Vitamin C for the Treatment of Corona Virus Research Update

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medical group

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Why have Dr. Anderson Present this?

Can we cover everything?

Oral Vitamin C

Next Four Slides:

https://www.townsendletter.com/article/online-unexpected-oral-vitamin-c-response/

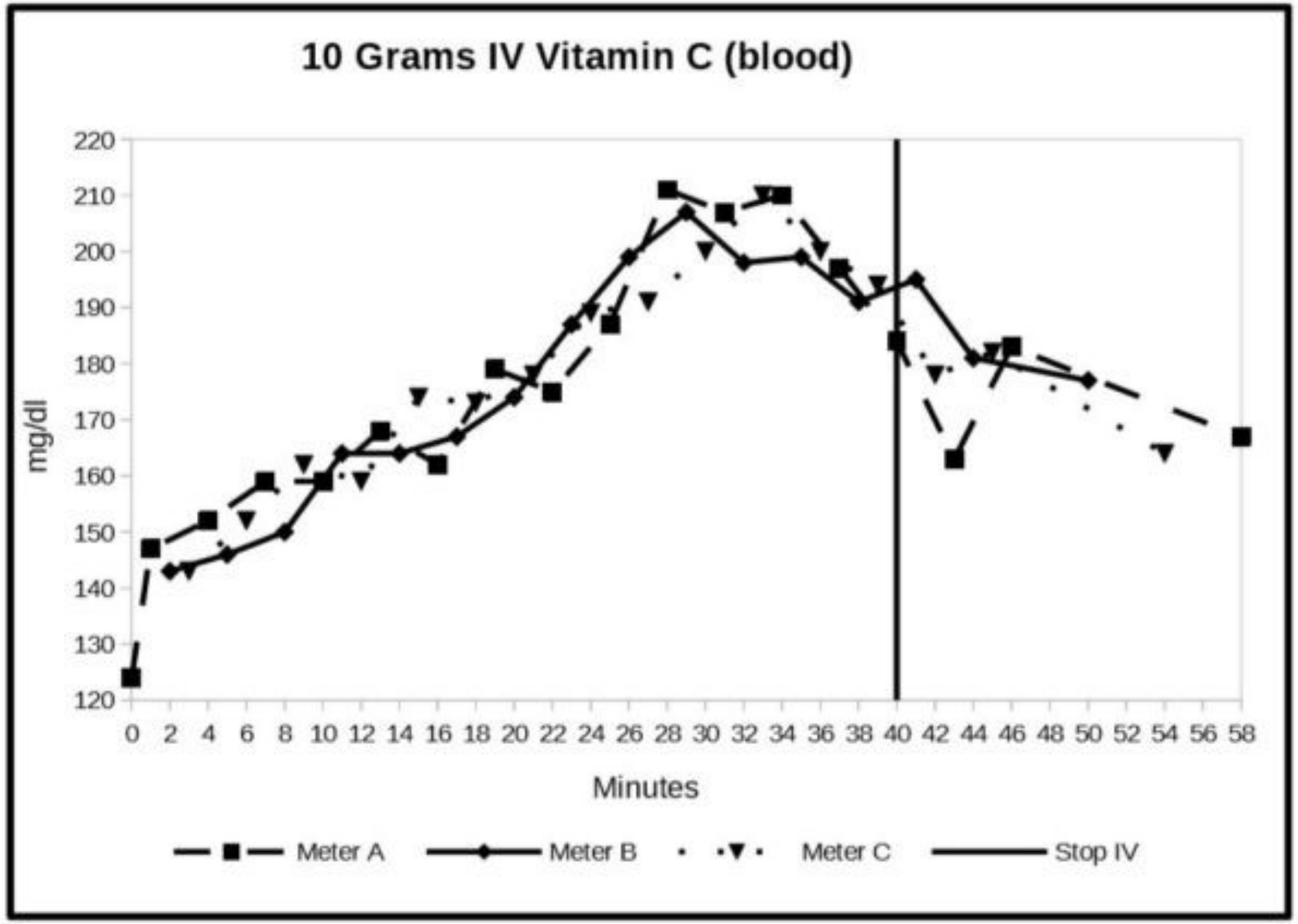


Fig 1. Measurements at one-minute intervals during a 10 gram intravenous infusion of vitamin C.

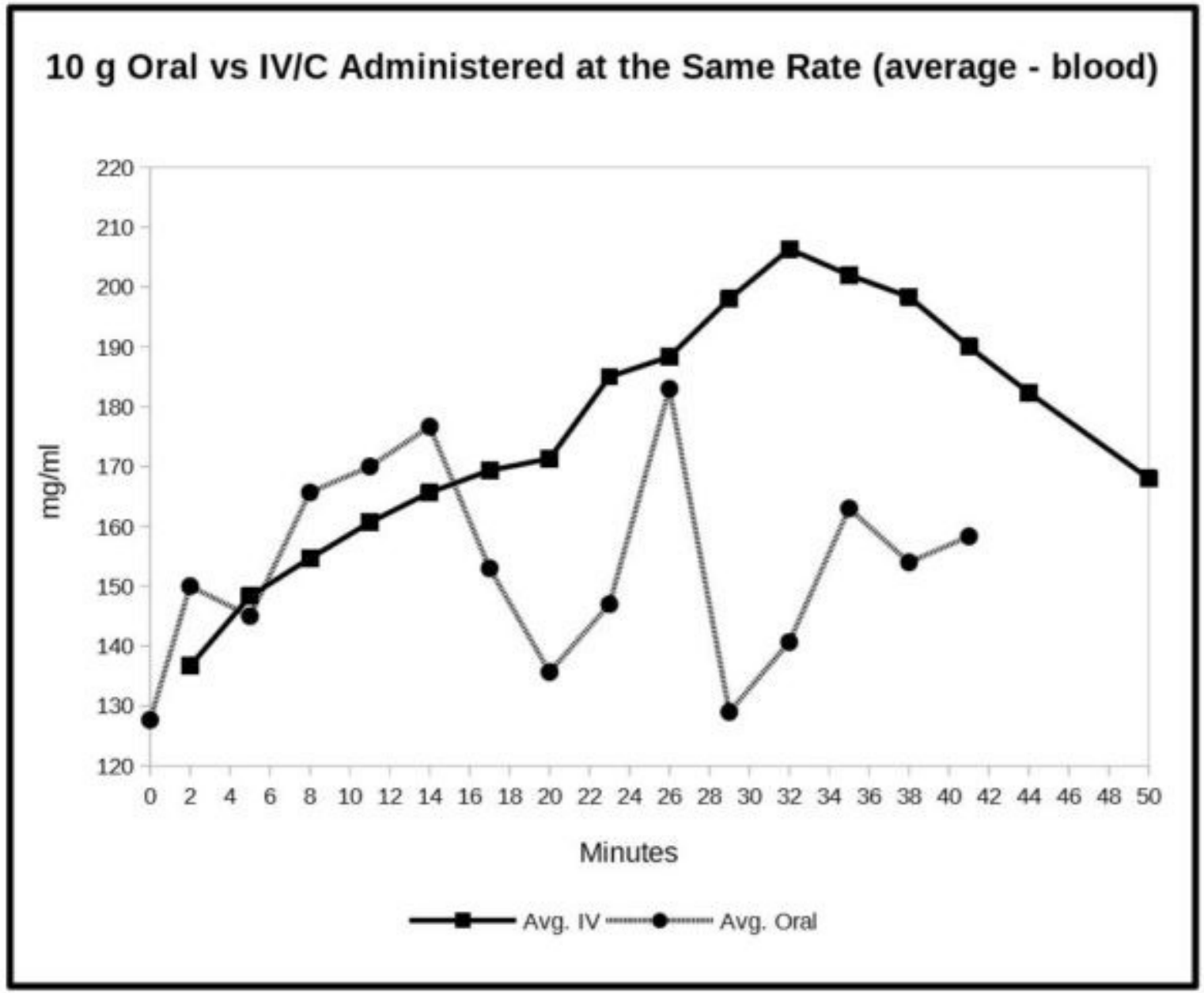


Figure 2 compares the response from oral ascorbic acid when given to match the rate of the intravenous infusion.

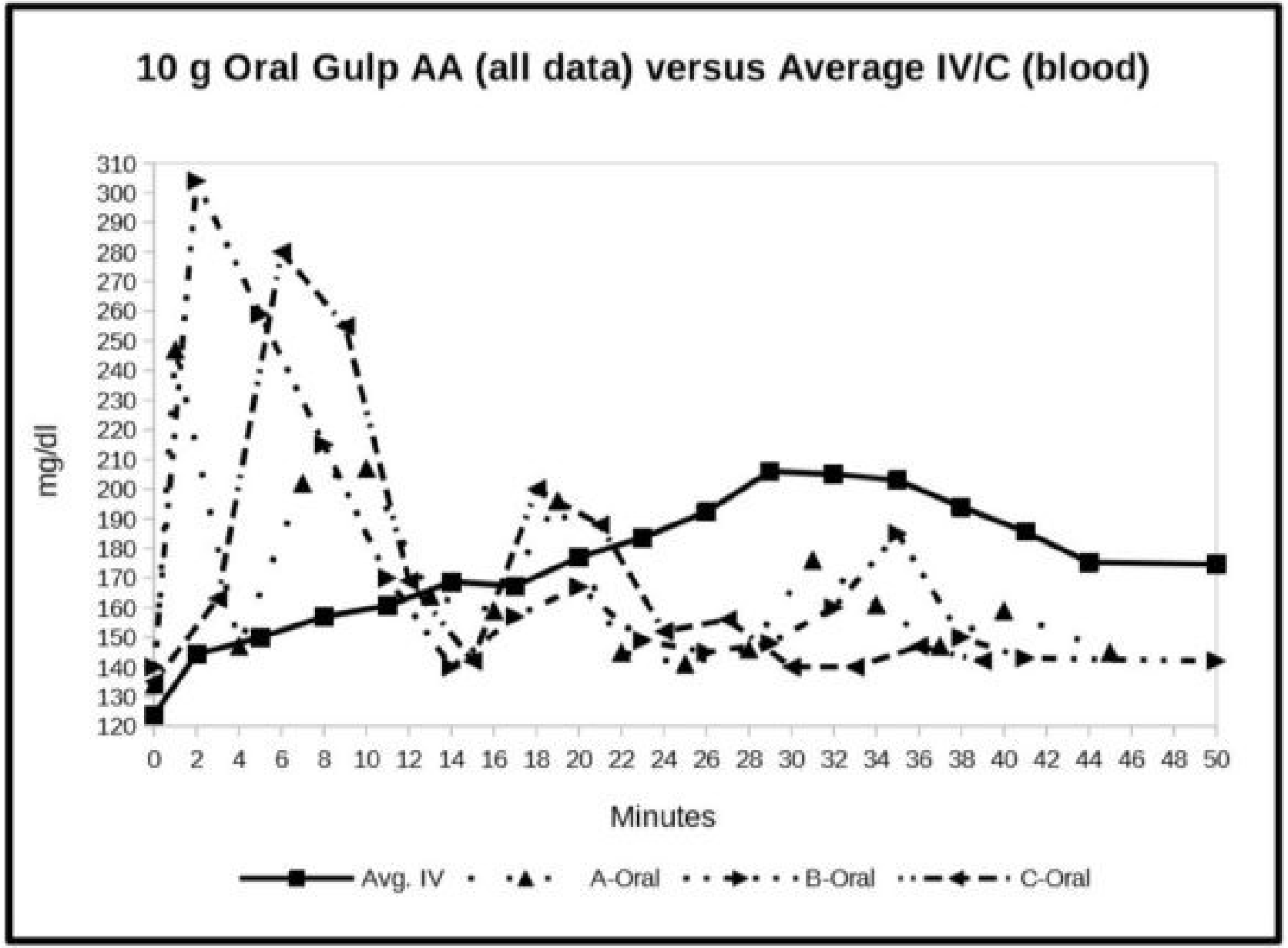
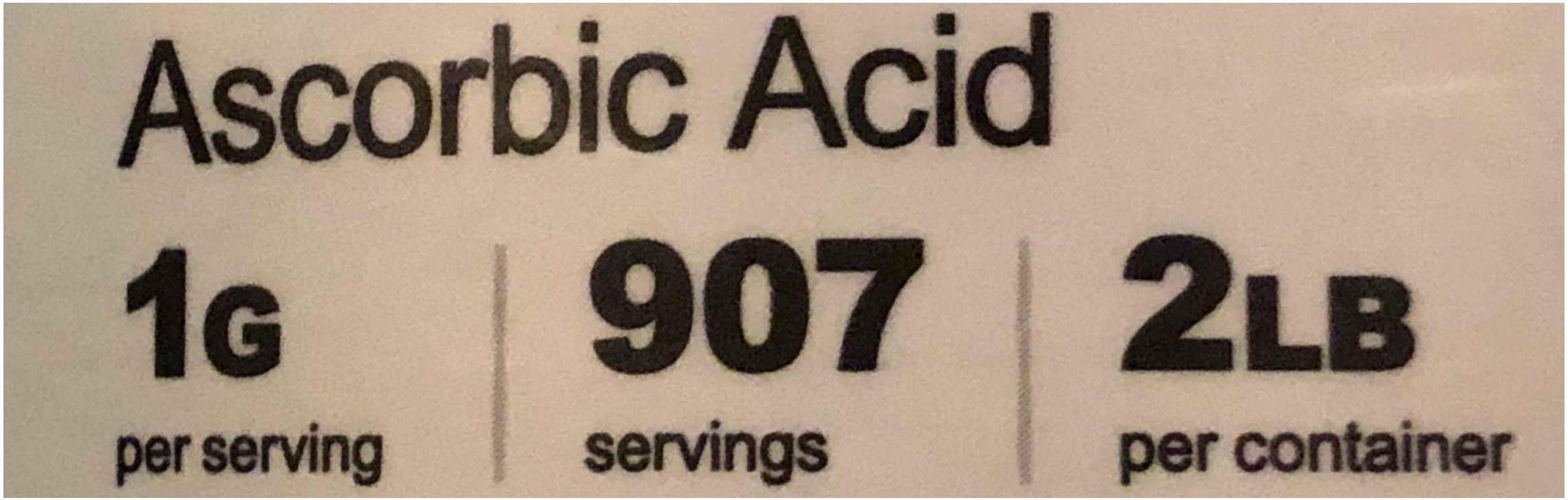


Fig. 3. Time series following a single oral dose versus IV – mg/dl versus time in minutes. All three meters are plotted.

From the “Conclusions”

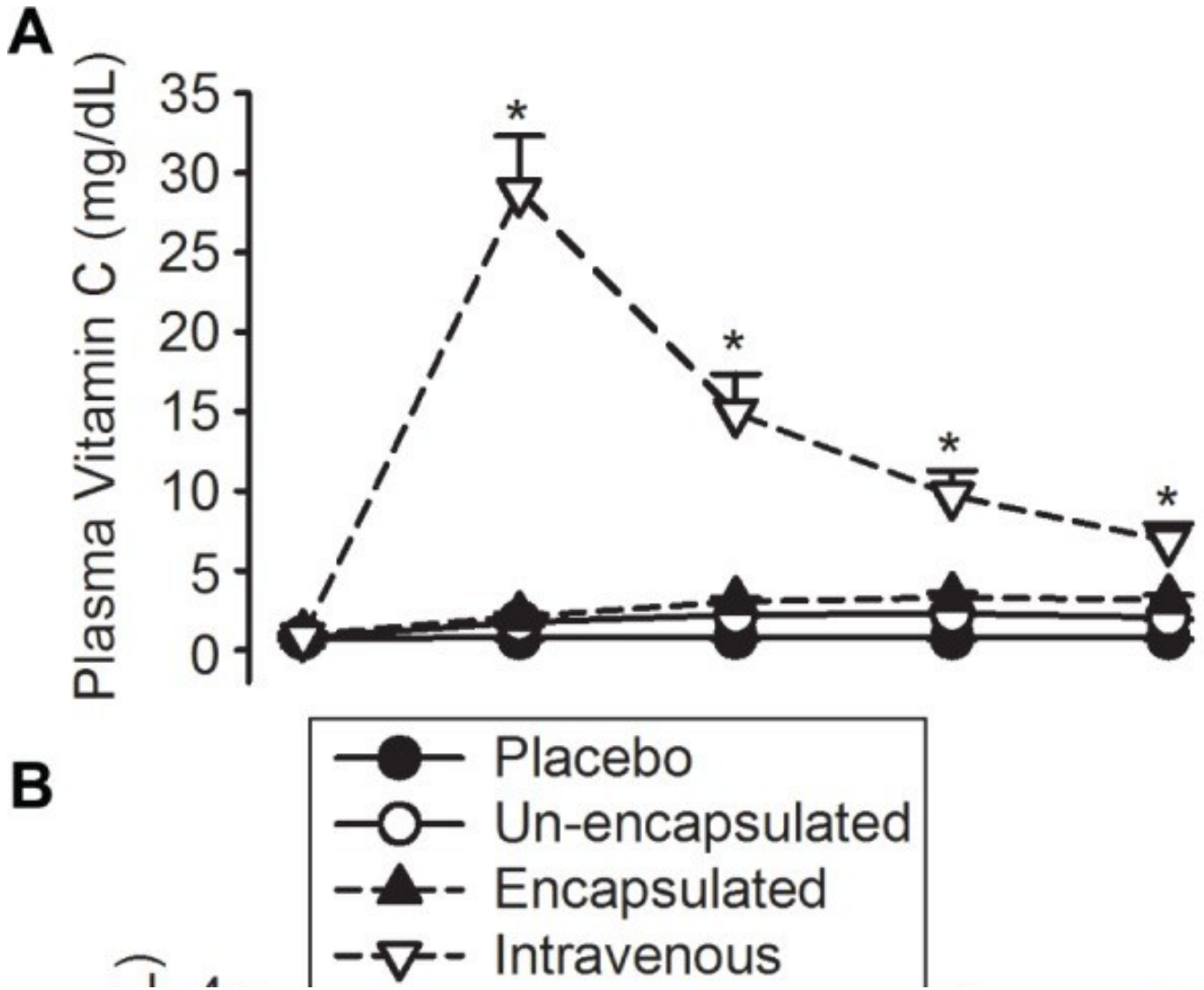
“Cathcart described how people who are sick and under stress can tolerate very high oral intakes of vitamin C.* The Cathcart bowel tolerance amounts, sometimes as high as 200 grams daily, are difficult to reconcile with the current paradigm if blood plasma saturates at 250 mg.”

*Cathcart RF. Vitamin, C.; titrating to bowel tolerance, anascorbemia, and acute induced scurvy. Med Hypotheses. 1981;7:1359–1376.


Ascorbic Acid
1G
per serving
907
servings
2LB
per container

Liposomal C

* “Encapsulated” = Liposomal



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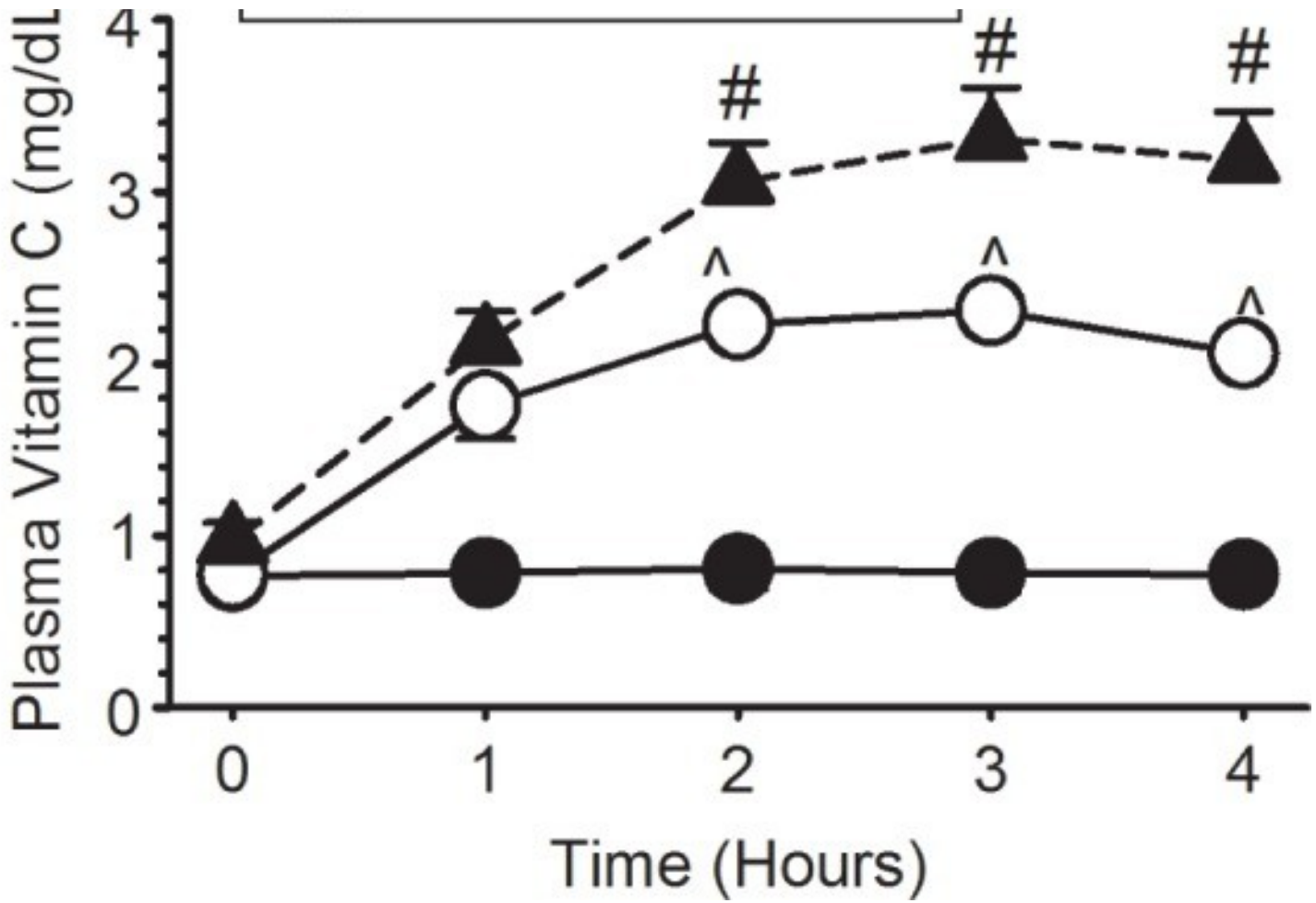

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IV Vitamin C: Safety, Definitions and Kinetics

Work up: HDIVC

- G6PD Status
- Kidney Function
- General Health
- Electrolytes
- Dose

So – How much IVC will oxidize?

- A definitive level for the threshold of oxidation in intravenously (IV) administered ascorbate is unclear.

- Two papers [1,2] indicate that lower levels than previously considered (5-10 grams IVC) may cause oxidation and another [3] disagrees.

[1] Hininger I, Waters R, Osman M, et al. Prooxidant effects of vitamin C in EDTA chelation therapy and long-term antioxidant benefits of therapy. Free Radic Biol Med 2005;38:1565-1570.

[2] Roussel AM, et.al. EDTA Chelation Therapy, without Added Vitamin C, Decreases Oxidative DNA Damage and Lipid Peroxidation. Altern Med Rev 2009;14(1):56-61

[3] Mühlhöfer A, et. al. High-dose intravenous vitamin C is not associated with an increase of pro-oxidative biomarkers. Eur J Clin Nutr. 2004 Aug;58(8):1151-8. **(Note 'High Dose' was 7.4 grams).**

Oxidation Conclusions:

- Although lower doses of IVC can cause transient oxidation the likelihood of use of low dose IVC as an “oxidative therapy” is small.
  - This in no way minimizes the utility of lower dose IVC strategies.
  - These lower dose IVC formulas can have more additives and can be used for quality of life enhancement and general nutrient support.
- Truly “oxidative” IVC formulas that have a practical longer-term oxidative effect in the body likely begin at 20-25 grams and above.
  - For example the “oxidative” effect of a 10-gram IVC is real, but highly transient.
  - When employing an “oxidative strategy” with IVC the dose escalation for those purposes generally starts at 25 Grams.

A ‘safe’ Recommendation

- Run pre-IV G6PD and hemoglobinopathy screening (CBC) for IV Ascorbate above 15 grams on repeated use:
  - serial IV over several days

- Run G6PD/ hemoglobinopathy screening on any person getting any single IVC over 20 - 25 grams

G6PD Testing

1. Qualitative (“Normal / Abnormal”)

2. RBC-G6PD or Total-G6PD

3. Quantitative G6PD
    1. A calculated value using both Total and RBC G6PD – considered most sensitive at assessing borderline cases.
    2. G6PD QUANT = {G6PD Blood / RBC G6PD}
    3. Value given in Units per Trillion RBC (U/Tril RBC)

**Ultimately, all are appropriate for screening prior to HDIVC treatment.

** A Quantitative result is most sensitive.

Dosing of IVC:

- "Low Dose" IVC
  - **0.07 to 0.14 Grams per kilogram of body weight**
  - Quality of Life in cancer and other illnesses
  - General immune and antioxidant support
    - These IV's contain support nutrients, and occasionally are given with Glutathione

- "High Dose – Oxidative" IVC
  - **0.4 to 1.4 Grams per kilogram of body weight**
  - Those for purely oxidative purposes
    - These generally only have minerals to balance blood electrolytes and are generally not given with glutathione or other nutrients on the same day.

Note most trials reported

- “High Dose” is actually low dose by the above standards.
- Some do use boluses in the truly high dose range (25 – 50 + grams).
- You cannot tell until you see the materials and methods.

References: Prior section

[1] Hininger I, Waters R, Osman M, et al. Prooxidant effects of vitamin C in EDTA chelation therapy and long-term antioxidant benefits of therapy. Free Radic Biol Med 2005;38:1565-1570.

[2] Roussel AM, et.al. EDTA Chelation Therapy, without Added Vitamin C, Decreases Oxidative DNA Damage and Lipid Peroxidation. Altern Med Rev 2009;14(1):56-61

[3] Mühlhöfer A, et. al. High-dose intravenous vitamin C is not associated with an increase of pro-oxidative biomarkers. Eur J Clin Nutr. 2004 Aug;58(8):1151-8. (Note 'High Dose' was 7.4 grams).

[4] Lutsenko, E A, Carcamo J M, Golde DW. Vitamin C Prevents Gene Mutation Induced by Oxidative Stress. Journal of Biological Chemistry. 277(19), May 10,2002. DOI 10.1074/jbc.M201151200 / available on line at http://www.jbc.org

[5] Vojdani, A. Namatella, G. Enhancement of Human Natural Killer Cytotoxic Activity by Vitamin C in Pure and Augmented Formulations. Journal of Nutritional and Environmental Medicine. Vol. 7, No. 3 , Pages 187-196. 1997. DOI: 10.1080/13590849762600

[6] Vollbracht C, et. al. Intravenous vitamin C administration improves quality of life in breast cancer patients during chemo-/radiotherapy and aftercare: results of a retrospective, multicentre, epidemiological cohort study in Germany. In Vivo. 2011 Nov-Dec;25(6):983-90.

[7] Yeom CH Jung GC, Song KJ. Changes of terminal cancer patients' health-related quality of life after high dose vitamin C administration. J Korean Med Sci. 2007 Feb;22(1):7-11.

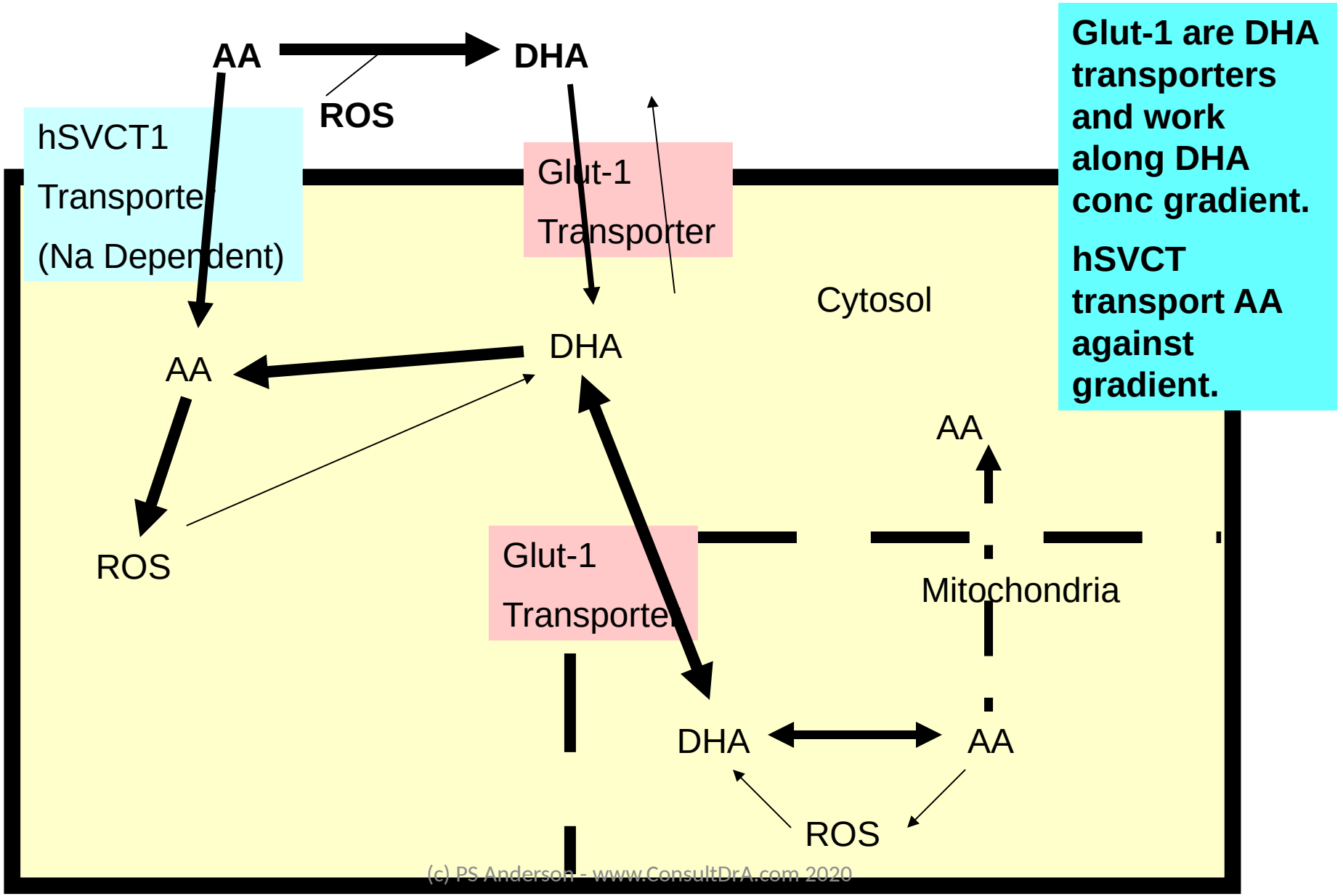
[8] Mehrnoush Mirhosseini MD and Robin Fainsinger MD. Fast Facts Documents # 190 Parenteral Nutrition in Advanced Cancer Patients. http://www.eperc.mcw.edu/EPERC/FastFactsIndex/ff_190.htm. Originally published October 2007. Current version re-copy-edited in May 2009.

[9] Ali A, Njike VY, Northrup V, Sabina AB, Williams AL, Liberti LS, Perlman AI, Adelson H, Katz DL. Intravenous micronutrient therapy (Myers' Cocktail) for fibromyalgia: a placebo-controlled pilot study. J Altern Complement Med. 2009 Mar;15(3):247-57. PMID: 19250003

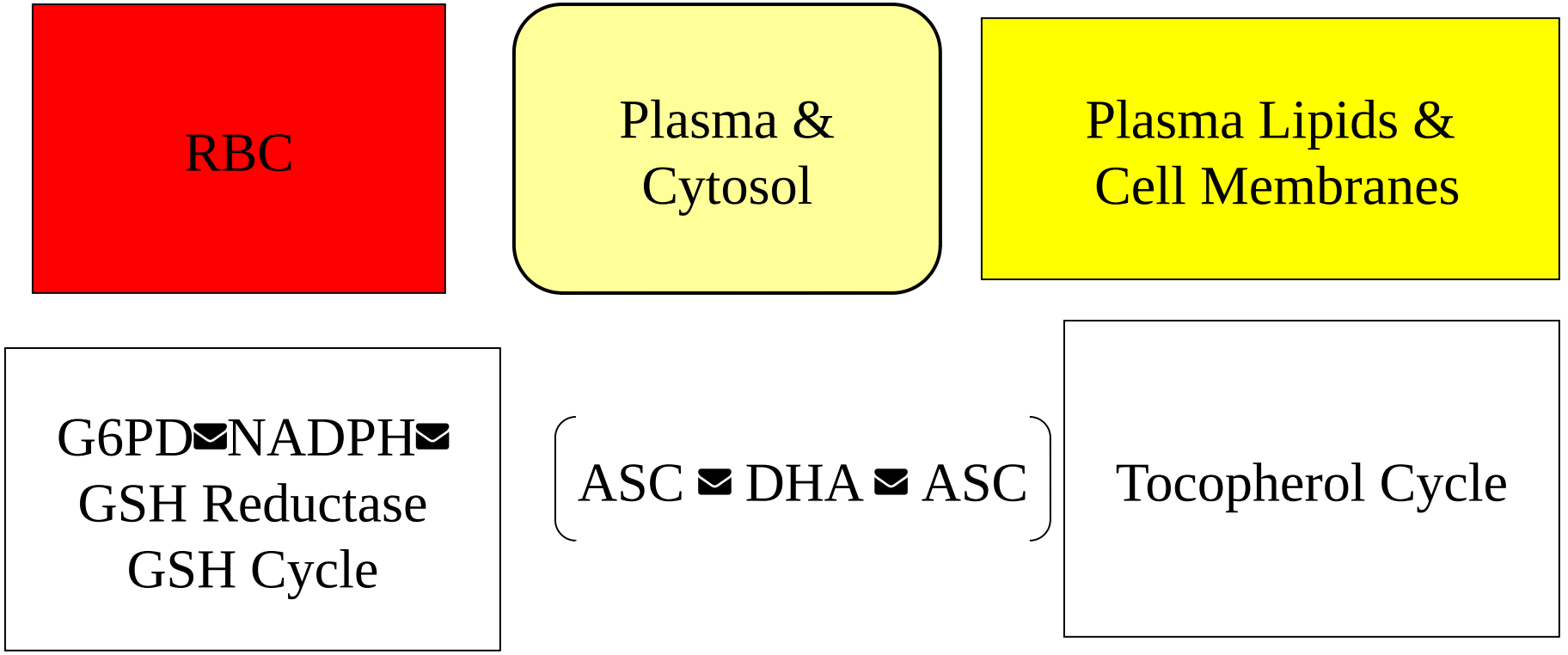
[10] Anderson P., Naydis E., Standish L. (2011, November). High Dose IV Ascorbic Acid Therapy: the Bastyr Experience. Poster session presented at the Society for Integrative Oncology, Cleveland, OH.

[11] Anderson P. "Intravenous Vitamin C in Naturopathic Oncology." Scientific Presentation. Oncology Association of Naturopathic Physicians. Scottsdale, Arizona. 2012.

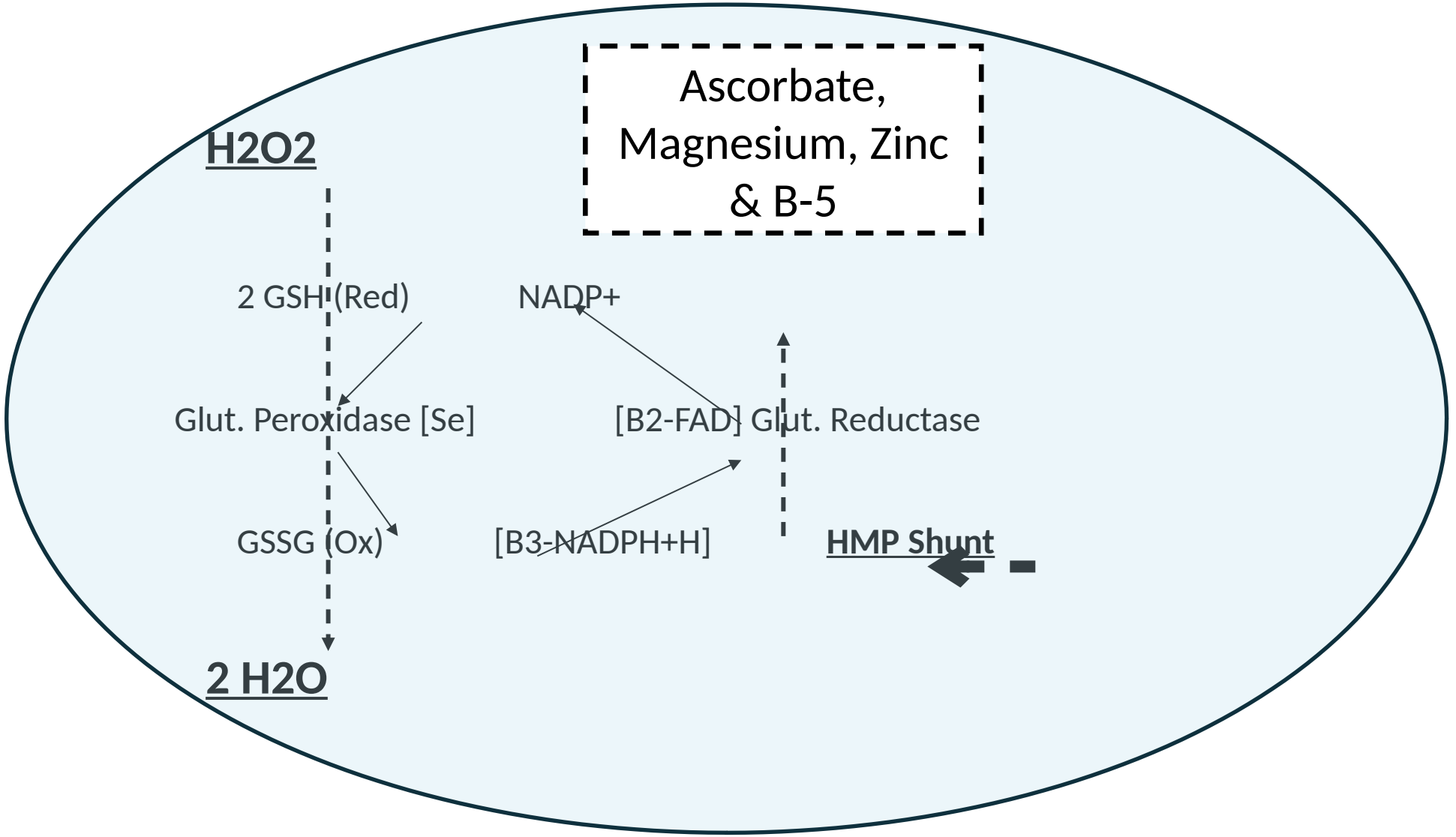
Uptake and cycling of Ascorbate by Cells:



G6PD – RBC GSH – Ascorbate - Tocopherols:



Glutathione and Cofactors



Data

Some of the Papers – Vitamin C

- H Hemila. Vitamin C and Infections Nutrients 2017, 9, 339
- Wang J, Wu F and Corpe C (2019) Editorial: Vitamin C in Cancer and Infectious Diseases: Physiological, Biochemical and Therapeutic Interventions. Front. Physiol. 10:734. doi: 10.3389/fphys.2019.00734
- Fowler III AA, Kim C, Lepler L, Malhotra R, Debesa O, Natarajan R, Fisher BJ, Syed A, DeWilde C, Priday A, Kasirajan V. Intravenous vitamin C as adjunctive therapy for enterovirus/rhinovirus induced acute respiratory distress syndrome. World J Crit Care Med 2017; 6(1): 85-90
- Respiratory protease/antiprotease balance determines susceptibility to viral infection and can be modified by nutritional antioxidants (2015) https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4587599/

- And many more

Journal of Orthomolecular Medicine

A few case reports from JOM:

- **High Dose Intravenous Vitamin C and Influenza: A Case Report (2018)**
- **Intravenous Vitamin C and Infectious Mononucleosis: A Case Report (2018)**
- **High Dose Intravenous Vitamin C Treatment for Zika Fever (2016)**
- **High Dose Intravenous Vitamin C Treatment for Chikungunya Fever (2014)**

http://orthomolecular.org/resources/omns/v04n03.shtml

IVC: Sepsis and COVID

Sepsis and IVC - JAMA 2019

Septic patient mortality reduces from 46% in placebo group to 30% in the IVC group at day 28. And an average 3-day reduction in ICU stay.

Interventions: Patients were randomly assigned to receive intravenous infusion of vitamin C (50 mg/kg in dextrose 5% in water, n = 84) or placebo (dextrose 5% in water only, n = 83) every 6 hours for 96 hours.

** 3,500 mg IVC over 6 hours in a 70 Kg patient.

Alpha A. Fowler, et.al Effect of Vitamin C Infusion on Organ Failure and Biomarkers of Inflammation and Vascular Injury in Patients With Sepsis and Severe Acute Respiratory Failure. JAMA, 2019; 322 (13): 1261 DOI: 10.1001/jama.2019.11825

2019 Review: 2 – 16 G IVC in Sepsis

So, the CITRIS-ALI results support a potential role for adjuvant high-dose i.v. vitamin C for sepsis. Large RCTs are under way to confirm these results. Whether HAT-therapy induces additional beneficial effect when vitamin C is dosed sufficiently high remains to be demonstrated, although hydrocortisone and thiamine are certainly indicated in specific patient groups.

Spoelstra–de Man, A.M.E., Oudemans–van Straaten, H.M. & Berger, M.M. Adjuvant vitamin C for sepsis: mono or triple?. Crit Care 23, 425 (2019). https://doi.org/10.1186/s13054-019-2717-x

Vitamin C Infusion for the Treatment of Severe 2019-nCoV Infected Pneumonia

https://clinicaltrials.gov/ct2/show/NCT04264533

12g Vitamin C will be infused in the experimental group twice a day for 7 days by the infusion pump with a speed of 12ml/h.

Study Type : Interventional (Clinical Trial)

Estimated Enrollment : 140 participants

Allocation: Randomized

Intervention Model: Parallel Assignment

Masking: Triple (Participant, Care Provider, Outcomes Assessor)

http://orthomolecular.org/resources/omns/v16n11.shtml

“A second clinical trial of intravenous vitamin C was announced in China on Feb. 13th. In this second study, says Dr. Cheng, "They plan to give 6,000 mg/day and 12,000 mg/day per day for moderate and severe cases. We are also communicating with other hospitals about starting more intravenous vitamin C clinical studies. We would like to see oral vitamin C included in these studies, as the oral forms can be applied to more patients and at home."

https://orthomolecular.activehosted.com/index.php?action=social&chash=0a09c8844ba8f0936c20bd791130d6b6.148&s=077e82533818e7d7e96a3de4d74fcdd6

Dr. Mao stated that his group treated **~50 cases** of moderate to severe cases of Covid-19 infection with high dose IVC. The IVC dosing was in the range of **10,000 mg - 20,000 mg a day for 7-10 days, with 10,000 mg for moderate cases and 20,000 for more severe cases,** determined by pulmonary status (mostly the oxygenation index) and coagulation status. All patients who received IVC improved and there was no mortality. Compared to the average of a 30-day hospital stay for all Covid-19 patients, those patients who received high dose IVC had a hospital stay about 3-5 days shorter than the overall patients.

https://orthomolecular.activehosted.com/index.php?action=social&chash=0a09c8844ba8f0936c20bd791130d6b6.148&s=077e82533818e7d7e96a3de4d74fcdd6

Dr. Mao discussed one severe case in particular who was deteriorating rapidly. He gave a bolus of 50,000 mg IVC over a period of 4 hours. The patient's pulmonary (oxygenation index) status stabilized and improved as the critical care team watched in real time. There were **no side effects reported** from any of the cases treated with high dose IVC.

Other Data from Chinese Hospital Internal Documents (Translated from Mandarin)

An official statement from Xi'an Jiaotong University Second Hospital (2) reads:

"On the afternoon of February 20, 2020, another 4 patients with severe new coronaviral pneumonia recovered from the C10 West Ward of Tongji Hospital. In the past 8 patients have been discharged from hospital. . . [H]igh-dose vitamin C achieved good results in clinical applications. We believe that for patients with severe neonatal pneumonia and critically ill patients, vitamin C treatment should be initiated as soon as possible after admission. . .[E]arly application of large doses of vitamin C can have a strong antioxidant effect, reduce inflammatory responses, and improve endothelial function. . . Numerous studies have shown that the dose of vitamin C has a lot to do with the effect of treatment. . . [H]gh-dose vitamin C can not only improve antiviral levels, but more importantly, can prevent and treat acute lung injury (ALI) and acute respiratory distress (ARDS)."

(ii) Treatment of light and general patients

Support treatment needs to be strengthened to ensure adequate heat, attention to water, electrolyte balance, maintain internal environmental stability, close monitoring of patients' vital signs and oxygen saturation. … **Treatment with heparin anticoagulant and high doses of vitamin C is recommended**. Low-molecular heparin 1 to 2 /d, continued until the patient's D-diipolymer level returned to normal. Once the fibrin degradation product (fibrino degradation product, FDP) is 10 sg/mL and/or D-diipolymer s.5 sg/mL, use ordinary heparin anticoagulant. **Vitamin C 50 to 100 mg/kg per day, intravenous drips, continuous use time to oxygenation index significantly improved as the goal.** If there is progress in lung lesions, it is recommended to apply high-dose broad-spectrum protease inhibitor sustenase inhibitors of 60 to 1 million units/d, continued to improve lung imaging examination. In the event of a "cytokine storm", intermittent short-term blood filtration (intermittent short veno-venuous hemofiltration, ISVVH) is recommended.

6. Cytokine Storms" Prevention and Control:

High doses of vitamin C and ordinary heparin anticoagulant are recommended. High doses of vitamin C are intravenously injected 100 to 200 mg/kg per day. Continuous use time is aimed at a significant improvement in oxygenation index. It is recommended to apply a large dose of broad-spectrum protease inhibitor sustenase, given 1.6 million units per 8 h 1 times, in a mechanical ventilation state, when the oxygenation index is 300 mmHg can be reduced to 1 million units/d. Anticoagulant therapy can be used to protect endothelial cells and reduce cytokine release, FDP s 10 sg/mL and/or D-diipolymers s5 sg/mL to ordinary heparin (3 to 15 IU/kg per hour) anticoagulant. The patient's clotting function and platelets must be reviewed at 4 h after first use of heparin. With ISVVH, 6 to 10 h per day.

A manner of stratifying patient experience and disease progression (slightly different terms than the Chinese document above)But good for clinical thinking

Asymptomatic (+) ✉ Early Sx. ✉ MidLevel Sx ✉ Hospitalization ✉ Recovery

Resources:

Website Resources

At no cost:

https://www.consultdranderson.com/iv-monographs/

- MANY literature summaries, handouts, pharmacology data and formulas here.
- Formulas for low and high dose IVC as well as hydrating nutrient formulas for critical patients.
- Also the data presented at SIO on HDIVC and optimal formulas.
- And many more items

Webinar with a nominal fee:

COVID Update for Clinicians (all the “non-IVC” information) Given 03-17-2020

https://www.consultdranderson.com/product/covid-19-update/

Common Questions

1) can you please address risks for those with dietary oxalate issues (when there is no kidney disease) – and what can they do instead or use to mitigate the harmful effects?

2) Risks for those with G6PD deficiencies and hemochromatosis and/or high ferritin levels

3) what folks can do at home with oral vitamin C should they not have access to a doctor who can do IV vitamin C

4) how to request vitamin C IV if you do end up in a conventional hospital

Questions?

Thank You!