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FLU AND IMMUNITY

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INTRODUCTION

Doctor Jacques M. May of the American Geographical Society best summarized the concept of preventive medicine according to Emmanuel Cheraskin: “It is as though I had on a table three dolls, one of glass, another of celluloid, and a third of steel, and I chose to hit the three dolls with a hammer using equal strength. The first doll would break, the second would scar and the third would emit a pleasant sound.”

Cheraskin argued that whether one succumbs to the flu or other illnesses depends upon host resistance and susceptibility. Why is the immune functioning in one person glass and steel in another?

This paper will discuss host resistance as it applies to the flu and other viruses. All around good nutrition is essential for a well-rounded immune system, but specific nutrients play a critical role in resistance to viruses. The goal of this paper is to provide some scientific insights into how we can move from a constitution of glass to celluloid to steel.

References:

Detection and Prevention of Chronic Disease Utilizing Multiphasic Health Screening Techniques, Hearings before the Subcommittee on Health of the Elderly of the Special Committee on Aging, United States Senate, September 20-22, 1966.

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VITAMIN D

Dr. John Cannell was one of the first individuals to link vitamin D levels with the ability to resist the flu. Cannell worked as a psychiatrist at a psychiatric hospital. He had the patients under his care on vitamin D supplementation because they evidenced a tendency to develop deficiency due to their confinement indoors.

In April of 2005 a flu epidemic began in the hospital and afflicted those all around Cannell’s ward--to the right, left, and across the hall. Cannell’s wards even mixed with the sick patients, *yet not one developed fever and debilitating muscle aches.*

In July of 2005 an article by Adrian Gombart in the *FASEB Journal* offered a credible explanation for the resistance to the flu virus observed by Cannell. The journal article demonstrated that a powerful antimicrobial peptide called *cathelicidin* is activated by vitamin D.

Human beings have only one

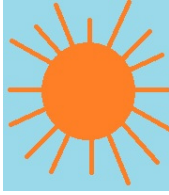
cathelicidin antimicrobial peptide which helps the body ward off bacteria, viruses, and fungi. Domesticated animals like cows, pigs, and horses have several.

Cathelicidin is one of the munitions stored up in white blood cells. It is used to punch holes in the external membranes of microbes causing their innards to spill out. Cathelicidin is one of the immune system’s most potent and effective weapons against microbial invasion and its production in the body is triggered by vitamin D.

In the words of John White of McGill University in Montreal who made the vitamin D and cathelicidin connection, “When the researchers administered 1,25-D to a variety of cells...the gene for making cathelicidin ‘went boom! Its induction was very, very strong.’” Another researcher, Adrian Gombart of the University of California, commented that “nothing turned on the cathelicidin gene to any degree except vitamin D. And it really turned that gene on--just cranked it up. I was completely surprised.”

A pioneering paper by Barlow and associates concluded, “Influenza virus-infected mice ... had lower concentrations of pro-inflammatory cytokines in the lung than did infected animals that had not been treated with cathelicidin peptides. These data suggest that treatment of influenza-infected individuals with cathelicidin-derived therapeutics, or modulation





of endogenous cathelicidin production may provide significant protection against disease.”

Measuring Vitamin D

Vitamin D is a powerful nutrient which functions as both a vitamin and a hormone. Both excess and deficiency can have serious repercussions.

Testing for vitamin D status is available, although it can be confusing. The test for the active form of vitamin D is 25(OH)D or 25-hydroxyvitamin D and not 1,25(OH)D. The typical norms for vitamin D have been based on the averages of a vitamin D deficient population and normal levels are not optimal.

Dr. Cannell suggests that the testing should be interpreted as follows according to the most recent investigations on the vitamin:

Less than 20 ng/mL (50 nmol/L)

••**Outright deficiency**

20-40 ng/mL (50-100 nmol/L)

••**Insufficiency**

40-65 ng/mL (100-160 nmol/L)

••**Proposed optimal range**

Over 80 ng/ml (200 nmol/L)

••**Excess Vitamin D/Risk of Toxicity**

Vitamin D utilization is regulated by the trace minerals calcium and magnesium. Deficiency can interfere with the effectiveness of vitamin D supplementation.

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Therapies, Sept/Oct 2004, Vol. 10, No. 5, 32

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Barlow P.G., et al. Antiviral activity and increased host defense against influenza infection elicited by the human cathelicidin LL-37. *PLoS One*, 2011;6(10):e25333. doi:10.1371/journal.pone.0025333

GLUCOSAMINE

It was recently discovered that a key mediator of interferon response to viral attack is the *mitochondrial antiviral-signaling protein (MAVS)*. This molecule is upregulated by glucosamine. It has been suggested that 3 or more grams of glucosamine a day may improve resistance to flu viruses.

REFERENCE:

McCarty, Mark F., Nutraceuticals have potential for boosting the type 1 interferon response to RNA viruses including influenza and coronavirus, *Progress in Cardiovascular Diseases*, Available online 12 February 2020. <https://doi.org/10.1016/j.pcad.2020.02.007>

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OMEGA-3 AND VITAMIN A

Omega-3 fats are precursors to resolvins and protectins which regulate the inflammatory response. Protectin D1 has been shown to inhibit replication of influenza viruses and improve severe influenza. Its precursor is the omega-3 fat DHA. Morita and associates state the following: “These results identify the endogenous lipid mediator PD1 as an innate suppressor of influenza virus replication that protects against lethal influenza virus infection.”

Many researchers have noted an association between diabetes and increased risk of death from epidemics of pneumonia and the flu. One article in the *American Journal of Public Health* wrote, “People with diabetes are 2 to 3 times more likely than those without diabetes to have pneumonia and influenza as an underlying or contributing cause of death, and mortality and morbidity increase significantly

among people with diabetes during epidemics of pneumonia and influenza.”

Diabetics are at particular risk because high blood sugars suppress immune function. One reason for this is that vitamin C and glucose are transported about the body by the same transport mechanism. High sugar levels inhibit vitamin C transport to critical sites during infection.

Diabetics also tend to have low levels of vitamin A due to difficulty converting carotenoids to vitamin A. Vitamin A deficiency was so common in diabetics that Dr. Mark Altschule used signs of vitamin A deficiency as a criteria for a possible diagnosis of diabetes. Altschule also noted that many diabetics were deficient in zinc which is essential for proper utilization of vitamin A.

Respiratory tract infection is also associated with measles and in one very fine study respiratory tract infection associated with measles was reduced by 85% with vitamin A supplementation. The researchers summarized as follows:

“Ninety percent of the patients had hypoproteinemia (low vitamin A). Integrated morbidity scores, determined by severity of condition (eg, diarrhoea, herpes, and respiratory-tract infection) were assigned on day 8 and 6 wk and 6 mo; these were reduced by 82%, 61%, and 85%, respectively, in the supplemented group, which was mainly due to reduced respiratory-tract infection. There was one death in the placebo group.”

Recommendations of modest amounts of preformed vitamin A to assure proper functioning of the mucous and cilia in the lungs is





recommended by many physicians.

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Altschule, Mark, *Nutritional Factors in General Medicine*, Springfield, IL.: Charles C. Thomas, 1978, 90-93.

Coutsoudis, Anna, Vitamin A supplementation reduces measles morbidity in young African children: a randomized, placebo-controlled, double-blind trial, *Am J Clin Nutr*, 199 1;54:890-5.

VITAMIN E

Vitamin E may be particularly important for older people. This vitamin has an affinity for the lungs and had been shown to decrease the severity of influenza in older mice. One paper summarized as follows: “These experiments demonstrate that high doses of E significantly enhance influenza viral clearance in aged mice but only modestly affect young mice.”

Han concludes an article on his research by writing, “The beneficial effect of vitamin E on reducing the pulmonary influenza virus titer in old mice should be tested in humans and for other viral infections.” A good dose of vitamin E is 200-600 IU a day.

Hayek, Michael G., Vitamin E supplementation decreases lung virus titers in mice infected with influenza, *The Journal of Infectious Diseases* 1997;176:273-6.

Han, Sung Nim, Antioxidants, Cytokines, and Influenza Infection in Aged Mice and Elderly Humans, *The Journal of Infectious Diseases*, Volume 182, Issue Supplement 1, September 2000, Pages S74-S80, <https://doi.org/10.1086/315915>

FLAVONOIDS

Some flavonoids have such potent antiviral properties that they are being

considered for use as drugs. A study of resveratrol, a flavonoid found in grapes and wine, reported the following:

“All currently approved anti-influenza drugs target essential viral functions and/or structures, and the major drawback of this approach is that the virus will eventually adapt to the selective pressure exerted by the drug. Inactivation of host-cell functions that are essential for virus replication, which seems to be the mechanism of RV’s (resveratrol’s) anti-influenza activity, offers 2 important advantages: not only is it more difficult for the virus to adapt to, but it can also be expected to affect viral replication independently of the invader’s type, strain, and antigenic properties. For these reasons, RV merits further investigation as a potential weapon for combating the growing threat of influenza.”

EGCG, a flavonoid found in tea, and punicalagins, found in pomegranate, have been shown to have similar inhibitory effects on influenza viruses.

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Kim, Yunjeong, et al., Inhibition of influenza virus replication by plant-derived isoquercetin, *Antiviral Research*, November 2010, 88(2), 227-23.

Haidari, Mehran, et al., Pomegranate (*Punica granatum*) purified polyphenol extract inhibits influenza virus and has a synergistic effect with oseltamivir, *Phytomedicine*, December 2009; 16(12): 1127-1136.

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ZINC AND SELENIUM

Sandstead and associates concluded that “Zinc deficiency is relevant to H1N1 influenza because it decreases cell-mediated immunity.”

Work by Melinda Beck and associates created quite a sensation when it was first published, but has been forgotten to a large extent.

These researchers demonstrated that deficiency of the trace mineral selenium not only increased the likelihood of infection with flu viruses but also made the infections more serious. The fact that selenium deficiency increased inflammatory pneumonia symptoms is significant due to the fact that this complication is the key factor resulting in death among those suffering with the flu.

Beck summarizes the importance of selenium as follows: “In summary, mice fed a diet deficient in Se develop much more severe lung pathology postinfluenza virus infection than Se-adequate mice....the increase in lung pathology was ...associated with an increase in the mRNA expression of pro-inflammatory cytokines and chemokines and a decrease in the expression of anti-inflammatory cytokines.”

In other words, selenium deficiency during infection with the flu both increases and sustains the inflammatory response, especially in the lungs. Selenium can lead to increased mutations of viral DNA making flu viruses more dangerous.

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Sandstead, Harold H., et al., Zinc intake and resistance to H1N1 influenza, *Am J Public Health*. June 2010; 100(6): 970-971.

Beck, Melinda A., et al., Selenium deficiency increases the pathology of an influenza virus infection, *The FASEB Journal* express article 10.1096/fj.00-0721fj. Published online April 27, 2001.

VITAMIN C

Linus Pauling suggested that the cold and flu could be prevented or ameliorated by proper use of vitamin C. Pauling recommended taking vitamin C in split doses. For the flu he suggested most people would need “the regu-





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lar intake of 1 gram or more per hour.”

Robert Cathcart III became interested in vitamin C after reading Pauling’s book on vitamin C. Cathcart not only experimented with large quantities of vitamin C on himself, but he also administered vitamin C to bowel tolerance to 20,000 of his patients. He found that as need for the vitamin increased it was better tolerated. Cathcart administered up to 200 grams of vitamin C orally or by injection for flu and other conditions.

REFERENCES:

Levy, Thomas E., *Curing the Incurable: Vitamin C, Infectious Diseases, and Toxins*, Henderson Nevada: Livon Books, 2002.

Pauling, Linus, *Vitamin C, The Common Cold, and the Flu*, San Francisco: W. H. Freeman and Company, 1976, 146-154.

Cathcart, Robert F. III, The Method of Determining Proper Doses of Vitamin C for the Treatment of Disease by Titrating to Bowel Tolerance, *Orthomolecular Psychiatry*, 1981; 10(2):125-132.

SILVER NANOPARTICLES

Silver nanoparticles have been shown to inhibit flu and other viruses. One paper concludes their research as follows: “These results provide evidence that AgNPs (silver nanoparticles) have beneficial effects in preventing H3N2 influenza virus infection both in vitro (in the

test tube) and in vivo (in living tissues), and demonstrate that AgNPs can be used as potential therapeutics for inhibiting outbreaks of influenza.”

Silver is not really a nutrient in the sense of the other compounds mentioned in this paper. It is included because it is apparently both harmless and a highly effective antimicrobial substance. As a last resort it has saved many lives.

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Xiang D, Zheng Y, Duan W, et al. Inhibition of A/Human/Hubei/3/2005 (H3N2) influenza virus infection by silver nanoparticles in vitro and in vivo [published correction appears in *Int J Nanomedicine*. 2013;8:4703]. *Int J Nanomedicine*. 2013;8:4103–4113. doi:10.2147/IJN.S53622

CONCLUSION

It should be obvious that there are many nutrients that can improve resistance to flu viruses. Augmenting a good diet with a few of these nutrients can make a significant difference in host susceptibility to influenza or flu viruses.

Diet is important as well. The dietary habit most likely to increase susceptibility to viral attack is a high intake of sugar. Sugar antidotes or blocks the effectiveness of vitamin C and also is known to dramatically re-

duce the effectiveness of immune function for hours after its consumption.

REFERENCE:

Cheraskin, E., et al., Sucrose, neutrophilic phagocytosis and resistance to disease, *Dental Survey*, 30 Nov 1976, 52(12):46-48

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