

Info about Vitamin C Therapy

Read Dr. Levy's book called Curing the Incurables to learn more about the efficacy and safety of doing vitamin C therapies.

Read Dr. Humphries article about the Vitamin C protocol at this link:

<http://drsuzanne.net/2017/10/sodium-ascorbate-vitamin-c-treatment-of-whooping-cough-suzanne-humphries-md/>

(I'd simply give the person as much vitamin C powder as they can tolerate (until they get loose bowels and then back down some and continue giving them doses of vitamin C throughout the day.) Either ascorbic acid or sodium ascorbate can be used.) (I may also give them 1-3 packets of Lypo-C packets from LivOn labs per day.)

To follow the protocol, the following amounts of vitamin C are suggested:

Weight in Pounds	Amount of Vitamin C per Day
20 Pounds	1,700 – 3,400 mg
30 pounds	2,500 – 5,000 mg
60 pounds	5,000 – 10,000 mg
75 pounds	6,500 – 13,000 mg
100 pounds	8,500 – 17,000 mg
125 pounds	10,000 – 20,000 mg

(In divided doses throughout the day – up to bowel tolerance level.)

Liposomal Technology and Intracellular Bioavailability

From Dr. Thomas Levy's Book, *Curing the Incurable*

Summary

Many researchers in numerous different studies have clearly established that vitamin C is one of the safest supplements or nutrient substances that can be taken. Multigram doses of vitamin C taken daily over a period of years are virtually devoid of any side effects. Furthermore, even very high oral (200,000 mg) and intravenous (300,000 mg) doses of vitamin C over a 24-hour period have also been shown to be safe.

One of the biggest misunderstandings and ongoing misrepresentations about vitamin C is that it might place a normal person at a greater risk of developing kidney stone disease. Multiple large studies have clearly shown this concern to be completely without any basis. To the contrary, vitamin C probably lessens the incidence of kidney stones in the populations of people who supplement it regularly. Although vitamin C is known to be a contributor to the production of oxalate, which is a principal ingredient in most kidney stones, more than 50 other risk factors in addition to vitamin C have been identified for developing this type of stone disease. In patients with chronic kidney insufficiency and failure, however, vitamin C supplementation must be conservative and closely monitored. It should be added that this same concern applies to

monitoring the other risk factors for stone disease, which will also become more problematic as kidney function declines. An analysis of a typical research report relating vitamin C and kidney stone formation showed that many risk factors other than vitamin C are usually present, even though the many other potential risk factors do not appear to have been considered by the authors.

Vitamin C has been documented to occasionally promote prooxidant activity in addition to its regular role as a powerful antioxidant. The prooxidant properties are found most commonly in test tube, or *in vitro*, studies. However, the presence of catalytic metals with a low enough concentration of vitamin C can result in prooxidant activity, even inside the body. Generally, however, larger doses of vitamin C protect against any possible damage that could result from focal sites of prooxidant activity, rendering this entire issue as primarily only a theoretical concern.

Because of the potential prooxidant activity of vitamin C in the face of catalytic metals, diseases that feature iron excess require careful evaluation and supplementation. Once again, using larger rather than smaller doses of vitamin C is usually a practical solution for many such patients.

G6PD deficiency, in at least a handful of reports, appears to precipitate a hemolytic crisis in the blood when vitamin C is given at a certain dosage level. From a practical standpoint, however, the very limited number of reports in light of the widespread incidence of this disorder and the widespread administration of vitamin C suggests such hemolysis is quite rare. Minimizing or eliminating vitamin C supplementation if the patient is G6PD-deficient is not necessarily in the best interests of long-term health. Testing for this disease is still appropriate so that any potential problems after initial vitamin C supplementation can be anticipated and properly monitored.

Vitamin C is an especially effective supplement for most cancer patients. The vitamin C is generally well-tolerated, and most cancer patients positively respond to this treatment. A limited number of case reports suggests that the daily vitamin C dosage for cancer patients should be built up gradually before proceeding directly to high-dose

supplementation. Cancer patients who take laetrile may be at a theoretical risk of increased cyanide exposure. However, this has not been clearly demonstrated to be of clinical concern, especially when larger doses of vitamin C are regularly supplemented.

Regular high-dose vitamin C therapy over an extended time seems to induce more enzyme activity, which helps to metabolize the greater vitamin C presence. A sudden stopping of significant long-term supplementation can drop vitamin C levels significantly lower than normal for a few days. Practically, this is of little concern unless someone is acutely hospitalized and in need of greater doses of vitamin C at a time when vitamin C levels are dropping lower than normal.

Transplant patients definitely need vitamin C supplementation for optimal health and optimal organ graft function. However, whether extra-high doses of vitamin C for prolonged periods of time could stimulate immune function to more readily reject transplanted organs remains only a theoretical possibility. It is yet to be proved but worthy of clinical consideration on an individual basis.

References

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Chapter Five

Liposome Technology and Intracellular Bioavailability

*Real knowledge is to know the extent
of one's ignorance.*

CONFUCIUS (551-479 B.C.)

Overview

Since Frederick Klenner, MD established the enormous therapeutic utility of vitamin C in a wide variety of diseases and medical conditions, the added clinical benefit of intravenous administration over all other routes of administration became readily apparent and increasingly indisputable over time. Patients with diseases resistant to oral vitamin C administration repeatedly demonstrated dramatic responses to vitamin C given intravenously. Indeed, the intravenous administration of vitamin C rapidly established itself as the "gold standard" of vitamin C treatment modalities. Similarly, the technique of intravenous administration, in general, has long been considered the optimal way to deliver virtually any drug or nutrient into the body. It has always been intuitively reasoned that the delivery of a drug or nutrient directly into the bloodstream had to be the most beneficial and effective form of administration.

Although still little known to many active health care practitioners, the science of liposome technology initially emerged in the 1960s (Bangham et al., 1965) and has continued to be refined in its scientific development and practical clinical applications over the last 40 years or so (Gregoriadis, 2007). The huge potential of this exciting technology is only really beginning to be appreciated now. In a nutshell, the oral administration of liposome encapsulated nutrients and drugs has many defined and unequivocal advantages over their intravenous administration. Why this technology may someday soon make many intravenous therapies effectively obsolete or at least secondary forms of administration will be addressed in the rest of this chapter.

The Liposome

Liposomes are microscopic spheres of phospholipids that are stable in water and able to contain water-soluble substances (Walde et al., 1990; Walde and Ichikawa, 2001). Simplistically, a conventional liposome is structurally similar to many of the cells in the body. Phospholipids, particularly phosphatidylcholine, are prominent components of both natural cell walls as well as liposome walls. When phospholipids are placed in a water environment, they naturally form these liposomal spheres spontaneously, similar to when oil is put in water. This occurs because a phospholipid is a long molecule with a water-soluble (hydrophilic or water-seeking) end and a fat-soluble (hydrophobic or fat-seeking) end. The fat-seeking ends are driven to avoid the water and to clump together, resulting in the natural formation of a membrane that is comprised of the fat-seeking ends of the phospholipid molecules on the inside and the water-seeking tails of the molecules facing to the outside. This membrane then naturally collapses into many tiny spheres containing the water in which it was formed. Depending on what is already dissolved in the water when the phospholipids are added, any of a wide variety of substances can be encapsulated in liposomes.

Liposome Characteristics (Conventional)

The basic, unmodified (“nontargeted”) liposome has certain characteristics making it an extraordinarily useful tool for the efficient and typically nontoxic administration of a wide variety of drugs and nutrients. These characteristics include the following:

1. Excellent absorption after oral administration. Regardless of the substance encapsulated in the liposomes, an excellent absorption into the blood, or lymph, can be expected (Ling et al., 2006).
2. Protection of the encapsulated substance from digestion or degradation. Until the substance is released from the liposome, it will remain largely inert to its environment inside the body. The substance will not be broken down or metabolized by enzymes in the gut or in the blood, and the substance will exert none of its chemical/biological effects while inside the liposome. For substances with a deliberately toxic profile, like cancer-killing agents, much less clinical toxicity can be expected because of these liposome properties.
3. Supplemental value of the lipid content of the liposome by itself. The typical unmodified and unloaded liposome contains a large amount of phosphatidylcholine (PC). PC and its closely related components appear to have a multitude of different positive effects even when given alone. These effects include the following:
 - a. Antioxidant (Das et al., 2007)
 - b. Anti-atherosclerotic (Altman et al., 1980; Levy, 2006)
 - c. Cholesterol-lowering (Mastellone et al., 2000)
 - d. Tissue protection from ischemia (Aabdallah and Eid, 2004; Demirbilek et al., 2006)
 - e. Treatment and prevention of liver disease (Lieber, 2004; Buang et al., 2005; Lamireau et al., 2007)
 - f. Treatment and prevention of cell membrane damage (Lubin et al., 1972; Demirbilek et al., 2004)

- g. Protection against pancreatic damage (Lee et al., 2003)
 - h. Protection against gallstone formation (Kasbo et al., 2003)
 - i. Vital role in the metabolism of the nucleus and its membrane (Albi et al., 2008)
4. Deep intracellular access. The similarity of the liposome membrane to the cell membranes in the body allow absorption/passage of the liposome to the intracellular space (cytoplasm), as well as into structures within the cells, such as mitochondria (Yamada and Harashima, 2008), endoplasmic reticula, and even the nuclei (Rawat et al., 2007).
5. Absorption without energy consumption. An unmodified liposome can result in the absorption of a substance from the gut into the blood, and from the blood into the cytoplasm and organelles within the cells, in an *energy-sparing* way. Many large molecules require energy-consuming, active membrane transport mechanisms for intracellular access (Baumrucker, 1985). For even a relatively small molecule like vitamin C, much of its delivery from the blood into the cells – in both its active form and its oxidized (dehydroascorbate) form – requires the expenditure of cellular energy (Goldenberg and Schweinzer, 1994; Puskas et al., 2000; Liang et al., 2001; Wilson, 2005). In addition cellular energy (as glutathione) must ultimately be spent, or oxidized, to restore the dehydroascorbate form of vitamin C to its active, reduced state inside the cell (Meister, 1994). This is especially inefficient since the function of vitamin C as an antioxidant is to deliver electrons, not deplete them. However, when vitamin C is given in its most common forms (not in liposomes), the ultimate goal of increased intracellular levels of active vitamin C requires the depletion of other antioxidants to be achieved.

6. Greater uptake by macrophages (scavenger cells) relative to other cells. When the encapsulated substance is a potent antioxidant such as vitamin C, the function of these important immune cells can be enhanced.
7. Distribution throughout the body. This is a feature of the unmodified liposome. Such a property is highly desirable when the encapsulated substance is a nutrient that is useful to all the cells of the body. Liposome modifications can be introduced that can target certain cells, such as cancer cells, with encapsulated drugs that are highly toxic and not desirable for distribution throughout the body. Many modifications to liposomes can be introduced, including the following:
 - a. Encapsulated contents
 - b. Size
 - c. Surrounding membrane thickness (multilamellar)
 - d. Type of phospholipids in the membranes
 - e. Membrane-entrapped drugs or substances (fat-soluble)
 - f. Membrane-attached immunoglobulins, protein antigens, antibodies, or polyethylene glycol (PEG) [surface-modified] (Cattel et al., 2004; Schnyder and Huwyler, 2005)
 - g. Sensitivity to pH
 - h. Positive charge (cationic liposomes)

A Unique Marriage: Liposomes and Antioxidants

A wide variety of antioxidant and nutrient substances have already been effectively administered therapeutically and in research models with the use of liposome technology. These include, but are not limited to, the following:

1. Vitamin C (Hickey et al., 2008)
2. Vitamin E (Yao et al., 1994; Wu and Zern, 1999)
3. Vitamin A (Lee et al., 2002; Sato et al., 2008)

4. Beta carotene, carotenoids (Chen and Djuric, 2001; Socaciu et al., 2002; Pinteau et al., 2005; Gouranton et al., 2008)
5. Glutathione (Wendel, 1983; Rosenblat et al., 2007; Mirahmadi et al., 2008)
6. L-cysteine (El Kateb et al., 2008)
7. N-acetylcysteine (Hoesel et al., 2008)
8. Superoxide dismutase (Chan et al., 1987; Imaizumi et al., 1990; Nakae et al., 1990)
9. Silibinin, silymarin (Maheshwari et al., 2003; El-Samaligy et al., 2006)
10. Adenosine triphosphate [ATP] (Chapat et al., 1991; Puisieux et al., 1994; Konno et al., 1996; Verma et al., 2005; Korb et al., 2008)
11. Quercetin [flavonoid antioxidant] (Sarkar and Das, 2006; Mandal et al., 2007; Rivera et al., 2008)
12. Rutin [flavonoid antioxidant] (Goniotaki et al., 2004; Xi and Guo, 2007)
13. Catalase (Yoshimoto et al., 2006; Jubeh et al., 2006)
14. Coenzyme Q10 [ubiquinone] (Verma et al., 2007)
15. Resveratrol (Caddeo et al., 2008)
16. Melatonin (Dubey et al., 2007; Dubey et al., 2008)
17. Combination antioxidants [carotenoids and glutathione] (Junghans et al., 2000); [vitamin C and vitamin E] (Waters et al., 1997)

The above list, which is but a minimal sampling of the wide array of such substances that can be administered to the body in a liposomal form, is reflective of the enormous potential utility of this type of drug/nutrient delivery system.

Intravenous Impact with Oral Administration

Vitamin C is an ideal substance for delivery by the basic, nontargeted liposome technology. Already documented to deliver roughly twice the maximum amount of vitamin C to the blood previously be-

lieved to be possible with other more "traditional" forms of oral vitamin C (Hickey et al., 2008), the clinical impact of liposome encapsulated vitamin C appears to exceed even the clinical impact of intravenous vitamin C. It would appear that the ability of liposomes to deliver their contents inside the cells, often without the consumption of energy (electrons) in the process, makes this intracellular bioavailability of the encapsulated substance to be superior to even intravenous infusion.

While the 100% delivery of something directly into the blood offers a tremendous advantage over all known forms of oral administration, intravenous infusion of any substance does not assure a direct, non-energy-depleting, access to the inside of cells, which is where the "sickness" is in most ill individuals. However, this is not to suggest that intravenous vitamin C is not highly beneficial and should never be used. Much of the incredible information and research in this book clearly attests otherwise. Because of this, a sick, possibly toxic, individual is best advised to receive vitamin C by both the oral liposome encapsulated route and the intravenous route whenever possible. These two routes of administration work synergistically in optimizing the antioxidant capacity for treating a given condition. However, given the choice of only one or the other, adequately dosed oral liposome encapsulated vitamin C will prove to be clinically superior to intravenous vitamin C in most instances.

When the condition is very acute and largely contained in the blood, as with an acute intoxication such as a venomous snakebite, an intravenous infusion may well prove to be superior to any oral preparation, liposome-based or otherwise. However, the emphasis is on the immediacy of the clinical situation, as snakebite toxins will likely prove to be more responsive to the liposome encapsulated vitamin C after they have entered the cells and poisoned them from within. Given together, however, intravenous vitamin C and oral liposome encapsulated vitamin C are proving to be a combination that would have even made Dr. Klenner envious.

The dosing of oral liposome encapsulated vitamin C is approached in the same empirical manner that Dr. Klenner used on all of his patients. As the liposome encapsulated vitamin C is absorbed very rap-

idly when taken on an empty stomach, additional dosing can follow the initial dosing by as little as 30 to 60 minutes in the pursuit of a satisfactory clinical response. This is similar to the initial time frame of clinical response seen with intravenous dosing. When it is clear that the patient is responding positively and the clinical condition is clearly resolving, dosing may be maintained at the same frequency without further increase in dose amount. As with all vitamin C and antioxidant therapy, never discontinue therapy for at least 24 to 48 hours after the condition of the patient is felt to be completely cured or resolved. This is especially the case with rapidly evolving viral diseases. As with all other forms of vitamin C therapy, a poor or inadequate clinical response to liposome encapsulated vitamin C is best approached with a more vigorous and protracted dosing schedule.

Summary

Drug delivery systems utilizing liposome technology are revolutionizing the medical therapies for a variety of different medical diseases and conditions, although they still remain enormously overlooked or neglected. The biochemical characteristics of liposomes allow ready intracellular access for their encapsulated substances. The clinical responses of infected and toxic patients with adequate amounts of oral liposome encapsulated therapy, particularly vitamin C, are even often surpassing the clinical responses seen with intravenous therapies. In the case of vitamin C, the difference can be dramatic. A much smaller oral dose of liposome encapsulated vitamin C (5 to 10 grams) often results in a clearly superior clinical response than a much larger dose of vitamin C given intravenously (25 to 100 grams). Of course, when a critically ill individual has access to both intravenous and liposome encapsulated forms of therapy, it is best to take both. However, intravenous therapy is time-consuming, expensive, and of limited availability to many people. It is also associated with occasional but significant side effects (for example, inflamed veins or infection at the site), and it is often uncomfortable or even painful during administration. Liposome encapsulated vitamin C can now extend the amazing benefits of properly-dosed vitamin C to very many more people than ever before.

Vitamin C Case Studies

JAMES M. NORTHINGTON, M.D., Editor VOL.CIII APRIL, 1951 No. 4

Massive Doses of Vitamin C and the Virus Diseases F. R. KLENNER, M.D., Reidsville, North Carolina T has been reported that one of the mold-derived drugs, in addition to being a good antibiotic, is a super-vitamin Conversely, we argue that vitamin C, besides being an essential vitamin, is a superantibiotic. Vitamin C in vitro, if maintained at body temperature, inactivates certain toxins at an unbelievable rate. Five parts per thousand of vitamin C with toxins and appropriate controls, incubated at 37° C. for 48 hours showed when tested on mice the minimal lethal dose for the control tubes to be 1 16,000 c.c., while that from the mixture of vitamin C and toxin was only 1/1,000 of a c.c. (Klegler, Guggenheim, Warburg, 1938). In this study the loss of vitamin C in toxin broth and ordinary broth controls followed a constant pattern: the loss, however, was always greater in the toxin broth tube. The difference between the rate of disappearance of vitamin C in toxin and ordinary broth was more striking the greater the concentration of vitamin C. It is. Therefore, reasonable to conclude that the degree of neutralization in a virus infection will be in proportion to the concentration of the vitamin and the length of time in which it is employed.

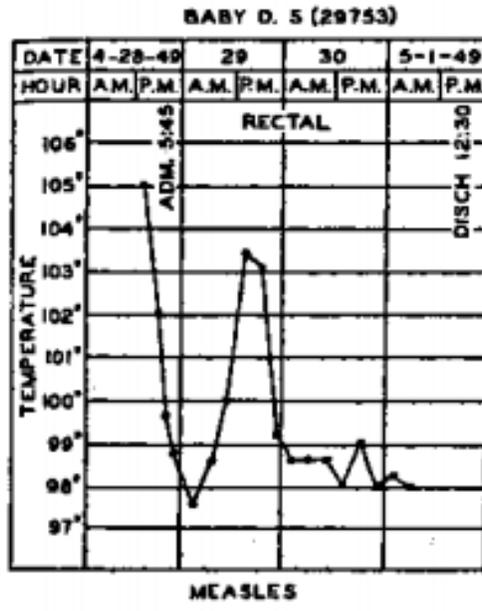
Since it has long been known that the virus organism resembles more the toxins and ferments than the common animate causes of disease, it would seem plausible that the detoxication effected Presented in the Fifty-second Annual Meeting of the Tri-State Medical Association of the Carolinas and Virginia. held at Columbia, February 19th and 20th, 1951. by vitamin C is produced by a direct combination of the vitamin with the toxin and/or virus, this followed by the oxidation of the new compound which destroys both the virus and/or toxin and the vitamin. This destruction of the virus by oxidation has been concurred in by many investigators. Since vitamin C is an integral part of the oxidationreduction system of the body, its function in the role of an antibiotic becomes intelligible. To appreciate the antagonistic properties of vitamin C against the virus organism and the chemical ferments of exotoxin-producing microorganisms, one must forget its present academic status as a factor essential for life. A cow is valuable to the farmer not only for her ability to produce milk, but also as a source of organic fertilizer. Vitamin C, likewise, is important, not only as a detoxifying agent, as a catalyst aiding cellular respiration by acting as a hydrogen transport, as a catalyst in the assimilation of iron, and as a conservator of collagen fibers and bundles in tissues of mesenchymal origin; but, also, because of its function as a reducing agent or the precursor of such a substance. In this latter capacity it fulfills the requirements of an antibiotic. A striking phenomenon of vitamin C is the similarity of response, whether to correct pathologic processes due to a deficiency of this compound, acting as a vitamin; or to destroy the ferments of microorganisms, acting as an antibiotic.

Within a few hours after institution of adequate vitamin C therapy to correct an avitaminosis, hisl 102 MASSIVE DOSES OF VITAMIN C & VIRUS DISEASES—Klenner April, 1951 tological evidence of bone improvement is obtainable Fibroblasts begin to form normal connective tissue and capillary buds are invading hemorrhagic areas (Youmans, 1941). Similar is its dramatic antibiotic action, the rule being clear evidence of clinical response within a few hours.

The purpose of this paper is to present clinical proof of such action for this vitamin.

Case Histories I

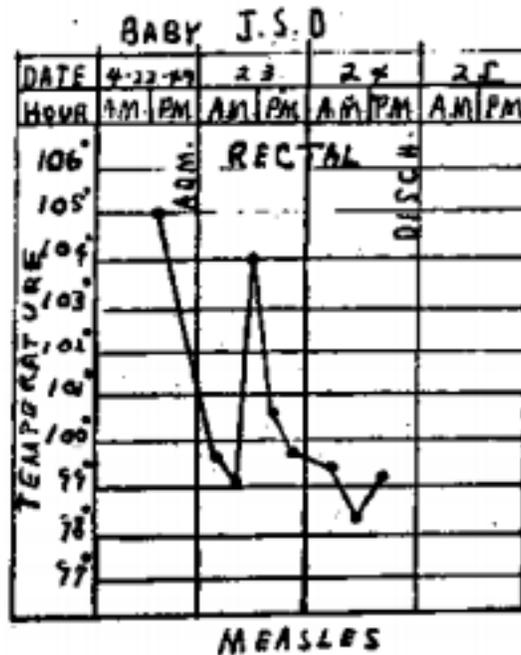
Case I is one of premeasles in a ten-months-old baby. The term "premeasles" is adopted to express the syndrome of fever, redness of eyes and throat, catarrh, spasmodic bronchial cough and Koplik spots. Vitamin C, 65 mgm. per Kg. of body weight, was injected intramuscularly every four hours. The fever dropped from 105 to 97.6° F. within 12 hours. All symptoms showed marked clearing. This sudden drop in the fever was thought to be explainable on one of three grounds: 1) Common right drop. 2) Due to the antibiotic action of vitamin C. 3) Even if the vitamin C administration had been continued, possibly a moderate rise would have occurred in the late afternoon of the second day, granting a highly virulent organism and a poorly resisting host. To determine which of these deductions was valid, vitamin C was discontinued for a period of eight hours. At this point the rectal temperature was back up to 103.4. Vitamin C therapy was resumed and instead of the expected 8 P M. climb, the temperature was down to 99.2 (R) eight hours later. The vitamin C injections were continued, the baby made an uneventful



recovery and was discharged 60 hours following admission. No measles rash developed. Eighteen months have elapsed since this illness and the child has not had clinical measles. This is not due to the establishment of active immunity but to the lack of a second exposure.

Case Histories 2

Case 2 confirms the previous case. This case is that of a 22-months-old infant with symptoms identical with that just described. The same medication was followed; the same clinical course followed. Under parental pressure the child was discharged from the hospital within 36 hours, apparently well. Four days later the child's brother and sister broke out with measles, which ran the usual course, having received no specific therapy. Seven days later the 22-months child broke out with measles. This time vitamin C was not given. The case was judged as modified.

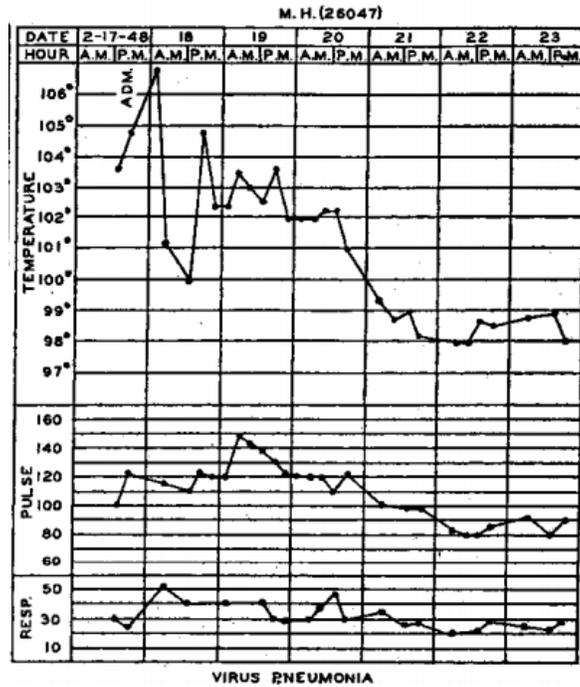


The response as observed in measles was characteristic for vitamin C versus virus infections. Two cases of virus pneumonia complicated by encephalitis were so unusual that case histories are given.

Case 3 Histories

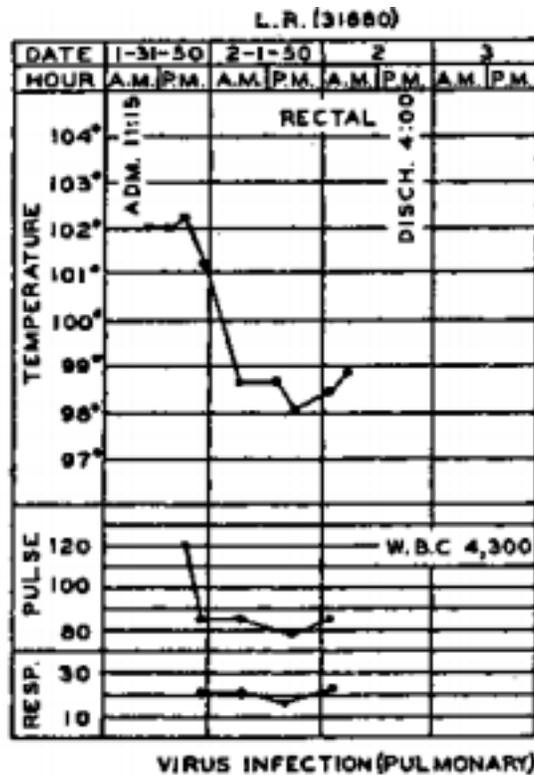
Case 3 is that of a colored woman, aged 28. with history (given by a relative) of chills and fever and chest and head cold for 14 days, severe headache for three days. In stupor when first seen, eye lids closed, a white foam at the mouth which she periodically tried to spit out. Temperature by axilla 106.8.

Dehydration was much in evidence, breath sounds diminished to absent, tactile fremitus increased over the entire right lung. The sulfa drugs, penicillin and streptomycin with supportive treatment had been exhausted. Four grams of vitamin C was given intravenously along with 1000 c.c. of 5 per cent dextrose in saline solution. Temperature dropped to 100 (Ax.) within 11 hours. Four hours later, vitamin C was resumed—every two to three hours, in dosage of 2 to 4 grams depending upon the response. After 72 hours the patient was awake, sitting up in bed and taking fluids freely by mouth. There was no fever at this time, nor for the remainder of the time in hospital. Vitamin C was continued for a period of two weeks; the frequency was cut to every 12 hours, two grams at a dose. An interesting complication was deafness; her speech gave a loud, monotonous, bell-sound effect. It was debated whether this was the result of the streptomycin or to the encephalitis. Prostigmin 1:2000, 1 c.c., and vitamin B1, 200 mgm., were given IM twice daily. On the tenth day of treatment the hearing suddenly returned to normal. The x-ray picture of the right lung was one of almost complete consolidation. Although the patient was clinically well of her pneumonia after 72 hours, the x-ray picture was not completely clear until 90 days later.



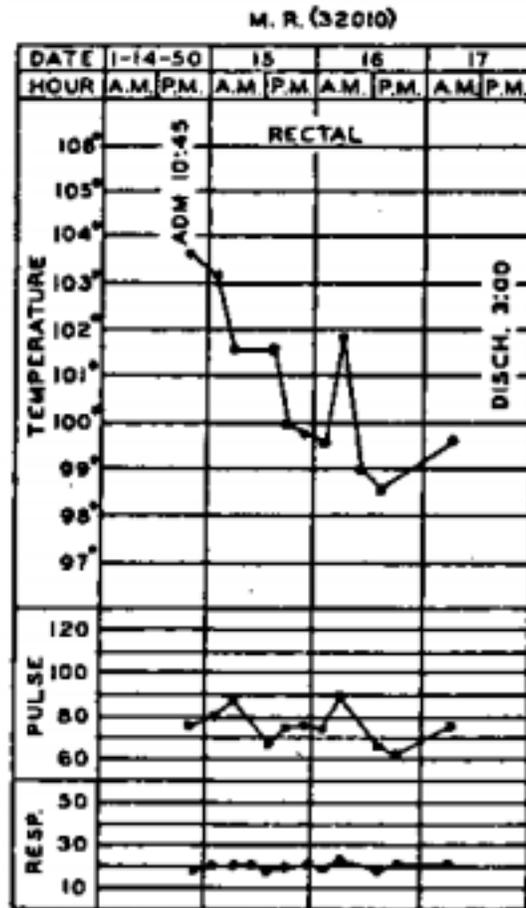
This phenomenon of Nature clearing the debris after killing out the virus organism was observed in five other cases. The time required was in direct proportion to the degree of pulmonary involvement. There is nothing new about this procedure; Nature merely duplicating a stage in the metamorphosis of the frog in getting rid of its tadpole tail.

Case Histories 4



In the case of the man, Case 6, the fever decline was after a modified step-ladder fashion. In this instance the amount of vitamin C injected was less than half of the recommended dose. The WBC was 5,850, admission urine sugar +++. Thirtyone grams of vitamin C was injected intravenously over a period of 60 hours. It is to be noted that the same amount of vitamin C (2 grams every four hours) was given to the boy and to the man, disregarding the factor of body weight. Had the man received four or five grams every four hours, or two grams every two hours, his hospital course would probably have followed the same pattern as that of the boy. A point of great interest was that at subsequent examinations the urine was consistently negative for sugar. The course in these cases emphasizes the necessity of administering

massive doses of vitamin C at frequent, regular intervals so as -to maintain the proper level of this antibiotic in the tissues.



VIRUS PNEUMONIA

(Administration of Vitamin C)

The amount of vitamin C for optimal effect will vary greatly with the individual. The type of the disease and the degree of toxemia are important guides in determining the dosage. Although the usual dose of vitamin C is calculated on the basis of 65 mgm. per Kg. of body weight, and given every two to four hours by needle, under certain conditions larger single injections can be used to good advantage. Vitamin C given to a child with measles, mumps or chickenpox will abort or modify the attack, depending upon the intensity of the treatment. If the activity of the pathogen is stopped, the development of active immunity will be interrupted. In handling these particular childhood diseases, when uncomplicated, the treatment should be aimed at modification of the infection as the plan of choice. To accomplish this end vitamin C should be increased to 250 mgm. per Kg. of body weight, and the injection given intramuscularly. It will be necessary, at .times, to repeat with half of this amount eight hours later. The vitamin was given in a concentration of 500 mg. per c.c. of solution. Pain was slight and lasted only a few minutes. Procaine, 0.5 to 2 per cent, instilled from a second syringe into the gluteal muscle through a placed needle just before giving the vitamin might solve this problem. The itch of measles and of chickenpox, the occasional vomiting of these illnesses, and the pain of mumps were

fully controlled within one hour, when 250 mg./Kg. body weight was used. Instead of repeating waves of macules in chickenpox, and the usual seven to nine days required for crusting, following the heavy modifying injection no new eruptions appeared and crusting was present within six hours. Further clinical studies may prove that the routine use of the higher dose (250 mg./Kg. body wt.) replacing the usual (65 mg./Kg. body wt.) is indicated in all virus infections and the results produced may be even more dramatic.

(Vitamin C and Poliomyelitis)

The greatest value of vitamin C in virus infections does not rest with these lesser kinds of diseases, some of which, e.g. measles, can be modified or prevented by the proper use of immune globulin. The value above all others is its positive action against the virus causing poliomyelitis. A report of this usage was published in the official journal of this association in 1949. Many physicians refuse to employ vitamin C in the amounts suggested, simply because it is counter to their fixed ideas of what is reasonable; but it is not against their reason to try some new product being advertised by an alert drug firm. It is difficult for me to reconcile these two attitudes. On the other hand, many physicians who have been willing to try vitamin C against the virus of poliomyelitis have obtained the same striking results as we reported. Scores of letters from practitioners here in the United States and in Canada could be presented in evidence. In some instances doctors have cured their own children of poliomyelitis by giving vitamin C and in other cases doctors themselves have been cured.

In poliomyelitis vitamin C performs three important functions: 1) It destroys the virus; 2) acting as the dehydrator and diuretic of first choice, it removes the edema fluid from the brain and the cord; 3) it preserves the lining of the central canal and maintains more regular spacing and less crowding of the ependymal cells (Altman). The pressure within the bony vault of the central nervous system resulting from the inflammatory process excited by the virus, acts as a haemostat to cut off the blood supply to the anterior horn cells. This compression of their vessels denies to the horn cells the essentials for function, for life even.

(Case Histories II)

It is of more than academic interest to review April, 1951 MASSIVE DOSES OF VITAMIN C & VIRUS DISEASES—Klenner 105 VIRUS PNEUMONIA the findings of McCormick in 50 confirmed cases of poliomyelitis in and around Toronto, Canada, during the epidemic of 1949. This report is that children of families eating brown bread who came down with poliomyelitis did not develop paralysis; whereas in those families eating white bread many of the children having poliomyelitis did develop paralysis. The point here is that brown bread has 28 times more vitamin B1 than does white bread Obviously, then, the paralysis which complicates acute poliomyelitis appears to be due to a B1 avitaminosis. Vitamin C by removing edema fluid relieves from pressure these vessels that supply nutriment to the horn cells, thus allowing the normal complement of vitamin B1 to reach these cells.

In December, 1949, a 5-year-old white girl was brought to my office with paralysis of both lower extremities of 4½ days' duration. The child had been ill for 12 days. There was complete flaccid paralysis of the right leg, 85 per cent paralysis of the left leg. Pain was directed to the knee and to the lumbar back. In hospital the diagnosis of poliomyelitis was confirmed by four consulting physicians. Spinal fluid

cells were 82. No medication of any type was given exclusive of vitamin C. Massage was started immediately. The rationale of using early massage had two bases: 1) In the course of general practice patients would give a history of having had poliomyelitis when a child and that their mother rubbed the paralyzed member day and night until function returned. 2) That paralyzed muscle was in profound shock and "artificial respiration" would maintain proper metabolism during the emergency phase. To the first injection of vitamin C there was definite response. After 96 hours the child was moving both legs. The flexion was slow and deliberate. She was discharged from the hospital at this time, vitamin C being continued by mouth—1000 mg. every two hours with fruit juice for seven days. On the 11th day of treatment the child was walking about the house, but her gait was slow and her posture was poor, being bent forward. Vitamin C was discontinued and vitamin B1 started—10 mg. before meals and bed hour—Carbonated drinks were encouraged for their sugar content and mild stimulating action. Nineteen days after starting treatment there was complete return of sensory and motor function which has persisted to this date.

A boy of eight years was brought to my office with a history of having had "flu" for a week, and four days previously having developed photophobia, conjunctivitis, sore throat, nausea, vomiting and a back-of-the-eyes type headache of such intensity that adult doses of aspirin had no effect. The boy was either rubbing his neck on the left side or holding his head between his hands, begging for something to relieve his pain. The fever was 104.4 (Ax.) He was tender in the lumbar region and he had a drawing sensation referred to the hamstring attachments at the knee. Two grams of vitamin C was given IV while in the office.

He was then sent to the local hospital where he received promptly a second injection of 2 grams of the vitamin, after which it was given every four hours. Six hours after commencing therapy the neck pain was gone, the headache completely relieved, he could tolerate the ceiling light, his eyes were dry and the redness clearing. Nausea and vomiting had disappeared, the fever was down to 100.6 (Ax.), and he was sitting up in bed in a jovial mood while he drank a carbonated beverage. He was discharged from the hospital after receiving 26 grams of the vitamin in a 48-hour period, clinically well. Vitamin C was continued by mouth, 1500 mg. every two hours with fruit juice for one week, then change was made to vitamin B1, 25 mg. before meals and bed hour. Vitamin B1 in these cases should be continued for a period of no less than three months as nerve tissue is slow in recovering from damage.

In using vitamin C as an antibiotic minor complications were occasionally seen. These fall into six groups:

- 1) Diarrhea in two cases. In each instance the preparation contained sodium bisulfate. The enteritis cleared on giving a preparation of vitamin C not containing this salt.
- 2) Induration in 42 cases—seen either immediately following the injection (allergy), or delayed. In the latter it was found that the injections were being given too close to the surface. Applications of warm magnesium sulfate as a compress gave prompt relief of the pain and swelling. In two of these cases fluctuation ensued and healing was effected by surgical drainage and the application of compresses. The impression in these two cases was that a vein had been opened by the needle. The exudate was dark and both the slide and culture studies were negative for bacteria.

- 3) Endothelial irritation in three cases. Acute pain radiated from the site of the injection to the shoulder. In each instance the concentration of the vitamin was one gram to each 5 c.c. solution and the amount given exceeded two grams. After slowing the rate of injection this reaction did not occur.
- 4) Venous thrombosis in one case. The concentration was 500 mg..per c.c. solution; the total dose 5 c-c. Compressing relieved the pain. The pathology was very similar to that following the use of 50 per cent dextrose solution.
- 5) Syncope—In maximum doses given IV a sensation of fainting and dyspnea occurred seven times. Five of these patients were over 55 years of age. The disagreeable symptoms were relieved by slowing the speed of the injections.
- 6) Rash—In three cases a pin-point dermatitis occurred, limited to the face and upper third of the torso, identical to that seen in infants taking orange juice. This did not necessitate discontinuance of therapy and cleared spontaneously several days after vitamin C was stopped.

Calcium, in vivo, duplicates the chemical behavior of vitamin C in many respects. Calcium gluconate and calcium lexulinate were used in conjunction with vitamin C therapy in a small series of pulmonary virus infections and in mild cases of influenza. There was a definite synergistic response. Patients with colds derived most benefit from this combined treatment. Because of its action on cardiac muscle, the use of calcium was limited to adults and the amount injected to two grams per day- One gram administered IV at moderate speed will so slow the heart as in many cases to produce syncope. If the concentration becomes great enough cardiac arrest in a tonically contracted state might result. It is, however, quite possible that, with the proper ionic balance of calcium and vitamin C in the same solution, larger amounts could be given without side effects. The massive dose schedule limits the usefulness of the calcium ion in virus diseases to that of an adjuvant only.

(Of Vitamin C and Hyperglycemia / Diabetes)

In all of the cases of virus infection reviewed in this study one laboratory finding stood out as of great significance. On admission to the hospital the first routine urine examination showed some degree of glycosuria. The pattern of the qualitative Benedict's reaction was constant enough to postulate that the higher the reading the more severe was the pathology. Repeat urine sugar studies following vitamin C therapy revealed complete clearing. This was true even though fruit juices were forced to tolerance. This finding confirmed the knowledge that interference with the normal physiology of the adrenal glands, either by the toxins produced by microorganisms or by surgery, has a profound influence on metabolism, especially of the carbohydrates. Adrenalin in the blood stream causes hyperglycemia with resulting glycosuria. Adrenalin acts either by stimulation of the sympathetic nervous system or directly via the blood.

This action of adrenalin is via the blood only, because the effect, as demonstrated in experimental animals, is still realized after destruction of the cord and sympathetic plexuses and degeneration of the peripheral post-ganglionic fibers (Evans, 1930). The glycosuria found in these cases was not due to a lowering of the threshold for sugar excretion by the kidney, paralleling a phloridzin diabetes, since the carbohydrate mechanism was associated with a hyperglycemia (Zuelzer, 1901, Metzger, 1902, Paton,

1903). Likewise there was no evidence of kidney damage. Albumin was reported negative and the microscopic examination showed no cells or casts. Apparently this is a condition of artificial diabetes mellitus, which would suggest the answer for the diabetic who loses ability to maintain sugar-insulin balance when embarrassed with an acute infection.

The story of a 7-year-old boy may have a lesson. He has been known to be diabetic since the age of four years. Any incident of infection in this lad produced an alarming interference of his sugar-insulin-diet equilibrium. Recently he contracted measles, and as the disease process developed toward its height the urine sugar curve swung sharply upward. From an occasional dose of 5 units regular insulin his requirement rose to 30 units regular insulin, three times each day, while still running a 3- or 4-plus Benedict's test. (Other forms of insulin proved by trial to be too dangerous.) At the peak of his infection vitamin C was started in a modifying dose of one gram every four hours. His general condition soon improved and in the course of several days he returned to his usual diet-insulin schedule and his usual urine sugar. In patients with diabetes, vitamin C should be discontinued just as soon as the temperature returns to normal. Prolonged use of vitamin C might prove undesirable due to its dehydrating and diuretic powers.

The pathologic process at work here is only compatible with abnormal amounts of adrenalin in the blood stream. It is not a response to an emotional stimulus to the adrenal medulla, since free adrenalin in the circulating blood has a transitory action, being so rapidly oxidized that none gets into the urine. This suggested that the regulator of the adrenalin mechanism had been removed, so that a constant supply of adrenalin would be present in the blood, making possible a concentration sufficiently high to cause constant vasoconstriction.

April, 1951 MASSIVE DOSES OF VITAMIN C 6- VIRUS DISEASES—Klenncr 107 Ritzmann (1909) found that adrenalin affected carbohydrate metabolism only when this vasoconstriction phase existed. This finding was concurred in by Lusk (1914), who further concluded that its action on blood vessels caused asphyxia of the tissues which tended to increase the acidity of the blood and the tissues. This superimposed acidity further promotes the production of adrenalin hyperglycemia (Peters and Geyelin, 1917). McDannell and Underbill (1919), studying these phenomena in rabbits, found that slight hyperglycemia could be controlled by the administration of sodium carbonate.

The rationale of forcing fruit juices in the old treatment of colds was based on this theory as postulated by Hawley et al. (1936) that a highly alkaline urine would have lower amounts of vitamin C than a highly acid urine; the alkaline ash from the organic acids serving to retain the vitamin C in the blood and tissues where Nature had assigned it to guard against the many enemies of the body—the toxins and ferments of bacteria. As a result of avitaminosis C, liver glycogen is mobilized—glycogenolysis; and further storing of sugar in the liver is prevented—glycogenesis (Mackenzie, 1917). To further enhance the hyperglycemia this vasoconstriction brings about a decrease in the pancreatic secretions by lessening the amount of blood passing through the gland (Mann and McLachlan, 1917).

That the adrenal glands and vitamin C are closely allied in the defense of the body has been proven by experimentation and by autopsy. In normal persons any excess of vitamin C is excreted in the urine. In persons suffering with an acute infection, particularly a virus infection, vitamin C is not only absent from the urine but is also missing from the blood serum. This is true even when moderate amounts are given intravenously. These observations on serum were made with a Klett-Summerson photoelectric colorimeter using the method described by Mindlin and Butler. The observations on the urine were

conducted according to the instructions of Goldsmith and Ellenger. Harde and Benjamin (1934-35) found the vitamin C fraction of the adrenal glands greatly reduced in monkeys killed or paralyzed by the virus of poliomyelitis. Yavorsky, Almoden and King (1934) reported identical findings in humans having died of various infectious agents.

(Vitamin C in Virus Diseases)

This gives us an important concept of the value of vitamin C in virus diseases. The explanation for the absence of vitamin C in the infectious states is that this agent joins with the toxin and/or virus to form a new compound which is then destroyed by oxidation. Since the body is dependent on food for vitamin C to meet its daily needs, it is obvious that the body tissues would soon be depleted, and we would expect to find evidence of a prescorbutic state in patients who had hypovitaminosis C. In patients seriously ill with a virus invader, the added strain on the capillaries by the application of a tourniquet, even for a few seconds, produced petechial hemorrhages at the site of constriction, since not all patients thus demonstrated this capillary weakness, all patients ill with a virus infection were investigated by the aid of a petechiometer. Increased capillary fragility was found to exist in all cases, and the number of petechiae as expressed in centimeters of mercury followed the urine sugar findings. This deficiency syndrome was reversed as the glycosuria cleared, indicating that both were responsive to a proper plasma level for vitamin C.

At this same time the anaerobic conditions in the tissues will be relieved by the catalytic action of vitamin C acting as a gas transport to aid this cellular respiration. The abnormal acidity of the blood and tissues will be removed and abnormal amounts of free adrenalin will disappear from the blood stream. Following this the constriction of the blood vessels will cease, allowing the liver and pancreatic tissue to return to normal function. Continuance of frequent injections of properly calculated doses of vitamin C will restore the normal physiology of the body. This is not all of the story.

Lojkin (1937), studying the various phases of the inactivation of crystalline tobacco mosaic virus by 1-ascorbic acid, suggested that the action was not due to reduced vitamin C nor to the irreversibly oxidized dehydroascorbic acid. Lojkin felt that it was due to a specific intermediate product which is formed in the course of the catalytic auto-oxidation of vitamin C, an action stimulated by the presence of copper ions. This intermediate product must be a peroxide because a peroxide is formed during copper-catalyzed oxidation of vitamin C. This peroxide is decomposed as rapidly as it is formed (Barrow, De Meio, Klemperer, 1935-36).

Lyman and associates (1937) confirmed the peroxide theory by observing that the oxygen uptake, beyond that calculated for the reaction ascorbic acid to dehydroascorbic acid, was not due to further oxidation of dehydroascorbic acid to an irreversible oxidation product, because treatment of the oxidized solution with hydrogen sulfide gave complete recovery of the ascorbic acid. These men also found that copper catalysis accelerates not only the reversible oxidation of vitamin C, but also further oxidation of dehydroascorbic acid. This action of the copper ion elucidates the findings that vitamin C in massive, frequent doses works better in the body than in a laboratory test tube.

Hippocrates declared the highest duty of medicine to be to get the patient well. He further declared that, of several remedies physicians should choose the least sensational- Vitamin C would seem to meet both these requirements.

NOTE: PubMed gives a different Volume -number compared with the one printed: Massive doses of vitamin C and the virus diseases. South Med Surg. 1951 Apr;113(4):101-7. No abstract available. PMID: 14855098 [PubMed - indexed for MEDLINE]

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Observations On the Dose and Administration of Ascorbic Acid When Employed Beyond the Range Of A Vitamin In Human Pathology

Frederick R. Klenner, M.D., F.C.C.P.

Comment by [Robert F. Cathcart, M.D.](#): This paper repeatedly refers to intravenous *ascorbic acid*. My personal experience, my talking with Klenner, and with his wife, Annie Klenner, who served as his nurse, would indicate that he means *sodium ascorbate*. [See my article on how to make intravenous C solutions](#). I am especially indebted to Annie Klenner for her descriptions of how Fred made the intravenous solutions of sodium ascorbate.

Editor's Note:

Because of the unusually high amounts of ascorbic acid used in Dr. Klenner's treatment as reported in his paper, we asked him to verify amounts mentioned. Following is his answer:

"To the Editor of the ICAN Journal: This will confirm that all 'quantity' factors given in my paper are correct and can be confirmed from hospital and medical office records. The notation relative to 150 grams represents the amount used for reversing pathology in a given case and was the amount given over a period of 24 hours. (The I.V. was continuous.) This was given in three bottles of 5D water, decanting only enough from 1000 c.c. to be replaced by the 'C' ampoules.

"Recently the FDA has published a 'warning' that too much soda-ascorbate might be harmful, referring to the sodium ion. In reply to this I can state that for many years I have taken 10 to 20 grams of sodium ascorbate by mouth daily, and my blood sodium remains normal. These levels are checked by an approved laboratory. 20 grams each day and my urine remains at or just above pH 6."

Signed:

Fred R. Klenner, M.D.

[Body of paper](#)

[Summary](#)

[Appendix](#) - more case histories

[Bibliography](#)

[Klenner Biography](#)

Ancient History and Homespun Vitamin C Therapies

Folklore of past civilizations report that for every disease afflicting man there is an herb or its equivalent that will effect a cure. In Puerto Rico the story has long been told "that to have the health tree **Acerola** in one's back yard would keep colds out of the front door."^[1] The ascorbic acid content of this cherry-like fruit is thirty times that found in oranges. In Pennsylvania, U.S.A., it was, and for many still is, **Boneset**, scientifically called **Eupatorium perfoliatum**^[2]. Although it is now rarely prescribed by physicians, Boneset was the most commonly used medicinal plant of eastern United States. Most farmsteads had a bundle of dried Boneset in the attic or woodshed from which a most bitter tea would be meted out to the unfortunate victim of a cold or fever. Having lived in that section of the country we qualified many times for this particular drink. The **Flu of 1918** stands out very forcefully in that the Klenners survived when scores about us were dying. Although bitter it was curative and most of the time the cure was overnight. Several years ago my curiosity led me to assay this "herbal medicine" and to my surprise and delight I found that we had been taking from ten to thirty grams of natural vitamin C at one time. Even then it was given by body weight. Children one cupful; adults two to three cupfuls. Cups those days held eight ounces. Twentieth century man seemingly forgets that his ancestors made crude. drugs from various plants and roots, and that these decoctions, infusions, juices, powders, pills and ointments served his purpose. Elegant pharmacy has only made the forms and shapes more acceptable.

Early specifications, action and dosages for administrations.

To understand the chemical behavior of ascorbic acid in human pathology, one must go beyond its present academic status either as a factor essential for life or as a substance necessary to prevent scurvy. This knowledge is elementary. Listen to what appeared in Food and Life Yearbook 1939, U.S. Department of Agriculture^[3]: "In fact even when there is not a single outward symptom of trouble, a person may be in a state of vitamin C deficiency more dangerous than **scurvy** itself. When such a condition is not detected, and continues uncorrected, the teeth and bones will be damaged, and what may be even more serious, the blood stream is weakened to the point where it can no longer resist or fight infections not so easily cured as scurvy." It is true that without these infinitesimal amounts myriads of body processes would deteriorate and even come to a fatal halt.

Ascorbic acid has many important functions. It is a powerful **oxidizer** and when given in massive amounts; that is, 50 grams to 150 grams, **intravenously**, for certain pathological conditions, and "run in" as fast as 20 Gauge needle will allow, it acts as a "Flash Oxidizer,"^[4] often correcting the pathology within minutes. Ascorbic acid is also a powerful **reducing agent**. Its neutralizing action on certain **toxins, exotoxins, virus infections, endotoxins and histamine** is in direct proportion to the amount of the lethal factor involved and the amount of ascorbic acid given. At times it is necessary to use ascorbic acid **intramuscularly**. It should always be used **orally**, when possible, along with the needle.

Scurvy historically the target; today's goal of high blood levels to cope with self-induced abuses and physiological traumas.

If one is to employ ascorbic acid intelligently, some index for requirements must be realized. Unfortunately there exists today a sort of "brand" called "**minimum daily requirements**." This illegitimate "child" has been co-fathered by the **National Academy of Science** and The **National Research Council** and represents a tragic error in judgment. There are many factors which increase the demand by the body for ascorbic acid, and unless these are appreciated, at least by physicians, there can be no

real progress. It is vitally important that cognizance be taken of the demand by the body for ascorbic acid far beyond so-called scorbutic levels. Briefly these demands can be summarized:

1. The age of the individual;
2. Habits -- such as smoking, the use of alcohol, playing habits;
3. Sleep, especially when induced artificially;
4. Trauma.-- trauma caused by a pathogen, the trauma of work, the trauma of surgery, the trauma to the body produced accidentally or intentionally;
5. Kidney threshold;
6. Environment;
7. Physiological stress;
8. Season of the year;
9. Loss in the stool;
10. Variations in individual absorption;
11. Variations in "binders" in commercial tablets;
12. Body chemistry;
13. Drugs;
14. Pesticides;
15. Body weight;
16. Inadequate storage.

Flexible dosage standards explained as minimal standards.

With such knowledge it is no longer possible to accept a set numerical unit in terms of **minimal daily requirements**. This is true because of the simple fact that people are different and these same people experience different situations at various times. With ascorbic acid, today's adequate supply means little or nothing in terms of the needs for tomorrow. Let us start thinking in terms of **maximum requirements**. For too long a time we have under supplied our children and ourselves by accepting through negative ignorance and acquiescence so-called standards. Based on scant data on **mammalian synthesis**, available for the rat, a 70-Kg. individual would produce 1.8 grams^[5] to 4.0 grams^[6] of ascorbic acid per day in the unstressed condition. **Under stress**, up to 15.2 grams.^[7] Compare this to the 70 mg recommended for daily requirements without stress and 200 mg for the simple stress of the obstetrical patient, and you will recognize the disparity and understand why we have been waging a one man war against the establishment in Washington for 23 years.

Ascorbic acid not synthesized by man

Work on mammalian biosynthesis of ascorbic acid indicates that the vitamin C story as is generally accepted represents an oversimplification of available evidence.^[8,9,10] This often leads to misinterpretations and false impressions. It has been proposed that the biochemical lesion which produces the human need for exogenous sources of ascorbic acid, is the absence of the active enzyme, L-gulonolactone oxidase from the human liver^[11]. A defect or loss of the gene controlling the synthesis of this enzyme in man, blocks the final phase in the series for converting glucose to ascorbic acid. Virus can mutate cells, X-Rays can do it and it can occur by chance. Such a mutation could have happened, denying all progenies of this mutated animal the ability to produce ascorbic acid. Survival demanded ascorbic acid from an exogenous source. This is not remarkable. Other recognized genetic diseases in which a missing enzyme causes a pathological syndrome, in man, are phenylketonuria, galactosemia and alkaptonuria.

It is worthy to note that Sealock and Goodland have ascribed to ascorbic acid the faculty of being the necessary co-enzyme in the metabolic oxidation of **tyrosine**. The velocity of the oxidation in this reaction is dependent upon the concentration of vitamin C. Tyrosine is essential in breaking down protein to usable amino acid. The scorbutic **guinea-pig's** liver is unable to oxidize tyrosine except in the presence of ascorbic acid. This suggests a lead in the study of the metabolic abnormality **Alkaptonuria** in humans. Ascorbic acid administration will correct the alkaptonuria of the scorbutic guinea pig. Its effect on human alkaptonuria has been inconsistent. The reason: Inadequate use of ascorbic acid.

Biochemist Irwin Stones' concept has practical value

The inability of man to manufacture his own ascorbic acid, due to genetic fault, has been called "**hypoascorbemia**" by Irwin Stone.^[12] This is another reason for abolishing the present concept of daily minimal requirements. The physiological requirements in man are no different from other mammals capable of carrying out this synthesis.

Various procedures testing for the vitamin C levels and Requirements of the body.

Various tests have been employed to determine the degree of body saturation of vitamin C, but for the most part they have been misleading. **Blood and urine samples** analyzed with 2:6 dichlorophenol indophenol will give values roughly 7 percent less than when testing with dinitrophenol hydrazine. Gothlin advocates the **capillary fragility test** which is similar to the **tourniquet test** of Hess in results. Both can be used to estimate the quantity of vitamin C necessary to maintain **capillary integrity**. The **intra-dermal test** of Rotter as modified by Slobody^[13] is again gaining new recruits. In principle it is the same as the **lingual test** of Ringdorf and Cheraskin^[14] since both are based on the time required to decolorize dye. The lingual test is rapid and simple to perform but it requires a syringe with a 25 gauge needle and a stop watch. Since the dye methods depend on the reduction of the reagent by vitamin C, any substance having a reducing potential lower than the dye is a possible source of interference. Twenty years ago we elected to measure, as a therapeutic gauge, the amount of vitamin C in urine by borrowing on its ability to reduce qualitative Benedict's solution. A 2 plus Benedict's reaction in a known dextrose free urine was accepted as a standard. This test was helpful in gauging requirements for simple stress, but not accurate enough when using needle therapy. Fifteen years ago we developed the **Silver Nitrate-Urine test**^[15]. This test employs 10 drops of 5 percent silver nitrate and 10 drops urine which is placed in a Wasserman tube. When read in two minutes it will give a color pattern showing white, beige, smoke gray or charcoal or various combinations of any two depending upon the degree of saturation. We have found this color index test is all one will need for establishing

the **correct amount of ascorbic acid to use** by mouth, by muscle, by vein in the handling of all types of human pathology either as the specific drug or as an adjuvant with other antibiotics or neutralizing chemicals. In severe pathological conditions the urine sample, taken every four hours, must show a fine charcoal-like precipitation with a clear supernatant liquid if positive clinical results are to be realized. Spilling in the urine is not new. Abraham and Keefer have demonstrated that when penicillin is injected intravenously, excretions in the urine account for 60 percent of the administered dose.

Role played by ascorbic acid in intercellular reactions, neutralizing, possibly controlling virus production.

In 1935 Stanley isolated a crystalline protein possessing the properties of tobacco mosaic virus. It contained two substances, ribonucleic acid (**RNA**) and protein. The simple structure characteristic of tobacco mosaic virus was soon found to be a basic property of many human viruses such as **coxsackie virus** (which I believe to be the cause of **Multiple Sclerosis**), **Echoviruses** and **polioviruses** - they all contain only ribonucleic acid and protein. There exist minor variations. Adenoviruses contain deoxyribonucleic acid (**DNA**) and protein. Other viruses such as that causing **influenza** contain added lipid and polysaccharides. Deoxyribonucleic acid is used to program the large viruses, like mumps, ribonucleic acid is used to program the small viruses, like measles. The role of the protein coat is to protect the parasitic but unstable nucleic acid as it rides the "blood highway" or "lymphatic system" to gain specific cell entry. Pure viral nucleic acid without its protein coat can be inactivated by constituents of normal blood. There are several theories as to what happens after cell entry:

- Once inside a given cell. the virus nucleic acid sheds its protein coat and proceeds to modify the host cell by either creating mutations or by directly substituting its own nucleic acid;
- The infectious nucleic acid, after entering a human cell, retains its protein coat and starts to produce its own type protein coat^[16] and viral nucleic acid, so that new units can either depart to enter other cells or by destruction of the cell, thus making the infection more severe;
- The introduction of a foreign fragment of nucleic acid in the cell-virus interaction approach as postulated by Starr^[17]. In the Starr theory there can exist cells with partial chromosome make-up and cells with multi-nuclei. Hiliary Kropowski holds that these partial cells are 'pseudo-virions'^[18] and are found in some tumor-virus infections. A key factor in the Starr-Kropowski thinking is that the cell maintains its biological integrity to support virus development despite the abnormal morphology and genetic deficiency. If these invaded cells could be destroyed or the invader neutralized the illness would suddenly terminate. Ascorbic acid has the capability of entering all cells. Under normal circumstances its presence is beneficial to the cell, however, when the cell has been invaded by a foreign substance, like virus nucleic acid, enzymatic action by ascorbic acid contributes to the breakdown of virus nucleic acid to adenosine deaminase which converts adenosine to inosine. The net result is to lead to purines which are extensively catabolized and not to p+urines which are utilized for further nucleic acid. Ascorbic acid also joins with the available virus protein, making a new macromolecule which acts as the repressor factor. It has been demonstrated that when combined with the repressor, the operator gene, virus nucleic acid, cannot react with any other substance and cannot induce activity in the structural gene, therefore inhibiting the multiplication of new virus bodies. The tensile strength of the cell membrane is exceeded by these macromolecules with rupture and destruction.

Another hypothesis is that vitamin C acts to create new "L" viruses which are impotent. Still another, that the "binding" alone is sufficient to destroy the virus.

Promptness of massive ascorbic acid in avoiding fatal encephalitis related to stubborn head and chest colds.

In 1953^[19] we presented a case history and films of a patient with **virus pneumonia**. This patient was unconscious, with a fever of 106.8°F (A. corrected) when admitted to the hospital. 140 grams ascorbic acid was given intravenously over a period of 72 hours at which time she was awake, sitting up in bed and taking fluids freely by mouth. The temperature was normal. Since that time we have observed a more deadly syndrome associated with a virus causing head and chest colds. This is one of the adenovirus striking in the area of the upper respiratory tract with resulting fever, sore throat and eyes, and when in children can cause fatal pneumonia. More often death is indirect by way of incipient **encephalitis** where the child can be dead in 30 minutes. These are the babies and children found dead in bed and attributed to suffocation [**SIDS, Sudden Infant Death Syndrome**]. It is suffocation but by way of a syndrome we observed and reported in 1957^[20] which is similar to that found in cephalic tetanus-toxemia culminating in diaphragmatic spasm, with dyspnea and finally asphyxia.^[21] By 1958^[22] we had collected sufficient information from our office and hospital patients to catalog this deadly syndrome into two important stages.

- Stage 1
 - There is always a history of having had the "**Flu**" which lasted **48 to 96 hours** complicated with extreme physical or mental distress; or
 - A mild **cold, similar to an allergic rhinitis, which lingered on for several weeks** but did not incapacitate the individual.
- Stage 2, which is always sudden, will present itself in at least seven forms:
 - Convulsive seizures;
 - Extreme excitability resembling delirium tremens if an adult and with dancing of the eyeballs if a child;
 - Severe chill;
 - Strangling in the course of eating or drinking (bulbar type);
 - Collapse;
 - Stupor;
 - Hemiplegic type.

Other findings of this dramatic second stage are:

- Rapid pulse;
- Temperature can be normal, moderately elevated or high;
- Respirations twice to three times normal and in some cases will be suggestive of air hunger;

- Pupils will be moderately open and in some instances (hemiplegic) one will be markedly dilated;
- Urine negative;
- The white blood count running from 6,000 to 25,000 with a high poly count in the differential;
- Young patients starting the second phase with a convulsion there has been not only a history of normal bowel movements but also an enema given at the time of first examination has produced a normal stool;
- Bladder sphincter control was abnormal in our cases who convulsed or who were in coma.

Neurological Changes

It is apparent that the second stage of this syndrome is triggered by a breakthrough at the site of **the blood-brain barrier**. The time required for neurological changes to become evident is roughly comparable to the time necessary for similar neuropathology to be demonstrated following a **severe head injury**. Cerebral edema exists in both conditions. In my practice I start massive ascorbic acid therapy immediately. I have seen **children dead in from 30 minutes to 2 hours** because their attending physician was not impressed with their illness upon hospital admission. An autopsy on one of these patients showed **bilateral pneumonitis** - all one needs to spark a **deadly encephalitis**. To indicate just how common this syndrome presents itself, I relate here a newspaper account of a 15 year old girl who had a **mild, lingering cold** for several weeks. She attended a dance party one evening and except for a complaint of feeling extremely tired, she went to bed apparently well. She was found dead in bed the following morning. An autopsy showed bilateral pneumonia. How many times have you read such an account? This is why it is necessary for everybody to take adequate supplemental vitamin C to guard against such disasters.

Literature Research

In 1960 we decided to research the literature before writing our paper. "**Virus Encephalitis As A Sequel Of The Pneumonias.**"^[22] Rosenfield in 1903 described a similar syndrome under the caption "Brain Purpura or Hemorrhagic Encephalitis." Comby, in 1907, was the first to call attention to the interesting "metastatic" sequela of the pneumonias. Baker and Noran in 1945 enumerated five groups, each showing certain definite clinical characteristics which may be of both diagnostic and prognostic significance in relation to this virus syndrome. ^[23]

- Symptoms of a nonspecific nature - headache, vomiting, irritability;
- Delirious type;
- Convulsive type;
- Lethargic type;
- Hemiplegic type.

These groups plus two additional types, namely:

- Chill - blood invasion type;

- Collapse,

were as we reported them, independently, in the Tri-State Medical Journal, October 1958. Their results: **Some recovered, some died and still others lived as "vegetation" mental cripples. All of our patients recovered.** Thirteen years from the time of the Baker-Noran report to the time of our report and 13 years from the time of our report to the present time. This makes the issue urgent. Physicians must recognize the **inherent danger of the lingering head or chest cold** and appreciate the importance of early massive vitamin C therapy.

How does the brain become involved in encephalitis?--some speculations.

Clinical problems such as these groups present, leads one to speculate on the pathways in which the virus gains entrance into the brain. We can summarize:

- Through the olfactory nerves;
- Through the portals of the stomach from material swallowed, either pulmonary or upper respiratory drainage;
- Direct extension from otitis media or from mastoid cells;
- The blood stream. Arriving in the brain the virus goes through the blood cerebrospinal fluid barrier and/or the blood brain barrier by one of three ways:
 - Electrical charge;
 - Chemical lysis of tissue;
 - Osmosis.

Bakay^[24] reported that the **permeability of the blood-brain barrier** can be changed by introducing various toxic agents into the blood circulation. Chambers and Zweifach^[25] emphasized the importance of the intercellular cement of the capillary wall in regulating permeability of the blood vessels of the central nervous system. In this syndrome the toxic substance is an **adenovirus**. Ascorbic acid will repair and maintain the **integrity of the capillary wall**.

Burns - degrees explained and some therapy rational.

In the **treatment of burns** ascorbic acid, in sufficient amounts, reflects itself as a truly miracle substance. In the early forties, when I was using ascorbic acid, intramuscularly, in treating **bacillary dysentery**, shiga type, with excellent results, Lund, Lam and many others were using, what they called, massive doses of ascorbic acid in the treatment of burns. One or two grams each day, in fluids, was the recognized dose. Burns are at the beginning first degree and some remain as just an erythema. Many times the **first degree burn progresses rapidly** to the second degree stage and remains as "blisters". Still others go on to **third degree** which usually is more pronounced on the third-plus post-burn day. There is a **fourth stage** which results from lack of knowledge in treatment. It terminates with **skin grafting and plastic surgery**. We believe that ascorbic acid will eliminate the fourth stage and the third stage if used as we will later program.

Burns - continued descriptive and related therapies.

The pathologic **physiology of a burn wound** from the moment of the accident is in a state of dynamic change until the wound heals or the patient dies. The primary consideration is the phenomenon of blood sludging originally recognized by Knisely in 1945.^[26,27] Initially there is intravascular agglutination of red blood cells into distinctly visible, smooth, hard, rigid, basic masses. Lofstrom in 1959 demonstrated that the **oxygen uptake** by the tissues is greatly reduced because of the sludging and therefore reduced rate of flow. Berkeley^[28] in 1960 concluded that this phenomenon of sludging or agglutination results in capillary thrombosis in the area of the burn, extending proximally to involve the large arterioles and venules and thereby creating tissue destruction greater than that originally produced by the burn. Anoxia produces **added tissue destruction**. Lund and Levenson^[28] found that after severe burns there is considerable alteration in the metabolism of ascorbic acid as shown by a low concentration of ascorbic acid in the plasma either with the patient fasting or after saturation tests and also low urinary excretion of vitamin C either with the patient fasting or after the injection of test doses. The extent of the abnormality closely paralleled the severity of the burn. Bergman^[30] reported an increase demand for ascorbic acid in burns especially when epithelization and formation of granulation tissue are taking place. Lam^[31] also reported in 1941 a marked decrease in the plasma ascorbic acid concentration in patients with severe burns. Klasson^[32] although limiting the amount of ascorbic acid to a dose range of 300 mg to 2000 mg daily, in divided doses, found that it hastened the healing of wounds by producing healthy granulation tissue and also that it reduced local edema. He rationalized that **ascorbic acid used locally** as a 2% dressing possessed astringent properties similar to hydrogen peroxide. He also reported that **antibiotic therapy was rarely necessary**.

Severe burns and related therapy.

Harlen Stone^[33] suggested the use of gentamicin in major burns to lower the sepsis caused by pseudomonas. Absorption of its exotoxin from the infected burn wound inhibits the bacterial defense mechanism of the reticuloendothelial system. Death can result either from the toxemia alone or from an associated septicemia. We have found that the secret in treating burns can be summarized in five steps:

1. The use of the "old covered wagon" type cradle when indicated, with three 25 watt bulbs. The patient controls the heat by turning on and off the first bulb as needed to keep warm. No garments or dressings are allowed;
2. The employment of a 3% ascorbic acid solution as a spray over the entire area of the burn. The spray can be applied with a Devilbis unit using an ordinary portable pressure pump. The old type "flit gun" can also be used or even a 50 c.c. syringe with a 20 gauge needle. The 3% solution is used every 2 to 4 hours for a period of roughly five days;
3. The use of vitamin A and D ointment over the area of the burn and this is now alternated, q4h with the 3% ascorbic acid solution;
4. The administration of massive doses of ascorbic acid by vein and by mouth. 500 mg per Kg. body weight diluted to at least 18 c.c. per gram vitamin C using 5% dextrose in water, saline in water or Ringers solution and for the initial injection, run in as fast as a 20 gauge needle or catheter will carry the flow. Cut-downs are frequently necessary and the foot-ankle area is recommended. Vitamin C solution is repeated every 8 hours for the first several days, then at 12 hour intervals. Ascorbic acid, by mouth, is given to tolerance. Loose stools is accepted as this index. Using large doses of ascorbic acid I.V. will necessitate the administration of at least one

gram **calcium gluconate**, daily, to replace free calcium ions removed in the breakdown chemical action as ascorbic acid goes to dehydroascorbic acid, then to ketogulonic acid and later to oxalic acid as the calcium salt;

5. Supportive treatment; that is, whole blood and maintaining electrolyte balance.

If seen early after the burn there will be no infections and no eschar formations. This eliminates fluid formation, since the eschar traps will not exist and there will be no distal edema because the venous and lymphatic systems will remain open. There will be no arterial obstruction and no nerve compression. Pseudomonas will not be a problem, since ascorbic acid destroys the exotoxin systemically and locally. Even if the burn is seen late when pseudomonas is a major problem the gram negative bacilli will be destroyed in a few days leaving a clean healthy surface. I have seen **eschars** 2 inches wide and 1/2 inch thick, severely infected so that stench had to be controlled with deodorizing sprays, **melt away** when employing the method outlined. Ascorbic acid also eliminates pain so that **opiates or their equivalent are not required**. In extremely extensive burns that involve back and front of the patient, the "**Hoverbed**"^[35] employed by the British should be considered. It uses the same principle as the hovercraft to lift a solid object. What has been overlooked in burns is that there are many living epithelial cells in the areas that grossly look like "raw muscle." With the use of ascorbic acid these cells are kept viable, will multiply and soon meet with other proliferating units in the establishment of a new integument.

Regarding personal and environmental pollution-carbon monoxide.

We are all plagued with varying degrees of chronic **carbon monoxide poisoning**. This is the price we pay for putting our "railroads" on our highways, **smoking** and being too lazy to walk. Small amounts of carbon monoxide, if constantly maintained in the alveoli, can produce serious effects. Carbon monoxide in the inspired air leads to oxygen deficiency in the tissues causing extreme exhaustion. The affinity of carbon monoxide for hemoglobin is roughly **300 times** as great as that for oxygen. In addition to active replacement of oxy-hemoglobin the presence of some proportion of carboxy-hemoglobin decreases the dissociability of such oxy-hemoglobin as remains. Carbon monoxide can be released from hemoglobin if the patient is exposed to high pressure of oxygen, 93% along with 7% carbon dioxide. This is not always available. Ascorbic acid in the blood is constantly losing molecules of water. Perfectly dry carbon monoxide and oxygen cannot unite to form carbon dioxide, but carbon monoxide and water may give rise to carbon dioxide in the complete absence of oxygen. The reactions which take place are $CO + H_2O = HCOOH$ $CO_2 + H_2$ (Wright). Here the oxygen of the water has been used to oxidize carbon monoxide to carbon dioxide with the liberation of hydrogen. **Glutathione** may facilitate this cellular oxidation by acting as a hydrogen acceptor (Hopkins). Clinical experience suggests that if sufficient ascorbic acid is suddenly placed into the blood stream - 12 grams to 50 grams - that through "**Flash Oxidation**" a concentration of oxygen is made high enough to pull carbon monoxide from hemoglobin to form carbon dioxide. This rapidly formed carbon dioxide acts with the high oxygen tension to serve the same purpose as when given by "mask," further enhancing the chemical action taking place. Ascorbic acid will also prevent residuals such as paralysis, blindness, interference with sensations, muscle spasms or twitchings which in some cases can be permanent.

Primary and lasting benefits in pregnancy.

Observations made on over 300 consecutive obstetrical cases using supplemental ascorbic acid, by mouth, convinced me that failure to use this agent in sufficient amounts in pregnancy borders on malpractice. The lowest amount of ascorbic acid used was 4 grams and the highest amount 15 grams each day. (Remember the rat-no stress manufactures equivalent "C" up to 4 grams and with stress up to 15.2 grams). Requirements were roughly 4 grams first trimester, 6 grams second trimester and 10 grams third trimester. Approximately 20 percent required 15 grams, each day, during last trimester. Eighty percent of this series received a booster injection of 10 grams, intravenously, on admission to the hospital. Hemoglobin levels were much easier to maintain. **Leg cramps** were less than three percent and always was associated with "getting out" of Vitamin C tablets. **Striae gravidarum** was seldom encountered and when it was present there existed an associated problem of too much eating and too little walking. The capacity of the skin to resist the pressure of an expanding uterus will also vary in different individuals. Labor was shorter and less painful. There were no postpartum hemorrhages. The perineum was found to be remarkably elastic and episiotomy was performed electively. Healing was always by first intention and even after 15 and 20 years following the last child the firmness of the perineum is found to be similar to that of a primigravida in those who have continued their daily supplemental vitamin C. No patient required catheterization. No toxic manifestations were demonstrated in this series. There was no cardiac stress even though 22 patients of the series had rheumatic hearts. One patient in particular was carried through two pregnancies without complications. She had been warned by her previous obstetrician that a second pregnancy would terminate with a maternal death. She received no ascorbic acid with her first pregnancy. This lady has been back teaching school for the past 10 years. She still takes 10 grams of ascorbic acid daily. Infants born under massive ascorbic acid therapy were all robust. Not a single case required resuscitation. We experienced no feeding problems. The Fultz quadruplets were in this series. They took milk nourishment on the second day. These babies were started on 50 mg ascorbic acid the first day and, of course, this was increased as time went on. Our only nursery equipment was one hospital bed, an old, used single unit hot plate and an equally old 10 quart kettle. Humidity and ascorbic acid tells this story. They are the only quadruplets that have survived in southeastern United States. Another case of which I am justly proud is one in which we delivered 10 children to one couple. All are healthy and good looking. There were no miscarriages. All are living and well. They are frequently referred to as **the vitamin C kids**, in fact all of the babies from this series were called "**Vitamin C Babies**" by the nursing personnel--they were distinctly different.

How concerned should we be about oxalic acid and kidney stones? A technical explanation.

One of the "scare" weapons used by the critics on high daily doses of ascorbic acid is the oxalic acid-**kidney stone** hypothesis. Meakins^[36] states that the chief factors in the formation of renal calculi are perversions of metabolic processes, infection and stasis in the urinary tract. There are two schools of thought on stone formation: 1) That there is a central nucleus of colloids on which the crystalloids are precipitated; 2) That the crystalloids are deposited from the urine in which they are present in concentrated solution, in which salt and hydrogen ion concentrations are important factors. In all cases stasis and a concentrated urine appear to be the chief physiological factors. The only way that oxalic acid can be produced from ascorbic acid is through splitting of the lactone ring. This happens above pH5. The reaction of urine when 10 grams of vitamin C is taken daily is usually pH6. Oxalic acid precipitates out of solution only from a neutral or alkaline solution-pH7 to pH10. Kelli and Zilva^[37] reported that "Nutrition experiments showed that dehydroascorbic acid is protected in vivo from rapid transformation

to the antiscorbutically impotent diketogulonic acid from which oxalic acid is derived." Values reported in the literature for normal 24 hour urinary oxalate excretions for humans range from 14 mg to 56 mg. Lamden et al.^[38] found in a group of volunteers that the ingestion of 9 grams ascorbic acid daily resulted in oxalate spills as high as 68 mg for 24 hours and in the controls without extra vitamin C the high was 64 mg for a 24 hour period.

These critics have overlooked the individual with **diabetes mellitus**. The amount of oxalic acid found in the diabetic patient approximates that found in the urine of a normal person taking 10 grams vitamin C each day. With the diabetic we find a paradox. Give this individual 10 grams ascorbic acid daily, by mouth, and the urinary oxalate excretion remains relatively unchanged. Diabetics are known for their diuresis. The individual who takes 10 or more grams of vitamin C each day will find that this organic compound is an excellent diuretic. No urinary stasis; no urine concentration.

The ascorbic acid kidney stone story is a myth. Methylene blue will dissolve calcium oxalate stones giving 65 mg orally 2 to 3 times a day. (Dr. M. J. Vernon Smith: Med. World News, Dec. 4, 1970)

Why death from insect and snake bites?

It is estimated that 6500 deaths occur each year in the United States from snake **bite**. Many more from various flying insects, spiders, certain plants and some caterpillars. These are needless deaths. Several factors are at work in these pathologies:

- The tox-albumin of the snake bite, like the copperhead or rattler;
- Formic acid plus a toxin with a protein cover, called proteotoxin by Arthus,^[39] such as found in bees and wasps;
- Neurotoxin from the Black Widow, the Fiddle Spider and snakes like the Cobra and Coral;
- Production of histamine, especially in the more severe stings and bites.

Wells^[40] in 1925 called the poison of certain spiders and snakes **zootoxins** and of poisonous plants, **phytotoxins**. Ford^[41] in 1911 reported three classes of toxins in plants and fungi:

- Nerve poisons-muscarine;
- Those causing structural changes in the viscera with resulting fatty degeneration;
- Gastrointestinal irritants.

Ascorbic acid to the rescue.

It is a demonstrated principle that the production of **histamine** and other end products from deaminized cell proteins released by injury to cells are a cause of **shock**. The clinical value of ascorbic acid in combating shock is explained when we realize that the deaminizing enzymes from the damaged cells are inhibited by vitamin C.^[42] It has been shown by Chambers and Pollock^[43] that mechanical damage to a cell results in pH changes which reverse the cell enzymes from constructive to destructive activity. The pH changes spread to other cells. This destructive activity releases histamine a major shock producing substance. The presence of vitamin C inhibits this enzyme transition into the destructive phase. Clark and Rossiter^[44] reported that conditions of shock and stress cause depletion of the ascorbic acid content

of the plasma. As with the virus bodies, ascorbic acid also joins with the protein factor of these toxins effecting quick destruction.

The answer to these emergencies is simple. Large amounts of ascorbic acid 350 mg to 700 mg per Kg. body weight given intravenously. 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 follow-up 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.

A case history-success due to promptness with a twelve gram injection.

As an example of the lethal effect of certain stings and bites, I briefly relate a case history. An adult male came to my office complaining of severe chest pain and the inability to take a deep breath. Stated that he had been "stung" or "bitten" 10 minutes earlier. Thinking that it was a Black Widow and not bothering to look for fang marks, due to the gravity of the situation, I gave one gram calcium gluconate intravenously. This gave no relief. He begged for help saying **he was dying**. He was becoming cyanotic [blue or livid skin from lack of oxygen]. 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. He was sent home to locate the "culprit". He soon returned with an object that looked like a mouse. It was 1 1/2 inches long with long brown hair. There was a dark ridge down the entire back. It had seven pairs of propelling units and a tail much like a mouse. The following day I took "The Thing" to Duke University where it was identified as the **Puss Caterpillar**. This unusual caterpillar left 44 red raised marks on the back of its victim. Except for vitamin C this individual would have died from shock and asphyxiation.

Some concern answered regarding high dosage of ascorbic acid.

Merton Lamden, a biochemist, writing in the New England Journal of Medicine, Feb. 11, 1971, expresses grave doubts about the safety of large doses of ascorbic acid taken by mouth. He gives a report by Paterson^[45] on the diabetogenic effect of dehydroascorbic acid on rats. Paterson in 1950 employed only the Ketone formula of ascorbic acid, dehydroascorbic acid, which he administered, undiluted, intravenously, in extraordinary amounts. His results were based on giving rats, weighing 100 grams to 120 grams, dehydroascorbic acid in doses from 20 to 50 mg. This transposed to a man weighing 70 kilograms would represent a dose of 3,500 grams-roughly 5,000 grams ascorbic acid. *[DoctorYourself.com editor's note: This is a math error. 50mg in a 100g rat translates into 35g in a 70kg human, not 3,500g. The salient point is that Paterson, the researcher critical of vitamin C, administered dehydroascorbate and not ascorbic acid. Further explanation is in Smith RG and Penberthy WT, The Vitamin Cure for Arthritis, p 55-57. The original paper is <http://www.jbc.org/content/183/1/81.full.pdf>]* Obviously the work has no relationship with the ingestion of ascorbic acid by humans. I have taken from 10 to 20 grams of ascorbic acid daily since my last visit to this college - 18 years ago. I do not have diabetes mellitus and if I might digress a moment, neither have I had a kidney stone.

Diabetes mellitus response to 10 grams ascorbic acid by mouth.

Over the past 17 years we have studied the effect of 10 grams by mouth, in patients with diabetes mellitus. We found that every diabetic not taking supplemental vitamin C could be classified as having **sub-clinical scurvy**. For this reason they find it **difficult to heal wounds**. The diabetic patient will use the supplemental vitamin C for better utilization of his insulin. It will assist the liver in the metabolism of carbohydrates and to reinstate his body to heal wounds like normal individuals. We found that 60% of all diabetics could be controlled with diet and 10 grams ascorbic acid daily. The other 40% will **need much less needle insulin** and less oral medication. Contrary to what Medical News Letter, (Vol. 12 # 26, Dec. 25 1970) carried to the physicians the Tes-Tape is accurate in testing urine samples.

Observations following post-surgery cases on blood plasma levels of ascorbic acid. Deduction is evident of the need for substantial amounts of ascorbic acid prior to surgery.

In 1960 and again in 1966, in papers delivered before the Tri-State Medical Society, I called attention to the "**scurvy**" levels of ascorbic acid found in **postoperative** patients. Plasma levels recorded before starting anesthesia and after cessation of such inhalants and completion of surgery remained unchanged. This has lead many to believe that surgery created little or no demand for supplemental "C". We found, however, that samples of blood taken six hours after surgery showed drops of approximately 1/4 the starting amount and at 12 hours the levels were down to one-half. Samples taken 24 hours later, without added ascorbic acid to fluids, showed levels 3/4 lower than the original samples. Baylor University research team reported similar findings in 1965. Bartlett, Jones^[48] and others reported that in spite of low levels of plasma ascorbic acid at time of surgery, normal wound healing may be produced by adequate vitamin C therapy during the post-operative period. Lanman and Ingalls^[47] showed that the tensile strength of healing wounds is lowered in the presence of "scurvy plasma levels". Schumacher^[48] reported that the preoperative use of as little as 500 mg of vitamin C given orally "was remarkably successful in preventing shock and weakness" following dental extractions. Many other investigators have shown in both laboratory and clinical studies, that optimal primary wound healing is dependent to a large extent upon the vitamin C content of the tissues.

In 1949, it was my privilege to assist at an abdominal exploratory laparotomy. A mass of small viscera was found "glued together". The area was so friable that every attempt at separation produced a torn intestine. After repairing some 20 tears the surgeon closed the cavity as a **hopeless situation**. Two grams ascorbic acid was given by syringe every two hours for 48 hours and then 4 times each day. In 36 hours the patient was walking the halls and in seven days was discharged with normal elimination and no pain. She has outlived her surgeon by many years. We recommend that all patients take 10 grams ascorbic acid each day. Where this is not done and the surgery is elective, then 10 grams by mouth should be given for several weeks prior to surgery. At least 30 grams should be given, daily, in solutions, post-operatively, until oral medication is allowed and tolerated.

Mononucleosis aided by ascorbic acid.

After studying hundreds of college students, Yale researchers have evidence that strengthens the link between mononucleosis and **Epstein-Barr virus**, a herpes-like agent also associated with **Burkitt lymphoma**.^[49] Large doses of intravenous "C" has a striking influence on the course of **mononucleosis**. In one patient who was given the last rites of her church, the girls mother took things into her own hands when the attending physician refused to give ascorbic acid. In each bottle of intravenous fluids she

would quickly "tap in" 20 to 30 grams vitamin C. The patient made an uneventful recovery. Her mother has her B.S. in Nursing and has been a long time advocate of massive "C" therapy.

Could ascorbic acid have anti-cancer features?

Schlegel^[50] from Tulane University has been using 1.5 grams ascorbic acid daily to prevent recurrences of **cancer of the bladder**. He and biochemist Pipkin have been able to demonstrate that in the presence of ascorbic acid, carcinogenic metabolites will not develop in the urine. They suggest that spontaneous tumor formation is the result of **faulty tryptophan metabolism** while urine is retained in the bladder. Schlegel termed ascorbic acid "**An Anticancer Vitamin**". Along this line Glick and Hosoda^[51] reported on work by Von Numers and Pettersson that the depletion of mast cells from guinea pigs skin was due to ascorbic acid deficiency. The possibilities indicated are that vitamin C is necessary either directly or indirectly for formation of mast cells, or for their maintenance once formed or both. Ascorbic acid will control myelocytic leukemia provided 25 to 30 grams are taken orally each day.

One can only speculate on what massive therapy would do in all forms of cancer. Many pathologic conditions are cured by giving 5 million to 100,000 million units of penicillin as an intravenous drip over a period of 4 to 6 weeks. How long must we wait for someone to start continuous ascorbic acid drip for 2 to 3 months, giving 100 to 300 grams each day, for various malignant conditions?

Barbiturate patients in shock normalized with ascorbic acid.

Clemmesen^[52] states that the important principles in management of barbiturate poisoning are anti-shock therapy, continuous oxygen and patent airways. Hadden et al.^[53] suggest six measures as supportive treatment. An intensive care unit would be necessary to carry out these functions. All one really need do is give adequate ascorbic acid therapy. One patient who had taken 2640 mg **Lotusate** (talbutal) was seen in the emergency room with a blood pressure of 60/0. Twelve grams vitamin C was given intravenously with a 50 c.c. syringe and then the needle attached to a bottle of 5D water containing 50 grams ascorbic acid. Within 10 minutes the blood pressure was 100/60 demonstrating the effect of vitamin C on shock. A second bottle of 250 c.c. 5D water containing one gram emivan was started in the other arm. The patient was awake in 3 hours, taking juice with "C" added. She received 125 grams ascorbic acid by vein in 12 hours. Ascorbic acid not only assists with hepatic metabolism but also as a major diuretic flushes these compounds out by way of the kidneys. Nasal oxygen running 6 liters per minute was also employed. Another patient who had masked 2400 mg secenal with paraldehyde was awake after 42 grams of ascorbic acid had been given by vein as fast as a 20 gauge needle could carry the flow. She received 75 grams vitamin C by vein and 30 grams by mouth in a 24 hour period.

Cholesterol not a problem, when daily intake of ascorbic acid is high.

Mention should be made of the role^[54] played by vitamin C as a regulator of the rate at which cholesterol is formed in the body; deficiency of the vitamin speeding the formation of this substance. In experimental work, guinea pigs fed a diet free of ascorbic acid showed a 600 percent acceleration in cholesterol formation in the adrenal glands. Ten grams or more each day and then eat all the eggs you want. That is my schedule and my cholesterol remains normal, Russia has published many articles demonstrating these same benefits.

Lockjaw relieved.

Ascorbic acid has no equal as an adjuvant with other drugs in many conditions. With **Tolserol** it is curative in the treatment of Lockjaw. Both drugs must be used in proper amounts. In our case 1000 mg Tolserol given intravenously to a boy weighing 20 Kg. was the optimal amount to use. In 48 hours he was given 90 grams ascorbic acid and 3000 mg Tolserol, all intravenously.^[55] Jungeblut^[56] reported that vitamin C, when added to tetanus toxin "in vitro", brings about inactivation of the toxin.

Two cases of **Trichinosis** was treated and cured using Vitamin C: and Para-Aminobenzoic acid.^[57] Although the temperature curve was returned to normal in 36 hours it was found that nine days of treatment was necessary for permanent cures.

Infectious hepatitis relieved.

Viral hepatitis needs brief mentioning. There are two types: 1) Infectious hepatitis; 2) Needle hepatitis. Physical activity has always been considered to increase the severity and prolong the course of the disease.^[58] In Vietnam, Freebern and Repsher showed that pick-and-shovel details had no effects on the 199 controls as against 199 kept at bed rest.^[59] One thing is certain. Given massive intravenous ascorbic acid therapy and patients are well and back to work in from 3 to 7 days. In these cases the vitamin is also employed by mouth as follow-up therapy. Dr. Bauer at the University Clinic, Basel, Switzerland, reported that just 10 grams daily, intravenously, proved the best treatment available.

Ascorbic acid therapy applied to various maladies.

We could continue indefinitely extolling the merits of ascorbic acid.

- Boyd and Campbell^[60] reported excellent results in the healing of **corneal ulcers** even though their massive doses was 1.5 grams daily. In one case of a corneal burn from the phosphorus off an old time match, the pain was relieved immediately with the intravenous injection of 12 grams vitamin C with a 50 c.c syringe. One gram was prescribed each hour for 50 grams. The cornea was normal in less than 24 hours.
- One single injection of ascorbic acid calculated at 500 mg per Kg. body weight will reverse **heat stroke**.
- One to three injections of the vitamin in a dose range of 400 mg Kg. body weight will effect a dramatic cure in **Virus Pancarditis**.
- One gram taken every one to two hours during exposure will prevent **sunburn**.
- Intravenous injections will quickly relieve the pain and **erythema**, even the second degree burns when precautions are not taken.
- One to three injections of 400 mg per Kg. given every eight hours will "dry up" **chicken-pox** in 24 hours.
- If **nausea** is present it will stop the nausea.

These injections are usually given with a syringe in a dilution of one gram to 5 c.c fluid. This concentration will produce immediate thirst. This is prevented by having the patient drink a glass of juice just before giving the injection.

- 40 grams ascorbic acid by vein and 1000 mg to 2000 mg vitamin B1 intramuscularly will neutralize the person **intoxicated by alcohol** and will **save the life** if one drinks after using **Antibuse**.
- 5 per cent ointment using a water soluble base will cure acute **fever blisters** if applied 10 or more times a day and we have removed several small basal cell epithelioma has with a 30 percent ointment.
- Dr. Virno^[61] at the eye clinic, University of Rome, Italy, reported very promising results in **glaucoma** with a dose schedule of 100 mg per Kg. body weight taken after meals and bed hour. He also reported that these large doses have proved to be safe.
- In **arthritis** at least 10 grams daily and those taking 15 to 25 grams daily will experience commensurate benefit. Supportive treatment must also be given. Repair of collagenous tissue is dependent of adequate ascorbic acid.
- Complications of **smallpox vaccination** are usually handled by adequate oral ascorbic acid. Several times we found it necessary to give the "C" intravenously along with Adenosine. Twenty percent ichthammol used locally with vaccinia necrosum is good psychology.
- In **herpes zoster** two grams vitamin C intramuscularly and 50 mg Adenosine 5-Monophosphoric acid, aqueous solution, also intramuscularly every 12 hours. Compound tincture benzoin locally is helpful.
- In massive "**shingles**" ascorbic acid should also be given by vein. Always as much by mouth as can be tolerated. Heavy metal intoxication is also resolved with adequate vitamin C therapy.

General all around benefits of one to ten grams ascorbic acid per day.

It has been suggested that ascorbic acid metabolism may be an index of total metabolism and thus serve as a general diagnostic guide. Adults taking at least 10 grams of ascorbic acid daily, and children under ten at least one gram for each year of life will find that the **brain will be clearer**, the mind more active, the body less wearied and the memory more retentive.

Summary

The types of pathology treated with massive doses of ascorbic acid run the entire gamut of medical knowledge. Body needs are so great that so called minimal daily requirements must be ignored. A genetic error is the probable cause for our inability to manufacture ascorbic acid, thus requiring exogenous sources of vitamin C. Simple dye or chemical test are available for checking individual needs. Ascorbic acid destroys virus bodies by taking up the protein coat so that new units cannot be made, by contributing to the break-down of virus nucleic acid with the result of controlled purine metabolism. Its action in dealing with virus pneumonia and virus encephalitis has been outlined. The clinical use of vitamin C in pneumonia has a very sound foundation. In experimental tests monkeys kept on a vitamin C free diet all died of pneumonia while those with adequate diets remained healthy.^[62] Many investigators have shown an increased need for ascorbic acid in this condition.^[63,64] Brody in 1953 after studying vitamin C and colds in college students advised that ascorbic acid be given early and often in sufficient amounts. Regnier^[65] reporting in review of Allergy found that the larger the dose of ascorbic acid the

better were the results. Our findings resulted in a schedule of one gram each hour for 48 hours and then 10 grams each day by mouth. Those under ten at least one gram for each year of life.

Virus Encephalitis.

Virus encephalitis is a deadly syndrome and must be treated heroically with intravenous and/or intramuscular injections of ascorbic acid. We recommend a dose schedule of from 350 mg to 700 mg per Kg. body weight diluted to at least 18 c.c. of 5D water to each gram of "C". In small children, 2 and 3 grams can be given intramuscularly, every 2 hours. An ice cap to the buttock will prevent soreness and induration. Ascorbic acid in amounts under 400 mg per Kg. body weight can be administered intravenously with a syringe in dilutions of 5 c.c. to each one gram provided the ampoule is buffered with sodium bicarbonate with sodium Bisulfite added. As much as 12 grams can be given in this manner with a 50 c.c. syringe. Larger amounts must be diluted with "bottle" dextrose or "saline" solutions and run in by needle drip. This is true because amounts like 20 to 25 grams which can be given with a 100 c.c. syringe can suddenly dehydrate the cerebral cortex so as to produce convulsive movements of the legs. This represents a peculiar syndrome, symptomatic epilepsy, in which the patient is mentally clear and experiences no discomfort except that the lower extremities are in mild convulsion. This epileptiform type seizure will continue for 20 plus minutes and then abruptly stop. Mild pressure on the knees will stop the seizure so long as pressure is maintained. If still within the time limit of the seizure the spasm will reappear by simply withdrawing the hand pressure. I have seen this in two patients receiving 26 grams intravenously with a 100 c.c. syringe on the second injection. One patient had poliomyelitis, the other malignant measles. Both were adults. I have duplicated this on myself to prove no after effects. Intramuscular injections are always 500 mg to 1 c.c. solution. With continuous intravenous injections of large amounts of ascorbic acid, at least one gram of calcium gluconate must be added to the fluids each day. This is done because we have found that massive doses of ascorbic acid pulls free calcium ions from the vicinity of the platelets or from the calcium-prothrombin complex as the lactone ring of dehydroascorbic acid is opened. The first sign of calcium ion loss is "nose bleeding". This differs from the nosebleed found, at times, in cases of chicken pox or measles. Here it represents frank scurvy from vitamin C deficiency. The pathology being "Capillary fragility".^[66]

Burns.

A new treatment for burns has been outlined, which if followed will eliminate skin grafting and plastic surgery. It is probably too simple to gain early acceptance. The literature has been suggesting the value of ascorbic acid in burns for many years. Proper local application and the amount for systemic usage has been misleading. One only need see one case properly treated with ascorbic acid to appreciate its importance. If ascorbic acid can destroy the exotoxin of tetanus, as Jungeblut demonstrated, it can also destroy the exotoxin of Pseudomonas. Ascorbic acid plays an important role in maintaining fluid balance in the body. Ruskin pointed out that the vitamin activates an enzyme arginase, which breaks down the amino acid arginine, resulting in production of urea which is one key to tissue fluid balance.

Pregnancy.

The simple stress of pregnancy demands supplemental vitamin C. This amount will vary with the individual. The silver nitrate-urine test will simplify these findings. Vitamin C seems especially concerned with mesenchymal tissue. When one considers the demands of the fetus and infant, especially premature babies, it is obvious that high vitamin C intakes are required during pregnancy because this

"parasite" will drain available "C" from the mother. Greenblatt^[67] reports excellent results following the oral administration of vitamin C in the therapy of habitual abortion. In my own practice I was able to take women who had had as many as five abortions without a successful pregnancy and carry them through two and three uneventful pregnancies with the use of supplemental vitamin C. The German literature is "stacked" with articles recommending high doses of vitamin C during gestation because they believe that this substance is of great benefit in influencing the health of the mother and in preventing infections. The vital contribution of ascorbic acid to the body tissues can be summed up in the formation and maintenance of normal intercellular material, especially in the connective tissue, bones, teeth, and blood vessels. Genetic errors might be prevented if prospective mothers were advised to take 10 or more grams of ascorbic acid daily. It is significant that we found in the simple stress of pregnancy, a normal physiological process, that equivalent requirements paralleled those found in the rat when under stress. Experiments by King et al.^[68] have shown that the need for supplemental vitamin C begins with the embryo.

Kidney Stones.

The "scare" factor of large doses of ascorbic vs. kidney stones has been laid to rest. Since the urine is usually pH6, one can see that the opening of the lactone ring is a slow process. This reaction takes place in tissues and is probably regulated by the amount of glutathione present. The important considerations are that one must have a concentrated urine, that stasis must be a factor and that the urine must be alkaline for any appreciable amounts of the crystalloids to precipitate out. This will never occur with massive ascorbic acid therapy. Furthermore, it has been shown that the controls in a given experiment had almost as much oxalic acid spill as did those volunteers taking 9 grams of ascorbic acid daily.

Insect - Snake Bites.

The quickness of results in snake bite, spider bite, hornet stings and caterpillar reactions demonstrates the usefulness in saving lives. It is best to give the vitamin intravenously with a syringe since bottle preparations are too time consuming. One precaution must be given. There exist a 2 gram ascorbic acid ampoule, and ironically it is the only one to my knowledge approved by the Food and Drug Administration, which might "kill" if used undiluted in a syringe. This lethal factor is due to the preservatives added. Each ampoule contains 2 grams sodium ascorbate. Vehicle contains: Monothioglycerol 0.14%; Sodium Formaldehyde Sulfoxylate 0.05%; Methyl Paraben 0.13%; Propyl Paraben 0.015%. Neutralized to pH6 with Sodium Bicarbonate; Water for injection q.s. This ampoule can be used intravenously ONLY when diluted to at least 25 c.c. to one gram. One sometimes will be confronted with extraordinary allergic and shock symptoms along with acute respiratory obstruction. In these situation one must employ Benadryl intravenously and/or intramuscularly and an adrenocortical hormone such as Decadron. These can be given by a nurse while the ascorbic acid is being prepared. In their absence a second "syringe" dose of ascorbic acid will suffice. Fluids by mouth should be given to prevent or correct thirst which all patients seem to experience.

Diabetes

Large doses of ascorbic acid do not cause diabetes mellitus in humans as has been suggested. On the contrary 10 grams daily, by mouth, has proved to be beneficial. The fact that 10 grams will allow them to heal wounds like normal individuals will save many legs in the future. Lamden, a biochemist, instigated

these fears by misinterpretation of the results reported by Patterson using the Ketone formula intravenously in rats.

In Surgery.

In surgery the use of ascorbic acid resolves itself into a "must" situation. The 24 hour frank scurvy levels should be sufficient evidence to encourage all surgeons to use vitamin C freely in their fluids. Proper employment of vitamin C by the surgeons will all but eliminate the post-surgery deaths.

In Malignancy.

The part very large doses of ascorbic acid given intravenously over a prolonged period offers a medical challenge. From cabbage and tomatoes grown in the carbon-14 chambers radioactive ascorbic acid can be extracted, which can be used in tracer studies. At least one research team has demonstrated that in cancer all available "C" is mobilized at the site of the malignancy. Lauber and Rosenfeld reported that "C" is mobilized from the tissues of the body and selectively concentrated in traumatized areas. In one hopeless case we administered 17 grams daily for 92 consecutive days without changing the blood or urine levels from that associated with scurvy. This is the reason we believe a dose range of 100 grams to 300 grams daily by continuous intravenous drip for a period of several months might prove surprisingly profitable. Blood chemistry should be followed daily with such an investigation. Schlegel found that even a dose of 1.5 grams a day, by mouth, would prevent bladder cancer.

Barbiturate Poisoning.

Our findings in no less than 15 cases of barbiturate poisoning suggested that no death should occur from this error in judgment. We also observed the dramatic effect of 12 grams intravenously on blood pressure associated with shock. The shock seen in heat stroke had been corrected by the time the injection was completed. The dose range used was 500 mg per Kg body weight.

Tetanus - Trichinosis

The use of ascorbic acid with Tolserol in the treatment of Tetanus should be accepted as universal treatment. Here again the dose must be proper. Our case as reported will serve as a guide in making these calculations. Ascorbic acid along with Para-Aminobenzoic acid is curative in Trichinosis. Both drugs are administered by mouth. It is estimated that at least 5 million cases of chronic Trichinosis exists in the United States. Just nine days of treatment would return these individuals to normal. In our cases 10 grams ascorbic acid was given daily and Para-Aminobenzoic acid was employed in high range. Four to six grams to start then three grams every 2 hours for eight times. For the remainder of the nine day schedule it was given 3 grams every two hours during the day and every three hours during the night.

Viral Hepatitis.

Ascorbic acid is the drug of choice in viral hepatitis. The dose used ranges from 400 mg to 600 mg per Kg body weight, depending on the severity of the disease. It should be given every 8 to 12 hours. Ten grams ascorbic acid daily in divided doses is also given by mouth. Those under 10 years the usual schedule of at least one gram for each year of life.

Multiple Uses.

We have reviewed many other pathological conditions in which ascorbic acid plays an important part in recovery. To these might be added Cardiovascular Diseases, Hypermenorrhea, Peptic and Duodenal Ulcers, Post-operative and Radiation Sickness, Rheumatic Fever, Scarlet Fever, Poliomyelitis, Acute and Chronic Pancreatitis, Tularemia, Whooping Cough and Tuberculosis. In one case of scarlet fever in which Penicillin and the Sulfa drugs were showing no improvement, fifty grams ascorbic acid given intravenously resulted in a dramatic drop in the fever curve to normal. Here the action of ascorbic acid was not only direct but also as a synergist. A similar situation was observed in a case of lobar pneumonia. In another case of purperal sepsis following a criminal abortion the initial dose of ascorbic acid was 1200 mg per Kg body weight and two subsequent injections were at the 600 mg level. Along with Penicillin and Sulfadiazine an admission temperature of 105.4°F. was normal in nine hours. The patient made an uneventful recovery. In one spectacular case of Black Widow^[69] spider bite in a 3 1/2 year old child, in coma, one gram calcium gluconate and 4 grams of ascorbic acid was administered intravenously when first seen in the office. Four grams ascorbic acid was then given every six hours using a 20 c.c. syringe. She was awake and well in 24 hours. Physical examination showed a comatose child with a rigid abdomen. The area about the umbilicus was red and indurated, suggesting a strangulated hernia. With a 4 power lens, fang marks were in evidence. Thirty hours after starting the vitamin C therapy the child expelled a large amount of dark clotted blood. There was no other residual. A review of the literature confirmed that this individual has been the only one to survive with such findings; the others were reported at autopsy. Ten grams vitamin C and 200 mg to 400 mg vitamin B-6, by mouth, daily will "shield" one from mosquito bites. Twenty percent will also require 100 mg vitamin B-6 intramuscularly each week.

General Nutrition.

Vitamin C plays a very important role in general nutrition. Deficiency of this substance in sufficient amounts can be a factor in loss of appetite, loss of weight or failure to grow, muscular weakness, anemia and various skin lesions. The relationship between vitamin C and the health of the gums and teeth has long been recognized. Laboratory studies on gum-teeth connective tissue have reaffirmed this relationship.^[70] Our son who will be 19 in July has never developed a tooth cavity. Since age 10 he has received at least 10 grams ascorbic acid, daily, by mouth. Before age 10 the amount given was on a sliding scale.^[71]

Intravenous Application.

Ascorbic acid must be given by needle to bring about quick reversal of various "insults" to the human body. We have found that doses must range from 350 mg to 1200 mg per Kg body weight. Under 400 mg per Kg of body weight the injection can be made with a syringe provided the vitamin is buffered with sodium bicarbonate with Sodium Bisulfite added. Above 400 mg doses per Kg body weight, and a particular ampoule described in this summary, the vitamin must be diluted to at least 18 c.c. of 5 per cent dextrose in water, saline in water or Ringer's solution. Many times Adenosine 5-Monophosphate, 25 mg in children and 50 to 100 mg in adults, given intramuscularly, is necessary to achieve results. The aqueous solution is more effective for quick results, although Adenosine in Gel can be employed. In debilitated individuals or when the pathology is serious, Desoxycorticosterone Acetate (DCA), aqueous solution, must also be added to the schedule. Usually 2.5 mg for children and 5 mg for adults is the daily intramuscular dose required. Sudden swelling of the feet indicates abnormal sensitivity and the drug must be discontinued.

It must be remembered when using ascorbic acid that experiments on man are the only experiments which can give positive evidence of therapeutic action in man. Likewise, the use of ascorbic acid in human pathology must follow the Law of Mass Action: "In reversible reactions, the extent of chemical change is proportional to the active masses of the interacting substance."

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