Vitamin C
24/7
Optimizing the Impact of a Universal Therapy

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Presentation Overview

1. Excess oxidation (oxidative stress) as the basis for all disease
2. Brief review of reduction-oxidation physiology
3. Primary sources of chronically increased oxidative stress
4. Brief review of what vitamin C has already been established to do (toxins, infections, chronic degenerative disease, reduction as repair for oxidized biomolecules; “old” virus threats and “new” virus threats)
5. Factors impacting the optimal impact of vitamin C as a primary therapeutic tool
6. Vitamin C impact in sepsis
7. Resolving or mitigating the **most disease-causing and disease-promoting condition in the history of medicine** to date
8. Updated Multi-C Protocol for infections and chronic degenerative disease

Reference Checking

Go to:

http://www.ncbi.nlm.nih.gov/pubmed/

In the PubMed search box, enter the seven or eight digit number, by itself, at the end of each reference in this presentation. This is the PubMed Identifier (PMID) number

Then click on “Search” and you will go directly to the Abstract of that article, or for a few articles, you will have access to the full article. If there is no PMID number, it is not available on PubMed.

The Cause of All Disease: A Unified Theory

The onset and evolution of **all** diseases, as well as all of the associated symptomatology, is caused by, and/or mediated by:

Increased Oxidative Stress (IOS)

IOS exists when the production of free radicals (highly reactive pro-oxidants) exceeds the body's antioxidant capacity to neutralize (reduce) them, or to prevent their production in the first place. IOS **always** exists where there is a deficiency of antioxidants, an excess of free radicals, or both. [Halliwell (2006), 16760481]

Redox Medicine Basics

The essence of redox (reduction-oxidation) medicine is really the **essence of vitamin C-based biochemistry**.

Pro-oxidant (aka "toxin")

Takes, or causes to be taken, electrons away from biomolecules (OXIDATION)

Antioxidant (vitamin C is the prototype)

Gives (or restores) electrons back to oxidized biomolecules (REDUCTION)

Redox Medicine Basics

All disease, then, results from the relative ***presence of*** and the ***interactions among and between***:

Pro-Oxidants (Toxins)

Pathogens (Pro-Oxidant *Providers*)

Antioxidants (Nutrients)

Redox Medicine Basics

The basic redox nature of vitamin C and the pro-oxidant nature of all toxins concisely explains why vitamin C, along with many other antioxidants, has been documented to be an effective ***antitoxin*** (antidote) against ***all*** toxins for which it has been tested, *in vitro* and *in vivo*, in plants, animals, and humans, and including clinical studies. [Levy (2002), book, *Curing the Incurable*]

Redox Medicine Basics

A pro-oxidant and a toxin are actually **ONE AND THE SAME**, and they ***inflict the same biochemical effect (oxidation)***.

An antioxidant is a true antitoxin, because it restores the electron depletion in an oxidized biomolecule induced by the toxin, ***or*** it reduces the electron-depleted toxin itself, making it relatively or completely inert, depending upon the toxin and its microenvironment.

All ***pathogens*** induce increased oxidative stress by oxidizing important biomolecules needed for normal metabolism via the production of endotoxins, exotoxins, oxidized metabolic byproducts, and sometimes due to space occupation from infectious bulk. They also consume antioxidant stores.

Increased Oxidative Stress (IOS): Disease Determination

What disease one has depends on:

1. The ***duration*** of the IOS (acute or chronic toxicity)
2. The ***location*** of the IOS (extracellular, intracellular, specific organs or tissues)
3. The ***degree*** of the IOS (minimal to severe)
4. The ***combination*** of the above three IOS factors (for example; severe intracellular IOS in an organ—malignancy; or mild intra-and/or extracellular IOS in muscle and joints—myalgias and arthralgias
5. The ***nature of the toxin (pro-oxidant)*** involved in the IOS (unique chemical characteristics—where does it concentrate, for example)

Promoters of Chronic Diseases (Pro-oxidant Sources)

1. **Endogenous** toxins, from previous exposures and ongoing infections (endotoxins, exotoxins, aerobic and anaerobic metabolic byproducts, **dental**); documented to strongly promote oxidative stress and lessen antioxidant capacity; **avoidable**
2. **Exogenous** toxin exposures (heavy metal, pesticides, contaminated air, water, and/or food, largely, but not completely, **unavoidable**)
3. Toxic iron status (most people in "normal" range are toxic; adulterated food supply; completely **avoidable**)
4. Toxic calcium status (the rule in all American adults; completely **avoidable**)
5. Dietary toxin exposures/production (constipated gut, *Clostridium*); inadequate/poor nutrition and/or poor digestion (poor digestion is worse than poor food quality in terms of impact on the antioxidant capacity of the body; **avoidable**)
6. Low sex hormone levels; **avoidable**
7. Decreased intracellular thyroid function (perhaps the most important upregulator of chronically increased oxidative stress); **avoidable**

Treatment Principles for <u>All</u> Chronic Degenerative Diseases

1. **<u>Prevent/minimize</u>** new daily toxin exposure (environmental, dental, dietary, digestive)
2. **<u>Neutralize</u>** existing toxins present in body
3. **<u>Excrete</u>** toxin stores in a non-toxic, or minimally toxic, manner (excretion augmentation and/or chelation)
4. **<u>Resolve</u>** infections, and eliminate the reasons for contracting new infections
5. **<u>Supplement optimally</u>** to maximize the antioxidant/nutrient status of the body as completely as possible; vitamin C optimization is essential; certain baseline supplements are virtually always indicated (magnesium, vitamin K, vitamin D, iodoral [MANY others are beneficial; multiple factors what is best regimen for a given individual]
6. **<u>Address hormone imbalance</u>**, typically deficiencies of testosterone, estrogen, and/or thyroid hormone (help prevent dissemination of focal infections and their impact
7. **<u>Minimize (NOT eliminate) prescription medicines</u>** to those clearly offering increased benefit over the benefits of above six principles (e.g., high blood pressure, angina, severe infections [antibiotics], severe pain)

What Has Vitamin C Already Been Proven to Do?

Kill/inactivate all viruses ***in vitro*** against which it has been tested. A few prominent examples:

Poliovirus: vitamin C completely inactivated the poliovirus, ***rendering it completely non-infectious***, even when injected directly into the brains of monkeys [19870431]

Herpesviruses

Enteroviruses: [29558]

Influenza virus: [22931805]

Rabies virus

What Has Vitamin C Already Been Proven to Do?

Resolve all ***acute*** viral syndromes (***in vivo***) for which it has been adequately dosed.

Prominent examples:

Polio: Vitamin C cured acute polio (60 of 60 cases)
(Klenner in 1949); full article:

http://www.seanet.com/~alexs/ascorbate/194x/klenner-fr-southern_med_surg-1949-v111-n7-p209.htm

Also, vitamin C cured acute but **advanced** polio and its associated ***flaccid paralysis***:
(Klenner in 1951); full article:

http://www.seanet.com/~alexs/ascorbate/195x/klenner-fr-southern_med_surg-1951-v103-n4-p101.htm
)

What Has Vitamin C Already Been Proven to Do?

Resolve all ***acute*** viral syndromes for which it has been adequately dosed. Prominent examples:

Acute hepatitis:

Dalton, 1962 [13883259] (Six daily 2,000 mg injections)

Cathcart, 1981 [7321921] (Reported that he never had a single case of acute viral hepatitis fail to respond to properly dosed IVC, and that he never had a VC-treated hepatitis patient subsequently develop chronic hepatitis)

Orens, 1983 [6573223] (IV and oral)

What Has Vitamin C Already Been Proven to Do?

Resolve all ***acute*** viral syndromes for which it has been adequately dosed. Prominent examples:

Vitamin C repeatedly cured cases of viral encephalitis, many ***presenting in coma***:

(July 1949) Klenner F. The treatment of poliomyelitis and other virus diseases with vitamin C. *Southern Medicine & Surgery* 111:209-214 [18147027]

(April 1951) Klenner F. Massive doses of vitamin C and the virus diseases. *Southern Medicine & Surgery* 103:101-107 [14855098]

(1953) Klenner F. The use of vitamin C as an antibiotic. *Journal of Applied Nutrition* 6:274-278

(1971) Klenner F. Observations of the dose and administration of ascorbic acid when employed beyond the range of a vitamin in human pathology. *Journal of Applied Nutrition* 23:61-88

What Has Vitamin C Already Been Proven to Do?

Resolve all ***acute*** viral syndromes for which it has been adequately dosed.
Prominent examples:

Measles (simple and complicated)

Mumps (simple and complicated) [18147027]

Herpes infections, ***acute*** (chickenpox) [14908970]

Rabies: vitamin C-treated guinea pigs had improved survival [1191395];
No studies of humans infected with rabies and treated with VC found

What About Ebola?

A protocol of ozone therapy in conjunction with vitamin C has actually been documented to cure Ebola virus. This was achieved with four different patients. While vitamin C and glutathione supplements were given, it was the ozone that was the featured part of the protocol. The vitamin C was not administered in the high doses reported to resolve other viral infections. (Rowen et al. (2016) "Rapid resolution of hemorrhagic fever (Ebola) in Sierra Leone with ozone therapy," *African Journal of Infectious Disease,* 10:49-54.)

What About Ebola?

There is no reasonable rationale of any kind to assert that vitamin C should not be given to Ebola patients. It could be ***easily documented*** that each and every such patient no longer has measurable vitamin C in the plasma or urine, and that every Ebola patient is suffering from acute scurvy in addition to the massive viral presence in the body! From this point of view, vitamin C should at least be administered in amounts adequate to normalize blood and urine levels. No infected body should be expected to fight a life-threatening infection along with an ***acute***, ***infection-induced state of scurvy***.

Remember to support the body and the immune system while killing the pathogen. Patients with severe and advanced infections are extremely depleted of nutrients and antioxidant capacity in general. The more advanced and rapidly advancing the infection is, the worse this depletion, by definition.

What About Chikungunya?

Vitamin C infusions, hydrogen peroxide infusions, and ozone administrations have all resolved Chikungunya virus, a viral syndrome that can physically debilitate its victims for years with severe chronic arthritis. VC + hydrogen peroxide was especially effective in rapidly relieving even long-standing pain secondary to this viral infection (Marcial-Vega, 2015 [26035980])

(Gonzalez et al., 2014, "High Dose Intravenous Vitamin C and Chikungunya Fever: A Case Report," *Journal of Orthomolecular Medicine,* Volume 29)

There has never been reported an acute viral syndrome that has not been resolved or at least substantially accelerated in its rate of resolution with sufficiently high-dose, persistent administrations of vitamin C. When used in conjunction with ozone, even chronic infections can often be resolved (Ascorbazone therapy)

What About Zika?

Zika fever is another virus that has been manipulated into a major health scare for the public, especially augmented by the reports of microcephaly in the babies born of women who contracted the virus while pregnant.

Like all the other acute viral syndromes for which data exists, high-dose vitamin C readily resolves the infection

(Gonzalez et al., 2016, "High Dose Intravenous Vitamin C Treatment for Zika Fever," *Journal of Orthomolecular Medicine,* Volume 31)

What Has Vitamin C Already Been Proven to Do?

Documented efficacy in non-viral infections.

Diphtheria, tetanus, staphylococcus, streptococcus, pseudomonas (all documented as ***curable*** with vitamin C therapy)

While vitamin C is an ***absolute virucide***, it is:

1. ***Often*** bactericidal
2. ***Almost always*** bacteriostatic, and
3. ***Always*** strongly supportive of an optimally competent immune system. Clinically, properly-dosed vitamin C will resolve all acute and many chronic viral infections, as well as most acute infections resulting from other non-viral pathogens (Levy, 2002, ***Curing the Incurable***)

What Has Vitamin C Already Been Proven to Do?

Documented efficacy in non-viral infections.

Malaria (very positive responses to **very low doses**)

Leprosy, typhoid fever, brucellosis, trichinosis

Dysentery (amebic and bacillary)

Trypanosomal infections (Chagas' disease)

What Has Vitamin C Already Been Proven to Do?

Documented as the **ultimate nonspecific antitoxin and poison antidote**, *in vitro* and *in vivo*:

Toxic elements (mercury, lead, chromium, arsenic, cadmium, nickel, vanadium, aluminum, fluorine); [Levy, 2002, *Curing the Incurable,* pp. 280-312]

Venoms (snake, spider); Klenner (1971) Observations of the dose and administration of ascorbic acid when employed beyond the range of a vitamin in human pathology. *Journal of Applied Nutrition* 23 61; Klenner (1974) Significance of high daily intake of ascorbic acid in preventive medicine. *Journal of the International Academy of Preventive Medicine* 1 45

Alcohol [3304067]

Barbiturates; (1971 & 1974, Klenner, see above) [5899011]

What Has Vitamin C Already Been Proven to Do?

Documented as the **ultimate nonspecific antitoxin and poison antidote**, *in vitro* and *in vivo*:

Toxic mushrooms [6200941]; effectiveness of other antioxidants, ALA: [366411]; NAC: [10635453] (VC & antioxidant therapy still not a routine part of mushroom poisoning

Pesticides, six different types; (2002) Levy, *Curing the Incurable*, pp. 267-271

Strychnine, tetanus; (1937) Jungeblut 33 203 [neutralized tetanus toxin *in vitro*], [5986216] [tetanus toxin neutralization *in vivo*], [14291219] [strychnine neutralization *in vitro*], [4383547] [strychnine neutralization *in vivo*]

What Has Vitamin C Already Been Proven to Do?

Definite benefits in the following:

Lyme, AIDS, ***chronic*** hepatitis

- "Embedded pathogens;" vitamin C (or any other agent) cannot work optimally without physical access to the pathogen

Common cold; a very high requirement of vitamin C needed for the total quantity of virus usually present

Tuberculosis; slow-growing, slow-reacting; massive amount of literature documenting benefits of C for this

Pertussis; combination infection/toxin

What Has Vitamin C Already Been Proven to Do?

Neutralize radiation toxicity and/or repair damage from it

Just as in any other type of free radical/oxidation environment, radiation exposure results from electron loss from the affected tissues/biomolecules

Basic research: Ala-Ketola, 1974 [4450227] [vitamin C could prevent death in rats from otherwise fatal whole body ionizing radiation exposure]

Clinical research, Kennedy, 2001 [11316150] [vitamins C and E prevented side effects of pelvic irradiation in cancer patients]

What Has Vitamin C Already Been Proven to Do?

Neutralize radiation toxicity and/or repair damage from it

In Japan, after the tsunami-induced nuclear plant breach, the Japanese College of Intravenous Therapy (JCIT) treated many individuals with vitamin C-centered therapies.

In a study, five Fukushima Nuclear Plant workers with heavy radiation exposure received IVC only twice monthly, along with the regular supplementation of oral liposome-encapsulated vitamin C, as well as alpha lipoic acid, selenium, and a multi-vitamin preparation. Over a two-month period, statistically significant drops were seen in a laboratory test for free DNA, as well as in a multifactorial Cancer Risk Score evaluation [Yanagisawa]

Vitamin C, Ultimate Immune Booster

At least 19 different ways in which vitamin C supports/improves immune system function are described in the literature:

1. Increased interferon production [7149924]
2. Enhanced phagocytic function [9795745]
3. Selective concentration of vitamin C in white blood cells [7082619, 8340380]
4. Enhanced cell-mediated (T lymphocyte) immune response [300689]
5. Enhanced WBC cytokine production to help generate the immune response [8942423]

Vitamin C, Ultimate Immune Booster

6. Prolongs T lymphocyte longevity [10357874]
7. Enhanced NO production by macrophages [10575633]
8. Enhanced T cell proliferation [6604680]
9. Enhanced B cell proliferation [9119607]
10. Inhibition of neuraminidase, keeping viruses and bacteria trapped in mucus [634178]
11. Enhanced antibody production and complement activity [7163630, 3108470]

Vitamin C, Ultimate Immune Booster

12. Enhanced natural killer cell activity [9248859]
13. Enhanced prostaglandin formation [316494]
14. Enhanced cyclic GMP levels in lymphocytes; GMP mediates the action of many hormones [36416]
15. Pathogen killing with peroxide [4892384]
16. Histamine detoxification, supporting local immune factors [1578094]

Vitamin C, Ultimate Immune Booster

17. Helps to neutralize the local increased oxidative stress (free radicals, pro-oxidant molecules) that further the infective process [11805243]
18. Nonspecific immunopotentiation and improvement of the vaccination effect [10760396]. However, the most important vitamin C effect in vaccinated babies, children and adults is its ability to neutralize vaccine-related toxins.
19. Possible alteration of bacterial cell surface qualities, facilitating antibiotic access [207492] This means VC augments antibiotics and should be taken with them, and does not have to been given instead of them.

Vitamin C:
The Ultimate Therapy

Regardless of whether there exists an appropriate antibiotic or other antimicrobial agent for administration, vitamin C should ***always*** be part of ***any*** protocol for ***any*** infection, acute or chronic, because:

1. Vitamin C significantly **enhances immune function**, in at least 20 different ways. (2002) Levy, *Curing the Incurable,* pp. 180-3
2. Vitamin C has its own **direct anti-pathogen properties** (iron, Fenton reaction)
3. Vitamin C **neutralizes toxins**, including endotoxins, exotoxins, and the nonspecific pro-oxidant effects associated with any infection
4. Vitamin C **repairs (reduces) oxidized** biomolecules (toxin damage).
5. **All infections consume vitamin C**, so failing to supplement with vitamin C means the patient with be dealing with **infection-induced pre-scurvy and even frank scurvy** as well (consider making ***serial*** plasma vitamin C levels a routine part of the testing in all hospitalized patients)
6. The electrons provided by vitamin C are the **primary fuel** on which every cell in the body runs.

Optimizing Vitamin C Therapy

Vitamin C, in its **active, reduced form**, needs to maximally **accumulate** inside the cells, and subcellular organelles (especially mitochondria and nuclei) of the target tissue(s).

As well, vitamin C should reach optimal concentrations in the plasma and extracellular spaces as well, ***and be maintained***. Any effective treatment protocol has to ultimately achieve this goal to some degree, unless only symptom masking is being accomplished.

Factors in Optimizing Vitamin C Therapy

1. Dose (multigram always if possible and well-tolerated, except with some advanced renal disease)
2. Route (oral, regular; oral, liposome-encapsulated; intravenous; intramuscular; continuous, pulsed; continuous + pulsed)
3. Rate (Endogenous insulin potentiation effect)
4. Frequency (more often is better; continuous with dose spiking is optimal)
5. Duration (clinical status, symptom response)
6. Type (avoid calcium ascorbate)

Vitamin C and Sepsis

Severe Sepsis and Septic Shock

1.5 grams of VC IV every 6 hours (only 6 grams daily) + 50 mg of hydrocortisone q. 6 hours, and 200 mg thiamine q. 12 hours; all three for 4 days or until ICU discharge

The hospital mortality was 8.5% (4 of 47) in the treatment group compared to 40.4% (19 of 47) in the control group [27940189]

Vitamin C and Sepsis

It is well-documented that vitamin C is a highly effective therapy for all acute bacterial and viral infections, and it is clear that such fulminant infections rapidly put the body into an acute state of scurvy that further impairs effective immune system function. With 7 to 10 grams IV daily for ***3*** days, one month mortality was 14% versus 64%. (Zabet, 2016 [27162802]) Dosage low, treatment period very short.

There is no downside to giving vitamin C to such patients.

Vitamin C and Sepsis

<u>VC and hydrocortisone mutual enhancement (synergy</u>):

VC facilitates hydrocortisone effect by restoring oxidized glucocorticoid receptor, which is the predominant redox state of such receptors in sepsis [9698091]

Corticosteroids dramatically increase intracellular uptake of VC [11502226]

Advanced sepsis is characterized by increased endogenous cortisol concentrations [24971687, 28224564]

Vitamin C and Sepsis

Ascorbic acid and hydrocortisone (cortisol) are arguably the two most powerful anti-inflammatory agents, and they both occur naturally. Of course, most humans are severely deficient in L-gulonolactone oxidase, and don't make their own from glucose, as they were genetically designed to do. Nevertheless, it is the body's design to respond to inflammation and infection (and sepsis) with an increased presence of ascorbate, as well as an increased presence of cortisol. ***They are designed by nature to work together***.

Scurvy at Sea

Several million sailors died of scurvy, but ***many survived as well***. How did so many individuals survive under the same circumstances that killed so many?

In 1499 Vasco de Gama had 116 of 170 men die of scurvy. However that means 54 survived.

Magellan lost 212 of 230 men, but 18 survived.

Many voyages during that time had anywhere from 50% to zero survival

A typical sailor's diet was comprised of biscuits, salted beef, pork, and fish, butter, cheese, dried peas, and a great deal of beer.

Usually many started dying after six weeks at sea.

Endogenous Vitamin C Production with GULO

Actually, the loss of the ability to make vitamin C via GULO develops **shortly after the baby is born**, but the ability IS present during fetal development, and often for up to a few months after delivery. Other individuals appear to make vitamin C for much (or all?) of their lives.

In utero, fetuses have been shown to have vitamin C levels 4 to 11 times higher than those of adults. One study showed that umbilical cord blood plasma VC levels were 4-fold (400%) higher than the vitamin C levels in the **maternal blood plasma** [4830116] Another study showed that exclusively breast-fed infants were able to maintain plasma vitamin C levels as much as 2-fold higher than their mothers and equal to or higher than **vitamin C-supplemented control babies** [6496385]. If breast feeding has a factor that promotes continued transcription of the GULO gene, this is arguably it's most important benefit over bottle feeding, enormously benefiting the early development of the baby, as well as its general health and susceptibility to childhood infectious diseases.

Bantu tribe **children** appeared to have the ability to remain free of overt scurvy in spite of an infinitesimal intake of vitamin C (3 to 8 mg daily). This was also in spite of a background of what was described as "severe malnutrition" [13315928]

Cummings in 1981 described female subjects that appeared to synthesize vitamin C. One of them demonstrated vitamin C "saturation" while vitamin C intake progressively decreased. Another young woman went 149 days without dietary vitamin C and ended up being dropped from the study that wanted to evaluate vitamin C deficiency/scurvy [7211730]

Stop Codons and Vitamin C Production via GULO

It would appear, then, that in fetuses and young babies the GULO gene **is being actively transcribed into the GULO enzyme**, and later this ability to be transcribed is lost by most individuals (but not all). The mechanism of this loss of transcription is felt to be the presence of an acquired “stop codon” or “premature termination codon” that is inserted into the messenger RNA, roughly like a piece of gum on (or in) a zipper. Just as the zipper can’t get past the gum, the ribosome that reads the RNA can’t get past the stop codon. A stop codon is a sequence of three nucleotides (triplet) in the messenger RNA being transcribed by the ribosome that aborts the transcription process. There are three different stop codon sequences, none of which code for an amino acid, stopping the further production of the protein being transcribed.

Codons and Epigenetics

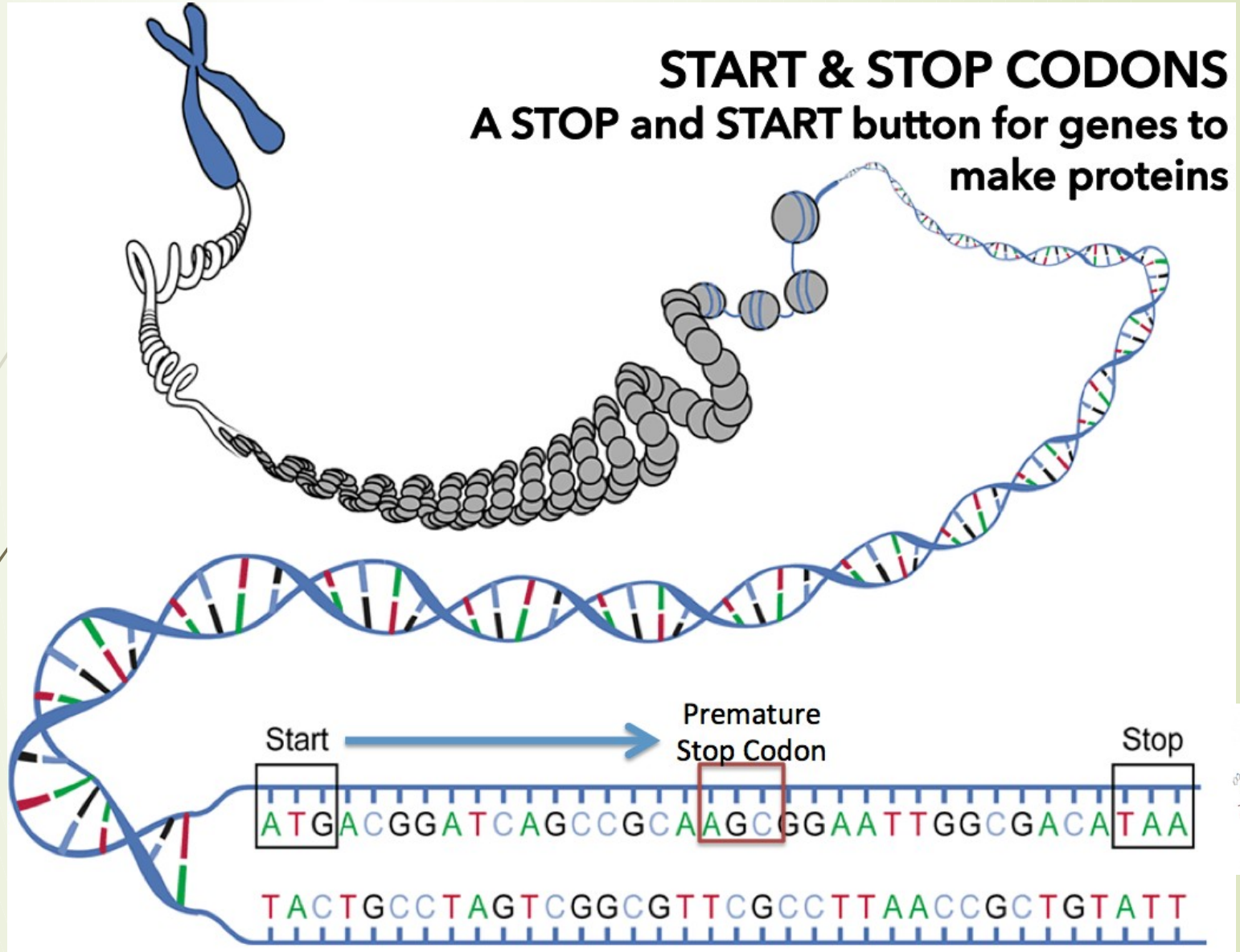
A regular codon is a set of three consecutive nucleotides in a strand of DNA or RNA that provides the genetic information to code for a specific amino acid that will be incorporated into a protein chain. Of the 64 possible combinations of three nucleotide bases, 61 specify an amino acid, while the remaining three combinations are **stop codons** that do not code for any amino acid. Stop codons also have "release factors" that are associated with their ability to block effective transcription.

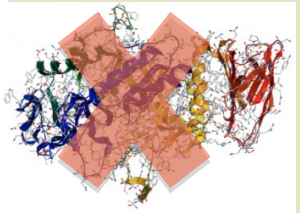
All of this comes under the aegis of **EPIGENETICS**, which basically refers to any of the modifiable factors that result in variable expressions of the genome. Pure genetics involves simply what the DNA sequence is. Epigenetics is perhaps most clearly exemplified by tangible differences in identical twins, that is, evidence that identical DNA sequences can have clear variations in phenotypic traits and protein/genetic expression.

Codons and Epigenetics

The scientific evidence supports the concept that many genetic “deficiencies” involving the presence of stop codons at critical points in the synthesis of a protein can be corrected/overcome by agents that promote “readthrough.” This is basically just a name for the phenomenon that allows a transcription process to not be aborted by the presence of a stop codon, instead allowing the insertion of an amino acid at the stop codon position that would not otherwise occur [29131862]. Rather, the stop codon is “read through” and protein synthesis can proceed to completion. This process is discussed at length in the literature, although the precise mechanism involved in stop codon readthrough does not yet appear to be well-delineated [24773318, 23293581, 24939317]

One mechanism of readthrough has been described, asserting that the therapeutic agent binds the ribosome reading the mRNA and interferes with the ability of the translation termination factors’ ability to properly recognize the stop codon [27407112] Some agents can promote readthrough on stop codons acquired in cancer cell gene mutations [28145797]





GULONOLACTONE OXIDASE ENZYME

Restoring GULO and other defective gene proteins

We now know that the loss of L-gulonolactone oxidase enzyme function in the liver is ***not irreversibly lost in the human being***. Many think that the DNA sequencing required to produce GULO is completely lost, and no approach can restore this enzyme function. This is NOT the case.

Three ways to restore GULO function in the liver:

1. Genetic engineering

2. Prescription drugs (significant toxicity)

3. Nutrient supplementation that restores normal or near-normal genetic function in multiple conditions with genetic “defects” and DNA “mutations”

Direct GULO Insertions

Genetic engineering

In 1996 Japanese researchers showed that the microinjection of the GULO gene into fertilized fish eggs produced an offspring that had GULO enzyme activity [8687450]

In 2008, both animal and human cells were able to synthesize GULO following gene therapy using a viral vector [18764764]

Neither of these approaches are of any immediate, practical importance in getting the restoration of GULO function in humans, but they clearly demonstrate that the GULO can be restored, at least to some degree

CRISPR Gene Editing

Genetic engineering

CRISPR ("clustered regularly interspaced short palindromic repeats") technology for gene editing

Basically takes pieces of virally sourced DNA and inserts them into genes

Not surprisingly, unwanted new gene mutations have been seen to occur [30010673]

Drugs for Gene Expression

Prescription Drug Agents

Aminoglycosides can promote stop codon readthrough in some conditions [22820013, 23083810]

Cystic fibrosis mutations are being readthrough with agents, such as ivacaftor, and with escin, an herbal agent [18937996, 27104944]

Nutrients for Gene Expression

Nutrient agents

Resveratrol and thalassemia

Generally, infants are not born with thalassemia, but would appear to “acquire”, much like GULO enzyme deficiency

Clinically, the critical consideration in patients with thalassemia is the need for repeated transfusions. Resveratrol is a fetal hemoglobin inducer [22378234]. In one study on humans, resveratrol eliminated the need for transfusions in half of the subjects, with many of the other patients needing less frequent transfusions [Chowdhury et al. (2017), *International Journal of Advanced Research*, 5:1816-1821]

Resveratrol, psoralens from plant extracts, and rapamycin can all stimulate production of fetal hemoglobin [18955291]

Nutrient Restoration of GULO in Humans

Researchers discovered (2017) that an olive fruit extract was able to double plasma vitamin C levels in 14 healthy volunteers after one month. There was no increase in dietary vitamin C intake, nor were any dietary supplements taken [28063380]

A logical conclusion is that these individuals had readthrough of their GULO stop codons and started making their own vitamin C.

Anecdotally Speaking…

Taking the agent extracted from olive fruit appears to have facilitated the rapid recovery from

Influenza

Common cold

Cold with laryngitis

Alcohol hangover

My own experience with it has resulted in chronically keen vision, much less chronic back pain, less acid reflux, better sleep and improved energy. High blood pressure is much better controlled on less medication. Urine evidence of probable continuous detoxification.

Therapeutic Goals

1. **Prevention is always better than cure**, since cure means having to deal with the symptoms and pathology of a condition for a variable period of time before relief. (However, cure is still pretty good!)

2. Remember that having a continuous supply of vitamin C from the liver does not prevent the individual from getting an infection or confronting a toxin challenge. Rather, it accelerates and makes more complete the recovery from that condition once systemic oxidative stress exceeds a given degree.

3. Optimal therapy requires quality supplementation to prevent disease, as well as to augment the recovery from acute conditions, while ameliorating the negative clinical impact of chronic medical conditions that are rarely or never cured.

Foundational Supplement Regimen

1. Magnesium
2. Vitamin D3
3. Vitamin C (frequent regular doses and/or daily liposome-encapsulated)
4. GULO restoration with olive fruit extract
5. Vitamin K with K2
6. Iodine (Iodoral)
7. B complex
8. No calcium, copper, or iron
9. Many other quality supplements, depending on personal needs and economic considerations. However, these foundational supplements should always be included.

Multi-C Protocol (updated)

1. Oral liposome-encapsulated vitamin C (for optimal ***intracellular*** access by ascorbate, as well as in subcellular organelles)

2. Multigram doses of sodium ascorbate powder, taken several times daily, up to or reaching bowel tolerance (in order to minimize gut toxicity & support ***extracellular*** access by ascorbate) [7321921, 4069036]

3. Oral administration of ascorbyl palmitate (for optimal ***fat-soluble*** access by ascorbate) [15209539, 12595755, 9890643]

4. Intermittent IV administration of ascorbate (to optimize ***extracellular*** access by ascorbate, as well as to further ***support*** intracellular pools of ascorbate); also **IV push applications**, sometimes with insulin and/or hydrocortisone; continuous low-dose infusion

5. Intramuscular administration of ascorbate

6. Agents that promote and sustain vitamin C in the plasma

In the Words of Mark Twain

Whenever you find yourself on the side of the majority, it is time to pause and reflect.

It ain't what you don't know that gets you into trouble. It's what you know for sure that just ain't so.

For Contact and Further Information

www.peakenergy.com (www.tomlevymd.com)

Videos, newsletters, books, and general information

For questions or comments:

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I cannot offer personal consultations, but I will try to address any and all reasonable questions. If a patient has a doc who want to email me questions regarding my vitamin C-centered protocols, that would be fine.