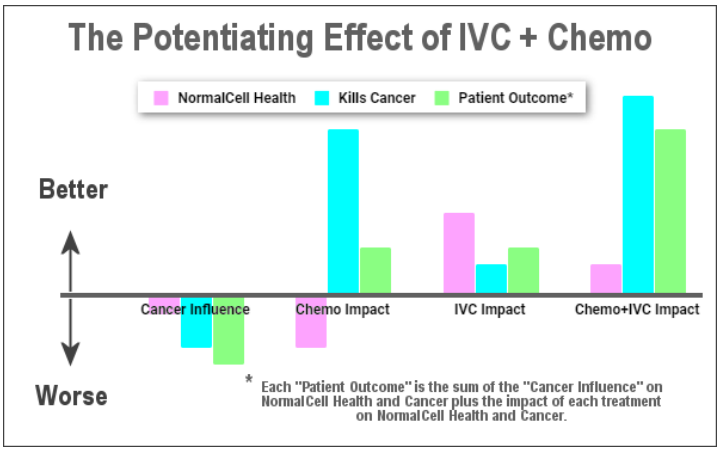
How Does IVC Help Cancer Patients?
50+ Peer Reviewed Studies Show Us How.

Below are 50+ peer-reviewed medical studies consistently demonstrating how IVC helps cancer patients. Each of these items are discussed in greater depth in the footnotes below.

1. Improves Quality of Life: On all 9 scales when IVC is used.[2i, 2j, 2k, 2l, 2m, 2n, 2o, 2p 2q, 1j, 2s, 2t, 2u, 2v] See also: http://ivcbook.com/ebooks/PalliativebenefitsofIVC.pdf
2. Much Less Pain: See the references above as most of them demonstrate this.
3. Inhibits Chemotherapy-Aggravated Sepsis [3.3a, 3.3b, 3.3c]
4. Improves Recovery from cancer-compromised organ function and tissue damage from Conventional Treatments [3.4a,3.4b]
5. Strengthens Normal Cells, Repairs Cellular Damage [3.5a]
6. Corrects Cancer-Caused Scurvy [3.6a 1a 1c]
7. Decreases Inflammation [27a, 3.7b, 3.7c, 3.7d]
8. Strengthens Cancer-Riden Immunity System [3.8a, 3.8b, 3.8c, 3.8d, 3.8e, 3.8f, 3.3c]
9. Improves Chemotherapy Effectiveness [3.9a, 3.9b, 3.9c, 3.9d, 3.9e, 3.9f, 3.9g, 3.9h, 3.9i, 3.9j, 3.9k, 3.9l, 3.9m, 3.9n]



10. Improves Radiotherapy Effectiveness [3.10a, 3.10b, 3.10c]
11. Inhibits the Spread of Cancer via Anti-Angiogenesis [3.11a, 3.11b, 3.11c, 3.11d]
12. Selectively Kills Cancer Directly [3.12a, 3.12b, 3.12c, 3.12d, 3.9l, 3.12e, 3.12f, 3.12g.

Relatively extremely-safe when done correctly [safe]

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Why does the NIH essentially keep repeating the same Phase 1 trial again and again?

The NIH is 100% tax funded ($30 billion annually) and must demonstrate that they have the public's best interest in mind. One way to do that is by doing endless “investigative” phase 1 trials on this “promising, needs more study” cancer treatment, but never progressing through phase 3 regardless how promising the preceding phases indicate.

They've been repeating this process for 35 years (starting with Moertel in the 80's and his 3 trials grossly underdosed that the blood serum level). Each time they do it with a slightly tweaked parameter, or for a slightly different cancer. It looks like the NIH is making progress but they really are not. They keep saying they'll do a phase 2 and a phase 3... rarely do they get to the promised phase 2, and never have they done a phase 3 on IVC, because they're busy repeating the phase 1 trial again, and again, and again, on another cancer. A number of phase 2 and phase 3 portions segments of the phase 1 trials have been proposed, and then rejected with no reason given.

Admittedly phase 3 trials are very expensive so only 1 out of every 13 trials are phase 3 (1785/134 = 13.5[a]). But the results from Phase 1 IVC trials should more than justify putting them in the top 8% to get Phase 3 trial funding. Admittedly something is wrong with the budget too when only 14% of National Cancer Institute's budget goes to doing trials ($754M[a] / $5311M[b] = 14%). Trials are how research is done … which is what the NCI does (or is supposed to do). The other 86% of their budge is apparently overhead. However that point is immaterial. IVC deserves to be in the top 8% of treatments to get a Phase 3 trial (because the budget problem exists for all trials, not just those that don't have a pharmaceutical company championing the cause).

Additionally, with regard to cost, on average the cost relationship between Phase 1, Phase 2 and Phase 3 oncology trials is about 1:3:6.[c] In other words the dozens of Phase 1 and Phase 2 tests that have already been done cost us far more than it would have cost doing a single Phase 3 after the first successful Phase 1 and Phase 2. So the cost argument for not doing a Phase 3 for IVC is moot, or in other words there is obviously a different reason for not doing the Phase 3 for IVC in spite of it demonstrating so many profound benefits.

Compounding the suspicious way IVC has been tabled for Phase 3 testing is they way it has been tested: with only the most challenging cancers (like pancreatic, lung cancer, etc). It almost seems as if they are trying to find a cancer on which it fails, but alas so far IVC has killed every cancer in vitro and have always improved patient outcomes in vivo when recommended protocols and recommended patient requirements are followed (which is itself another important discussion point of suspicion that we won't get into now).

In contrast, when testing most new pharmaceuticals the NIH tests them in vivo on a more fair cross section of cancers first, and upon promising phase 1 testing no time is wasted getting the follow up studies through phase 2, and upon promising phase 2 results phase 3 testing is championed through as fast as possible. Pharmaceutical sponsors then push it through the FDA to get coverage by health care insurance. Then, after it's approved, focusing on the more challenging cancers like specifically for pancreatic or lung may be tested. Unlike IVC, they don't test it with every cancer, or retest every possible dose level, or drug combination, etc … so unlike IVC they don't do dozens and dozens of Phase 1 trials where they all show some efficacy before moving onto Phase 2 … one Phase 1 for every possible permutation, and all in sequence, before doing the proper large cohort study necessary to get it covered by insurance. They don't do that

extra work for conventional chemo drugs. But they do for IVC, which is far safer than any chemo drug.

As a result only a very small collection of studies have moved on to phase 2, and the NIH has *never* done a phase 3 for IVC. Instead they summarize each trial with words similar to: “promising, needs more study” and then they redo a phase 1 type test on another strain, or dose, or population, or treatment combination. As a result they never generate a large enough cohort of data within a single test to decisively state for that test that IVC works and should be covered by health care insurance… a very effective way to indefinitely keep a life saving treatment at bay from the general public.

Motivations

As long as IVC isn't covered by health care insurance, IVC will not be considered by anyone except the most studious patients, and it will remain out of reach from all but the most financially well-off patients since it has to be paid out of pocket. So the practice does seem to benefit companies whose business could be cannibalized by the treatment. Be it intentional or not, indefinitely repeating phase 1 trials of IVC by making minor tweaks between each trial and pretending it’s a big enough change to start all over, certainly seems to maintain the status quo for pharmaceutical companies while giving the appearance that the NIH is making progress with IVC. They are *not* making progress, but rather they appear to be intentionally retesting phase 1 type tests into the ground.

Doing large cohort phase 3 testing for IVC (proper protocols, patient groupings, etc) is extremely overdue. Of that there really is no doubt when compared to conventional NIH practices with typical pharmaceutical products that had performed similarly at Phase 1 and Phase 2. They moved right on the phase 3 and jumped through whatever hoops necessary to get insurance coverage.

This all begs the question … How much incentive is there to keep up this retesting-charade to maintain the status quo? About $15 Billion per year worth of incentive. Let’s run the numbers: In 2016 Pharmaceutical companies spent $58.8 Billion researching and developing new drugs, of which 26% were chemotherapeutics[d], or in other words they spend roughly $15 Billion on developing chemo drugs every year, and if they found any that were as profoundly beneficial as IVC then they would absolutely have pushed it through Phase 2 and Phase 3, and it would now already be part of conventional cancer treatment (and at a pretty penny to the taxpayer because insurance would cover it). The treatment would of course cost a lot more than IVC costs right now (except economies of scale should result in some treatment savings especially since IVC can be done with chemo). So from that analysis one could say it is worth at least $15 Billion per year to them to keep IVC from progressing through proper phase 3 testing because that’s what they’re spending to find something similar from which they could profit.

$15 Billion is about 10% of what will be spent on chemotherapy (expected chemo costs to be $150 Billion annually by 2020[e]) so it is actually a relatively small amount to pay for the improvement demonstrated in the studies above. It's also a fair presumption that if IVC were pushed through proper phase 3 testing and was covered by health care then total patient costs would go down due to quicker recovery and longer remissions (as demonstrated in most of the above 50+ studies).

Shooting Themselves in the Foot

The ironic thing is that most lower overall costs would come from shorter hospital stays, but chemotherapeutic drugs which are now harmful become more benign and effective when IVC is added, so chemo use would likely increase rather than decrease in use. The end result would be better recovery and lower overall costs from reduced hospital stays, rather than a reduction of chemo. Just healthier, happier, better, more effective chemo experiences.

50% of people will get cancer.[f] For pharmaceutical companies this is a very big piece of their future, and so there is a lot of fear when IVC is seen as a threat. The big threat however is fear itself. Fear to do the right thing and proceed with phase 3 trials using proper (IVC expert recommended) protocols and proper study group design.

This is the main reason cancer patients have to special order IVC. It is why it is never offered upfront when people meet their oncologist for the first time. It is why a few cancer doctors will even refuse to do it, and why they keep putting off phase 3 trials for IVC … for 45 years now. Fear that it might work too well so that the pharmaceutical cash cow, chemo, will go out to pasture. It's a fear the study data does not warrant. IVC is amazingly beneficial (as demonstrated by the above 50+ studies) and it should be an essential treatment for anyone with cancer. However it's an integrative piece, and works best by far when combined with other treatments like those the NCI is apparently protecting by refusing to give IVC Phase 3 testing.

Footnotes:

Note that NIH references that have "PMC" in the url have the full text. For example:http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3691494. Note how the URL ends in "**PMC**3691494". That PMC indicates that it has the full text. Most of the other references only has abstracts but the full text can be purchased online usually for around $40 if you don't already have access.

a - http://www.thedailybeast.com/how-big-pharma-holds-back-in-the-war-on-cancer

b - https://www.cancer.gov/about-nci/budget/annual-plan/nci-plan-2012.pdf
c - https://aspe.hhs.gov/report/examination-clinical-trial-costs-and-barriers-drug-development
d - https://www.fool.com/investing/2016/07/31/12-big-pharma-stats-that-will-blow-you-away.aspx
e- http://www.cnbc.com/2016/06/02/the-worlds-2015-cancer-drug-bill-107-billion-dollars.html
f - http://dx.doi.org/10.1038/bjc.2014.606

Improves Quality of Life: IVC universally improves quality of life by providing immediate pain-relief from growing tumors, from surgery, radiation, and chemo side effects, improving appetite, alleviating nausea, replenishing energy, and improving patient mood and optimism. The European Organization for Research and Treatment of Cancer came up with an objective standardized measurement for quality of life for cancer patients called the "Cancer QLQ-C30". It includes nine multi-item scales: five functional scales (physical, role, cognitive, emotional, and social); three symptom scales (fatigue, pain, and nausea and vomiting); and a global health and quality-of-life scale. It has been used in many studies showing a significant improvement in all 9 scales when IVC is used.[2i, 2j ,2k ,2l , 2m, 2n, 2o, 2p 2q, 1j, 2s, 2t, 2u, 2v] The results of all QOL studies to date related to IVC are summarized in "Palliative Benefits of IVC" in the appendix, or http://ivcbook.com/ebooks/PalliativebenefitsofIVC.pdf,).

2i - Vollbracht C1, Schneider B, Leendert V, Weiss G, Auerbach L, Beuth J.; 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. https://www.ncbi.nlm.nih.gov/pubmed/22021693

2j - Chang Hwan Yeom, Gyou Chul Jung, and Keun Jeong Song. 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. Published online 2007 Feb 28. doi: 10.3346/jkms.2007.22.1.7 https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2693571

2k - Du WD, Yuan ZR, Sun J, Tang JX, Cheng AQ, Shen DM, Huang CJ, Song XH, Yu XF, Zheng SB; Therapeutic efficacy of highdose vitamin C on acute pancreatitis and its potential mechanisms; World J Gastroenterol. 2003 Nov;9(11):25659. http://www.ncbi.nlm.nih.gov/pubmed/14606098 http://www.wjgnet.com/10079327/full/v9/i11/2565.htm

2l - Hidenori Takahashiemail, Haruyoshi Mizunoemail, Atsuo Yanagisawa Highdose intravenous vitamin C improves quality of life in cancer patients; Personalized Medicine Universe 1 (2012) 4953 http://www.personalizedmedicineuniverse.com/article/S21864950(12)000132/fulltext

2m - L.J.Hoffer, M.Levine, S.Assouline, D.Melnychuk, S.J.Padayatty, K.Rosadiuk, C.Rousseau, L.Robitaille & W.H.Miller Jr; Phase I clinical trial of i.v. ascorbic acid in advanced malignancy; Annals of Oncology, October 2008 http://www.ncbi.nlm.nih.gov/pubmed/18544557 http://annonc.oxfordjournals.org/content/19/11/1969.long

2n - Ma Y, Chapman J, Levine M, Polireddy K, Drisko J, Chen Q.; Highdose parenteral ascorbate enhanced chemosensitivity of ovarian cancer and reduced toxicity of chemotherapy;
Sci Transl Med 5 February 2014: Vol. 6, Issue 222, p. 222 http://www.ncbi.nlm.nih.gov/pubmed/24500406
http://medicalxpress.com/news/201402intravenousvitaminboostchemocancerfighting.html

2o - Anitra C. Carr, Margreet C. M. Vissers, and John S. Cook; The Effect of Intravenous Vitamin C on Cancer and ChemotherapyRelated Fatigue and Quality of Life; Front Oncol. 2014; 4: 283. http://www.ncbi.nlm.nih.gov/pmc/articles/PMC4199254

2p - www.doctoryourself.com/riordan1.html

2q - http://www.doctoryourself.com/RiordanIVC.pdf

2r - Stephenson CM, Levin RD, Spector T, Lis CG; Phase I clinical trial to evaluate the safety, tolerability, and pharmacokinetics of highdose intravenous ascorbic acid in patients with advanced cancer .;Cancer Chemotherapy and Pharmacology2013;72(1):139146 http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3691494

2s - Günes-Bayir A1, Kiziltan HS.; Palliative Vitamin C Application in Patients with Radiotherapy-Resistant Bone Metastases: A Retrospective Study.; Nutr Cancer. 2015;67(6):921-5. doi: 10.1080/01635581.2015.1055366. Epub 2015 Jul 13. https://www.ncbi.nlm.nih.gov/pubmed/26168394

2t - Jeon Y1, Park JS2, Moon S3, Yeo J4. Effect of Intravenous High Dose Vitamin C on Postoperative Pain and Morphine Use after Laparoscopic Colectomy: A Randomized Controlled Trial.; Pain Res Manag. 2016;2016:9147279. Epub 2016 Oct 30 https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5107231

Much Less Pain: Although a QOL metric, this metric deserves special attention given its significance and consistency among all QOL studies involving IVC. As mentioned previously studies show that relieving pain correlate with extended survival time. The very first IVC-only (no other therapies) study of terminal-cancer IVC patients observed pain-relief enough to discontinue morphine (the authors suggested relief was due to decreasing tumor size). A subsequent study reported "tremendous decrease in pain even among those who were dying", and another study found "complete cessation of pain", and at least 3 additional studies with similar findings regarding pain. The Riordan Clinic has done more IVC treatments than any other clinic … at least 40,000 infusions, and highlights "reduced pain" (as well as "well-being') as the most notable observations. For references, see "Palliative Benefits of IVC" in the appendix, or online at http://ivcbook.com/ebooks/PalliativebenefitsofIVC.pdf.

Inhibits Chemotherapy-Aggravated Sepsis: IVC helps prevent and alleviate a condition called sepsis, a potentially fatal infection or inflammation generally related to intravenous injection.[3.3a, 3.3b, 3.3c] This is one of the most serious and life-threatening conditions in cancer treatment since chemotherapy treatments put the arterial-venous system in a compromised state, and it provides a fast-track for foreign bacteria to invade the body. Sepsis can be an oncologist's (and his patient's) worst nightmare.

3.3a - Thomas E Ichim, Boris Minev, ... James Koropatnick, Chien-Shing Chen and Neil H Riordan; Intravenous ascorbic acid to prevent and treat cancer-associated sepsis? Journal of Translational Medicine20119:25DOI: 10.1186/1479-5876-9-25 http://www.translational-medicine.com/content/9/1/25

3.3b - Alpha A Fowler, III, Aamer A Syed, [...], and Ramesh Natarajan; Phase I safety trial of intravenous ascorbic acid in patients with severe sepsis; J Transl Med. 2014; 12: 32. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3937164

3.3c - Jahan K, Ahmad K, Ali MA., Effect of ascorbic acid in the treatment of tetanus.; Bangladesh Med Res Counc Bull. 1984 Jun;10(1):24-8.; https://www.ncbi.nlm.nih.gov/pubmed/6466264

Improves Recovery from cancer-compromised organ function and tissue damage from Conventional Treatments: IVC accelerates the recovery from chemotherapy, radiation, and surgery as it is one of the two collagen constituents that humans do not produce. Collagen is the basis for all connective tissue and requires two external substances to synthesize: vitamin C and lysine (vitamin C normally being the limiting factor). Without IVC cancer patients are deficient in vitamin C which makes it unusually difficult to recover to soft tissue damage. This is especially the case for those chemotherapy treatments which target fast growing cells (thereby resulting in mouth sores, baldness, and other symptoms related to areas of the body where new cells must be constantly replenished in high volume - mainly collagen and similar tissues). IVC compensates by improving the replenishing logistics of these chemo-compromised tissues.[3.4a,3.4b]

3.4a - S Murad, D Grove, K A Lindberg, G Reynolds, A Sivarajah, and S R Pinnell; Regulation of collagen synthesis by ascorbic acid; May 1, 1981 vol. 78 no. 5 http://www.pnas.org/content/78/5/2879

3.4b - McCormick WJ.; Cancer: a collagen disease, secondary to a nutritional deficiency.; Arch Pediatr. 1959 Apr;76(4):166-71.; https://www.ncbi.nlm.nih.gov/pubmed/13638066 https://www.seleneriverpress.com/historical-archives/all-archive-articles/138-cancer-a-collagen-disease-secondary-to-a-nutritional-deficiency

Strengthens Normal Cells, Repairs Cellular Damage: Similar to item #4 (which is more related to connective tissue and how it relates to organ functioning) IVC also helps at the cellular level and strengthens the intracellular matrix of healthy normal cells at the cancer battle's front lines where each tumor grows, also repairing damage to tumor-adjacent normal cells from radiation and surgery. [3.5a]

3.5a - Cameron E, Pauling L, Leibovitz B.; Ascorbic acid and cancer: a review.; Cancer Res. 1979 Mar;39(3):663-81. https://www.ncbi.nlm.nih.gov/pubmed/371790

Corrects Cancer-Caused Scurvy: There is broad consensus that all cancer patients have scurvy-levels of vitamin C levels in blood serum and that it is difficult even with extremely high doses at high frequency throughout the day to consistently maintain proper vitamin C level in late stage patients. IVC combined with oral supplementation corrects the scurvy levels of vitamin C endemic to the blood and tissues of all cancer patients. It also saturates tissues in purely beneficial vitamin C for 6 hours after the treatment, making it easier to maintain proper levels through oral supplementation for days afterward. [3.6a] [1a] [1c]

3.6a - Park CH1, Kimler BF, Yi SY, Park SH, Kim K, Jung CW, Kim SH, Lee ER, Rha M, Kim S, Park MH, Lee SJ, Park HK, Lee MH, Yoon SS, Min YH, Kim BS, Kim JA, Kim WS.; Depletion of L-ascorbic acid alternating with its supplementation in the treatment of patients with acute myeloid leukemia or myelodysplastic syndromes.; Eur J Haematol. 2009 Aug;83(2):108-18. doi: 10.1111/j.1600-0609.2009.01252.x. Epub 2009 Mar 5. https://www.ncbi.nlm.nih.gov/pubmed/19284416

1a - Padayatty SJ, Sun H, Wang Y, Riordan HD, Hewitt SM, Katz A, et al. Vitamin C Pharmacokinetics: Implications for Oral and Intravenous Use. Ann Intern Med. 2004;140:533-537. doi: 10.7326/0003-4819-140-7-200404060-00010 https://www.ncbi.nlm.nih.gov/pubmed/15068981

1c - Catriona R MaylandMichael IBennettKeith Allan, Palliative Medicine Vol 19, Issue 1, pp. 17 - 20 July-01-2016 10.1191/0269216305pm970oa https://www.ncbi.nlm.nih.gov/pubmed/15690864

Decreases Inflammation: IVC decreases cancer related inflammation in tumor regions. A 2013 study looking at 48 IVC patients found that subjects starting with high CRP levels (usually indicating inflammation from heavy tumor load) 4 out of 5 experienced a significant reduction. [27a] The average CRP improvement among the 20 prostate cancer patients experiencing benefit was 90%. A mere 250mg Vitamin C injection (0.5% of what IVC patients get) for heart patients, 3x weekly, reduced CRP on average by at least 50%. [3.7b], [3.7c], [3.7d]

3.7b - Vajihe Biniaz, Mehdi Sadeghi Shermeh, [...], and Behzad Einollahi; Effect of Vitamin C Supplementation on C-reactive Protein Levels in Patients Undergoing Hemodialysis: A Randomized, Double Blind, Placebo-Controlled Study; Nephrourol Mon. 2014 Jan; 6(1): e13351. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3968960

3.7c - Nina Mikirova, Joseph Casciari, [...], and Paul Taylor; Effect of high-dose intravenous vitamin C on inflammation in cancer patients; J Transl Med. 2012; 10: 189. doi: 10.1186/1479-5876-10-189 https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3480897

3.7d - N. Mikirova* , A. Rogers, J. Casciari, P. Taylor ; Effect of high dose intravenous ascorbic acid on the level of inflammation in patients with rheumatoid arthritis; Vol.1, No.2, 26-32 (2012) Modern Research in Inflammation http://dx.doi.org/10.4236/mri.2012.12004

Strengthens Immunity System: IVC strengthens immunity system responses to keep infections at bay and increase immune responses toward cancer. [3.8a], [3.8b], [3.8c], [3.8d], [3.8e], [3.8f], [3.3c]

3.8a - Yeonsil Yu, Seyeon Bae, [...], and Wang Jae Lee; The Anti-tumor Activity of Vitamin C via the Increase of Fas (CD95) and MHC I Expression on Human Stomach Cancer Cell Line, SNU1; Immune Netw. 2011 Aug; 11(4): 210–215. doi: 10.4110/in.2011.11.4.210 https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3202620

3.8b - Nina A. Mikirova and Ronald Hunninghake; Effect of high dose vitamin C on Epstein-Barr viral infection; Med Sci Monit. 2014; 20: 725–732. doi: 10.12659/MSM.890423; https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4015650
3.8c - Nelson JL1, Alexander JW, Jacobs PA, Ing RD, Ogle CK.; Metabolic and immune effects of enteral ascorbic acid after burn trauma.; Burns. 1992 Apr;18(2):92-7.; https://www.ncbi.nlm.nih.gov/pubmed/1590939
3.8d - Kodama M1, Kodama T, Murakami M, Kodama M; Vitamin C infusion treatment enhances cortisol production of the adrenal via the pituitary ACTH route.; In Vivo. 1994 Nov-Dec;8(6):1079-85.; https://www.ncbi.nlm.nih.gov/pubmed/7772741
3.8e - Sung Hye Byun, MD and Younghoon Jeon, MD; Administration of Vitamin C in a Patient with Herpes Zoster - A case report -; Korean J Pain. 2011 Jun; 24(2): 108–111. doi: 10.3344/kjp.2011.24.2.108; https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3111558
3.8f - Kodama M1, Oyama A, Takagi H.; Control of interstitial pneumonia by drip infusion of megadose vitamin C, dehydroepiandrosterone and cortisol. A short review of our experience.; In Vivo. 2008 Mar-Apr;22(2):263-7.; https://www.ncbi.nlm.nih.gov/pubmed/18468413
3.3c - Jahan K, Ahmad K, Ali MA., Effect of ascorbic acid in the treatment of tetanus.; Bangladesh Med Res Counc Bull. 1984 Jun;10(1):24-8.; https://www.ncbi.nlm.nih.gov/pubmed/6466264

Improves Chemotherapy Effectiveness: IVC increases the efficacy of chemotherapeutic agents in killing cancer cells. There is perhaps more peer-reviewed data on this topic in respected medical journals than any other claim here, and yet the unfounded and repeatedly disproven fear that IVC might lessen chemo-effectiveness is one of the most common justifications used to discourage it's use. The evidence of IVC's catalyzing effect on chemo is extensive and incontrovertible. 3.9a, 3.9b, 3.9c, 3.9d, 3.9e, 3.9f, 3.9g, 3.9h, 3.9i, 3.9j, 3.9k, 3.9l, 3.9m, 3.9n

3.9a - Espey MG1, Chen P, Chalmers B, Drisko J, Sun AY, Levine M, Chen Q.; Pharmacologic ascorbate synergizes with gemcitabine in preclinical models of pancreatic cancer.; Free Radic Biol Med. 2011 Jun 1;50(11):1610-9. doi: 10.1016/j.freeradbiomed.2011.03.007. Epub 2011 Mar 12.; https://www.ncbi.nlm.nih.gov/pubmed/21402145
3.9b - Verrax J1, Calderon PB.; Pharmacologic concentrations of ascorbate are achieved by parenteral administration and exhibit antitumoral effects.; Free Radic Biol Med. 2009 Jul 1;47(1):32-40. doi: 10.1016/j.freeradbiomed.2009.02.016. Epub 2009 Feb 28.; https://www.ncbi.nlm.nih.gov/pubmed/19254759
3.9c - Lamson DW1, Brignall MS.; Antioxidants in cancer therapy; their actions and interactions with oncologic therapies.; Altern Med Rev. 1999 Oct;4(5):304-29.; https://www.ncbi.nlm.nih.gov/pubmed/10559547
3.9d - Prasad KN1, Kumar A, Kochupillai V, Cole WC.; High doses of multiple antioxidant vitamins: essential ingredients in improving the efficacy of standard cancer therapy.; J Am Coll Nutr. 1999 Feb;18(1):13-25.; https://www.ncbi.nlm.nih.gov/pubmed/10067654
3.9e - Prasad KN1.; Multiple dietary antioxidants enhance the efficacy of standard and experimental cancer therapies and decrease their toxicity.; Integr Cancer Ther. 2004 Dec;3(4):310-22.; https://www.ncbi.nlm.nih.gov/pubmed/15523102
3.9f - Simone CB 2nd1, Simone NL, Simone V, Simone CB.; Antioxidants and other nutrients do not interfere with chemotherapy or radiation therapy and can increase kill and increase survival, part 1.; Altern Ther Health Med. 2007 Jan-Feb;13(1):22-8.; https://www.ncbi.nlm.nih.gov/pubmed/17283738
3.9g - Simone CB 2nd1, Simone NL, Simone V, Simone CB.; Antioxidants and other nutrients do not interfere with chemotherapy or radiation therapy and can increase kill and increase survival, Part 2.; Altern Ther Health Med. 2007 Mar-Apr;13(2):40-7.; https://www.ncbi.nlm.nih.gov/pubmed/17405678
3.9h - Daniel A. Monti, Edith Mitchell, [...], and Mark Levine; Phase I Evaluation of Intravenous Ascorbic Acid in Combination with Gemcitabine and Erlotinib in Patients with Metastatic Pancreatic Cancer; PLoS One. 2012; 7(1): e29794. doi: 10.1371/journal.pone.0029794; https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3260161/
3.9i - Block KI1, Koch AC, Mead MN, Tothy PK, Newman RA, Gyllenhaal C.; Impact of antioxidant supplementation on chemotherapeutic efficacy: a systematic review of the evidence from randomized controlled trials.; Cancer Treat Rev. 2007 Aug;33(5):407-18. Epub 2007 Mar 23.; https://www.ncbi.nlm.nih.gov/pubmed/17367938
3.9j - Prasad KN1.; Rationale for using high-dose multiple dietary antioxidants as an adjunct to radiation therapy and chemotherapy.; J Nutr. 2004 Nov;134(11):3182S-3S.; https://www.ncbi.nlm.nih.gov/pubmed/15514298
3.9k - Joseph J. Cullen, Douglas R. Spitz, and Garry R. Buettner; Comment on "Pharmacologic ascorbate synergizes with Gemcitabine in pre-clinical models of pancreatic cancer" i.e. All we are saying is, give C a chance; Free Radic Biol Med. 2011 Jun 15; 50(12): 1726–1727. doi: 10.1016/j.freeradbiomed.2011.03.030; https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3128375/pdf/nihms304544.pdf

3.9l - JJ Casciari, NH Riordan, TL Schmidt, XL Meng, JA Jackson, and HD Riordan; Cytotoxicity of ascorbate, lipoic acid, and other antioxidants in hollow fibre in vitro tumours; British Journal of Cancer (2001) 84(11), 1544–1550 doi: 10.1054/bjoc.2001.1814,; https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2363673/pdf/84-6691814a.pdf

3.9m - Michael Graham Espey, Ping Chen, [...], and Qi Chen; Pharmacologic ascorbate synergizes with gemcitabine in preclinical models of pancreatic cancer; Free Radic Biol Med. 2011 Jun 1; 50(11): 1610–1619. doi: 10.1016/j.freeradbiomed.2011.03.007; https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3482496/

3.9n - Schoenfeld, Sibenaller, Mapuskar, Wagner, Cramer-Morales, Furqan, Sandhu, Carlisle, Smith, Abu Hejleh, Berg, Zhang, Keech, Parekh, Bhatia, Monga V2, Bodeker, Ahmann, Vollstedt, Brown, Shanahan Kauffman, Schall, Hohl, Clamon, Greenlee, Howard, Shultz, Smith, Riley, Domann, Cullen, Buettner, Buatti, Spitz, Allen. O2·- and H2O2-Mediated Disruption of Fe Metabolism Causes the Differential Susceptibility of NSCLC and GBM Cancer Cells to Pharmacological Ascorbate. Cancer Cell. 2017 Mar 16. pii: S1535-6108(17)30062-4. doi: 10.1016/j.ccell.2017.02.018 https://www.ncbi.nlm.nih.gov/pubmed/28366679

Improves Radiotherapy Effectiveness: There have been a few studies that investigated the effect that IVC has had on the efficacy of radiotherapy. All three showed that the addition of IVC resulted in a significantly increase in double-strand DNA breaks than when the radiotherapy was tried on it's own. Additionally, cancer killing efficacy using the combination of radiotherapy with IVC was much higher than when IVC alone was used. Lastly, although not part of these 3 studies, it is noteworthy here to mention that IVC also strengthens the normal cellular matrix and repairs damage done to the normal cells during radiotherapy[3.10a, 3.10b, 3.10c]

3.10a - Shinozaki K1, Hosokawa Y, Hazawa M, Kashiwakura I, Okumura K, Kaku T, Nakayama E.; Ascorbic acid enhances radiation-induced apoptosis in an HL60 human leukemia cell line.; J Radiat Res. 2011;52(2):229-37. Epub 2011 Feb 19.; https://www.ncbi.nlm.nih.gov/pubmed/21343676

3.10b - Herst PM1, Broadley KW, Harper JL, McConnell MJ.; Pharmacological concentrations of ascorbate radiosensitize glioblastoma multiforme primary cells by increasing oxidative DNA damage and inhibiting G2/M arrest.; Free Radic Biol Med. 2012 Apr 15;52(8):1486-93. doi: 10.1016/j.freeradbiomed.2012.01.021. Epub 2012 Feb 2.; https://www.ncbi.nlm.nih.gov/pubmed/22342518

3.10c - Castro ML1, McConnell MJ1, Herst PM2.; Radiosensitisation by pharmacological ascorbate in glioblastoma multiforme cells, human glial cells, and HUVECs depends on their antioxidant and DNA repair capabilities and is not cancer specific.; Free Radic Biol Med. 2014 Sep;74:200-9. doi: 10.1016/j.freeradbiomed.2014.06.022. Epub 2014 Jun 30.; https://www.ncbi.nlm.nih.gov/pubmed/24992837

Inhibits the Spread of Cancer via Anti-Angiogenesis: In many if not most cases cancer manages to increase the proliferation of blood vessels in its immediate vicinity in a process called angiogenesis (meaning "creating vascularity") … thereby increasing its ability to spread. IVC suppresses cancer-cell propagation by inhibiting the growth of new blood vessels around and near tumors (a process called anti-angiogenesis). [3.11a, 3.11b, 3.11c, 3.11d]

3.11a - Nina A Mikirova,corresponding author#1 Thomas E Ichim,#2 and Neil H Riordan#2; Anti-angiogenic effect of high doses of ascorbic acid; J Transl Med. 2008; 6: 50. doi: 10.1186/1479-5876-6-50; https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2562367

3.11b - Mikirova N1, Riordan N2, Casciari J3.; Modulation of Cytokines in Cancer Patients by Intravenous Ascorbate Therapy.; Med Sci Monit. 2016 Jan 3;22:14-25.; https://www.ncbi.nlm.nih.gov/pubmed/26724916

3.11c - Ashino H1, Shimamura M, Nakajima H, Dombou M, Kawanaka S, Oikawa T, Iwaguchi T, Kawashima S.; Novel function of ascorbic acid as an angiostatic factor.; Angiogenesis. 2003;6(4):259-69.; https://www.ncbi.nlm.nih.gov/pubmed/15166494

3.11d - Nina A Mikirova,corresponding author#1 Joseph J Casciari,#1 and Neil H Riordan#1; Ascorbate inhibition of angiogenesis in aortic rings ex vivo and subcutaneous Matrigel plugs in vivo; J Angiogenes Res. 2010; 2: 2. doi: 10.1186/2040-2384-2-2; https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2820478

Selectively Kills Cancer Directly: IVC selectively kills cancer cells by H2O2 expression.[3.12a, 3.12b, 3.12c, 3.12d, 3.9l, 3.12e, 3.12f, 3.12g].

3.12a - Levine M1, Padayatty SJ, Espey MG.; Vitamin C: a concentration-function approach yields pharmacology and therapeutic discoveries.; Adv Nutr. 2011 Mar;2(2):78-88. doi: 10.3945/an.110.000109. Epub 2011 Mar 10.; https://www.ncbi.nlm.nih.gov/pubmed/22332036
3.12b - Chen Q, Espey MG, Krishna MC, et al. Pharmacologic ascorbic acid concentrations selectively kill cancer cells: Action as a pro-drug to deliver hydrogen peroxide to tissues. Proceedings of the National Academy of Sciences of the United States of America. 2005;102(38):13604-13609. doi:10.1073/pnas.0506390102. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1224653/
3.12c - Chen Q, Espey MG, Sun AY, et al. Ascorbate in pharmacologic concentrations selectively generates ascorbate radical and hydrogen peroxide in extracellular fluid in vivo. Proceedings of the National Academy of Sciences of the United States of America. 2007;104(21):8749-8754. doi:10.1073/pnas.0702854104. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1885574/
3.12d - Cameron E, Campbell A.; The orthomolecular treatment of cancer. II. Clinical trial of high-dose ascorbic acid supplements in advanced human cancer.; Chem Biol Interact. 1974 Oct;9(4):285-315.; https://www.ncbi.nlm.nih.gov/pubmed/4430016
3.12e - Mastrangelo D, Massai L, Lo Coco F, Noguera NI, Borgia L, Fioritoni G, Berardi A, Iacone A, Muscettola M, Pelosi E, Castelli G, Testa U, Di Pisa F, Grasso G.; Cytotoxic effects of high concentrations of sodium ascorbate on human myeloid cell lines.; Ann Hematol. 2015 Nov;94(11):1807-16. doi: 10.1007/s00277-015-2464-2.; https://www.ncbi.nlm.nih.gov/pubmed/26264692
3.12f - Chen Q1, Espey MG, Sun AY, Pooput C, Kirk KL, Krishna MC, Khosh DB, Drisko J, Levine M.; Pharmacologic doses of ascorbate act as a prooxidant and decrease growth of aggressive tumor xenografts in mice.; Proc Natl Acad Sci U S A. 2008 Aug 12;105(32):11105-9. doi: 10.1073/pnas.0804226105.; https://www.ncbi.nlm.nih.gov/pubmed/18678913
3.12g - Uetaki M, Tabata S, Nakasuka F, Soga T, Tomita M. Metabolomic alterations in human cancer cells by vitamin C-induced oxidative stress. Scientific Reports. 2015;5:13896. doi:10.1038/srep13896. http://www.nature.com/articles/srep13896