


[Home](#)
[History](#)
[Library](#)
[Nutrients](#)
[Resources](#)
[Contact](#)
[Contribute](#)
[Back To Archive](#)

This article may be reprinted free of charge provided 1) that there is clear attribution to the Orthomolecular Medicine News Service, and 2) that both the OMNS free subscription link <http://orthomolecular.org/subscribe.html> and also the OMNS archive link <http://orthomolecular.org/resources/omns/index.shtml> are included.

#### FOR IMMEDIATE RELEASE

Orthomolecular Medicine News Service, Feb 16, 2020

## Early Large Dose Intravenous Vitamin C is the Treatment of Choice for 2019-nCov Pneumonia

Richard Z Cheng, MD, PhD; Hanping Shi, MD, PhD; Atsuo Yanagisawa, MD, PhD; Thomas Levy, MD, JD; Andrew Saul, PhD.

(OMNS February 16, 2020) The 2019-nCov (coronavirus) epidemic originated in Wuhan, China and is now spreading to many other continents and countries, causing a public fear. Worst of all, there is no vaccine or specific antiviral drugs for 2019-nCov available. This adds to the public fear and gloomy outlook. A quick, rapidly deployable and accessible, effective and also safe treatment is urgently needed to not only save those patients, to curtail the spread of the epidemic, but also very important in the psychological assurance to people worldwide, and to the Chinese in particular. Acute organ failure, especially pulmonary failure (**acute respiratory distress syndrome, ARDS**) is the key mechanism for 2019-nCov's fatality. Significantly increased oxidative stress due to the rapid release of free radicals and cytokines etc. is the hallmark of ARDS which leads to cellular injury, organ failure and death. Early use of large dose antioxidants, especially **vitamin C (VC)**, therefore, plays a key role in the management of these patients. We call upon all those in the leadership, and those providing direct assistance patients, to bravely and rapidly apply large dose **intravenous vitamin C (IVC)** to help those patients and to stop this epidemic.

#### 2019-nCov is a rapidly developing epidemic with a high morbidity and mortality.

Wang et al reports 26% ICU admission rate and a 4.3% mortality rate in their 138 confirmed cases [1]. Chen et al report that out of 99 confirmed 2019-nCov patients, 17 (17%) patients developed ARDS and, among them, 11 (11%) patients worsened in a short period of time and died of multiple organ failure.

**Increased oxidative stress, an underlying "cytokine storm," leads to ARDS which is the key pathology of high mortality of these pandemic viral infections. Cytokine storm-induced ARDS is the key pathology leading to death of these patients [2]. Intravenous vitamin C effectively counters oxidative stress.**

#### Cytokine storm

Coronaviruses and influenza are among the pandemic viruses that can cause lethal lung injuries and death from ARDS [3]. Viral infections cause a "cytokine storm" that can activate lung capillary endothelial cells leading to neutrophil infiltration and increased oxidative stress (reactive oxygen and nitrogen species) that further damages lung barrier function [3]. ARDS, which is characterized by severe hypoxemia, is usually accompanied by uncontrolled inflammation, oxidative injury, and the damage to the alveolar-capillary barrier [4]. The increased oxidative stress is a major insult in pulmonary injury such as acute lung injury (ALI) and acute respiratory distress syndrome (ARDS), two clinical manifestations of acute respiratory failure with substantially high morbidity and mortality [5,6].

In a report of 29 patients confirmed of 2019-nCov pneumonia patients, 27 (93%) showed increased hsCRP, a marker of inflammation (and oxidative stress) [7]. Transcription factor nuclear factor erythroid 2-related factor 2 (Nrf2) is a major regulator of antioxidant response element-(ARE-) driven cytoprotective protein expression. The activation of Nrf2 signaling plays an essential role in preventing cells and tissues from injury induced by oxidative stress. Vitamin C is an essential element of the antioxidant system in cellular response [8].

Part of vitamin C's biological effects in critical care management are well reviewed in a recent article by Nabzdyk and Bittner from Mass Gen Hospital of Harvard Medical School on World's

Journal of Critical Care Medicine [9]:

Antioxidant, radical oxygen scavenger protecting cells from oxidative Steroid- and catecholamine synthesis, cofactor in catecholamine, vasopressin and steroid synthesis, improves hemodynamics, may accelerate resolution of shock
Immune cell function. Increases neutrophil phagocytosis and chemotaxis, affects macrophage migration, enhances T and NK cell proliferation, modulates their function, may increase antibody formation.
Endothelial cell function. Decreases endothelium ICAM expression and leukocyte adhesion, improves endothelial barrier function, improves microcirculation
Carnitine production, modulates fatty acid metabolism, may improve microcirculation and cardiac function
Wound healing, cofactor of collagen synthesis, mitogen for fibroblasts

### Antioxidants, especially large dose IV vitamin C (IVC) in the management of ARDS.

It's clear that increased oxidative stress plays a major role in the pathogenesis of ARDS and death. Cytokine storm is observed in both viral and bacterial infections [3]. Cytokine storm leads to increased oxidative stress, ARDS and death seems to be a common and non-specific pathway. This is important in clinical management. Since the prevention and management targeting increased oxidative stress with large dose of antioxidants seems a logical step and can be applied to these deadly pandemics, without the lengthy waiting for pathogen-specific vaccines and drugs, as is the case of the current 2019-nCov epidemic.

As a matter of fact, large dose intravenous vitamin C (IVC) has been used clinically successfully in viral ARDS and also in influenza [10]. Fowler et al described a 26-year-old woman developed viral ARDS (rhinovirus and enterovirus-D68) [3]. She was admitted to ICU. After failure to routine standard management, she was placed on ECMO on day 3. High dose IVC (200mg/kg body/24 hour, divided in 4 doses, one every 6 hours) was also started on ECMO day 1. Her lungs showed significant improvement on day 2 of high dose IVC infusion on X-ray imaging. She continued to improve on ECMO and IVC and ECMO was discontinued on ECMO day 7 and the patient recovered and was discharged from the hospital on hospital day 12, without the need of supplemental oxygen. One month later, X-ray of her lungs showed complete recovery. Gonzalez et al (including one of the authors, Thomas Levy) reported recently a severe case of influenza successfully treated with high dose IVC [10]. 25-year-old MG developed flu-like symptoms which was rapidly deteriorating to the degree that, about 2 weeks later, the patient barely had the energy to use the toilet. He was placed on high dose IVC (50,000 mg of vitamin C in 1000 ml Ringer's solution, infused over 90 minutes). The patient immediately reported significant improvement the next day. On day 4 of IVC infusion he reported to feel normal. He continued oral VC (2,000 mg twice daily) [10]. Another story has been widely circulating on the social media that large dose IVC reportedly was used in 2009 to save a New Zealand farmer, Alan Smith (Primal Panacea). One of us (Thomas Levy) was consulted upon in this case [11] [12]. Hemila et al reported that vitamin C shortens ICU stay in their 2019 meta-analysis of 18 clinical studies with a total of 2004 ICU patients on the journal *Nutrients* [13]. In this report, 17,000 mg/day IVC shortened the ICU stay by 44%. Marik et al reported their use of IVC in 47 sepsis ICU cases. They found a significant reduction in mortality rate in the IVC group of patients [14].

Dietary antioxidants (vitamin C and sulforaphane) were shown to reduce oxidative-stress-induced acute inflammatory lung injury in patients receiving mechanical ventilation [15]. Other antioxidants (curcumin) have also been shown to have promising anti-inflammatory potential in pneumonia [16].

High dose IVC has been clinically used for several decades and a recent NIH expert panel document states clearly that high dose IVC (1.5 g/kg body weight) is safe and without major side effects [17].

### Summary

2019-nCov pneumonia is a rapidly developing disease with high morbidity and mortality rate. The key pathogenesis is the acute lung injury causing ARDS and death. Coronaviruses, influenza viruses and many other pandemic viral infections are usually associated with an increase oxidative stress leading to oxidative cellular damage resulting in multi-organ failure. Antioxidants administration therefore has a central role in the management of these conditions, in addition to the standard conventional supportive therapies. Preliminary clinical studies and case reports show that early administration of high dose IVC can improve clinical conditions of patients in ICU, ARDS and flu. It needs to be pointed that pandemics like 2019-nCov will happen in the future. Specific vaccines and antiviral drugs R&D take long time to develop and are not available for the current nCov epidemic and won't be ready when the next pandemic strikes. IVC and other antioxidants are universal agents for ARDS that can be rapidly applied clinically. Given that high dose IVC is safe, can be effective, we call on the involved leadership and healthcare professionals to look into high dose IVC without further delay. More clinical studies of the IVC and oral VC (such as liposomal-encapsulated VC) are needed to develop standard protocols for the current use and future uses

are urgently needed. We hope when the next pandemic strikes, we won't be so helpless and we'll be ready.

### For further reading

Coronavirus Patients in China to be Treated with High-Dose Vitamin C <http://orthomolecular.org/resources/omns/v16n10.shtml> As of the date of publication of this Orthomolecular Medicine News service Release, Dr. Cheng is in Wuhan facilitating IVC treatment for hospitalized coronavirus patients.

Vitamin C and its Application to the Treatment of nCoV Coronavirus  
<http://orthomolecular.org/resources/omns/v16n09.shtml>

Hospital-based Intravenous Vitamin C Treatment for Coronavirus and Related Illnesses  
<http://orthomolecular.org/resources/omns/v16n07.shtml>

Nutritional Treatment of Coronavirus  
<http://orthomolecular.org/resources/omns/v16n06.shtml>

Vitamin C Protects Against Coronavirus  
<http://orthomolecular.org/resources/omns/v16n04.shtml>

### References

1. Wang D, Hu B, Hu C, Zhu F, Liu X, Zhang J, Wang B, Xiang H, Cheng Z, Xiong Y, Zhao Y, Li Y, Wang X, Peng Z. Clinical Characteristics of 138 Hospitalized Patients With 2019 Novel Coronavirus-Infected Pneumonia in Wuhan, China. *JAMA*. 2020 Feb 7;
2. Chen N, Zhou M, Dong X, Qu J, Gong F, Han Y, Qiu Y, Wang J, Liu Y, Wei Y, Xia J, Yu T, Zhang X, Zhang L. Epidemiological and clinical characteristics of 99 cases of 2019 novel coronavirus pneumonia in Wuhan, China: a descriptive study. *Lancet Lond Engl*. 2020 Jan 30;
3. 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 Feb 4;6(1):85-90.
4. Meng L, Zhao X, Zhang H. HIPK1 Interference Attenuates Inflammation and Oxidative Stress of Acute Lung Injury via Autophagy. *Med Sci Monit Int Med J Exp Clin Res*. 2019 Jan 29;25:827-35.
5. Yan X, Fu X, Jia Y, Ma X, Tao J, Yang T, Ma H, Liang X, Liu X, Yang J, Wei J. Nrf2/Keap1/ARE Signaling Mediated an Antioxidative Protection of Human Placental Mesenchymal Stem Cells of Fetal Origin in Alveolar Epithelial Cells. *Oxid Med Cell Longev*. 2019;2019:2654910.
6. Hecker L. Mechanisms and consequences of oxidative stress in lung disease: therapeutic implications for an aging populace. *Am J Physiol Lung Cell Mol Physiol*. 2018 01;314(4):L642-53.
7. Chen L, Liu HG, Liu W, Liu J, Liu K, Shang J, Deng Y, Wei S. [Analysis of clinical features of 29 patients with 2019 novel coronavirus pneumonia]. *Zhonghua Jie He He Hu Xi Za Zhi Zhonghua Jiehe He Huxi Zazhi Chin J Tuberc Respir Dis*. 2020 Feb 6;43(0):E005.
8. Liu Q, Gao Y, Ci X. Role of Nrf2 and Its Activators in Respiratory Diseases. *Oxid Med Cell Longev*. 2019;2019:7090534.
9. Nabzdyk CS, Bittner EA. Vitamin C in the critically ill - indications and controversies. *World J Crit Care Med*. 2018 Oct 16;7(5):52-61.
10. High Dose Vitamin C and Influenza: A Case Report - ISOM [Internet]. [cited 2020 Feb 9]. Available from: <https://isom.ca/article/high-dose-vitamin-c-influenza-case-report/?from=groupmessage&isappinstalled=0>
11. Levy T. *Primal Panacea*. MedFox Publishing; 350 p. (Kindle Edition).
12. Levy TE. *Primal Panacea*. Medfox Pub, 2012. Kindle, 2017.
13. Hemilä H, Chalker E. Vitamin C Can Shorten the Length of Stay in the ICU: A Meta-Analysis. *Nutrients*. 2019 Mar 27;11(4).
14. Marik PE, Khangoora V, Rivera R, Hooper MH, Catravas J. Hydrocortisone, Vitamin C, and Thiamine for the Treatment of Severe Sepsis and Septic Shock: A Retrospective Before-After Study. *Chest*. 2017;151(6):1229-38.

15. Patel V, Dial K, Wu J, Gauthier AG, Wu W, Lin M, Espey MG, Thomas DD, Jr CRA, Mantell LL. Dietary Antioxidants Significantly Attenuate Hyperoxia-Induced Acute Inflammatory Lung Injury by Enhancing Macrophage Function via Reducing the Accumulation of Airway HMGB1. *Int J Mol Sci.* 2020 Feb 1;21(3).

16. Zhang B, Swamy S, Balijepalli S, Panicker S, Mooliyil J, Sherman MA, Parkkinen J, Raghavendran K, Suresh MV. Direct pulmonary delivery of solubilized curcumin reduces severity of lethal pneumonia. *FASEB J Off Publ Fed Am Soc Exp Biol.* 2019 Dec;33(12):13294-309.

17. High-Dose Vitamin C (PDQ(r))-Health Professional Version - National Cancer Institute [Internet]. [cited 2020 Feb 9]. Available from: <https://www.cancer.gov/about-cancer/treatment/cam/hp/vitamin-c-pdq>

### Nutritional Medicine is Orthomolecular Medicine

Orthomolecular medicine uses safe, effective nutritional therapy to fight illness. For more information: <http://www.orthomolecular.org>

### Find a Doctor

To locate an orthomolecular physician near you: <http://orthomolecular.org/resources/omns/v06n09.shtml>

The peer-reviewed Orthomolecular Medicine News Service is a non-profit and non-commercial informational resource.

### Editorial Review Board:

Ilyès Baghli, M.D. (Algeria)  
 Ian Brighthope, M.D. (Australia)  
 Prof. Gilbert Henri Crussol (Spain)  
 Carolyn Dean, M.D., N.D. (USA)  
 Damien Downing, M.D. (United Kingdom)  
 Michael Ellis, M.D. (Australia)  
 Martin P. Gallagher, M.D., D.C. (USA)  
 Michael J. Gonzalez, N.M.D., D.Sc., Ph.D. (Puerto Rico)  
 William B. Grant, Ph.D. (USA)  
 Tonya S. Heyman, M.D. (USA)  
 Suzanne Humphries, M.D. (USA)  
 Ron Hunninghake, M.D. (USA)  
 Michael Janson, M.D. (USA)  
 Robert E. Jenkins, D.C. (USA)  
 Bo H. Jonsson, M.D., Ph.D. (Sweden)  
 Jeffrey J. Kotulski, D.O. (USA)  
 Peter H. Lauda, M.D. (Austria)  
 Thomas Levy, M.D., J.D. (USA)  
 Homer Lim, M.D. (Philippines)  
 Stuart Lindsey, Pharm.D. (USA)  
 Victor A. Marcial-Vega, M.D. (Puerto Rico)  
 Charles C. Mary, Jr., M.D. (USA)  
 Mignonne Mary, M.D. (USA)  
 Jun Matsuyama, M.D., Ph.D. (Japan)  
 Dave McCarthy, M.D. (USA)  
 Joseph Mercola, D.O. (USA)  
 Jorge R. Miranda-Massari, Pharm.D. (Puerto Rico)  
 Karin Munsterhjelm-Ahumada, M.D. (Finland)  
 Tahar Naili, M.D. (Algeria)  
 W. Todd Penberthy, Ph.D. (USA)  
 Dag Viljen Poleszynski, Ph.D. (Norway)  
 Datuk Selvam Rengasamy, MBBS (Malaysia)  
 Jeffrey A. Ruterbusch, D.O. (USA)  
 Gert E. Schuitemaker, Ph.D. (Netherlands)  
 Thomas L. Taxman, M.D. (USA)  
 Jagan Nathan Vamanan, M.D. (India)  
 Garry Vickar, MD (USA)  
 Ken Walker, M.D. (Canada)  
 Anne Zauderer, D.C. (USA)

Andrew W. Saul, Ph.D. (USA), Editor-In-Chief  
Editor, Japanese Edition: Atsuo Yanagisawa, M.D., Ph.D. (Japan)  
Editor, Chinese Edition: Richard Cheng, M.D., Ph.D. (USA)  
Robert G. Smith, Ph.D. (USA), Associate Editor  
Helen Saul Case, M.S. (USA), Assistant Editor  
Michael S. Stewart, B.Sc.C.S. (USA), Technology Editor  
Jason M. Saul, JD (USA), Legal Consultant

**Comments and media contact:** [drsaul@doctoryourself.com](mailto:drsaul@doctoryourself.com) OMNS welcomes but is unable to respond to individual reader emails. Reader comments become the property of OMNS and may or may not be used for publication.

**To Subscribe at no charge:** <http://www.orthomolecular.org/subscribe.html>

**To Unsubscribe from this list:** <http://www.orthomolecular.org/unsubscribe.html>

[Back To Archive](#)

---

[\[Home\]](#) [\[History\]](#) [\[Library\]](#) [\[Nutrients\]](#) [\[Resources\]](#) [\[Contact\]](#) [\[Contribute\]](#)

[Back To Molecule](#)



This website is managed by [Riordan Clinic](#)  
A Non-profit 501(c)(3) Medical, Research and Educational Organization  
3100 North Hillside Avenue, Wichita, KS 67219 USA  
Phone: 316-682-3100; Fax: 316-682-5054  
© (Riordan Clinic) 2004 - 2017

Information on Orthomolecular.org is provided for educational purposes only. It is not intended as medical advice.  
Consult your orthomolecular health care professional for individual guidance on specific health problems.