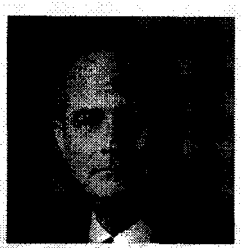
A Guide to the Optimal Administration of Vitamin C



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A Guide to the Optimal Administration of Vitamin C

The causal relationship between vitamin C deficiency and osteoporosis is clear. And in truth, vitamin C deficiencies have been implicated in the causation and/or worsening of most, if not all, chronic degenerative diseases.

Realizing that an individual with a chronic degenerative disease such as osteoporosis is substantially deficient in vitamin C and the other important components of the general antioxidant matrix in the body is straightforward. However, restoring the levels of vitamin C and other important antioxidants to normal or near-normal levels is not is as simple as one would hope. While popping a vitamin C pill of any size daily will help just about everyone, it falls far short of the goal of reaching the state of optimized health that a normal antioxidant balance will bring in the body.

Many conditions, especially acute infections and acute toxin exposures, can readily be addressed and resolved with an aggressive administration of multigram doses of vitamin C for several days. However, optimizing vitamin C levels in the tissues of the body to minimize the impact and evolution of chronic diseases is a different story. This appendix will endeavor to outline the different ways in which vitamin C can be most effectively administered, along with important suggestions for both reaching and maintaining optimal tissue levels of vitamin C.

Important Factors in the Effective Administration of Vitamin C

1. Dose
2. Route
3. Rate
4. Frequency
5. Duration of treatment period
6. Type of vitamin c
7. Adjunt therapies
8. Safety
9. Quality of overall protocol

Dose: The Most Critical Factor for Effective Results

While all of the factors of vitamin C administration to be discussed are important, inadequate dosing is the single most important factor in preventing complete clinical success with the vitamin C treatment. If enough vitamin C is not given to deal with the amount of increased oxidative stress involved with an infection, poisoning, or with an ongoing medical condition, complete clinical success will never be realized. It is also important to emphasize that some success short of an optimal response will always be seen no matter how little vitamin C is given. In sick individuals vitamin C is always in short supply, and any amount will help some. More will help even more. Optimal success will be seen when all excess oxidative stress has been neutralized and continues to be neutralized as it recurs.

In the treatment of acute infections and acute poisonings optimal dosing is especially critical, since many such conditions can kill or cause long-term secondary organ damage if present in the body long enough before effective treatment. Determining the initial dose requires clinical evaluation. And even more importantly, follow-up clinical evaluation is needed after the initial dose has been given to determine whether future dosing needs to be higher, the same, or even a little lower. It is always optimal to work with a healthcare practitioner familiar with vitamin C to monitor clinical progress and make dosing changes as indicated.

While not an absolute rule, a reasonable guide for selecting the initial dose of vitamin C to be given intravenously would be roughly from 1 to 1.5 grams per kilogram of body weight.

Practically speaking this would mean 25 grams for most children old enough to readily tolerate an IV line.

- 50 to 75 grams for a 100- to 150-pound person.
- 75 to 150 grams for a 150- to 250-pound person.
- Larger children will benefit most by starting at 50 grams. Lower doses and higher doses can always be given as deemed clinically appropriate.

When determining long-term vitamin C dosing for general healthcare maintenance as well as chronic disease management, factors of convenience, symptom relief, and laboratory test results play significant roles in selecting both the type(s) and amounts of vitamin C to be taken orally daily. The general Vitamin C Dosage Guide on the previous page provides a basic starting reference.

GENERAL VITMAMIN C DOSAGE GUIDE

Vitamin C Type	Typical Dose	Maximum Dose	Dose Frequency	Dose Monitoring/ Adjustments
Liposome-Encapsulated	1,000 to 5,000 mg daily	No absolute dosage	Not necessary to divide into multiple doses	Increase until symptomatic improvement no longer seen
Ascorbyl Palmitate (not liposome-encapsulated)	1,000 to 2,000 mg daily	5,000 mg	Best to divide doses throughout day	Increase until no symptomatic improvement no longer seen
Pill or Powder	5 to 15 grams	To bowel tolerance	Best to divide doses throughout day	Bowel tolerance and/or until symptomatic improvement no longer seen

Convenience

Vitamin C, in pill or powder form is best given several times a day due to its rapid clearance through the kidneys. This is less of a concern with the liposome-encapsulated form of vitamin C, as the intracellular uptake of this form of vitamin C substantially slows its excretion. The optimal dosage of vitamin C is best determined over a few days by how much sodium ascorbate or ascorbic acid it takes to reach bowel tolerance (just before the onset of diarrhea). Most reasonably healthy individuals will end up with a bowel tolerance dose throughout the day between 5 and 15 grams of vitamin C. Some people have much more sensitive bowels and cannot take more than one or two grams. Such individuals should take more of the liposome-encapsulated vitamin C, as bowel tolerance is not an issue with that form of vitamin C. Other individuals have very high bowel tolerances of 20, 30, 40 grams or more of vitamin C and a handful of individuals cannot reliably reach a bowel tolerance level. Generally these individuals have significant toxin levels in their bodies, often secondary to dental infections, such as root canal-treated teeth.

Symptom Relief

Very few individuals have completely symptom-free lives. As all symptoms are mediated by increased oxidative stress in some area of the body. At the very least vitamin C can always be expected to lessen a symptom when dosed correctly. Individuals who begin supplementing vitamin C quickly develop a sense for what amount of vitamin C makes them feel the best and this is a good way to help determine long-term dosing. Other individuals who have no discernible symptoms will nevertheless begin to develop an increased "health awareness" the longer they supplement vitamin C. Such individuals often begin to feel better without having realized they were not feeling optimally before. Also they quickly realize when they are having a toxic or infectious challenge, as their sense of wellness becomes slightly impaired. In these instances the vitamin C dose can be increased above maintenance levels for a few days to deal with that challenge and not permit outright sickness to develop.

Laboratory testing

Rarely do all the scores in a broad array of baseline laboratory tests fall within the normal range. As vitamin C is administered over time many abnormal tests will significantly improve or even normalize. An astute healthcare practitioner will be able to determine optimal doses over time through evaluation of routine laboratory testing. Laboratory testing is an especially elegant way to fine-tune vitamin C dosing, as some individuals may still feel well even while certain laboratory test scores are moving the wrong direction.

What's the Best Avenue for Vitamin C Administration?

Vitamin C can be given intravenously, intramuscularly, by mouth, per rectum, by misting inhalers, topically on the eyes or in the ears, and both on the skin as well as through it (transdermally). Most commonly it is given orally and intravenously. The success of any vitamin C treatment, however, depends primarily on getting vitamin C molecules in direct contact with the pro-oxidant molecules in the site(s) of increased oxidative stress.

When using vitamin C in the treatment of delicate areas, such as the eyes or the respiratory tract, it is important to always use pH-neutral solutions of vitamin C (sodium ascorbate or properly buffered ascorbic acid). Intramuscular injections, discussed further below, are great for babies and small children. Rectal administrations can also be an option if oral or intravenous routes are not feasible or if a retention enema application is being used, as for a condition such as chronic ulcerative colitis. Conditions such as colitis do not require rectal administration however. Any inflammatory condition of the intestine or colon can also be very effectively treated by oral administration of sodium ascorbate powder in water or juice up to bowel tolerance.

How Fast Should Vitamin C Be Administered?

How fast a dose of vitamin C is given intravenously is a very important factor for maximizing the benefit of vitamin C therapy. Depending on the condition being treated and the effect that is desired, vitamin C can be given in seconds as an IV push or it can be infused rapidly, slowly, or even as a continuous infusion over 24 or more hours.

IV Push:
When a patient is in imminent danger of death, such as might be seen after an acute exposure to life-threatening amounts of venom or toxin that are still largely circulating in the bloodstream, multigram doses of vitamin C (sodium ascorbate or well-buffered ascorbic acid) can be admnistered via IV push. The idea is to get as much vitamin C in direct contact with circulating toxins as rapidly as possible. The results can be dramatic. Dr. Klenner described how he treated a cyanotic patient who was acutely poisoned by the bite of a venomous Puss Caterpillar only 10 minutes earlier and complaining of severe chest pain, the inability to take a deep breath, and the feeling that he was dying:

"Twelve grams of vitamin C was quickly pulled into a 50 c.c. syringe and with a 20 gauge needle was given intravenously as fast as the plunger could be pushed. Even before the injection was completed, he exclaimed, 'Thank God.' The poison had been neutralized that rapidly."

Rapid Infusion:
Rapid infusion generally means an infusion rate that is as rapid as a wide-open IV line will permit. Practically speaking, this translates to 500 to 700 cc of vitamin C solution being administered in a time frame between 40 and 60 minutes, typically containing between 50 and 100 grams of vitamin C.

When such an amount of vitamin C is infused this rapidly the pancreas perceives the vitamin C load as a glucose load because glucose and vitamin C molecules are extremely similar chemically. Consequently the pancreas secretes substantial insulin into the blood to deal with what it considers to be an acute excess of glucose. For most individuals the insulin release is significant enough that a pronounced hypoglycemia, sometimes as low as 20 to 25 mg/dL, ensues and is maintained until the IV is completed or some oral or IV forms of glucose are supplied to increase the glucose level. This type of vitamin C infusion, then, can be viewed as an endogenously-induced form of insulin potentiation therapy (IPT).

IPT, involving the deliberate induction of substantial hypoglycemia with insulin injections, has been documented to be a very effective way to increase the cellular uptake of most nutrients and/or medications given at the same time.3 The endogenously-induced IPT will have the same effect, assuring a much larger uptake of vitamin C into the cells than would otherwise take place when it is infused at a slower rate and no significant release of insulin is stimulated. In cell studies insulin has been documented to stimulate vitamin C accumulation.4-6 Such studies, along with known effects of IPT,

reliably indicate that similar mechanisms are in play for insulin promoting vitamin C uptake in all the metabolically active cells in the body.

Slow Infusion:
As noted, rapid infusions can acutely push much more vitamin C inside the cells. However a much greater portion of the vitamin C also ends up being excreted through the kidneys in the process. Many chronic degenerative disease patients, including heart patients and cancer patients, will benefit optimally when their infusion take place over two or more hours. Many such patients will benefit from both rapid and slow infusions during the course of their protocol administration. Vitamin C, like regular antibiotic therapy, can offer more benefit when given several times as a high-concentration, rapidly-infused "loading dose," to be followed over a more extended period of time with repeated slow infusions. This simply allows the underlying disease to be exposed to more vitamin C more of the time, often resulting in dramatic symptom lessening and even disease reversal.

Continuous Infusion:
This is a form of administration that should be of great value but has not yet been done with any frequency. Dr. Klenner first made the suggestion with regard to the possible treatment of cancer:

"Twelve grams of vitamin C was quickly pulled into a 50 c.c. syringe and with a 20 gauge needle was given intravenously as fast as the plunger could be pushed. Even before the injection was completed, he exclaimed, 'Thank God.' The poison had been neutralized that rapidly."

Perhaps the only flaw in Dr. Klenner's assertion is that it would seem unlikely that most cancers would require months to resolve with such an approach. Of course the practical "flaw" is that as of the writing of this book no hospital in the United States will permit any infusion of vitamin C, much less a continuous infusion. Should circumstances ever permit this approach, however, it is likely that an enormous amount of good could be done not only with cancer, but also with any other chronic degenerative disease, including neurological conditions like multiple sclerosis and Alzheimer's disease.

What's the Optimal Interval Between Vitamin C Administrations?

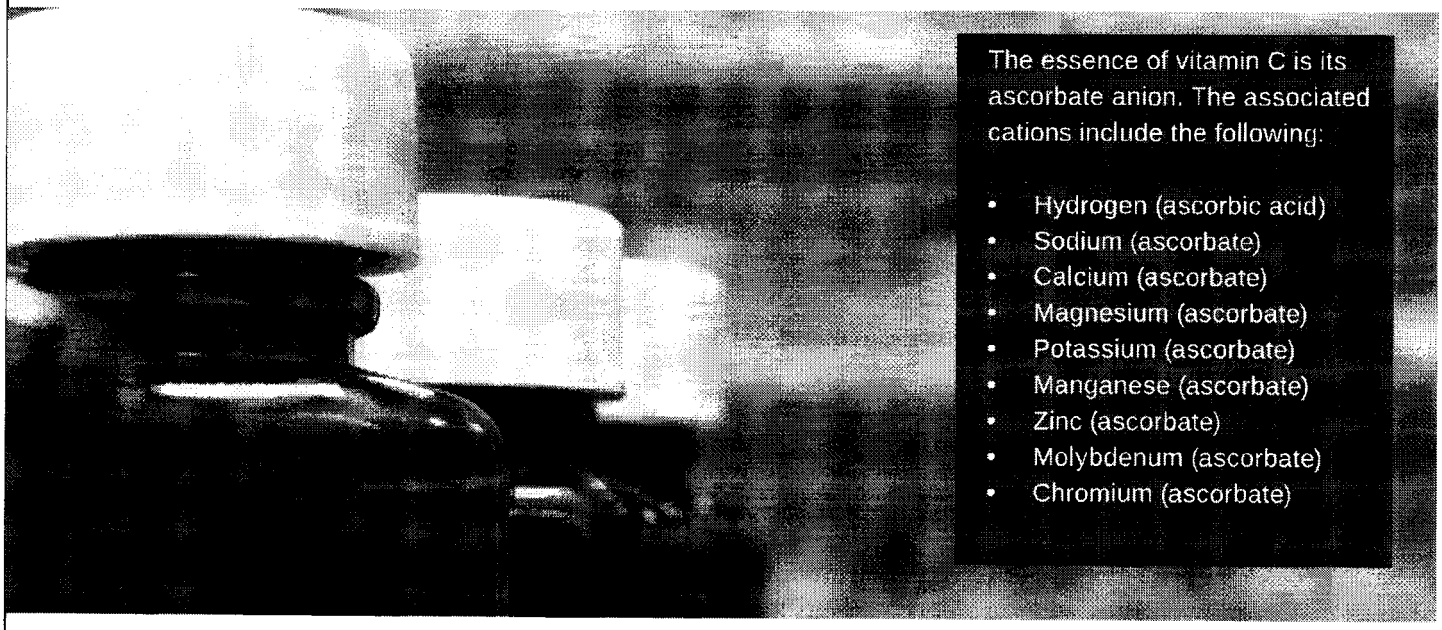
The appropriate frequency of vitamin C dosing in any of its forms is completely based on the clinical response to the previous administration(s) of vitamin C. When treating an acute infectious disease or an acute intoxication/poisoning, the improvement of vital signs and the reported relief of any associated acute symptomatology dictate how soon and how sizeable the next dose of vitamin C should be. When no significant improvement is seen more vitamin C should be given immediately and generally infused more rapidly. IV push should be reserved for those circumstances when death or coma appear imminent.

If an appropriately-sized dose of vitamin C is administered the first time a positive response should nearly always result, especially if intravenous administration is being utilized. The decision of when and how much the second dose of vitamin C should be will still be dictated by the clinical expertise of the treating healthcare practitioner. An oral vitamin C regimen can also be pushed in a vigorous fashion by a caregiver at home if no healthcare provider is involved. The lowering of elevated temperatures, rapid heart rates, and rapid breathing, along with normalization of elevated or depressed blood pressures and the overall increased comfort level of the patient are the most important parameters to follow in the early stage of treatment. It is also important to give sizeable doses of both regular vitamin C and liposome-encapsulated vitamin C orally regardless of whether the patient is also receiving any intravenous administrations.

How Long Should Vitamin C Administrations Be Continued?

Especially for significant acute infectious diseases, the duration of a vitamin C treatment regimen by whatever route of administration, is important. A patient can and usually does respond very dramatically to a large initial dose of vitamin C. However, even when clinical normalcy appears to have been restored it is very important to give sizeable doses of vitamin C for at least 48 hours after the patient "appears" completely cured. Many infections, especially viral ones, can rebound promptly when vitamin C therapy is not extended for this length of time. Giving a large amount of vitamin C orally, IV, and/or IM every 4 to 6 hours around the clock will reliably resolve an acute infectious syndrome much more rapidly than would be seen with a very large single dose with no follow-up dose for another 24 hours.

What's the Best Chemical Form of Vitamin C to Use?



Ascorbic acid

This is really the prototypical form of vitamin C. This is always a desirable form of vitamin C to take when there is no concern with stomach upset due to excess acid effect, or no concern of excess acidity causing pain at the catheter site when given intravenously.

Sodium ascorbate

This is probably the optimal form of regular vitamin C that has not been encapsulated with liposomes. This is because very large amounts can be given up to the point of inducing a diarrhea-like, vitamin C-flush effect when what is known as bowel tolerance is reached. If exceeding the bowel tolerance level is well-tolerated this is also a very desirable effect as it neutralizes and eliminates a large amount of gut-generated toxins before they get absorbed. The amount of sodium ascorbate needed to exceed the bowel tolerance point can also be useful as a rough guide to the degree of infection or toxicity that is present in the patient. Generally the greater the infectious and/or toxic challenge the more vitamin C gets absorbed from the gut and the less of it reaches the colon, with the bowel tolerance point not being reached as readily.

It should also be noted that large amounts of sodium ascorbate can be taken by most individuals, including those with high blood pressure and heart disease, without causing fluid retention or an increase in blood pressure. This is because it is sodium chloride, not sodium associated with another anion like ascorbate, citrate, or bicarbonate, that reliably causes fluid retention and aggravates high blood pressure in individuals sensitive to volume overload. The term "sodium-dependent" hypertension should forever be replaced with the term "sodium chloride-dependent" or "table salt-dependent" hypertension. In any event, large doses of sodium ascorbate should not be avoided for fear of provoking elevated blood pressure.

Calcium ascorbate

This form is typically marketed as Ester C or buffered vitamin C. This form just adds another unnecessary source of calcium to the supplementing individual. While it is true that it is easy on the stomach, sodium ascorbate is tolerated just as easily and does not aggravate the preexisting state of calcium excess already present in most older individuals.

Magnesium ascorbate

This is an excellent form of vitamin C since it brings both magnesium and ascorbate into the body. The only practical limit to dosage with this form of vitamin C would be the amount that starts to approach bowel tolerance and that results in diarrhea. Probably the main reason against supplementing magnesium ascorbate on a regular basis is that it adds significant cost to what are two exceptionally inexpensive supplements when taken separately.

Potassium ascorbate

This is also a good form of ascorbate for supplementation. The only problem is that it is relatively easy to overdose on potassium, which can cause fatal cardiac arrhythmias, especially if it is taken with the same abandon as so many other completely nontoxic supplements. Potassium should never really be taken on a regular basis unless advised or prescribed by a healthcare practitioner who has done appropriate clinical and laboratory testing beforehand. For people who are in need of potassium supplementation this can be a excellent supplement. It just needs some measure of regular monitoring.

The other forms of ascorbate

These are forms other than the specific forms mentioned above. They are not really good forms of vitamin C to ingest in large amounts on a regular basis. While ascorbate has no real toxicity concerns, most of the mineral ascorbates, especially manganese, molybdenum, zinc, and chromium, can very easily be overdone. Also, as mentioned above they are needlessly expensive and do not end up providing the amounts of vitamin C that most individuals should be taking on a regular basis. Better to take a quality supplement with a wide range of minerals along with multigram amounts of sodium ascorbate separately.

Vitamin C Type	Advantages	Disadvantages
Liposome-Encapsulated	• Highest bioavailability • No digestive upset or diarrhea • Slower excretion rate • Best intracellular delivery	• Most expensive
CAUTION: *Inexpensive brands are often just emulsions and not truly liposome-encapsulated.*		
Ascorbic Acid	• Most desirable regular form if no concern of stomach upset • Inexpensive	• Frequent dosing and potential of diarrhea can make less convenient • Most prone to stomach upset
Sodium Ascorbate	• Best tolerated of pill/powder forms if large doses are desired • Sodium content not a concern for those worried about fluid retention or high blood pressure • Inexpensive	• Frequent dosing and potential of diarrhea can make less convenient
Calcium Ascorbate	• Calcium acts as buffer, easier on stomach	• More expensive than other forms
CAUTION: *Added calcium is always undesirable.*		
Magnesium Ascorbate	• Brings magnesium and ascorbate into body	• More expensive than other forms
Potassium Ascorbate	• Brings potassium into the body	• More expensive than other forms • Limited to small doses • Requires a measure of regular monitoring
CAUTION: *Potassium can be toxic — too much can be fatal.*		
Other Forms of Ascorbate	• Brings other trace elements into the body	• More expensive than other common forms • Limited to small doses
CAUTION: ***Not recommended.*** *Potential of toxicity, especially with manganese, molybdenum, zinc, and chromium forms.*		
Ascorbyl Palmitate	• Fat-soluable, so it provides extra protection for fat-rich tissues • Less potential for digestive upset	• More expensive than other forms

Ascorbyl Palmitate

Unlike all the other ascorbate forms listed above, this is a form of vitamin C that is fat-soluble. Including at least a gram or two of ascorbyl palmitate in a daily supplementation regimen can provide important additional antioxidant coverage in fat-rich tissues and areas not otherwise well-protected by the more common forms of vitamin C. Ascorbyl palmitate has been demonstrated to protect the cell membrane of intact red blood cells as well as to protect important anti-atherosclerotic lipoproteins in the body. It has also been employed as an antioxidant to prevent skin aging. Liposome delivery systems containing ascorbyl palmitate have been demonstrated to kill cancer cells in vitro as well as to slow

supplementation regimen can provide important additional antioxidant coverage in fat-rich tissues and areas not otherwise well-protected by the more common forms of vitamin C. Ascorbyl palmitate has been demonstrated to protect the cell membrane of intact red blood cells as well as to protect important anti-atherosclerotic lipoproteins in the body. It has also been employed as an antioxidant to prevent skin aging. Liposome delivery systems containing ascorbyl palmitate have been demonstrated to kill cancer cells in vitro as well as to slow tumor growth in mice more effectively than with free ascorbic acid. 18 All of these studies indicate the importance of including ascorbyl palmitate as part of an optimally effective vitamin C-centered protocol.

"Vitamin C Complex"

There is also a vitamin C supplement being marketed as "Vitamin C Complex," with the basic assertion that vitamin C must be present in a "food form" with multiple associated substances, such as antioxidant bioflavonoids like rutin and quercetin, to be of any benefit. Many of the sellers of a product like this even make the incredibly outlandish assertion that pure vitamin C, as ascorbic acid or sodium ascorbate, is not of much benefit and will not even reverse scurvy by itself. In a nutshell, this is all marketing hyperbole by companies trying to carve out a piece of the vitamin C sales pie.

Just as has been asserted several times in this book, vitamin C does function optimally with as large a network of other antioxidants as can be assimilated. However it is completely wrong and frankly ridiculous to assert that it will not reverse scurvy by itself or that it is of very limited utility by itself. All the work of vitamin C pioneer, Frederick Klenner, M.D., with infectious diseases and toxins demonstrated unequivocally the incredible and typically curative value of vitamin C utilized by itself in high doses in these conditions.

Just as crazy, some sellers of this product claim ascorbic acid is not vitamin C, which is as crazy as a statement can be. Presumably this assertion is made in order to convince vitamin consumers that their product is the only one that can deliver the many benefits of vitamin C ingestion. Not surprisingly this form of vitamin C supplementation is substantially more expensive that regular supplemental forms of vitamin C. Although this is a product that will certainly provide benefits more benefit is available for less money spent on just ascorbic acid or sodium ascorbate. Buyer beware!

Will Vitamin C Administration Compete with Other Treatments?

Unless another therapy is inherently pro-oxidant or toxic in nature, vitamin C will only add to the desired effects. For example, if an individual is receiving chemotherapy for cancer the vitamin C can neutralize the chemotherapy drug itself if both are circulating in the blood at the same time. The chemotherapy is a toxic, electron-seeking agent, and the vitamin C is an antioxidant, electron-donating agent. When any chemotherapy agent has received the electrons it is seeking it ceases to be toxic and can no longer kill or help to kill a cancer cell.

However this effect is easily avoided by staggering the dosing of any inherently toxic drug and any administered vitamin C by a few hours or so. It should also be noted that when vitamin C is given after a cancer chemotherapy agent it helps both to kill the cancer cell even more effectively while also repairing the damage that was done to normal cells by the chemotherapy. When the vitamin C is given before such chemotherapy a greater cancer-killing effect is also seen and many normal cells that would have been damaged are protected by the greater concentration of vitamin C present.

It is also important to note that vitamin C does not interfere with the antimicrobial effects of antibiotics. Quite the contrary, vitamin C enhances the effects of many antibiotics and one should never avoid indicated antibiotic therapy if there is the possibility to take it along with the vitamin C. Vitamin C has many different supportive effects on the immune system20 including increasing the degree of antibody response to a pathogen. Even though vitamin C can often do the job on a bacterial infection by itself here is no reason to avoid its synergistic effect with an appropriate antibiotic in resolving the infection.

How Safe is Vitamin C?

Vitamin C as seen under a microscope

An important factor in the administration of any therapy to treat a medical condition is how safe it is. Many traditional medical therapies can often have a desired clinical effect, but they can also have a significant side effect or toxicity much of the time. "First, do no harm" continues to be the appropriate standard by which any therapeutic intervention is measured regardless of how effective it might be some of the time.

Except in patients with significant chronic renal insufficiency or chronic renal failure, vitamin C has no definable toxicity. Of course nearly all drugs have to be administered with caution in patients with kidney failure, and vitamin C is no exception. It should also be noted that many patients with deteriorating kidney function can benefit greatly from well-monitored vitamin C therapy. This is because inflammation, which is only another way of describing increased oxidative stress, is at the root of evolving kidney failure.

Outside of the context of poor kidney function vitamin C is enormously safe given in the highest of doses over extended periods of time in even the sickest of patients. Also, vitamin C has no relation to the development of kidney stones in spite of the continued efforts by the scientific media to convince doctors and the public otherwise. In fact vitamin C reliably decreases the chances of kidney stones and the persons with the highest blood levels of vitamin C have the lowest incidence of kidney stone disease.
One very rare side effect of vitamin C can occur in patients with G6PD deficiency, an X-linked recessive hereditary disease. G6PD (glucose-6-phosphate dehydrogenase) is an enzyme that is especially important in red blood cell metabolism. When is it severely deficient in the red blood cells, a hemolysis (rupture) of many of the red blood cells can be provoked by any of a number of agents, anemia being the result of an acute development.

The blood test measuring G6PD is readily available and it is appropriate to obtain this test before initiating vitamin C therapy if possible. However even when this deficiency is present it is still unlikely that the vitamin C will provoke any red blood cell hemolysis.

If a test is positive and the need for vitamin C is urgent treatment should proceed, but with closer clinical monitoring, slower infusion, lower doses, and a slower increasing of the vitamin C dose over time. It should also be noted that the initial doses of vitamin C will decrease the susceptibility of the red blood cells to subsequent hemolysis as well, since vitamin C helps to bolster intracellular glutathione levels, which strongly protects them from hemolysis.

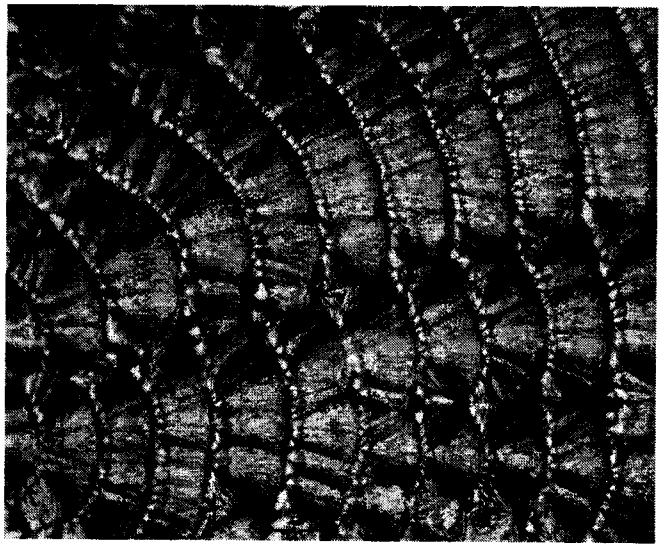
Excerpt from Death By Calcium by Thomas E, Levy, MD, JD

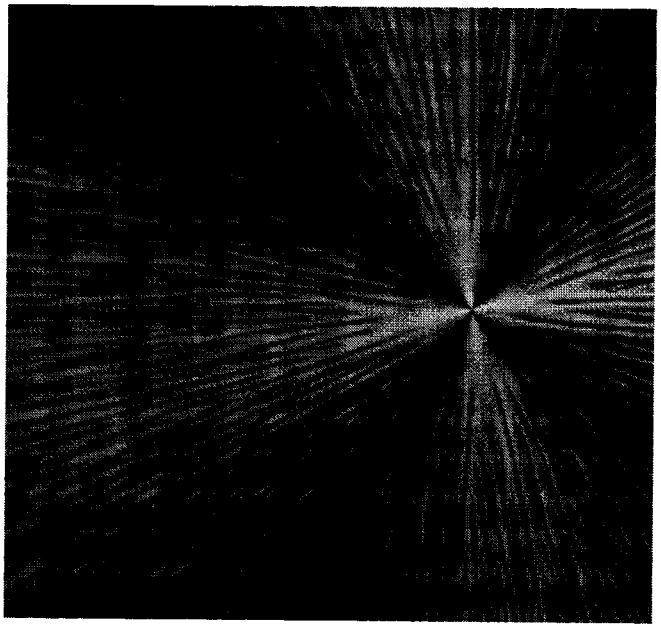
Will Vitamin C Administration Compete with Other Treatments?

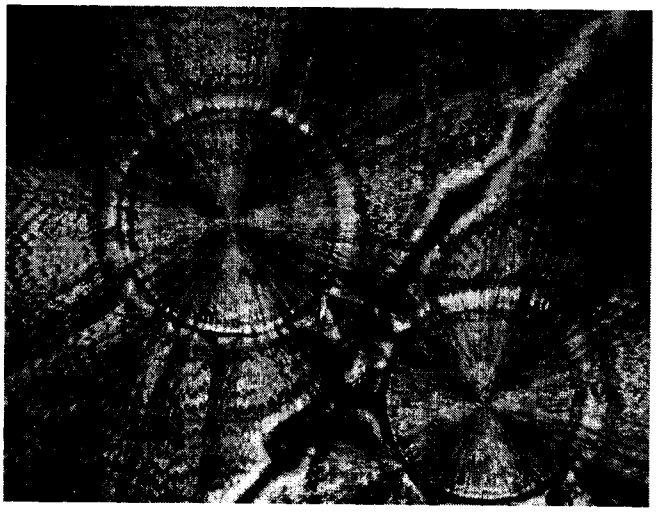
This factor is much more important in the treatment of chronic degenerative diseases than when treating acute infectious diseases or acute toxin exposures. Toxins and infections will generally respond favorably and rapidly to the aggressive administration of vitamin C as discussed above. However, how effective it is with a chronic condition depends on how effectively several other factors that use up the antioxidant capacity of the body are addressed. Discussed at greater length in Chapters 16, 17, and 18, these factors are:

- How effectively new toxins are being avoided.
- How completely chronic infections and occult acute infections have been eradicated.
- How effectively old toxins have been eliminated and how effectively they are continuing to be eliminated in the most minimally toxic manner possible.
- Whether deficient levels of critical regulatory hor-

More photos of Vitamin C under a microscope.







Multi-C Protocol

As the ultimate goal of an optimally effective vitamin C protocol is to get as much of the active (reduced) vitamin C into as many areas of the body in the highest concentrations possible, the Multi-C Protocol utilizes multiple forms of vitamin C for supplementation. The basic outline of this protocol is as follows:

1. One to five grams of liposome-encapsulated vitamin C taken orally daily.
2. Multigram doses of sodium ascorbate powder taken orally several times daily in juice or water up to or reaching bowel tolerance (the induction of watery diarrhea).
3. One to three grams daily of ascorbyl palmitate orally daily.
4. 25 to 150 grams of vitamin C intravenously up to several times weekly and occasionally daily depending on the condition and the need to get vitamin C blood levels at very high levels for longer periods of time.

The reasoning behind the Multi-C Protocol is as follows:

1.) Liposome-Encapsulated Vitamin C

Liposomes utilize a very unique biodelivery system, achieving an intracellular delivery of a substantial percentage of their paylo without the expenditure of energy in the process. When that payload is vitamin C the result is cells containing more vitamin C leading to decreased intracellular oxidative stress without an accompanying depletion of the energy resources in the body in order to achieve that goal.

All other forms of regular unencapsulated vitamin C, administered either orally or intravenously, need to consume energy for cells to end up with an increased content of active reduced vitamin C. While oxidized vitamin C circulating in the blood can be taken into cells passively without the immediate consumption of energy, energy must still be spent inside the cells to reduce it back to its active antioxidant state.

Reduced (unoxidized) vitamin C circulating in the blood, however, requires an active transport mechanism to get inside the cell, which means that energy must be consumed for the transport system to work. Therefore, even when regular vitamin C is delivered straight into the blood, significant energy consumption must take place to increase the levels of active vitamin C inside the cells.

Liposome-encapsulated vitamin C, even though taken orally, does not deplete any of the energy stores in the body to deliver its payload inside the cells.

In addition to their energy-sparing system of delivery, liposomes have an exceptionally rapid and enhanced form of absorption in the gastrointestinal tract. Unlike regular forms of vitamin C, nearly all of the liposome-encapsulated vitamin C is absorbed.

2.) Sodium Ascorbate Powder

The consumption of vitamin C on a regular (optimally daily) basis as sodium ascorbate powder facilitates the direct neutralization of toxins that are formed by the incomplete digestion, or putrefaction, of different foods. When the doses are pushed high enough and bowel tolerance is reached, further intake results in a watery diarrhea. This watery diarrhea, also known as a C-flush, further ensures that a substantial amount of toxins are directly eliminated without the need for neutralization. Inducing a C-flush at least once weekly is a great idea for general health support, as it allows for toxins to be eliminated, toxins to be neutralized and it helps keep the bowels regular even when the amounts of vitamin C being ingested are not up to bowel tolerance levels. If desired, inducing a C-flush even more frequently is fine.

Anything that induces bowel movements at least once a day, and preferably twice a day, will definitely promote good health. When ingested foodstuffs stay in the gut for more than 24 hours, significant putrefaction & anaerobic bacterial toxin formation will always result. Because of this, any degree of constipation is a substantial additional challenge to maintaining a healthy level of vitamin C and other antioxidants in the body, as many of the most potent toxins generated in a sluggish gut are equal in toxicity to those seen in chronic dental infections, like root canals and other chronically infected teeth. The regular ingestion of sodium ascorbate also assures a regular uptake of vitamin C into the extracellular fluids and spaces of the body. Just as the liposome-encapsulated vitamin C targets the intracellular spaces the vitamin C powder continually supplies the extracellular areas while providing all of its other benefits in producing a healthy gut. Of course some of the extracellular vitamin C also eventually makes its way inside the cells as well, just not with the efficiency of oral liposome-encapsulated vitamin C.

2.) Ascorbyl Palmitate

As discussed in greater detail above, ascorbyl palmitate is a unique form of vitamin C that is fat-soluble rather than water-soluble. As such, this allows the antioxidant effects of vitamin C to reach areas normally not as readily accessible to regular water-soluble vitamin C.

4.) Intravenous Vitamin C (IVC)

IVC allows the administration of vastly higher doses of vitamin C than can be given by any other route. It results in very high concentrations in the blood and extracellular fluids. It also eventually increases intracellular vitamin C levels as well, even though energy consumption is required to achieve this (see above). Although all forms of vitamin C have been documented to have potent anti-toxic and antimicrobial properties, a very large body of scientific evidence collected since the early 1940's has shown that properly dosed and administered IVC can result in a degree of toxin (poison) neutralization and infection resolution that simply has not been rivaled by any other agent.

It is also important to emphasize that vitamin C need not be used instead of other traditional agents for combating toxins and infections, as it works well along with any other traditional measures used for these conditions. However, the evidence does clearly show that vitamin C works better as a monotherapy than any other single agent that modern medicine has to offer.

Another parenteral (non-oral) application of vitamin C that is little used today but that can be highly effective in certain situations is the intramuscular route. Frederick Klenner, MD, who singularly pioneered the field of the effective clinical applications of vitamin C, would often use intramuscular injections in young patients who were not optimal candidates for taking anything intravenously or for ingesting sufficient quantities of anything orally. Regarding the intramuscular injection of vitamin C, Dr. Klenner had the following to say:

> "In small patients, where veins are at a premium, ascorbic acid can easily be given intramuscularly in amounts up to two grams at one site. Several areas can be used with each dose given. Ice held to the gluteal muscles until red, almost eliminates the pain. We always reapply the ice for a few minutes after the injection. Ascorbic acid is also given, by mouth, as followup treatment. Every emergency room should be stocked with vitamin C ampoules of sufficient strength so that time will never be counted —as a factor in saving a life. The 4 gram, 20 c.c. ampoule and 10 gram 50 c.c. ampoule must be made available to the physician."

It should also be noted that they typical injection used by Dr. Klenner was sodium ascorbate or ascorbic acid buffered with sodium bicarbonate, not just straight ascorbic acid. Additionally, great care needs to be taken to ensure that the entire injection is intramuscular, with none of it in the loose subcutaneous tissue. Whether by misguided intramuscular injection or by an infiltrated intravenous infuscion of vitamin C, subcutaneous placement of any amount of vitamin C is enormously painful, often for up to an hour or so before resolving. While no damage is done by a subcutaneous infiltration, the pain is significant enough that the patient might not be so willing to permit future vitamin C infusions or injections.

A suggested formula for intramuscular injections would be:

- 2 cc of vitamin C (500 mg/cc)
- 1 cc of sterile water,
- 0.5 cc of 8.4% sodium bicarbonate
- 1 cc of 2% procaine

(formula courtesy of Jason West, DC, NMD)

This makes a total volume of 4.5 cc, half injected into each buttock. While Dr. Klenner gave 2 grams rather than 1 gram at each injection site, this protocol eliminates any significant pain resulting from these injections.

Practical IVC Considerations

In addition to how quickly vitamin C should be infused and how much should be given at a time, as discussed above, it is very important that the patient is completely comfortable and free of discomfort or pain in the process. Significant pain during the infusion of vitamin C, or any thing else for that matter, will reliably lead to phlebitis, or inflammation of the vein, if not promptly addressed at the time of the infusion. No matter how good a vitamin C-cen tered protocol might be it will do no little or no good if the patient becomes severely noncompliant in returning for continued IV infusions. Since it is clear that most patients will get their best clinical results with optimally-dosed vi tamin C versus other traditional therapies, it is important not to let the patient get to the point of refusing further IVC treatment.

It should first be emphasized that most patients have no problem with vitamin C infusions, tolerating them without any symptomatology of any kind. However, when significant discomfort appears during an IV infusion, the following factors should all be considered in making the infusion as comfortable as possible:

1) **Size of intravenous cannula, or infusion catheter.** A larger cannula inside a smaller vein can cause discomfort.

2) **Placement of cannula**. Even though a cannula might be completely inside the vein, demonstrating venous backflow when tested, pain can ensue when the angle of the cannula abuts directly against the side of the vein or when a venous valve is at the tip of the cannula. Oftentimes nothing will stop the pain except cannula removal with reinsertion at another site in the vein, with greater care to insert the cannula in as coaxial an alignment as possible.

3) **Size of the vein.** While some individuals can tolerate IV infusions in the tiniest of veins, many cannot. The largest vein available should always be chosen except when it is already known that smaller, more distal veins tolerate the infusion well, as in a larger man with substantially-sized veins on the back of the hand. Ifthe patient is a smaller woman, or even a child, consideration should be given to having a central line placed if there appears to be no other way to get the amount of vitamin C infused at the rate desired and repeated infusions are clearly warranted for the condition.

4) **Rate of flow**. Many individuals tolerate a slower infusion perfectly well, while always noticing increasing discomfort the more rapid the infusion becomes. Ifthis sensitivity is severe, consideration should again be given to the placement of a central line if deemed appropriate. Some patients will complain of discomfort and get relief when the infusion rate is slowed and then later not feel any discomfort when the infusion rate is once again increased. Whatever the physiological reason is, it appears that the vein can show increased tolerance the longer it is exposed to the vitamin C infusion. Minimal discomfort can often be alleviated with cold (or even hot!) compresses gently applied and held over the infusion site.

5) Concentration. When a large enough vein cannot be found for infusion without significant discomfort a more dilute infusion of vitamin C is usually warranted.

6) **Temperature of the infusion solution**. Making sure the infusion solution is close to body temperature during the administration period can prevent a substantial amount of discomfort from ever developing in the first place. Many offices are quite cold and the IV solutions often tend to be room temperature, or less. One or more refrigerated vitamin C vials should be pre-warmed in a room temperature bag. To minimize any degradation (oxidation) of the vitamin C place the IV bag in hot water for 10 to 15 minutes before adding the vitamin C. The vitamin C vial can similarly be warmed immediately before being added to the IV bag.

7) **Presence of other solutes**. Generally, it is best to infuse vitamin C and nothing else. While other agents can be added, it is important not to blame the vitamin C for discomfort in the IV when something else is at fault.

8) **pH of the infusion**. The more acidic an infusion is the more likely it will hurt. A pH of 7.0 to 7.4 is ideal, and it is characteristically reached when sodium ascorbate powder is put into solution in sterile water. When ascorbic acid is used it must be buffered with sodium bicarbonate. Vials of ascorbic acid buffered with sodium bicarbonate are available but they are generally buffered only to be somewhere in the range of pH 5.5 to 7.0. For the exceptionally sensitive patient, pH test paper should be utilized to make sure pH is in the optimal range and more sodium bicarbonate should be added to the infusion if necessary to get into that range.

9) **Nature of carrier solution**. Generally it is best to infuse vitamin C mixed in sterile water. While DSW, normal saline, or lactated Ringer's solution can be used, it is best to stick with vitamin C in sterile water, buffered as close to a pH of 7.0 to 7.4 as possible. DSW should really never be used, since it puts more glucose into the blood at the same time as the vitamin C and it prevents the maximal amount of vitamin C from getting into the cells, since glucose and vitamin C use the same mechanism for entering the cells.

10) **Presence of persistent or severe pain**. Any extravasation, or leakage, of vitamin C outside of the vein and into the subcutaneous tissue is severely painful, usually persisting for an hour or more before dissipation is complete. Sometimes the cannula can move back out of the vein transiently and a little leakage will take place. When the cannula comes completely out of the vein it will be obvious to the experienced practitioner.

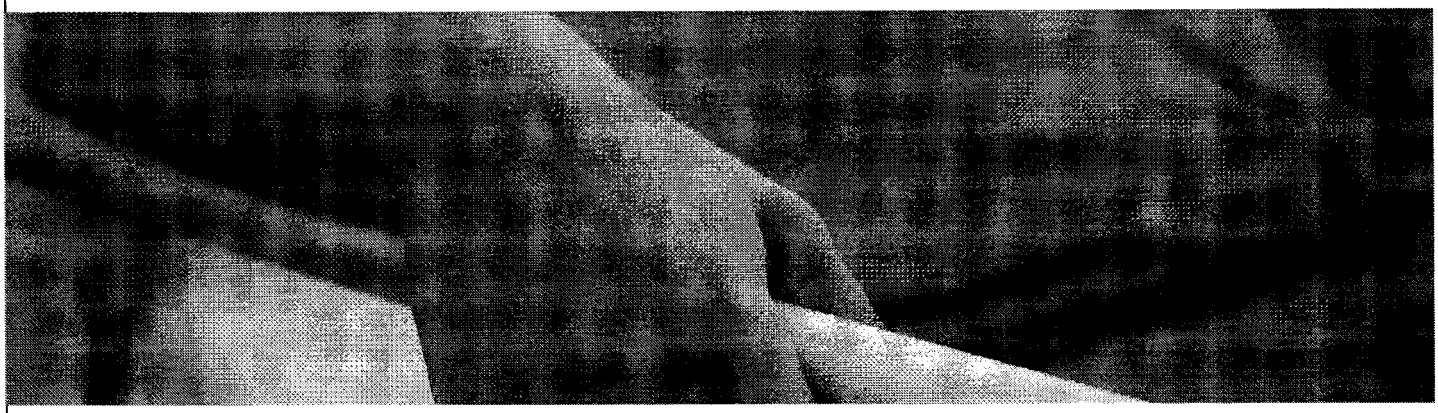
11) **Vitamin C-induced hypoglycemia**. Rarely, some individuals are so sensitive to the infusion of multigram amounts of vitamin C that they will demonstrate some hypoglycemia secondary to increased insulin release from the pancreas at infusion rates well below what most other patients tolerate easily. When any unexplained agitation, sweating, minimal disorientation, or increase in blood pressure occurs, be prepared to give some fruit juice orally or some glucose intravenously. Also, while very rare, an occasional individual, typically cachetic and poorly nourished in general, can have a delayed hypoglycemia reaction hours later at home. All patients should be encouraged to promptly eat after an infusion session is complete.

12) **Allergy-like reactions**. Technically the ascorbate anion should never cause an allergic reaction in anyone as it is a natural antioxidant molecule vital to health, as well as a substance that can be used to treat an allergic reaction. Nevertheless individuals may sometimes (rarely) demonstrate a rash and feel poorly.

When this occurs shortly after the IV is started a allergy-like reaction is likely and the IV should be stopped. Consideration should then be given to obtaining vitamin C from a different source. Corn is commonly a source, but beet and casaba are also sources. When the reaction occurs late in the IV or shortly after its conclusion a detoxification from the cells is more likely.

This type of reaction and how to deal with it is addressed below in the "Mop-Up Vitamin C" section. If different types of vitamin C, mixed in different carrier solutions, continue to produce the same effect, premedication with an injection of 100 to 250 mg of hydrocortisone will usually blunt or prevent the reaction. This is a one-time dose and further steroids should not be given following the infusion.

Mop-Up IVC



Many individuals, especially sicker ones with acute and chronic infections as well as substantial toxin accumulations in their bodies, will feel anywhere from minimally to substantially ill late during an infusion of vitamin C or directly following it. These exacerbations of illness have been called Herxheimer, or Herxheimer-like reactions. The first described Herxheimer reaction occurred when syphilis patients with a high pathogen load took their first injection of penicillin. The kill-off of the pathogens was so extensive that massive amounts of pro-oxidant dead pathogen-related debris was released into the blood as a result. The clinical result was a much sicker patient, at least in the short term, while the body processed and eliminated the toxic debris. Following an infusion of vitamin C these Herxheimer-like reactions can occur because of one or more of the following reasons:

1) Whenever an acute or chronic infection responds dramatically enough to the antimicrobial effect of vitamin C. This results in the release of toxic pathogen-related debris into the blood and lymphatics similar to the syphilis example above.

2) Whenever a legitimate detoxification occurs. When some individuals with longstanding and substantial accumulations of toxins inside the cells receive a high enough dose of vitamin C quickly enough, toxins are then mobilized out of the cells and flood the blood and lymphatics. Generally, this occurs only when toxin levels are so high that many of the natural enzymatic chelators and toxin mobilizers are themselves in an oxidized and relatively nonfunctional state. The massive administration then causes a big intracellular rise in vitamin C, the enzymes are repaired by reduction (electron donation) from the vitamin C, and the toxins are released in large quantities. It is very important to realize that detoxification is also retoxification, and many newly mobilized toxins are just as free to be redeposited anew somewhere else in the body as to be excreted via the urine or feces. Detoxification should never be deliberately done vigorously without the ability to sufficiently promote neutralization and excretion of those toxins after they are released from the cells.

3) Whenever a substantial quantity of cancer cells are rapidly killed via necrosis: When dosed and administered correctly, many different cancers will begin to resolve, often to the point of complete resolution. When a patient has a relatively large physical mass of cancer cells in their body this type of reaction is more likely to occur than when the collective cancer mass is small. This reaction can be very dramatic in some patients and several days may be needed for the patient to properly process and excrete the pro-oxidant debris. Of note as well, both cancer cells and most infectious agents have very large concentrations of reactive iron inside and the rupture of cancer cells and pathogens via vitamin C-fed mechanisms can quite abruptly release large amounts of reactive iron into the blood and lymphatics. Iron is highly toxic (pro-oxidant) when concentrated in its unbound, reactive form.

The Mop-Up vitamin C infusion, at first, might seem paradoxical. That is to say, the very same agent (vitamin C) that caused the blood of pro-oxidant debris into the blood and lymphatics is also the very same agent best suited to deal with that. The trick is in the amount of vitamin C infused and the rate at which it is infused.

All three of the types of pro-oxidant reactions noted above share one thing in common. Namely they needed large amounts of vitamin C given quickly to become manifest. However, at the termination of such an infusion a "Low & Slow" follow-up infusion of vitamin C at 25% or less of the initial amount given, infused over two hours or more, will readily "mop-up" much or all of the pro-oxidant debris released by the larger rapid infusion.

The mop-up infusion does not significantly worsen the pro-oxidant release because of its low concentration and slow rate of infusion. However, it does very effectively neutralize the toxins already released while they are circulating in the blood and lymphatics. While the figures are not precise, this would mean that someone who was feeling well at the outset of a 50 gram infusion of vitamin C but began feeling poorly after the completion of the infusion in about one hour, should then receive about 12.5 grams of vitamin C infused over another two hours.

While most pro-oxidant debris release scenarios occur when stimulated, as with a vitamin C infusion it also important to appreciate what is going on in a patient with an extended, chronic detoxification process. For example, when an older patient has an exceptionally large amount of stored toxins in the body the stage is set for a chronic release of toxins when enough other things occur. The relatively abrupt initiation of a quality supplement regimen, especially when accompanied or preceded by a removal of ongoing sources of toxin exposure, as from dental infections like root canals, can result in enough of a reactivation of natural detoxification enzymes inside the cells that a chronic detoxification results. As such, the patient can begin to feel poorly a greater percentage of the time the less the antioxidant capacity of the body is supported.

Just as with the acute pro-oxidant debris release scenario, the chronic one is readily dealt with by the same "Low & Slow" vitamin C infusions, with a good clinical response typically realized. However, many chronic detoxi-fications can take months or sometimes years before the individual truly feels well, so experimentation must take place with finding the best amounts of vitamin C to take orally that will neutralize the pro-oxidant products of detoxification without significantly further stimulating their release from the cells.

Another especially important consideration about the Mop-Up vitamin C infusion is that is allows the healthcare practitioners to push vitamin C doses higher than might have been possible otherwise. As long as a patient feels good by the time they leave the office they will generally come back for more treatment, even if they were a bit symptomatic toward the end of the initial infusion. Mop-Up vitamin C, then, is a tool that allows a large group of patients that could otherwise only tolerate substantially lower doses of vitamin C to push their doses into a range that will produce even more positive clinical outcomes that were not otherwise attainable.

Recap

All infections, all toxin exposures, and all chronic degenerative diseases will benefit some and often greatly from properly dosed and administered vitamin C. The different forms of vitamin C and the various ways to give it offer a wide range of treatment possibilities, capable of being appropriately individualized for optimal clinical response.

The new concept of Mop-Up vitamin C now allows the vitamin C practitioner to push the therapeutic envelope to previously unattainable levels. Utilized properly, vitamin C-centered protocols have already gone and will continue to go where no protocols have gone before.