patients with advanced pancreatic cancer.

10. **A Research Study of Intravenous Vitamin C in Combination with Irinotecan Versus Irinotecan Alone for Advanced Colorectal Cancer**
    Thomas Jefferson University, Philadelphia, Pennsylvania.

    This protocol is a phase I/II, study of ascorbic acid (AA) infusions combined with treatment with Irinotecan versus treatment with irinitecan alone in patients with recurrent or advanced colorectal cancer who have failed at least one treatment regimen with a 5-FU based therapy. This study will be conducted as an amendment to Investigational New Drug #77486.

11. **A Study of Vitamin C in the Treatment of Liver Cancer to Determine if it is Safe and Effective.**
    Thomas Jefferson University, Philadelphia, Pennsylvania.

    This protocol is a phase I/II, study of ascorbic acid (AA) infustions combined with treatment with sorafenib versus treatment with sorafenib aone in subjects with metastatic hepatocellular carcinoma. The phase I aspect will assess the safety and efficacy of the concurrent treatments and the phase II aspect will utilize CT (computer tomography) scans to assess overall tumour response rate and evaluate disease progression.

12. **New Treatment Option for Pancreatic Cancer**
    University of Kansas Medical Center, Kansas City, Kansas

    In the United States, approximately 30,000 new cases of pancreatic cancer are diagnosed each year and an almost equal number of deaths are related to this cancer. Different types of chemotherapeutic treatments are used that target different parts of the cancer cell with some success, but there is room for other treatment options.

    It is known that people with cancer are using high doses of intravenous vitamin C also known as ascorbate, as a cancer treatment and this is occurring frequently. When vitamin C is given in this manner it is not taken by mouth; instead, it enters your body through an IV (intravenous) site, or tube

that is inserted through a needle into your vein. If you have a portacath in place, the IV will be given using your port. When Vitamin C enters your body through an IV site, it is known that it acts like a drug and not a vitamin. It produces a substance around the cancer cells called hydrogen peroxide. It has been seen in animal research studies that hydrogen peroxide kills the cancer cells while leaving the normal cells unharmed.

Currently the FDA does not approve the use of high-dose intravenous Vitamin C as a cancer treatment. The use of intravenous Vitamin C in this study is experimental. Furthermore, it is important to know that we do not expect the intravenous Vitamin C given in this study to be healing for the treatment of your cancer.

13. Safety and Efficacy Study of Gemcitabine Combined With High Dose Intravenous Vitamin C (HDIVC) for Patients With Metastatic Adenocarcinoma of the Pancreas

Eastern Regional Medical Center, Philadelphia, Pennsylvania

- The combination of gemcitabine and HDIVC is safe and may favourably change the clinical course for an individual patient.
- The combination of gemcitabine and HDIVC is synergistic in anti-tumour effects as seen in preclinical models, where HDIVC creates a pro-oxidative effect that adds to the anti-tumour effect of gemcitabine.
- The combination of gemcitabine and HDIVC may improve Progression Free Survival (PFS)
- The dosage schema of 1.2 g/kg bolus infusion followed by lower dose of 0.3 g/kg infusion may create sustained elevation in Vitamin C plasma levels for increased cytotoxic effect.
- The addition of HDIVC and oral supplementation of Vitamin C to standard treatment with gemcitabine may improve quality of life for patients with comparison to prior to treatment start of this protocol.
- CA 19-9 and inflammatory markers may show trends for patients in this trial.

14. A Phase I Trial of High-Dose Ascorbate in Glioblastoma Multiforme
Holden Comprehensive Cancer Care Center at the University of Iowa, Iowa City, Iowa.

This is a phase I (first in man) study testing the safety of adding high dose ascorbate (vitamin C) to standard radiation and chemotherapy for initial treatment of glioblastoma multiforme (GBM).

15. Phase 1 Clinical Trial to evaluate the safety, tolerability and pharmacokinetics of high-dose ascorbic acid in patients with advanced cancer.
C M Stephenson, R D Levin, T Spector, C G Lis
This phase I clinical trial evaluated the safety, tolerability, and pharmacokinetics of high-dose intravenous (i.v.) ascorbic acid as a

monotherapy in patients with advanced solid tumors refractory to standard therapy.