Augmented Pro-Oxidant Therapy

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1. Introduction

Augmented pro-oxidant therapy is a powerful method for treating cancer without the use of toxic chemotherapy or other harmful drugs. This is a very exciting new approach to cancer treatment that is based on very strong scientific evidence and this treatment is available today. This form of cancer therapy exploits one of the most universal vulnerabilities within cancer cells.

This article describes how augmented pro-oxidant therapy works in terms that are understandable to the layperson. Scientific jargon can be overwhelming and confusing so every attempt is made to use familiar language and simple to grasp concepts. Augmented pro-oxidant therapy is a method for killing cancer cells and shrinking tumors in a manner that causes no harm to normal cells and does not create any adverse side effects.

The Nutritional Oncology Research Institute (NORI) is an independent cancer research organization focused on developing nutritionally-based nontoxic cancer therapies. The NORI Protocol utilizes a pro-oxidant therapy to selectively kill cancer cells. Augmented pro-oxidant therapy is a refinement and an upgrade to an existing successful cancer treatment protocol. Recent scientific advances have improved our understanding of how cancer cells are dependent on antioxidants for their survival.

Safe and effective cancer therapies must not cause harm to normal cells while destroying malignant cells only. How can this be accomplished given that there are few differences between normal cells and cancer cells that can be exploited? Conventional chemotherapy and radiotherapy exploit the much higher cell division rate of cancer cells compared to normal cells. Still, these therapies create major toxicity, result in drug resistance and cause second cancers.

Fortunately, there is a difference between cancer cells and normal cells that can help us design effective nontoxic therapies. This key difference between normal cells and cancer cells is related to oxidative stress.

There is much confusion with regard to antioxidants and pro-oxidants as therapeutic agents and nutritional supplements. This article attempts to clear up any

confusion while presenting a unique treatment approach that will undoubtably revolutionize medical oncology.

Augmented pro-oxidant therapy represents a broad new approach to treat cancer with very little to no toxicity or adverse side effects. This type of therapy may use combinations of natural compounds and/or repurposed pharmaceutical agents. Diet also plays a role at multiple levels. The NORI protocol combines a highly targeted dietary therapy with augmented pro-oxidant therapy which has demonstrated safety and efficacy for a wide array of cancers either as a standalone or integrative therapy.

2. Oxidative Stress (ROS)

Oxygen is necessary for life, but biological processes can turn oxygen into dangerous compounds. If these compounds are not regulated or neutralized effectively, disease states appear. Cancer is a byproduct of excessive exposure to reactive oxygen compounds. Free radical is an equivalent term for reactive oxygen compound.

There are also reactive nitrogen species (NOS) which play a role in cancer, but this topic will not be addressed here. ROS is the primary player in cancer development and therapy.

Oxidative stress refers to a state where there is an excessive level of reactive oxygen species (ROS). Cancer cells are overwhelmed by a high level of oxidative stress compared to normal cells. This excess of oxidative stress in cancer cells is caused by altered metabolism, which is the result of damaged mitochondria. Mitochondria are the energy powerhouse within every cell. Cancer is characterized by damaged and dysfunctional mitochondria. In fact, there are mitochondrial DNA mutation patterns common to all forms of cancer.

The wide difference in oxidative stress between normal cells and cancer cells is a targetable vulnerability for cancer therapy. Oxidative stress is sometimes referred to as redox (reduction/oxidation) imbalance. Oxidative stress can be caused by insufficient antioxidant defense or from external sources such as radiation, ozone, hydrogen peroxide or toxic compounds.

A sustained level of oxidative stress may be involved in the development and progression of cancer. Triggers for cancer are typically events that elevate oxidative stress. One example is ionizing radiation. Another is antibiotic treatment.

A majority of chemotherapeutic agents kill cancer cells by exceeding the level of maintainable oxidative stress. These agents are unfortunately highly toxic and indiscriminate. There are many natural agents that are selective and kill cancer cells with no harm to normal cells.

3. Antioxidants vs. Pro-Oxidants

Antioxidants are familiar as components in foods and nutritional supplements that fight free radical damage. An antioxidant accepts an unpaired electron. Pro-oxidants are reactive compounds that can damage DNA, lipids, proteins and cell membranes.

Studies suggest that antioxidants play a dual role in cancer. Antioxidants may be important in cancer prevention but once cancer is initiated, antioxidants can support cancer cell progression and survival.

Some antioxidants become pro-oxidants at very high concentration. The best example of this is vitamin C when administered via IV injection at very high dosage.

Hydrogen peroxide is a prime example of a pro-oxidant. Hydrogen peroxide is a compound that exists in normal cells and is used by immune cells as a defense against pathogens.

4. Intracellular Antioxidant Systems

There are multiple antioxidant systems in every cell. These antioxidant systems are essential for the protection of DNA, cell membranes, proteins, mitochondria, lipids and overall normal cellular functions. Antioxidants are necessary for neutralization of free radicals that may enter the cell or are generated through normal processes. Most free radical generation is generated by energy metabolism within the TCA cycle and electron transport chain.

Studies show that antioxidant systems are overly expressed in cancer cells. This is reasonable given the excess oxidative stress caused by altered metabolism within the mitochondria.

Glutathione (GSH) is the master antioxidant for all cells. Glutathione is abundant throughout the body and especially abundant in the liver.

Other antioxidant systems include Thioredoxin (TRX), Catalase (CAT), Superoxide Dismutase (SOD).

Blocking or interfering with multiple antioxidant systems simultaneously is the foundation of augmented pro-oxidant therapy.

5. Antioxidant Inhibitors

An antioxidant inhibitor is an agent that interferes with the expression of a specific antioxidant system. Some compounds may play a dual role as a pro-oxidant and an

antioxidant inhibitor. More research will be necessary to untangle the details of how these compounds function.

Sodium selenite is an example of a compound that is both a pro-oxidant and antioxidant inhibitor.

Interfering with glutathione synthesis is key to developing an effective augmented pro-oxidant therapy. There is an experimental compound called Buthionine Sulfoximine (BSO) which blocks glutathione synthesis. Cancer cells do not survive in the presence of BSO.

6. Natural Pro-Oxidants

There are numerous natural pro-oxidants but only very few are suitable for cancer therapy. Bioavailability is the most limiting factor for the therapeutic use of natural compounds. For any natural compound to be effective therapeutically, it must be easily absorbed into the blood stream after being administered orally. The following list of natural compounds are bioavailable and have proven efficacy as anti-cancer agents.

Sodium selenite is a natural pro-oxidant that has been studied extensively for its ability to selectively kill cancer cells. The physical and pharmacological properties of sodium selenite are ideal for cancer therapy.

Molecular iodine is a pro-oxidant that selectively kills cancer cells by increasing ROS selectively in cancer cells. Interestingly, ionic iodine behaves as an antioxidant so nearly pure molecular iodine is necessary for cancer therapy.

Vitamin E Delta and Gamma Tocotrienols behave as a fat soluble pro-oxidant that localize within the mitochondrial membrane. The polyunsaturated tail of the molecule initiates a lipid peroxidation chain reaction which elevated ROS.

Piperlongumine is a compound derived from the long pepper and behaves as a potent and selective anti-cancer agent. Piperlongumine is a pro-oxidant and causes a high elevation of ROS in cancer cells.

Genipin induces elevated ROS by inhibiting UCP2. Genipin is derived from the gardenia fruit (Zhi Zi).

7. NSAIDS as Pro-Oxidants

Non-steroidal anti-inflammatory drugs (NSAIDs) including OTC aspirin have been associated with lower cancer risk and improved survival. Studies show that NSAIDs affect cancer cells through multiple mechanisms. The primary mechanism is increased

mitochondrial ROS which triggers collapse of the mitochondrial membrane. This results in the release of cytochrome c and the subsequent apoptotic cascade. Celecoxib, a popular anti-inflammatory prescription drug has been studied extensively as an anticancer agent. The primary mechanism of Celecoxib is increasing oxidative stress.

Simple adult aspirin (325 mg) taken 4 times a day offers an additional layer to increase oxidative stress. This approach is currently being evaluated as part of the NORI protocol. Layer 1 is methionine restriction which lowers glutathione. Layer 2 is sodium selenite which is directly cytotoxic due to increasing oxidative stress. Layer 3 is aspirin. This simple combination may prove to be highly effective in destroying tumor and cancer stem cells without any adverse side effects.

8. Redox Recycling Agents

Redox recycling agents act as both an antioxidant and pro-oxidant. Redox recycling is a process where a chemical reaction bounces back and forth almost continuously between oxidation and reduction. The result is a large increase in ROS that is sustained for long periods of time. Redox recycling agents have a quinone chemical structure. some chemotherapy agents are based on quinones.

Vitamin K3 (1,4-napthoquinone or menadione) is a redox recycling agent known for potent anti-cancer activity. Vitamin K3 depletes glutathione. Shikonin and plumbagin are related compounds that exhibit potent anti-cancer activity.

Pyrroloquinoline Quinone (PQQ) is another redox recycling agent with potent anti-cancer activity.

8. Methionine Restricted Diet and Glutathione Synthesis

Studies suggest that a methionine restricted diet lowers the level of glutathione which sensitizes cancer cells to oxidative treatments. A methionine restricted diet has been shown to enhance the effects of chemotherapy and reverse drug resistance.

The amino acids, methionine, glycine, glutamine and cysteine are necessary for the synthesis of glutathione. Methionine restriction greatly reduces the availability of these amino acids.

A methionine restricted diet offers cancer patients many other benefits which help slow cancer progression. Diet alone will not cure or effectively manage cancer but it is a very powerful tool within the many choices of natural treatment options. Detailed information on the science and implementation of a methionine restricted can be found at www.howtostarvecancernaturally.com.

9. Antioxidants in Foods and Supplements

Antioxidants found in foods such as fruits and vegetables are not able to interfere with augmented pro-oxidant therapy. However, highly concentrated vegetable juices may be an issue and should be avoided during therapy. We have been bombarded by so much information regarding antioxidants as being good but in the context of pro-oxidant therapy, antioxidants are not helpful and counter productive.

Antioxidant supplements must be avoided during therapy. These include vitamin C, NAC, vitamin E tocopherol, vitamin A and glutathione. Amino acid supplements, especially glutathione precursors, methionine, cysteine and glycine must be avoided.

Studies suggest that antioxidant supplements actually promote cancer progression. This makes sense since cancer cells are burdened by a high level of oxidative stress and antioxidants enhance cancer cell survival.

10. Other Oxidative Therapies

There are two popular oxidative therapies that may prove to be helpful in boosting the effectiveness of augmented pro-oxidant therapy. These therapies are available within naturopathic or integrative medical clinics or they may be administered at home.

Ozone therapy has been around for a long time and can be administered in multiple ways. One way is by directly injecting ozone into a vein. Another is to remove a quantity of blood, bubble ozone through it and then inject it back into circulation. Ozone can be administered at home through rectal insufflation, body bag or steam sauna methodologies.

Hydrogen peroxide is an oxidative therapy that involves injection of hydrogen peroxide into the blood stream or orally administering hydrogen peroxide.

These therapies are not only useful for cancer but also for treating infections. Hyperbaric oxygen is not an oxidative therapy and it has very little value in cancer therapy, if any.

11. Practical Implications

Augmented pro-oxidant therapy will emerge as a next-generation cancer therapy that can be administered in-home or in a clinical setting. This form of cancer therapy will prove to be completely nontoxic, inexpensive and universal for nearly every form of cancer. Implementation of augmented pro-oxidant therapy will require specially trained health practitioners to advise and supervise the patient with regard to diet,

supplements and the details of the therapy. A team approach is warranted with this form of cancer therapy.

The cost factor for augmented pro-oxidant therapy is definitely not a limitation because the pro-oxidant agents are inexpensive and readily available nutraceutical products. The cost is mainly in the supervision of the therapy. Cancer has bankrupted many and this is due to a combination of factors involving insurance companies, hospitals, physicians and pharmaceutical companies. There is a better way that operates outside the cancer monopoly money machine.

12. Conclusion

The NORI Protocol is very different from mainstream oncology which narrowly address the problem with a single drug or combination of two drugs. Treating cancer effectively requires a very broad approach and one that exploits key vulnerabilities of cancer cells.
Augmented pro-oxidant therapy is clearly a path forward in developing a cure or safe nontoxic methods for managing cancer.

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